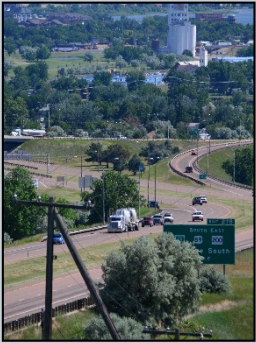


# Appendix 4:

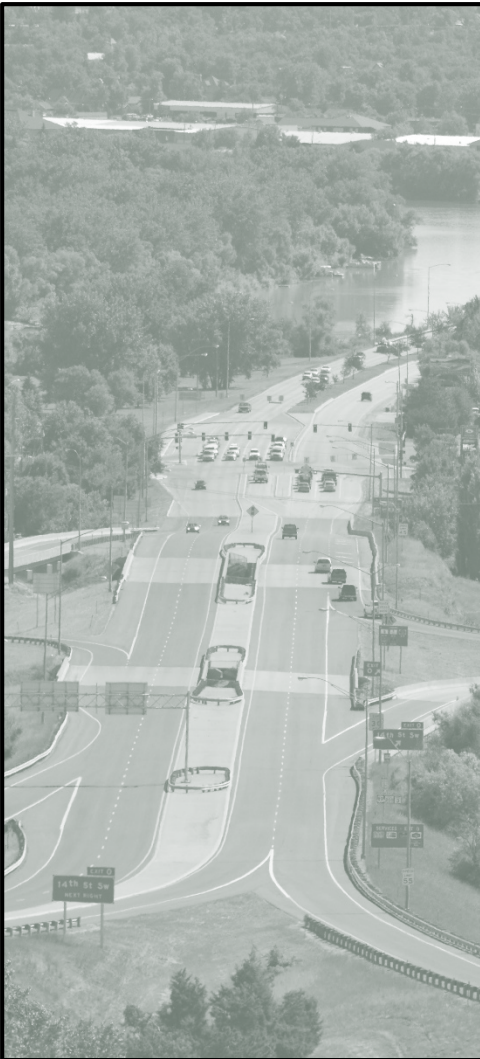
## *Existing and Projected Conditions Report*



*Prepared by:*

**Robert Peccia & Associates**

825 Custer Ave | Helena, MT



# EXISTING AND PROJECTED CONDITIONS

*December 31, 2014*

*prepared for:*  
Montana Department of Transportation



*prepared by:*  
Robert Peccia & Associates  
Helena, Montana



# TABLE OF CONTENTS

|   |     |
|---|-----|
| Table of Contents .....   | i   |
| List of Figures .....   | iii |
| List of Tables .....  | iii |
| 1.0 Introduction .....  | 1   |
| 1.1 Study Area .....  | 1   |
| 1.2 Past, Current and Planned Projects .....                        | 3   |
| 1.3 Existing Plans and Regulations .....                            | 4   |
| 2.0 Demographics .....  | 6   |
| 2.1 Population Characteristics .....                                | 6   |
| 2.2 Population Projections .....                                    | 8   |
| 2.3 Employment and Income Characteristics .....                     | 9   |
| 3.0 Existing Transportation System .....                            | 12  |
| 3.1 Physical Features and Characteristics .....                     | 12  |
| 3.1.1 Hydraulics .....  | 12  |
| 3.1.2 Bridges .....   | 12  |
| 3.1.3 Operations .....  | 14  |
| 3.1.4 Pavement Condition .....                                      | 14  |
| 3.1.5 Alternative Transportation Modes .....                        | 15  |
| 3.1.6 Railroad .....  | 15  |
| 3.1.7 Air Service .....   | 15  |
| 3.1.8 Utilities .....   | 16  |
| 3.2 Geometric Conditions .....                                      | 16  |
| 3.2.1 Mainline Interstate .....                                     | 16  |
| 3.2.2 Interchanges .....  | 20  |
| 3.2.3 Intersections .....   | 24  |
| 3.3 Traffic Characteristics .....                                   | 26  |
| 3.3.1 Traffic Volumes .....   | 26  |
| 3.3.2 Mainline Operation .....                                      | 27  |
| 3.3.3 Interchange Ramps .....                                       | 29  |
| 3.3.4 Intersections .....   | 31  |
| 3.4 Safety .....  | 34  |
| 3.4.1 Safety Trends, Contributing Factors, and Crash Clusters ..... | 36  |
| 4.0 Projected Transportation System .....                           | 37  |

|  |    |
|--|----|
| 5.0 Environmental Setting .....                        | 41 |
| 5.1 Physical Environment.....                          | 41 |
| 5.1.1 Soil Resources and Prime Farmland .....          | 41 |
| 5.1.2 Geologic Resources .....                         | 41 |
| 5.1.3 Surface Waters .....                             | 42 |
| 5.1.4 Groundwater .....                                | 43 |
| 5.1.5 Wetlands .....                                   | 43 |
| 5.1.6 Floodplains and Floodways .....                  | 44 |
| 5.1.7 Irrigation .....                                 | 44 |
| 5.1.8 Air Quality .....                                | 44 |
| 5.1.9 Hazardous Substances.....                        | 45 |
| 5.2 Biological Environment.....                        | 45 |
| 5.2.1 Mammals .....                                    | 45 |
| 5.2.2 Birds.....                                       | 46 |
| 5.2.3 Threatened and Endangered Species .....          | 46 |
| 5.2.4 Species of Concern .....                         | 47 |
| 5.2.5 Vegetation.....                                  | 47 |
| 5.2.6 Fisheries Information .....                      | 47 |
| 5.2.7 Noxious Weeds.....                               | 48 |
| 5.2.8 Crucial Areas Planning System .....              | 48 |
| 5.3 Social and Cultural Environment .....              | 48 |
| 5.3.1 Demographic and Economic Conditions .....        | 48 |
| 5.3.2 Land Ownership and Land Use .....                | 49 |
| 5.3.3 Recreational Resources .....                     | 49 |
| 5.3.4 Cultural Resources .....                         | 50 |
| 5.3.5 Noise.....                                       | 50 |
| 5.3.6 Visual Resources.....                            | 51 |
| 6.0 Areas of Concern and Consideration Summary .....   | 52 |
| 6.1 Transportation System .....                        | 52 |
| 6.2 Environmental Considerations .....                 | 53 |
| Appendix A: Bridge Inspection Reports                  |    |
| Appendix B: Traffic Data Collection                    |    |
| Appendix C: Existing Conditions Traffic Data Analysis  |    |
| Appendix D: Projected Conditions Traffic Data Analysis |    |



## LIST OF FIGURES

|  |    |
|--|----|
| Figure 1.1: Study Area .....                         | 2  |
| Figure 3.1: Existing Traffic Conditions .....        | 33 |
| Figure 3.2: Crash Locations .....                    | 35 |
| Figure 4.1: Projected Traffic Conditions .....       | 40 |
| Figure 6.1: Areas of Concern and Consideration ..... | 54 |

## LIST OF TABLES

|  |    |
|--|----|
| Table 1.1: MDT Projects within the Study Area Since 1987 .....       | 3  |
| Table 2.1: Current Population and Past Growth .....                  | 6  |
| Table 2.2: Population Race and Ethnicity Data (2010) .....           | 7  |
| Table 2.3: Age Distribution (1980 to 2010) .....                     | 7  |
| Table 2.4: Housing Occupancy and Tenure .....                        | 8  |
| Table 2.5: Vehicles Available .....                                  | 8  |
| Table 2.6: Population Projections through 2035 .....                 | 8  |
| Table 2.7: Employment by Industry .....                              | 9  |
| Table 2.8: Employment Status .....                                   | 9  |
| Table 2.9: Commuting to Work Statistics .....                        | 10 |
| Table 2.10: Income Statistics .....                                  | 11 |
| Table 3.1: Bridge Locations and Condition .....                      | 13 |
| Table 3.2: Pavement Condition .....                                  | 15 |
| Table 3.3: Geometric Design Criteria (Freeway) .....                 | 17 |
| Table 3.4: Horizontal Curve Attributes .....                         | 18 |
| Table 3.5: Vertical Curve Attributes .....                           | 19 |
| Table 3.6: Interchange Ramp Standards .....                          | 20 |
| Table 3.7: Interchange Horizontal Alignment Attributes .....         | 21 |
| Table 3.8: Interchange Vertical Alignment Attributes .....           | 23 |
| Table 3.9: Interchange Spacing Attributes .....                      | 24 |
| Table 3.10: Left-Turn Bay Lengths .....                              | 25 |
| Table 3.11: Historic Average Annual Growth Rates .....               | 27 |
| Table 3.12: Mainline Level of Service .....                          | 28 |
| Table 3.13: Vehicle Speed Data .....                                 | 28 |
| Table 3.14: Interchange Ramp Level of Service .....                  | 30 |
| Table 3.15: I-315 Interchange Volumes .....                          | 31 |
| Table 3.16: Intersection Level of Service .....                      | 32 |
| Table 3.17: Crash Statistics .....                                   | 34 |
| Table 4.1: Projected Traffic Volumes .....                           | 37 |
| Table 4.2: Projected Mainline LOS .....                              | 38 |
| Table 4.3: Projected Interchange Ramp LOS .....                      | 38 |
| Table 4.4: Projected Intersection LOS .....                          | 39 |
| Table 5.1: Threatened and Endangered Species in Cascade County ..... | 46 |
| Table 5.2: Historic Properties .....                                 | 50 |

# EXISTING AND PROJECTED CONDITIONS

## 1.0 INTRODUCTION

This report identifies existing and projected roadway conditions and social, economic, and environmental factors that influence the Great Falls Interstate System. The analysis performed includes a planning level examination of the corridor by applying technical and environmental considerations to determine known issues, constraints, and/or areas of concern.

The analysis contained in this report is based on existing and historic traffic data, field measurements and observations, roadway as-built plans, aerial imagery, Geographical Information Systems (GIS), and publically available environmental information and demographics. The analysis was conducted for three main categories: demographics, transportation, and environment.

## 1.1 STUDY AREA

The study area for the *I-15 Gore Hill to Emerson Junction Corridor Planning Study* includes Interstate 15 (I-15) through Great Falls, beginning southwest of the Gore Hill Interchange (I-15, Exit 277) near Reference Post (RP) 277 and ending northwest of Emerson Junction (Exit 282) near RP 284. Additionally, the study area includes Interstate 315 (I-315) and 10<sup>th</sup> Avenue South, west of the Missouri River (RP 95). **Figure 1.1** presents the study area boundary.

Within the study area, I-15 is classified as a principal arterial and is part of the National Highway System (NHS). The Interstate serves as the main north-south corridor through Montana from the Idaho state line at Monida to the Canada boundary at Sweet Grass. I-315 is an interstate spur from I-15 and is known as Business Loop I-15. I-315 transitions to 10<sup>th</sup> Avenue South, east of the intersection with Fox Farm Road.

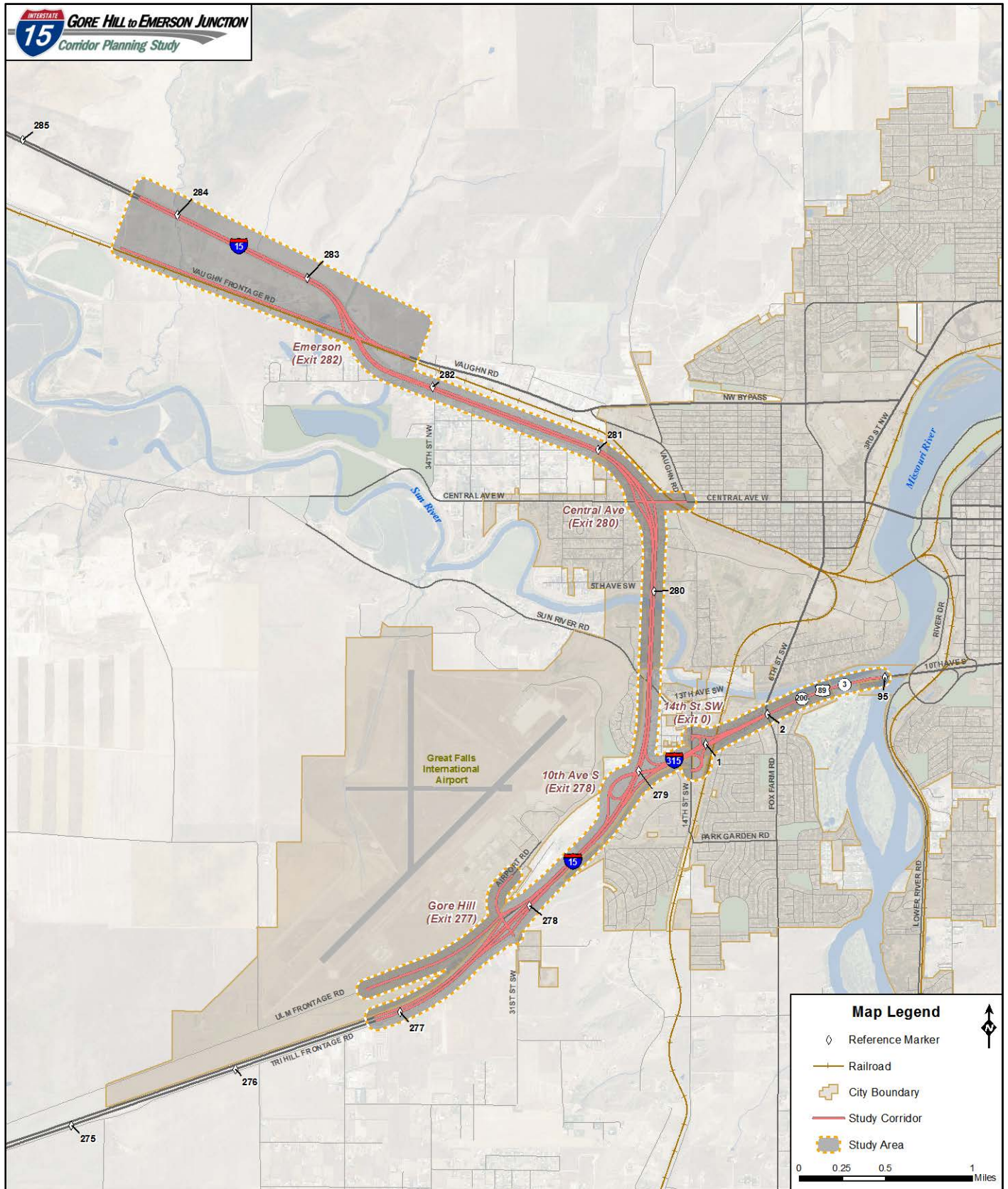


Figure 1.1: Study Area

## 1.2 PAST, CURRENT AND PLANNED PROJECTS

The Montana Department of Transportation's (MDT's) online summary of road and bridge construction projects awarded since July 23, 1987, was reviewed to identify projects previously implemented within the study area. Since 1987, MDT lists 14 completed projects along the corridor. **Table 1.1** lists these projects, along with a brief description of the scope available in MDT's Program and Project Management System.

**Table 1.1: MDT Projects within the Study Area Since 1987**

| Project Designation   | Description  |
|---|--|
| <b>10<sup>TH</sup> AVE SOUTH - WARDEN BR TO 6<sup>TH</sup> SOUTHWEST</b>          | Concrete repair, median adjustment, and diamond grinding from Warden Bridge to Fox Farm intersection |
| <b>2002-10<sup>TH</sup> AVE SOUTH/FOX FARM RD-GREAT FALLS</b>                     | Roadway and Roadside Safety Improvements   |
| <b>BRIDGE DECKS-GREAT FALLS</b>   | Rehabilitation of I-15 bridges at Sun River and the overpass at 5 <sup>th</sup> Avenue Southwest     |
| <b>FOX FARM RD &amp; 10<sup>TH</sup> AVE SOUTH - GREAT FALLS - CASCADE COUNTY</b> | Safety improvement project to address rear end crashes involving right turning vehicles              |
| <b>GREAT FALLS - CENTRAL AVE WEST BRIDGE APPROACHES – CASCADE COUNTY</b>          | Rehabilitation of the eastbound Warden Bridge  |
| <b>GREAT FALLS – FOX FARM RD/10<sup>TH</sup> AVE. SO CASCADE COUNTY</b>           | Concrete resurfacing between 6 <sup>th</sup> Street Southwest / Fox Farm Road and Warden Bridge      |
| <b>GREAT FALLS-NORTH &amp; SOUTH</b>  | Interstate rehabilitation  |
| <b>GREAT FALLS-NORTH &amp; SOUTH CASCADE COUNTY</b>                               | Interstate fence replacement and installation of cattle guards                                       |
| <b>GREAT FALLS URBAN (I-315)</b>  | Overlay of I-315 and ramps at 10 <sup>th</sup> Avenue South and exit 0                               |
| <b>I15-BRIDGE REPAIR-GREAT FALLS</b>  | Emergency repair of beams damaged by trucks hauling high load  |
| <b>SF 129-GREAT FALLS WRONG WAY-PH 1</b>  | New signing to address wrong way traffic on off ramps on I-15  |
| <b>2002 INTERSECTION IMPVT-GF</b>   | Safety adjustments to northbound I-15 off ramp at Central Avenue West                                |
| <b>D3 SIGNING (I-15)</b>  | Guide sign replacement   |
| <b>GREAT FALLS-VAUGHN</b>   | Seal and cover from Emerson Junction to the north  |

Source: MDT Project List accessible at [http://www3.mdt.mt.gov:7782/mttplc/mttplc.tplk0007.project\\_init](http://www3.mdt.mt.gov:7782/mttplc/mttplc.tplk0007.project_init)

The Montana 2014-2018 *Final Surface Transportation Improvement Program* (STIP) is a federally required publication that shows funding obligations over the next five years. This program identifies improvement projects to preserve and improve Montana's transportation system. The Montana 2014-2018 Final STIP identifies the following future projects within the study area:

- **Emerson Junction to Manchester:** This project will be a major rehabilitation of I-15 beginning at RP 282.2 and ending at RP 285.9. It is estimated that the letting date for this project will be in 2017.
- **Bridge Preservation, Great Falls IM:** This project is bridge deck preservation on I-15 between RP 209.1 and 247.2 (outside of the study limits) and I-315 at RP 1.06. It is estimated that the letting date for this project will be in 2016.



## 1.3 EXISTING PLANS AND REGULATIONS

The following provides a summary of existing planning documents and regulations associated with transportation in the area. A number of local plans exist with goals and objectives related to the transportation system. Additionally, Federal regulations would have to be adhered to should changes occur to the Interstate System.

### Great Falls Area Long Range Transportation Plan – 2014

The *Great Falls Area Long Range Transportation Plan (LRTP) – 2014* is intended to offer guidance for the decision-makers in the Great Falls Area by responding to existing transportation system concerns through a menu of large and small improvements to the transportation network. The LRTP provides a blueprint for guiding transportation infrastructure investments based on system needs and associated decision-making principles.

The LRTP identified the need for an Interstate Corridor Study through the Great Falls area. The LRTP states the following:

*Due to preliminary recommendations to make improvements to both the Emerson Junction and Gore Hill interchanges and other identified needs for added lanes and operational improvements on I-15 and I-315, an Interstate Corridor Study for the Great Falls area is recommended. The need for new interchanges, feasibility, and analysis of capacity and operational concerns, will assist in identifying potential locations, priorities, costs and scope for improvements. The study should include westbound movements on 10<sup>th</sup> Avenue South, east of the intersection of Fox Farm Road and 6<sup>th</sup> Street SW, for traffic that exits at "Exit 0", as well as connections with I-315 to I-15.*

### Cascade County Growth Policy Update (2014)

The *Cascade County Growth Policy Update (2014)* was drafted as a comprehensive plan to provide guidance on decisions regarding land development and public investments within Cascade County. The document outlines 13 goals, of which the transportation goal is most relevant:

#### **Goal 6:**

Promote and maintain a transportation system that provides safety, efficiency, and is cost effective.

#### **Objectives:**

- A. New additions to the transportation system should be compatible with the existing road system and coordinated with roads from other jurisdictions.
- B. Transportation planning for new developments should support the Cascade County Growth Policy.
- C. Ensure that all new roads, both public and private, are built to county design standards for new construction. These standards can be found within the Cascade County Subdivision Regulations.
- D. Encourage provisions for multi-modal types of transportation including: bike lanes, trails, pedestrian facilities, etc.
- E. Develop and implement road and bridge improvement standards and maintenance schedules.
- F. Develop a policy and implementation program in cooperation with developers and school districts to provide walks, bridges and pathways for children to improve safety and reduces transportation costs between residential neighborhoods, schools and stores.



- G. Develop secondary means of access, where practical, to settlements and subdivisions in order to improve safety and overall traffic circulation.
- H. Continue using Road Improvement Districts and Rural Maintenance Districts to maximize funding strategies.
- I. Coordinate transportation issues with wildfire and fire protection issues, policies and goals.

#### City of Great Falls Growth Policy Update (2013)

The *City of Great Falls Growth Policy Update (2013)* is intended to provide guidance to the local government with regard to establishing policy and a framework to guide the social, environmental, economic, and physical makeup of the city of Great Falls. The *Growth Policy* recognizes that transportation and growth go hand in hand. Furthermore, the *Growth Policy* identifies I-15 as the main regional route. Tenth Avenue South is also identified within the *Growth Policy* as being the largest road facility in the city.

#### Great Falls International Airport Master Plan (Ongoing)

Great Falls International Airport is currently developing a master plan to evaluate the long-term vision for its properties and adjacent areas. The Airport is primarily served by the Gore Hill Interchange. Changes to the transportation system and land use near the airport could impact the function of the Interstate System.

#### Great Falls Transit Development Plan (2010)

The *Great Falls Transit Development Plan (TDP)* was developed to analyze and recommend strategies that will affect the delivery of public transportation services for the Great Falls Transit District. The TDP states the following: "The mission of the Great Falls Transit District is to provide a safe, reliable, affordable and fiscally sound transportation system for the people of Great Falls and Black Eagle, Montana." Currently no fixed routes use roads within the I-15 corridor study area, with the exception of one line using the intersection of Fox Farm Road and 10<sup>th</sup> Avenue South. Furthermore, no new alternative routes were recommended within the study area.

#### Interstate System Access Informational Guide (2010)

The intent of the Interstate system is to provide for movement of military and civilian equipment, freight, and personnel over long distances and between and within states. The Federal Highway Administration (FHWA) is charged with administering the Interstate System to ensure its structural and operational integrity. In 2010, FHWA published the *Interstate System Access Informational Guide* to provide guidance for both FHWA field staff and state departments of transportation (DOTs) on how and what should be addressed in requests for new or modified access to the Interstate System. The *Guide* provides information and methods for evaluating requests for new access to the Interstate System. Specifically, the *Guide* references eight policy requirements that must be met for new or modified interchanges.<sup>1</sup> The goal of the *Guide* is to provide technical and policy support for access to the Interstate System.

---

<sup>1</sup>U.S. Department of Transportation, Federal Highway Administration, *Access to the Interstate System*, Notice of revised policy statement, <http://www.gpo.gov/fdsys/pkg/FR-2009-08-27/html/E9-20679.htm>

## 2.0 DEMOGRAPHICS

This section provides an overview of the socioeconomic characteristics of the study area. Historic and recent trends in area demographics help define existing conditions and aid in forecasting techniques as there is a direct correlation between motor vehicle travel and socioeconomic indicators.

Demographic and socioeconomic information was reviewed to help determine recent trends in population, age distribution, employment, economic status, and commuting for area residents. Socioeconomic data sources do, however, often lag considerably behind the actual years of interest. This analysis presents the most current data and statistics available and indicates recent and potential changes in the area.

### 2.1 POPULATION CHARACTERISTICS

A review of demographics within the study area is appropriate to gain an understanding of historical trends in population, age, race, and ethnicity. Understanding population composition is necessary, as the data may influence the types of improvements identified. For example, an aging population may indicate a need for specific types of transportation improvements such as transit services and/or non-motorized infrastructure improvements. The presence of a disadvantaged population may warrant other considerations, especially during project development activities.

**Table 2.1** shows total population and growth statistics for the city of Great Falls and Cascade County. A comparison of similar statistics for the state of Montana and the United States is also provided. Between 1990 and 2010, the population of the city of Great Falls increased at a higher rate than Cascade County during the same time. Both the city and the county experienced lower growth than the state of Montana and the United States over the same period.

**Table 2.1: Current Population and Past Growth**

| Area                       | Population<br>(1990) | Population<br>(2000) | Population<br>(2010) | Percent Growth<br>(1990-2010) | Current Population<br>(2013 Estimate) |
|----------------------------|----------------------|----------------------|----------------------|-------------------------------|---------------------------------------|
| <b>City of Great Falls</b> | 55,097               | 56,690               | 58,505               | 6.2%                          | 59,351                                |
| <b>Cascade County</b>      | 77,691               | 80,357               | 81,327               | 4.7%                          | 82,384                                |
| <b>State of Montana</b>    | 799,065              | 902,195              | 989,415              | 23.8%                         | 1,015,165                             |
| <b>United States</b>       | 248,709,873          | 281,421,906          | 308,745,538          | 24.1%                         | 316,128,839                           |

Source: U.S. Bureau of the Census, *Census of the Population*

**Table 2.2** depicts race and ethnicity characteristics in the city of Great Falls, Cascade County, and the state of Montana at the time of the 2010 Census. The population of Great Falls is predominately white with percentages of minority populations slightly higher than for the state of Montana. The Census data show that Great Falls and Cascade County have roughly the same ethnic composition.

**Table 2.2: Population Race and Ethnicity Data (2010)**

| Race / Ethnicity                                  | City of Great Falls |       | Cascade County |       | State of Montana |       |
|---|---------------------|-------|----------------|-------|------------------|-------|
| <b>White</b>                                      | 50,723              | 86.7% | 71,100         | 87.4% | 868,628          | 87.8% |
| <b>Hispanic or Latino</b>                         | 1,978               | 3.4%  | 2,711          | 3.3%  | 28,565           | 2.9%  |
| <b>Black or African American</b>                  | 583                 | 1.0%  | 958            | 1.2%  | 3,743            | 0.4%  |
| <b>American Indian and Alaska Native</b>          | 2,753               | 4.7%  | 3,274          | 4.0%  | 59,902           | 6.1%  |
| <b>Asian</b>                                      | 505                 | 0.9%  | 665            | 0.8%  | 6,138            | 0.6%  |
| <b>Native Hawaiian and Other Pacific Islander</b> | 66                  | 0.1%  | 78             | 0.1%  | 609              | 0.1%  |
| <b>Some Other Race</b>                            | 29                  | 0.0%  | 45             | 0.1%  | 540              | 0.1%  |
| <b>Two or More Races</b>                          | 1,868               | 3.2%  | 2,496          | 3.1%  | 21,290           | 2.2%  |
| <b>Total</b>                                      | <b>58,505</b>       |       | <b>81,327</b>  |       | <b>989,415</b>   |       |

Source: U.S. Bureau of the Census, Census of the Population

**Table 2.3** presents the change in total population and age for the city of Great Falls and Cascade County since 1980. Between 1980 and 2010, the percentage of county and city residents age 65 or older showed a notable increase, while the percentage of those younger than 18 decreased over the same period. The median age in the city increased from 30.6 years in 1980 to 39.0 years in 2010. The county experienced a similar increase in median age, rising from 28.6 years in 1980 to 38.9 years in 2010. These statistics point to the aging of the population and follow similar trends within Montana and across the United States.

**Table 2.3: Age Distribution (1980 to 2010)**

| Year                  | < 18 Years |        | 18-64 Years |       | 65+ Years |       | Total Population | Median Age |
|-----------------------|------------|--------|-------------|-------|-----------|-------|------------------|------------|
| City of Great Falls   |            |        |             |       |           |       |                  |            |
| 1980                  | 15,713     | 27.7%  | 34,489      | 60.8% | 6,523     | 11.5% | 56,725           | 30.6       |
| 1990                  | 14,325     | 26.0%  | 32,507      | 59.0% | 8,265     | 15.0% | 55,097           | 34.4       |
| 2000                  | 14,138     | 24.9%  | 33,654      | 59.4% | 8,898     | 15.7% | 56,690           | 37.8       |
| 2010                  | 13,161     | 22.5%  | 35,648      | 60.9% | 9,696     | 16.6% | 58,505           | 39         |
| Change (1980 to 2010) | -2,552     | -16.2% | 1,159       | 3.4%  | 3,173     | 48.6% | 1,780            | 8.4        |
| Cascade County        |            |        |             |       |           |       |                  |            |
| 1980                  | 23,544     | 29.2%  | 49,164      | 60.9% | 7,988     | 9.9%  | 80,696           | 28.6       |
| 1990                  | 21,520     | 27.7%  | 46,304      | 59.6% | 9,867     | 12.7% | 77,691           | 32.7       |
| 2000                  | 20,912     | 26.0%  | 48,197      | 60.0% | 11,248    | 14.0% | 80,357           | 36.7       |
| 2010                  | 18,630     | 22.9%  | 50,007      | 61.5% | 12,690    | 15.6% | 81,327           | 38.9       |
| Change (1980 to 2010) | -4,914     | -20.9% | 843         | 1.7%  | 4,702     | 58.9% | 631              | 10.3       |

Source: U.S. Bureau of the Census, Census of the Population

**Table 2.4** presents housing occupancy data for the city of Great Falls, Cascade County, and the state of Montana. The city of Great Falls has 26,602 housing units. Of those units, 24,660 are occupied. Cascade County has 37,260 housing units, of which 33,352 are occupied. The average household size for owner-occupied houses in the city of Great Falls, Cascade County, and the state of Montana is roughly the same at 2.45 individuals per household. For renter-occupied households, the city of Great Falls has a lower occupancy at 2.06 persons per household compared to Cascade County and the state of Montana, which both have approximately 2.20 persons per household.

**Table 2.4: Housing Occupancy and Tenure**

| Housing                       | City of Great Falls | Cascade County | State of Montana |
|-------------------------------|---------------------|----------------|------------------|
| <b>Total Housing Units</b>    | <b>26,602</b>       | <b>37,260</b>  | <b>481,401</b>   |
| <b>Occupied Housing Units</b> | 24,660              | 33,352         | 405,508          |
| <b>Owner-occupied</b>         | 15,659              | 22,057         | 277,816          |
| <b>Average Household Size</b> | 2.46                | 2.45           | 2.45             |
| <b>Renter-occupied</b>        | 9,001               | 11,295         | 127,692          |
| <b>Average Household Size</b> | 2.06                | 2.21           | 2.20             |

Source: 2008-2012 American Community Survey 5-Year Estimates

**Table 2.5** portrays data for the availability of vehicles per household. This information can be used to identify alternative transportation-dependent populations. The city of Great Falls has a higher percentage of households with no vehicles available compared to Cascade County and the state of Montana with 9.3, 7.6, and 5.3 percent, respectively. Data indicate that 2,287 of the 2,536 households (90 percent) in Cascade County with no vehicle available are within the city of Great Falls.

**Table 2.5: Vehicles Available**

| Vehicles                            | City of Great Falls |       | Cascade County |       | State of Montana |       |
|-------------------------------------|---------------------|-------|----------------|-------|------------------|-------|
| <b>Occupied Housing Units</b>       | <b>24,660</b>       |       | <b>33,352</b>  |       | <b>405,508</b>   |       |
| <b>No Vehicles Available</b>        | 2,287               | 9.3%  | 2,536          | 7.6%  | 21,329           | 5.3%  |
| <b>1 Vehicle Available</b>          | 7,954               | 32.3% | 9,856          | 29.6% | 114,421          | 28.2% |
| <b>2 Vehicles Available</b>         | 8,904               | 36.1% | 12,230         | 36.7% | 153,045          | 37.7% |
| <b>3 or More Vehicles Available</b> | 5,515               | 22.4% | 8,730          | 26.2% | 116,713          | 28.8% |

Source: 2008-2012 American Community Survey 5-Year Estimates

## 2.2 POPULATION PROJECTIONS

The Montana Department of Commerce Census and Economic Information Center provides county-level population projections. The projections were developed by Regional Economic Models, Inc. (REMI) for the state of Montana using the firm's *eREMI* model. Projections of Cascade County based on the *eREMI* model show a population increase of approximately 19 percent by 2035. In comparison, the model projects that the state of Montana's population will grow by approximately 17 percent by 2035.

**Table 2.6** shows the populations for Cascade County and the state of Montana in the 2010 Census, and it provides population estimates for key years from 2015 through 2035 based on the *eREMI* model. The projections suggest that Cascade County's population will have an average annual growth rate of approximately 0.7 percent per year.

**Table 2.6: Population Projections through 2035**

| Area                    | 2010    | 2015      | 2020      | 2025      | 2030      | 2035      | Average Annual Growth Rate (2010-2035) |
|-------------------------|---------|-----------|-----------|-----------|-----------|-----------|--|
| <b>Cascade County</b>   | 81,327  | 85,673    | 90,176    | 94,147    | 96,502    | 96,676    | 0.69%                                  |
| <b>State of Montana</b> | 989,415 | 1,043,653 | 1,094,712 | 1,134,324 | 1,156,494 | 1,162,253 | 0.65%                                  |

Source: U.S. Bureau of the Census, *Census of the Population and eREMI for Montana and Counties by REMI*.

## 2.3 EMPLOYMENT AND INCOME CHARACTERISTICS

**Table 2.7** presents data on the estimated number of employees (age 16 years and older) and the industries in which they are employed within the city of Great Falls, Cascade County, and the state of Montana. The data in **Table 2.7**, taken from the 2008-2012 American Community Survey (ACS) profile for these geographies, also include employment estimates by industry. The data show that most employment in the county and in the city of Great Falls is associated with service industries, followed by the retail trade and construction industries.

**Table 2.7: Employment by Industry**

| Industry   | City of Great Falls |       | Cascade County |       | State of Montana |       |
|--|---------------------|-------|----------------|-------|------------------|-------|
| <b>Agriculture, Forestry, Fishing and Hunting, and Mining</b>                              | 472                 | 1.7%  | 1,133          | 2.9%  | 34,024           | 7.1%  |
| <b>Construction</b>  | 2,326               | 8.2%  | 3,156          | 8.0%  | 39,115           | 8.1%  |
| <b>Manufacturing</b>   | 846                 | 3.0%  | 1,282          | 3.2%  | 22,791           | 4.7%  |
| <b>Wholesale Trade</b>   | 814                 | 2.9%  | 1,143          | 2.9%  | 12,009           | 2.5%  |
| <b>Retail Trade</b>  | 3,867               | 13.6% | 5,171          | 13.0% | 56,945           | 11.8% |
| <b>Transportation, Warehousing, and Utilities</b>  | 1,281               | 4.5%  | 1,939          | 4.9%  | 23,871           | 5.0%  |
| <b>Information</b>   | 541                 | 1.9%  | 609            | 1.5%  | 8,913            | 1.8%  |
| <b>Finance, Insurance, Real Estate, and Rental and Leasing</b>                             | 2,305               | 8.1%  | 2,770          | 7.0%  | 26,526           | 5.5%  |
| <b>Professional, Scientific, Management, Administrative, and Waste Management Services</b> | 2,213               | 7.8%  | 2,709          | 6.8%  | 39,353           | 8.2%  |
| <b>Educational Services, Health Care, and Social Assistance</b>                            | 6,075               | 21.4% | 8,343          | 21.0% | 108,970          | 22.6% |
| <b>Arts, Entertainment, Recreation, Accommodation, and Food Services</b>                   | 3,345               | 11.8% | 4,209          | 10.6% | 53,023           | 11.0% |
| <b>Other Services, Except Public Administration</b>  | 1,266               | 4.5%  | 1,724          | 4.3%  | 22,361           | 4.6%  |
| <b>Public Administration</b>   | 1,770               | 6.2%  | 2,586          | 6.5%  | 30,353           | 6.3%  |
| <b>Armed Forces</b>  | 1,228               | 4.3%  | 2,865          | 7.2%  | 3,553            | 0.7%  |
| <b>Total Employed Population 16 Years and Over</b>   | <b>28,349</b>       |       | <b>39,639</b>  |       | <b>481,807</b>   |       |

Source: 2008-2012 American Community Survey 5-Year Estimates

Unemployment rates are represented in **Table 2.8** and are current as of July 2014. The data show an unemployment rate for Cascade County that is lower than the rate for the state of Montana (4.0 percent versus 4.4 percent) and the United States (6.5 percent). Conversely, the unemployment rate for the city of Great Falls is higher than the rate for the state of Montana (6.1 percent versus 4.4 percent).

**Table 2.8: Employment Status**

| Labor Force              | Cascade County | State of Montana | United States |
|--------------------------|----------------|------------------|---------------|
| <b>Labor Force</b>       | 40,826         | 531,972          | 157,573,000   |
| <b>Employed</b>          | 39,195         | 508,741          | 147,265,000   |
| <b>Unemployed</b>        | 1,631          | 23,231           | 10,307,000    |
| <b>Unemployment Rate</b> | 4.0%           | 4.4%             | 6.5%          |

Source: Montana Department of Labor and Industry, Research and Analysis Bureau – Labor Force Statistics, July 2014 (data are not seasonally adjusted).



Information about the number of workers (16 years and older) and their commuting characteristics is available from the ACS. The ACS information provided estimates of the transportation modes used by commuters. **Table 2.9** presents mode choice characteristics for workers in the city of Great Falls, Cascade County, and the state of Montana. According to the ACS, more than 90 percent of the commuting workers in Cascade County and the city of Great Falls rely on personal vehicles or carpools for transportation to work destinations. The share of workers that drove alone from both the county and the city is greater than that seen statewide.

**Table 2.9: Commuting to Work Statistics**

| Mode Choice                                      | City of Great Falls |       | Cascade County |       | State of Montana |       |
|--|---------------------|-------|----------------|-------|------------------|-------|
| <b>Workers 16 Years and Over</b>                 | <b>27,980</b>       |       | <b>39,075</b>  |       | <b>470,377</b>   |       |
| <b>Car, Truck, or Van — Drove Alone</b>          | 22,855              | 81.7% | 31,142         | 79.7% | 352,644          | 75.0% |
| <b>Car, Truck, or Van — Carpooled</b>            | 2,847               | 10.2% | 4,273          | 10.9% | 48,324           | 10.3% |
| <b>Public Transportation (excluding taxicab)</b> | 316                 | 1.1%  | 369            | 0.9%  | 4,369            | 0.9%  |
| <b>Walked</b>                                    | 708                 | 2.5%  | 1,211          | 3.1%  | 22,790           | 4.8%  |
| <b>Other means</b>                               | 561                 | 2.0%  | 764            | 2.0%  | 11,779           | 2.5%  |
| <b>Worked at home</b>                            | 693                 | 2.5%  | 1,316          | 3.4%  | 30,471           | 6.5%  |
| <b>Mean Travel Time to Work</b>                  | <b>14.5</b>         |       | <b>16.1</b>    |       | <b>18.0</b>      |       |

Source: 2008-2012 American Community Survey 5-Year Estimates

**Table 2.10** presents income statistics for the city of Great Falls, Cascade County, and the state of Montana. The ACS shows estimated household incomes for the city of Great Falls and Cascade County to be \$42,085 and \$43,817, respectively. These values are below the median household income for the state of Montana, which is \$45,456. The per capita income for both the city of Great Falls (\$23,238) and Cascade County (\$23,976) is lower than that of the state of Montana (\$25,002).

**Table 2.10** also contains poverty statistics for the city of Great Falls, Cascade County, and the state of Montana. According to the 2008-2012 ACS profile, the number of residents living below the poverty line was higher for the city of Great Falls than for Cascade County and the state. About 14.8 percent of all individuals living in Montana were estimated to be below the poverty line. The ACS estimates show that 16.9 percent of individuals living in the city of Great Falls and 14.9 percent in Cascade County are living in poverty.

The ACS data also show that the county and city likely had a greater percentage of persons under the age of 18 living in poverty than the percentage for same age group in the state. The share of persons over the age of 65 living in poverty is, however, similar among the city, the county, and the state.

**Table 2.10: Income Statistics**

| Income   | City of<br>Great Falls | Cascade<br>County | State of<br>Montana |
|--|------------------------|-------------------|---------------------|
| <b>Median Household Income</b>                               | \$42,085               | \$43,817          | \$45,456            |
| <b>Median Family Income</b>                                  | \$56,368               | \$56,958          | \$58,951            |
| <b>Per Capita Income</b>                                     | \$23,238               | \$23,976          | \$25,002            |
| <b>Persons Living in Poverty (%)</b>                         | 16.9%                  | 14.9%             | 14.8%               |
| <b>Persons Under 18 Living in Poverty (%)</b>                | 27.8%                  | 24.2%             | 19.9%               |
| <b>Persons over 65 Living in Poverty (%)</b>                 | 8.6%                   | 8.5%              | 8.4%                |
| <b>Families Living in Poverty (%)</b>                        | 13.2%                  | 11.4%             | 9.8%                |
| <b>Families with Children under 18 Living in Poverty (%)</b> | 24.1%                  | 20.9%             | 17.0%               |

Source: 2008-2012 American Community Survey 5-Year Estimates

## 3.0 EXISTING TRANSPORTATION SYSTEM

I-15 is functionally classified as a principal arterial on the NHS Interstate System. The Interstate serves as the main north-south corridor through Montana and connects Canada to the southern border of California. The roadway was constructed or improved at various times, beginning in 1939 and extending to 2009. I-15 is part of the Canamex Trade Corridor, which Congress designated as a “High Priority Corridor” in the 1995 *National Highway Systems Designation Act*. The corridor’s main objective is to facilitate trade and strengthen the corridor’s position in the global economy.

I-315 begins at the 10<sup>th</sup> Avenue South junction with I-15 (RP 279). It was opened to traffic in late 1967. The corridor is currently signed as Business Loop 15, US 89, and MT 200. I-315 is one of the shortest Interstate highways in the country at 0.828 miles, and it terminates at the intersection of Fox Farm Road and 6<sup>th</sup> Street Southwest.

Primary users of the corridors consist of all types of individuals including locals, commuters, travelers, and freight operators. Interstate highways are considered part of the principal arterial freeway system. Freeways are characterized by having fully controlled access, high design speeds, and a high level of driver comfort and safety. For these reasons, freeways have separate geometric design criteria than those of a standard principal arterial highway.

### 3.1 PHYSICAL FEATURES AND CHARACTERISTICS

This section discusses the physical features and characteristics of the study corridor. Information was gathered using publically available sources, field observations, GIS data, and MDT as-built drawings.

#### 3.1.1 Hydraulics

I-15 crosses the Sun River at RP 279.35, between the 10<sup>th</sup> Avenue South Interchange and the Central Avenue West Interchange. The crossing consists of a concrete bridge structure. Additionally, a steel culvert is located along I-15 at RP 283.4 for drainage conveyance.

#### 3.1.2 Bridges

MDT’s Highway Bridge Program (HBP) emphasizes asset management and preservation. This emphasis promotes a “right treatment at the right time” philosophy in prioritizing and selecting projects on MDTs bridge system. MDT has defined the bridge program objectives and performance measures. The objectives and measures are intended to identify the right treatments for Montana’s bridge assets, as well as promoting cost-effective bridge preservation, appropriate safety-related work, and economic growth.

MDT uses a Structure Condition Performance Measure and a Deck Performance Condition Measure. These measures categorize bridge conditions as good, fair, or poor, based on the condition rating given to the bridge deck (riding surface), superstructure (generally beams underneath the riding surface), and substructure (support structure extending into the ground). Additionally, the Structure Condition Performance Measure assigns a poor rating to a bridge that is structurally deficient.

A bridge is considered structurally deficient if load-carrying elements have deteriorated enough to be considered in “poor condition” or the adequacy of the waterway opening provided by the bridge is insufficient, causing intolerable traffic interruptions. When a bridge is classified as structurally deficient, it does not mean that it is unsafe. A structurally deficient bridge typically requires increased maintenance and repair to remain in service and eventual rehabilitation or replacement to address overall deficiencies.

The deck condition performance measure uses the National Bridge Inventory (NBI) deck rating to give an indication of the deck condition and a planning level indication of needed preservation treatment. The deck condition ranking is a general indicator of the condition of any individual deck. The rankings are useful for planning purposes on a system wide basis.

There are 17 bridges within the study area. **Table 3.1** shows the bridge locations and condition ratings. All 17 bridges have a structure condition of “good,” which indicates that they are candidates for continued preservation. The bridge deck ratings include “good” (possible candidate for sealing), “fair-1” (candidate for healer/sealer), and “fair-2” (candidate for resurfacing). Detailed bridge inspection reports are available in **Appendix A**.

**Table 3.1** also lists the width of each bridge within the study area. According to the MDT *Bridge Design Standards*, a bridge on the Interstate System is recommended to consist of 12-foot travel lanes, 4-foot inside shoulder, and 10-foot outside shoulder. This recommendation results in a total bridge width of 50 feet for three travel lanes, 38 feet for two travel lanes, and 26 feet for one travel lane. A number of bridges on the Interstate System within the study area have widths narrower than the recommended standards, as noted in the table below. However, the recommended standards are for new bridges on the Interstate System. Bridges to remain in place that do not meet the recommended width may be considered for additional signing or widening depending on further engineering analysis<sup>2</sup>.

**Table 3.1: Bridge Locations and Condition**

| Location                     |                  | Feature Crossed        | Year Built | Width (feet)      | Length (feet) | Structure Condition | Deck Condition |
|------------------------------|------------------|------------------------|------------|-------------------|---------------|---------------------|----------------|
| <b>I-15</b>                  | RP 279.98 (NB)   | Sun River              | 1966       | 28 <sup>(a)</sup> | 485           | Good                | Good           |
|                              | RP 279.98 (SB)   | Sun River              | 1966       | 28 <sup>(a)</sup> | 485           | Good                | Good           |
|                              | RP 280.09 (NB)   | 5 <sup>th</sup> Ave SW | 1967       | 37 <sup>(a)</sup> | 125           | Good                | Good           |
|                              | RP 280.09 (SB)   | 5 <sup>th</sup> Ave SW | 1967       | 37 <sup>(a)</sup> | 125           | Good                | Good           |
|                              | RP 282.55 (NB)   | Vaughn Rd / BNSF RR    | 1967       | 28 <sup>(a)</sup> | 354           | Good                | Fair-1         |
|                              | RP 282.55 (SB)   | Vaughn Rd / BNSF RR    | 1967       | 28 <sup>(a)</sup> | 359           | Good                | Fair-1         |
| <b>I-315</b>                 | RP 0.01          | I-15                   | 1967       | 45 <sup>(a)</sup> | 294           | Good                | Fair-1         |
|                              | RP 0.34 (EB)     | 14 <sup>th</sup> St SW | 1967       | 36 <sup>(a)</sup> | 150           | Good                | Fair-2         |
|                              | RP 0.34 (WB)     | 14 <sup>th</sup> St SW | 1967       | 45 <sup>(a)</sup> | 145           | Good                | Fair-1         |
|                              | RP 0.34 (EB Off) | 14 <sup>th</sup> St SW | 1997       | 23 <sup>(a)</sup> | 136           | Good                | Good           |
|                              | RP 1.06 (EB)     | BNSF RR                | 1946       | 45 <sup>(a)</sup> | 178           | Good                | Fair-2         |
|                              | RP 1.06 (WB)     | BNSF RR                | 1967       | 37 <sup>(a)</sup> | 208           | Good                | Fair-2         |
|                              | RP 1.06 (WB Off) | BNSF RR                | 1996       | 23 <sup>(a)</sup> | 186           | Good                | Good           |
| <b>Central Ave</b>           | RP 0.16 (EB)     | BNSF RR                | 1967       | 27                | 551           | Good                | Fair-1         |
|                              | RP 0.16 (WB)     | BNSF RR                | 1967       | 27                | 551           | Good                | Fair-1         |
| <b>10<sup>th</sup> Ave S</b> | RP 94.61 (EB)    | Missouri River         | 1983       | 40                | 2122          | Good                | Fair-1         |
|                              | RP 94.61 (WB)    | Missouri River         | 1951       | 28                | 2093          | Good                | Good           |

Source: MDT Bridge Management System, 2014.

<sup>(a)</sup> Interstate bridge width does not meet existing standards.

<sup>2</sup> MDT *Bridge Design Standards*, National Highway System (NHS) Interstate

### 3.1.3 Operations

The Interstate System within the study area is considered a Level I winter maintenance level according to the MDT *Maintenance Operations and Procedures Manual*.<sup>3</sup> A Level I roadway receives the highest level of maintenance and attention during inclement weather events. Level I routes are eligible to receive up to 24-hour-per-day coverage during storms. The primary objective is to keep at least one travel lane in each direction open to traffic and to provide intermittently bare pavement as soon as possible. Within the study area, there are additional operation controls aimed at improving the function of the transportation system.

- **Snow Fence:** There are multiple locations with snow fences at and near the 10th Avenue South Interchange. The snow fence is intended to trap and prevent snow from blowing across the roadway.
- **Variable Message Sign (VMS):** To address vehicle operations related to adverse weather conditions, portable VMSs are used to alert motorists of changes in weather conditions. The VMSs are commonly deployed near the Gore Hill Interchange during high wind events.
- **Bridges:** Bridges typically freeze quicker than the normal roadway surface, causing operational issues for motorists. Signing alerting motorists to watch for ice on the bridges are used during the winter months.
- **Detours:** Concerns have been noted about not having a viable detour route for the Gore Hill area. Incidents occurring near Gore Hill have resulted in closed lanes on the Interstate, as well as increases in vehicle delay and queuing.

### 3.1.4 Pavement Condition

MDT annually tracks and measures pavement condition indices in the corridor. MDT's Pavement Management System (PvMS) is used to analyze the collected data to determine the relative performance of the pavement. Items of primary interest include the presence and degree of cracking and rutting, as well as overall ride quality. By understanding the condition of the pavement, MDT can identify the most appropriate treatments and resources needed to extend pavement life. Several pavement condition indices are monitored through MDT's PvMS. The performance measures and corresponding indices are such that the numerical value of 100 is assigned to a new pavement with no flaws, and zero is assigned to a highly degraded pavement. The following performance measures are routinely used to track pavement conditions:

- **Ride Index:** This is determined by using an internationally applied roughness index (IRI) in inches per mile and converting the number to a 0 to 100 scale.
- **Rut Index (RI):** This is calculated by converting rut depth to a 0 to 100 scale. Rut measurements are taken approximately every foot and averaged into one-tenth-mile reported depths.
- **Alligator Crack Index (ACI):** This is measured by combining all load-associated cracking and converting the index to a 0 to 100 scale.
- **Miscellaneous Cracking Index (MCI):** This is calculated by combining all non-load-associated cracking and converting the index into a 0 to 100 scale.
- **Overall Performance Index (OPI):** This is determined by combining and placing various weighting factors on the IRI, RI, ACI, and MCI figures and converting the index to a 0 to 100

---

<sup>3</sup> MDT *Maintenance Operations and Procedures Manual*, Chapter 9, Winter Maintenance Program, December 2009, <http://www.mdt.mt.gov/publications/docs/manuals/mmanual/chapt9c.pdf>



scale. The OPI is calculated to provide a single index describing the current general health of a particular route or system.

The most important performance measure is the OPI, as this index includes all the aforementioned indices. An OPI of 80 to 100 is considered “good,” 60 to 79.9 is “fair,” and 0 to 59.9 is “poor.” As shown in **Table 3.2**, the various pavement condition performance measures generally indicate good performance for I-15. Between RP 282.2 and RP 286.6 on I-15, however, the OPI indicates poor overall performance. A resurfacing project is planned for I-15 between RP 282.2 and RP 285.9. It is anticipated that this project would be let in 2017. Information for OPI on I-315 indicates a poor to fair pavement condition.

**Table 3.2: Pavement Condition**

| Route           | Begin RP | End RP | Surface Width | Last Surface | Last Treatment | Flexible Thickness (feet) | IRI  | RI   | ACI  | MCI   | OPI  |
|-----------------|----------|--------|---------------|--------------|----------------|---------------------------|------|------|------|-------|------|
| <b>I-15 NB</b>  | 270.5    | 282.2  | 38            | 2007         | 2007           | 0.33                      | 86.2 | 76.5 | 99.8 | 100.0 | 79.7 |
| <b>I-15 SB</b>  | 270.5    | 282.2  | 38            | 2007         | 2007           | 0.33                      | 88.8 | 78.7 | 99.2 | 100.0 | 82.6 |
| <b>I-15 NB</b>  | 282.2    | 286.6  | 38            | 1999         | 2006           | 0.75                      | 49.0 | 64.0 | 69.3 | 95.1  | 43.1 |
| <b>I-15 SB</b>  | 282.2    | 286.6  | 38            | 1999         | 2006           | 0.75                      | 44.0 | 72.0 | 88.0 | 96.2  | 51.0 |
| <b>I-315 EB</b> | 0.0      | 1.4    | 38            | 1996         | 1996           | 0.34                      | 59.3 | 67.0 | 91.3 | 98.3  | 60.5 |
| <b>I-315 WB</b> | 0.0      | 1.4    | 38            | 1996         | 1996           | 0.34                      | 83.0 | 73.0 | 80.1 | 99.8  | 57.6 |

Source: MDT Pavement Management System, 2014

### 3.1.5 Alternative Transportation Modes

There are currently no dedicated bicycle or pedestrian facilities along the study corridor. The *Great Falls Area LRTP* identifies a recommendation for a multi-use path adjacent to the study area near the junction of 6th Street SW and I-315. Spot improvements to the Central Avenue crossing of I-15 and the railroad are also recommended in the *LRTP* to accommodate bike lanes.<sup>4</sup>

### 3.1.6 Railroad

A service line for BNSF Railway runs within the study area. The Interstate crosses over the railroad at two locations within the study area: along I-15 Emerson Junction and along I-315 just east of 14th Street Southwest. Additionally, Central Avenue crosses over the railroad just west of Vaughn Road within the study area. More information about the bridge structures is provided in **Section 3.1.2**.

### 3.1.7 Air Service

The Great Falls International Airport is adjacent to the study area. Access to the airport is provided by Airport Drive, which connects to the Gore Hill Interchange. While it has been categorized as a “primary commercial service” airport by the National Plan of Integrated Airport Systems, it also has a military component. The airport is home to Great Falls Air National Guard Base and the Montana Air National Guard’s 120<sup>th</sup> Air Lift Wing, an Air National Guard unit employed in air defense. The airport also offers substantial infrastructure for the air cargo industry. FedEx operates a warehouse as a sorting and distribution hub for Montana. The U.S. Customs Border Patrol operates an office at the airport, which facilitates international travel.

<sup>4</sup> *Great Falls Area Long Range Transportation Plan – 2014*, page 219.

### 3.1.8 Utilities

I-15 in the study area includes overhead power and telephone crossings. Longitudinal occupancy of Interstate right-of-way is not permitted, and, as such, utility involvement is limited. Electric power and natural gas utilities are provided by Northwestern Energy. CenturyLink provides telecommunication services to the study area.

## 3.2 GEOMETRIC CONDITIONS

Existing roadway geometrics were evaluated and compared to current MDT standards. Available as-built drawings were reviewed for the freeway system within the study area. Field reviews of the study corridor took place in July 2014 to confirm and supplement information contained in the as-built drawings, as well as to identify additional areas of concern within the study area.

The MDT *Road Design Manual* and *Traffic Engineering Manual* specifies general design principles and controls that determine the overall operational characteristics of the roadway. Of critical importance to determining design standards is the design speed. MDT's manuals provide guidance for design speed based on facility and operating characteristics; however, some judgment is necessary. A facility's design speed and its operating speed may differ. The design speed is a selected speed used to determine the various geometric design features of the roadway. The operating speed is the highest overall speed at which a driver may travel on a given section of roadway under favorable weather conditions and prevailing traffic conditions without at any time exceeding the safe speed as determined by the design speed. The design criteria for the study corridor are based on current MDT standards as described in the following sections.

### 3.2.1 Mainline Interstate

The mainline Interstate is characterized as a controlled access, four-lane, divided highway with high travel speeds. The key purpose of the mainline Interstate is to carry traffic over large distances quickly. The following subsections provide the analysis of the current geometric conditions along the Interstate within the study area. The evaluation compares the existing geometrics to current design standards. Note that design standards change over time. Locations that do not meet current design standards may have met standards in place during the time of construction. Additionally, it is possible that design exceptions may have been used during the initial design process.

#### Design Criteria

**Table 3.3** lists current design standards for freeway (NHS-Interstate) routes according to MDT design criteria. The freeway design criteria depend on terrain and area context (i.e., urban or rural). Based on the definitions provided in MDT's *Road Design Manual*, most of I-15 within the study area appears to be of rural context with level terrain (70-miles-per-hour [mph] design speed) with some areas of rolling terrain (60-mph design speed). I-315 appears to be of urban context (50-mph design speed). For the purposes of this report, areas along I-15 that do not meet 70-mph design standards and areas along I-315 that do not meet 50-mph design standards were noted as being substandard. A final determination of design speed will ultimately be made during project development.

Table 3.3: Geometric Design Criteria (Freeway)

| Design Element                            |   |                            | Rural                                  |        |        | Urban                       |
|---|---|----------------------------|--|--------|--------|-----------------------------|
| Design Controls                           | Design Forecast Year (Geometrics)           |                            | 20 Years                               |        |        | 20 Years                    |
|   | Design Speed <sup>(a)</sup>                 | Level                      | 70 mph                                 |        |        | 50 mph                      |
|   |   | Rolling                    | 60 mph                                 |        |        |                             |
|   |   | Mountainous                | 50 mph                                 |        |        |                             |
| Level of Service                          |   |                            | B                                      |        |        | B                           |
| Roadway Elements                          | Travel Lane Width <sup>(a)</sup>            |                            | 4@12'                                  |        |        | 4@12'                       |
|   | Shoulder Width <sup>(a)</sup>               | Outside Shoulder           | 10'                                    |        |        | 10'                         |
|   |   | Inside Shoulder            | 4'                                     |        |        | 4'                          |
|   | Cross Slope                                 | Travel Lane <sup>(a)</sup> | 2%                                     |        |        | 2%                          |
|   |   | Shoulder                   | 2%                                     |        |        | 2%                          |
|   | Median Width                                | Level                      | Minimum: 36'                           |        |        | Desirable: 36' Minimum: 16' |
|   |   | Rolling                    | Minimum: 36'                           |        |        |                             |
| Mountainous                               |   | Minimum: 16'               |  |        |        |                             |
| Earth Cut Sections                        | Ditch                                       | Inslope                    | 6:1 (Width: 6')                        |        |        | 6:1 (Width: 6')             |
|   |   | Width                      | 10' Min.                               |        |        | 10'                         |
|   |   | Slope                      | 20:1 towards back slope                |        |        | 20:1 towards back slope     |
|   | Back Slope; Cut Depth at Slope Stake        | 0' - 5'                    | 5:1                                    |        |        | 5:1                         |
|   |   | 5' - 10'                   | Level/Rolling: 4:1; Mountainous: 3:1   |        |        | 3:1                         |
|   |   | 10' - 15'                  | Level/Rolling: 3:1; Mountainous: 2:1   |        |        | 2:1                         |
|   |   | > 15'                      | Level/Rolling: 2:1; Mountainous: 1.5:1 |        |        | 1.5:1                       |
| Earth Fill Slopes                         | Fill Height at Slope Stake                  | 0' - 10'                   | 6:1                                    |        |        | 6:1                         |
|   |   | 10' - 20'                  | 4:1                                    |        |        | 4:1                         |
|   |   | 20' - 30'                  | 3:1                                    |        |        | 3:1                         |
|   |   | > 30'                      | 2:1                                    |        |        | 2:1                         |
| Alignment Elements                        | DESIGN SPEED                                |                            | 50 mph                                 | 60 mph | 70 mph | 50 mph                      |
|   | Stopping Sight Distance <sup>(a)</sup>      |                            | 425'                                   | 570'   | 730'   | 425'                        |
|   | Minimum Radius (e=8.0%) <sup>(a) (b)</sup>  |                            | 760'                                   | 1,200' | 1,820' | 760'                        |
|   | Superelevation Rate <sup>(a)</sup>          |                            | e <sub>max</sub> =8.0%                 |        |        | e <sub>max</sub> =8.0%      |
|   | Vertical Curvature (K-Value) <sup>(a)</sup> | Crest                      | 85                                     | 151    | 247    | 84                          |
|   |   | Sag                        | 96                                     | 136    | 181    | 96                          |
|   | Maximum Grade <sup>(a)</sup>                | Level                      | 3%                                     |        |        | 5%                          |
|   |   | Rolling                    | 4%                                     |        |        |                             |
|   |   | Mountainous                | 5%                                     |        |        |                             |
| Minimum Vertical Clearance <sup>(a)</sup> |   |                            | 17.0'                                  |        |        | 17.0'                       |

Source: MDT Road Design Manual, Chapter 12, Figure 12-3, "Geometric Design Criteria for Rural Principal Arterials" (National Highway System-Non-Interstate), 2008

<sup>(a)</sup> Controlling design criteria (see Section 8.8 of the MDT Road Design Manual)

<sup>(b)</sup> Super elevation rate (e)

## Horizontal Alignment

Elements comprising horizontal alignment include curvature, superelevation (i.e., the bank on the road), and sight distance. These horizontal alignment elements influence traffic operation and safety and relate directly to the design speed of the corridor. MDT's standards for horizontal curves are defined in terms of curve radius, and they vary based on design speed. For a 70-mph design speed (level terrain), the minimum recommended radius is 1,810 feet with a minimum stopping sight distance (SSD) of 730 feet. The minimum recommended radius and SSD for a 60-mph design speed (rolling terrain) are 1,200 feet and 570 feet, respectively. For an urban freeway (50-mph design speed), a minimum radius of 760 feet and a minimum sight distance of 425 feet are recommended.

**Table 3.4** summarizes each horizontal curve on the Interstate roadways within the study area. A determination of whether the curve met standards was noted based on the design criteria discussed previously. The controlling design criteria for the horizontal curves are radius and SSD. Stopping sight distance for a horizontal curve is evaluated based on the ability to see through the inside of the corner. Minimum sight obstruction distances were calculated based on the criteria contained in the *Traffic Engineering Manual*.<sup>5</sup> The minimum sight obstruction distance is measured from the center of the inside travel lane and defines the area that should be clear of obstructions to allow for the recommended SSD.

There are five existing horizontal curves along I-15 within the study area and two horizontal curves along I-315. Four of the five curves along I-15 meet the minimum standards for horizontal curvature based on a 70-mph design speed (level terrain). The failing curve, at RP 282.37, does not meet the minimum radius requirements at a 70-mph design speed; however, the curve does meet the radius requirements for a 60-mph design speed (rolling terrain). Along I-315, one horizontal curve does not meet urban freeway standards (50-mph speed) based on curve radius. All horizontal curves were found to have adequate SSD.

**Table 3.4: Horizontal Curve Attributes**

| Curve Location (RP) | Length (feet) | Radius (feet) | Min. Sight Obstruction (feet) | Design Speed Met (mph) | Meets Standards | Comments   |
|---------------------|---------------|---------------|-------------------------------|------------------------|-----------------|--|
| I-15                | 277.2         | 2,557         | 5,730                         | 11.6                   | 70              | <b>YES</b>   |
|                     | 278.9         | 4,334         | 5,732                         | 11.6                   | 70              | <b>YES</b>   |
|                     | 280.7         | 3,892         | 3,274                         | 20.3                   | 70              | <b>YES</b>   |
|                     | 282.4         | 986           | 1,637                         | 40.5                   | 60              | <b>NO</b> Does not meet level terrain standards based on curve radius. |
|                     | 282.9         | 956           | 1,909                         | 34.8                   | 70              | <b>YES</b>   |
| I-315               | 0.07          | 350           | 739                           | 30.3                   | 45              | <b>NO</b> Does not meet urban freeway standards based on curve radius. |
|                     | 0.29          | 250           | 1,146                         | 19.6                   | 55              | <b>YES</b>   |

## Vertical Alignment

Vertical alignment is a measure of the elevation change of a roadway. The length and steepness of grades directly affect the operational characteristics of the roadway. The controlling design limits for vertical curves are SSD, vertical curvature (K-value), and maximum grade. Vertical curves can be placed into two categories: crest and sag. A crest curve is created at the top of a hill or when the grade decreases. Conversely, a sag curve occurs at the bottom of a hill or when the grade increases.

<sup>5</sup> MDT *Traffic Engineering Manual*, Chapter 25, Section 25.5, Equation 25.5-1

**Table 3.5** lists the location and controlling design features for each vertical curve along the Interstate roadways within the study area. According to the *Road Design Manual*, the maximum allowable grades are 3 percent for level terrain, 4 percent for rolling terrain, and 5 percent for mountainous terrain, although grades of up to 7 percent may be provided with approval. The rate of vertical curvature is expressed in terms of the K-value. The K-value is defined as a function of the length of the curve compared to the algebraic change in grade, which comprises either a sag or a crest vertical curve. For a 70-mph design speed (level terrain), minimum K-values of 247 and 181 are recommended for crest and sag vertical curves, respectively. A minimum SSD of 730 feet is recommended for a 70-mph design speed. For sag curves, SSDs only apply where overhead structures exist. No sag curves have existing overhead obstructions within the study area.

Within the study area, there are 19 vertical curves along I-15 and 2 vertical curves on I-315. Both vertical curves along I-315 meet urban freeway standards. Of the 19 vertical curves along I-15, 15 meet existing standards for a 70-mph design speed (level terrain). Two curves have maximum grades that do not meet level terrain standards; however, they do meet standards for mountainous terrain. One curve has a K-value below standards for level terrain, while another curve does not meet level terrain standards for K-value and SSD.

**Table 3.5: Vertical Curve Attributes**

| Curve Location (RP) | Type  | Length (feet) | Grade Back | Grade Ahead | K-value | SSD (feet) | Design Speed Met (mph) | Meets Standards | Comments |   |
|---------------------|-------|---------------|------------|-------------|---------|------------|------------------------|-----------------|----------|---|
| I-15                | 276.2 | Crest         | 800        | 0.8%        | 0.1%    | 1,188.7    | 2,003                  | 70              | YES      |   |
|                     | 276.7 | Crest         | 800        | 0.1%        | -0.6%   | 1,164.5    | 1,971                  | 70              | YES      |   |
|                     | 277.1 | Crest         | 1,000      | -0.6%       | -1.5%   | 1,127.4    | 1,717                  | 70              | YES      |   |
|                     | 277.3 | Sag           | 1,000      | -1.5%       | -0.2%   | 777.0      | -                      | 70              | YES      |   |
|                     | 277.6 | Crest         | 800        | -0.2%       | -0.8%   | 1,232.9    | 2,063                  | 70              | YES      |   |
|                     | 277.9 | Crest         | 1,100      | -0.9%       | -5.0%   | 265.1      | 756                    | 50              | NO       | Does not meet level terrain standards based on grade.           |
|                     | 278.8 | Sag           | 1,000      | -5.0%       | -1.0%   | 250.0      | -                      | 50              | NO       | Does not meet level terrain standards based on grade.           |
|                     | 279.3 | Crest         | 1,000      | -1.0%       | -2.9%   | 540.5      | 1,083                  | 70              | YES      |   |
|                     | 280.0 | Sag           | 1,100      | -2.9%       | 0.9%    | 292.6      | -                      | 70              | YES      |   |
|                     | 280.2 | Crest         | 1,100      | 0.9%        | -0.8%   | 643.3      | 1,181                  | 70              | YES      |   |
|                     | 280.5 | Sag           | 400        | -0.8%       | 1.5%    | 173.9      | -                      | 60              | NO       | Does not meet level terrain standards based on K-value.         |
|                     | 280.8 | Crest         | 600        | 1.5%        | -0.3%   | 329.7      | 893                    | 70              | YES      |   |
|                     | 281.7 | Sag           | 800        | -0.2%       | 0.2%    | 2,000.0    | -                      | 70              | YES      |   |
|                     | 282.3 | Sag           | 800        | 0.2%        | 2.5%    | 355.6      | -                      | 70              | YES      |   |
|                     | 282.5 | Crest         | 750        | 2.5%        | -1.0%   | 220.6      | 690                    | 60              | NO       | Does not meet level terrain standards based on K-value and SSD. |
|                     | 282.7 | Sag           | 200        | -1.0%       | -0.2%   | 250.0      | -                      | 70              | YES      |   |
|                     | 282.7 | Crest         | 200        | -1.0%       | -1.1%   | 5,000.0    | 2,708                  | 70              | YES      |   |
|                     | 283.0 | Crest         | 200        | -0.2%       | -0.9%   | 266.7      | 1,539                  | 70              | YES      |   |
| 283.0               | Sag   | 200           | -1.1%      | -0.9%       | 1,333.3 | -          | 70                     | YES             |          |   |
| I-315               | 0.09  | Crest         | 800        | 1.0%        | -4.5%   | 145        | 560                    | 50              | YES      |   |
|                     | 0.28  | Sag           | 400        | -4.5%       | -2.3%   | 180        | -                      | 50              | YES      |   |



### 3.2.2 Interchanges

The purpose of an interchange is to allow traffic to enter or exit the Interstate with minimal disturbance to its traffic stream. This is accomplished by using grade-separated intersections connected by ramps. There are four interchanges along I-15 and one interchange along I-315 within the study area. This section discusses the geometric conditions of the five interchanges.

#### Standards

The five interchanges within the study area were evaluated based on a variety of standards. The MDT *Road Design Manual* provides general geometric standards for horizontal and vertical curvature for interchange ramps, while the MDT *Traffic Engineering Manual* provides guidance for ramp lengths to allow for vehicle acceleration and deceleration. **Table 3.6** provides the interchange ramp standards used to evaluate the interchanges as defined by MDT.

**Table 3.6: Interchange Ramp Standards**

| Type                                      | Criteria                          |                 | Standard               |
|---|-----------------------------------|-----------------|------------------------|
| <b>Exit Ramp</b>                          | Taper Rate                        | Taper Design    | 2 to 5 degrees         |
|   |                                   | Parallel Design | 215 feet               |
|   | Deceleration Length ( $L_d$ )     |                 | (a)                    |
|   | Sight Distance in Advance of Gore |                 | 1,180 feet             |
| <b>Entry Ramp</b>                         | Taper Rate                        | Taper Design    | 50:1 to 70:1           |
|   |                                   | Parallel Design | 350 feet               |
|   | Acceleration Rate ( $L_a$ )       |                 | (b)                    |
|   | Horizontal Curve Radius           |                 | 1,000 feet             |
| <b>Spacing</b>                            | Exit - Entrance                   |                 | 500 feet               |
|   | Entrance - Exit                   |                 | 2,000 feet             |
| <b>Auxiliary Lane Drop</b> <sup>(c)</sup> | Within an Interchange             |                 | 500 feet to 1,000 feet |

Source: MDT Traffic Engineering Manual, Chapter 29, November 2007

<sup>(a)</sup> MDT Traffic Engineering Manual, Section 29.5.1.3

<sup>(b)</sup> MDT Traffic Engineering Manual, Section 29.5.2.3

<sup>(c)</sup> An auxiliary lane should be provided where the distance between the end of the entrance terminal and the beginning of an exit terminal is less than 1,500 feet. An auxiliary lane may be dropped at an exit if properly signed and designed.

Ensuring adequate ramp lengths and proper geometrics is necessary to provide for safe vehicle interaction at Interstate entrance and exit points. Additionally, the spacing between interchange ramps affects vehicle interactions and can influence traffic flow and safety. Ramps that are too close together can result in additional vehicle conflicts due to merging and diverging traffic. An additional concern regarding ramp spacing is vehicle lane-shifting patterns. Closely spaced interchanges and/or intersections may require vehicles to shift between lanes to reach their intended lane. Traffic flow and safety issues may result if enough length is not provided for in areas where lane shifts are necessary to enter or exit the Interstate.

#### Horizontal Alignment

The horizontal alignment of a ramp is controlled by the radius of any curve on the ramp, super elevation, taper angle, taper length, gap acceptance length ( $L_g$ ), and deceleration/acceleration lengths ( $L_d/L_a$ ). The limiting values for these characteristics are functions of the design speed for a given ramp. For this

analysis, the minimum design speed was determined based on the super elevation and radius for each given curve. **Table 3.7** presents the horizontal geometric attributes for each of the ramps.

**Table 3.7: Interchange Horizontal Alignment Attributes**

| Curve Location         |           | Radius<br>(feet) | Super-<br>elevation | Taper<br>Rate | L <sub>d</sub> /L <sub>a</sub><br>(feet) | L <sub>g</sub><br>(feet) | Design<br>Speed Met<br>(mph) | Meets<br>Standards | Comments   |
|------------------------|-----------|------------------|---------------------|---------------|--|--------------------------|------------------------------|--------------------|--|
| Gore Hill              | SB ON     | 2,865            | 0.04                | 50:1          | 1,513                                    | 300                      | 50                           | NO                 | Does not meet standards based on acceleration length.                    |
|                        | SB OFF    | 2,953            | 0.05                | 4°30'00"      | 358                                      | -                        | 50                           | YES                |  |
|                        |           | 3,773            | 0.03 <sup>(a)</sup> | -             | -  | -                        | 45                           | YES                |  |
|                        | NB ON     | 2,865            | 0.04 <sup>(a)</sup> | 50:1          | 1,604                                    | 300                      | 50                           | NO                 | Does not meet standards based on acceleration length.                    |
|                        | NB OFF    | 2,865            | 0.04                | 4°30'00"      | 323                                      | -                        | 50                           | NO                 | Does not meet standards based on deceleration length.                    |
| 10th Ave S             | SB ON     | 764              | 0.08                | -             | -  | -                        | 50                           | YES                |  |
|                        |           | 764              | 0.07                | (b)           | -  | (b)                      | 50                           | YES                |  |
|                        | SB OFF    | 5,730            | 0.03                | 5°00'00"      | 463                                      | -                        | 60                           | NO                 | Does not meet standards based on deceleration length.                    |
|                        |           | 385              | 0.08                | -             | -  | -                        | 35                           | YES                |  |
|                        |           | 198              | 0.08                | -             | -  | -                        | 25                           | YES                |  |
|                        |           | 358              | 0.08                | -             | -  | -                        | 35                           | YES                |  |
|                        | WB OFF    | 382              | 0.08                | 4°30'00"      | 310                                      | -                        | 35                           | YES                |  |
|                        | NB ON     |                  |                     | (b)           | 590 <sup>(c)</sup>                       | 590 <sup>(c)</sup>       |                              | NO                 | Does not meet standards based on acceleration length.                    |
|                        | NB OFF    | 5,730            | 0.03                | 4°30'00"      | -  | -                        | 60                           | YES                |  |
|                        |           | 2,339            | 0.03                | -             | 740                                      | -                        | 35                           | YES                |  |
| Central Ave            | NB OFF    | 3,274            | 0.03 <sup>(a)</sup> | 4°30'00"      | 1,388                                    | -                        | 45                           | YES                |  |
|                        |           | 5,730            | 0.03 <sup>(a)</sup> | -             | -  | -                        | 60                           | YES                |  |
|                        | NB ON     | 7,640            | 0.02 <sup>(a)</sup> | 50:1          | 1,491                                    | 428                      | 55                           | NO                 | Does not meet standards based on acceleration length.                    |
|                        | SB ON     | 1,359            | 0.06 <sup>(a)</sup> | 50:1          | 1,379                                    | 300                      | 45                           | NO                 | Does not meet standards based on acceleration length.                    |
|                        | SB OFF    | 3,204            | 0.03 <sup>(a)</sup> | 7°43'00"      | 1,144                                    | -                        | 45                           | NO                 | Does not meet standards based on taper rate.                             |
|                        |           | 1,637            | 0.03 <sup>(a)</sup> | -             | -  | -                        | 30                           | YES                |  |
| Emerson Junction       | NB ON     | 1,433            | 0.05 <sup>(a)</sup> | -             | -  | -                        | 40                           | YES                |  |
|                        |           | 1,146            | 0.04 <sup>(a)</sup> | 50:1          | 266                                      | 266                      | 30                           | NO                 | Does not meet standards based on acceleration length.                    |
|                        | SB OFF    | 1,910            | 0.06 <sup>(a)</sup> | 4°30'00"      | 0  | -                        | 50                           | NO                 | Does not meet standards based on deceleration length.                    |
|                        |           | 1,146            | 0.08 <sup>(a)</sup> | -             | -  | -                        | 55                           | NO                 |  |
| 14 <sup>th</sup> St SW | EB OFF    | 230              | 0.08 <sup>(a)</sup> | 4°34'26"      | 503                                      | -                        | 30                           | YES                |  |
|                        | EB SHARED | 246              | 0.06 <sup>(a)</sup> | -             | -  | -                        | 30                           | YES                |  |
|                        | EB ON     | 382              | 0.02 <sup>(a)</sup> | 3°48'51"      | 930                                      | 790                      | <25                          | YES                |  |
|                        | WB ON     | 170              | 0.08 <sup>(a)</sup> | 3°49'00"      | 505                                      | 305                      | 25                           | NO                 | Does not meet standards based on acceleration and gap acceptance length. |
|                        |           | 170              | 0.08 <sup>(a)</sup> | -             | -  | -                        | 25                           | YES                |  |
|                        | WB OFF    | 521              | 0.02 <sup>(a)</sup> | 4°34'26"      | 714                                      | -                        | <25                          | YES                |  |
|                        |           | 382              | 0.07 <sup>(a)</sup> | -             | -  | -                        | 35                           | YES                |  |

<sup>(a)</sup> Value measured in the field.

<sup>(b)</sup> Information unavailable.

<sup>(c)</sup> Estimated based on aerial photography.

### Vertical Alignment

The vertical alignment of a ramp is expressed in terms of the rate of curvature (K-value) and vertical grade. For a crest curve, the minimum curvature depends on the SSD for a given design speed. For sag curves, the minimum curvature depends on rider comfort at a given design speed. The vertical curves on the interchange ramps were evaluated based on a 50-mph design speed. The minimum K-value for a crest or sag vertical curve is 84 or 96, respectively. The maximum grade for a 50-mph design speed is 5 percent.

**Table 3.8** presents the vertical geometric design attributes of the each interchange ramp within the study area. Many of the vertical curves fail to meet the minimum curvature required for a 50-mph design speed. A lower design speed may, however, result in acceptable curvature values. The design speed met based on the K-value is shown in the table. In addition, there are some ramps with grades exceeding 5 percent.

### Interchange Spacing

Providing for proper interchange spacing is necessary to accommodate vehicular maneuvers, for all signing, and to achieve optimal capacity. In urban areas such as Great Falls, interchanges are more likely to be spaced closer together than in rural areas. The recommended spacing from an exit ramp to an entrance ramp is 500 feet. Conversely, 2,000-foot spacing is recommended between an entrance ramp and an exit ramp.<sup>6</sup> These are initial recommendations, and further traffic analysis should be conducted according to procedures outlined in the *Highway Capacity Manual*. **Table 3.9** shows the interchange spacing attributes within the study area.

For locations where recommended spacing lengths are unachievable, auxiliary lanes may be used to accommodate weaving and merging/diverging traffic characteristics. Auxiliary lanes should be provided where the distance between entrance and exit ramps is less than 1,500 feet.<sup>7</sup> No auxiliary lanes are currently provided within the study area.

The 10<sup>th</sup> Avenue South and 14<sup>th</sup> Street Southwest Interchanges along I-315 are spaced closer than 1,500 feet. This location has weaving and merging/diverging characteristics that result in reduced capacity and operational concerns (**See Section 3.3.3**).

---

<sup>6</sup> MDT *Traffic Engineering Manual*, Chapter 29, Section 29.3.6

<sup>7</sup> MDT *Traffic Engineering Manual*, Chapter 29, Section 29.3.7

Table 3.8: Interchange Vertical Alignment Attributes

| Curve Location (RP)                |           | Type  | Length (feet) | Grade Back | Grade Ahead | K Value | Stopping Sight Distance (feet) | Design Speed Met (mph) | Meets Standards | Comments  |
|------------------------------------|-----------|-------|---------------|------------|-------------|---------|--------------------------------|------------------------|-----------------|---|
| Gore Hill                          | SB ON     | Sag   | 200           | -1.0%      | 2.3%        | 60.4    | -                              | 40                     | NO              | Does not meet standards based on rate of curvature.           |
|                                    | SB OFF    | Crest | 450           | -0.9%      | -5.8%       | 93.2    | 448                            | 50                     | NO              | Does not meet standards based on grade.                       |
|                                    | NB ON     | Crest | 300           | -1.3%      | -5.0%       | 80.4    | 439                            | 45                     | NO              | Does not meet standards based on rate of curvature.           |
|                                    | NB OFF    | Sag   | 300           | -1.0%      | 3.9%        | 60.7    | -                              | 35                     | NO              | Does not meet standards based on rate of curvature.           |
|                                    |           | Crest | 300           | 3.9%       | 0.0%        | 76.5    | 425                            | 45                     | NO              | Does not meet standards based on rate of curvature.           |
| 10 <sup>th</sup> Ave S             | SB ON     | Sag   | 700           | -5.5%      | 1.0%        | 107.4   | -                              | 50                     | NO              | Does not meet standards based on grade.                       |
|                                    | SB OFF    | Crest | 300           | -1.0%      | -6.8%       | 51.7    | 336                            | 40                     | NO              | Does not meet standards based on rate of curvature and grade. |
|                                    |           | Sag   | 350           | -6.8%      | -3.2%       | 97.2    | -                              | 50                     | NO              | Does not meet standards based on grade.                       |
|                                    | NB ON     | Crest | 600           | 2.1%       | -0.2%       | 260.9   | 769                            | 70                     | YES             |   |
|                                    | NB OFF    | Sag   | 400           | -4.7%      | -0.8%       | 102.0   | -                              | 50                     | YES             |   |
|                                    |           | Crest | 500           | -0.8%      | -5.0%       | 119.0   | 507                            | 55                     | YES             |   |
| Central Ave                        | NB OFF    | Sag   | 300           | -0.6%      | 3.5%        | 74.1    | -                              | 40                     | NO              | Does not meet standards based on rate of curvature.           |
|                                    |           | Crest | 200           | 3.5%       | 0.0%        | 57.1    | 408                            | 40                     | NO              | Does not meet standards based on rate of curvature.           |
|                                    | NB ON     | Crest | 300           | -2.0%      | -4.0%       | 150.0   | 690                            | 55                     | YES             |   |
|                                    |           | Sag   | 400           | -4.0%      | 1.3%        | 75.8    | -                              | 40                     | NO              | Does not meet standards based on rate of curvature.           |
|                                    | SB ON     | Sag   | 400           | -1.2%      | 2.0%        | 127.0   | -                              | 55                     | YES             |   |
|                                    | SB OFF    | Crest | 300           | 0.0%       | -1.5%       | 200.0   | 869                            | 65                     | YES             |   |
|                                    |           | Sag   | 400           | -1.5%      | 1.7%        | 123.5   | -                              | 55                     | YES             |   |
| Emerson Junction                   | NB ON     | Sag   | 500           | -0.7%      | 4.3%        | 100.0   | -                              | 50                     | YES             |   |
|                                    |           | Crest | 400           | 4.3%       | -1.0%       | 76.2    | 406                            | 45                     | NO              | Does not meet standards based on rate of curvature.           |
|                                    | SB OFF    | Sag   | 250           | 0.0%       | 4.5%        | 55.6    | -                              | 35                     | NO              | Does not meet standards based on rate of curvature.           |
|                                    |           | Crest | 400           | 4.5%       | -0.2%       | 84.4    | 428                            | 50                     | YES             |   |
| I-315 Exit 0 (14 <sup>th</sup> St) | EB OFF    | Crest | 300           | -2.3%      | -3.9%       | 187.4   | 824                            | 60                     | YES             |   |
|                                    |           | Crest | 300           | -3.9%      | -5.0%       | 271.2   | 1126                           | 70                     | YES             |   |
|                                    | EB SHARED | Sag   | 300           | -5.0%      | -0.4%       | 65.4    | -                              | 40                     | NO              | Does not meet standards based on rate of curvature.           |
|                                    | EB ON     | Crest | 400           | 5.0%       | 0.3%        | 85.3    | 430                            | 50                     | YES             |   |
|                                    |           | Crest | 200           | 0.3%       | -2.0%       | 88.1    | 575                            | 50                     | YES             |   |
|                                    | WB ON     | Crest | 250           | -3.1%      | -5.6%       | 99.5    | 555                            | 50                     | NO              | Does not meet standards based on grade.                       |
|                                    | WB OFF    | Crest | 500           | 3.0%       | -4.2%       | 69.4    | 387                            | 45                     | NO              | Does not meet standards based on rate of curvature.           |

**Table 3.9: Interchange Spacing Attributes**

|          | Location                              | Type            | Length (feet) | Meets Standards | Comments                                     |
|----------|---------------------------------------|-----------------|---------------|-----------------|--|
| I-15 NB  | Gore Hill                             | Exit - Entrance | 2,500         | YES             |  |
|          | Gore Hill to 10 <sup>th</sup> Ave S   | Entrance - Exit | 3,640         | YES             |  |
|          | 10 <sup>th</sup> Ave S                | Exit - Entrance | 2,250         | YES             |  |
|          | 10 <sup>th</sup> Ave S to Central Ave | Entrance - Exit | 5,960         | YES             |  |
|          | Central Ave                           | Exit - Entrance | 2,475         | YES             |  |
| I-15 SB  | Central Ave                           | Exit - Entrance | 2,440         | YES             |  |
|          | Central Ave to 10 <sup>th</sup> Ave S | Entrance - Exit | 7,760         | YES             |  |
|          | 10 <sup>th</sup> Ave S                | Exit - Entrance | 1,400         | YES             |  |
|          | 10 <sup>th</sup> Ave S to Gore Hill   | Entrance - Exit | 2,700         | YES             |  |
|          | Gore Hill                             | Exit - Entrance | 2,640         | YES             |  |
| I-315 EB | I-15 to 14 <sup>th</sup> St SW        | Entrance - Exit | 570           | NO              | Does not meet interchange spacing standards. |
|          | 14 <sup>th</sup> St SW                | Exit - Entrance | 1,100         | YES             |  |
| I-315 WB | 14 <sup>th</sup> St SW                | Exit - Entrance | 1,340         | YES             |  |
|          | 14 <sup>th</sup> St SW to I-15        | Entrance - Exit | 780           | NO              | Does not meet interchange spacing standards. |

### Access

The FHWA *Interstate System Access Informational Guide* provides technical and policy support for evaluating new or modified access to the Interstate System. The *Guide* provides information and methods for analyzing Interstate access to support planning, design, and safety analysis. Included in the *Guide* are eight policy requirements that must be addressed when requesting access to the Interstate. One of the policy requirements states that new or revised access points should provide for all traffic movements.<sup>8</sup> Note that the Emerson Junction is currently configured as a partial interchange. According to current policy, new construction of partial interchanges are not supported by FHWA except in extreme circumstances.

### 3.2.3 Intersections

The placement of intersections at the termini of ramps can affect the operation of the Interstate and the crossing roadway. If the intersections were placed too close to each other, they could generate queuing issues that could back up onto the Interstate mainline. Queuing can also affect the operation of the crossroad by creating unnecessary delay. As such, intersection locations must be carefully considered to allow enough space for the necessary turn bays needed to alleviate possible queuing issues. The geometric design of an intersection can also cause unnecessary delay if large vehicles cannot make left- or right-hand turns without interfering with traffic. Interchange ramps and intersections should be designed to accommodate a standard semi-truck with a 67-foot wheelbase (WB-67).

**Table 3.10** presents the analysis of the left-turn bays, when present, at the intersections within the study area. Included in the table are values for the recommended length based on MDT standards, as well as the 95<sup>th</sup> percentile queue based on the existing peak hour traffic analysis. The 95<sup>th</sup> percentile queue is the length at which queue lengths are shorter 95 percent of the time. For example, if the 95<sup>th</sup> percentile

<sup>8</sup> FHWA *Interstate Access Guidelines Informational Guide*, August 2010, page 6.

queue is 100 feet, queue lengths would be shorter than 100 feet 95 percent of the time and longer than 100 feet 5 percent of the time.

**Table 3.10: Left-Turn Bay Lengths**

| Intersection                                    | Peak Hour Turning Volume (vph) | Recommended Length (feet) | 95 <sup>th</sup> Percentile Queue (feet) | Existing Length (feet) | Meets Standards | Comments                                 |
|---|--------------------------------|---------------------------|--|------------------------|-----------------|--|
| <b>14<sup>th</sup> St SW / EB Ramps</b>         | 102                            | 70                        | 25                                       | 300                    | <b>YES</b>      |  |
| <b>14<sup>th</sup> St SW / WB Ramps</b>         | 638                            | (a)                       | 330                                      | 115                    | <b>NO</b>       | Vehicle queuing along interchange ramp.  |
| <b>Fox Farm Rd / 10<sup>th</sup> Ave S (EB)</b> | 242                            | 280                       | 310                                      | 200                    | <b>NO</b>       | Does not meet turn-bay length standards. |
| <b>Fox Farm Rd / 10<sup>th</sup> Ave S (WB)</b> | 486                            | 325 <sup>(b)</sup>        | 310                                      | 350                    | <b>YES</b>      |  |
| <b>Central Ave / NB Ramps (EB)</b>              | 6                              | 50                        | 0  | 50                     | <b>YES</b>      |  |
| <b>Central Ave / SB Ramps (WB)</b>              | 230                            | 192                       | 20                                       | 105                    | <b>NO</b>       | Does not meet turn-bay length standards. |
| <b>Vaughn Road / Central Ave (EB)</b>           | 71                             | 59                        | 10                                       | 150                    | <b>YES</b>      |  |

<sup>(a)</sup> Outside of the range of standards.

<sup>(b)</sup> Existing dual-turn lanes

### Gore Hill Interchange

Four intersections exist within the immediate vicinity of the Gore Hill Interchange. The southbound off-ramp terminates at a four-legged, two-way, stop controlled intersection with Airport Road and I-15 Frontage Road. Traffic turning from the off-ramp to Airport Road has a free-flowing dedicated right-turn lane. One concern at this intersection is the possibility that drivers traveling northbound on I-15 Frontage Road may travel straight and enter the southbound off-ramp traveling in the wrong direction. Another concern is the proximity of this intersection to the intersection of Airport Road and the southbound on-ramp, a distance of approximately 60 feet. Vehicles attempting to make a left turn onto the southbound on-ramp have to contend with any oncoming traffic leaving the southbound off-ramp intersection.

The intersection of Airport Road and the northbound on- and off-ramps is a typical two-way, stop-controlled intersection. This intersection is located approximately 80 feet from the intersection of Airport Road and Tri-Hill Frontage Road. Traffic performing a left-hand turn onto Tri-Hill Frontage Road has to contend with traffic making a right turn off of the northbound off-ramp, in addition to the traffic traveling southeast across the interchange. The distance between the southbound on-ramp and the northbound ramps is approximately 370 feet.

### 14th Street Southwest Interchange

The intersections at the ramp termini at 14<sup>th</sup> Street Southwest are both four-legged signalized intersections. They are approximately 925 feet apart and appear to meet geometric spacing standards. Left-turn bays are provided at both intersections. The intersection of 14<sup>th</sup> Street Southwest and the westbound ramps has a high volume of left-turning vehicles along the east leg. During the PM peak-hour, left-turn volume exceeds the range of recommended turn bay lengths provided by MDT. Vehicle queuing was noted along the interchange ramp approaching the mainline Interstate.



### Fox Farm Road

The intersection of Fox Farm and 10<sup>th</sup> Avenue South is a four-legged, stop-controlled intersection. This intersection is at the terminus of I-315. A single left-turn bay is provided along the eastbound leg, and dual left-turn lanes are provided along the westbound leg. The left-turn bay along the eastbound leg does not appear to meet existing standards. During the on-site evaluation, observers noted that the queue length from the eastbound left-turn lane often exceeded available storage during the PM peak hour.

### Central Avenue Interchange

The Central Avenue Interchange is a diamond interchange with stop-controlled intersections at the ramp terminals and raised medians to provide protected turn-bays. The intersections are spaced approximately 450 feet apart, and they appear to meet geometric design standards. Both on-ramps include channelized right-turn lanes, which require vehicles to merge at the entrance to the ramp.

The intersection along the northbound ramps includes an eastbound left-turn bay that appears to meet minimum length standards. The southbound ramp intersection has a dedicated westbound left-turn lane for vehicles accessing the Interstate. The existing turn-bay length does not appear to meet existing standards; however, minimal vehicle queuing was shown by the traffic analysis.

The southbound off-ramp has a channelized right-turn lane and a dedicated receiving lane along Central Avenue. However, a stop sign requires vehicles to stop before entering Central Avenue. At the intersection of the southbound off-ramp and Central Avenue, three westbound lanes merge to a single lane within approximately 300 feet. There does not appear to be proper signage and/or markings indicating the dropping of two travel lanes.

### Emerson Junction

The intersections located at Emerson Junction are both three-legged, unsignalized intersections and are spaced approximately 750 feet apart. The northbound on-ramp intersection with Vaughn Road has a right-turn slip lane for traffic traveling westbound on Vaughn Road. Eastbound traffic has a 40-foot, left-turn storage area between Vaughn Road and the northbound on-ramp. The southbound off-ramp has a single lane serving both left- and right-turning traffic. The southbound off-ramp intersection is scheduled for reconstruction, which will result in a shift to the northwest to provide a more standard “T” intersection.

## 3.3 TRAFFIC CHARACTERISTICS

An evaluation of traffic characteristics was completed using available data provided by MDT, as well as field-collected data. Peak-hour, turning-movement counts were conducted at 12 intersections within the study area. Mainline traffic volume counts were also completed at nine locations along the Interstate. Additional traffic information for vehicle speeds, driving patterns, and lane-changing interactions was also documented at various locations along the corridor. The following sections provide details about the existing traffic characteristics of the corridor. Detailed data is included in the **Appendices B, C, and D**. **Figure 3.1** shows the existing traffic conditions of the study area.

### 3.3.1 Traffic Volumes

MDT administers annual traffic count data at 12 locations within the study area. MDT, the city of Great Falls, or Cascade County conducts the annual traffic counts, which are adjusted to represent yearly averages for traffic. In addition, an automatic traffic recorder (ATR) is located outside of the study area approximately 3 miles to the northwest of Emerson Junction. The ATR collects traffic data year-round

from sensors embedded in the roadway. Data from the other traffic count sites are collected annually at limited times by using pneumatic tube counters.

In addition to existing conditions, MDT provided historic data for the traffic count sites within the study area. The average annual daily traffic (AADT) on I-15 ranges from 5,950 vehicles per day (vpd) north of Central Avenue, to as high as 14,670 vpd north of Gore Hill. Volumes on I-315 approach 25,000 vpd west of Fox Farm Road. The AADT on the non-interstate roads ranges from 4,555 vpd on the Vaughn Frontage Road to 29,800 vpd on 10th Avenue South. **Table 3.11** shows the growth rates experienced within the study area over various time intervals.

**Table 3.11: Historic Average Annual Growth Rates**

| Location                     |                             | 2013 AADT | 1994-2013 | 2000-2013 | 2007-2013 |
|------------------------------|-----------------------------|-----------|-----------|-----------|-----------|
| <b>I-15</b>                  | S of Gore Hill              | 6,370     | 1.4%      | 0.4%      | 0.1%      |
| <b>I-15</b>                  | N of Gore Hill              | 14,670    | 1.6%      | 1.3%      | -0.1%     |
| <b>I-15</b>                  | N of 10 <sup>th</sup> Ave   | 10,550    | 1.5%      | 1.3%      | 0.3%      |
| <b>I-15</b>                  | N of Central Ave            | 5,950     | 1.2%      | 0.5%      | -1.8%     |
| <b>I-15</b>                  | N of Emerson                | 9,090     | 0.9%      | 0.1%      | -1.2%     |
| <b>I-315</b>                 | W of 14 <sup>th</sup> St SW | 15,140    | (a)       | (a)       | 0.8%      |
| <b>I-315</b>                 | W of Fox Farm               | 24,680    | 4.2%      | 1.8%      | 0.1%      |
| <b>31<sup>st</sup> St SW</b> | S of Interchange            | 8,360     | 5.6%      | 4.7%      | -0.8%     |
| <b>Airport Dr</b>            | N of Interchange            | 3,640     | -0.1%     | 0.7%      | 2.3%      |
| <b>10<sup>th</sup> Ave S</b> | Warden Bridge               | 29,800    | 1.5%      | 1.5%      | 0.4%      |
| <b>Central Ave</b>           | E of Interchange            | 12,514    | 0.0%      | 0.5%      | 3.0%      |
| <b>Central Ave</b>           | W of Interchange            | 7,746     | 0.6%      | 1.5%      | 4.4%      |
| <b>Vaughn Rd</b>             | E of Interchange            | 6,530     | 0.0%      | -0.4%     | 1.5%      |
| <b>Vaughn Rd</b>             | W of Interchange            | 4,555     | 0.4%      | 0.7%      | 7.4%      |

Source: MDT Data and Statistics Bureau, Traffic Data Collection Section, 2014

<sup>(a)</sup> Data unavailable

### 3.3.2 Mainline Operation

The operational condition of a mainline Interstate highway is often characterized by the level of service (LOS). LOS is a qualitative description of a driver's experience on a highway or facility, as defined in the 2010 Highway Capacity Manual (HCM). LOS of a mainline freeway segment is affected by geometric and traffic characteristics. LOS is determined based on the traffic density of the highway in terms of passenger cars per mile per lane (pc/mi/ln). The inputs used to calculate traffic density include traffic volume, free-flow speed, percentage of trucks and busses, driver population, peak-hour factors, number of travel lanes, and the terrain. LOS can range from A to F with A representing free flow conditions and F representing heavily congested conditions. Analysis of I-15 was performed using Highway Capacity Software (HCS) 2010. The LOS was evaluated during AM and PM peak hour conditions. **Table 3.12** shows the results of the LOS analysis.

**Table 3.12: Mainline Level of Service**

| Location |                                | Direction  | AM Peak Hour |                    | PM Peak Hour |                    |
|----------|--------------------------------|------------|--------------|--------------------|--------------|--------------------|
|          |                                |            | LOS          | Density (pc/mi/ln) | LOS          | Density (pc/mi/ln) |
| I-15     | South of Gore Hill             | Northbound | A            | 2.1                | A            | 2.1                |
|          |                                | Southbound | A            | 2.3                | A            | 3.3                |
|          | North of Gore Hill             | Northbound | A            | 4.8                | A            | 7.3                |
|          |                                | Southbound | A            | 4.7                | A            | 6.0                |
|          | South of Central Ave           | Northbound | A            | 3.0                | A            | 4.6                |
|          |                                | Southbound | A            | 3.0                | A            | 4.5                |
|          | North of Central Ave           | Northbound | A            | 3.2                | A            | 3.0                |
|          |                                | Southbound | A            | 2.0                | A            | 3.2                |
|          | North of Emerson Junction      | Northbound | A            | 2.8                | A            | 5.9                |
|          |                                | Southbound | A            | 5.0                | A            | 4.3                |
| I-315    | West of 14 <sup>th</sup> St SW | Eastbound  | A            | 5.7                | A            | 7.5                |
|          |                                | Westbound  | A            | 5.6                | A            | 6.5                |
|          | East of 14 <sup>th</sup> St SW | Eastbound  | A            | 10.9               | A            | 10.7               |
|          |                                | Westbound  | A            | 6.0                | B            | 12.4               |

The MDT *Traffic Engineering Manual* states that a LOS of B or better is recommended for both urban and rural freeways. I-15 is shown to operate at LOS A during the existing peak hours within the study area. I-315 also operates at LOS A, with the exception of the westbound lane east of 14<sup>th</sup> Street Southwest, which operates at LOS B during the PM peak hour.

### Vehicle Speeds

Vehicle speed data was collected along the I-15 southbound mainline between the 10<sup>th</sup> Avenue South and Gore Hill Interchanges. This location has a steep upgrade, and it has been noted to have speed differentials between the left and right travel lanes in the southbound direction. The speed data were collected over 24 hours in July 2014. The existing speed limit at this location is 65 mph.

**Table 3.13** shows the results of the speed data collection. Included in the table are the 85<sup>th</sup> percentile speed, the average speed, and the pace. The primary speed data factor for determining the validity of the posted speed limit is the 85<sup>th</sup> percentile speed. The 85<sup>th</sup> percentile speed is that speed at or below which 85 percent of vehicles are traveling. For example, if the 85<sup>th</sup> percentile speed is 65 mph, it means that 85 percent of vehicles are traveling 65 mph or below. The pace is also an important factor, and it represents the 10-mph range within which most vehicles travel.

**Table 3.13: Vehicle Speed Data**

| Location       |            | Volume | Speed Limit (mph) | 85 <sup>th</sup> Percentile Speed (mph) | Average Speed | Pace (mph) |     |
|----------------|------------|--------|-------------------|---|---------------|------------|-----|
| <b>I-15 SB</b> | Right Lane | 7,039  | 65                | 68.2                                    | 59.9          | 60 - 70    | 49% |
|                | Left Lane  | 855    | 65                | 74.4                                    | 60.6          | 65 - 75    | 57% |

As shown in the table, it appears that vehicles are generally traveling at higher speeds in the left lane than in the right lane. The 85<sup>th</sup> percentile speed for the right lane is more than 6 mph lower than the left lane. The pace of the left lane is also shown to be higher than in the right lane. Due to the steep upgrade

and the mix of vehicle types, there are often slow-moving vehicles mixed with faster ones at this location. A higher percentage of vehicles in the pace represents fairly even travel speeds, while a lower percent within the pace may point to high-speed variations. At this location, the percentage of vehicles within the pace is relatively low. This is an indicator of large distribution of vehicle speeds. The varying vehicle speeds is likely a result of a mixture of slower moving heavy truck traffic combined with faster moving passenger vehicles.

#### 10<sup>th</sup> Avenue South / Gore Hill Origin-Destination

An origin-destination (OD) study was conducted between the 10<sup>th</sup> Avenue South and Gore Hill Interchanges. The intent of the study was to evaluate the travel patterns between the 10<sup>th</sup> Avenue South and Gore Hill Interchanges in the southbound direction. The study found that during the AM peak hour approximately 65 percent of vehicles that enter the Interstate at 10<sup>th</sup> Avenue South immediately exit at Gore Hill. During the PM peak hour, this percentage was found to be approximately 48 percent.

### 3.3.3 Interchange Ramps

Connection between the mainline Interstate highway and local roads is provided by a dedicated ramp road. Similar to the Interstate mainline, the performance of the interchange ramps can be evaluated for LOS. As with traditional roadways, interchange ramps are impacted by the amount of traffic congestion present. For on-ramps, the capacity of the ramp roadway is rarely an issue due to generally free-flowing conditions with no traffic control. For off-ramps, however, congestion on the ramp can cause queuing that may cause failure at the ramp-to-freeway junction. **Table 3.14** provides the results of the LOS analysis for the interchange ramps.

As with the Interstate mainline, a LOS of B or better is recommended for the interchange ramps. Each of the ramps along I-15 within the study area is shown to function at LOS A and appear to have available capacity. All ramps along I-315 function at LOS B or better during the peak hours.

**Table 3.14: Interchange Ramp Level of Service**

| Location                     |             | AM Peak Hour |                       | PM Peak Hour |                       |
|------------------------------|-------------|--------------|-----------------------|--------------|-----------------------|
|                              |             | LOS          | Density<br>(pc/mi/ln) | LOS          | Density<br>(pc/mi/ln) |
| <b>Gore Hill</b>             | NB On-ramp  | <b>A</b>     | 3.9                   | <b>A</b>     | 8.7                   |
|                              | NB Off-ramp | <b>A</b>     | 3.7                   | <b>A</b>     | 3.7                   |
|                              | SB On-ramp  | <b>A</b>     | 0.0                   | <b>A</b>     | 0.0                   |
|                              | SB Off-ramp | <b>A</b>     | 6.2                   | <b>A</b>     | 7.1                   |
| <b>10<sup>th</sup> Ave S</b> | NB On-ramp  | <b>A</b>     | 6.5                   | <b>A</b>     | 8.6                   |
|                              | NB Off-ramp | <b>A</b>     | 2.9                   | <b>A</b>     | 5.7                   |
|                              | SB On-ramp  | <b>A</b>     | 3.2                   | <b>A</b>     | 4.7                   |
|                              | SB Off-ramp | <b>A</b>     | 3.4                   | <b>A</b>     | 5.1                   |
| <b>14<sup>th</sup> St SW</b> | EB On-ramp  | <b>B</b>     | 13.5                  | <b>B</b>     | 12.9                  |
|                              | EB Off-ramp | <b>A</b>     | 5.1                   | <b>A</b>     | 6.9                   |
|                              | WB On-ramp  | <b>A</b>     | 8.3                   | <b>A</b>     | 9.2                   |
|                              | WB Off-ramp | <b>A</b>     | 3.4                   | <b>B</b>     | 10.1                  |
| <b>Central Ave</b>           | NB On-ramp  | <b>A</b>     | 0.0                   | <b>A</b>     | 0.2                   |
|                              | NB Off-ramp | <b>A</b>     | 0.0                   | <b>A</b>     | 0.0                   |
|                              | SB On-ramp  | <b>A</b>     | 1.5                   | <b>A</b>     | 3.6                   |
|                              | SB Off-ramp | <b>A</b>     | 0.0                   | <b>A</b>     | 0.0                   |
| <b>Emerson Junction</b>      | NB On-ramp  | <b>A</b>     | 2.8                   | <b>A</b>     | 8.0                   |
|                              | SB Off-ramp | <b>A</b>     | 6.8                   | <b>A</b>     | 5.9                   |

### I-315 Interchanges

The I-315 Interstate has unique urban traffic characteristics. The Interstate mainline is less than a mile long and begins at the 10<sup>th</sup> Avenue South Interchange. The 14<sup>th</sup> Street Southwest Interchange is located close to the 10<sup>th</sup> Avenue South Interchange, which causes traffic flow issues related to vehicle weaving and merging/diverging. A video of the I-315 Interstate was recorded during the peak hours to evaluate the influence of traffic movements to the area. From the video, traffic movement volumes were counted during the peak hours.

**Table 3.15** shows the peak hour volumes along the influencing ramps, as well as the destination of the vehicles expressed as a percentage. For example, during the AM peak hour, 338 vehicles traveled along the I-15 northbound off-ramp at the 10<sup>th</sup> Avenue South Interchange. Of those 338 vehicles, 10 percent exited at 14<sup>th</sup> Street Southwest, 58 percent stayed on I-315 in the right lane, and 32 percent merged to the left lane on I-315.

**Table 3.15: I-315 Interchange Volumes**

|                              | Location                         | AM Peak Hour | PM Peak Hour |
|------------------------------|----------------------------------|--------------|--------------|
| <b>10<sup>th</sup> Ave S</b> | <b>I-15 NB Off</b>               | <b>338</b>   | <b>436</b>   |
|                              | <i>14<sup>th</sup> St SW Off</i> | 10%          | 22%          |
|                              | <i>I-315 Right Lane</i>          | 58%          | 57%          |
|                              | <i>I-315 Left Lane</i>           | 32%          | 21%          |
|                              | <b>I-15 SB Off</b>               | <b>192</b>   | <b>239</b>   |
|                              | <i>14<sup>th</sup> St SW Off</i> | 12%          | 35%          |
|                              | <i>I-315 Right Lane</i>          | 10%          | 10%          |
|                              | <i>I-315 Left Lane</i>           | 78%          | 55%          |
| <b>14<sup>th</sup> St SW</b> | <b>I-315 EB On</b>               | <b>498</b>   | <b>523</b>   |
|                              | <i>I-315 Right Lane</i>          | 48%          | 55%          |
|                              | <i>I-315 Left Lane</i>           | 52%          | 45%          |
|                              | <b>I-315 WB On</b>               | <b>122</b>   | <b>161</b>   |
|                              | <i>I-15 NB On</i>                | 62%          | 49%          |
|                              | <i>I-15 SB On, Right Lane</i>    | 33%          | 46%          |
|                              | <i>I-15 SB On, Left Lane</i>     | 5%           | 5%           |

### 3.3.4 Intersections

A LOS analysis was performed at 12 intersections within the study area. The LOS analysis was completed using PTV Vistro software during the AM and PM peak hours. For intersections, LOS is based on vehicle delay, which is influenced by the number of stops, available gaps, and impediments caused by other vehicles. A LOS of A represents little to no delay, while a LOS of F represents substantial delay. A LOS of C or better is generally recommended. The results of the peak-hour, intersection LOS analysis are shown in **Table 3.16**.

For signalized intersections, the LOS is based on the average stopped delay per vehicle. The procedures used to evaluate signalized intersections are based on detailed information on geometry, lane-use, signal timing, peak-hour volumes, arrival types, and other parameters. This information is then used to calculate delays and determine the capacity of each intersection.

LOS for two-way, stop-controlled intersections is based on the delay experienced by each movement within the intersection, rather than on the overall stopped delay per vehicle at the intersection. LOS is defined by the movement with the highest amount of delay. As a result, the intersection LOS may not accurately reflect the performance of the intersection as a whole. For example, a single, left-turning vehicle along the minor, stop-controlled approach may experience high amounts of delay due to a lack of available gaps. This movement may, however, only represent a small portion of the total intersection volume.



**Table 3.16: Intersection Level of Service**

| Intersection Name                   | Control Type | AM Peak Hour  |          | PM Peak Hour  |          |
|-------------------------------------|--------------|---------------|----------|---------------|----------|
|                                     |              | Delay (s/veh) | LOS      | Delay (s/veh) | LOS      |
| Tri Hill and Frontage Airport Rd    | Two-way stop | 13.5          | <b>B</b> | 14.5          | <b>B</b> |
| I-15 NB and Airport Rd              | Two-way stop | 16.9          | <b>C</b> | 55.4          | <b>F</b> |
| I-15 SB On and Airport Rd           | Two-way stop | 8.6           | <b>A</b> | 11.0          | <b>B</b> |
| I-15 SB Off and Airport Rd          | Two-way stop | 12.7          | <b>B</b> | 35.3          | <b>E</b> |
| 14 <sup>th</sup> St SW and I-315 EB | Signalized   | 14.4          | <b>B</b> | 13.0          | <b>B</b> |
| 14 <sup>th</sup> St SW and I-315 WB | Signalized   | 23.0          | <b>C</b> | 19.4          | <b>B</b> |
| Fox Farm and I-315                  | Signalized   | 45.3          | <b>D</b> | 38.5          | <b>D</b> |
| Central Ave and I-15 SB             | Two-way Stop | 28.0          | <b>D</b> | 42.0          | <b>E</b> |
| Central Ave and I-15 NB             | Two-way Stop | 19.9          | <b>C</b> | 29.1          | <b>D</b> |
| Central Ave and Vaughn Rd           | Two-way Stop | 27.1          | <b>D</b> | 65.0          | <b>F</b> |
| Vaughn Rd and I-15 SB               | Two-way Stop | 10.1          | <b>B</b> | 10.1          | <b>B</b> |
| Vaughn Rd and I-15 NB               | Two-way Stop | 7.3           | <b>A</b> | 7.3           | <b>A</b> |

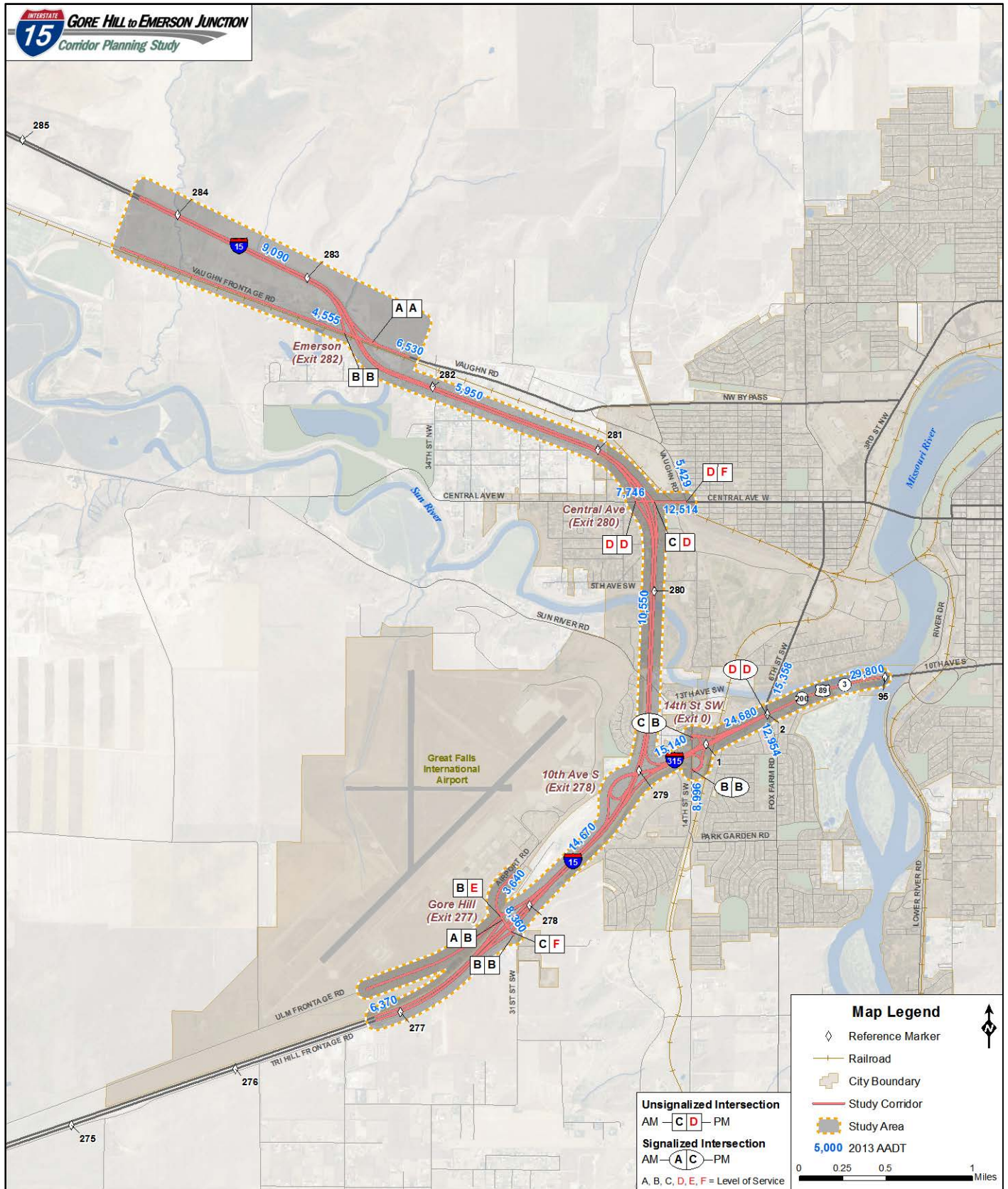


Figure 3.1: Existing Traffic Conditions

### 3.4 SAFETY

The MDT Traffic and Safety Bureau provided crash data for all of Cascade County from January 1, 2009, to December 31, 2013. Crash data for the study area were selected using GIS. Records show 525 crashes occurring within the study area during the crash analysis period. Four crashes resulted in fatalities, eight crashes resulted in incapacitating injuries, 41 crashes produced non-incapacitating evident injuries, and 71 crashes resulted in possible injuries. An incapacitating injury is defined as an injury, other than a fatality, which prevents the injured person from walking, driving, or normally continuing the activities the person was capable of performing before injury. **Figure 3.2** presents the spatial distribution of the crash data for the five-year analysis period.

**Table 3.17** provides a comparison of the crash rate, crash severity index, and crash severity rate within the study area. The crash data presented in the table are based on crashes occurring from calendar year 2009 through 2013. Crash rates are defined as the number of crashes per million vehicle miles of travel. The crash severity index is the ratio of the sum of the level of crash degree to the total number of crashes. Crash severity rate is determined by multiplying the crash rate by the crash severity index.

Between 2008 and 2012, the statewide average rural crash rate, severity index, and severity rate for the Interstate system was 0.90, 1.83, and 1.65, respectively. For urban Interstates during this same time period, the statewide average crash rate, severity index, and severity rate was 1.21, 1.72, and 2.08, respectively.

**Table 3.17: Crash Statistics**

|       | Segment   | Begin<br>RP | End<br>RP | #<br>Fatal | #<br>Incap | Total<br>Crashes | AADT 3-<br>year<br>Average | Crash<br>Rate | Severity<br>Index | Severity<br>Rate |
|-------|---|-------------|-----------|------------|------------|------------------|----------------------------|---------------|-------------------|------------------|
| I-15  | Southwest of Gore Hill                                      | 270.4       | 277.8     | 0          | 0          | 18               | 6,360                      | 1.55          | 1.00              | 1.55             |
|       | Northeast of Gore Hill                                      | 277.8       | 278.9     | 1          | 2          | 70               | 13,474                     | 2.85          | 1.16              | 3.29             |
|       | 10th Ave South to Central Ave                               | 279.9       | 280.5     | 0          | 1          | 32               | 9,786                      | 1.79          | 1.06              | 1.90             |
|       | Central Ave to Emerson Junction                             | 280.5       | 282.5     | 0          | 0          | 48               | 6,486                      | 4.06          | 1.00              | 4.06             |
|       | North of Emerson Junction                                   | 282.5       | 286.5     | 2          | 1          | 43               | 9,470                      | 2.49          | 1.37              | 3.41             |
| I-315 | 10 <sup>th</sup> Ave South to 14 <sup>th</sup> St Southwest | 0           | 0.3       | 0          | 0          | 13               | 15,890                     | 0.45          | 1.00              | 0.45             |
|       | 14 <sup>th</sup> St Southwest to Fox Farm                   | 0.3         | 1.4       | 0          | 2          | 114              | 25,870                     | 2.41          | 1.04              | 2.50             |
|       | East of Fox Farm  | 94.4        | 95.7      | 0          | 0          | 137              | 30,890                     | 2.43          | 1.00              | 2.43             |



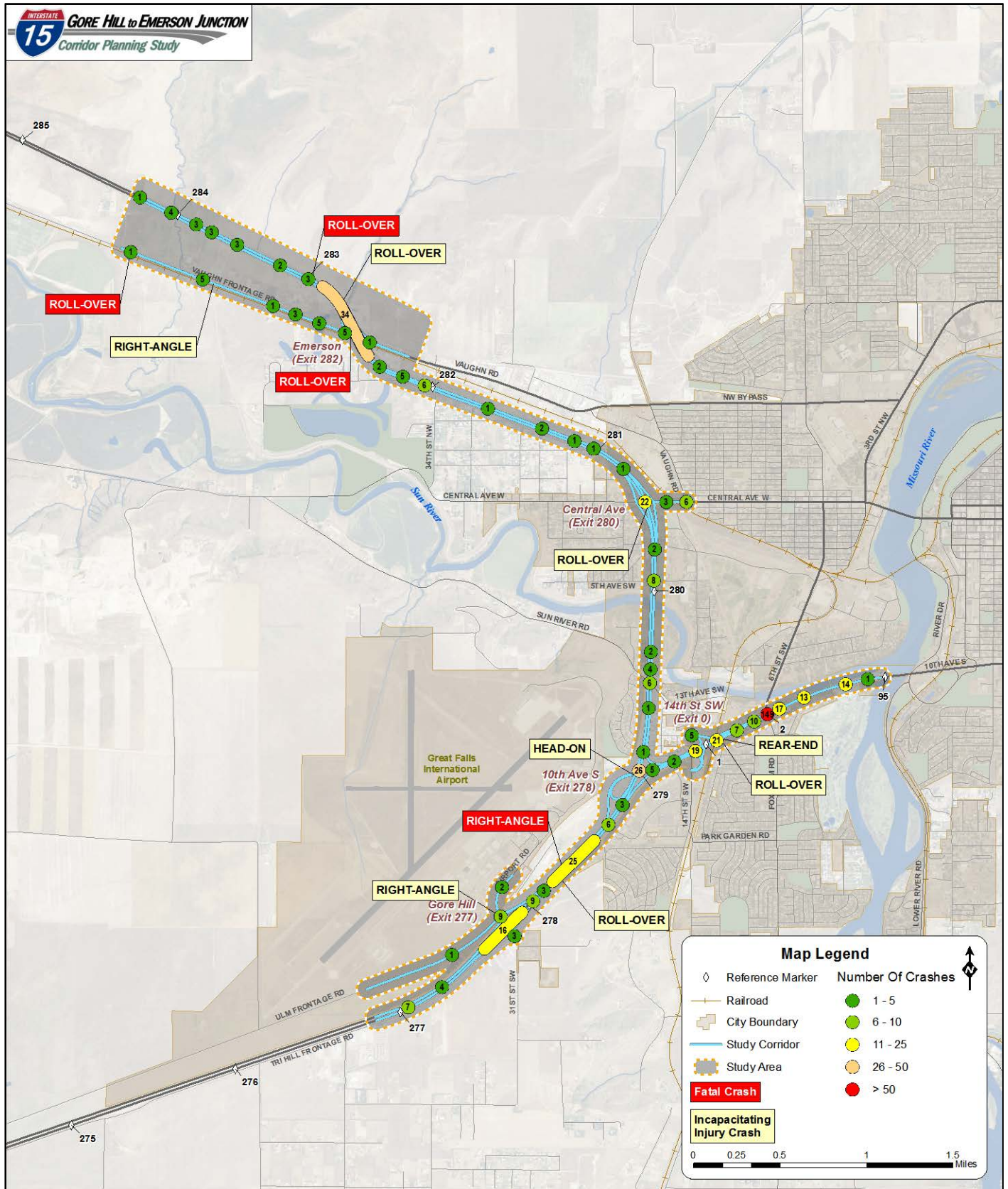


Figure 3.2: Crash Locations

### 3.4.1 Safety Trends, Contributing Factors, and Crash Clusters

On average, approximately 105 crashes occurred each year during the crash analysis period. Multi-vehicle crashes accounted for nearly 53 percent of crashes, with approximately 62 percent of all crashes occurring in dry conditions. Furthermore, 61 percent of crashes occurred during daylight. Approximately 38 percent of crashes during the analysis period happened when roads were icy, snowy, or wet. The primary contributing factors listed in crashes during the analysis period included careless driving (32 percent of crashes), driving too fast for conditions (21 percent of crashes), disregarding traffic markings/signs/signals (16 percent of crashes), and driving under the influence of alcohol/drugs (14 percent of crashes).

Of the vehicles involved in a crash, 92 percent were passenger vehicles (automobiles, pickups, SUVs, etc.). Records show 15 crashes involving motorcycles, 38 crashes involving heavy trucks with trailers, and 2 crashes involving buses.

The main observed crash trends are rear-end collisions (178) followed by fixed-object collisions (138). Of the fixed-object collisions, 90 of the collisions list contact with guardrails, median barriers, bridge rails, or impact attenuators as the first harmful event. Rear-end collisions are clustered on I-315 and 10<sup>th</sup> Avenue South. Clusters of fixed-object collisions are present between the Gore Hill and 10<sup>th</sup> Avenue South Interchanges (11 crashes), I-15 underpass of Sun River Road (7 crashes), I-15 bridge over the Sun River (5 crashes), Central Avenue Interchange (7 crashes), Emerson Junction Interchange (15 crashes), and I-315 from RP 0 to RP 1 (21 crashes).

Approximately 8 percent of reported crashes resulted in rollovers (44 crashes). Two clusters were identified between the Gore Hill and 10<sup>th</sup> Avenue South Interchanges (7 crashes) and at the Emerson Junction Interchange (10 crashes). Each of the seven rollover crashes between the Gore Hill and the 10<sup>th</sup> Avenue South Interchanges occurred with dry road conditions.

The road condition was listed as icy or snow-covered in 138 crashes. These crashes appear to be clustered between the Gore Hill and 10<sup>th</sup> Avenue South Interchanges (12 crashes), I-15 underpass of Sun River Road (6 crashes), Emerson Junction Interchange (19 crashes), and I-315 between 14<sup>th</sup> Street Southwest Interchange and Fox Farm (60 crashes).

## 4.0 PROJECTED TRANSPORTATION SYSTEM

Projected transportation conditions were analyzed to estimate how traffic patterns and characteristics may change compared to existing conditions. The analysis was based on known existing conditions and anticipated land development expected to occur out to 2035. The travel demand model developed for the *Great Falls Area LRTP – 2014* was used to determine growth rates for the study area. **Table 4.1** shows the average annual growth rate (AAGR) up to 2035, as defined by the traffic demand model. The AAGR values were applied to known traffic count locations to project 2035 AADT volumes.

**Table 4.1: Projected Traffic Volumes**

| Location                     |                             | 2013 AADT | Traffic Model Projected AAGR <sup>(a)</sup> | 2035 Projected AADT |
|------------------------------|-----------------------------|-----------|---|---------------------|
| <b>I-15</b>                  | S of Gore Hill              | 6,370     | 0.9%  | 7,681               |
| <b>I-15</b>                  | N of Gore Hill              | 14,670    | 1.9%  | 22,358              |
| <b>I-15</b>                  | N of 10 <sup>th</sup> Ave   | 10,550    | 2.1%  | 16,693              |
| <b>I-15</b>                  | N of Central Ave            | 5,950     | 0.6%  | 6,804               |
| <b>I-15</b>                  | N of Emerson                | 9,090     | 0.9%  | 10,998              |
| <b>I-315</b>                 | W of 14 <sup>th</sup> St SW | 15,140    | 0.8%  | 17,979              |
| <b>I-315</b>                 | W of Fox Farm               | 24,680    | 0.7%  | 28,546              |
| <b>31<sup>st</sup> St SW</b> | S of Interchange            | 8,360     | 2.3%  | 13,678              |
| <b>Airport Dr</b>            | N of Interchange            | 3,640     | 4.6%  | 9,887               |
| <b>10<sup>th</sup> Ave S</b> | Warden Bridge               | 29,800    | 0.7%  | 34,630              |
| <b>Central Ave</b>           | E of Interchange            | 12,514    | 2.4%  | 21,270              |
| <b>Central Ave</b>           | W of Interchange            | 7,746     | 0.1%  | 7,974               |
| <b>Vaughn Rd</b>             | E of Interchange            | 6,530     | 1.4%  | 8,835               |
| <b>Vaughn Rd</b>             | W of Interchange            | 4,555     | 1.1%  | 5,762               |

<sup>(a)</sup> AAGRs were calculated from the traffic model developed for the *Great Falls Area LRTP – 2014*.

The growth rates from the travel demand model were used to project Interstate mainline peak hour volumes. A LOS analysis was conducted for the Interstate under projected 2035 conditions. **Table 4.2** presents the resulting LOS values for both the AM and PM peak hours. As indicated in the table, all segments along I-15 and I-315 are projected to remain at a LOS B or better under 2035 conditions.

The traffic volumes along the interchange ramps were similarly projected to 2035 using growth rates defined in the travel demand model. The projected LOS of the interchange ramps is presented in **Table 4.3**. All of the interchange ramps are projected to remain within the acceptable bounds of LOS B put forth by MDT.



Table 4.2: Projected Mainline LOS

| Location     |                                | Direction  | AM Peak Hour |                    | PM Peak Hour |                    |
|--------------|--------------------------------|------------|--------------|--------------------|--------------|--------------------|
|              |                                |            | LOS          | Density (pc/mi/ln) | LOS          | Density (pc/mi/ln) |
| <b>I-15</b>  | South of Gore Hill             | Northbound | <b>A</b>     | 2.6                | <b>A</b>     | 2.6                |
|              |                                | Southbound | <b>A</b>     | 3.1                | <b>A</b>     | 4.0                |
|              | North of Gore Hill             | Northbound | <b>A</b>     | 7.4                | <b>B</b>     | 11.3               |
|              |                                | Southbound | <b>A</b>     | 7.2                | <b>A</b>     | 9.3                |
|              | South of Central Ave           | Northbound | <b>A</b>     | 4.8                | <b>A</b>     | 7.4                |
|              |                                | Southbound | <b>A</b>     | 4.8                | <b>A</b>     | 7.2                |
|              | North of Central Ave           | Northbound | <b>A</b>     | 3.7                | <b>A</b>     | 3.4                |
|              |                                | Southbound | <b>A</b>     | 2.4                | <b>A</b>     | 3.7                |
|              | North of Emerson Junction      | Northbound | <b>A</b>     | 3.4                | <b>A</b>     | 6.5                |
|              |                                | Southbound | <b>A</b>     | 6.1                | <b>A</b>     | 5.2                |
| <b>I-315</b> | West of 14 <sup>th</sup> St SW | Eastbound  | <b>A</b>     | 6.7                | <b>A</b>     | 8.9                |
|              |                                | Westbound  | <b>A</b>     | 6.3                | <b>A</b>     | 7.3                |
|              | East of 14 <sup>th</sup> St SW | Eastbound  | <b>A</b>     | 10.9               | <b>B</b>     | 12.5               |
|              |                                | Westbound  | <b>A</b>     | 6.7                | <b>B</b>     | 13.8               |

Table 4.3: Projected Interchange Ramp LOS

| Location                     |             | AM Peak Hour |                    | PM Peak Hour |                    |
|------------------------------|-------------|--------------|--------------------|--------------|--------------------|
|                              |             | LOS          | Density (pc/mi/ln) | LOS          | Density (pc/mi/ln) |
| <b>Gore Hill</b>             | NB On-Ramp  | <b>A</b>     | 9.3                | <b>B</b>     | 17.5               |
|                              | NB Off-Ramp | <b>A</b>     | 5.7                | <b>A</b>     | 5.6                |
|                              | SB On-Ramp  | <b>A</b>     | 0.3                | <b>A</b>     | 1.2                |
|                              | SB Off-Ramp | <b>A</b>     | 9.1                | <b>B</b>     | 11.5               |
| <b>10<sup>th</sup> Ave S</b> | NB On-Ramp  | <b>A</b>     | 8.4                | <b>B</b>     | 11.5               |
|                              | NB Off-Ramp | <b>A</b>     | 5.9                | <b>B</b>     | 10.3               |
|                              | SB On-Ramp  | <b>A</b>     | 6.2                | <b>A</b>     | 8.3                |
|                              | SB Off-Ramp | <b>A</b>     | 6.5                | <b>A</b>     | 9.7                |
| <b>14<sup>th</sup> St SW</b> | EB On-Ramp  | <b>B</b>     | 16.1               | <b>B</b>     | 15.4               |
|                              | EB Off-Ramp | <b>A</b>     | 6.1                | <b>A</b>     | 8.2                |
|                              | WB On-Ramp  | <b>A</b>     | 9.1                | <b>B</b>     | 10.1               |
|                              | WB Off-Ramp | <b>A</b>     | 4.0                | <b>B</b>     | 11.4               |
| <b>Central Ave</b>           | NB On-Ramp  | <b>A</b>     | 0.0                | <b>A</b>     | 1.3                |
|                              | NB Off-Ramp | <b>A</b>     | 0.0                | <b>A</b>     | 0.0                |
|                              | SB On-Ramp  | <b>A</b>     | 6.3                | <b>B</b>     | 10.1               |
|                              | SB Off-Ramp | <b>A</b>     | 0.0                | <b>A</b>     | 0.0                |
| <b>Emerson Junction</b>      | NB On-Ramp  | <b>A</b>     | 3.7                | <b>B</b>     | 10.3               |
|                              | SB Off-Ramp | <b>A</b>     | 8.0                | <b>A</b>     | 7.0                |

Intersection volumes were projected to 2035 by applying growth rates along each intersection approach leg as defined by the travel demand model. The projected intersection LOS results are presented in **Table 4.4**. Similar to the existing LOS, many of the poor-performing intersections are two-way, stop-controlled intersections. All intersections on Central Avenue are projected to operate at a LOS of F if no changes are made before 2035. At Gore Hill, all but the southbound on-ramp intersections are expected to operate at a poor LOS. The three signalized intersections are projected to continue operating at levels similar to their current performance.

**Table 4.4: Projected Intersection LOS**

| Intersection Name                   | Control Type | AM Peak Hour  |          | PM Peak Hour  |          |
|-------------------------------------|--------------|---------------|----------|---------------|----------|
|                                     |              | Delay (s/veh) | LOS      | Delay (s/veh) | LOS      |
| Tri Hill and Frontage Airport Rd    | Two-way stop | 27.3          | <b>D</b> | 43.7          | <b>E</b> |
| I-15 NB and Airport Rd              | Two-way stop | 44.2          | <b>E</b> | (a)           | <b>F</b> |
| I-15 SB On and Airport Rd           | Two-way stop | 10.4          | <b>B</b> | 23.5          | <b>C</b> |
| I-15 SB Off and Airport Rd          | Two-way stop | 121.8         | <b>F</b> | 3138.9        | <b>F</b> |
| 14 <sup>th</sup> St SW and I-315 EB | Signalized   | 13.3          | <b>B</b> | 12.4          | <b>B</b> |
| 14 <sup>th</sup> St SW and I-315 WB | Signalized   | 22.2          | <b>C</b> | 19.6          | <b>B</b> |
| Fox Farm and I-315                  | Signalized   | 39.0          | <b>D</b> | 35.6          | <b>D</b> |
| Central Ave and I-15 SB             | Two-way Stop | 178.9         | <b>F</b> | 314.9         | <b>F</b> |
| Central Ave and I-15 NB             | Two-way Stop | 113.1         | <b>F</b> | 445.2         | <b>F</b> |
| Central Ave and Vaughn Rd           | Two-way Stop | 406.0         | <b>F</b> | 1422.7        | <b>F</b> |
| Vaughn Rd and I-15 SB               | Two-way Stop | 11.0          | <b>B</b> | 11.0          | <b>B</b> |
| Vaughn Rd and I-15 NB               | Two-way Stop | 7.3           | <b>A</b> | 7.4           | <b>A</b> |

<sup>(a)</sup> Outside the bounds of the software.

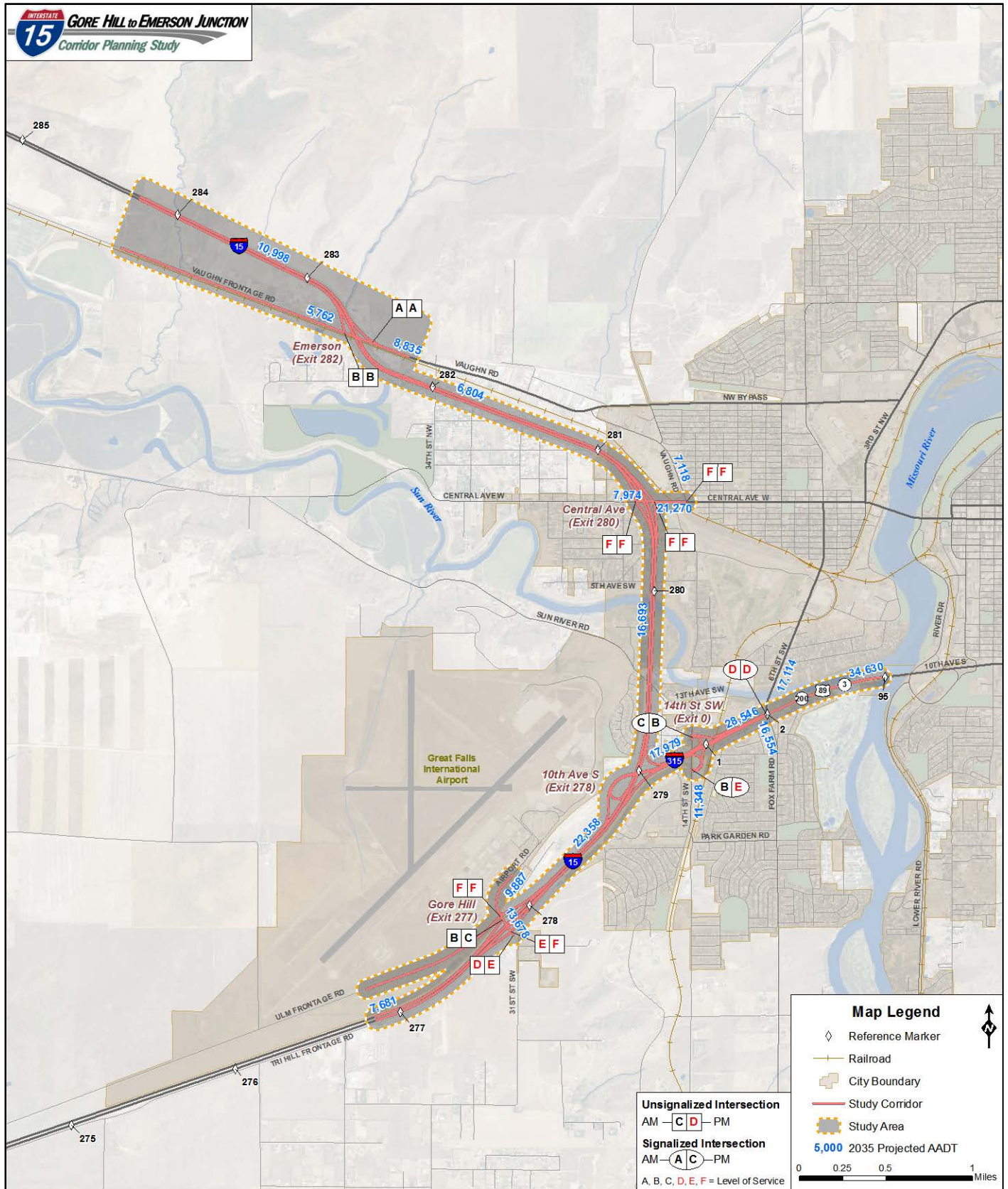


Figure 4.1: Projected Traffic Conditions

## 5.0 ENVIRONMENTAL SETTING

This section provides a summary of the *Environmental Scan* developed by MDT.<sup>9</sup> The primary objective of the *Environmental Scan* is to determine potential constraints and opportunities within the study area. As a planning-level scan, the information is obtained from various publicly available reports, websites, and other documentation, as well as a “windshield survey” conducted by MDT staff. This scan is not a detailed environmental investigation. Refer to the MDT *Environmental Scan* for more detailed information.

### 5.1 PHYSICAL ENVIRONMENT

The following subsections present an overview of items related to the physical environment.

#### 5.1.1 Soil Resources and Prime Farmland

Information obtained on soils is used to determine the presence of prime and unique farmland in the study area to demonstrate compliance with the Farmland Protection Policy Act. Farmland includes prime farmland, some prime if irrigated farmland, unique farmland, and farmland (other than prime or unique farmland) that is of statewide or local importance. Prime farmland soils are those that have the best combination of physical and chemical characteristics for producing food, feed, and forage; the area must also be available for these uses. Prime farmland can be either non-irrigated or lands that would be considered prime if irrigated. Farmland of statewide importance is defined as follows: land, in addition to prime and unique farmlands, that is of statewide importance for the production of food, feed, fiber, forage, and oilseed crops.

Soil surveys of the study area are available from the U.S. Department of Agriculture, Natural Resource Conservation Service (NRCS). NRCS indicates that prime if irrigated farmlands and farmlands of statewide importance are present in this corridor. Land from approximately RP 278.8 to 279.0 and 280.5 to 284.3 is considered prime if irrigated farmland. The approximate location of farmlands of statewide importance is from RP 266.8 to 278.0, 279.5 to 280.5, and 282.5 to 284.3.

If a federally funded improvement option forwarded from the study will require acquisition of lands from these areas, MDT will have to complete a CPA-106 Farmland Conversion Impact Rating Form for Linear Projects and coordinate with NRCS. NRCS will use information from that form to keep an inventory of the prime and important farmlands within the state. Some areas designated as prime farmland have previously been developed. Previously developed land designated as prime farmland is no longer subject to the Farmland Protection Policy Act and should not be an impact to future improvement options.

#### 5.1.2 Geologic Resources

Information on the geology and seismicity in the area of the corridor study was obtained from several published sources. Geologic mapping was reviewed for rock types, the presence of unconsolidated material, and fault lines. The seismicity and potential seismic hazards were also reviewed. This geologic information can help determine potential design and construction issues related to embankments and road design.

---

<sup>9</sup> MDT Environmental, *I-15 Gore Hill to Emerson Junction Corridor Study – Environmental Scan*, August 2014



Hillside slopes between the uplands and valley floor appear to be marginally stable at a maximum approximate slope of 2H:1V. There are numerous visible signs of instability, but most are relatively small and presently inactive. MDT exerted considerable effort stabilizing the cuts through Gore Hill in the 1980s; several landslides required regrading, and a substantial network of pipes and drains was installed. Appropriate cut slope and drainage design will minimize the risk of destabilizing these hillside slopes again.

Settlement of embankment fills on valley floor deposits poses some risk through the proposed corridor. This risk may be mitigated by using a combination of methods, which include preloading embankments, lowering fill heights, and using wick drains to speed settlement.

Improvements brought forward from the study will be subject to a more detailed analysis of the above-mentioned geotechnical risk factors. Part of this detailed analysis may involve taking advance borings to evaluate soil characteristics at exact project locations. This is standard procedure for most MDT road projects. The design of any improvements should consider specific requirements that come from the detailed analysis.

### 5.1.3 Surface Waters

Maps and GIS data were reviewed to identify the location of surface water bodies within the study area, including rivers, streams, lakes, or reservoirs. The Sun River is the main surface water in the corridor. Additionally, various surface waters, including streams, natural drainages, and wetlands, are also present in the area, but in small numbers. Impacts on these surface waters may occur from project improvements such as culverts under the roadway or rip rap armoring of banks. Effects on those water bodies will have to be identified and coordinated with applicable agencies during any future project design.

Much of the study area is also located within the Great Falls Municipal Separate Storm Sewer System (MS4) area. Under the Small MS4 General Permit, new development or redevelopment projects greater than or equal to 1 acre must implement, when practicable, low-impact development (LID) practices that infiltrate, evapo-transpire, or capture for reuse the runoff generated from the first half-inch of rainfall from a 24-hour storm preceded by 48 hours of no measurable precipitation. MS4 issues, including potential applicability of LID requirements, will have to be further evaluated during any future project design.

#### Total Maximum Daily Load Information

Section 303, subsection d (303d) of the Clean Water Act requires the state of Montana to develop a list, subject to U.S. Environmental Protection Agency (EPA) approval, of water bodies that do not meet water quality standards. When water quality fails to meet state standards, the Montana Department of Environmental Quality (DEQ) determines the causes and sources of pollutants in a subbasin assessment and sets maximum pollutant levels, called total maximum daily load (TMDL).

A TMDL sets maximum pollutant levels in a watershed. The TMDLs become the basis for implementation plans to restore the water quality to a level that supports its designated beneficial uses. The implementation plans identify and describe pollutant controls and management measures (such as best management practices), the mechanisms by which the selected measures are to be put into action, and the individuals and entities responsible for implementation projects.

The study corridor travels through the Sun River Watershed. The Sun River crosses I-15 under a bridge within the study area and runs parallel to, and north of, 10th Avenue South on the eastern edge of the corridor. In this segment of the Sun River, bank erosion and channel alterations decrease the quality of the instream habitat. Water coming from Muddy Creek upstream of the corridor augments flows in the

Sun River during the irrigation season; the Muddy Creek water is high in nutrients and suspended sediments.

According to a 2014 DEQ report, the Sun River fully supports the beneficial use of drinking water. The creek does not support aquatic life (cold-water fishery and warm water fishery) use based on numerous reports indicating severe impairment. Macroinvertebrate and periphyton sampling results indicate moderate to severe impairment. Aquatic life habitat is severely impaired due to siltation, flow alteration, bank erosion, and habitat degradation. Aquatic life chemistry is severely impaired due to high nutrient concentrations, turbidity, and temperatures. Agricultural uses are severely impaired due to relatively high total dissolved solids that decrease suitability for irrigation. The lack of support for recreation use is due to high amounts of nutrients that increase the risk of nuisance algal blooms.

The 2014 Integrated 303(d)/305(b) Water Quality Report for Montana by DEQ lists the Sun River watershed as impaired. The water bodies within the Sun River watershed that are located in the study area are Category 4A. Category 4A water bodies are waters where one or more applicable beneficial uses are impaired, threatened, or not supported, and a TMDL has been completed and approved to address the factors causing the impairment or threat. Any construction practices will have to comply with the requirements set forth in the TMDL plan.

#### Wild and Scenic Rivers

The Wild and Scenic Rivers Act Congress created in 1968 provided for the protection of certain selected rivers, as well as their immediate environments, that possess outstandingly remarkable scenic, recreational, geologic, fish and wildlife, historic, cultural, or other similar values. At this time, neither the Sun River, nor any of its tributaries, carries the wild and scenic designation. The Missouri River at the east terminus of the corridor study also does not carry the wild and scenic designation.

#### 5.1.4 Groundwater

There are currently 6,105 wells on record in Cascade County; some of these wells exist within the study area. There are three State Monitoring Network wells and 28 public water supply wells in Cascade County. The wells in Cascade County have many different uses, the most common being domestic use. The typical setback for a public water supply well is a 100-foot isolation zone in which no source of pollutant should be inside, making a public well an item of avoidance. If either a private or public well is to be impacted, standard right-of-way procedures would need to be followed. Impacts on existing wells should be considered if a project is forwarded from this study.

#### 5.1.5 Wetlands

The U.S. Army Corps of Engineers (COE) defines wetlands as those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas.

Formal wetland delineations according to standard COE- and MDT-defined procedures will have to be conducted during the project development process. Additionally, impacts on wetlands will have to be avoided and minimized to the greatest extent possible through conscientious project design. Documentation of avoidance and minimization measures will have to be included in the project development. Unavoidable wetland impacts will have to be mitigated in accordance with COE regulations and Executive Order 11990: Protection of Wetlands. During any project development process,



evaluation of potential stream impacts according to COE's May 2013 Stream Mitigation Procedure (or revised version) will be necessary.

### 5.1.6 Floodplains and Floodways

Executive Order 11988, Floodplain Management, requires federal agencies to avoid, to the extent possible, the long- and short-term adverse impacts associated with the occupancy and modification of floodplains and to avoid direct and indirect support of floodplain development wherever there is a practicable alternative. In accomplishing this objective, "each agency shall provide leadership and shall take action to reduce the risk of flood loss, to minimize the impact of floods on human safety, health, and welfare, and to restore and preserve the natural and beneficial values served by flood plains in carrying out its responsibilities" for the following actions:

- Acquiring, managing, and disposing of federal lands and facilities
- Providing federally undertaken, financed, or assisted construction and improvements
- Conducting federal activities and programs affecting land use, including but not limited to water and related land resources planning, regulation, and licensing activities

Federal-Aid Policy Guide, 23 CFR 650, Bridges, Structures, and Hydraulics, provides "policies and procedures for the location and hydraulic design of highway encroachments on flood plains, including direct Federal highway projects administered by the FHWA." This document defines the "Base Flood" as the "flood or tide having a 1 percent chance of being exceeded in any given year" and the "Base Flood Plain" as the "area subject to flooding by the base flood."

Federal Emergency Management Agency Issued Flood Maps for Cascade County indicate that the Zone AE 100-Year Flood with base flood elevations exists along only two small portions of the study area. The remainder of the study area is Zone X, which is the 500-Year Flood, or is not within a floodplain at all. Forwarding of improvement options from the study that result in the placement of fill within the regulatory floodplain will require identifying and evaluating impacts on the floodplains. Project development could require coordination with Cascade County and the City of Great Falls to minimize floodplain impacts and obtain necessary floodplain permits for project construction.

### 5.1.7 Irrigation

Irrigated grazing land exists within the study area. Depending on the improvement option(s) proposed, there is a potential to impact irrigation facilities. Project development may require redesigning, modifying existing, and/or constructing new irrigation canals, ditches, or pressurized systems in consultation with the owners to minimize impacts on agricultural operations. Additional expenses may occur if impacts on irrigation facilities will occur based on study findings.

### 5.1.8 Air Quality

EPA designates communities that do not meet National Ambient Air Quality Standards (NAAQS) as "non-attainment areas." States are then required to develop plans to control source emissions and ensure future attainment of NAAQS. Great Falls was designated non-attainment for carbon monoxide (CO) in 1980, and eventually the limits of the non-attainment area were mapped as the 10<sup>th</sup> Avenue South Corridor. In 2002, Great Falls received designation to attainment status for carbon monoxide. Great Falls is now under a December 2000 Carbon Monoxide Limited Maintenance Plan (CO LMP). The Montana DEQ submitted an updated Great Falls CO LMP in 2011, and revisions to the State Implementation Plan that would include some alternative CO monitoring strategies were laid out in the 2011 LMP. However, until EPA acts on these submittals, the December 2000 CO LMP is the controlling

document for current air quality conformity determinations. The former non-attainment area is not located within the study area, so no further transportation conformity analysis will be necessary.

Depending on the scope of the project under consideration along this corridor, an evaluation of mobile source air toxics (MSATs) may be required. MSATs are compounds emitted from highway vehicles and off-road equipment that are known or suspected to cause cancer or other serious health and environmental effects. The expectation that special air-quality design considerations will be required is low when considering future project design.

### 5.1.9 Hazardous Substances

The Natural Resource Information System database was searched for underground storage tank (UST) sites, leaking underground storage tank (LUST) sites, abandoned mine sites, remediation response sites, landfills, National Priority List sites, hazardous waste, crude oil pipelines, and toxic release inventory sites within the study area.

#### USTs and LUSTs

There is a cluster of UST and LUST sites at the Airport Interchange and numerous tank sites along Terminal Drive with facilities associated with the airport. None of these sites is likely to result in added cost or resources to any project that is forwarded from the study, however.

There is one unresolved LUST site near 34<sup>th</sup> St Southwest, referred to as the Ruth Graham Property, and two other LUST sites along the Northwest Bypass both east and west of 34<sup>th</sup> St Northwest. Both of those sites are also currently unresolved. One is the Yellowstone Truck Stop, and the other is N&H Transportation. Construction near these leaking tank sites may result in handling and disposal of contaminated soils, which will increase costs.

#### Water Quality Act/State Superfund Sites (Comprehensive Environmental Cleanup and Responsibility Act)

There are four Water Quality Act (WQA) or State Superfund Sites listed in DEQ's on-line database; only one of the four is active. The active site, Western by Products, is located near the north end of the study area between I-15 and Vaughn Road. Information available for this site indicates that it is currently an "Active" site; however, a No Further Action status was issued in 1984. If a project encroaches onto this facility, there may be additional costs associated with contaminated soil and groundwater. Efforts should be made to avoid impacts on this site if possible as it is still listed on the WQA Ranking list.

## 5.2 BIOLOGICAL ENVIRONMENT

The following information applies to natural resources within the study area and reflects a baseline natural resource condition. Depending on the level of detail available through the high-level baseline scan, some of the information is presented at the county level, some at the study-area level, and some at the corridor level.

### 5.2.1 Mammals

Wildlife species inhabiting or traversing the project study area are typical of those that occur in developed and disturbed areas of central Montana. Most species habituate to disturbed areas and, as a result, are predominately generalist species.

Common mammals occupying habitats in, traversing, or having a distribution range that overlaps the study area are white-tail deer, mule deer, and coyote. Other common mammals potentially occurring in the project area include, but are not limited to, porcupine, raccoon, striped skunk, badger, bobcat, red fox, muskrat, Richardson's ground squirrel, deer mouse, and meadow vole.

A review of the MDT Maintenance Animal Incident Database for from January 2004 through December 2013 shows 39 records of animal carcasses within the study area. With the exception of only a few other animals, white-tail deer and mule deer account for most of the recorded wildlife mortality within the study area. One elk, one pronghorn antelope, one mountain lion, and two coyotes comprise the other records. The majority of the carcass pickups were located around the bridge over the Sun River and to the north, from RP 279.5 to RP 284.

### 5.2.2 Birds

Trees or structures that will be impacted by any project resulting from this corridor study should be removed outside of the nesting season (typical nesting season is from April 15 to August 15) or when active nests are not present. Any projects forwarded from this study will have to include consideration of potential constraints that may result from nesting times of migratory birds.

No bald eagle or golden eagle nests were identified within one-half mile of the study area. Review of the corridor for eagle nests will have to occur during project design and before construction to verify that no new nests are present.

### 5.2.3 Threatened and Endangered Species

The U.S. Fish and Wildlife Service (USFWS) maintains the federal list of threatened and endangered species. Species on this list receive protection under the Endangered Species Act. An "endangered" species is one that is in danger of extinction throughout all or a significant portion of its range. A "threatened" species is one that is likely to become endangered in the foreseeable future. USFWS also maintains a list of species that are candidates or proposed for possible addition to the federal list. According to USFWS, five threatened, endangered, or candidate species are listed as occurring in Cascade County (see **Table 5.1**).

**Table 5.1: Threatened and Endangered Species in Cascade County**

| Common Name            | Status     |
|------------------------|------------|
| <b>Canada Lynx</b>     | Threatened |
| <b>Red Knot</b>        | Proposed   |
| <b>Wolverine</b>       | Proposed*  |
| <b>Sprague's Pipit</b> | Candidate  |
| <b>Whitebark Pine</b>  | Candidate  |

*\*Note that the wolverine has since been removed as a proposed threatened and endangered species.*

The Montana Natural Heritage Program - Natural Heritage Map Viewer (report generated May 15, 2014) database records and maps documents observations of species in a known location. According to the database (report generated May 15, 2014), there are no records of any threatened, endangered, proposed, or candidate species within the boundaries of the corridor study.

As the federal status of protected species changes over time, reevaluation of the listing status and a review for the potential occurrence of these species in the project area should take place before issuing a determination of effect relative to potential project impacts. If a project moves forward from this study,

completion of an evaluation of potential effects on any of the species listed above has to occur during the project development process.

#### 5.2.4 Species of Concern

Montana Species of Concern (SOCs) are native animals breeding in the state that are considered to be at risk due to declining population trends, threats to their habitats, and/or restricted distribution. Designation of a species as an SOC is not a statutory or regulatory classification. Instead, these designations provide a basis for resource managers and decision-makers to direct limited resources to priority data collection needs and to address conservation needs proactively.

According to the Montana Natural Heritage Program - Natural Heritage Map Viewer (report generated May 15, 2014) database, which records and maps documented observations of SOC in a known location, there is one historic record of many-headed sedge within the study area. This record is from 1891, and there is no expectation for this species to occur within the study area due to development of Great Falls since 1891.

Conducting a reevaluation for the presence of SOC is important during the project design phase. If present, developers should consider adding special conditions to the project design and/or construction documents to avoid or minimize impacts to these species.

#### 5.2.5 Vegetation

According to the Montana National Heritage Program Landcover Report, the dominate land cover near the study area is developed land consisting of major roads, including the Interstate, residential, and commercial land. Outside the developed land in the city of Great Falls are some cultivated crops, including hay land south of the Gore Hill Interchange and north of the Emerson Junction, as well as a minor amount of grassland, wetlands, and riparian habitat near the Sun River crossing. All land types in the project area are disturbed to some extent. If forwarding a project from the study, following practices outlined in Standard Specification 201 and any related supplemental specifications will help minimize adverse impacts on vegetation.

#### 5.2.6 Fisheries Information

Montana Fish, Wildlife, and Parks (FWP) listed the Sun River as a substantial fishery resource value and manages the Sun River as a trout water. I-15 crosses the Sun River within the study area. According to the Montana Fisheries Information System (MFISH) database (report generated May 15, 2014), fish species commonly occurring within the Sun River within the study area are as follows:

- Brown trout
- Longnose sucker
- Longnose dace
- Stonecat
- Walleye
- White sucker

Rare fish species within the study area include the following:

- Mottled sculpin
- Rainbow trout
- Mountain whitefish

- Burbot
- Common carp
- Flathead chub
- Northern pike

FWP listed the Missouri River as a substantial fishery resource value and manages the Missouri River as a non-trout water. 10<sup>th</sup> Avenue South crosses the Missouri River at the east terminus of the study area.

Forwarding any projects that affect the Sun River or Missouri River will likely require incorporation of design measures to facilitate aquatic species passage. Notification to FWP is necessary for impacts on the Sun River aquatic resources.

### 5.2.7 Noxious Weeds

Noxious weeds can degrade native vegetative communities, choke streams, compete with native plants, create fire hazards, degrade agricultural and recreational lands, and pose threats to the viability of livestock, humans, and wildlife. Areas with a history of disturbance, like highway rights-of-way, are at particular risk of weed encroachment. The Invaders Database System lists 28 exotic plant species and 10 noxious weed species documented in Cascade County, some of which may be present within the study area.

Seeding disturbed areas with desirable plant species will reduce the spread and establishment of noxious weeds and allow reestablishing permanent vegetation. If forwarding a project from the study, field surveys for noxious weeds should begin before any ground disturbance.

### 5.2.8 Crucial Areas Planning System

The Crucial Areas Planning System (CAPS) is a resource intended to provide useful and non-regulatory information during the early planning stages of development projects, conservation opportunities, and environmental review. The finest data resolution within CAPS is at the square-mile section scale or water body. Use of these data layers at a more localized scale is not appropriate and may lead to inaccurate interpretations since the classification may or may not apply to the entire square-mile section. This scale is too broad for use during MDT's assessment of potential impacts at the project level. The CAPS system provides a general overview of the study area. CAPS results are presented in the *Environmental Scan*.

CAPS provides general recommendations and recommendations specific to transportation projects for both terrestrial and aquatic species and habitat. These recommendations of the CAPS system can have a generic application to possible project locations moving forward from the study. Coordination with the FWP wildlife biologist should occur during project development.

## 5.3 SOCIAL AND CULTURAL ENVIRONMENT

The following subsections present an overview the social and cultural environment within the study area.

### 5.3.1 Demographic and Economic Conditions

Under the National and Montana Environmental Policy Acts and associated implementing regulations, state and federal agencies must assess potential social and economic impacts resulting from proposed actions. FHWA guidelines recommend consideration of impacts on neighborhoods and community cohesion, social groups including minority populations, and local and/or regional economies, as well as growth and development induced by transportation improvements. **Section 2.0** presents demographic

and economic information to assist in identifying human populations that improvements may affect within the study area.

Title VI of the U.S. Civil Rights Act of 1964, as amended (USC 2000(d)) and Executive Order 12898 require that no minority, or, by extension, low-income person shall be disproportionately adversely impacted by any project receiving federal funds. For transportation projects, this means that no particular minority or low-income person may be disproportionately isolated, displaced, or otherwise subjected to adverse effects. If forwarding a project from the improvement option(s) occurs, an Environmental Justice evaluation will have to occur during the project development process.

### 5.3.2 Land Ownership and Land Use

Ownership of the land within the study area is a mix of private and public. MDT and State Trust are the only holders of public land within the corridor. Most of the public land is in the form of right-of-way or state parklands. Most of the land in the study area is either residential rural and/or urban. The other land uses within the corridor are commercial, industrial, agricultural, and recreational.

Additional research and coordination will be required to ascertain the specific encumbrances associated with particular parcels of land. Any projects that move forward from this study will have to consider adjacent land use.

### 5.3.3 Recreational Resources

The intent of Section 4(f) is to protect publically owned parks, recreation areas, wildlife and waterfowl refuges, and public and private historic sites of local, state, and national significance. Transportation projects using federal funds cannot use properties that are protected by Section 4(f) unless there are no feasible and prudent avoidance alternatives and all possible planning to minimize harm has occurred.

Various recreational resources exist within and near the study area. A green belt on the northeast corner of 10<sup>th</sup> Avenue South and 6<sup>th</sup> St SW, owned by MDT, is not protected under Section 4(f) per 23CFR774.13(H)(2014). According to the Montana FWP resources list, there are two state-owned parks inside the study area, Westside Viaduct Park and West Hill Park. Currently the only development on either of these two parks is a lift station in West Hill Park. The remainder of this parkland is undeveloped and not currently available for public use. There is also one City of Great Falls park located, Community Hill Park, within the study area. The Community Hill Park is currently being used as a community garden / orchard that has standard access hours, outside of which it is locked preventing access by the public.

If a project is forwarded that may impact these parks, a reevaluation should take place to determine what the parks availability for use by the public is at that time. If these parks become available for full time public use in the future, additional investigation and coordination with the officials having jurisdiction over the parks will be necessary to determine whether the parks are “significant” and protected by Section 4(f) of the U.S. Department of Transportation Act.

Section 6(f) of the National Land and Water Conservation Fund Act is another federal measure intended to preserve, develop, and assure the quality and quantity of outdoor recreation resources. Section 6(f) protection applies to all projects that impact recreational lands purchased or improved with land and water conservation funds. At this time, there are no Section 6(f) resources identified in the study area. If a project were to be developed outside of the study area, reevaluation of 6(f) resources would have to occur, as they exist close to the study area limits. Avoiding impacts on 6(f) resources is a priority. Approval for a 6(f) use is a lengthy process involving rigorous mitigation requirements and approvals from several resource agencies.



### 5.3.4 Cultural Resources

If a project is federally funded, MDT will conduct a cultural resource survey of the area of potential effect for this project, as specified in Section 106 of the National Historic Preservation Act (36 CFR 800). Section 106 requires federal agencies to “take into account the effects of their undertakings on historic properties.” The purpose of the Section 106 process is to identify historic and archaeological properties that could be affected by the undertaking, assess the effects of the project, and investigate methods to avoid, minimize, or mitigate any adverse effects on historic properties. Special protections for these properties are also afforded under Section 4(f) of the Transportation Act.

A file search of the study area through the Montana State Historic Preservation Office revealed one historic property located within 0.15 mile of the existing alignment, the Missouri River/Warden Bridge. In addition, five National Registry of Historic Places (NRHP) listed historic districts and properties are located within a mile of the study corridor, but are outside the study area (see **Table 5.2**). An examination of the Montana Cadastral Survey information indicates that at least 33 historic age properties are located within 0.2 mile of the existing corridor. The study area contains many cultural resources, all of which consist of historic sites. Cultural resources will not likely be a substantial issue, but the issue is important to address as planning progresses.

**Table 5.2: Historic Properties**

| Site   | Site No. | NRHP Eligibility |
|--|----------|------------------|
| <b>Missouri River/Warden Bridge</b>            | 24CA0401 | Listed           |
| <b>Cascade County Courthouse</b>               | 24CA0233 | Listed           |
| <b>Great Falls Central Business District</b>   | 24CA0977 | Listed           |
| <b>C.M. &amp; St. P. Passenger Depot</b>       | 24CA0271 | Listed           |
| <b>Great Falls Railroad Historic District</b>  | 24CA0335 | Listed           |
| <b>Great Falls West Bank Historic District</b> | 24CA1527 | Listed           |

If a project is forwarded from the study, a cultural resource survey for unrecorded historic, pre-historic, and archaeological properties within the area of potential effect will be completed during the project development process. Flexibility in design will be important to avoid and/or minimize impacts on historically significant sites.

### 5.3.5 Noise

Traffic noise may have to be evaluated for planned improvements to the study corridor. Noise analysis is necessary for “Type I” projects. If the roadway improvements are limited (e.g., the horizontal and vertical alignments are not changed, and the highway remains a two-lane facility), then the project would not be considered a Type I project.

If the improvements planned for the road would include a substantial shift in the horizontal or vertical alignments, increasing the number of through-lanes, passing lanes, or turning lanes, or increasing the traffic speed and volume, then the project would be considered a Type I project, which would require a detailed noise analysis. The analysis would include measuring ambient noise levels at selected receivers and modeling design-year noise levels using projected traffic volumes.

Noise abatement measures would be considered for the project if noise levels would approach or substantially exceed the noise abatement criteria. The noise abatement measures must be considered

reasonable and feasible before implementation. If noise abatement measures were deemed necessary, they could increase costs of proposed future Type I roadway improvements.

### 5.3.6 Visual Resources

The visual resources of an area include landforms, vegetation, water features, and physical modifications caused by human activities that give the landscape its visual character and aesthetic qualities. Visual resources are typically assessed based on the landscape character (what is seen), visual sensitivity (human preferences and values regarding what is seen), scenic integrity (degree of intactness and wholeness in landscape character), and landscape visibility (relative distance of seen areas) of a geographically defined view shed. The study area is a blended landscape that has been developed with islands of natural beauty persevering. An evaluation of the potential effects on visual resources may be necessary, depending on the improvement options forwarded from this study.

## 6.0 AREAS OF CONCERN AND CONSIDERATION SUMMARY

This section provides a list and description of areas of concern and consideration within the study area. These areas were identified through review of as-built drawings, field review, public databases, and other resources. More discussion has been provided in the previous sections, and it is reiterated here as appropriate. **Figure 6.1** provides a graphical summary of the areas of concern.

### 6.1 TRANSPORTATION SYSTEM

#### Bridges

- Bridges along the Interstate within the study area have surface widths that do not meet current standards.

#### Operations

- The Interstate System is considered a Level I winter maintenance level.
- Snow fence and VMS are currently used to address vehicle operations related to adverse weather conditions.

#### Pavement Condition

- A segment of I-15 currently has poor surfacing conditions. A resurfacing project is planned for this location in 2017.
- I-315 had poor to fair surfacing conditions.

#### Railroad

- The Interstate crosses over the railroad at two locations within the study area.

#### Air Service

- The Great Falls International Airport is adjacent to the study area and is accessed primarily by the Gore Hill Interchange.

#### Mainline Interstate

- One location on I-15 has a vertical grade that does not meet current standards.
- Two vertical curves on I-15 do not meet current standards.
- One horizontal curve on I-15 and one horizontal curve on I-315 do not meet current standards.

#### Interchanges

- Seven of eight interchange on-ramps do not appear to meet current standards for acceleration length.
- Three of seven interchange off-ramps do not appear to meet current standards for deceleration length.

- Spacing between the 10<sup>th</sup> Avenue South and 14<sup>th</sup> Street SW Interchanges does not appear to meet current standards.
- Emerson Junction is a partial interchange and does not support full vehicle movements.

### Intersections

- Six of the twelve intersections evaluated have a LOS of D or worse during one or both peak hours.

### Safety

- Four fatal crashes and eight incapacitating injury crashes occurred during the five-year analysis period.
- A trend of fixed-object collisions was noted occurring along the Interstate.

## 6.2 ENVIRONMENTAL CONSIDERATIONS

### Physical Environment

- Areas of prime farmland if irrigated and farmlands of statewide importance exist within the study area.
- There are signs of instability and past landslides near the Gore Hill area.
- Much of the study area is located within the Great Falls MS4 area.
- I-15 crosses over the Sun River.

### Biological Environment

- Thirty-nine animal carcasses were recorded over the past ten years.
- Five threatened, endangered, or candidate species are listed within Cascade County.
- Seven rare fish species are listed within the study area.
- Twenty-eight exotic plant species and ten noxious weed species are documented within Cascade County.

### Social and Cultural Environment

- Two 4(f) resources are located within the study area.
- The Missouri River/Warden Bridge is listed as a historic property.







# APPENDIX A

---

## *Bridge Inspection Reports*



**INITIAL ASSESSMENT FORM FOR STRUCTURE :****I00015279+09761**

Location : GREAT FALLS Structure Name:

**General Location Data**MDT Maintenance Section : **31-01 Great Falls**District Code, Number, Location : **03 Dist 3 GREAT FALLS**Division Code, Location : **31 GREAT FALLS**County Code, Location : **013 CASCADE**City Code, Location : **32800 GREAT FALLS**Kind fo Hwy Code, Description : **1 1 Interstate Hwy**Signed Route Number : **00015**Str Owner Code, Description : **1 State Highway Agency**Maintained by Code, Description : **1 State Highway Agency**Intersecting Feature : **SUN RIVER**Kilometer Post, Mile Post : **450.57 km 279.97**Structure on the State Highway System : ☒ Latitude : **47°29'58"**Structure on the National Highway System : ☒ Longitude : **111°20'34"**Str Meet or Exceed NBIS Bridge Length : ☒**Construction Data**Construction Project Number : **I 15-5(22)273**Construction Station Number : **589+50.00**Construction Drawing Number : **6903**Construction Year : **1966**

Reconstruction Year :

**Traffic Data**Current ADT : **9,150** ADT Count Year : **2009** Percent Trucks : **2 %****Structure Loading, Rating and Posting Data****Loading Data :**

|                          |                  |                               |
|--------------------------|------------------|-------------------------------|
| Design Loading :         |                  | <b>5 MS 18 (HS 20)</b>        |
| Inventory Load, Design : | <b>32.6 mton</b> | <b>A LFD Assigned</b>         |
| Operating Load, Design : | <b>33.5 mton</b> | <b>A LFD Assigned</b>         |
| Posting :                |                  | <b>5 At/Above Legal Loads</b> |

**Rating Data :**

|                     | Operating    | Inventory | Posting |
|---------------------|--------------|-----------|---------|
| Truck 1 Type 3 :    |              |           |         |
| Truck 2 Type 3-S3 : |              |           |         |
| Truck 3 Type 3-3 :  | <b>58.32</b> |           |         |

**Structure, Roadway and Clearance Data****Structure Deck, Roadway and Span Data :**

Structure Length : **147.83 m**  
 Deck Area : **1,442.00 m sq**  
 Deck Roadway Width : **8.53 m**  
 Approach Roadway Width : **11.28 m**  
 Median Code, Description : **0 No median**

**Structure Vertical and Horizontal Clearance Data :**

Vertical Clearance Over the Structure : **99.99 m**  
 Reference Feature for Vertical Clearance : **N Feature not hwy or RR**  
 Vertical Clearance Under the Structure : **0.00 m**  
 Reference Feature for Lateral Underclearance : **N Feature not hwy or RR**  
 Minimum Lateral Under Clearance Right : **0.00 m**  
 Minimum Lateral Under Clearance Left : **0.00 m**

**Span Data****Main Span**

Number Spans : **5**  
 Material Type Code, Description : **5 Prestressed concrete**  
 Span Design Code, Description : **2 Stringer/Multi-beam or Girder Deck**

Deck Structure Type : **1 Concrete Cast-in-Place**  
 Deck Surfacing Type : **3 Latex Concrete or similar additive**  
 Deck Protection Type : **0 None**  
 Deck Membrain Type : **0 None**

**Approach Span**

Number of Spans : **0**  
 Material Type Code, Description :  
 Span Design Code, Description :

**Structure Vertical and Horizontal Clearance Data Inventory Route :**

| Over / Under Direction Name | Inventory Route | South, West or Bi-directional Travel |          |            | North or East Travel |          |            |
|-----------------------------|-----------------|--------------------------------------|----------|------------|----------------------|----------|------------|
|                             |                 | Direction                            | Vertical | Horizontal | Direction            | Vertical | Horizontal |
| Route On Structure          | I00015          | N/A                                  |          |            | North                | 99.99 m  | 8.53 m     |
| I-15 NB                     |                 |                                      |          |            |                      |          |            |



# INITIAL ASSESSMENT FORM FOR STRUCTURE :

I00015279+09761

Continue

## Inspection Data

Sufficiency Rating : **78.5**

Structure Status : **Func Obs - Elg Rehab**

Inspection Due Date : **19 December 2014**

(91) Inspection Frequency (months) : **24**

Next Under Water Insp : **15 Nov 2016**

Under Water Insp Type : **Type II**

## NBI Inspection Data

(90) Date of Last Inspection : 19 December 2012

Last Inspected By : Charles Pepos - 107

(90) Inspection Date :

Inspected By :

(58) Deck Rating :

7

(68) Deck Geometry :

3

(36A) Bridge Rail Rating :

1

(62) Culvert Rating :

N

(59) Superstructure Rating :

7

(67) Structure Rating :

6

(36B) Transition Rating :

1

(61) Channel Rating :

6

(60) Substructure Rating :

6

(69) Under Clearance :

N

(36C) Approach Rail Rating :

1

(71) Waterway Adequacy :

8

(72) App Rdwy Align :

7

(41) Posting Status :

A

(36D) End Rail Rating :

1

(113) Scour Critical :

5

Unrepaired Spalls : 0 m sq

Deck Surfacing Depth : 1.00 in

## Inspection Hours

Crew Hours for inspection :

2

Snooper Required :

N

Helper Hours :

0

Snooper Hours for inspection :

0

Special Crew Hours :

0

Flagger Hours :

0

Special Equipment Hours :

0

| Inspection Work Candidates |                   | Status | Priority | Effected<br>Structure<br>Unit | Scope of<br>Work | Action | Covered<br>Condition<br>States |
|----------------------------|-------------------|--------|----------|-------------------------------|------------------|--------|--------------------------------|
| Candidate ID               | Date<br>Requested |        |          |                               |                  |        |                                |

Late Reason:

Inspection Date: 12/19/2012

**Element Inspection Data**

\*\*\*\*\* Span : Main-0 - \*\*\*\*\*

| Element Description   |              |     |          |       |           |            |            |            |            |            |
|---|--------------|-----|----------|-------|-----------|------------|------------|------------|------------|------------|
| Smart Flag  | Scale Factor | Env | Quantity | Units | Insp Each | Pct Stat 1 | Pct Stat 2 | Pct Stat 3 | Pct Stat 4 | Pct Stat 5 |
| Element 22 - P Conc Deck/Rigid Ov   |              |     |          |       |           |            |            |            |            |            |
|   | 1            | 3   | 1441     | sq.m. | X         | 100        | 0          | 0          | 0          | 0          |
|   |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :   |              |     |          |       |           |            |            |            |            |            |
| 12/19/2012 - Random, tight cracks in all of the Spans. Minor studded tire wear in the wheel paths.  |              |     |          |       |           |            |            |            |            | UZGZ       |
| 12/27/2010 - 9.75 * 147.83 = 1441.34 Deck had 1" milled off and then placed 2" of silica fume concrete in 2010. Deck looks Good today. Some cracking near Abutment 1 that were sealed during construction.  |              |     |          |       |           |            |            |            |            | ZBDZ       |
| Inspection Notes:   |              |     |          |       |           |            |            |            |            |            |
|   |              |     |          |       |           |            |            |            |            |            |
|   |              |     |          |       |           |            |            |            |            |            |
| Element 109 - P/S Conc Open Girder  |              |     |          |       |           |            |            |            |            |            |
|   | 1            | 1   | 739      | m.    |           | 100        | 0          | 0          | 0          |            |
|   |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :   |              |     |          |       |           |            |            |            |            |            |
| 12/19/2012 - Good condition. Spall is unchanged in Span 5 and no new hits were observed.  |              |     |          |       |           |            |            |            |            | UZGZ       |
| 12/27/2010 - Good condition. Small spall on the Right girder in Span 5 has not changed.   |              |     |          |       |           |            |            |            |            | ZBDZ       |
| 12/02/2008 - Good Condition. Same on the Right most girder in Span 5.   |              |     |          |       |           |            |            |            |            | DZGZ       |
| 11/02/2006 - Right girder in Span 5 has been hit by overheight equipment and caused a small spalled area. No cracking or visible strands in this area.  |              |     |          |       |           |            |            |            |            | CKDP       |
| 10/18/2002 - 147.83 * 5 = 739.15m No change.  |              |     |          |       |           |            |            |            |            | VZJZ       |
| Inspection Notes:   |              |     |          |       |           |            |            |            |            |            |
|   |              |     |          |       |           |            |            |            |            |            |
|   |              |     |          |       |           |            |            |            |            |            |
| Element 210 - R/Conc Pier Wall Piers 2 thru 5   |              |     |          |       |           |            |            |            |            |            |
|   | 1            | 3   | 41       | m.    |           | 90         | 5          | 5          | 0          |            |
|   |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :   |              |     |          |       |           |            |            |            |            |            |
| 12/19/2012 - Some tight vertical cracking. Small spalls along the backside of the ice breakers. Small delamination on the face of Pier 4 near the waterline. Some surface scale on the Pierwalls near the waterline.  |              |     |          |       |           |            |            |            |            | UZGZ       |
| 12/27/2010 - Tight mapping cracks in the Pierwall faces. Some small spalls along the ice breakers. Some small delaminated areas observed during last snooper inspection in the worst cracked areas.   |              |     |          |       |           |            |            |            |            | ZBDZ       |
| There are no additional comments from the underwater inspection by Infrastructure Engineers on 11/15/2011. CRH  |              |     |          |       |           |            |            |            |            |            |
| 12/02/2008 - Small spalls, Condition State 2, and some small delaminations, Condition State 3.  |              |     |          |       |           |            |            |            |            | DZGZ       |
| 11/02/2006 - Minor concrete spall at the waterline near the Pier noses. Several areas of tight mapping cracks in all (4) Pier walls. Ice breakers painted this past summer.   |              |     |          |       |           |            |            |            |            | CKDP       |
| Per Infrastructure Engineers August 22, 2006 underwater inspection, the substructure units are in good condition. There are no significant structural defects below the high waterline. There are vertical cracks up to 1/16" wide with light efflorescence on both the north face and south face of pier 3 starting at the waterline and extending up 10 feet. |              |     |          |       |           |            |            |            |            |            |
| 10/18/2002 - 10.14 * 4 = 40.56m Same as snooper inspection of 05-29-2001.   |              |     |          |       |           |            |            |            |            | VZJZ       |
| 04/13/1998 - Snooper Inspection of 5-29-2001: Some minor section loss at the water line from debris and ice. Some drift at the nose of the pier shafts. Ice breakers could be painted.  |              |     |          |       |           |            |            |            |            | RHGY       |
| 02/01/1994 - None   |              |     |          |       |           |            |            |            |            | REFI       |
| Inspection Notes:   |              |     |          |       |           |            |            |            |            |            |
|   |              |     |          |       |           |            |            |            |            |            |
|   |              |     |          |       |           |            |            |            |            |            |

# INITIAL ASSESSMENT FORM FOR STRUCTURE :

**I00015279+09761**

Continue

\*\*\*\*\* Span : Main-0 - (cont.) \*\*\*\*\*

| Element Description  |              |     |          |       |           |            |            |            |            |            |
|--|--------------|-----|----------|-------|-----------|------------|------------|------------|------------|------------|
| Smart Flag   | Scale Factor | Env | Quantity | Units | Insp Each | Pct Stat 1 | Pct Stat 2 | Pct Stat 3 | Pct Stat 4 | Pct Stat 5 |
| Element 215 - R/Conc Abutment 1 and 6  |              |     |          |       |           |            |            |            |            |            |
|  | 1            | 1   | 27       | m.    |           | 90         | 5          | 5          | 0          |            |
|  |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :  |              |     |          |       |           |            |            |            |            |            |
| 12/19/2012 - Left corner of Abutment 6 is delaminated. Small spalls at the backwall to cap area.   |              |     |          |       |           |            |            |            |            | UZGZ       |
| 12/27/2010 - Delaminations on Left end of Abutment 6's cap. A couple of small surface spalls in the backwalls near girder embedments. Tight shrinkage cracks in both backwalls.                  |              |     |          |       |           |            |            |            |            | ZBDZ       |
| 12/02/2008 - Abutment 6 has a small delminaiton on the Left end of the cap; Condition State 3. Tight cracks in both backwalls; Condition State 2. None are a problem.                            |              |     |          |       |           |            |            |            |            | DZGZ       |
| 11/02/2006 - Minor and tight cracks in both Abutments. Both backwalls have a couple of small spalls near the bearings where girder are embedded.   |              |     |          |       |           |            |            |            |            | CKDP       |
| 10/18/2002 - (10.14 * 2) (4 * 17.75) = 27.28m ok   |              |     |          |       |           |            |            |            |            | VZJZ       |
| Inspection Notes:  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
| Element 234 - R/Conc Cap Piers 2 thru 5  |              |     |          |       |           |            |            |            |            |            |
|  | 1            | 1   | 41       | m.    |           | 90         | 5          | 5          | 0          |            |
|  |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :  |              |     |          |       |           |            |            |            |            |            |
| 12/19/2012 - Small delamination on the Right end and Span 4 side of Pier 5's cap. Small spalls in random areas along the edges of the caps; none are a problem. Bird debris on tops of the caps. |              |     |          |       |           |            |            |            |            | UZGZ       |
| 12/27/2010 - Small delamination on the Span 4 side of Bent 5's cap. Some minor spalls. Bird debris on the caps.  |              |     |          |       |           |            |            |            |            | ZBDZ       |
| 12/02/2008 - Small spalls and some cracks; Condition State 2. A couple of small delaminations; Condition State 3.  |              |     |          |       |           |            |            |            |            | DZGZ       |
| 11/02/2006 - Staining from past leaking joints. Some small areas where there is shallow and rusty tie wire which is causing some small surface spalling.   |              |     |          |       |           |            |            |            |            | CKDP       |
| 10/18/2002 - Change Env. State to a "1" as the leaky joints have been removed. Rest is the same as last several reports.   |              |     |          |       |           |            |            |            |            | VZJZ       |
| Inspection Notes:  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
| Element 303 - Assembly Joint/Seal Pier 2 and 5 - New in 2010   |              |     |          |       |           |            |            |            |            |            |
|  | 1            | 3   | 20       | m.    |           | 100        | 0          | 0          |            |            |
|  |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :  |              |     |          |       |           |            |            |            |            |            |
| 12/19/2012 - Sanding material is packed in the joint glands. Steel sound solid when tapped on.   |              |     |          |       |           |            |            |            |            | UZGZ       |
| 12/27/2010 - All of the steel looks Good. Ends of the joints area at the curb shows sloppy workmanship pathces.  |              |     |          |       |           |            |            |            |            | ZBDZ       |
| 12/02/2008 - Steel sounds solid when tapped on. Some small spalls along the stell. Gland is full of sanding material. No leakage observed.   |              |     |          |       |           |            |            |            |            | DZGZ       |
| 11/02/2006 - Joint area is packed full of sanding material. Some spalling along the joint steel. Steel sounds soild when tapped on. No leaking is apparent from either joint.                    |              |     |          |       |           |            |            |            |            | CKDP       |
| 10/18/2002 - 10.14 * 2 = 20.28m Replaced all (4) sliding plates with 303's. Full of sanding material.  |              |     |          |       |           |            |            |            |            | VZJZ       |
| Inspection Notes:  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |

**INITIAL ASSESSMENT FORM FOR STRUCTURE :****I00015279+09761**

Continue

\*\*\*\*\* Span : Main-0 - (cont.) \*\*\*\*\*

| Element Description   |              |     |          |       |           |            |            |            |            |            |
|---|--------------|-----|----------|-------|-----------|------------|------------|------------|------------|------------|
| Smart Flag  | Scale Factor | Env | Quantity | Units | Insp Each | Pct Stat 1 | Pct Stat 2 | Pct Stat 3 | Pct Stat 4 | Pct Stat 5 |
| Element 311 - Moveable Bearing  |              |     |          |       |           |            |            |            |            |            |
|   | 1            | 2   | 25       | ea.   |           | 90         | 10         | 0          |            |            |
|   |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :   |              |     |          |       |           |            |            |            |            |            |
| 12/19/2012 - Alignment is ok. Spot rust, paint loss, and faded paint.   |              |     |          |       |           |            |            |            |            | UZGZ       |
| 12/27/2010 - Spot rust, paint loss, and bird debris.  |              |     |          |       |           |            |            |            |            | ZBDZ       |
| 12/02/2008 - Some spot rust and bird debris.  |              |     |          |       |           |            |            |            |            | DZGZ       |
| 11/02/2006 - Blown off and overcoat painted in 2006.  |              |     |          |       |           |            |            |            |            | CKDP       |
| 10/18/2002 - No change.   |              |     |          |       |           |            |            |            |            | VZJZ       |
| 04/13/1998 - Snooper inspection of 5-29-2001: Some rust, pitting, and minor paint loss; mostly on the north most pier.  |              |     |          |       |           |            |            |            |            | RHGY       |
| 02/01/1994 - None   |              |     |          |       |           |            |            |            |            | REFI       |
| Inspection Notes:   |              |     |          |       |           |            |            |            |            |            |
|   |              |     |          |       |           |            |            |            |            |            |
|   |              |     |          |       |           |            |            |            |            |            |
| Element 313 - Fixed Bearing   |              |     |          |       |           |            |            |            |            |            |
|   | 1            | 2   | 25       | ea.   |           | 90         | 10         | 0          |            |            |
|   |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :   |              |     |          |       |           |            |            |            |            |            |
| 12/19/2012 - Spot rust, paint loss, and faded paint.  |              |     |          |       |           |            |            |            |            | UZGZ       |
| 12/27/2010 - Spot rust and paint loss. Bird debris.   |              |     |          |       |           |            |            |            |            | ZBDZ       |
| 12/02/2008 - Some spot rust and bird debris.  |              |     |          |       |           |            |            |            |            | DZGZ       |
| 11/02/2006 - Blown off and overcoat painted in 2006.  |              |     |          |       |           |            |            |            |            | CKDP       |
| 10/18/2002 - No change from last report.  |              |     |          |       |           |            |            |            |            | VZJZ       |
| Inspection Notes:   |              |     |          |       |           |            |            |            |            |            |
|   |              |     |          |       |           |            |            |            |            |            |
|   |              |     |          |       |           |            |            |            |            |            |
| Element 331 - Conc Bridge Railing   |              |     |          |       |           |            |            |            |            |            |
|   | 1            | 3   | 296      | m.    |           | 95         | 5          | 0          | 0          |            |
|   |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :   |              |     |          |       |           |            |            |            |            |            |
| 12/19/2012 - Generally in Good ocndition. Random shrinkage cracks. Spalling on the backside of the barrier where the W-Beam bolts up.   |              |     |          |       |           |            |            |            |            | UZGZ       |
| 12/27/2010 - Unchanged from previous inspections.   |              |     |          |       |           |            |            |            |            | ZBDZ       |
| 12/02/2008 - Same as past inspections and add that the ends have been upgraded to new rail shoes since the last inspection. Curbs under the barrier are in Good condition with surface spall near the deckline. |              |     |          |       |           |            |            |            |            | DZGZ       |
| 11/02/2006 - Minor and random vertical cracks along the front face and some cracks also along the rebar in random spots on the backside of the rail. Some rubs and scrapes to the rail.                         |              |     |          |       |           |            |            |            |            | CKDP       |
| 10/18/2002 - 147.83 * 2 = 295.63m Minor, vertical cracks and scrapes. Rail was placed in front of the metal bridge rail in 1999.  |              |     |          |       |           |            |            |            |            | VZJZ       |
| Inspection Notes:   |              |     |          |       |           |            |            |            |            |            |
|   |              |     |          |       |           |            |            |            |            |            |
|   |              |     |          |       |           |            |            |            |            |            |

**INITIAL ASSESSMENT FORM FOR STRUCTURE :****I00015279+09761**

Continue

\*\*\*\*\* Span : Main-0 - (cont.) \*\*\*\*\*

| Element Description  |              |     |          |       |           |            |            |            |            |            |
|--|--------------|-----|----------|-------|-----------|------------|------------|------------|------------|------------|
| Smart Flag   | Scale Factor | Env | Quantity | Units | Insp Each | Pct Stat 1 | Pct Stat 2 | Pct Stat 3 | Pct Stat 4 | Pct Stat 5 |
| Element 334 - Metal Rail Coated Steel Posts and Top Round Pipe --- Now behind the Concrete Rail  |              |     |          |       |           |            |            |            |            |            |
|  | 1            | 3   | 296      | m.    |           | 90         | 10         | 0          | 0          | 0          |
|  |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :  |              |     |          |       |           |            |            |            |            |            |
| 12/19/2012 - Rusty spots, paint loss, and scale on the rail posts and top pipe tube.   |              |     |          |       |           |            |            |            |            | UZGZ       |
| 12/27/2010 - Removed W-Beam in 2010. Rust spots, minor surface pitting, and paint loss on the posts and top rail.  |              |     |          |       |           |            |            |            |            | ZBDZ       |
| 12/02/2008 - Rust, paint peel, some surface pitting, and exposed base coat.  |              |     |          |       |           |            |            |            |            | DZGZ       |
| 11/02/2006 - Rusty, pitting, faded paint, peeling paint, and some prime coat visible on the rail posts and top rail pipe. W-beam has rusty spots throughout. |              |     |          |       |           |            |            |            |            | CKDP       |
| 10/18/2002 - 147.83 * 2 = 295.63m Rust, pitting, and paint loss throughout.  |              |     |          |       |           |            |            |            |            | VZJZ       |
| 04/13/1998 - None  |              |     |          |       |           |            |            |            |            | RHGY       |
| 02/01/1994 - None  |              |     |          |       |           |            |            |            |            | REFI       |
| Inspection Notes:  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
| Element 358 - Deck Cracking SmFlag   |              |     |          |       |           |            |            |            |            |            |
| X  | 1            | 3   | 1        | ea.   | X         | 100        | 0          | 0          | 0          |            |
|  |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :  |              |     |          |       |           |            |            |            |            |            |
| 12/19/2012 - Some reflective cracking was visible today.   |              |     |          |       |           |            |            |            |            | UZGZ       |
| 12/27/2010 - Milled off 1" and replaced with 2" of new silica fume concrete.   |              |     |          |       |           |            |            |            |            | ZBDZ       |
| 12/02/2008 - Due to quantity and need to start tracking.   |              |     |          |       |           |            |            |            |            | DZGZ       |
| Inspection Notes:  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |



**I00015279+09761**

**Continue**

## General Inspection Notes

12/19/2012 - Good markers on both sides of Abutment 1 today.

UZGZ

12/27/2010 - NBI 72, roadway alignment, rated a "7" as bridge is narrower than the approach roadway.

ZBDZ

Good markers on Left and Right corners of Abutment 1.

12/02/2008 - Good markers on the approach section.

11/02/2006 - Markers on both side of the approach and they are in Good condition.

CKDP

Steel bridge rail could be removed as it is not serving any purpose. Deck will be needing periodic patching and would be a Good candidate for a re-hab.

Per Infrastructure Engineers August 22, 2006 underwater inspection, the substructure units are in good condition. There are no significant structural defects below the high waterline. There is no significant local or general scour present. There are no significant restrictions in the channel that will adversely impact flow. There is light timber debris at the upstream nose of pier 3. The channel bottom consists of mud/silt, and riprap. NBI ITEM 61 CHANGED PER INFRASTRUCTURE ENGINEERS UNDERWATER INSPECTION.

10/18/2002 - NBI 36 is up to current standards; 26A is now concrete barrier rail.

VZJZ

04/13/1998 - 5-29-2001: Snooper inspection this pm. Should remove the trees that are going up near and under the bridge on both ends.

02/01/1994 - Sufficiency Rating Calculation Accepted by ops\$u5963 at 3/11/97 10:44:28

Sufficiency Rating Calculation Accepted by ops\$u9004 at 2/19/97 14:15:02

09/01/1991 - Updated with tape 1994

NB94

02/01/1990 - Updated with tape 1991

NB91

02/01/1988 - Updated with tape 1989

02/01/1986 - Updated with tape 1987

01/01/1984 - Updated with tape 1985

08/01/1981 - Updated with tape 1984

03/01/1979 - Updated with tape 1980

NB80



## INITIAL ASSESSMENT FORM FOR STRUCTURE :

I00015279+09762

Location : GREAT FALLS Structure Name:

## General Location Data

MDT Maintenance Section : 31-01 Great Falls

District Code, Number, Location : 03 Dist 3 GREAT FALLS

Division Code, Location : 31 GREAT FALLS

County Code, Location : 013 CASCADE

City Code, Location : 32800 GREAT FALLS

Kind fo Hwy Code, Description : 1 1 Interstate Hwy

Signed Route Number : 00015

Str Owner Code, Description : 1 State Highway Agency

Maintained by Code, Description : 1 State Highway Agency

Intersecting Feature : SUN RIVER

Kilometer Post, Mile Post : 450.57 km 279.97

Structure on the State Highway System : ☒ Latitude : 47°29'58"Structure on the National Highway System : ☒ Longitude : 111°20'35"Str Meet or Exceed NBIS Bridge Length : ☒

## Construction Data

Construction Project Number : I 15-5(22)273

Construction Station Number : 589+50.00

Construction Drawing Number : 6903

Construction Year : 1966

Reconstruction Year : 1977

## Traffic Data

Current ADT : 9,150 ADT Count Year : 2009 Percent Trucks : 2 %

## Structure Loading, Rating and Posting Data

## Loading Data :

|                          |           |                        |
|--------------------------|-----------|------------------------|
| Design Loading :         |           | 5 MS 18 (HS 20)        |
| Inventory Load, Design : | 32.6 mton | A LFD Assigned         |
| Operating Load, Design : | 33.5 mton | A LFD Assigned         |
| Posting :                |           | 5 At/Above Legal Loads |

## Rating Data :

|                     | Operating | Inventory | Posting |
|---------------------|-----------|-----------|---------|
| Truck 1 Type 3 :    |           |           |         |
| Truck 2 Type 3-S3 : |           |           |         |
| Truck 3 Type 3-3 :  | 58.32     |           |         |

## Structure, Roadway and Clearance Data

## Structure Deck, Roadway and Span Data :

Structure Length : 147.83 m  
Deck Area : 1,442.00 m sq  
Deck Roadway Width : 8.53 m  
Approach Roadway Width : 11.28 m  
Median Code, Description : 0 No median

## Structure Vertical and Horizontal Clearance Data :

Vertical Clearance Over the Structure : 99.99 m  
Reference Feature for Vertical Clearance : N Feature not hwy or RR  
Vertical Clearance Under the Structure : 0.00 m  
Reference Feature for Lateral Underclearance : N Feature not hwy or RR  
Minimum Lateral Under Clearance Right : 0.00 m  
Minimum Lateral Under Clearance Left : 0.00 m

## Span Data

## Main Span

Number Spans : 5  
Material Type Code, Description : 5 Prestressed concrete  
Span Design Code, Description : 2 Stringer/Multi-beam or Girder Deck

Deck Structure Type : 1 Concrete Cast-in-Place  
Deck Surfacing Type : 3 Latex Concrete or similar additive  
Deck Protection Type : 0 None  
Deck Membrain Type : 0 None

## Approach Span

Number of Spans : 0  
Material Type Code, Description :  
Span Design Code, Description :



## Structure Vertical and Horizontal Clearance Data Inventory Route :

| Over / Under Direction<br>Name | Inventory<br>Route | South, West or Bi-directional Travel |          |            | North or East Travel |          |            |
|--------------------------------|--------------------|--------------------------------------|----------|------------|----------------------|----------|------------|
|                                |                    | Direction                            | Vertical | Horizontal | Direction            | Vertical | Horizontal |
| Route On Structure             | I00015             | South                                | 99.99 m  | 8.53 m     | N/A                  |          |            |
| I-15 SB                        |                    |                                      |          |            |                      |          |            |



# INITIAL ASSESSMENT FORM FOR STRUCTURE :

**I00015279+09762**

Continue

## Inspection Data

Sufficiency Rating : **78.5**

Structure Status : **Func Obs - Elg Rehab**

Inspection Due Date : **19 December 2014**

(91) Inspection Frequency (months) : **24**

Next Under Water Insp : **17 Nov 2016**

Under Water Insp Type : **Type II**

## NBI Inspection Data

(90) Date of Last Inspection : **19 December 2012**

Last Inspected By : **Charles Pepos - 107**

(90) Inspection Date :

Inspected By :

(58) Deck Rating :

**7**

(68) Deck Geometry :

**3**

(36A) Bridge Rail Rating :

**1**

(62) Culvert Rating :

**N**

(59) Superstructure Rating :

**7**

(67) Structure Rating :

**6**

(36B) Transition Rating :

**1**

(61) Channel Rating :

**6**

(60) Substructure Rating :

**6**

(69) Under Clearance :

**N**

(36C) Approach Rail Rating :

**1**

(71) Waterway Adequacy :

**8**

(72) App Rdwy Align :

**7**

(41) Posting Status :

**A**

(36D) End Rail Rating :

**1**

(113) Scour Critical :

**5**

Unrepaired Spalls : **0 m sq**

Deck Surfacing Depth : **1.00 in**

## Inspection Hours

Crew Hours for inspection :

**2**

Snooper Required :

**N**

Helper Hours :

**0**

Snooper Hours for inspection :

**0**

Special Crew Hours :

**0**

Flagger Hours :

**0**

Special Equipment Hours :

**0**

| Inspection Work Candidates              |                         | Status              | Priority      | Effected Structure Unit | Scope of Work         | Action     | Covered Condition States |
|---|-------------------------|---------------------|---------------|-------------------------|-----------------------|------------|--------------------------|
| Candidate ID                            | Date Requested          |                     |               |                         |                       |            |                          |
| <b>D31-FY2007-000037</b>                | <b>26 December 2006</b> | <b>Approved</b>     | <b>High</b>   | M Main                  | 334 Metal Rail Coated | Repl Paint |                          |
| Clean and paint the rail and posts.     |                         |                     |               |                         |                       |            |                          |
| Approved. DRC                           |                         |                     |               |                         |                       |            |                          |
|   |                         |                     |               |                         |                       |            |                          |
|   |                         |                     |               |                         |                       |            |                          |
| <b>D31-FY2013-000018</b>                | <b>20 December 2012</b> | <b>Not Approved</b> | <b>Medium</b> | M Main                  | 210 R/Conc Pier Wall  | Min Repair |                          |
| Remove the drift at the nose of Pier 3. |                         |                     |               |                         |                       |            |                          |
|   |                         |                     |               |                         |                       |            |                          |
|   |                         |                     |               |                         |                       |            |                          |

Late Reason:

Inspection Date: 12/19/2012

# INITIAL ASSESSMENT FORM FOR STRUCTURE :

**I00015279+09762**

Continue

## Element Inspection Data

\*\*\*\*\* Span : Main-0 - \*\*\*\*\*

| Element Description  |              |     |          |       |           |            |            |            |            |            |
|--|--------------|-----|----------|-------|-----------|------------|------------|------------|------------|------------|
| Smart Flag   | Scale Factor | Env | Quantity | Units | Insp Each | Pct Stat 1 | Pct Stat 2 | Pct Stat 3 | Pct Stat 4 | Pct Stat 5 |
| Element 22 - P Conc Deck/Rigid Ov Silica Fume Concrete oOverlay in 2010  |              |     |          |       |           |            |            |            |            |            |
|  | 1            | 3   | 1441     | sq.m. | X         | 100        | 0          | 0          | 0          | 0          |
|  |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :  |              |     |          |       |           |            |            |            |            |            |
| 12/19/2012 - Some minor studded tire wear in the wheel paths. Some reflective cracking.  |              |     |          |       |           |            |            |            |            | UZGZ       |
| 12/27/2010 - 9.75 * 147.83 = 1441.34 Deck had 1" milled off and then placed 2" of silica fume concrete in 2010. Deck looks Good today. Some cracking near Abutment 1 that were sealed during construction.   |              |     |          |       |           |            |            |            |            | ZIDZ       |
| Inspection Notes:  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
| Element 109 - P/S Conc Open Girder   |              |     |          |       |           |            |            |            |            |            |
|  | 1            | 1   | 739      | m.    |           | 100        | 0          | 0          | 0          |            |
|  |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :  |              |     |          |       |           |            |            |            |            |            |
| 12/19/2012 - Good condition.   |              |     |          |       |           |            |            |            |            | UZGZ       |
| 12/27/2010 - Good condition.   |              |     |          |       |           |            |            |            |            | ZIDZ       |
| 12/02/2008 - Good condition. Same on the scrapes in Span 5.  |              |     |          |       |           |            |            |            |            | DZGZ       |
| 11/02/2006 - No problems observed. A couple of the girders in Span 5 have scrapes on their bottoms from overheight equipment.  |              |     |          |       |           |            |            |            |            | CZDP       |
| 10/18/2002 - 5 * 147.83 = 739.15m  |              |     |          |       |           |            |            |            |            | VCKA       |
| Inspection Notes:  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
| Element 210 - R/Conc Pier Wall Piers 2 thru 5  |              |     |          |       |           |            |            |            |            |            |
|  | 1            | 3   | 42       | m.    |           | 90         | 5          | 5          | 0          |            |
|  |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :  |              |     |          |       |           |            |            |            |            |            |
| 12/19/2012 - Small spalls behind the ice breakers. Pier 4 has a small delaminated area in the underwater inspection; photo. Tight cracks in the Pierwalls.   |              |     |          |       |           |            |            |            |            | UZGZ       |
| 12/27/2010 - Unchanged from previous inspections.  |              |     |          |       |           |            |            |            |            | ZIDZ       |
| The 11/15/2011 underwater inspection by Infrastructure Engineers shows that this element is in the same condition with the same minor defects noted in the 2006 inspection. CRH  |              |     |          |       |           |            |            |            |            |            |
| 12/02/2008 - Condition State 3 for shallow surface delaminations and Condition State 2 for minor spalls and cracking. Wear at the waterline.   |              |     |          |       |           |            |            |            |            | DZGZ       |
| 11/02/2006 - Minor wear/scaling of the concrete at the waterline and behind the ice breakers. Some areas of tight mapping cracks in the Pier walls sides. Patched areas appear to be holding up well, but some delamination also noted. Ice breakers overcoat painted in 2006. Per Infrastructure Engineers August 22, 2006 underwater inspection, the substructure units are in good condition. There are no significant structural defects below the high waterline. Pier 3 and 4 have light concrete scale up to 1/32" deep and light algae growth. |              |     |          |       |           |            |            |            |            | CZDP       |
| 10/18/2002 - 4 * 10.14 = 40.56m Same as previous reports.  |              |     |          |       |           |            |            |            |            | VCKA       |
| 04/13/1998 - Snooper Inspection of 5-29-2001: Some of the repaired areas are ok, some are questionable in their attachment to the existing concrete. Some wear and minor deterioration at the water line. Some drift at the nose of the pier shafts.   |              |     |          |       |           |            |            |            |            | RHGN       |
| 02/01/1994 - None  |              |     |          |       |           |            |            |            |            | REFI       |
| Inspection Notes:  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |

**INITIAL ASSESSMENT FORM FOR STRUCTURE :****I00015279+09762**

Continue

\*\*\*\*\* Span : Main-0 - (cont.) \*\*\*\*\*

| Element Description  |              |     |          |       |           |            |            |            |            |            |
|--|--------------|-----|----------|-------|-----------|------------|------------|------------|------------|------------|
| Smart Flag   | Scale Factor | Env | Quantity | Units | Insp Each | Pct Stat 1 | Pct Stat 2 | Pct Stat 3 | Pct Stat 4 | Pct Stat 5 |
| Element 215 - R/Conc Abutment 1 and 6  |              |     |          |       |           |            |            |            |            |            |
|  | 1            | 1   | 27       | m.    |           | 95         | 5          | 0          | 0          |            |
|  |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :  |              |     |          |       |           |            |            |            |            |            |
| 12/19/2012 - Small spalls by some of the girder embedments and along the cap to backwall area.   |              |     |          |       |           |            |            |            |            | UZGZ       |
| 12/27/2010 - Small spalls near girder embedments. Abutment 1 has some plywood on the chamfered area from past construction.  |              |     |          |       |           |            |            |            |            | ZIDZ       |
| 12/02/2008 - Some tight cracks in both backwalls and small spalls near the girder embedments.  |              |     |          |       |           |            |            |            |            | DZGZ       |
| 11/02/2006 - Both backwalls have a small spall near the bearings where the ends of the girders are embedded. Both caps have a couple of tight cracks that are not a problem.         |              |     |          |       |           |            |            |            |            | CZDP       |
| 10/18/2002 - 10.14 * 2) (4 * 1.75) = 27.28   |              |     |          |       |           |            |            |            |            | VCKA       |
| Inspection Notes:  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
| Element 234 - R/Conc Cap Piers 2 thru 5  |              |     |          |       |           |            |            |            |            |            |
|  | 1            | 1   | 41       | m.    |           | 90         | 5          | 5          | 0          |            |
|  |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :  |              |     |          |       |           |            |            |            |            |            |
| 12/19/2012 - Small spall on the Left end of Pier 2's cap. Some staining from past joint leakage. Some bird nests/debris on top of the caps. Small spall on the caps of Pier 3 and 5. |              |     |          |       |           |            |            |            |            | UZGZ       |
| 12/27/2010 - Unchanged from previous inspections. Pier 2 and 5 were cleaned off this past summer.  |              |     |          |       |           |            |            |            |            | ZIDZ       |
| 12/02/2008 - Cap at Bent 2 has a small spall and delaminated area. Some cracks; none are a problem.  |              |     |          |       |           |            |            |            |            | DZGZ       |
| 11/02/2006 - Stained from prior leaky joints. Some tight cracking under the girders and a couple of shallow tie wires are visible. Some delaminated patched areas also found.        |              |     |          |       |           |            |            |            |            | CZDP       |
| 10/18/2002 - Dropped Env. State as no longer un leaky joints; YET. 4 * 10.14 = 40.56m No change from previous reports.   |              |     |          |       |           |            |            |            |            | VCKA       |
| Inspection Notes:  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
| Element 303 - Assembly Joint/Seal Pier 2 and 4 - New in 2010   |              |     |          |       |           |            |            |            |            |            |
|  | 1            | 3   | 20       | m.    |           | 100        | 0          | 0          |            |            |
|  |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :  |              |     |          |       |           |            |            |            |            |            |
| 12/19/2012 - Joint is packed with sanding material today. No apparent leakage. Steel is solid when tapped on.  |              |     |          |       |           |            |            |            |            | UZGZ       |
| 12/27/2010 - Underside of deck at curbs shows poor workmanship in construction patches.  |              |     |          |       |           |            |            |            |            | ZIDZ       |
| 12/02/2008 - Steel sounds solid when tapped on. Small spalls along the joint edge. Full of sanding material. No leaking observed.  |              |     |          |       |           |            |            |            |            | DZGZ       |
| 11/02/2006 - Joint gland is full of sanding material. No apparent leaking. Joint steel sounds solid when tapped on. Some spalling and delamination concrete along the joint steel.   |              |     |          |       |           |            |            |            |            | CZDP       |
| 10/18/2002 - 2 * 10.14 = 20.28m Mostly full of sanding material.   |              |     |          |       |           |            |            |            |            | VCKA       |
| Inspection Notes:  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |

**INITIAL ASSESSMENT FORM FOR STRUCTURE :****I00015279+09762**

Continue

\*\*\*\*\* Span : Main-0 - (cont.) \*\*\*\*\*

| Element Description  |              |     |          |       |           |            |            |            |            |            |
|--|--------------|-----|----------|-------|-----------|------------|------------|------------|------------|------------|
| Smart Flag   | Scale Factor | Env | Quantity | Units | Insp Each | Pct Stat 1 | Pct Stat 2 | Pct Stat 3 | Pct Stat 4 | Pct Stat 5 |
| Element 311 - Moveable Bearing   |              |     |          |       |           |            |            |            |            |            |
|  | 1            | 1   | 25       | ea.   |           | 90         | 10         | 0          |            |            |
|  |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :  |              |     |          |       |           |            |            |            |            |            |
| 12/19/2012 - Alignment is Good. Paint loss, spot rust, and bird debris.  |              |     |          |       |           |            |            |            |            | UZGZ       |
| 12/27/2010 - Spot rust, paint loss, and bird debris.   |              |     |          |       |           |            |            |            |            | ZIDZ       |
| 12/02/2008 - Spot rust and bird debris.  |              |     |          |       |           |            |            |            |            | DZGZ       |
| 11/02/2006 - Blown off and overcoat painted in 2006.   |              |     |          |       |           |            |            |            |            | CZDP       |
| 10/18/2002 - Moved to Env. State 2 as no longer under a leaky joint; YET. Rest is the same as the last several reports.  |              |     |          |       |           |            |            |            |            | VCKA       |
| Inspection Notes:  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
| Element 313 - Fixed Bearing  |              |     |          |       |           |            |            |            |            |            |
|  | 1            | 1   | 25       | ea.   |           | 90         | 10         | 0          |            |            |
|  |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :  |              |     |          |       |           |            |            |            |            |            |
| 12/19/2012 - Paint loss, spot rust, and birde debris.  |              |     |          |       |           |            |            |            |            | UZGZ       |
| 12/27/2010 - Spot rust, paint loss, and bird debris.   |              |     |          |       |           |            |            |            |            | ZIDZ       |
| 12/02/2008 - Spot rust and bird debris.  |              |     |          |       |           |            |            |            |            | DZGZ       |
| 11/02/2006 - Blown off and overcoat painted in 2006.   |              |     |          |       |           |            |            |            |            | CZDP       |
| 10/18/2002 - Dropped Env. State as no lnger under a leaky joint; YET. Rest is the same as previous reports.  |              |     |          |       |           |            |            |            |            | VCKA       |
| Inspection Notes:  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
| Element 331 - Conc Bridge Railing  |              |     |          |       |           |            |            |            |            |            |
|  | 1            | 3   | 296      | m.    |           | 95         | 5          | 0          | 0          |            |
|  |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :  |              |     |          |       |           |            |            |            |            |            |
| 12/19/2012 - Patch on the Right barrier at Abutment 6 looks Good and is holding up well. Some random shrinkage cracks. Spalls at the W-Beam to barrier connection.                               |              |     |          |       |           |            |            |            |            | UZGZ       |
| 12/27/2010 - Unchanged from previous inspections.  |              |     |          |       |           |            |            |            |            | ZIDZ       |
| 12/02/2008 - Same as past inspections on the tight cracks. Ends have been updated since the past inspections for new guardrail. Both curbs look Good with small surface spall near the deckline. |              |     |          |       |           |            |            |            |            | DZGZ       |
| 11/02/2006 - Minor dings and scrapes. Random vertical cracking on both sides with the backside at some of the rebar locations.   |              |     |          |       |           |            |            |            |            | CZDP       |
| 10/18/2002 - 147.83 * 2 = 295.66m Some dings and scrapes with some vertical shrinkage cracks throughout.   |              |     |          |       |           |            |            |            |            | VCKA       |
| Inspection Notes:  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |





# INITIAL ASSESSMENT FORM FOR STRUCTURE :

**I00015279+09762**

Continue

\*\*\*\*\* Span : Main-0 - (cont.) \*\*\*\*\*

| Element Description  |              |     |          |       |           |            |            |            |            |            |
|--|--------------|-----|----------|-------|-----------|------------|------------|------------|------------|------------|
| Smart Flag   | Scale Factor | Env | Quantity | Units | Insp Each | Pct Stat 1 | Pct Stat 2 | Pct Stat 3 | Pct Stat 4 | Pct Stat 5 |
| Element 334 - Metal Rail Coated Steel Posts w\ Round Top Rail behind the Concrete Rail   |              |     |          |       |           |            |            |            |            |            |
|  | 1            | 3   | 296      | m.    |           | 90         | 10         | 0          | 0          | 0          |
|  |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :  |              |     |          |       |           |            |            |            |            |            |
| 12/19/2012 - Rusty spots, paint loss, and some scale on the posts and top pipe rail.   |              |     |          |       |           |            |            |            |            | UZGZ       |
| 12/27/2010 - Rusty spots, paint loss, and some minor surface pitting on the rail posts and top pipe. W-Beam removed in 2010.   |              |     |          |       |           |            |            |            |            | ZIDZ       |
| 12/02/2008 - Rusty spots, peeling paint, fading paint, and minor surface pitting.  |              |     |          |       |           |            |            |            |            | DZGZ       |
| 11/02/2006 - Rusty, pitted, paint loss, faded paint, and prime coat visible on the rail posts and top pipe rail. W-Beam has rusty spots.   |              |     |          |       |           |            |            |            |            | CZDP       |
| 10/18/2002 - 147.83 * 2 = 295.66m More rust, pitting, and paint loss.  |              |     |          |       |           |            |            |            |            | VCKA       |
| 04/13/1998 - Snooper inspection of 5-29-2001: in the 2nd from the last span, the 5th post on the right, back from the pier has spalled concrete at it's attachment point to the deck. It is behind barrier rail now. |              |     |          |       |           |            |            |            |            | RHGN       |
| 02/01/1994 - None  |              |     |          |       |           |            |            |            |            | REFI       |
| Inspection Notes:  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
| Element 358 - Deck Cracking SmFlag   |              |     |          |       |           |            |            |            |            |            |
| X  | 1            | 3   | 1        | ea.   | X         | 100        | 0          | 0          | 0          |            |
|  |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :  |              |     |          |       |           |            |            |            |            |            |
| 12/19/2012 - Some reflective cracking throughout the overlay in all the Spans.   |              |     |          |       |           |            |            |            |            | UZGZ       |
| 12/27/2010 - Milled off 1" and overlayed with 2" of silica fume concrete in 2010.  |              |     |          |       |           |            |            |            |            | ZIDZ       |
| 12/02/2008 - Due to density and size of the cracks; especially in the areas where the delaminations are starting to spall.   |              |     |          |       |           |            |            |            |            | DZGZ       |
| Inspection Notes:  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |

**100015279+09762**

**Continue**

## General Inspection Notes

12/19/2012 - Good markers on both sides of Abutment 6.

UZGZ

12/27/2010 - NBI 72, roadway alignment, rated a "7" as bridge is narrower than the approach roadway.

ZIDZ

Good markers on both sides of Abutment 6.

12/02/2008 - Good markers on the approach corners.

DZGZ

11/02/2006 - Markers on the Left and Right sides of the approach end and in Fair to Good condition.

CZDP

Steel bridge rail could be removed as it is not serving any purpose. Bridge deck has had some patched spalls and will be needing more. This would be a Good candidate for a deck re-hab.

Per Infrastructure Engineers August 22, 2006 underwater inspection, the substructure units are in good condition. There are no significant structural defects below the high waterline. There is no significant local or general scour present. There are no significant restrictions in the channel that will adversely impact flow. NBI 61 CHANGED PER INFRASTRUCTURE ENGINEERS UNDERWATER INSPECTION.

10/18/2002 - NBI 36 is now up to current standards; 36A upgraded to concrete barrier rail now.

VCKA

04/13/1998 - 5-29-2001: Snooper inspection this am. Should clean out the trees & brush that is going next to and underneath the structure.

RHGN

02/01/1994 - Sufficiency Rating Calculation Accepted by ops\$u5963 at 3/11/97 10:44:28

Sufficiency Rating Calculation Accepted by ops\$u9004 at 2/19/97 14:15:03

09/01/1991 - Updated with tape 1994

02/01/1990 - Updated with tape 1991

02/01/1988 - Updated with tape 1989

02/01/1986 - Updated with tape 1987

01/01/1984 - Updated with tape 1985

08/01/1981 - Updated with tape 1984

03/01/1979 - Updated with tape 1980

NB80

**INITIAL ASSESSMENT FORM FOR STRUCTURE :****I00015280+00941**

Location : GREAT FALLS Structure Name:

**General Location Data**MDT Maintenance Section : **31-01 Great Falls**District Code, Number, Location : **03 Dist 3 GREAT FALLS**Division Code, Location : **31 GREAT FALLS**County Code, Location : **013 CASCADE**City Code, Location : **32800 GREAT FALLS**Kind fo Hwy Code, Description : **1 1 Interstate Hwy**Signed Route Number : **00015**Str Owner Code, Description : **1 State Highway Agency**Maintained by Code, Description : **1 State Highway Agency**Intersecting Feature : **SEP 5TH AVE SW**Kilometer Post, Mile Post : **450.76 km 280.09**Structure on the State Highway System : ☒ Latitude : **47°30'04"**Structure on the National Highway System : ☒ Longitude : **111°20'34"**Str Meet or Exceed NBIS Bridge Length : ☒**Construction Data**Construction Project Number : **IG 15-5(27)274**Construction Station Number : **595+55.00**Construction Drawing Number : **7092**Construction Year : **1967**

Reconstruction Year :

**Traffic Data**Current ADT : **9,150** ADT Count Year : **2009** Percent Trucks : **2 %****Structure Loading, Rating and Posting Data****Loading Data :**

|                          |                  |                               |
|--------------------------|------------------|-------------------------------|
| Design Loading :         |                  | <b>5 MS 18 (HS 20)</b>        |
| Inventory Load, Design : | <b>32.6 mton</b> | <b>A LFD Assigned</b>         |
| Operating Load, Design : | <b>36.2 mton</b> | <b>A LFD Assigned</b>         |
| Posting :                |                  | <b>5 At/Above Legal Loads</b> |

**Rating Data :**

|                     | Operating    | Inventory | Posting |
|---------------------|--------------|-----------|---------|
| Truck 1 Type 3 :    |              |           |         |
| Truck 2 Type 3-S3 : |              |           |         |
| Truck 3 Type 3-3 :  | <b>83.84</b> |           |         |

**Structure, Roadway and Clearance Data****Structure Deck, Roadway and Span Data :**

Structure Length : **38.10 m**  
 Deck Area : **455.00 m sq**  
 Deck Roadway Width : **11.35 m**  
 Approach Roadway Width : **11.89 m**  
 Median Code, Description : **0 No median**

**Structure Vertical and Horizontal Clearance Data :**

Vertical Clearance Over the Structure : **99.99 m**  
 Reference Feature for Vertical Clearance : **H Hwy beneath struct**  
 Vertical Clearance Under the Structure : **4.60 m**  
 Reference Feature for Lateral Underclearance : **H Hwy beneath struct**  
 Minimum Lateral Under Clearance Right : **3.66 m**  
 Minimum Lateral Under Clearance Left : **0.00 m**

**Span Data****Main Span**

Number Spans : **3**  
 Material Type Code, Description : **5 Prestressed concrete**  
 Span Design Code, Description : **2 Stringer/Multi-beam or Girder Deck**

Deck Structure Type : **1 Concrete Cast-in-Place**  
 Deck Surfacing Type : **3 Latex Concrete or similar additive**  
 Deck Protection Type : **0 None**  
 Deck Membrain Type : **0 None**

**Approach Span**

Number of Spans : **0**  
 Material Type Code, Description :  
 Span Design Code, Description :

**Structure Vertical and Horizontal Clearance Data Inventory Route :**

| Over / Under Direction Name | Inventory Route | South, West or Bi-directional Travel |          |            | North or East Travel |          |            |
|-----------------------------|-----------------|--------------------------------------|----------|------------|----------------------|----------|------------|
|                             |                 | Direction                            | Vertical | Horizontal | Direction            | Vertical | Horizontal |
| One Route Under             | L07544          | Both                                 | 4.60 m   | 10.36 m    | N/A                  |          |            |
| 5TH AVE. SW                 |                 |                                      |          |            |                      |          |            |
| Route On Structure          | I00015          | N/A                                  |          |            | North                | 99.99 m  | 11.35 m    |
| I - 15 NB                   |                 |                                      |          |            |                      |          |            |



# INITIAL ASSESSMENT FORM FOR STRUCTURE :

**I00015280+00941**

Continue

## Inspection Data

Sufficiency Rating : **96.6**

Structure Status : **Not Deficient**

Inspection Due Date : **15 October 2014**

(91) Inspection Frequency (months) : **24**

## NBI Inspection Data

(90) Date of Last Inspection : **15 October 2012**

Last Inspected By : **Charles Pepos - 107**

(90) Inspection Date :

Inspected By :

(58) Deck Rating : **7**

(68) Deck Geometry : **5**

(36A) Bridge Rail Rating : **1**

(62) Culvert Rating : **N**

(59) Superstructure Rating : **7**

(67) Structure Rating : **7**

(36B) Transition Rating : **1**

(61) Channel Rating : **N**

(60) Substructure Rating : **7**

(69) Under Clearance : **6**

(36C) Approach Rail Rating : **1**

(71) Waterway Adequacy : **N**

(72) App Rdwy Align : **8**

(41) Posting Status : **A**

(36D) End Rail Rating : **1**

(113) Scour Critical : **N**

Unrepaired Spalls : **0 m sq**

Deck Surfacing Depth : **1.00 in**

## Inspection Hours

Crew Hours for inspection : **2**

Snooper Required : **N**

Helper Hours : **0**

Snooper Hours for inspection : **0**

Special Crew Hours : **0**

Flagger Hours : **0**

Special Equipment Hours : **0**

| Inspection Work Candidates         |                        | Status          | Priority      | Effected<br>Structure<br>Unit | Scope of<br>Work | Action            | Covered<br>Condition<br>States |
|------------------------------------|------------------------|-----------------|---------------|-------------------------------|------------------|-------------------|--------------------------------|
| Candidate ID                       | Date<br>Requested      |                 |               |                               |                  |                   |                                |
| <b>D31-FY2004-000064</b>           | <b>28 January 2004</b> | <b>Approved</b> | <b>Medium</b> | All Spans                     | Bridge           | Spot Paint (flex) |                                |
| Clean around bearings and repaint. |                        |                 |               |                               |                  |                   |                                |
| Approved. DRC                      |                        |                 |               |                               |                  |                   |                                |
|                                    |                        |                 |               |                               |                  |                   |                                |
|                                    |                        |                 |               |                               |                  |                   |                                |
|                                    |                        |                 |               |                               |                  |                   |                                |

Late Reason:

Inspection Date: 10/15/2012

**INITIAL ASSESSMENT FORM FOR STRUCTURE :****I00015280+00941**

Continue

**Element Inspection Data**

\*\*\*\*\* Span : Main-0 - \*\*\*\*\*

| Element Description  |              |     |          |       |           |            |            |            |            |            |
|--|--------------|-----|----------|-------|-----------|------------|------------|------------|------------|------------|
| Smart Flag   | Scale Factor | Env | Quantity | Units | Insp Each | Pct Stat 1 | Pct Stat 2 | Pct Stat 3 | Pct Stat 4 | Pct Stat 5 |
| Element 22 - P Conc Deck/Rigid Ov  |              |     |          |       |           |            |            |            |            |            |
|  | 1            | 3   | 455      | sq.m. | X         | 100        | 0          | 0          | 0          | 0          |
|  |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :  |              |     |          |       |           |            |            |            |            |            |
| 10/15/2012 - Minor wear in the wheel paths. Tight transverse cracks over both Bent 2 and 3. Random cracking in Span 1.                         |              |     |          |       |           |            |            |            |            | QZHZ       |
| 10/18/2010 - 11.95 * 38.10 = 455.30 1" milled off, A and B repairs done, and 2" overlay then placed. Good condition today.                     |              |     |          |       |           |            |            |            |            | SODZ       |
| Inspection Notes:  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
| Element 109 - P/S Conc Open Girder   |              |     |          |       |           |            |            |            |            |            |
|  | 1            | 1   | 191      | m.    |           | 100        | 0          | 0          | 0          |            |
|  |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :  |              |     |          |       |           |            |            |            |            |            |
| 10/15/2012 - Unchanged from past inspections and generally in Good condition.  |              |     |          |       |           |            |            |            |            | QZHZ       |
| 10/18/2010 - Generally Good condition. Minor rubs from overheight loads and some minor cracking on ends of the girders noted at Bents 2 and 3. |              |     |          |       |           |            |            |            |            | SODZ       |
| 10/15/2008 - Good condition. Some minor rubs and scrapes from overheight loads.  |              |     |          |       |           |            |            |            |            | QZGZ       |
| 10/24/2006 - Good condition. Minor cracks from backside of the embedded bearing plate to the ends of several of the girders.                   |              |     |          |       |           |            |            |            |            | ZZGZ       |
| 10/08/2002 - 38.10 * 5 = 190.5m  |              |     |          |       |           |            |            |            |            | IZDK       |
| Inspection Notes:  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
| Element 205 - R/Conc Column Bent 2 and 3   |              |     |          |       |           |            |            |            |            |            |
|  | 1            | 1   | 4        | ea.   |           | 95         | 5          | 0          | 0          |            |
|  |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :  |              |     |          |       |           |            |            |            |            |            |
| 10/15/2012 - All (4) are generally in Good condition with a small spall on the Right column of Bent 3.   |              |     |          |       |           |            |            |            |            | QZHZ       |
| 10/18/2010 - Good condition. Minor and tight surface shrinkage cracks.   |              |     |          |       |           |            |            |            |            | SODZ       |
| 10/15/2008 - Generally Good condition. Some tight surface shrinkage cracks.  |              |     |          |       |           |            |            |            |            | QZGZ       |
| 10/24/2006 - Tight surface shrinkage cracks.   |              |     |          |       |           |            |            |            |            | ZZGZ       |
| 10/08/2002 - ok  |              |     |          |       |           |            |            |            |            | IZDK       |
| Inspection Notes:  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |

# INITIAL ASSESSMENT FORM FOR STRUCTURE :

**I00015280+00941**

Continue

\*\*\*\*\* Span : Main-0 - (cont.) \*\*\*\*\*

| Element Description  |              |     |          |       |           |            |            |            |            |            |
|--|--------------|-----|----------|-------|-----------|------------|------------|------------|------------|------------|
| Smart Flag   | Scale Factor | Env | Quantity | Units | Insp Each | Pct Stat 1 | Pct Stat 2 | Pct Stat 3 | Pct Stat 4 | Pct Stat 5 |
| Element 215 - R/Conc Abutment 1 and 4  |              |     |          |       |           |            |            |            |            |            |
|  | 1            | 2   | 30       | m.    |           | 95         | 5          | 0          | 0          |            |
|  |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :  |              |     |          |       |           |            |            |            |            |            |
| 10/15/2012 - Tight cracks in both of the backwalls and caps. Small spalls on the cap to backwall connection area and a couple of the embedded bearings.  |              |     |          |       |           |            |            |            |            | QZHZ       |
| 10/18/2010 - Minor and tight cracks in both backwalls. Small spalls near a couple of the girder embedded bearings.   |              |     |          |       |           |            |            |            |            | SODZ       |
| 10/15/2008 - Small spall near the bearings in the backwalls. Tight cracks in both of the backwalls and caps.   |              |     |          |       |           |            |            |            |            | QZGZ       |
| 10/24/2006 - Damp at the backwall to cap joint and around the bearings. A couple of small spalls where the girders are embedded in the backwalls.  |              |     |          |       |           |            |            |            |            | ZZGZ       |
| 10/08/2002 - (11.95 1.50 1.50) * 2 = 29.90m Minor, tight cracks in backwalls. Env. State 2 due to wet soil in median near the bridge ends.   |              |     |          |       |           |            |            |            |            | IZDK       |
| 04/13/1998 - None  |              |     |          |       |           |            |            |            |            | RHGR       |
| 02/01/1994 - None  |              |     |          |       |           |            |            |            |            | REFI       |
| Inspection Notes:  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
| Element 234 - R/Conc Cap Bent 2 and 3  |              |     |          |       |           |            |            |            |            |            |
|  | 1            | 1   | 24       | m.    |           | 90         | 5          | 5          | 0          |            |
|  |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :  |              |     |          |       |           |            |            |            |            |            |
| 10/15/2012 - Small delaminations on the Right ends of both of the Bent caps. Minor surface spalls on the underside of both caps from rebar chair feet. Stains from past joint leakage.                           |              |     |          |       |           |            |            |            |            | QZHZ       |
| 10/18/2010 - Same comments as past inspections. Small delamination on Right ends of Bent 2 and 3's caps. Very minor surface distress in these areas.   |              |     |          |       |           |            |            |            |            | SODZ       |
| 10/15/2008 - Left end of the cap at Bent 2 has a small delaminated area, 6" x 14"; Condition State 3. Tight cracks at the steps. Small surface spall on the underside of the caps from exposed rebar chair feet. |              |     |          |       |           |            |            |            |            | QZGZ       |
| 10/24/2006 - Minor surface spalls on the underside of the caps from exposed/rusty rebar chairs.  |              |     |          |       |           |            |            |            |            | ZZGZ       |
| 10/08/2002 - 11.95 * 2 = 23.90m Minor stains from exposed rebar chairs. Underside of left end of cap at Bent 3 has minor popouts along rebar chairs.   |              |     |          |       |           |            |            |            |            | IZDK       |
| Inspection Notes:  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
| Element 313 - Fixed Bearing Bent 2 and 3   |              |     |          |       |           |            |            |            |            |            |
|  | 1            | 1   | 20       | ea.   |           | 90         | 10         | 0          |            |            |
|  |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :  |              |     |          |       |           |            |            |            |            |            |
| 10/15/2012 - Spot rust, paint loss, and some debris.   |              |     |          |       |           |            |            |            |            | QZHZ       |
| 10/18/2010 - Spot rust and paint loss.   |              |     |          |       |           |            |            |            |            | SODZ       |
| 10/15/2008 - Spot rust and paint loss.   |              |     |          |       |           |            |            |            |            | QZGZ       |
| 10/24/2006 - Spot rust throughout. Bents 2 and 3's have pigeon debris around them.   |              |     |          |       |           |            |            |            |            | ZZGZ       |
| 10/08/2002 - Rusty spots throughout.   |              |     |          |       |           |            |            |            |            | IZDK       |
| Inspection Notes:  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |



**I00015280+00941**

**Continue**

\*\*\*\*\* Span : Main-0 - (cont.) \*\*\*\*\*

| Element Description                                   |              |     |          |       |           |            |            |            |            |            |
|---|--------------|-----|----------|-------|-----------|------------|------------|------------|------------|------------|
| Smart Flag  | Scale Factor | Env | Quantity | Units | Insp Each | Pct Stat 1 | Pct Stat 2 | Pct Stat 3 | Pct Stat 4 | Pct Stat 5 |
| Element 334 - Metal Rail Coated W-Beam w/ Steel Posts |              |     |          |       |           |            |            |            |            |            |
|   | 1            | 3   | 76       | m.    |           | 85         | 10         | 5          | 0          | 0          |
|   |              |     |          |       |           | %          | %          | %          | %          | %          |

Previous Inspection Notes :

10/15/2012 - W-Beam had dings and rubs on both sides. Left rail is bent near Abutment 1. Loose and twisted blocks. Rail posts show rusty spots, scale, and paint loss. Curbs are in Good condition.

10/18/2010 - Rusty spots and paint loss on the W-Beam. Several twisted and loose blocks. Left rail near Abutment 1 has a bent area.

10/15/2008 - Rusty spots on the rail and posts. Some loose and twisted wood rail blockouts. Curbs are in Good condition. QZGZ

10/24/2006 - Rusty spots on the W-Beam and rail posts. Both rails have scrapes and bent areas. Curbs are in Good condition. ZZGZ

10/08/2002 -  $38.10 * 2 = 76.20\text{m}$  Rusty spots, pitting, and scrapes throughout both rails. Rust on the posts. IZDK

04/13/1998 - None RHGR

02/01/1994 - None REF

Inspection Notes:

## General Inspection Notes

|   |      |
|---|------|
| 10/15/2012 - Good 14' - 2" clearance signs on both sides of the bridge for travellers on 5th Ave. SW. | QZHZ |
|---|------|

10/18/2010 - NBI 36A, bridge rail, is rated a "1" as if meets the Bridge Bureau's policy of "no retro-fit" needed.

NBI 58, superstructure, rated a "7" due to rubs on the bottom of the girders and tight cracks on the ends of the girders.

Good 14' - 2" clearance signs on both sides of the bridge for 5th Ave. SW.

10/15/2008 - Good 14'-2" overheight signs on both sides of the structure for 5th Ave. SW. QZGZ

Close to a deck cracking smart flag due to wide cracks over Bents 2 and 3.

Removed Abutment bearing.

NBI 60, substructure, rated a "7" due to small surface spalls on the underside of the caps at Bents 2 and 3 from exposed/rusty rebar chairs. Also

small spalls in the backwalls where the girders are embedded.

10/08/2002 - NBI 36A to a "0" as rail is W-beam blocked out to the curb face. 36B transition rail. Bridge approach section and curbs tapers on

approach ends of the structure only.

04/13/1998 - None

02/01/1994 - Sufficiency Rating Calculation Accepted by ops\$u5963 at 3/11/97 10:44:28

Sufficiency Rating Calculation Accepted by ops\$u9004 at 2/19/97 14:15:04

01/01/1002 - Updated with type 1004 NR04

02/01/1999. Updated with type 1991. NR04

|            |                        |      |
|------------|------------------------|------|
| 09/01/1999 | Updated with tape 1999 | ND99 |
| 09/01/1999 | Updated with tape 1999 | ND99 |

|            |                        |      |
|------------|------------------------|------|
| 02/01/1999 | Updated with tape 1999 | NR00 |
| 02/01/1999 | Updated with tape 1999 | NR00 |

|                                     |      |
|-------------------------------------|------|
| 02/01/1966 - Updated with tape 1966 | ND66 |
| 01/15/1967 - Added to the ... 1967  | ND67 |

|                                     |      |
|-------------------------------------|------|
| 01/01/1964 - Updated with tape 1963 | NB63 |
| 03/15/1964 - Mailed to Mr. ... 1964 | NB64 |

|                                     |      |
|-------------------------------------|------|
| 00/01/1901 - Updated with tape 1904 | ND04 |
| 00/01/1905 - Added with tape 1905   | ND05 |

03/01/1979 - Updated with tape 1980 NB60

---

**INITIAL ASSESSMENT FORM FOR STRUCTURE :****I00015280+00942**

Location : GREAT FALLS Structure Name:

**General Location Data**MDT Maintenance Section : **31-01 Great Falls**District Code, Number, Location : **03 Dist 3 GREAT FALLS**Division Code, Location : **31 GREAT FALLS**County Code, Location : **013 CASCADE**City Code, Location : **32800 GREAT FALLS**Kind fo Hwy Code, Description : **1 1 Interstate Hwy**Signed Route Number : **00015**Str Owner Code, Description : **1 State Highway Agency**Maintained by Code, Description : **1 State Highway Agency**Intersecting Feature : **SEP 5TH AVE SW**Kilometer Post, Mile Post : **450.76 km 280.09**Structure on the State Highway System : ☒ Latitude : **47°30'04"**Structure on the National Highway System : ☒ Longitude : **111°20'35"**Str Meet or Exceed NBIS Bridge Length : ☒**Construction Data**Construction Project Number : **IG 15-5(27)274**Construction Station Number : **595+55.00**Construction Drawing Number : **7092**Construction Year : **1967**

Reconstruction Year :

**Traffic Data**Current ADT : **9,150** ADT Count Year : **2009** Percent Trucks : **2 %****Structure Loading, Rating and Posting Data****Loading Data :**

|                          |                  |                               |
|--------------------------|------------------|-------------------------------|
| Design Loading :         |                  | <b>5 MS 18 (HS 20)</b>        |
| Inventory Load, Design : | <b>32.6 mton</b> | <b>A LFD Assigned</b>         |
| Operating Load, Design : | <b>34.4 mton</b> | <b>A LFD Assigned</b>         |
| Posting :                |                  | <b>5 At/Above Legal Loads</b> |

**Rating Data :**

|                     | Operating    | Inventory | Posting |
|---------------------|--------------|-----------|---------|
| Truck 1 Type 3 :    |              |           |         |
| Truck 2 Type 3-S3 : |              |           |         |
| Truck 3 Type 3-3 :  | <b>83.84</b> |           |         |

**Structure, Roadway and Clearance Data****Structure Deck, Roadway and Span Data :**

Structure Length : **38.10 m**  
 Deck Area : **455.00 m sq**  
 Deck Roadway Width : **11.35 m**  
 Approach Roadway Width : **11.89 m**  
 Median Code, Description : **0 No median**

**Structure Vertical and Horizontal Clearance Data :**

Vertical Clearance Over the Structure : **99.99 m**  
 Reference Feature for Vertical Clearance : **H Hwy beneath struct**  
 Vertical Clearance Under the Structure : **4.57 m**  
 Reference Feature for Lateral Underclearance : **H Hwy beneath struct**  
 Minimum Lateral Under Clearance Right : **3.66 m**  
 Minimum Lateral Under Clearance Left : **0.00 m**

**Span Data****Main Span**

Number Spans : **3**  
 Material Type Code, Description : **5 Prestressed concrete**  
 Span Design Code, Description : **2 Stringer/Multi-beam or Girder Deck**

Deck Structure Type : **1 Concrete Cast-in-Place**  
 Deck Surfacing Type : **3 Latex Concrete or similar additive**  
 Deck Protection Type : **0 None**  
 Deck Membrain Type : **0 None**

**Approach Span**

Number of Spans : **0**  
 Material Type Code, Description :  
 Span Design Code, Description :

**Structure Vertical and Horizontal Clearance Data Inventory Route :**

| Over / Under Direction Name | Inventory Route | South, West or Bi-directional Travel |          |            | North or East Travel |          |            |
|-----------------------------|-----------------|--------------------------------------|----------|------------|----------------------|----------|------------|
|                             |                 | Direction                            | Vertical | Horizontal | Direction            | Vertical | Horizontal |
| One Route Under             | L07544          | Both                                 | 4.57 m   | 10.36 m    | N/A                  |          |            |
| 5TH AVE. SW                 |                 |                                      |          |            |                      |          |            |
| Route On Structure          | I00015          | South                                | 99.99 m  | 11.35 m    | N/A                  |          |            |
| I - 15 SB                   |                 |                                      |          |            |                      |          |            |

**INITIAL ASSESSMENT FORM FOR STRUCTURE :****I00015280+00942**

Continue

**Inspection Data**Sufficiency Rating : **96.6**Structure Status : **Not Deficient**Inspection Due Date : **15 October 2014**(91) Inspection Frequency (months) : **24****NBI Inspection Data**

(90) Date of Last Inspection : 15 October 2012

Last Inspected By : Charles Pepos - 107

(90) Inspection Date :

Inspected By :

(58) Deck Rating :

|   |  |
|---|--|
| 7 |  |
|---|--|

(68) Deck Geometry :

|   |  |
|---|--|
| 5 |  |
|---|--|

(36A) Bridge Rail Rating :

|   |  |
|---|--|
| 1 |  |
|---|--|

(62) Culvert Rating :

|   |  |
|---|--|
| N |  |
|---|--|

(59) Superstructure Rating :

|   |  |
|---|--|
| 7 |  |
|---|--|

(67) Structure Rating :

|   |  |
|---|--|
| 7 |  |
|---|--|

(36B) Transition Rating :

|   |  |
|---|--|
| 1 |  |
|---|--|

(61) Channel Rating :

|   |  |
|---|--|
| N |  |
|---|--|

(60) Substructure Rating :

|   |  |
|---|--|
| 7 |  |
|---|--|

(69) Under Clearance :

|   |  |
|---|--|
| 6 |  |
|---|--|

(36C) Approach Rail Rating :

|   |  |
|---|--|
| 1 |  |
|---|--|

(71) Waterway Adequacy :

|   |  |
|---|--|
| N |  |
|---|--|

(72) App Rdwy Align :

|   |  |
|---|--|
| 8 |  |
|---|--|

(41) Posting Status :

|   |  |
|---|--|
| A |  |
|---|--|

(36D) End Rail Rating :

|   |  |
|---|--|
| 1 |  |
|---|--|

(113) Scour Critical :

|   |  |
|---|--|
| N |  |
|---|--|

Unrepaired Spalls : 0 m sq

Deck Surfacing Depth : 1.00 in

**Inspection Hours**

Crew Hours for inspection :

|   |  |
|---|--|
| 2 |  |
|---|--|

Snooper Required :

|   |
|---|
| N |
|---|

Helper Hours :

|   |  |
|---|--|
| 0 |  |
|---|--|

Snooper Hours for inspection :

|   |  |
|---|--|
| 0 |  |
|---|--|

Special Crew Hours :

|   |  |
|---|--|
| 0 |  |
|---|--|

Flagger Hours :

|   |  |
|---|--|
| 0 |  |
|---|--|

Special Equipment Hours :

|   |  |
|---|--|
| 0 |  |
|---|--|

| Inspection Work Candidates         |                   | Status   | Priority | Effected<br>Structure<br>Unit | Scope of<br>Work | Action            | Covered<br>Condition<br>States |
|------------------------------------|-------------------|----------|----------|-------------------------------|------------------|-------------------|--------------------------------|
| Candidate ID                       | Date<br>Requested |          |          |                               |                  |                   |                                |
| D31-FY2004-000065                  | 28 January 2004   | Approved | Medium   | All Spans                     | Bridge           | Spot Paint (flex) |                                |
| Clean around bearings and repaint. |                   |          |          |                               |                  |                   |                                |
| Approved. DRC                      |                   |          |          |                               |                  |                   |                                |
|                                    |                   |          |          |                               |                  |                   |                                |
|                                    |                   |          |          |                               |                  |                   |                                |
|                                    |                   |          |          |                               |                  |                   |                                |

Late Reason:

Inspection Date: 10/15/2012

**INITIAL ASSESSMENT FORM FOR STRUCTURE :****I00015280+00942**

Continue

**Element Inspection Data**

\*\*\*\*\* Span : Main-0 - \*\*\*\*\*

| Element Description   |              |     |          |       |           |            |            |            |            |            |
|---|--------------|-----|----------|-------|-----------|------------|------------|------------|------------|------------|
| Smart Flag  | Scale Factor | Env | Quantity | Units | Insp Each | Pct Stat 1 | Pct Stat 2 | Pct Stat 3 | Pct Stat 4 | Pct Stat 5 |
| Element 22 - P Conc Deck/Rigid Ov   |              |     |          |       |           |            |            |            |            |            |
|   | 1            | 3   | 455      | sq.m. | X         | 100        | 0          | 0          | 0          | 0          |
|   |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :   |              |     |          |       |           |            |            |            |            |            |
| 10/15/2012 - Minor wear in the wheel paths. Random cracking on the Left side of the deck near Abutment 4 in Span 3.   |              |     |          |       |           |            |            |            |            | QZHZ       |
| 10/18/2010 - 11.95 * 38.10 = 455.30 Milled off 1", Class A and B repair, and then placed a 2" Silica Fume Concrete overlay in 2010. Good condition today.   |              |     |          |       |           |            |            |            |            | SZDZ       |
| Inspection Notes:   |              |     |          |       |           |            |            |            |            |            |
|   |              |     |          |       |           |            |            |            |            |            |
|   |              |     |          |       |           |            |            |            |            |            |
| Element 109 - P/S Conc Open Girder  |              |     |          |       |           |            |            |            |            |            |
|   | 1            | 1   | 191      | m.    |           | 100        | 0          | 0          | 0          |            |
|   |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :   |              |     |          |       |           |            |            |            |            |            |
| 10/15/2012 - Unchanged from past inspections and in Good condition.   |              |     |          |       |           |            |            |            |            | QZHZ       |
| 10/18/2010 - Generally Good condition. Minor scrapes and rubs from overheight loads on the bottom of the girders. Tight cracks on the ends of the girders at Bent 2 and 3.                        |              |     |          |       |           |            |            |            |            | SZDZ       |
| 10/15/2008 - Generally in Good condition. Minor scrapes to the Left two girders from overheight loads.  |              |     |          |       |           |            |            |            |            | QZGZ       |
| 10/24/2006 - Minor scrape to the Left girder in Span 2 from overheight load. Several of the girders have minor cracks from the backside of the embedded bearing plate to the ends of the girders. |              |     |          |       |           |            |            |            |            | ZCGZ       |
| 10/08/2002 - 38.10 * 5 = 190.5m   |              |     |          |       |           |            |            |            |            | ISDL       |
| Inspection Notes:   |              |     |          |       |           |            |            |            |            |            |
|   |              |     |          |       |           |            |            |            |            |            |
|   |              |     |          |       |           |            |            |            |            |            |
| Element 205 - R/Conc Column Bent 2 and 3  |              |     |          |       |           |            |            |            |            |            |
|   | 1            | 1   | 4        | ea.   |           | 95         | 5          | 0          | 0          |            |
|   |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :   |              |     |          |       |           |            |            |            |            |            |
| 10/15/2012 - All are generally in Good condition with small spalls on (2) columns from construction activity.   |              |     |          |       |           |            |            |            |            | QZHZ       |
| 10/18/2010 - Good condition.  |              |     |          |       |           |            |            |            |            | SZDZ       |
| 10/15/2008 - Good condition. Small scrape on the Left column of Bent 2.   |              |     |          |       |           |            |            |            |            | QZGZ       |
| 10/24/2006 - No major problems noted with minor and tight surface shrinkage cracks.   |              |     |          |       |           |            |            |            |            | ZCGZ       |
| 10/08/2002 - Minor, tight shrinkage cracks.   |              |     |          |       |           |            |            |            |            | ISDL       |
| Inspection Notes:   |              |     |          |       |           |            |            |            |            |            |
|   |              |     |          |       |           |            |            |            |            |            |
|   |              |     |          |       |           |            |            |            |            |            |

**INITIAL ASSESSMENT FORM FOR STRUCTURE :****I00015280+00942**

Continue

\*\*\*\*\* Span : Main-0 - (cont.) \*\*\*\*\*

| Element Description  |              |     |          |       |           |            |            |            |            |            |
|--|--------------|-----|----------|-------|-----------|------------|------------|------------|------------|------------|
| Smart Flag   | Scale Factor | Env | Quantity | Units | Insp Each | Pct Stat 1 | Pct Stat 2 | Pct Stat 3 | Pct Stat 4 | Pct Stat 5 |
| Element 215 - R/Conc Abutment 1 and 4  |              |     |          |       |           |            |            |            |            |            |
|  | 1            | 2   | 30       | m.    |           | 95         | 5          | 0          | 0          |            |
|  |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :  |              |     |          |       |           |            |            |            |            |            |
| 10/15/2012 - Tight cracks in both of the backwalls and caps. Small spalls near the cap to backwall connections and at a couple of the embedded bearings.   |              |     |          |       |           |            |            |            |            | QZHZ       |
| 10/18/2010 - Generally Good condition. Tight cracks in both backwalls.   |              |     |          |       |           |            |            |            |            | SZDZ       |
| 10/15/2008 - Same as prior inspection and add some tight cracks in both caps and backwalls of the Abutments.   |              |     |          |       |           |            |            |            |            | QZGZ       |
| 10/24/2006 - Minor seepage at the bearings and along the cap to backwall joint. A couple of small spalls where the girders are embedded in the backwalls.  |              |     |          |       |           |            |            |            |            | ZCGZ       |
| 10/08/2002 - (11.95 1.50 1.50) * 2 = 29.90m Env. State 2 as some moisture coming from between the backwall to cap connection on this date and wet soil in median area.   |              |     |          |       |           |            |            |            |            | ISDL       |
| 03/13/1998 - None  |              |     |          |       |           |            |            |            |            | RHGT       |
| 02/01/1994 - None  |              |     |          |       |           |            |            |            |            | REFI       |
| Inspection Notes:  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
| Element 234 - R/Conc Cap Bent 2 and 3  |              |     |          |       |           |            |            |            |            |            |
|  | 1            | 1   | 24       | m.    |           | 90         | 5          | 5          | 0          |            |
|  |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :  |              |     |          |       |           |            |            |            |            |            |
| 10/15/2012 - Minor surface spalls on the underside of both caps from rebar chair feet. Right end of Bent 3's cap has a small surface delamination and both caps show tight cracking on their ends. Spall with exposed rebar on the Left end of Bent 2's cap. |              |     |          |       |           |            |            |            |            | QZHZ       |
| 10/18/2010 - Minor surface spalls on the underside of both caps. Spall with exposed rebar ends on the Left end of Bent 2's cap.  |              |     |          |       |           |            |            |            |            | SZDZ       |
| 10/15/2008 - Surface spalls on the underside of both caps. Tight cracks on the ends of both caps.  |              |     |          |       |           |            |            |            |            | QZGZ       |
| 10/24/2006 - Minor and small surface spalls where rebar chairs are exposed on the underside of the caps. Staining from leakage in the past.  |              |     |          |       |           |            |            |            |            | ZCGZ       |
| 10/08/2002 - 2 * 11.95 = 23.90m Minor staining from areas where the rebar chairs are exposed.  |              |     |          |       |           |            |            |            |            | ISDL       |
| Inspection Notes:  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
| Element 313 - Fixed Bearing Bent 2 and 3   |              |     |          |       |           |            |            |            |            |            |
|  | 1            | 1   | 20       | ea.   |           | 90         | 10         | 0          |            |            |
|  |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :  |              |     |          |       |           |            |            |            |            |            |
| 10/15/2012 - Spot rust, paint loss, and some debris.   |              |     |          |       |           |            |            |            |            | QZHZ       |
| 10/18/2010 - Spot rust and paint loss.   |              |     |          |       |           |            |            |            |            | SZDZ       |
| 10/15/2008 - Spot rust and paint loss.   |              |     |          |       |           |            |            |            |            | QZGZ       |
| 10/24/2006 - Spot rust on the bearings. Pigeon debris on the bearings at Bents 2 and 3.  |              |     |          |       |           |            |            |            |            | ZCGZ       |
| 10/08/2002 - Rusty spots throughout.   |              |     |          |       |           |            |            |            |            | ISDL       |
| Inspection Notes:  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |

**100015280+00942**

**Continue**

\*\*\*\*\* Span : Main-0 - (cont.) \*\*\*\*\*

[illegible]





# INITIAL ASSESSMENT FORM FOR STRUCTURE :

**I00015282+05471**

Location : 1M N GREAT FALLS Structure Name:

## General Location Data

District Code, Number, Location : **03 Dist 3 GREAT FALLS**

County Code, Location : **013 CASCADE**

Kind fo Hwy Code, Description : **1 1 Interstate Hwy**

Str Owner Code, Description : **1 State Highway Agency**

Intersecting Feature : **INT EMERSON, BNSF RR**

Structure on the State Highway System : ☒ Latitude : **47°31'17"**

Structure on the National Highway System : ☒ Longitude : **111°22'45"**

Str Meet or Exceed NBIS Bridge Length : ☒

MDT Maintenance Section : **31-01 Great Falls**

Division Code, Location : **31 GREAT FALLS**

City Code, Location : **32800 GREAT FALLS**

Signed Route Number : **00015**

Maintained by Code, Description : **1 State Highway Agency**

Kilometer Post, Mile Post : **454.70 km 282.54**

## Construction Data

Construction Project Number : **IG 15-5(27)274**

Construction Station Number : **724+45.00**

Construction Drawing Number : **7104**

Construction Year : **1967**

Reconstruction Year :

## Traffic Data

Current ADT : **9,280** ADT Count Year : **2009** Percent Trucks : **2 %**

## Structure Loading, Rating and Posting Data

### Loading Data :

|                          |                  |                               |
|--------------------------|------------------|-------------------------------|
| Design Loading :         |                  | <b>5 MS 18 (HS 20)</b>        |
| Inventory Load, Design : | <b>32.6 mton</b> | <b>A LFD Assigned</b>         |
| Operating Load, Design : | <b>34.4 mton</b> | <b>A LFD Assigned</b>         |
| Posting :                |                  | <b>5 At/Above Legal Loads</b> |

### Rating Data :

|                     | Operating    | Inventory | Posting |
|---------------------|--------------|-----------|---------|
| Truck 1 Type 3 :    |              |           |         |
| Truck 2 Type 3-S3 : |              |           |         |
| Truck 3 Type 3-3 :  | <b>63.18</b> |           |         |

## Structure, Roadway and Clearance Data

### Structure Deck, Roadway and Span Data :

Structure Length : **107.90 m**  
Deck Area : **1,052.00 m sq**  
Deck Roadway Width : **8.55 m**  
Approach Roadway Width : **11.58 m**  
Median Code, Description : **0 No median**

### Structure Vertical and Horizontal Clearance Data :

Vertical Clearance Over the Structure : **99.99 m**  
Reference Feature for Vertical Clearance : **H Hwy beneath struct**  
Vertical Clearance Under the Structure : **6.76 m**  
Reference Feature for Lateral Underclearance : **H Hwy beneath struct**  
Minimum Lateral Under Clearance Right : **2.75 m**  
Minimum Lateral Under Clearance Left : **0.00 m**

## Span Data

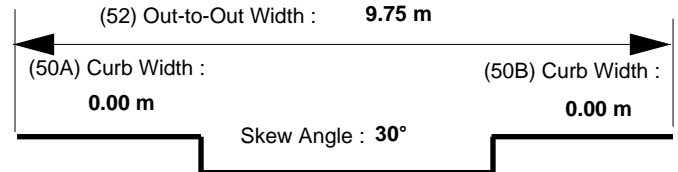
### Main Span

Number Spans : **6**  
Material Type Code, Description : **5 Prestressed concrete**  
Span Design Code, Description : **2 Stringer/Multi-beam or Girder Deck**

Deck Structure Type : **1 Concrete Cast-in-Place**  
Deck Surfacing Type : **3 Latex Concrete or similar additive**  
Deck Protection Type : **0 None**  
Deck Membrain Type : **0 None**

### Approach Span

Number of Spans : **0**  
Material Type Code, Description :  
Span Design Code, Description :



### Structure Vertical and Horizontal Clearance Data Inventory Route :

| Over / Under Direction Name | Inventory Route | South, West or Bi-directional Travel |          |            | North or East Travel |          |            |
|-----------------------------|-----------------|--------------------------------------|----------|------------|----------------------|----------|------------|
|                             |                 | Direction                            | Vertical | Horizontal | Direction            | Vertical | Horizontal |
| One Route Under             | N00123          | Both                                 | 6.76 m   | 9.14 m     | N/A                  |          |            |
| VAUGHN ROAD                 |                 |                                      |          |            |                      |          |            |
| Route On Structure          | I00015          | N/A                                  |          |            | North                | 99.99 m  | 8.55 m     |
| I-15 NB / EMERSON JCT       |                 |                                      |          |            |                      |          |            |

## Inspection Data

Inspection Due Date : 19 December 2014

Sufficiency Rating : 76.4

(91) Inspection Frequency (months) : 24

Structure Status : Func Obs - Elg Rehab

## NBI Inspection Data

(90) Date of Last Inspection : 19 December 2012

Last Inspected By : Charles Pepos - 107

(90) Inspection Date :

Inspected By :

(58) Deck Rating : 6

(68) Deck Geometry : 3

(36A) Bridge Rail Rating : 1

(62) Culvert Rating : N

(59) Superstructure Rating : 7

(67) Structure Rating : 7

(36B) Transition Rating : 1

(61) Channel Rating : N

(60) Substructure Rating : 7

(69) Under Clearance : 4

(36C) Approach Rail Rating : 1

(71) Waterway Adequacy : N

(72) App Rdwy Align : 7

(41) Posting Status : A

(36D) End Rail Rating : 1

(113) Scour Critical : N

Unrepaired Spalls : 0 m sq

Deck Surfacing Depth : 0.00 in

## Inspection Hours

Crew Hours for inspection : 2

Snooper Required : N

Helper Hours : 0

Snooper Hours for inspection : 0

Special Crew Hours : 0

Flagger Hours : 0

Special Equipment Hours : 0

| Inspection Work Candidates          |                  | Status       | Priority | Effected Structure Unit | Scope of Work            | Action            | Covered Condition States |
|-------------------------------------|------------------|--------------|----------|-------------------------|--------------------------|-------------------|--------------------------|
| Candidate ID                        | Date Requested   |              |          |                         |                          |                   |                          |
| D31-FY2007-000030                   | 27 November 2006 | Approved     | Medium   | M Main                  | Bridge                   | Spot Paint (flex) |                          |
| Clean and spot paint bearings.      |                  |              |          |                         |                          |                   |                          |
| Approved. DRC                       |                  |              |          |                         |                          |                   |                          |
|                                     |                  |              |          |                         |                          |                   |                          |
| D31-FY2007-000029                   | 27 November 2006 | Approved     | High     | M Main                  | 300 Strip Seal Exp Joint | Min Repair        |                          |
| Clean sanding material from joints. |                  |              |          |                         |                          |                   |                          |
| Approved. DRC                       |                  |              |          |                         |                          |                   |                          |
|                                     |                  |              |          |                         |                          |                   |                          |
| D31-FY2011-000025                   | 11 January 2011  | Not Approved | Low      | M Main                  | 334 Metal Rail Coated    | Repl Paint        |                          |
| Clean and spot paint rail.          |                  |              |          |                         |                          |                   |                          |
|                                     |                  |              |          |                         |                          |                   |                          |
|                                     |                  |              |          |                         |                          |                   |                          |

Late Reason:

Inspection Date: 12/19/2012

# INITIAL ASSESSMENT FORM FOR STRUCTURE :

**I00015282+05471**

Continue

## Element Inspection Data

\*\*\*\*\* Span : Main-0 - \*\*\*\*\*

| Element Description  |              |     |          |       |           |            |            |            |            |            |
|--|--------------|-----|----------|-------|-----------|------------|------------|------------|------------|------------|
| Smart Flag   | Scale Factor | Env | Quantity | Units | Insp Each | Pct Stat 1 | Pct Stat 2 | Pct Stat 3 | Pct Stat 4 | Pct Stat 5 |
| Element 12 - Bare Concrete Deck  |              |     |          |       |           |            |            |            |            |            |
|  | 1            | 3   | 1052     | sq.m. | X         | 0          | 100        | 0          | 0          | 0          |
|  |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :  |              |     |          |       |           |            |            |            |            |            |
| 12/19/2012 - Wider and open cracks over the un-jointed Bents. Random and mapping cracks in all of the Spans. Small surface spalls and delaminations along the edges of the joint steel.  |              |     |          |       |           |            |            |            |            | UZGZ       |
| 12/27/2010 - Small surface spalls and delaminations along joint steel. Wear in the wheel paths and mapping cracks in all Spans. Wider transverse cracks over Bent that are without joints.   |              |     |          |       |           |            |            |            |            | ZZDZ       |
| 11/19/2008 - Placed into Condition State 2 as a couple of small delaminations were observed with chain drag near the joints/guard angles. Wear in the wheel paths. Wider transverse cracks over the unjointed Bents. Some mapping cracks also. |              |     |          |       |           |            |            |            |            | TZDT       |
| 11/02/2006 - Open transverse cracks over the Bents without joints. Minor wear in the wheel paths. Some very minor flaking of latex concrete paste at the joint steel, but none delaminated or spalling.  |              |     |          |       |           |            |            |            |            | CODN       |
| 10/07/2002 - 107.90 * 9.75 = 1052.03 Deck was hydromilled and the removed material was replaced with latex concrete. The deck has some transverse cracks over the Bents that do not have expansion joints.                                     |              |     |          |       |           |            |            |            |            | IZHP       |
| 04/14/1998 - None  |              |     |          |       |           |            |            |            |            | RHHP       |
| 02/01/1994 - None  |              |     |          |       |           |            |            |            |            | REFI       |
| Inspection Notes:  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
| Element 109 - P/S Conc Open Girder   |              |     |          |       |           |            |            |            |            |            |
|  | 1            | 1   | 519      | m.    |           | 100        | 0          | 0          | 0          |            |
|  |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :  |              |     |          |       |           |            |            |            |            |            |
| 12/19/2012 - No problems observed.   |              |     |          |       |           |            |            |            |            | UZGZ       |
| 12/27/2010 - Good condition.   |              |     |          |       |           |            |            |            |            | ZZDZ       |
| 11/19/2008 - Generally Good condition.   |              |     |          |       |           |            |            |            |            | TZDT       |
| 11/02/2006 - Minor tight cracks from the backside of the embedded bearing plate to the ends of the girders on several of the girders; none are a problem.  |              |     |          |       |           |            |            |            |            | CODN       |
| 10/07/2002 - (6 * 19.8) (4 * 40.8) (5 * 47.3) = 518.5m Minor cracking of the concrete near the beam seat on a couple of girders; not a problem.  |              |     |          |       |           |            |            |            |            | IZHP       |
| Inspection Notes:  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
| Element 205 - R/Conc Column 2 thru 6   |              |     |          |       |           |            |            |            |            |            |
|  | 1            | 1   | 10       | ea.   |           | 90         | 5          | 5          | 0          |            |
|  |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :  |              |     |          |       |           |            |            |            |            |            |
| 12/19/2012 - Small surface delaminations near the ground on the construction joints. Shallow surface spalls on a couple of the columns. Generally in Good condition.   |              |     |          |       |           |            |            |            |            | UZGZ       |
| 12/27/2010 - Some small delaminated sack patches at construction joints near groundline on a couple of the columns. Small surface spalls along shallow tie wire.   |              |     |          |       |           |            |            |            |            | ZZDZ       |
| 11/19/2008 - Condition State 2 due to shallow tie wire and surface spalls. Condition State 3 for delaminations that have not popped off. Some cracks and small delaminations on the webwalls.  |              |     |          |       |           |            |            |            |            | TZDT       |
| 11/02/2006 - Tight surface shrinkage cracks. Some areas where shallow tie wire is on the surface. Wire is rusty and causing small surface spalls.  |              |     |          |       |           |            |            |            |            | CODN       |
| 10/07/2002 - Minor, tight random cracks on several coulmns.  |              |     |          |       |           |            |            |            |            | IZHP       |
| Inspection Notes:  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |



I00015282+05471

Continue

\*\*\*\*\* Span : Main-0 - (cont.) \*\*\*\*\*

| Element Description   |              |     |          |       |           |            |            |            |            |            |
|---|--------------|-----|----------|-------|-----------|------------|------------|------------|------------|------------|
| Smart Flag  | Scale Factor | Env | Quantity | Units | Insp Each | Pct Stat 1 | Pct Stat 2 | Pct Stat 3 | Pct Stat 4 | Pct Stat 5 |
| Element 215 - R/Conc Abutment 1 and 7   |              |     |          |       |           |            |            |            |            |            |
|   | 1            | 1   | 29       | m.    |           | 95         | 5          | 0          | 0          |            |
|   |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :   |              |     |          |       |           |            |            |            |            |            |
| 12/19/2012 - Good condition. Small spalls along the cap to backwall area. Erosion at the corners of the wingwalls. Some missing fill under Abutment 1's cap. Tight surface shrinkage cracks.            |              |     |          |       |           |            |            |            |            | UZGZ       |
| 12/27/2010 - Small spalls along a couple of the embedded bearings. Minor and tight cracks under G2 and G3 in Abutment 1's cap.  |              |     |          |       |           |            |            |            |            | ZZDZ       |
| 11/19/2008 - Same as last comments.   |              |     |          |       |           |            |            |            |            | TZDT       |
| 11/02/2006 - Both caps have minor and tight cracks. A couple of small spalls where girders ends are embedded in the backwall.   |              |     |          |       |           |            |            |            |            | CODN       |
| 10/07/2002 - (11.48 1.40 1.40) * 2 = 28.56m Minor cracking in Abutment backwalls. Minor erosion at wingwalls.   |              |     |          |       |           |            |            |            |            | IZHP       |
| Inspection Notes:   |              |     |          |       |           |            |            |            |            |            |
|   |              |     |          |       |           |            |            |            |            |            |
|   |              |     |          |       |           |            |            |            |            |            |
| Element 234 - R/Conc Cap Bents 2 thru 6   |              |     |          |       |           |            |            |            |            |            |
|   | 1            | 1   | 57       | m.    |           | 90         | 5          | 5          | 0          |            |
|   |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :   |              |     |          |       |           |            |            |            |            |            |
| 12/19/2012 - Bent 4's cap has a small delamination under G4 on the Span 3 side. Shallow surface spalls and delaminations on the underside of the caps from rebar chair feet.                            |              |     |          |       |           |            |            |            |            | UZGZ       |
| 12/27/2010 - Small delamination under G4 on the Span 3 face of Bent 4's cap. Mostly in Good condition. Some staining. Shallow surface spalls on under of caps from rebar chair feet.                    |              |     |          |       |           |            |            |            |            | ZZDZ       |
| 11/19/2008 - Condition State 3 for surface delaminations and Condition State 2 for cracks and small surface spalls. Staining from past joint leakage.   |              |     |          |       |           |            |            |            |            | TZDT       |
| 11/02/2006 - Most all of the undersides of the Bent caps have small surface spalls with rust staining from shallow rebar chairs.  |              |     |          |       |           |            |            |            |            | CODN       |
| 10/07/2002 - 5 * 11.48 = 57.40m Bottom side of cap at Bent 3-Right has some minor spalling concrete around exposed rebar chairs.  |              |     |          |       |           |            |            |            |            | IZHP       |
| Inspection Notes:   |              |     |          |       |           |            |            |            |            |            |
|   |              |     |          |       |           |            |            |            |            |            |
|   |              |     |          |       |           |            |            |            |            |            |
| Element 300 - Strip Seal Exp Joint  |              |     |          |       |           |            |            |            |            |            |
|   | 1            | 3   | 23       | m.    |           | 95         | 5          | 0          |            |            |
|   |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :   |              |     |          |       |           |            |            |            |            |            |
| 12/19/2012 - Lots of sanding material is packed into the gland area. No obvious leaking. Steel portions sound solid when tapped on. Small surface spalls and paste delaminations along the joint steel. |              |     |          |       |           |            |            |            |            | UZGZ       |
| 12/27/2010 - Steel sounds solid when tapped on. Small surface spalls and delaminations along edges of the steel. Both joints are full of sanding material. No leakage observed.                         |              |     |          |       |           |            |            |            |            | ZZDZ       |
| 11/19/2008 - Steel sounds solid when tapped on. Small spalls and delaminations along the joint edges. Gland is pushed down from debris, but no tears or leakage was observed.                           |              |     |          |       |           |            |            |            |            | TZDT       |
| 11/02/2006 - Joint steel is solid when tapped on. Joints are full of debris/sanding material which is pushing on the gland. No apparent leaking observed.   |              |     |          |       |           |            |            |            |            | CODN       |
| 10/07/2002 - 11.48 * 2 = 22.96m Joints are filled with sanding material/debris. Gland is in Good condition with no tears or leaking evident.  |              |     |          |       |           |            |            |            |            | IZHP       |
| Inspection Notes:   |              |     |          |       |           |            |            |            |            |            |
|   |              |     |          |       |           |            |            |            |            |            |
|   |              |     |          |       |           |            |            |            |            |            |

**INITIAL ASSESSMENT FORM FOR STRUCTURE :****I00015282+05471**

Continue

\*\*\*\*\* Span : Main-0 - (cont.) \*\*\*\*\*

| Element Description   |              |     |          |       |           |            |            |            |            |            |
|---|--------------|-----|----------|-------|-----------|------------|------------|------------|------------|------------|
| Smart Flag  | Scale Factor | Env | Quantity | Units | Insp Each | Pct Stat 1 | Pct Stat 2 | Pct Stat 3 | Pct Stat 4 | Pct Stat 5 |
| Element 311 - Moveable Bearing  |              |     |          |       |           |            |            |            |            |            |
|   | 1            | 1   | 25       | ea.   |           | 90         | 10         | 0          |            |            |
|   |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :   |              |     |          |       |           |            |            |            |            |            |
| 12/19/2012 - Spot rust, scale, faded paint, and some paste from the hydo-demolition. Alignment is ok.                                   |              |     |          |       |           |            |            |            |            | UZGZ       |
| 12/27/2010 - Spot rust, paint loss, and some scale.   |              |     |          |       |           |            |            |            |            | ZZDZ       |
| 11/19/2008 - Spots of rust, paint loss, and some concrete paste from past hydromilling.   |              |     |          |       |           |            |            |            |            | TZDT       |
| 11/02/2006 - Rusty spots, paint loss, and fading of the paint system.   |              |     |          |       |           |            |            |            |            | CODN       |
| 10/07/2002 - Rusty spots with some pitting.   |              |     |          |       |           |            |            |            |            | IZHP       |
| Inspection Notes:   |              |     |          |       |           |            |            |            |            |            |
|   |              |     |          |       |           |            |            |            |            |            |
|   |              |     |          |       |           |            |            |            |            |            |
| Element 313 - Fixed Bearing   |              |     |          |       |           |            |            |            |            |            |
|   | 1            | 1   | 29       | ea.   |           | 90         | 10         | 0          |            |            |
|   |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :   |              |     |          |       |           |            |            |            |            |            |
| 12/19/2012 - Spot rust, paint loss, and faded paint.  |              |     |          |       |           |            |            |            |            | UZGZ       |
| 12/27/2010 - Spot rust and paint loss.  |              |     |          |       |           |            |            |            |            | ZZDZ       |
| 11/19/2008 - Spots of rust, paint loss, and some concrete paste from past hydromilling.   |              |     |          |       |           |            |            |            |            | TZDT       |
| 11/02/2006 - Minor spot rust.   |              |     |          |       |           |            |            |            |            | CODN       |
| 10/07/2002 - Minor rusty spots with pitting.  |              |     |          |       |           |            |            |            |            | IZHP       |
| Inspection Notes:   |              |     |          |       |           |            |            |            |            |            |
|   |              |     |          |       |           |            |            |            |            |            |
|   |              |     |          |       |           |            |            |            |            |            |
| Element 331 - Conc Bridge Railing   |              |     |          |       |           |            |            |            |            |            |
|   | 1            | 3   | 216      | m.    |           | 95         | 5          | 0          | 0          |            |
|   |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :   |              |     |          |       |           |            |            |            |            |            |
| 12/19/2012 - Random shrinkage cracks. Minor surface spalls near the deck line. Spalls on the backside of the W-Beam bolt-up.            |              |     |          |       |           |            |            |            |            | UZGZ       |
| 12/27/2010 - Unchanged from past inspections.   |              |     |          |       |           |            |            |            |            | ZZDZ       |
| 11/19/2008 - Same comments as the past inspections and add some surfce spalls of the original curb near the deck line.                  |              |     |          |       |           |            |            |            |            | TZDT       |
| 11/02/2006 - Minor cracks along the rebar lines in a couple of the areas. Some minor and random vertical cracking.                      |              |     |          |       |           |            |            |            |            | CODN       |
| 10/07/2002 - 107.9 * 2 = 215.80m Minor, vertical cracks throughout. During a rehab project a barrier rail was built on top of the curb. |              |     |          |       |           |            |            |            |            | IZHP       |
| Inspection Notes:   |              |     |          |       |           |            |            |            |            |            |
|   |              |     |          |       |           |            |            |            |            |            |
|   |              |     |          |       |           |            |            |            |            |            |

**INITIAL ASSESSMENT FORM FOR STRUCTURE :****I00015282+05471**

Continue

\*\*\*\*\* Span : Main-0 - (cont.) \*\*\*\*\*

| Element Description   |              |     |          |       |           |            |            |            |            |            |
|---|--------------|-----|----------|-------|-----------|------------|------------|------------|------------|------------|
| Smart Flag  | Scale Factor | Env | Quantity | Units | Insp Each | Pct Stat 1 | Pct Stat 2 | Pct Stat 3 | Pct Stat 4 | Pct Stat 5 |
| Element 334 - Metal Rail Coated Single W-Beam and Steel Round Handrail w\ Steel Posts |              |     |          |       |           |            |            |            |            |            |
|   | 1            | 3   | 216      | m.    |           | 85         | 10         | 5          | 0          | 0          |
|   |              |     |          |       |           | %          | %          | %          | %          | %          |

## Previous Inspection Notes :

|  |      |
|--|------|
| 12/19/2012 - Rusty spots, paint loss, fading of the paint, and minor surface pitting to the posts near the curb line.  | UZGZ |
| 12/27/2010 - Rusty spots, paint loss, and scale on the W-Beam and posts. Some sanding material starting to build up on top of the curb against the rail posts. | ZZDZ |
| 11/19/2008 - No change.  | TZDT |
| 11/02/2006 - W-beam, steel posts, and handrail are rusted and pitted. Some paint is peeling also. All componenets are behind the concrete rail.                | CODN |
| 10/07/2002 - 107.90 * 2 = 215.80m Rusty and pitting throughout the rail and posts. The metal rail is behind the concrete barrier now.                          | IZHP |

## Inspection Notes:

## Element 358 - Deck Cracking SmFlag

|   |   |   |   |     |   |   |     |   |   |   |
|---|---|---|---|-----|---|---|-----|---|---|---|
| X | 1 | 3 | 1 | ea. | X | 0 | 100 | 0 | 0 |   |
|   |   |   |   |     |   | % | %   | % | % | % |

## Previous Inspection Notes :

|  |      |
|--|------|
| 12/19/2012 - Unchanged from past inspections.  | UZGZ |
| 12/27/2010 - Wide and open cracks over the Bents that don't have joints. Some wider mapping cracks in all Spans. | ZZDZ |
| 11/19/2008 - Open cracks over the unjointed Bents and need to start tracking it.                                 | TZDT |

## Inspection Notes:

**General Inspection Notes**

|  |      |
|--|------|
| 12/19/2012 - Fair markers at the Abutment 1 corners.   | UZGZ |
| 12/27/2010 - Fair markers on the Right and Left side of Abutment 1.  | ZZDZ |
| Erosion on all (4) corners with the NE corner being the worse.   |      |
| 11/19/2008 - NBI 58, deck, rated a "6" due to small delaminations and cracking in the deck surface.                    | TZDT |
| Markers on the Right and Left sides of Abutment 1 and in Fair condition.   |      |
| 11/02/2006 - Minor bumps on and off of the structure. Markers on the approach end of the bridge and in Fair condition. | CODN |
| 10/07/2002 - Markers on both side of the approach of the bridge and in Good condition.                                 | IZHP |
| 04/14/1998 - None  | RHHP |
| 02/01/1994 - Sufficiency Rating Calculation Accepted by ops\$u5963 at 3/11/97 10:44:29                                 | REFI |
| Sufficiency Rating Calculation Accepted by ops\$u9004 at 2/19/97 14:15:06  |      |
| 01/01/1992 - Updated with tape 1994  | NB94 |
| 03/01/1990 - Updated with tape 1991  | NB91 |
| 02/01/1988 - Updated with tape 1989  | NB89 |
| 02/01/1986 - Updated with tape 1988  | NB88 |
| 01/01/1984 - Updated with tape 1985  | NB85 |
| 08/01/1981 - Updated with tape 1984  | NB84 |
| 03/01/1979 - Updated with tape 1980  | NB80 |

**INITIAL ASSESSMENT FORM FOR STRUCTURE :****I00015282+05472****Location : 1M N GREAT FALLS Structure Name:****General Location Data**MDT Maintenance Section : **31-01 Great Falls**District Code, Number, Location : **03 Dist 3 GREAT FALLS**Division Code, Location : **31 GREAT FALLS**County Code, Location : **013 CASCADE**City Code, Location : **32800 GREAT FALLS**Kind fo Hwy Code, Description : **1 1 Interstate Hwy**Signed Route Number : **00015**Str Owner Code, Description : **1 State Highway Agency**Maintained by Code, Description : **1 State Highway Agency**Intersecting Feature : **INT EMERSON, BNSF RR**Kilometer Post, Mile Post : **454.70 km 282.54**Structure on the State Highway System : ☒ Latitude : **47°31'17"**Structure on the National Highway System : ☒ Longitude : **111°22'47"**Str Meet or Exceed NBIS Bridge Length : ☒**Construction Data**Construction Project Number : **IG 15-5(27)274**Construction Station Number : **724+45.00**Construction Drawing Number : **7104**Construction Year : **1967**

Reconstruction Year :

**Traffic Data**Current ADT : **9,280** ADT Count Year : **2009** Percent Trucks : **2 %****Structure Loading, Rating and Posting Data****Loading Data :**

|                          |                  |                               |
|--------------------------|------------------|-------------------------------|
| Design Loading :         |                  | <b>5 MS 18 (HS 20)</b>        |
| Inventory Load, Design : | <b>32.6 mton</b> | <b>A LFD Assigned</b>         |
| Operating Load, Design : | <b>34.4 mton</b> | <b>A LFD Assigned</b>         |
| Posting :                |                  | <b>5 At/Above Legal Loads</b> |

**Rating Data :**

|                     | Operating    | Inventory | Posting |
|---------------------|--------------|-----------|---------|
| Truck 1 Type 3 :    |              |           |         |
| Truck 2 Type 3-S3 : |              |           |         |
| Truck 3 Type 3-3 :  | <b>63.18</b> |           |         |

**Structure, Roadway and Clearance Data****Structure Deck, Roadway and Span Data :**

Structure Length : **109.42 m**  
 Deck Area : **1,067.00 m sq**  
 Deck Roadway Width : **8.55 m**  
 Approach Roadway Width : **11.58 m**  
 Median Code, Description : **0 No median**

**Structure Vertical and Horizontal Clearance Data :**

Vertical Clearance Over the Structure : **99.99 m**  
 Reference Feature for Vertical Clearance : **H Hwy beneath struct**  
 Vertical Clearance Under the Structure : **6.76 m**  
 Reference Feature for Lateral Underclearance : **H Hwy beneath struct**  
 Minimum Lateral Under Clearance Right : **2.75 m**  
 Minimum Lateral Under Clearance Left : **0.00 m**

**Span Data****Main Span**

Number Spans : **6**  
 Material Type Code, Description : **5 Prestressed concrete**  
 Span Design Code, Description : **2 Stringer/Multi-beam or Girder Deck**

Deck Structure Type : **1 Concrete Cast-in-Place**  
 Deck Surfacing Type : **3 Latex Concrete or similar additive**  
 Deck Protection Type : **0 None**  
 Deck Membrain Type : **0 None**

**Approach Span**

Number of Spans : **0**  
 Material Type Code, Description :  
 Span Design Code, Description :

**Structure Vertical and Horizontal Clearance Data Inventory Route :**

| Over / Under Direction Name | Inventory Route | South, West or Bi-directional Travel |          |            | North or East Travel |          |            |
|-----------------------------|-----------------|--------------------------------------|----------|------------|----------------------|----------|------------|
|                             |                 | Direction                            | Vertical | Horizontal | Direction            | Vertical | Horizontal |
| One Route Under             | N00123          | Both                                 | 6.76 m   | 9.14 m     | N/A                  |          |            |
| VAUGHN ROAD                 |                 |                                      |          |            |                      |          |            |
| Route On Structure          | I00015          | South                                | 99.99 m  | 8.55 m     | N/A                  |          |            |
| I-15 SB / EMERSON JCT       |                 |                                      |          |            |                      |          |            |





I00015282+05472

Continue

**Inspection Data**

Inspection Due Date : 19 December 2014

Sufficiency Rating : 76.4

(91) Inspection Frequency (months) : 24

Structure Status : Func Obs - Elg Rehab

**NBI Inspection Data**

(90) Date of Last Inspection : 19 December 2012

Last Inspected By : Charles Pepos - 107

(90) Inspection Date :

Inspected By :

(58) Deck Rating : 6

(68) Deck Geometry : 3

(36A) Bridge Rail Rating : 1

(62) Culvert Rating : N

(59) Superstructure Rating : 7

(67) Structure Rating : 7

(36B) Transition Rating : 1

(61) Channel Rating : N

(60) Substructure Rating : 7

(69) Under Clearance : 4

(36C) Approach Rail Rating : 1

(71) Waterway Adequacy : N

(72) App Rdwy Align : 7

(41) Posting Status : A

(36D) End Rail Rating : 1

(113) Scour Critical : N

Unrepaired Spalls : 0 m sq

Deck Surfacing Depth : 0.00 in

**Inspection Hours**

Crew Hours for inspection : 2

Snooper Required : N

Helper Hours : 0

Snooper Hours for inspection : 0

Special Crew Hours : 0

Flagger Hours : 0

Special Equipment Hours : 0

| Inspection Work Candidates                     |                   | Status       | Priority | Effected<br>Structure<br>Unit | Scope of<br>Work         | Action            | Covered<br>Condition<br>States |
|--|-------------------|--------------|----------|-------------------------------|--------------------------|-------------------|--------------------------------|
| Candidate ID                                   | Date<br>Requested |              |          |                               |                          |                   |                                |
| D31-FY2007-000032                              | 27 November 2006  | Approved     | Medium   | M Main                        | Bridge                   | Spot Paint (flex) |                                |
| Paint the rail.                                |                   |              |          |                               |                          |                   |                                |
| Approved. DRC                                  |                   |              |          |                               |                          |                   |                                |
|  |                   |              |          |                               |                          |                   |                                |
|  |                   |              |          |                               |                          |                   |                                |
| D31-FY2007-000031                              | 27 November 2006  | Approved     | Medium   | M Main                        | 300 Strip Seal Exp Joint | Min Repair        |                                |
| Clean debris/sanding material from the joints. |                   |              |          |                               |                          |                   |                                |
| 11-19-2008 Full.                               |                   |              |          |                               |                          |                   |                                |
| Approved. DRC                                  |                   |              |          |                               |                          |                   |                                |
|  |                   |              |          |                               |                          |                   |                                |
|  |                   |              |          |                               |                          |                   |                                |
| D31-FY2011-000026                              | 11 January 2011   | Not Approved | Low      | M Main                        | Bridge                   | Spot Paint (flex) |                                |
| Paint the bearings.                            |                   |              |          |                               |                          |                   |                                |
|  |                   |              |          |                               |                          |                   |                                |
|  |                   |              |          |                               |                          |                   |                                |

Late Reason:

Inspection Date: 12/19/2012

# INITIAL ASSESSMENT FORM FOR STRUCTURE :

**I00015282+05472**

Continue

## Element Inspection Data

\*\*\*\*\* Span : Main-0 - \*\*\*\*\*

| Element Description   |              |     |          |       |           |            |            |            |            |            |
|---|--------------|-----|----------|-------|-----------|------------|------------|------------|------------|------------|
| Smart Flag  | Scale Factor | Env | Quantity | Units | Insp Each | Pct Stat 1 | Pct Stat 2 | Pct Stat 3 | Pct Stat 4 | Pct Stat 5 |
| Element 12 - Bare Concrete Deck   |              |     |          |       |           |            |            |            |            |            |
|   | 1            | 3   | 1067     | sq.m. | X         | 0          | 100        | 0          | 0          | 0          |
|   |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :   |              |     |          |       |           |            |            |            |            |            |
| 12/19/2012 - Open cracks over the un-jointed Bents. Minor studded tire wear in the wheel paths. Small surface spalls and delaminations along the edges of the joint's steel. Random and mapping cracks in all of the Spans. |              |     |          |       |           |            |            |            |            | UIGZ       |
| 12/27/2010 - A couple of small surface delaminations along the joint steel. Minor wear in the wheel paths. Open cracks over the Bents without a joint. Wider mapping cracks in all Spans.                                   |              |     |          |       |           |            |            |            |            | ZWDZ       |
| 11/19/2008 - A couple of small delaminations near the joints. Wear in the wheel paths. Wide transverse cracks over the unjointed Bents. Mapping cracks in most of the Spans.  |              |     |          |       |           |            |            |            |            | TEDU       |
| 11/02/2006 - Transverse cracks over the Bents without joints. Wear in the wheel paths. Minor scale/flaking of latex paste at the joint steel, but no delaminations or spalling observed.                                    |              |     |          |       |           |            |            |            |            | CXDN       |
| 10/07/2002 - 109.42 * 9.76 = 1066.85 Deck was hydromilled and the removed material was replaced with latex concrete. The deck has transverse cracks over all the Bents that don't have expansion joints.                    |              |     |          |       |           |            |            |            |            | IZHQ       |
| 04/14/1998 - None   |              |     |          |       |           |            |            |            |            | RHHJ       |
| 02/01/1994 - None   |              |     |          |       |           |            |            |            |            | REFI       |
| Inspection Notes:   |              |     |          |       |           |            |            |            |            |            |
|   |              |     |          |       |           |            |            |            |            |            |
|   |              |     |          |       |           |            |            |            |            |            |
| Element 109 - P/S Conc Open Girder  |              |     |          |       |           |            |            |            |            |            |
|   | 1            | 1   | 526      | m.    |           | 100        | 0          | 0          | 0          |            |
|   |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :   |              |     |          |       |           |            |            |            |            |            |
| 12/19/2012 - Good condition.  |              |     |          |       |           |            |            |            |            | UIGZ       |
| 12/27/2010 - Good condition.  |              |     |          |       |           |            |            |            |            | ZWDZ       |
| 11/19/2008 - No problems observed.  |              |     |          |       |           |            |            |            |            | TEDU       |
| 11/02/2006 - Girders are in Good condition. Some minor cracks from the backside of the embedded bearing plate to the ends of the several of the girders; not a problem.   |              |     |          |       |           |            |            |            |            | CXDN       |
| 10/07/2002 - (4 * 40.8) (6 * 19.8) (5 * 48.8) = 526.0m Some girders have minor cracks near beam seats.  |              |     |          |       |           |            |            |            |            | IZHQ       |
| Inspection Notes:   |              |     |          |       |           |            |            |            |            |            |
|   |              |     |          |       |           |            |            |            |            |            |
|   |              |     |          |       |           |            |            |            |            |            |
| Element 205 - R/Conc Column 2 thru 6  |              |     |          |       |           |            |            |            |            |            |
|   | 1            | 1   | 10       | ea.   |           | 90         | 5          | 5          | 0          |            |
|   |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :   |              |     |          |       |           |            |            |            |            |            |
| 12/19/2012 - Small areas of surface delaminations near the groundline at the cold joints. Right column of Bent 5 has a small spalled area.  |              |     |          |       |           |            |            |            |            | UIGZ       |
| 12/27/2010 - Small delaminations to sack patches at construction joint near groundline with the Left column of Bent 4 being the worse. Some small scrapes and surface spalls on the web ties from construction.             |              |     |          |       |           |            |            |            |            | ZWDZ       |
| 11/19/2008 - Condition State 3 for small delamiantions observed in the Left column at Bent 4. Some small scrapes/spalls from construction activities and the webwalls for Bents 3 and 4 show some cracks and delaminations. |              |     |          |       |           |            |            |            |            | TEDU       |
| 11/02/2006 - Tight surface shrinkage cracks. Several small areas where tie wire is exposed and rusting. Some small surface spalling along the exposed tie wire.   |              |     |          |       |           |            |            |            |            | CXDN       |
| 10/07/2002 - Minor, tight cracks on several columns.  |              |     |          |       |           |            |            |            |            | IZHQ       |
| Inspection Notes:   |              |     |          |       |           |            |            |            |            |            |
|   |              |     |          |       |           |            |            |            |            |            |
|   |              |     |          |       |           |            |            |            |            |            |

# INITIAL ASSESSMENT FORM FOR STRUCTURE :

**I00015282+05472**

Continue

\*\*\*\*\* Span : Main-0 - (cont.) \*\*\*\*\*

| Element Description  |              |     |          |       |           |            |            |            |            |            |
|--|--------------|-----|----------|-------|-----------|------------|------------|------------|------------|------------|
| Smart Flag   | Scale Factor | Env | Quantity | Units | Insp Each | Pct Stat 1 | Pct Stat 2 | Pct Stat 3 | Pct Stat 4 | Pct Stat 5 |
| Element 215 - R/Conc Abutment 1 and 7  |              |     |          |       |           |            |            |            |            |            |
|  | 1            | 1   | 29       | m.    |           | 95         | 5          | 0          | 0          |            |
|  |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :  |              |     |          |       |           |            |            |            |            |            |
| 12/19/2012 - Small spalls along the cap to backwall area. Tight vertical crack under G2 at Abutment 1 and under G2 and G3 at Abutment 7. Erosion at all (4) wingwalls.   |              |     |          |       |           |            |            |            |            | UIGZ       |
| 12/27/2010 - Small spalls near a couple of the girders in the backwalls. Vertical crack under G2 at Abutment 1 and G2 and G3 at Abutment 7 in their caps.  |              |     |          |       |           |            |            |            |            | ZWDZ       |
| 11/19/2008 - Unchanged from past inspections.  |              |     |          |       |           |            |            |            |            | TEDU       |
| 11/02/2006 - Tight vertical cracks in both caps with Abutment 1's being the worse. A couple of small spalls along the ends of the girders where they are embedded in the backwalls.  |              |     |          |       |           |            |            |            |            | CXDN       |
| 10/07/2002 - (11.48 1.40 1.40) * 2 = 28.56m Minor, vertical cracks under girders at Abutment 1. Erosion at all (4) wingwalls.  |              |     |          |       |           |            |            |            |            | IZHQ       |
| Inspection Notes:  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
| Element 234 - R/Conc Cap 2 thru 6  |              |     |          |       |           |            |            |            |            |            |
|  | 1            | 1   | 57       | m.    |           | 90         | 5          | 5          | 0          |            |
|  |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :  |              |     |          |       |           |            |            |            |            |            |
| 12/19/2012 - Small surface spalls on the faces of (3) caps near the outer anchors. Small delaminations on Span 4 face of Bent 4 under G5. Small surface spalls and delaminations on the underside of the caps from rebar chair feet. |              |     |          |       |           |            |            |            |            | UIGZ       |
| 12/27/2010 - Unchanged for small delamination under G5 on Span 4 side of Bent 4's cap. Several small surface spalls on the cap faces near outer most anchors. Some shallow surface spalls on underside of the caps.                  |              |     |          |       |           |            |            |            |            | ZWDZ       |
| 11/19/2008 - Condition State 3 for small surface delaminations and Condition State 2 for cracks and minor spalling. Small spall on Bent 4's cap under G5 on the Span 4 side.   |              |     |          |       |           |            |            |            |            | TEDU       |
| 11/02/2006 - Underside of the caps show surface spalling from exposed and rusty rebar chairs. Also some staining around the chairs.  |              |     |          |       |           |            |            |            |            | CXDN       |
| 10/07/2002 - 5 * 11.48 = 57.40m Minor stains where construction rebar chairs are exposed. Minor, tight cracks on most caps.  |              |     |          |       |           |            |            |            |            | IZHQ       |
| Inspection Notes:  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
| Element 300 - Strip Seal Exp Joint   |              |     |          |       |           |            |            |            |            |            |
|  | 1            | 3   | 23       | m.    |           | 95         | 5          | 0          |            |            |
|  |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :  |              |     |          |       |           |            |            |            |            |            |
| 12/19/2012 - Joints are packed full of sanding material today. No apparent leakage. Steel portions sound solid when tapped on and there are small spalls/delaminations along the edges of the joint's steel.                         |              |     |          |       |           |            |            |            |            | UIGZ       |
| 12/27/2010 - Full of sanding material today. Steel portions of the joints sound solid when tapped but do have some shallow spalls and surface delaminations along their edges.   |              |     |          |       |           |            |            |            |            | ZWDZ       |
| 11/19/2008 - Steel sounds solid when tapped on. A couple of small spalls and delaminations along the steel edges. Gland is pushed down from debris with no obvious tears or leakage.   |              |     |          |       |           |            |            |            |            | TEDU       |
| 11/02/2006 - Joint steel sounds solid when tapped on. Joint area is full of debris/sanding material which is pushing down on the gland. No leaking was noted.  |              |     |          |       |           |            |            |            |            | CXDN       |
| 10/07/2002 - 11.48 * 2 = 22.96m Joints are full of sanding material. Gland doesn't appear to be torn anyplace and not leaking.   |              |     |          |       |           |            |            |            |            | IZHQ       |
| Inspection Notes:  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |

**INITIAL ASSESSMENT FORM FOR STRUCTURE :****I00015282+05472**

Continue

\*\*\*\*\* Span : Main-0 - (cont.) \*\*\*\*\*

| Element Description  |              |     |          |       |           |            |            |            |            |            |
|--|--------------|-----|----------|-------|-----------|------------|------------|------------|------------|------------|
| Smart Flag   | Scale Factor | Env | Quantity | Units | Insp Each | Pct Stat 1 | Pct Stat 2 | Pct Stat 3 | Pct Stat 4 | Pct Stat 5 |
| Element 311 - Moveable Bearing   |              |     |          |       |           |            |            |            |            |            |
|  | 1            | 1   | 25       | ea.   |           | 90         | 10         | 0          |            |            |
|  |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :  |              |     |          |       |           |            |            |            |            |            |
| 12/19/2012 - Spot rust, concrete paste, scale, and faded paint. Alignment is ok.   |              |     |          |       |           |            |            |            |            | UIGZ       |
| 12/27/2010 - Paint loss, spot rust, and minor scale.   |              |     |          |       |           |            |            |            |            | ZWDZ       |
| 11/19/2008 - Spot rust, paint loss, and some concrete paste from past hydromilling operations.   |              |     |          |       |           |            |            |            |            | TEDU       |
| 11/02/2006 - Spot rust, paint loss, and some dirt/debris.  |              |     |          |       |           |            |            |            |            | CXDN       |
| 10/07/2002 - Minor rust spots with minor pitting.  |              |     |          |       |           |            |            |            |            | IZHQ       |
| Inspection Notes:  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
| Element 313 - Fixed Bearing  |              |     |          |       |           |            |            |            |            |            |
|  | 1            | 1   | 33       | ea.   |           | 90         | 10         | 0          |            |            |
|  |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :  |              |     |          |       |           |            |            |            |            |            |
| 12/19/2012 - Paint loss, spot rust, and faded paint.   |              |     |          |       |           |            |            |            |            | UIGZ       |
| 12/27/2010 - Paint loss and spot rust. Some bird debris.   |              |     |          |       |           |            |            |            |            | ZWDZ       |
| 11/19/2008 - Spot rust, paint loss, and some concrete paste from past hydromilling operations.   |              |     |          |       |           |            |            |            |            | TEDU       |
| 11/02/2006 - Spot rust, paint loss, and some debris.   |              |     |          |       |           |            |            |            |            | CXDN       |
| 10/07/2002 - Minor rust spots and minor pitting.   |              |     |          |       |           |            |            |            |            | IZHQ       |
| Inspection Notes:  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
| Element 331 - Conc Bridge Railing  |              |     |          |       |           |            |            |            |            |            |
|  | 1            | 3   | 219      | m.    |           | 95         | 5          | 0          | 0          |            |
|  |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :  |              |     |          |       |           |            |            |            |            |            |
| 12/19/2012 - Random surface shrinkage cracks. Spalls on the backside of the barriers at the rail bolt-ups. Small surface spalls and deterioration along the deck line. |              |     |          |       |           |            |            |            |            | UIGZ       |
| 12/27/2010 - Vertical cracking throughout. A couple of small scrapes.  |              |     |          |       |           |            |            |            |            | ZWDZ       |
| 11/19/2008 - Unchanged. Small areas of surface deterioration on the original curbs near the deck line.   |              |     |          |       |           |            |            |            |            | TEDU       |
| 11/02/2006 - Minor cracks along the rebar lines on the backside. Random vertical cracks.   |              |     |          |       |           |            |            |            |            | CXDN       |
| 10/07/2002 - 109.42 * 2 = 218.84m Minor, vertical cracks throughout. During a rehab project a barrier was added on top of the existing curbs,                          |              |     |          |       |           |            |            |            |            | IZHQ       |
| Inspection Notes:  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |

**INITIAL ASSESSMENT FORM FOR STRUCTURE :****I00015282+05472**

Continue

\*\*\*\*\* Span : Main-0 - (cont.) \*\*\*\*\*

| Element Description  |              |     |          |       |           |            |            |            |            |            |
|--|--------------|-----|----------|-------|-----------|------------|------------|------------|------------|------------|
| Smart Flag   | Scale Factor | Env | Quantity | Units | Insp Each | Pct Stat 1 | Pct Stat 2 | Pct Stat 3 | Pct Stat 4 | Pct Stat 5 |
| Element 334 - Metal Rail Coated Singe W-Beam with Round Steel Handrail w\ Steel Posts  |              |     |          |       |           |            |            |            |            |            |
|  | 1            | 3   | 219      | m.    |           | 85         | 10         | 5          | 0          | 0          |
|  |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :  |              |     |          |       |           |            |            |            |            |            |
| 12/19/2012 - Faded paint, spot rust, and paint loss. Minor surface pitting on the rail posts near the curb line.   |              |     |          |       |           |            |            |            |            | UIGZ       |
| 12/27/2010 - Paint loss, minor surface pitting, and scale on the W-Beam and posts. Sanding material starting to build up behind the barrier on the top of the curb and against the rail posts. |              |     |          |       |           |            |            |            |            | ZWDZ       |
| 11/19/2008 - No significant change.  |              |     |          |       |           |            |            |            |            | TEDU       |
| 11/02/2006 - Rust, pitting, paint peel, and exposed prime coat on the rail posts and top handrail pipe. W-Beam has some rusty spots throughout.  |              |     |          |       |           |            |            |            |            | CXDN       |
| 10/07/2002 - 109.42 * 2 = 218.84m Rusty spots with pitting throughout rail and posts. The metal rail and posts are now behind a concrete barrier rail.   |              |     |          |       |           |            |            |            |            | IZHQ       |
| 04/14/1998 - None  |              |     |          |       |           |            |            |            |            | RHHJ       |
| 02/01/1994 - None  |              |     |          |       |           |            |            |            |            | REFI       |
| Inspection Notes:  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
| Element 358 - Deck Cracking SmFlag   |              |     |          |       |           |            |            |            |            |            |
| X  | 1            | 3   | 1        | ea.   | X         | 0          | 100        | 0          | 0          |            |
|  |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :  |              |     |          |       |           |            |            |            |            |            |
| 12/19/2012 - Unchanged from previous inspections.  |              |     |          |       |           |            |            |            |            | UIGZ       |
| 12/27/2010 - Wide cracks over un-jointed Bents. Some wider mapping cracks in all Spans.  |              |     |          |       |           |            |            |            |            | ZWDZ       |
| 11/19/2008 - Condition State 2 due to size of the cracks and nearing the density limit also.   |              |     |          |       |           |            |            |            |            | TEDU       |
| Inspection Notes:  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |



|  |      |
|--|------|
| 12/19/2012 - Good markers on the corners of Abutment 7.  | UIGZ |
| 12/27/2010 - Good markers on both sides of Abutment 7 for approaching traffic.   | ZWDZ |
| Minor erosion on all (4) corners.  |      |
| 11/19/2008 - NBI 58, deck, rated a "6" due to small delaminations and cracking.  | TED  |
| Bumps on and off of the structure. Markers on both corners of Abutment 7, approach roadway, and in Fair condition.   |      |
| 11/02/2006 - Minor bumps on and off of the structure. There are markers on the Right and Left approach rail into the bridge and in Fair to Good condition. | CXDN |
| 10/07/2002 - Markers on North end of the structure, approach side, and in Good condition.  | IZHQ |
| 04/14/1998 - None  | RHHJ |
| 02/01/1994 - Sufficiency Rating Calculation Accepted by ops\$u5963 at 3/11/97 10:44:30   | REF  |
| Sufficiency Rating Calculation Accepted by ops\$u9004 at 2/19/97 14:15:07  |      |
| 01/01/1992 - Updated with tape 1994  | NB94 |
| 03/01/1990 - Updated with tape 1991  | NB91 |
| 02/01/1988 - Updated with tape 1989  | NB89 |
| 02/01/1986 - Updated with tape 1988  | NB88 |
| 01/01/1984 - Updated with tape 1985  | NB85 |
| 08/01/1981 - Updated with tape 1984  | NB84 |
| 03/01/1979 - Updated with tape 1980  | NB80 |



## INITIAL ASSESSMENT FORM FOR STRUCTURE :

I00015284+00001

Location : 1M N EMERSON JCT Structure Name:

## General Location Data

District Code, Number, Location : 03 Dist 3 GREAT FALLS

County Code, Location : 013 CASCADE

Kind fo Hwy Code, Description : 1 1 Interstate Hwy

Str Owner Code, Description : 1 State Highway Agency

Intersecting Feature : DRAINAGE

Structure on the State Highway System : ☒ Latitude : 47°31'54"Structure on the National Highway System : ☒ Longitude : 111°24'06"Str Meet or Exceed NBIS Bridge Length : ☐

MDT Maintenance Section : 31-01 Great Falls

Division Code, Location : 31 GREAT FALLS

City Code, Location : 00000 RURAL AREA

Signed Route Number : 00015

Maintained by Code, Description : 1 State Highway Agency

Kilometer Post, Mile Post : 457.10 km 284.03

## Construction Data

Construction Project Number : I 15-5(9)275

Construction Station Number : 862+50.00

Construction Drawing Number :

Construction Year : 1960

Reconstruction Year :

## Traffic Data

Current ADT : 9,280 ADT Count Year : 2009 Percent Trucks : 2 %

## Structure Loading, Rating and Posting Data

## Loading Data :

|                          |           |                        |
|--------------------------|-----------|------------------------|
| Design Loading :         |           | 5 MS 18 (HS 20)        |
| Inventory Load, Design : | 32.6 mton | B ASD Assigned         |
| Operating Load, Design : | 32.6 mton | B ASD Assigned         |
| Posting :                |           | 5 At/Above Legal Loads |

## Rating Data :

|                     | Operating | Inventory | Posting |
|---------------------|-----------|-----------|---------|
| Truck 1 Type 3 :    |           |           |         |
| Truck 2 Type 3-S3 : |           |           |         |
| Truck 3 Type 3-3 :  | 48.6      |           |         |

## Structure, Roadway and Clearance Data

## Structure Deck, Roadway and Span Data :

Structure Length : 3.86 m  
Deck Area : 0.00 m sq  
Deck Roadway Width : 0.00 m  
Approach Roadway Width : 23.16 m  
Median Code, Description : 0 No median

## Structure Vertical and Horizontal Clearance Data :

Vertical Clearance Over the Structure : 99.99 m  
Reference Feature for Vertical Clearance : N Feature not hwy or RR  
Vertical Clearance Under the Structure : 0.00 m  
Reference Feature for Lateral Underclearance : N Feature not hwy or RR  
Minimum Lateral Under Clearance Right : 0.00 m  
Minimum Lateral Under Clearance Left : 0.00 m

## Span Data

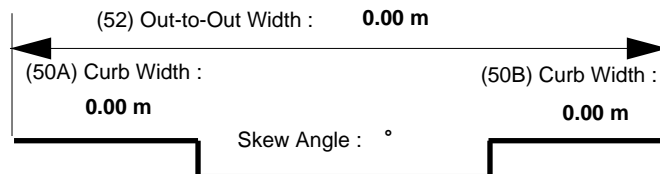
## Main Span

Number Spans : 1  
Material Type Code, Description : 3 Steel  
Span Design Code, Description : 19 Culvert (includes frame culverts)  
Deck

Deck Structure Type : N Not applicable  
Deck Surfacing Type : N Not Applicable (applies only to strutures with no dec  
Deck Protection Type : N Not applicable (applies only to structures with no de  
Deck Membrain Type : N Not applicable (applies only to structures with no de

## Approach Span

Number of Spans : 0  
Material Type Code, Description :  
Span Design Code, Description :



## Structure Vertical and Horizontal Clearance Data Inventory Route :

| Over / Under Direction<br>Name | Inventory<br>Route | South, West or Bi-directional Travel |          |            | North or East Travel |          |            |
|--------------------------------|--------------------|--------------------------------------|----------|------------|----------------------|----------|------------|
|                                |                    | Direction                            | Vertical | Horizontal | Direction            | Vertical | Horizontal |
| Route On Structure             | I00015             | Both                                 | 99.99 m  | 12.10 m    | N/A                  |          |            |
| I - 15                         |                    |                                      |          |            |                      |          |            |



**INITIAL ASSESSMENT FORM FOR STRUCTURE :****I00015284+00001**

Continue

**Inspection Data**Sufficiency Rating : **80**Structure Status : **Not Deficient**Inspection Due Date : **28 April 2016**(91) Inspection Frequency (months) : **24****NBI Inspection Data**

(90) Date of Last Inspection : 28 April 2014

Last Inspected By : Charles Pepos - 107

(90) Inspection Date :

Inspected By :

(58) Deck Rating :

N

(68) Deck Geometry :

9

(36A) Bridge Rail Rating :

N

(62) Culvert Rating :

6

(59) Superstructure Rating :

N

(67) Structure Rating :

6

(36B) Transition Rating :

N

(61) Channel Rating :

7

(60) Substructure Rating :

N

(69) Under Clearance :

N

(36C) Approach Rail Rating :

N

(71) Waterway Adequacy :

8

(72) App Rdwy Align :

8

(41) Posting Status :

A

(36D) End Rail Rating :

N

(113) Scour Critical :

8

Unrepaired Spalls : 0 m sq

Deck Surfacing Depth : 0.00 in

**Inspection Hours**

Crew Hours for inspection :

1

Snooper Required :

Helper Hours :

0

Snooper Hours for inspection :

0

Special Crew Hours :

0

Flagger Hours :

0

Special Equipment Hours :

0

| Inspection Work Candidates   |                   | Status   | Priority | Effected<br>Structure<br>Unit | Scope of<br>Work  | Action     | Covered<br>Condition<br>States |
|--|-------------------|----------|----------|-------------------------------|-------------------|------------|--------------------------------|
| Candidate ID   | Date<br>Requested |          |          |                               |                   |            |                                |
| D31-FY2006-000196  | 03 May 2006       | Approved | High     | M Main                        | 240 Steel Culvert | Rehab Elem |                                |
| Clean debris from inlet and outlet of the pipe and back to R/W. Also complete the outlet drainage ditch so as to drain the standing water in the pipe.<br>05-03-2010 Lots of tumbleweeds at both ends today.<br>05-07-2012 Pipe was clean today. Ditch needs to be taken past R/W to get rid of standing water.<br>04-28-2014 Inlet is full of tumbleweeds today and outlet needs to be cleaned up.<br>Approved. DRC |                   |          |          |                               |                   |            |                                |
|  |                   |          |          |                               |                   |            |                                |
|  |                   |          |          |                               |                   |            |                                |
|  |                   |          |          |                               |                   |            |                                |

Late Reason:

Inspection Date: 04/28/2014

### Element Inspection Data

\*\*\*\*\* Span : Main-0 - \*\*\*\*\*

| Element Description         |              |     |          |       |           |            |            |            |            |            |
|-----------------------------|--------------|-----|----------|-------|-----------|------------|------------|------------|------------|------------|
| Smart Flag                  | Scale Factor | Env | Quantity | Units | Insp Each | Pct Stat 1 | Pct Stat 2 | Pct Stat 3 | Pct Stat 4 | Pct Stat 5 |
| Element 240 - Steel Culvert |              |     |          |       |           |            |            |            |            |            |
|                             | 1            | 3   | 65       | m.    |           | 85         | 10         | 5          | 0          |            |
|                             |              |     |          |       |           | %          | %          | %          | %          | %          |

Previous Inspection Notes :

04/28/2014 - Area under SB lanes has rust, scale, and pin holes in the roof area in random spots. Concrete in the invert looks Good. (2) small holes in the roof about 30' in from the inlet.

ZFDZ

05/07/2012 - Pipe was clean today with knee deep water standing in the outlet. Rust, scale, and surface pitting on the invert. Some small pin holes in the invert. Holes 30 ft. in from the inlet end are unchanged.

A concrete liner was placed in this pipe during 2013 construction project. This took care of the problems on the invert of the pipe.

05/03/2010 - Same comments as the last inspections. Lots of tumbleweeds in the inlet and outlet of the pipe today.

04/24/2008 - No change on the 4" x 4" holes, 30 ft in from the inlet. 5 percent in Condition State 3 as a couple of small holes in the invert and because of loss of shape. Rusty spots, scale, and pitting on the bottom 1 ft of the pipe. Outlet is bouncy as hollow under the last 10 ft of the pipe.

04/18/2006 - 64.62 \* 1 = 64.62m Plans say it is a 13'-0" SSPP but field measurements show it to be 12'-8"(S) x 13'-9"(R). Concrete slope protection and cutoff wall added on the Right-Inlet end after initial construction. Pipe is dry at the inlet, 1' deep standing water at outlet and 2' of standing water under the SB Inae. Pipe has some rust spots and light scale on the invert. Hollow under the first 6 ft of the outlet of the pipe with no cut off wall or slope protection in place. Pipe end bounces when jumped on. About 30 ft in from the inlet is a 4" x 4" hole in the top-Left portion of the pipe. This hole does not appear to be a problem.

DQCV

Inspection Notes:

### General Inspection Notes

04/28/2014 - Outlet ditch needs to be worked on as still about 1-1/2' of water backed up in the inlet of the pipe for about 40'.

7FD7

05/07/2012 - Outlet end of the pipe is hollow under the pipe; back 15 ft.

IZGZ

Pipe's shape is Fair with some egg shape to it from construction activity.

05/03/2010 - Hollow area under outlet is unchanged. Mid-thigh deep at outlet today to ankle deep at inlet.

04/24/2008 - Scour hole at outlet and shallow stream bed 50 ft from the pipe has water standing 2 ft deep back into the pipe.

YZDZ

04/18/2006 - Cutoff wall and slope protection on Right end added in a construction project that also cleaned out the pipe. Guardrail for I-15 at the pipe due to slope steepness and is up to current standards.

DQCV



### Inspection Data

Sufficiency Rating : **96.6**  
Structure Status : **Not Deficient**

Inspection Due Date : **06 August 2014**

(91) Inspection Frequency (months) : **24**

### NBI Inspection Data

(90) Date of Last Inspection : 06 August 2012

Last Inspected By : Charles Pepos - 107

(90) Inspection Date :

Inspected By :

(58) Deck Rating : 7

(68) Deck Geometry : 9

(36A) Bridge Rail Rating : 1

(62) Culvert Rating : N

(59) Superstructure Rating : 7

(67) Structure Rating : 6

(36B) Transition Rating : 0

(61) Channel Rating : N

(60) Substructure Rating : 6

(69) Under Clearance : N

(36C) Approach Rail Rating : 1

(71) Waterway Adequacy : N

(72) App Rdwy Align : 8

(41) Posting Status : A

(36D) End Rail Rating : 0

(113) Scour Critical : N

Unrepaired Spalls : 0 m sq

Deck Surfacing Depth : 4.00 in

### Inspection Hours

Crew Hours for inspection : 1

Snooper Required : N

Helper Hours : 0

Snooper Hours for inspection : 0

Special Crew Hours : 0

Flagger Hours : 0

Special Equipment Hours : 0

| Inspection Work Candidates  |                 | Status   | Priority | Effected Structure Unit | Scope of Work           | Action     | Covered Condition States |
|---|-----------------|----------|----------|-------------------------|-------------------------|------------|--------------------------|
| Candidate ID  | Date Requested  |          |          |                         |                         |            |                          |
| D31-FY2004-000066   | 28 January 2004 | Approved | Low      | M Main                  | 215 R/Conc Abutment     | Min Repair |                          |
| Clean material away from the backwall drains.   |                 |          |          |                         |                         |            |                          |
| Approved. DRC   |                 |          |          |                         |                         |            |                          |
|   |                 |          |          |                         |                         |            |                          |
|   |                 |          |          |                         |                         |            |                          |
| D31-FY2005-000030   | 07 October 2004 | Approved | Low      | M Main                  | 39 Unp Conc Slab/AC Ovl | Min Repair |                          |
| Seal cracks between the deck slabs and the median slab. Also between the slab and asphalt surfacing. Some done, 8-6-2012. |                 |          |          |                         |                         |            |                          |
| Approved. DRC   |                 |          |          |                         |                         |            |                          |
|   |                 |          |          |                         |                         |            |                          |
|   |                 |          |          |                         |                         |            |                          |

Late Reason:

Inspection Date: 08/06/2012

# INITIAL ASSESSMENT FORM FOR STRUCTURE :

**I00015284+02351**

Continue

## Element Inspection Data

\*\*\*\*\* Span : Main-0 - \*\*\*\*\*

| Element Description  |              |     |          |       |           |            |            |            |            |            |
|--|--------------|-----|----------|-------|-----------|------------|------------|------------|------------|------------|
| Smart Flag   | Scale Factor | Env | Quantity | Units | Insp Each | Pct Stat 1 | Pct Stat 2 | Pct Stat 3 | Pct Stat 4 | Pct Stat 5 |
| Element 39 - Unp Conc Slab/AC Ovl  |              |     |          |       |           |            |            |            |            |            |
|  | 1            | 3   | 210      | sq.m. | X         | 100        | 0          | 0          | 0          | 0          |
|  |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :  |              |     |          |       |           |            |            |            |            |            |
| 08/06/2012 - Minor rutting in wheel paths. Roadway is smooth over structure.   |              |     |          |       |           |            |            |            |            | HZGZ       |
| 08/09/2010 - No change from the previous inspections.  |              |     |          |       |           |            |            |            |            | JZDZ       |
| 07/10/2008 - Chip seal in the past years. Minor ruts in the wheel paths, but surfacing is generally Good. Small section of exposed rebar on the underside of the slab at the Right edge of Abutment 1.   |              |     |          |       |           |            |            |            |            | KZCJ       |
| 06/08/2006 - Crack at centerline under the NB lanes that has efflorescence. Minor rutting in the asphalt surfacing.  |              |     |          |       |           |            |            |            |            | IZDU       |
| 09/21/2004 - Same as previous report. Joints at the median slabs to NB and SM slabs are leaking.   |              |     |          |       |           |            |            |            |            | VULZ       |
| 10/07/2002 - Mapping cracks on slab over the median with efflorescence on most cracks.   |              |     |          |       |           |            |            |            |            | IFHR       |
| 08/02/2000 - $38.30 \times 5.49 = 210.27$  |              |     |          |       |           |            |            |            |            | GHJY       |
| Seperation at the joints.  |              |     |          |       |           |            |            |            |            |            |
| 04/14/1998 - None  |              |     |          |       |           |            |            |            |            | RHHO       |
| 12/01/1995 - None  |              |     |          |       |           |            |            |            |            | YDNF       |
| 02/01/1994 - None  |              |     |          |       |           |            |            |            |            | REFI       |
| Inspection Notes:  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
| Element 215 - R/Conc Abutment  |              |     |          |       |           |            |            |            |            |            |
|  | 1            | 2   | 101      | m.    |           | 90         | 5          | 5          | 0          |            |
|  |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :  |              |     |          |       |           |            |            |            |            |            |
| 08/06/2012 - Some small delaminated areas near cracks with efflorescence. Still partially buried backwall drains. On both abutments worse cracks are from corners of spalls under traveled lanes.  |              |     |          |       |           |            |            |            |            | HZGZ       |
| 08/09/2010 - No change from the previous inspections.  |              |     |          |       |           |            |            |            |            | JZDZ       |
| 07/10/2008 - 5 percent in Condition State 3 for a small delmainated areas. 5 percent in Condition State 2 for cracks with efflorescence. Left wingwall at Abutment 1 has a slight seperation from the backwall. Some backwall drains are partially buried. |              |     |          |       |           |            |            |            |            | KZCJ       |
| 06/08/2006 - Same as previously reported plus some spalled patch, 4" x 10", on the Right end of Abutment 1 just under the deck.  |              |     |          |       |           |            |            |            |            | IZDU       |
| 09/21/2004 - Cracking from the corners of lane slabs with efflorescence on the cracks. Wingwalls are tight to the backwalls.   |              |     |          |       |           |            |            |            |            | VULZ       |
| 10/07/2002 - Same as previous report. Add weep drains along both backwalls are either buried or partially covered.   |              |     |          |       |           |            |            |            |            | IFHR       |
| 08/02/2000 - $(38.3 \times 2) + (4 \times 6.10) = 101.00m$   |              |     |          |       |           |            |            |            |            | GHJY       |
| Cracks with some water marking at the joints of the median section to the sections under the roadway. Slight seperation on the left end at the wingwalls to the backwall joint.  |              |     |          |       |           |            |            |            |            |            |
| 04/14/1998 - None  |              |     |          |       |           |            |            |            |            | RHHO       |
| 12/01/1995 - None  |              |     |          |       |           |            |            |            |            | YDNF       |
| 02/01/1994 - None  |              |     |          |       |           |            |            |            |            | REFI       |
| Inspection Notes:  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |

**100015284+02351**

**Continue**

\*\*\*\*\* Span : Main-0 - (cont.) \*\*\*\*\*

| Element Description  |              |     |          |       |           |            |            |            |            |            |
|--|--------------|-----|----------|-------|-----------|------------|------------|------------|------------|------------|
| Smart Flag   | Scale Factor | Env | Quantity | Units | Insp Each | Pct Stat 1 | Pct Stat 2 | Pct Stat 3 | Pct Stat 4 | Pct Stat 5 |
| Element 334 - Metal Rail Coated Single W-Beam w/ Steel Posts |              |     |          |       |           |            |            |            |            |            |
|  | 1            | 3   | 11       | m.    |           | 95         | 5          | 0          | 0          | 0          |
|  |              |     |          |       |           | %          | %          | %          | %          | %          |

Previous Inspection Notes :

08/06/2012 - Some spot rust and faded paint on rail posts. Some sanding material in lower post webs near bases. HZGZ

08/09/2010 - No change from the previous inspections. JZDZ

07/10/2008 - Spot rust on the W-Beam rail and top half of the posts. Paint loss and surface pitting on the lower portions of the webs and bases. KZCJ

06/08/2006 - Unchanged. IZDU

09/21/2004 - Spot rust on the rail posts and W-Beam rail.

10/07/2002 - Minor rusty spots to both posts and rail.

08/02/2000 -  $5.49 \times 2 = 10.98\text{m}$  GHJY

Some rust and pitting.

|                   |      |
|-------------------|------|
| 04/14/1998 - None | RHHO |
|-------------------|------|

12/01/1995 - None YDNF

02/01/1994 - None REFI

Inspection Notes:

### General Inspection Notes

08/06/2012 - Area under bridge was dry today as was all of the exposed backwall drains. HZGZ

08/09/2010 - NBI 36A, bridge rail, rated a "1" as if meets the "no retro-fit needed" policy of the Bridge Bureau. JZDZ

NB-Right end shoe is lapped against traffic flow.

07/10/2008 - Median barrier, PVC pipe, is in Good condition.

06/08/2006 - NBI 58, deck, rated a "7" due to minor rutting and cracks in the asphalt surfacing.

NBI 59, superstructure, rated a "7" due to minor cracking on the underside of the deck slab.

Small delineators on the rail blocks.

09/21/2004 - Weep drains on both of the backwalls and they are parially buried. Should be uncovered and cleaned out.

10/07/2002 - NBI 36A, B, and D do not meet current standards. 36A is part of continuous run and is only W-beam with steel posts.

08/02/2000 - New seal and cover in 1999. GHJY

04/14/1998 - None RHHC

12/01/1995 - Sufficiency Rating Calculation Accepted by PONTIS31 at 2/20/97 16:59:27

Sufficiency Rating Calculation Accepted by ops\$u9004 at 2/19/97 14:15:08

02/01/1994 - REF1

01/01/1992 - Updated with tape 1994

03/01/1990 - Updated with tape 1991

02/01/1988 - Updated with tape 1989

02/01/1986 - Updated with tape 1988

01/01/1984 - Updated with tape 1985 NB85

08/01/1981 - Updated with tape 1984

\_\_\_\_\_

---

|  |
|--|
|  |
|--|

---



# INITIAL ASSESSMENT FORM FOR STRUCTURE :

**I00315000+00001**

Location : GREAT FALLS Structure Name:

## General Location Data

MDT Maintenance Section : **31-01 Great Falls**

District Code, Number, Location : **03 Dist 3 GREAT FALLS**

Division Code, Location : **31 GREAT FALLS**

County Code, Location : **013 CASCADE**

City Code, Location : **32800 GREAT FALLS**

Kind fo Hwy Code, Description : **1 1 Interstate Hwy**

Signed Route Number : **00315**

Str Owner Code, Description : **1 State Highway Agency**

Maintained by Code, Description : **1 State Highway Agency**

Intersecting Feature : **INT I-15**

Kilometer Post, Mile Post : **0.02 km 0.01**

Structure on the State Highway System : ☒ Latitude : **47°29'06"**

Structure on the National Highway System : ☒ Longitude : **111°20'42"**

Str Meet or Exceed NBIS Bridge Length : ☒

## Construction Data

Construction Project Number : **I 15-5(26)271**

Construction Station Number : **536+44.00**

Construction Drawing Number : **6792**

Construction Year : **1967**

Reconstruction Year :

## Traffic Data

Current ADT : **15,040** ADT Count Year : **2009** Percent Trucks : **2 %**

## Structure Loading, Rating and Posting Data

### Loading Data :

|                          |                  |                               |
|--------------------------|------------------|-------------------------------|
| Design Loading :         |                  | <b>5 MS 18 (HS 20)</b>        |
| Inventory Load, Design : | <b>32.6 mton</b> | <b>A LFD Assigned</b>         |
| Operating Load, Design : | <b>36.2 mton</b> | <b>A LFD Assigned</b>         |
| Posting :                |                  | <b>5 At/Above Legal Loads</b> |

### Rating Data :

|                     | Operating    | Inventory | Posting |
|---------------------|--------------|-----------|---------|
| Truck 1 Type 3 :    |              |           |         |
| Truck 2 Type 3-S3 : |              |           |         |
| Truck 3 Type 3-3 :  | <b>72.91</b> |           |         |

## Structure, Roadway and Clearance Data

### Structure Deck, Roadway and Span Data :

Structure Length : **89.61 m**  
 Deck Area : **1,475.00 m sq**  
 Deck Roadway Width : **13.72 m**  
 Approach Roadway Width : **15.00 m**  
 Median Code, Description : **2 Closed median (no barrier)**

### Structure Vertical and Horizontal Clearance Data :

Vertical Clearance Over the Structure : **99.99 m**  
 Reference Feature for Vertical Clearance : **H Hwy beneath struct**  
 Vertical Clearance Under the Structure : **5.48 m**  
 Reference Feature for Lateral Underclearance : **H Hwy beneath struct**  
 Minimum Lateral Under Clearance Right : **3.55 m**  
 Minimum Lateral Under Clearance Left : **6.70 m**

## Span Data

### Main Span

Number Spans : **5**  
 Material Type Code, Description : **5 Prestressed concrete**  
 Span Design Code, Description : **2 Stringer/Multi-beam or Girder Deck**

Deck Structure Type : **1 Concrete Cast-in-Place**

Deck Surfacing Type : **5 Epoxy Overlay**

Deck Protection Type : **0 None**

Deck Membrain Type : **0 None**

### Approach Span

Number of Spans : **0**  
 Material Type Code, Description :  
 Span Design Code, Description :



## Structure Vertical and Horizontal Clearance Data Inventory Route :

| Over / Under Direction Name | Inventory Route | South, West or Bi-directional Travel |          |            | North or East Travel |          |            |
|-----------------------------|-----------------|--------------------------------------|----------|------------|----------------------|----------|------------|
|                             |                 | Direction                            | Vertical | Horizontal | Direction            | Vertical | Horizontal |
| One Route Under             | I00015          | South                                | 6.75 m   | 11.58 m    | North                | 5.48 m   | 11.58 m    |
| I-15 NB AND SB              |                 |                                      |          |            |                      |          |            |
| Route On Structure          | I00315          | West                                 | 99.99 m  | 8.53 m     | East                 | 99.99 m  | 4.88 m     |
| 10TH AVE. SOUTH INT.        |                 |                                      |          |            |                      |          |            |



**Inspection Data**

Sufficiency Rating : **88.4**  
Structure Status : **Not Deficient**

Inspection Due Date : **05 December 2014**

(91) Inspection Frequency (months) : **24**

**NBI Inspection Data**

(90) Date of Last Inspection : 05 December 2012

Last Inspected By : Charles Pepos - 107

(90) Inspection Date :

Inspected By :

(58) Deck Rating : 6

(68) Deck Geometry : 4

(36A) Bridge Rail Rating : 1

(62) Culvert Rating : N

(59) Superstructure Rating : 7

(67) Structure Rating : 6

(36B) Transition Rating : 1

(61) Channel Rating : N

(60) Substructure Rating : 6

(69) Under Clearance : 5

(36C) Approach Rail Rating : 1

(71) Waterway Adequacy : N

(72) App Rdwy Align : 7

(41) Posting Status : A

(36D) End Rail Rating : 1

(113) Scour Critical : N

Unrepaired Spalls : 0 m sq

Deck Surfacing Depth : 1.50 in

**Inspection Hours**

Crew Hours for inspection : 2

Snooper Required : N

Helper Hours : 0

Snooper Hours for inspection : 0

Special Crew Hours : 0

Flagger Hours : 0

Special Equipment Hours : 0

| Inspection Work Candidates                                     |                  | Status       | Priority | Effected Structure Unit | Scope of Work            | Action            | Covered Condition States |
|--|------------------|--------------|----------|-------------------------|--------------------------|-------------------|--------------------------|
| Candidate ID   | Date Requested   |              |          |                         |                          |                   |                          |
| D31-FY2003-000158  | 13 November 2002 | Approved     | High     | All Spans               | 300 Strip Seal Exp Joint | Min Repair        |                          |
| Clean the sanding material out of the rubber gland.            |                  |              |          |                         |                          |                   |                          |
| Approved. DRC  |                  |              |          |                         |                          |                   |                          |
|  |                  |              |          |                         |                          |                   |                          |
|  |                  |              |          |                         |                          |                   |                          |
| D31-FY2004-000074  | 28 January 2004  | Approved     | Low      | All Spans               | Bridge                   | Spot Paint (flex) |                          |
| Clean and paint bearings.                                      |                  |              |          |                         |                          |                   |                          |
| Approved. DRC  |                  |              |          |                         |                          |                   |                          |
|  |                  |              |          |                         |                          |                   |                          |
|  |                  |              |          |                         |                          |                   |                          |
| D31-FY2011-000022  | 28 December 2010 | Not Approved | Low      | M Main                  | 205 R/Conc Column        | Min Repair        |                          |
| Repair spalling / delaminations on the Right column of Bent 4. |                  |              |          |                         |                          |                   |                          |
|  |                  |              |          |                         |                          |                   |                          |
|  |                  |              |          |                         |                          |                   |                          |

Late Reason:

Inspection Date: 12/05/2012

# INITIAL ASSESSMENT FORM FOR STRUCTURE :

**I00315000+00001**

Continue

## Element Inspection Data

\*\*\*\*\* Span : Main-0 - \*\*\*\*\*

| Element Description  |              |     |          |       |           |            |            |            |            |            |
|--|--------------|-----|----------|-------|-----------|------------|------------|------------|------------|------------|
| Smart Flag   | Scale Factor | Env | Quantity | Units | Insp Each | Pct Stat 1 | Pct Stat 2 | Pct Stat 3 | Pct Stat 4 | Pct Stat 5 |
| Element 22 - P Conc Deck/Rigid Ov  |              |     |          |       |           |            |            |            |            |            |
|  | 1            | 3   | 1475     | sq.m. | X         | 0          | 100        | 0          | 0          | 0          |
|  |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :  |              |     |          |       |           |            |            |            |            |            |
| 12/05/2012 - Mapping cracks in all Spans. Surface delaminations along the guard angles and joint steel. Studded tire wear in the wheel paths.  |              |     |          |       |           |            |            |            |            | GZfZ       |
| 12/06/2010 - Mapping cracks in most of the Spans with 4 and 5 being the worse. Wear in the wheel paths. Small delaminations along the joint steel.   |              |     |          |       |           |            |            |            |            | GAeZ       |
| 11/17/2008 - Wear in the wheel paths. Transverse cracks over the Bents w/o joints. EB lane has mapping cracks in all of the Spans.   |              |     |          |       |           |            |            |            |            | RZDZ       |
| 11/02/2006 - Small delaminations along the joint over Bent 4. Wear in the wheel paths. Transverse cracking over the unjointed Bents.   |              |     |          |       |           |            |            |            |            | CXDO       |
| 10/16/2002 - 16.46 * 89.61 = 1474.98 Same on cracks with some delamination and transverse cracking also; quick chain drag.   |              |     |          |       |           |            |            |            |            | QZCJ       |
| 06/03/1998 - Numerous small, tight mapping cracks throughout the wear surface of the new overlay. A seal coat was applied in 1995 after the 1-1/2" rigid overlay. 19.19 * 89.61                                |              |     |          |       |           |            |            |            |            | QFBC       |
| 02/01/1994 - None  |              |     |          |       |           |            |            |            |            | REFI       |
| Inspection Notes:  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
| Element 109 - P/S Conc Open Girder   |              |     |          |       |           |            |            |            |            |            |
|  | 1            | 1   | 781      | m.    |           | 100        | 0          | 0          | 0          |            |
|  |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :  |              |     |          |       |           |            |            |            |            |            |
| 12/05/2012 - Girders are in Good condition.  |              |     |          |       |           |            |            |            |            | GZfZ       |
| 12/06/2010 - Good conditions with no hits observed.  |              |     |          |       |           |            |            |            |            | GAeZ       |
| 11/17/2008 - Generally in Good condition.  |              |     |          |       |           |            |            |            |            | RZDZ       |
| 11/02/2006 - Generally in Good condition. Some minor cracks from the back of the embedded bearing plate to the ends of the girders on several of the girders. None of these are a problem.                     |              |     |          |       |           |            |            |            |            | CXDO       |
| 10/16/2002 - (7 * 28.12) (10 * 43.5864) (8 * 18.5166)  |              |     |          |       |           |            |            |            |            | QZCJ       |
| Inspection Notes:  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
| Element 205 - R/Conc Column Bent 2, 3, 4, and 5  |              |     |          |       |           |            |            |            |            |            |
|  | 1            | 2   | 8        | ea.   |           | 90         | 5          | 5          | 0          |            |
|  |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :  |              |     |          |       |           |            |            |            |            |            |
| 12/05/2012 - Right column of Bent 4 shows spalls, delaminations, and deteriorated concrete on its' SE corners; photo. Tight surface shrinkage cracks. Columns of Bent 4 have some staining from joint leakage. |              |     |          |       |           |            |            |            |            | GZfZ       |
| 12/06/2010 - All look Good except the Right column at Bent 4 which has delaminations and spalling that is getting worse; photo.  |              |     |          |       |           |            |            |            |            | GAeZ       |
| 11/17/2008 - Right column at Bent 4 has delaminations and spalling for Condition State 3 and 2 respectively; photo. Tight surface shrinkage cracks throughout.   |              |     |          |       |           |            |            |            |            | RZDZ       |
| 11/02/2006 - Very minor spalling on a couple of the columns and none are a problem. A couple of the tie wires are exposed, but not a problem.  |              |     |          |       |           |            |            |            |            | CXDO       |
| 10/16/2002 - Most noticeable on the south column at Bent 4.  |              |     |          |       |           |            |            |            |            | QZCJ       |
| 06/03/1998 - Some spalling of concrete on a couple of the columns.   |              |     |          |       |           |            |            |            |            | QFBC       |
| 02/01/1994 - None  |              |     |          |       |           |            |            |            |            | REFI       |
| Inspection Notes:  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |

# INITIAL ASSESSMENT FORM FOR STRUCTURE :

**I00315000+00001**

Continue

\*\*\*\*\* Span : Main-0 - (cont.) \*\*\*\*\*

| Element Description   |              |     |          |       |           |            |            |            |            |            |
|---|--------------|-----|----------|-------|-----------|------------|------------|------------|------------|------------|
| Smart Flag  | Scale Factor | Env | Quantity | Units | Insp Each | Pct Stat 1 | Pct Stat 2 | Pct Stat 3 | Pct Stat 4 | Pct Stat 5 |
| Element 215 - R/Conc Abutment 1 and 6   |              |     |          |       |           |            |            |            |            |            |
|   | 1            | 1   | 45       | m.    |           | 95         | 5          | 0          | 0          |            |
|   |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :   |              |     |          |       |           |            |            |            |            |            |
| 12/05/2012 - Abutments are generally in Good condition. Small spalls along the cap to backwall area and (2) small spalls in Abutment 4's backwall by G3 and G6.   |              |     |          |       |           |            |            |            |            | GZfZ       |
| 12/06/2010 - Generally Good condition. (1) small spall in Abutment 1's backwall at girder embedment.  |              |     |          |       |           |            |            |            |            | GAeZ       |
| 11/17/2008 - (1) small spall in Abutment 1's backwall near a girder embedment.  |              |     |          |       |           |            |            |            |            | RZDZ       |
| 11/02/2006 - Minor and tight shrinkage cracks on both caps. (1) small spall along the girder embedment at Abutment 1. Erosion on the Right side of Abutment 1, SW corner.   |              |     |          |       |           |            |            |            |            | CXDO       |
| 10/16/2002 - (19.19 1.65 1.45) * 2  |              |     |          |       |           |            |            |            |            | QZCJ       |
| Inspection Notes:   |              |     |          |       |           |            |            |            |            |            |
|   |              |     |          |       |           |            |            |            |            |            |
|   |              |     |          |       |           |            |            |            |            |            |
| Element 234 - R/Conc Cap Bent 2, 3, 4, and 5  |              |     |          |       |           |            |            |            |            |            |
|   | 1            | 1   | 77       | m.    |           | 90         | 5          | 5          | 0          |            |
|   |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :   |              |     |          |       |           |            |            |            |            |            |
| 12/05/2012 - Spall on the Left end of Bent 3's cap had not changed. Bent 4's cap is stained and has surface spalls and delaminations on its' bottom at rebar chair feet.  |              |     |          |       |           |            |            |            |            | GZfZ       |
| 12/06/2010 - Spall on the Left end of Bent 3's cap on the Span 2 side; photo. Delaminations on the Right end of Bent 4's cap. Some small spalls on the surface of the cap bottoms from shallow rebar chair feet.        |              |     |          |       |           |            |            |            |            | GAeZ       |
| 11/17/2008 - Spall on Bent 3's cap has not gotten any worse. Surface delaminations and spalls on the underside of the caps from shallow tie wire and exposed rebar chair feet.  |              |     |          |       |           |            |            |            |            | RZDZ       |
| 11/02/2006 - Underside of the caps have small surface spalls where rusty rebar chairs are exposed. Also staining around the spalls. Left end of the cap at Bent 3 has a spall under the Span 2 side bearing; see photo. |              |     |          |       |           |            |            |            |            | CXDO       |
| 10/16/2002 - 19.19 * 4 = 76.76m   |              |     |          |       |           |            |            |            |            | QZCJ       |
| Inspection Notes:   |              |     |          |       |           |            |            |            |            |            |
|   |              |     |          |       |           |            |            |            |            |            |
|   |              |     |          |       |           |            |            |            |            |            |
| Element 300 - Strip Seal Exp Joint  |              |     |          |       |           |            |            |            |            |            |
|   | 1            | 3   | 19       | m.    |           | 95         | 5          | 0          |            |            |
|   |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :   |              |     |          |       |           |            |            |            |            |            |
| 12/05/2012 - Joint is packed with sanding material today. Steel sounds solid when tapped on. Small delaminations in header concrete along the joint's steel.  |              |     |          |       |           |            |            |            |            | GZfZ       |
| 12/06/2010 - Lots of dirt and ice in the joint today. Joint is leaking on its' Right end today. Steel all sounds solid when tapped on.  |              |     |          |       |           |            |            |            |            | GAeZ       |
| 11/17/2008 - Full of dirt. No obvious leaking observed. Steel sounds solid when tapped on. Some small spalls/delaminations along the steel.   |              |     |          |       |           |            |            |            |            | RZDZ       |
| 11/02/2006 - Joint steel sounds solid when tapped on. Packed with dirt/sanding material. No apparent areas of leakage. Some minor delaminations along the joint steel.  |              |     |          |       |           |            |            |            |            | CXDO       |
| 10/16/2002 - Full of sanding material.  |              |     |          |       |           |            |            |            |            | QZCJ       |
| 06/03/1998 - Need to clean out the sanding material that is in the joint.   |              |     |          |       |           |            |            |            |            | QFBC       |
| 19.19 * 1   |              |     |          |       |           |            |            |            |            |            |
| 02/01/1994 - None   |              |     |          |       |           |            |            |            |            | REFI       |
| Inspection Notes:   |              |     |          |       |           |            |            |            |            |            |
|   |              |     |          |       |           |            |            |            |            |            |
|   |              |     |          |       |           |            |            |            |            |            |



# INITIAL ASSESSMENT FORM FOR STRUCTURE :

**I00315000+00001**

Continue

\*\*\*\*\* Span : Main-0 - (cont.) \*\*\*\*\*

| Element Description  |              |     |          |       |           |            |            |            |            |            |
|--|--------------|-----|----------|-------|-----------|------------|------------|------------|------------|------------|
| Smart Flag   | Scale Factor | Env | Quantity | Units | Insp Each | Pct Stat 1 | Pct Stat 2 | Pct Stat 3 | Pct Stat 4 | Pct Stat 5 |
| Element 311 - Moveable Bearing Bent 4  |              |     |          |       |           |            |            |            |            |            |
|  | 1            | 2   | 20       | ea.   |           | 90         | 10         | 0          |            |            |
|  |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :  |              |     |          |       |           |            |            |            |            |            |
| 12/05/2012 - Alignment is Good. Rust, paint loss, staining, and bird debris.   |              |     |          |       |           |            |            |            |            | GZfZ       |
| 12/06/2010 - Alignment is Good. Rust, dirt, paint loss, and bird debris.   |              |     |          |       |           |            |            |            |            | GAeZ       |
| 11/17/2008 - Rusty, paint loss, and debris. Also staining from prior joint.  |              |     |          |       |           |            |            |            |            | RZDZ       |
| 11/02/2006 - Rusty, paint loss, dirt, and bird debris.   |              |     |          |       |           |            |            |            |            | CXDO       |
| 10/16/2002 - Add and some paint loss.  |              |     |          |       |           |            |            |            |            | QZCJ       |
| 06/03/1998 - Some rust & pitting.  |              |     |          |       |           |            |            |            |            | QFBC       |
| 02/01/1994 - None  |              |     |          |       |           |            |            |            |            | REFI       |
| Inspection Notes:  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
| Element 313 - Fixed Bearing  |              |     |          |       |           |            |            |            |            |            |
|  | 1            | 1   | 64       | ea.   |           | 90         | 10         | 0          |            |            |
|  |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :  |              |     |          |       |           |            |            |            |            |            |
| 12/05/2012 - Bent 2, 3, and 5 show faded paint and spot rust. Abutment bearings have paint loss, rust, minor surface pitting, and debris. Outer bearings at the Abutments are the worst. |              |     |          |       |           |            |            |            |            | GZfZ       |
| 12/06/2010 - Rust, dirt, paint loss, and bird debris.  |              |     |          |       |           |            |            |            |            | GAeZ       |
| 11/17/2008 - Spot rust on the Bent bearings with paint loss and surface pitting on some of the Abutment bearings.  |              |     |          |       |           |            |            |            |            | RZDZ       |
| 11/02/2006 - Some minor spot rust and bird debris.   |              |     |          |       |           |            |            |            |            | CXDO       |
| 10/16/2002 - No change.  |              |     |          |       |           |            |            |            |            | QZCJ       |
| Inspection Notes:  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
| Element 331 - Conc Bridge Railing  |              |     |          |       |           |            |            |            |            |            |
|  | 1            | 3   | 180      | m.    |           | 95         | 5          | 0          | 0          |            |
|  |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :  |              |     |          |       |           |            |            |            |            |            |
| 12/05/2012 - Rubs on both barriers. Spalls at the bolt holes on the backside of the barriers. Some shrinkage cracks. Generally in Good condition.  |              |     |          |       |           |            |            |            |            | GZfZ       |
| 12/06/2010 - Generally Good condition. Rubs and scrapes on both. Backside of the barrier has spalls near the ends around bolt holes.   |              |     |          |       |           |            |            |            |            | GAeZ       |
| 11/17/2008 - Unchanged with some rubs and scrapes noted.   |              |     |          |       |           |            |            |            |            | RZDZ       |
| 11/02/2006 - Numerous vertical cracks and some cracks along the rebar line. Backside of the rail at the bolt up areas shows minor spalls from drilling/construction activity.            |              |     |          |       |           |            |            |            |            | CXDO       |
| 10/16/2002 - ok  |              |     |          |       |           |            |            |            |            | QZCJ       |
| 06/03/1998 - New Cast-in-Place concrete barrier rail in 1995.  |              |     |          |       |           |            |            |            |            | QFBC       |
| 02/01/1994 - None  |              |     |          |       |           |            |            |            |            | REFI       |
| Inspection Notes:  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |

**100315000+00001**

**Continue**

\*\*\*\*\* Span : Main-0 - (cont.) \*\*\*\*\*

| Element Description                |              |     |          |       |           |            |            |            |            |            |
|------------------------------------|--------------|-----|----------|-------|-----------|------------|------------|------------|------------|------------|
| Smart Flag                         | Scale Factor | Env | Quantity | Units | Insp Each | Pct Stat 1 | Pct Stat 2 | Pct Stat 3 | Pct Stat 4 | Pct Stat 5 |
| Element 358 - Deck Cracking SmFlag |              |     |          |       |           |            |            |            |            |            |
| X                                  | 1            | 1   | 1        | ea.   | X         | 0          | 100        | 0          | 0          |            |
|                                    |              |     |          |       |           | %          | %          | %          | %          | %          |

Previous Inspection Notes :

12/05/2012 - Due to size and quantity. Spans 4 and 5 are the worst. Little to no sealer left.

GZFZ

12/06/2010 - Lots of mapping cracks, especially in Spans 4 and 5.

11/17/2008 - Condition State 2 due to density of cracks in the EB lane. Underside of the deck looks ok.

RZDZ

11/02/2006 - Cracking very visible today from coating of de-icer. No spalled areas. In Condition State 1 as sealed in 1995.

CXDO

10/16/2002 - No change.

QZCJ

06/03/1998 - Small, tight mapping cracks throughout the new rigid overlay. Sealed with a sealer during 1995 also.

QFBC

Inspection Notes:

### General Inspection Notes

12/05/2012 - End shoes at Abutment 6 are lapped against traffic.

GZFZ

Rail terminal section at Abutment 1-Left, NW corner, has (3) broken rail posts; photo.

Slope protection concrete has slid downhill into the columns at Bent 2 and is causing some cracking and spalling in the slope protection concrete, photo.

12/06/2010 - End shoes still lapped against traffic on the NE and SE corners.

11/17/2008 - Approaches overlayed in 2007.

RZDZ

NE and SE rail end shoes are lapped against traffic.

11/02/2006 - Slope protection at the Abutment fills shows some minor settlement and cracking.

CXDO

10/16/2002 - None

QZCJ

06/03/1998 - None

QFBC

02/01/1994 - Sufficiency Rating Calculation Accepted by ops\$u5963 at 3/11/97 10:45:03

Sufficiency Rating Calculation Accepted by ops\$u9004 at 2/19/97 14:15:32

01/01/1992 - Updated with tape 1994

03/01/1990 - Updated with tape 1991

02/01/1988 - Updated with tape 1989

02/01/1986 - Updated with tape 1987

**INITIAL ASSESSMENT FORM FOR STRUCTURE :****I00315000+03421**

Location : GREAT FALLS Structure Name:

**General Location Data**MDT Maintenance Section : **31-01 Great Falls**District Code, Number, Location : **03 Dist 3 GREAT FALLS**Division Code, Location : **31 GREAT FALLS**County Code, Location : **013 CASCADE**City Code, Location : **32800 GREAT FALLS**Kind fo Hwy Code, Description : **1 1 Interstate Hwy**Signed Route Number : **00315**Str Owner Code, Description : **1 State Highway Agency**Maintained by Code, Description : **1 State Highway Agency**Intersecting Feature : **FAU 5225-14TH STREET SW**Kilometer Post, Mile Post : **0.55 km 0.34**Structure on the State Highway System : ☒ Latitude : **47°29'13"**Structure on the National Highway System : ☒ Longitude : **111°20'17"**Str Meet or Exceed NBIS Bridge Length : ☒**Construction Data**Construction Project Number : **IG 315-5(3)272**Construction Station Number : **21+65.00**Construction Drawing Number : **6813**Construction Year : **1967**Reconstruction Year : **1995****Traffic Data**Current ADT : **25,500** ADT Count Year : **2009** Percent Trucks : **2 %****Structure Loading, Rating and Posting Data****Loading Data :**

|                          |                  |                               |
|--------------------------|------------------|-------------------------------|
| Design Loading :         |                  | <b>5 MS 18 (HS 20)</b>        |
| Inventory Load, Design : | <b>32.6 mton</b> | <b>A LFD Assigned</b>         |
| Operating Load, Design : | <b>35.3 mton</b> | <b>A LFD Assigned</b>         |
| Posting :                |                  | <b>5 At/Above Legal Loads</b> |

**Rating Data :**

|                     | Operating    | Inventory | Posting |
|---------------------|--------------|-----------|---------|
| Truck 1 Type 3 :    |              |           |         |
| Truck 2 Type 3-S3 : |              |           |         |
| Truck 3 Type 3-3 :  | <b>83.84</b> |           |         |

**Structure, Roadway and Clearance Data****Structure Deck, Roadway and Span Data :**

Structure Length : **45.72 m**  
 Deck Area : **546.00 m sq**  
 Deck Roadway Width : **10.96 m**  
 Approach Roadway Width : **10.96 m**  
 Median Code, Description : **0 No median**

**Structure Vertical and Horizontal Clearance Data :**

Vertical Clearance Over the Structure : **99.99 m**  
 Reference Feature for Vertical Clearance : **H Hwy beneath struct**  
 Vertical Clearance Under the Structure : **5.26 m**  
 Reference Feature for Lateral Underclearance : **H Hwy beneath struct**  
 Minimum Lateral Under Clearance Right : **1.70 m**  
 Minimum Lateral Under Clearance Left : **0.00 m**

**Span Data****Main Span**

Number Spans : **3**  
 Material Type Code, Description : **5 Prestressed concrete**  
 Span Design Code, Description : **2 Stringer/Multi-beam or Girder Deck**

Deck Structure Type : **1 Concrete Cast-in-Place**  
 Deck Surfacing Type : **1 Monolithic concrete (concurrently placed with struct**  
 Deck Protection Type : **0 None**  
 Deck Membrain Type : **0 None**

**Approach Span**

Number of Spans : **0**  
 Material Type Code, Description :  
 Span Design Code, Description :

**Structure Vertical and Horizontal Clearance Data Inventory Route :**

| Over / Under Direction Name | Inventory Route | South, West or Bi-directional Travel |          |            | North or East Travel |          |            |
|-----------------------------|-----------------|--------------------------------------|----------|------------|----------------------|----------|------------|
|                             |                 | Direction                            | Vertical | Horizontal | Direction            | Vertical | Horizontal |
| One Route Under             | U05225          | Both                                 | 5.26 m   | 9.14 m     | N/A                  |          |            |
| 14TH STREET SW              |                 |                                      |          |            |                      |          |            |
| Route On Structure          | I00315          | N/A                                  |          |            | North                | 99.99 m  | 10.96 m    |
| I - 315 EB                  |                 |                                      |          |            |                      |          |            |

**INITIAL ASSESSMENT FORM FOR STRUCTURE :****I00315000+03421**

Continue

**Inspection Data**Sufficiency Rating : **93**Structure Status : **Not Deficient**Inspection Due Date : **05 December 2014**(91) Inspection Frequency (months) : **24****NBI Inspection Data**

(90) Date of Last Inspection : 05 December 2012

Last Inspected By : Charles Pepos - 107

(90) Inspection Date :

Inspected By :

(58) Deck Rating : 5

(68) Deck Geometry : 4

(36A) Bridge Rail Rating : 1

(62) Culvert Rating : N

(59) Superstructure Rating : 8

(67) Structure Rating : 7

(36B) Transition Rating : 1

(61) Channel Rating : N

(60) Substructure Rating : 7

(69) Under Clearance : 4

(36C) Approach Rail Rating : 1

(71) Waterway Adequacy : N

(72) App Rdwy Align : 8

(41) Posting Status : A

(36D) End Rail Rating : 1

(113) Scour Critical : N

Unrepaired Spalls : 0 m sq

Deck Surfacing Depth : 0.00 in

**Inspection Hours**

Crew Hours for inspection : 2

Snooper Required : N

Helper Hours : 0

Snooper Hours for inspection : 0

Special Crew Hours : 0

Flagger Hours : 0

Special Equipment Hours : 0

| Inspection Work Candidates                |                   | Status   | Priority | Effected<br>Structure<br>Unit | Scope of<br>Work      | Action            | Covered<br>Condition<br>States |
|---|-------------------|----------|----------|-------------------------------|-----------------------|-------------------|--------------------------------|
| Candidate ID                              | Date<br>Requested |          |          |                               |                       |                   |                                |
| D31-FY2004-000075                         | 28 January 2004   | Approved | Low      | All Spans                     | Bridge                | Spot Paint (flex) |                                |
| Clean and paint bearings.                 |                   |          |          |                               |                       |                   |                                |
| Approved. DRC                             |                   |          |          |                               |                       |                   |                                |
|   |                   |          |          |                               |                       |                   |                                |
|   |                   |          |          |                               |                       |                   |                                |
| D31-FY2007-000039                         | 26 December 2006  | Approved | Medium   | M Main                        | 12 Bare Concrete Deck | Min Repair        |                                |
| Patch any spalled areas in the surfacing. |                   |          |          |                               |                       |                   |                                |
| Approved. DRC                             |                   |          |          |                               |                       |                   |                                |
|   |                   |          |          |                               |                       |                   |                                |
|   |                   |          |          |                               |                       |                   |                                |

Late Reason:

Inspection Date: 12/05/2012



**INITIAL ASSESSMENT FORM FOR STRUCTURE :****I00315000+03421**

Continue

**Element Inspection Data**

\*\*\*\*\* Span : Main-0 - \*\*\*\*\*

| Element Description  |              |     |          |       |           |            |            |            |            |            |
|--|--------------|-----|----------|-------|-----------|------------|------------|------------|------------|------------|
| Smart Flag   | Scale Factor | Env | Quantity | Units | Insp Each | Pct Stat 1 | Pct Stat 2 | Pct Stat 3 | Pct Stat 4 | Pct Stat 5 |
| Element 12 - Bare Concrete Deck  |              |     |          |       |           |            |            |            |            |            |
|  | 1            | 3   | 546      | sq.m. | X         | 0          | 100        | 0          | 0          | 0          |
|  |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :  |              |     |          |       |           |            |            |            |            |            |
| 12/05/2012 - Transverse cracks with some spalls and delaminations over Bents 2 and 3. Small delaminations along the guard angles. Wear from studded tires in the wheel paths.                            |              |     |          |       |           |            |            |            |            | GIFZ       |
| 12/06/2010 - Spalls, delaminations, and transverse cracks over Bent 2 and 3. Wear in the wheel paths. 2 percent or less delaminations in the deck surface.   |              |     |          |       |           |            |            |            |            | GZEV       |
| 11/17/2008 - Open transverse cracks over Bent 2 and 3. Some delaminations in all (3) Spans with an estimated 2 percent or less from a quick chain drag. Wear in the wheel paths.                         |              |     |          |       |           |            |            |            |            | RCDZ       |
| 11/02/2006 - Wear in the wheel paths. Transverse cracks over Bent 2 and 3 with some spalls over Bent 3 also noted.   |              |     |          |       |           |            |            |            |            | CZDO       |
| 10/10/2002 - $11.95 * 45.72 = 546.35$ Add slightly open cracks over both Bents. Some minor cracking throughout.  |              |     |          |       |           |            |            |            |            | KLKZ       |
| 06/03/1998 - $13.15 * 45.72 =$ Studded tires have left an almost exposed aggregate finish in both traffic lanes.   |              |     |          |       |           |            |            |            |            | QFKU       |
| 02/01/1994 - None  |              |     |          |       |           |            |            |            |            | REFI       |
| Inspection Notes:  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
| Element 109 - P/S Conc Open Girder   |              |     |          |       |           |            |            |            |            |            |
|  | 1            | 1   | 229      | m.    |           | 100        | 0          | 0          | 0          |            |
|  |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :  |              |     |          |       |           |            |            |            |            |            |
| 12/05/2012 - Good condition.   |              |     |          |       |           |            |            |            |            | GIFZ       |
| 12/06/2010 - Good condition.   |              |     |          |       |           |            |            |            |            | GZEV       |
| 11/17/2008 - Same as prior and in Good condition.  |              |     |          |       |           |            |            |            |            | RCDZ       |
| 11/02/2006 - No problems observed. Some girders have minor cracks from the backside of the embedded bearing plate to the ends of the girders.  |              |     |          |       |           |            |            |            |            | CZDO       |
| 10/10/2002 - $5 * 45.72 = 228.60m$   |              |     |          |       |           |            |            |            |            | KLKZ       |
| Inspection Notes:  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
| Element 205 - R/Conc Column Bent 2 and 3   |              |     |          |       |           |            |            |            |            |            |
|  | 1            | 1   | 4        | ea.   |           | 95         | 5          | 0          | 0          |            |
|  |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :  |              |     |          |       |           |            |            |            |            |            |
| 12/05/2012 - (2) small spall on the Right column of Bent 3. Tight surface shrinkage cracks in all (4) columns. Columns are in Good condition.  |              |     |          |       |           |            |            |            |            | GIFZ       |
| 12/06/2010 - Tight surface shrinkage cracks in all (4) columns. (2) small spalls on the Right column of Bent 3; patch has popped off. Generally in Good condition.                                       |              |     |          |       |           |            |            |            |            | GZEV       |
| 11/17/2008 - Generally in Good condition. Small delaminated patch on the Right column of Bent 3 for Condition State 3 and a small spall near the sidewalk line on the same column for Condition State 2. |              |     |          |       |           |            |            |            |            | RCDZ       |
| 11/02/2006 - Tight surface shrinkage cracks. Right/South Column at Bent 3 has a small chipped area near the sidewalk and some delaminated areas of the patch at its construction joint to the cap.       |              |     |          |       |           |            |            |            |            | CZDO       |
| 10/10/2002 - Some minor wear, weathering, and shrinkage cracks.  |              |     |          |       |           |            |            |            |            | KLKZ       |
| Inspection Notes:  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |

**INITIAL ASSESSMENT FORM FOR STRUCTURE :****I00315000+03421**

Continue

\*\*\*\*\* Span : Main-0 - (cont.) \*\*\*\*\*

| Element Description   |              |     |          |       |           |            |            |            |            |            |
|---|--------------|-----|----------|-------|-----------|------------|------------|------------|------------|------------|
| Smart Flag  | Scale Factor | Env | Quantity | Units | Insp Each | Pct Stat 1 | Pct Stat 2 | Pct Stat 3 | Pct Stat 4 | Pct Stat 5 |
| Element 215 - R/Conc Abutment   |              |     |          |       |           |            |            |            |            |            |
|   | 1            | 2   | 33       | m.    |           | 95         | 5          | 0          | 0          |            |
|   |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :   |              |     |          |       |           |            |            |            |            |            |
| 12/05/2012 - Small spalls along the cap to backwall area and (1) small spall at the G3 embedment in Abutment 1's backwall.                              |              |     |          |       |           |            |            |            |            | GIFZ       |
| 12/06/2010 - Small spall at (1) bearing in Abutment 1's backwall. Tight surface shrinkage cracks.   |              |     |          |       |           |            |            |            |            | GZEV       |
| 11/17/2008 - Unchanged. Graffiti has been painted over.   |              |     |          |       |           |            |            |            |            | RCDZ       |
| 11/02/2006 - Tight surface shrinkage cracks in both caps and some small spalls where the girders are embedded in the backwalls.                         |              |     |          |       |           |            |            |            |            | CZDO       |
| 10/10/2002 - Add some erosion at the corners.   |              |     |          |       |           |            |            |            |            | KLKZ       |
| 06/03/1998 - (13.15 * 2) 1.80 1.60 1.50 1.70 Some small, tight cracks with minor water staining.  |              |     |          |       |           |            |            |            |            | QFKU       |
| 02/01/1994 - None   |              |     |          |       |           |            |            |            |            | REFI       |
| Inspection Notes:   |              |     |          |       |           |            |            |            |            |            |
|   |              |     |          |       |           |            |            |            |            |            |
|   |              |     |          |       |           |            |            |            |            |            |
| Element 234 - R/Conc Cap Bent 2 and 3   |              |     |          |       |           |            |            |            |            |            |
|   | 1            | 1   | 26       | m.    |           | 100        | 0          | 0          | 0          |            |
|   |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :   |              |     |          |       |           |            |            |            |            |            |
| 12/05/2012 - Good condition. Lots of pigeon debris on top of the caps.  |              |     |          |       |           |            |            |            |            | GIFZ       |
| 12/06/2010 - Good condition. Some staining from bird debris.  |              |     |          |       |           |            |            |            |            | GZEV       |
| 11/17/2008 - Good condition. Same on staining and tight cracks.   |              |     |          |       |           |            |            |            |            | RCDZ       |
| 11/02/2006 - Some tight cracks at the steps in the caps. Lots of staining from pigeon debris on tops of the caps.                                       |              |     |          |       |           |            |            |            |            | CZDO       |
| 10/10/2002 - 13.15 * 2 = 26.30m   |              |     |          |       |           |            |            |            |            | KLKZ       |
| Inspection Notes:   |              |     |          |       |           |            |            |            |            |            |
|   |              |     |          |       |           |            |            |            |            |            |
|   |              |     |          |       |           |            |            |            |            |            |
| Element 313 - Fixed Bearing   |              |     |          |       |           |            |            |            |            |            |
|   | 1            | 1   | 30       | ea.   |           | 85         | 15         | 0          |            |            |
|   |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :   |              |     |          |       |           |            |            |            |            |            |
| 12/05/2012 - Faded paint and debris on the bearings at Bents 2 and 3. Bearings at both of the Abutments have paint loss, minor pitting, and heavy rust. |              |     |          |       |           |            |            |            |            | GIFZ       |
| 12/06/2010 - Rusty spots, paint loss, and bird debris.  |              |     |          |       |           |            |            |            |            | GZEV       |
| 11/17/2008 - Rust, paint loss, and bird debris.   |              |     |          |       |           |            |            |            |            | RCDZ       |
| 11/02/2006 - Spot rust and paint loss. Lots of piegeon debris on the bearings at Bents 2 and 3.   |              |     |          |       |           |            |            |            |            | CZDO       |
| 10/10/2002 - Add some paint loss and bird debris.   |              |     |          |       |           |            |            |            |            | KLKZ       |
| Inspection Notes:   |              |     |          |       |           |            |            |            |            |            |
|   |              |     |          |       |           |            |            |            |            |            |
|   |              |     |          |       |           |            |            |            |            |            |

**100315000+03421**

**Continue**

\*\*\*\*\* Span : Main-0 - (cont.) \*\*\*\*\*

| Element Description               |              |     |          |       |           |            |            |            |            |            |
|-----------------------------------|--------------|-----|----------|-------|-----------|------------|------------|------------|------------|------------|
| Smart Flag                        | Scale Factor | Env | Quantity | Units | Insp Each | Pct Stat 1 | Pct Stat 2 | Pct Stat 3 | Pct Stat 4 | Pct Stat 5 |
| Element 331 - Conc Bridge Railing |              |     |          |       |           |            |            |            |            |            |
|                                   | 1            | 3   | 91       | m.    |           | 95         | 5          | 0          | 0          |            |
|                                   |              |     |          |       |           | %          | %          | %          | %          | %          |

Previous Inspection Notes :

12/05/2012 - Some tight shrinkage cracks. Cracks on the backside of the barrier show efflorescence in areas. Ends shoe at Abutment 1 are lapped against traffic.

12/06/2010 - Scrapes and dings to both barriers. Vertical shrinkage cracks for the length of the rails. End shoes at Abutment 1 are lapped against traffic flow. GZEV

11/17/2008 - Some scrapes and dings on both rails. Tight vertical cracking, random, throughout.

11/02/2006 - Unchanged from previous reports. CZDO

10/10/2002 -  $45.72 * 2 = 91.44\text{m}$  Minor dings, scrapes, and vertical cracking.

06/03/1998 - New Cast-in-Place concrete rail in 1995.

02/01/1994 - None REFI

Inspection Notes:

| Element 358 - Deck Cracking SmFlag |   |   |   |     |   |   |   |     |   |   |
|------------------------------------|---|---|---|-----|---|---|---|-----|---|---|
| X                                  | 1 | 3 | 1 | ea. | X | 0 | 0 | 100 | 0 |   |
|                                    |   |   |   |     |   | % | % | %   | % | % |

Previous Inspection Notes :

12/05/2012 - Widest and densest areas of cracking are over the Bents with spalling and delaminations in the cracked areas. GIFZ

12/06/2010 - Some cracked areas show spaling starting and small delaminations.

11/17/2008 - Wide cracks with spalling over Bents 2 and 3. RCDZ

Inspection Notes:

## General Inspection Notes

12/05/2012 - Light on face of Bent 2's cap was not working today. Minor bumps on and off of the structure. GIFZ

12/06/2010 - Very minor bumps on and off of the bridge.

11/17/2008 - New approach overlay in 2007. RCDZ

Both of the rail end shoes at Approach 1 are lapped against the traffic flow.

11/02/2006 - Recent patches to the roadway approaches. Still minor bumps on and off of the structure. CZDO

10/10/2002 - ok

06/03/1998 - None QFKU

02/01/1994 - Sufficiency Rating Calculation Accepted by ops\$u5963 at 3/11/97 10:45:04

Sufficiency Rating Calculation Accepted by ops\$u9004 at 2/19/97 14:15:33

01/01/1992 - Updated with tape 1994

01/01/1990 - Updated with tape 1991 NB91

02/01/1988 - Updated with tape 1989

02/01/1986 - Updated with tape 1988

**INITIAL ASSESSMENT FORM FOR STRUCTURE :****I00315000+03422**

Location : GREAT FALLS Structure Name:

**General Location Data**MDT Maintenance Section : **31-01 Great Falls**District Code, Number, Location : **03 Dist 3 GREAT FALLS**Division Code, Location : **31 GREAT FALLS**County Code, Location : **013 CASCADE**City Code, Location : **32800 GREAT FALLS**Kind fo Hwy Code, Description : **1 1 Interstate Hwy**Signed Route Number : **00315**Str Owner Code, Description : **1 State Highway Agency**Maintained by Code, Description : **1 State Highway Agency**Intersecting Feature : **FAU 5225-14TH STREET SW**Kilometer Post, Mile Post : **0.55 km 0.34**Structure on the State Highway System : ☒ Latitude : **47°29'13"**Structure on the National Highway System : ☒ Longitude : **111°20'18"**Str Meet or Exceed NBIS Bridge Length : ☒**Construction Data**Construction Project Number : **IG 315-5(3)272**Construction Station Number : **21+65.00**Construction Drawing Number : **6813**Construction Year : **1967**Reconstruction Year : **1995****Traffic Data**Current ADT : **25,500** ADT Count Year : **2009** Percent Trucks : **2 %****Structure Loading, Rating and Posting Data****Loading Data :**

|                          |                  |                               |
|--------------------------|------------------|-------------------------------|
| Design Loading :         |                  | <b>5 MS 18 (HS 20)</b>        |
| Inventory Load, Design : | <b>32.6 mton</b> | <b>A LFD Assigned</b>         |
| Operating Load, Design : | <b>35.3 mton</b> | <b>A LFD Assigned</b>         |
| Posting :                |                  | <b>5 At/Above Legal Loads</b> |

**Rating Data :**

|                     | Operating    | Inventory | Posting |
|---------------------|--------------|-----------|---------|
| Truck 1 Type 3 :    |              |           |         |
| Truck 2 Type 3-S3 : |              |           |         |
| Truck 3 Type 3-3 :  | <b>83.84</b> |           |         |

**Structure, Roadway and Clearance Data****Structure Deck, Roadway and Span Data :**

Structure Length : **44.20 m**  
 Deck Area : **639.00 m sq**  
 Deck Roadway Width : **13.65 m**  
 Approach Roadway Width : **14.00 m**  
 Median Code, Description : **0 No median**

**Structure Vertical and Horizontal Clearance Data :**

Vertical Clearance Over the Structure : **99.99 m**  
 Reference Feature for Vertical Clearance : **H Hwy beneath struct**  
 Vertical Clearance Under the Structure : **5.20 m**  
 Reference Feature for Lateral Underclearance : **H Hwy beneath struct**  
 Minimum Lateral Under Clearance Right : **1.70 m**  
 Minimum Lateral Under Clearance Left : **0.00 m**

**Span Data****Main Span**

Number Spans : **3**  
 Material Type Code, Description : **5 Prestressed concrete**  
 Span Design Code, Description : **2 Stringer/Multi-beam or Girder Deck**

Deck Structure Type : **1 Concrete Cast-in-Place**  
 Deck Surfacing Type : **1 Monolithic concrete (concurrently placed with struct**  
 Deck Protection Type : **0 None**  
 Deck Membrain Type : **0 None**

**Approach Span**

Number of Spans : **0**  
 Material Type Code, Description :  
 Span Design Code, Description :

**Structure Vertical and Horizontal Clearance Data Inventory Route :**

| Over / Under Direction Name | Inventory Route | South, West or Bi-directional Travel |          |            | North or East Travel |          |            |
|-----------------------------|-----------------|--------------------------------------|----------|------------|----------------------|----------|------------|
|                             |                 | Direction                            | Vertical | Horizontal | Direction            | Vertical | Horizontal |
| One Route Under             | U05225          | Both                                 | 5.20 m   | 9.14 m     | N/A                  |          |            |
| 14TH STREET SW              |                 |                                      |          |            |                      |          |            |
| Route On Structure          | I00315          | West                                 | 99.99 m  | 13.65 m    | N/A                  |          |            |
| I - 315 WB                  |                 |                                      |          |            |                      |          |            |

**INITIAL ASSESSMENT FORM FOR STRUCTURE :****I00315000+03422**

Continue

**Inspection Data**Sufficiency Rating : **96**Structure Status : **Not Deficient**Inspection Due Date : **06 December 2014**(91) Inspection Frequency (months) : **48****NBI Inspection Data**

(90) Date of Last Inspection : 06 December 2010

Last Inspected By : Charles Pepos - 107

(90) Inspection Date :

Inspected By :

(58) Deck Rating :

6

(68) Deck Geometry :

9

(36A) Bridge Rail Rating :

1

(62) Culvert Rating :

N

(59) Superstructure Rating :

8

(67) Structure Rating :

7

(36B) Transition Rating :

1

(61) Channel Rating :

N

(60) Substructure Rating :

7

(69) Under Clearance :

4

(36C) Approach Rail Rating :

1

(71) Waterway Adequacy :

N

(72) App Rdwy Align :

8

(41) Posting Status :

A

(36D) End Rail Rating :

1

(113) Scour Critical :

N

Unrepaired Spalls : 0 m sq

Deck Surfacing Depth : 0.00 in

**Inspection Hours**

Crew Hours for inspection :

2

Snooper Required :

N

Helper Hours :

0

Snooper Hours for inspection :

0

Special Crew Hours :

0

Flagger Hours :

0

Special Equipment Hours :

0

| Inspection Work Candidates                                    |                   | Status   | Priority | Effected<br>Structure<br>Unit | Scope of<br>Work      | Action            | Covered<br>Condition<br>States |
|---|-------------------|----------|----------|-------------------------------|-----------------------|-------------------|--------------------------------|
| Candidate ID  | Date<br>Requested |          |          |                               |                       |                   |                                |
| D31-FY2004-000076   | 28 January 2004   | Approved | Low      | All Spans                     | Bridge                | Spot Paint (flex) |                                |
| Clean and paint bearings.                                     |                   |          |          |                               |                       |                   |                                |
| Approved. DRC   |                   |          |          |                               |                       |                   |                                |
|   |                   |          |          |                               |                       |                   |                                |
|   |                   |          |          |                               |                       |                   |                                |
| D31-FY2007-000041   | 26 December 2006  | Approved | Medium   | M Main                        | 12 Bare Concrete Deck | Min Repair        |                                |
| Patch any spalled areas in the deck, very small at this time. |                   |          |          |                               |                       |                   |                                |
| Approved. DRC   |                   |          |          |                               |                       |                   |                                |
|   |                   |          |          |                               |                       |                   |                                |
|   |                   |          |          |                               |                       |                   |                                |

Late Reason:

Inspection Date: 12/06/2010

**INITIAL ASSESSMENT FORM FOR STRUCTURE :****I00315000+03422**

Continue

**Element Inspection Data**

\*\*\*\*\* Span : Main-0 - \*\*\*\*\*

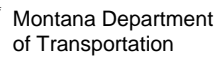
| Element Description   |              |     |          |       |           |            |            |            |            |            |
|---|--------------|-----|----------|-------|-----------|------------|------------|------------|------------|------------|
| Smart Flag  | Scale Factor | Env | Quantity | Units | Insp Each | Pct Stat 1 | Pct Stat 2 | Pct Stat 3 | Pct Stat 4 | Pct Stat 5 |
| Element 12 - Bare Concrete Deck   |              |     |          |       |           |            |            |            |            |            |
|   | 1            | 3   | 639      | sq.m. | X         | 0          | 100        | 0          | 0          | 0          |
|   |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :   |              |     |          |       |           |            |            |            |            |            |
| 12/06/2010 - Wear in the wheel paths. Tight cracks over Bents 2 and 3. Some random cracking in all (3) Spans.   |              |     |          |       |           |            |            |            |            | GZEW       |
| 11/02/2006 - Wear in the wheel paths. Cracking does not appear to be any worse or opening up. Put into Condition State 2 as there was (1) small, 1" x 2", area of delamination near Abutment 4 in the Left lane of traffic. |              |     |          |       |           |            |            |            |            | CZDO       |
| 10/10/2002 - 14.46 * 44.20 = 639.13 Numerous, small and tight, transverse and mapping cracks throughout; very noticeable of the repaired areas. Maybe a smart flag for deck cracking the next report.                       |              |     |          |       |           |            |            |            |            | KYKZ       |
| 06/03/1998 - 44.20 * 16.35 Deck was repaired, sealed only and widened in 1995.  |              |     |          |       |           |            |            |            |            | QF1X       |
| 02/01/1994 - None   |              |     |          |       |           |            |            |            |            | REFI       |
| Inspection Notes:   |              |     |          |       |           |            |            |            |            |            |
|   |              |     |          |       |           |            |            |            |            |            |
|   |              |     |          |       |           |            |            |            |            |            |
| Element 109 - P/S Conc Open Girder  |              |     |          |       |           |            |            |            |            |            |
|   | 1            | 1   | 265      | m.    |           | 100        | 0          | 0          | 0          |            |
|   |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :   |              |     |          |       |           |            |            |            |            |            |
| 12/06/2010 - Good condition.  |              |     |          |       |           |            |            |            |            | GZEW       |
| 11/02/2006 - Good condition. A couple of the girders have tight cracks from the backside of the embedded bearing plates to the ends of the girders.   |              |     |          |       |           |            |            |            |            | CZDO       |
| 10/10/2002 - Some scrapes to the bottom flange, but no dings or spalled concrete.   |              |     |          |       |           |            |            |            |            | KYKZ       |
| Inspection Notes:   |              |     |          |       |           |            |            |            |            |            |
|   |              |     |          |       |           |            |            |            |            |            |
|   |              |     |          |       |           |            |            |            |            |            |
| Element 205 - R/Conc Column Bent 2 and 3  |              |     |          |       |           |            |            |            |            |            |
|   | 1            | 1   | 6        | ea.   |           | 95         | 5          | 0          | 0          |            |
|   |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :   |              |     |          |       |           |            |            |            |            |            |
| 12/06/2010 - Surface shrinkage cracks. Generally in Good condition.   |              |     |          |       |           |            |            |            |            | GZEW       |
| 11/02/2006 - Tight surface shrinkage cracks. Left two(2) columns on the newer portion of the bridge have some loose/spalled patches over the construction joint to the cap.   |              |     |          |       |           |            |            |            |            | CZDO       |
| 10/10/2002 - Some wear, weathering, shrinkage cracks.   |              |     |          |       |           |            |            |            |            | KYKZ       |
| Inspection Notes:   |              |     |          |       |           |            |            |            |            |            |
|   |              |     |          |       |           |            |            |            |            |            |
|   |              |     |          |       |           |            |            |            |            |            |
| Element 215 - R/Conc Abutment 1 and 4   |              |     |          |       |           |            |            |            |            |            |
|   | 1            | 1   | 39       | m.    |           | 95         | 5          | 0          | 0          |            |
|   |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :   |              |     |          |       |           |            |            |            |            |            |
| 12/06/2010 - (1) small spall near girder embedment at Abutment 4. Some tight shrinkage cracks.  |              |     |          |       |           |            |            |            |            | GZEW       |
| 11/02/2006 - Minor and tight cracks in both caps with one small spalled area in the backwall where the girders are embedded.  |              |     |          |       |           |            |            |            |            | CZDO       |
| 10/10/2002 - A little more erosion and weathering of the concrete.  |              |     |          |       |           |            |            |            |            | KYKZ       |
| Inspection Notes:   |              |     |          |       |           |            |            |            |            |            |
|   |              |     |          |       |           |            |            |            |            |            |
|   |              |     |          |       |           |            |            |            |            |            |

**INITIAL ASSESSMENT FORM FOR STRUCTURE :****I00315000+03422**

Continue

\*\*\*\*\* Span : Main-0 - (cont.) \*\*\*\*\*

| Element Description   |              |     |          |       |           |            |            |            |            |            |
|---|--------------|-----|----------|-------|-----------|------------|------------|------------|------------|------------|
| Smart Flag  | Scale Factor | Env | Quantity | Units | Insp Each | Pct Stat 1 | Pct Stat 2 | Pct Stat 3 | Pct Stat 4 | Pct Stat 5 |
| Element 234 - R/Conc Cap Bent 2 and 3   |              |     |          |       |           |            |            |            |            |            |
|   | 1            | 1   | 33       | m.    |           | 100        | 0          | 0          | 0          |            |
|   |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :   |              |     |          |       |           |            |            |            |            |            |
| 12/06/2010 - Some tight surface shrinkage cracks. Rebar chair feet show some rust on the underside of both caps. Minor staining from bird debris. |              |     |          |       |           |            |            |            |            | GZEW       |
| 11/02/2006 - Staining from pigeon debris. Some tight cracks at the steps in the caps and none are a problem.                                      |              |     |          |       |           |            |            |            |            | CZDO       |
| 10/10/2002 - 16.35 * 2 = 32.70m   |              |     |          |       |           |            |            |            |            | KYKZ       |
| Inspection Notes:   |              |     |          |       |           |            |            |            |            |            |
|   |              |     |          |       |           |            |            |            |            |            |
| Element 313 - Fixed Bearing   |              |     |          |       |           |            |            |            |            |            |
|   | 1            | 1   | 36       | ea.   |           | 90         | 10         | 0          |            |            |
|   |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :   |              |     |          |       |           |            |            |            |            |            |
| 12/06/2010 - Rust spots, paint loss, and bird debris.   |              |     |          |       |           |            |            |            |            | GZEW       |
| 11/02/2006 - Rusty spots and paint loss. Lots of pigeon debris on both of the Bent caps.  |              |     |          |       |           |            |            |            |            | CZDO       |
| 10/10/2002 - Add some paint loss and bird debris.   |              |     |          |       |           |            |            |            |            | KYKZ       |
| Inspection Notes:   |              |     |          |       |           |            |            |            |            |            |
|   |              |     |          |       |           |            |            |            |            |            |
| Element 331 - Conc Bridge Railing   |              |     |          |       |           |            |            |            |            |            |
|   | 1            | 3   | 88       | m.    |           | 95         | 5          | 0          | 0          |            |
|   |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :   |              |     |          |       |           |            |            |            |            |            |
| 12/06/2010 - Same as past inspections.  |              |     |          |       |           |            |            |            |            | GZEW       |
| 11/02/2006 - Left/North rail has a couple of patches areas on its backside. Not a problem, only an aesthetic thing.                               |              |     |          |       |           |            |            |            |            | CZDO       |
| 10/10/2002 - Some dings, scrapes, and vertical cracking.  |              |     |          |       |           |            |            |            |            | KYKZ       |
| 06/03/1998 - New in 1995 and was Cast-in-Place.   |              |     |          |       |           |            |            |            |            | QFIX       |
| 44.20 * 2.  |              |     |          |       |           |            |            |            |            |            |
| 02/01/1994 - None   |              |     |          |       |           |            |            |            |            | REFI       |
| Inspection Notes:   |              |     |          |       |           |            |            |            |            |            |
|   |              |     |          |       |           |            |            |            |            |            |
| Element 358 - Deck Cracking SmFlag  |              |     |          |       |           |            |            |            |            |            |
| X   | 1            | 3   | 1        | ea.   | X         | 0          | 100        | 0          | 0          |            |
|   |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :   |              |     |          |       |           |            |            |            |            |            |
| 12/06/2010 - Condition State 2 due to amount of tight mapping cracks noted; especially when the surface is damp.                                  |              |     |          |       |           |            |            |            |            | GZEW       |
| Inspection Notes:   |              |     |          |       |           |            |            |            |            |            |
|   |              |     |          |       |           |            |            |            |            |            |

[illegible]



**INITIAL ASSESSMENT FORM FOR STRUCTURE :****I00315000+03423**

Location : GREAT FALLS Structure Name:

**General Location Data**MDT Maintenance Section : **31-01 Great Falls**District Code, Number, Location : **03 Dist 3 GREAT FALLS**Division Code, Location : **31 GREAT FALLS**County Code, Location : **013 CASCADE**City Code, Location : **32800 GREAT FALLS**Kind fo Hwy Code, Description : **8 8 Other (incl toll rds)**Signed Route Number : **00315**Str Owner Code, Description : **1 State Highway Agency**Maintained by Code, Description : **1 State Highway Agency**Intersecting Feature : **FAU 5225-14TH STREET SW**Kilometer Post, Mile Post : **0.55 km 0.34**Structure on the State Highway System : ☐ Latitude : **47°29'12"**Structure on the National Highway System : ☐ Longitude : **111°20'17"**Str Meet or Exceed NBIS Bridge Length : ☒**Construction Data**Construction Project Number : **IR 315-5(12)1F**Construction Station Number : **5+63.00**Construction Drawing Number : **15883**Construction Year : **1997**

Reconstruction Year :

**Traffic Data**Current ADT : **25,500** ADT Count Year : **2009** Percent Trucks : **2 %****Structure Loading, Rating and Posting Data****Loading Data :**

|                          |                  |                               |
|--------------------------|------------------|-------------------------------|
| Design Loading :         |                  | <b>5 MS 18 (HS 20)</b>        |
| Inventory Load, Design : | <b>32.6 mton</b> | <b>A LFD Assigned</b>         |
| Operating Load, Design : | <b>34.6 mton</b> | <b>A LFD Assigned</b>         |
| Posting :                |                  | <b>5 At/Above Legal Loads</b> |

**Rating Data :**

|                     | Operating   | Inventory | Posting |
|---------------------|-------------|-----------|---------|
| Truck 1 Type 3 :    |             |           |         |
| Truck 2 Type 3-S3 : |             |           |         |
| Truck 3 Type 3-3 :  | <b>48.6</b> |           |         |

**Structure, Roadway and Clearance Data****Structure Deck, Roadway and Span Data :**

Structure Length : **41.45 m**  
 Deck Area : **333.00 m sq**  
 Deck Roadway Width : **7.11 m**  
 Approach Roadway Width : **7.32 m**  
 Median Code, Description : **0 No median**

**Structure Vertical and Horizontal Clearance Data :**

Vertical Clearance Over the Structure : **99.99 m**  
 Reference Feature for Vertical Clearance : **H Hwy beneath struct**  
 Vertical Clearance Under the Structure : **5.71 m**  
 Reference Feature for Lateral Underclearance : **H Hwy beneath struct**  
 Minimum Lateral Under Clearance Right : **1.90 m**  
 Minimum Lateral Under Clearance Left : **0.50 m**

**Span Data****Main Span**

Number Spans : **3**  
 Material Type Code, Description : **5 Prestressed concrete**  
 Span Design Code, Description : **2 Stringer/Multi-beam or Girder Deck**

Deck Structure Type : **1 Concrete Cast-in-Place**  
 Deck Surfacing Type : **1 Monolithic concrete (concurrently placed with struct**  
 Deck Protection Type : **1 Epoxy Coated Reinforcing**  
 Deck Membrain Type : **0 None**

**Approach Span**

Number of Spans : **0**  
 Material Type Code, Description :  
 Span Design Code, Description :

**Structure Vertical and Horizontal Clearance Data Inventory Route :**

| Over / Under Direction Name | Inventory Route | South, West or Bi-directional Travel |          |            | North or East Travel |          |            |
|-----------------------------|-----------------|--------------------------------------|----------|------------|----------------------|----------|------------|
|                             |                 | Direction                            | Vertical | Horizontal | Direction            | Vertical | Horizontal |
| One Route Under             | U05225          | Both                                 | 5.71 m   | 9.14 m     | N/A                  |          |            |
| 14TH ST SW/BRIDGE ST        |                 |                                      |          |            |                      |          |            |
| Route On Structure          | I00315          | N/A                                  |          |            | East                 | 99.99 m  | 7.11 m     |
| I-315 EB OFF RAMP           |                 |                                      |          |            |                      |          |            |



# INITIAL ASSESSMENT FORM FOR STRUCTURE :

**I00315000+03423**

Continue

## Inspection Data

Sufficiency Rating : **96**

Structure Status : **Not Deficient**

Inspection Due Date : **16 June 2015**

(91) Inspection Frequency (months) : **48**

## NBI Inspection Data

(90) Date of Last Inspection : **16 June 2011**

Last Inspected By : **Charles Pepos - 107**

(90) Inspection Date :

Inspected By :

(58) Deck Rating : **7**

(68) Deck Geometry : **6**

(36A) Bridge Rail Rating : **1**

(62) Culvert Rating : **N**

(59) Superstructure Rating : **7**

(67) Structure Rating : **7**

(36B) Transition Rating : **1**

(61) Channel Rating : **N**

(60) Substructure Rating : **7**

(69) Under Clearance : **4**

(36C) Approach Rail Rating : **1**

(71) Waterway Adequacy : **N**

(72) App Rdwy Align : **7**

(41) Posting Status : **A**

(36D) End Rail Rating : **1**

(113) Scour Critical : **N**

Unrepaired Spalls : **0 m sq**

Deck Surfacing Depth : **0.00 in**

## Inspection Hours

Crew Hours for inspection : **2**

Snooper Required : **N**

Helper Hours : **0**

Snooper Hours for inspection : **0**

Special Crew Hours : **0**

Flagger Hours : **0**

Special Equipment Hours : **0**

| Inspection Work Candidates         |                     | Status          | Priority      | Effected<br>Structure<br>Unit | Scope of<br>Work         | Action            | Covered<br>Condition<br>States |
|------------------------------------|---------------------|-----------------|---------------|-------------------------------|--------------------------|-------------------|--------------------------------|
| Candidate ID                       | Date<br>Requested   |                 |               |                               |                          |                   |                                |
| <b>D31-FY2007-000143</b>           | <b>02 July 2007</b> | <b>Approved</b> | <b>Medium</b> | <b>M Main</b>                 | <b>313 Fixed Bearing</b> | <b>Rehab Elem</b> |                                |
| Clean and spot paint the bearings. |                     |                 |               |                               |                          |                   |                                |
| Approved. DRC                      |                     |                 |               |                               |                          |                   |                                |
|                                    |                     |                 |               |                               |                          |                   |                                |
|                                    |                     |                 |               |                               |                          |                   |                                |
|                                    |                     |                 |               |                               |                          |                   |                                |

Late Reason:

Inspection Date: 06/16/2011

# INITIAL ASSESSMENT FORM FOR STRUCTURE :

**I00315000+03423**

Continue

## Element Inspection Data

\*\*\*\*\* Span : Main-0 - -1 \*\*\*\*\*

| Element Description  |              |     |          |       |           |            |            |            |            |            |
|--|--------------|-----|----------|-------|-----------|------------|------------|------------|------------|------------|
| Smart Flag   | Scale Factor | Env | Quantity | Units | Insp Each | Pct Stat 1 | Pct Stat 2 | Pct Stat 3 | Pct Stat 4 | Pct Stat 5 |
| Element 26 - Conc Deck/Coatd Bars  |              |     |          |       |           |            |            |            |            |            |
|  | 1            | 3   | 333      | sq.m. | X         | 100        | 0          | 0          | 0          | 0          |
|  |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :  |              |     |          |       |           |            |            |            |            |            |
| 06/16/2011 - Transverse and mapping cracks over both Bents. Minor wear in the wheel paths from studded tire wear   |              |     |          |       |           |            |            |            |            | RZGB       |
| 05/31/2007 - Minor wear from studded tires. Transverse cracking over Bents 2 and 3 with the worse area at Bent 2. Not enough for a smart flag yet.                     |              |     |          |       |           |            |            |            |            | EZHZ       |
| 05/04/2005 - Some wear in the wheel paths. Transverse cracking over both of the Bents. (8.03 * 40.93 (brg to brg) = 328.67m NMS)                                       |              |     |          |       |           |            |            |            |            | EIFR       |
| 04/30/2003 - Deck has tight mapping cracks throughout the driving surface. Studded tire wear in the wheel paths with some exposed aggregate.                           |              |     |          |       |           |            |            |            |            | BPHZ       |
| 08/27/2001 - 8.03 * 41.45 = 332.8  |              |     |          |       |           |            |            |            |            | NHCO       |
| Slightly open cracks at the two bents. Numerous small, tight transverse &/or mapping cracks throughout the driving surface.  |              |     |          |       |           |            |            |            |            | KBGR       |
| 12/23/1998 - None  |              |     |          |       |           |            |            |            |            |            |
| Inspection Notes:  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
| Element 109 - P/S Conc Open Girder   |              |     |          |       |           |            |            |            |            |            |
|  | 1            | 1   | 166      | m.    |           | 100        | 0          | 0          | 0          |            |
|  |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :  |              |     |          |       |           |            |            |            |            |            |
| 06/16/2011 - Generally in Good condition. Small nick on bottom of G1S1 has not changed.  |              |     |          |       |           |            |            |            |            | RZGB       |
| 05/31/2007 - Small nick on the Left side of the Bottom flange of G1 in Span 1, but not a problem.  |              |     |          |       |           |            |            |            |            | EZHZ       |
| 05/04/2005 - Unchanged from previous reports. (4 * 40.93 = 163.72 NMS)   |              |     |          |       |           |            |            |            |            | EIFR       |
| 04/30/2003 - There is a small nick in the outside-left girder near Abutment 1. No problem with the nick or with any of the other girders noted.                        |              |     |          |       |           |            |            |            |            | BPHZ       |
| 08/27/2001 - Graffiti painted on girders near the Abutments.   |              |     |          |       |           |            |            |            |            | NHCO       |
| 12/23/1998 - None  |              |     |          |       |           |            |            |            |            | KBGR       |
| Inspection Notes:  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
| Element 205 - R/Conc Column Bents 2 and 3  |              |     |          |       |           |            |            |            |            |            |
|  | 1            | 1   | 4        | ea.   |           | 95         | 5          | 0          | 0          |            |
|  |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :  |              |     |          |       |           |            |            |            |            |            |
| 06/16/2011 - Generally in Good condition with some small area where small sacked patches are peeling off. Small spall on the Right column of Bent 3 from construction. |              |     |          |       |           |            |            |            |            | RZGB       |
| 05/31/2007 - Placed 5 percent into Condition State 2 as sacked patches are loose and peeling off of the columns. None of these areas are a problem.                    |              |     |          |       |           |            |            |            |            | EZHZ       |
| 05/04/2005 - Same on the small popouts.  |              |     |          |       |           |            |            |            |            | EIFR       |
| 04/30/2003 - No problems noted. A couple of small popouts in areas that were sacked during construction.   |              |     |          |       |           |            |            |            |            | BPHZ       |
| 08/27/2001 - None  |              |     |          |       |           |            |            |            |            | NHCO       |
| 12/23/1998 - _   |              |     |          |       |           |            |            |            |            | KBGR       |
| Inspection Notes:  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |

**INITIAL ASSESSMENT FORM FOR STRUCTURE :****I00315000+03423**

Continue

\*\*\*\*\* Span : Main-0 - -1 (cont.) \*\*\*\*\*

| Element Description  |              |     |          |       |           |            |            |            |            |            |
|--|--------------|-----|----------|-------|-----------|------------|------------|------------|------------|------------|
| Smart Flag   | Scale Factor | Env | Quantity | Units | Insp Each | Pct Stat 1 | Pct Stat 2 | Pct Stat 3 | Pct Stat 4 | Pct Stat 5 |
| Element 215 - R/Conc Abutment 1 and 4  |              |     |          |       |           |            |            |            |            |            |
|  | 1            | 1   | 20       | m.    |           | 95         | 5          | 0          | 0          |            |
|  |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :  |              |     |          |       |           |            |            |            |            |            |
| 06/16/2011 - Generally in Good condition. Small spall on construction joint of backwall to cap area of Abutment 1.   |              |     |          |       |           |            |            |            |            | RZGB       |
| 05/31/2007 - Minor spall at the cap to backwall construction joint at Abutment 1. Generally in Good condition.   |              |     |          |       |           |            |            |            |            | EZH Z      |
| 05/04/2005 - Minor and tight cracks in both of the backwalls. Erosion at the NW corners is worse. (Bent 1 = 9.62m Bent 4 = 10.67) = 20.29m   |              |     |          |       |           |            |            |            |            | EIFR       |
| 04/30/2003 - Abutments are in Good condition other than the erosion on the NW corner of the structure. Can't rate the element done due to erosion problems, so raised to all in State 1. |              |     |          |       |           |            |            |            |            | BPHZ       |
| 08/27/2001 - Erosion at the left wingwall of Abutment #1.  |              |     |          |       |           |            |            |            |            | NHCO       |
| 12/23/1998 - _   |              |     |          |       |           |            |            |            |            | KBGR       |
| Inspection Notes:  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
| Element 234 - R/Conc Cap Bents 2 and 3   |              |     |          |       |           |            |            |            |            |            |
|  | 1            | 1   | 16       | m.    |           | 100        | 0          | 0          | 0          |            |
|  |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :  |              |     |          |       |           |            |            |            |            |            |
| 06/16/2011 - Good condition.   |              |     |          |       |           |            |            |            |            | RZGB       |
| 05/31/2007 - Tight surface shrinkage cracks. Some loose sacked patches at the connections to the columns.  |              |     |          |       |           |            |            |            |            | EZH Z      |
| 05/04/2005 - No problems noted other than tight surface shrinkage cracks. (7.92 * 2 = 15.84m NMS)  |              |     |          |       |           |            |            |            |            | EIFR       |
| 04/30/2003 - Surface shrinkage cracking; no problems noted.  |              |     |          |       |           |            |            |            |            | BPHZ       |
| 08/27/2001 - 8.03 * 2 = 16.06m   |              |     |          |       |           |            |            |            |            | NHCO       |
| 12/23/1998 - None  |              |     |          |       |           |            |            |            |            | KBGR       |
| Inspection Notes:  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
| Element 313 - Fixed Bearing  |              |     |          |       |           |            |            |            |            |            |
|  | 1            | 1   | 16       | ea.   |           | 95         | 5          | 0          |            |            |
|  |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :  |              |     |          |       |           |            |            |            |            |            |
| 06/16/2011 - Dirt and bird debris on bearings of both Bents 2 and 3 with some spot rust.   |              |     |          |       |           |            |            |            |            | RZGB       |
| 05/31/2007 - Removed the Abutment bearings as they are not visible back to the anchor bolts. Bent bearings have spot rust and lots of debris on them.                                    |              |     |          |       |           |            |            |            |            | EZH Z      |
| 05/04/2005 - Same as last report. Bearings at Bents 2 and 3 are now covered by nesting pigeons. (4 8 8 4 = 24 NMS)   |              |     |          |       |           |            |            |            |            | EIFR       |
| 04/30/2003 - Rusty spots throughout the bearings. Pigeon debris on Bent 2 and 3's bearings. Left bearing at Abutment 1 is covered by dirt from erosion at the NW wingwall.               |              |     |          |       |           |            |            |            |            | BPHZ       |
| 08/27/2001 - Some debris and pigeon droppings.   |              |     |          |       |           |            |            |            |            | NHCO       |
| 12/23/1998 - _   |              |     |          |       |           |            |            |            |            | KBGR       |
| Inspection Notes:  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |

\* \* \* \* \* Span : Main-0 - -1 (cont.) \* \* \* \* \*

| Element Description               |              |     |          |       |           |            |            |            |            |            |
|-----------------------------------|--------------|-----|----------|-------|-----------|------------|------------|------------|------------|------------|
| Smart Flag                        | Scale Factor | Env | Quantity | Units | Insp Each | Pct Stat 1 | Pct Stat 2 | Pct Stat 3 | Pct Stat 4 | Pct Stat 5 |
| Element 331 - Conc Bridge Railing |              |     |          |       |           |            |            |            |            |            |
|                                   | 1            | 3   | 83       | m.    |           | 95         | 5          | 0          | 0          |            |
|                                   |              |     |          |       |           | %          | %          | %          | %          | %          |

#### Previous Inspection Notes :

06/16/2011 - Generally in Good condition with some tight shrinkage cracks. Small chips on the Right barrier in Span 3.

RZGB

05/31/2007 - Rest of the comments from prior reports still apply.

EZHZ

05/04/2005 - Same as last report and add some small nicks out of the top of the barrier in Span 3 - Right side. ( $40.93 * 2 = 81.86$  NMS)

04/30/2003 - Vertical cracking, mostly tight, throughout both barriers. A couple of small popouts in concrete surface of the barriers.

BPHZ

08/27/2001 -  $41.45 * 2 = 82.90\text{m}$

NHCO

12/23/1998 - None

KBGR

Inspection Notes:

| Element 358 - Deck Cracking SmFlag |   |   |   |     |   |   |     |   |   |   |
|------------------------------------|---|---|---|-----|---|---|-----|---|---|---|
| X                                  | 1 | 3 | 1 | ea. | X | 0 | 100 | 0 | 0 |   |
|                                    |   |   |   |     |   | % | %   | % | % | % |

Previous Inspection Notes :

06/16/2011 - Added as cracking seemed excessive over the Bents and some of the cracks are a little bigger, 0.5 to 0.7mm in size. Mostly to start a closer monitoring of the cracks.

RZGB

Inspection Notes:

### General Inspection Notes

06/16/2011 - NBI 72, roadway alignmnet, rated a "7" as deck is slightly narrower than the approach roadway and it is on a curve.

RZGB

05/31/2007 - NBI 59, superstructure, rated a "7" due to nick in G1S1 on the girders' bottom flange.

EZHZ

NBI 60, substructure, rated a "7" due to small delaminations in the patches on the columns and caps.

Erosion has been repaired on the Left side of Abutment 1.

05/04/2005 - Erosion at the NW corner of the structure is worse with some erosion to the fill under the wingwall. This could become a problem if flow gets under the concrete slope protection underneath the structure.

04/30/2003 - Same comments as 08-2001 report. Blocking on approach sections of the guardrail are loose and need to be tightened down and toe-nailed.

08/27/2001 - Guardrail underneath the structure to protect the bents. On the west(back on line) side it is barrier rail at the Bent with W-beam rail approach sections. End anchors do not meet current standards. Righth (east) side has impact attenuators for end anchors and do meet current standards.

NHCO

12/23/1998 - None

KBGR



## INITIAL ASSESSMENT FORM FOR STRUCTURE :

I00315001+00691

Location : GREAT FALLS Structure Name:

## General Location Data

District Code, Number, Location : 03 Dist 3 GREAT FALLS

County Code, Location : 013 CASCADE

Kind fo Hwy Code, Description : 1 1 Interstate Hwy

Str Owner Code, Description : 1 State Highway Agency

Intersecting Feature : BNSF RAILROAD

Structure on the State Highway System : ☒ Latitude : 47°29'16"Structure on the National Highway System : ☒ Longitude : 111°20'07"Str Meet or Exceed NBIS Bridge Length : ☒

MDT Maintenance Section : 31-01 Great Falls

Division Code, Location : 31 GREAT FALLS

City Code, Location : 32800 GREAT FALLS

Signed Route Number : 00315

Maintained by Code, Description : 1 State Highway Agency

Kilometer Post, Mile Post : 1.71 km 1.06

## Construction Data

Construction Project Number : IR 315-5(12)1F

Construction Station Number : 29+60.00

Construction Drawing Number : 1852

Construction Year : 1946

Reconstruction Year : 1996

## Traffic Data

Current ADT : 25,500 ADT Count Year : 2009 Percent Trucks : 2 %

## Structure Loading, Rating and Posting Data

## Loading Data :

|                          |           |                        |
|--------------------------|-----------|------------------------|
| Design Loading :         |           | 5 MS 18 (HS 20)        |
| Inventory Load, Design : | 32.6 mton | B ASD Assigned         |
| Operating Load, Design : | 52.6 mton | B ASD Assigned         |
| Posting :                |           | 5 At/Above Legal Loads |

## Rating Data :

|                     | Operating | Inventory | Posting |
|---------------------|-----------|-----------|---------|
| Truck 1 Type 3 :    |           |           |         |
| Truck 2 Type 3-S3 : |           |           |         |
| Truck 3 Type 3-3 :  | 120.29    |           |         |

## Structure, Roadway and Clearance Data

## Structure Deck, Roadway and Span Data :

Structure Length : 54.21 m  
Deck Area : 786.00 m sq  
Deck Roadway Width : 13.59 m  
Approach Roadway Width : 13.59 m  
Median Code, Description : 0 No median

## Structure Vertical and Horizontal Clearance Data :

Vertical Clearance Over the Structure : 99.99 m  
Reference Feature for Vertical Clearance : R Railroad beneath struc  
Vertical Clearance Under the Structure : 6.63 m  
Reference Feature for Lateral Underclearance : R Railroad beneath struc  
Minimum Lateral Under Clearance Right : 3.96 m  
Minimum Lateral Under Clearance Left : 0.00 m

## Span Data

## Main Span

Number Spans : 3  
Material Type Code, Description : 4 Steel continuous  
Span Design Code, Description : 2 Stringer/Multi-beam or Girder  
Deck

Deck Structure Type : 1 Concrete Cast-in-Place  
Deck Surfacing Type : 1 Monolithic concrete (concurrently placed with struct  
Deck Protection Type : 0 None  
Deck Membrain Type : 0 None

## Approach Span

Number of Spans : 0  
Material Type Code, Description :  
Span Design Code, Description :



## Structure Vertical and Horizontal Clearance Data Inventory Route :

| Over / Under Direction<br>Name | Inventory<br>Route | South, West or Bi-directional Travel |          |            | North or East Travel |          |            |
|--------------------------------|--------------------|--------------------------------------|----------|------------|----------------------|----------|------------|
|                                |                    | Direction                            | Vertical | Horizontal | Direction            | Vertical | Horizontal |
| Route On Structure             | I00315             | N/A                                  |          |            | East                 | 99.99 m  | 13.59 m    |
| I-315 - EXIT 0 - EB            |                    |                                      |          |            |                      |          |            |

**INITIAL ASSESSMENT FORM FOR STRUCTURE :****I00315001+00691**

Continue

**Inspection Data**Sufficiency Rating : **75.4**Structure Status : **Func Obs - Elg Rehab**Inspection Due Date : **28 June 2014**(91) Inspection Frequency (months) : **24****NBI Inspection Data**

(90) Date of Last Inspection : 28 June 2012

Last Inspected By : Charles Pepos - 107

(90) Inspection Date :

Inspected By :

(58) Deck Rating : 5

(68) Deck Geometry : 2

(36A) Bridge Rail Rating : 1

(62) Culvert Rating : N

(59) Superstructure Rating : 7

(67) Structure Rating : 7

(36B) Transition Rating : 1

(61) Channel Rating : N

(60) Substructure Rating : 7

(69) Under Clearance : 5

(36C) Approach Rail Rating : 1

(71) Waterway Adequacy : N

(72) App Rdwy Align : 8

(41) Posting Status : A

(36D) End Rail Rating : 1

(113) Scour Critical : N

Unrepaired Spalls : 0 m sq

Deck Surfacing Depth : 0.00 in

**Inspection Hours**

Crew Hours for inspection : 5

Snooper Required : Y

Helper Hours : 0

Snooper Hours for inspection : 3

Special Crew Hours : 0

Flagger Hours : 0

Special Equipment Hours : 0

| Inspection Work Candidates   |                   | Status   | Priority | Effected<br>Structure<br>Unit | Scope of<br>Work    | Action     | Covered<br>Condition<br>States |
|--|-------------------|----------|----------|-------------------------------|---------------------|------------|--------------------------------|
| Candidate ID   | Date<br>Requested |          |          |                               |                     |            |                                |
| D31-FY2004-000080  | 28 January 2004   | Approved | Medium   | All Spans                     | 215 R/Conc Abutment | Min Repair |                                |
| repair the erosion at the NE corner of the structure.<br>06-28-2012 Partially repaired with asphalt.<br>Approved. DRC  |                   |          |          |                               |                     |            |                                |
|  |                   |          |          |                               |                     |            |                                |
|  |                   |          |          |                               |                     |            |                                |
| D31-FY2005-000241  | 13 July 2005      | Approved | Low      | M Main                        | 234 R/Conc Cap      | Min Repair |                                |
| Fix/repair the small delaminated area on the Span 2 of Bent 2's cap.<br>06-28-2012 Also (1) on the Span 1 side of Bent 2's and on (1) on the Span 3 side of Bent 3's.<br>Approved. DRC |                   |          |          |                               |                     |            |                                |
|  |                   |          |          |                               |                     |            |                                |
|  |                   |          |          |                               |                     |            |                                |

Late Reason:

Inspection Date: 06/28/2012

**I00315001+00691**

Continue

**Element Inspection Data**

\*\*\*\*\* Span : Main-0 - \*\*\*\*\*

| Element Description  |              |     |          |       |           |            |            |            |            |            |
|--|--------------|-----|----------|-------|-----------|------------|------------|------------|------------|------------|
| Smart Flag   | Scale Factor | Env | Quantity | Units | Insp Each | Pct Stat 1 | Pct Stat 2 | Pct Stat 3 | Pct Stat 4 | Pct Stat 5 |
| Element 12 - Bare Concrete Deck  |              |     |          |       |           |            |            |            |            |            |
|  | 1            | 3   | 787      | sq.m. | X         | 0          | 0          | 100        | 0          | 0          |
|  |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :  |              |     |          |       |           |            |            |            |            |            |
| 06/28/2012 - Spalling and delaminations in all (3) Spans. Lots of cracking in all of the Spans. Poor skid resistance on the older portion of the deck.   |              |     |          |       |           |            |            |            |            | ZRGZ       |
| 05/07/2010 - No change from the previous inspections.  |              |     |          |       |           |            |            |            |            | HZMS       |
| 06/16/2008 - Delamiantions/spalls in all (3) spans, but mostly in the newer portion of the deck. About 1/3 of 1 lane is mostly delamiantated as found in a quick chain drag. Old deck surface has little skid resistance remaining.  |              |     |          |       |           |            |            |            |            | RZDZ       |
| 05/31/2007 - None  |              |     |          |       |           |            |            |            |            | EVHZ       |
| 05/04/2005 - Wear in the wheel paths. Some cracking throughout. Newer portion appears to be cracking over the rebar, transverse, on 6" to 8" centers. Placed in Condition State 2 as there are a couple of delaminated areas. Same on the low skid resistance.                                   |              |     |          |       |           |            |            |            |            | FZDZ       |
| 04/30/2003 - Minor areas of efflorescence on the underside of the deck. Tight transverse cracks throughout the deck; more evident over Bents 2 and 3. Wear in the wheel paths with exposed aggregate. Very low skid resistance.  |              |     |          |       |           |            |            |            |            | ZHEB       |
| 08/06/2001 - 54.25 * 14.50 = 786.63  |              |     |          |       |           |            |            |            |            | NHGN       |
| Studded tire wear in the wheel paths.  |              |     |          |       |           |            |            |            |            | UAIV       |
| 01/14/1999 - Small tight transverse cracks in deck surface. Minor efflorescence on underside of deck.  |              |     |          |       |           |            |            |            |            | YDNF       |
| 04/01/1996 - None  |              |     |          |       |           |            |            |            |            | REFI       |
| 02/01/1994 - None  |              |     |          |       |           |            |            |            |            |            |
| Inspection Notes:  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
| Element 107 - Paint Stl Opn Girder   |              |     |          |       |           |            |            |            |            |            |
|  | 1            | 1   | 380      | m.    |           | 85         | 10         | 5          | 0          | 0          |
|  |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :  |              |     |          |       |           |            |            |            |            |            |
| 06/28/2012 - Some fading of the paint on the newer girders and the Right side of the Left most older girder. Some rust, scale, and surface pitting of the older girders.   |              |     |          |       |           |            |            |            |            | ZRGZ       |
| 05/07/2010 - No change from the previous inspections.  |              |     |          |       |           |            |            |            |            | HZMS       |
| 06/16/2008 - Newer girders show minor fading of the coating system on the Outer-Right side of the Right most girder. Older portion of the structure's girders has some rusty spots, scale, and surface pitting; especially under open joints. Numerous broken welds on the attached blast plate. |              |     |          |       |           |            |            |            |            | RZDZ       |
| 05/31/2007 - None  |              |     |          |       |           |            |            |            |            | EVHZ       |
| 05/04/2005 - Rusty spots, scale, minor paint loss, and smoke on the lower flange and lower portions of the web area on the older girders. New girders have no problems noted as of now.  |              |     |          |       |           |            |            |            |            | FZDZ       |
| 04/30/2003 - Some spot rust on the original girders. Worse rust spots are under leaking joints. No paint on the back side of bolts used for connecting diaphragms to old girders and they are rusted. Some pack rust noted in the bottom flange area over both Bents.                            |              |     |          |       |           |            |            |            |            | ZHEB       |
| 08/06/2001 - 7 * 54.25 = 379.75m   |              |     |          |       |           |            |            |            |            | NHGN       |
| 01/14/1999 - Very minor rust on original painted steel beams.  |              |     |          |       |           |            |            |            |            | UAIV       |
| 04/01/1996 - None  |              |     |          |       |           |            |            |            |            | YDNF       |
| 02/01/1994 - None  |              |     |          |       |           |            |            |            |            | REFI       |
| Inspection Notes:  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |



**INITIAL ASSESSMENT FORM FOR STRUCTURE :****I00315001+00691**

Continue

\*\*\*\*\* Span : Main-0 - (cont.) \*\*\*\*\*

| Element Description  |              |     |          |       |           |            |            |            |            |            |
|--|--------------|-----|----------|-------|-----------|------------|------------|------------|------------|------------|
| Smart Flag   | Scale Factor | Env | Quantity | Units | Insp Each | Pct Stat 1 | Pct Stat 2 | Pct Stat 3 | Pct Stat 4 | Pct Stat 5 |
| Element 205 - R/Conc Column Bent 2 and 3   |              |     |          |       |           |            |            |            |            |            |
|  | 1            | 1   | 8        | ea.   |           | 90         | 5          | 5          | 0          |            |
|  |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :  |              |     |          |       |           |            |            |            |            |            |
| 06/28/2012 - (1) small delamination on Bent 3's - 2nd from the Left column. Spall on the Left column at Bent 2.                                |              |     |          |       |           |            |            |            |            | ZRGZ       |
| 05/07/2010 - No change from the previous inspections and in mostly Good condition.   |              |     |          |       |           |            |            |            |            | HZMS       |
| 06/16/2008 - Left column at Bent 2 has a small surface spall from exposed rebar chair; Condition State 2.                                      |              |     |          |       |           |            |            |            |            | RZDZ       |
| 05/31/2007 - None  |              |     |          |       |           |            |            |            |            | EVHZ       |
| 05/04/2005 - Minor and tight shrinkage cracks. Tight cracks at the cap to column construction joint.   |              |     |          |       |           |            |            |            |            | FZDZ       |
| 04/30/2003 - Some surface shrinkage cracks.  |              |     |          |       |           |            |            |            |            | ZHEB       |
| 08/06/2001 - None  |              |     |          |       |           |            |            |            |            | NHGN       |
| 01/14/1999 -   |              |     |          |       |           |            |            |            |            | UAIV       |
| 04/01/1996 - None  |              |     |          |       |           |            |            |            |            | YDNF       |
| 02/01/1994 - None  |              |     |          |       |           |            |            |            |            | REFI       |
| Inspection Notes:  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
| Element 215 - R/Conc Abutment 1 and 4  |              |     |          |       |           |            |            |            |            |            |
|  | 1            | 1   | 35       | m.    |           | 95         | 5          | 0          | 0          |            |
|  |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :  |              |     |          |       |           |            |            |            |            |            |
| 06/28/2012 - Tight cracks in both backwalls. The worse areas are on the older portion of the bridge. Spall on the Left wingwall of Abutment 1. |              |     |          |       |           |            |            |            |            | ZRGZ       |
| 05/07/2010 - No change from the previous inspections and in mostly Good condition.   |              |     |          |       |           |            |            |            |            | HZMS       |
| 06/16/2008 - Same on tight cracks. Left end of Abutment 1 has a small spalled area at the wingwall.  |              |     |          |       |           |            |            |            |            | RZDZ       |
| 05/31/2007 - None  |              |     |          |       |           |            |            |            |            | EVHZ       |
| 05/04/2005 - Both of the backwalls have cracks.  |              |     |          |       |           |            |            |            |            | FZDZ       |
| 04/30/2003 - Minor and tight cracks in areas where girder ends are embedded in the Abutment backwalls. Some erosion at the NE corner.          |              |     |          |       |           |            |            |            |            | ZHEB       |
| 08/06/2001 - $(14.50 * 2) + (4 * 1.60) = 35.40m$   |              |     |          |       |           |            |            |            |            | NHGN       |
| 01/14/1999 - None  |              |     |          |       |           |            |            |            |            | UAIV       |
| 04/01/1996 - None  |              |     |          |       |           |            |            |            |            | YDNF       |
| 02/01/1994 - None  |              |     |          |       |           |            |            |            |            | REFI       |
| Inspection Notes:  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |

# INITIAL ASSESSMENT FORM FOR STRUCTURE :

**I00315001+00691**

Continue

\*\*\*\*\* Span : Main-0 - (cont.) \*\*\*\*\*

| Element Description  |              |     |          |       |           |            |            |            |            |            |
|--|--------------|-----|----------|-------|-----------|------------|------------|------------|------------|------------|
| Smart Flag   | Scale Factor | Env | Quantity | Units | Insp Each | Pct Stat 1 | Pct Stat 2 | Pct Stat 3 | Pct Stat 4 | Pct Stat 5 |
| Element 234 - R/Conc Cap Bent 2 and 3  |              |     |          |       |           |            |            |            |            |            |
|  | 1            | 1   | 29       | m.    |           | 90         | 5          | 5          | 0          |            |
|  |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :  |              |     |          |       |           |            |            |            |            |            |
| 06/28/2012 - Bent 3's cap has a delaminated area under G2 on the Span 3 face and Bent 2's has a small delamination on the Span 2 face along with a small spalled area.         |              |     |          |       |           |            |            |            |            | ZRGZ       |
| 05/07/2010 - No change from the previous inspections and in mostly Good condition.   |              |     |          |       |           |            |            |            |            | HZMS       |
| 06/16/2008 - Small delaminated area on the Span 2 side of Bent 2's cap. Underside of the caps show some minor surface spalls from exposed and rusty rebar chair feet.          |              |     |          |       |           |            |            |            |            | RZDZ       |
| 05/31/2007 - None  |              |     |          |       |           |            |            |            |            | EVHZ       |
| 05/04/2005 - Same on the old to new construction joint. Small delaminated area on the Span 2 side of Bent 2's cap.   |              |     |          |       |           |            |            |            |            | FZDZ       |
| 04/30/2003 - Minor and tight cracks with some minor concrete popouts where old portion and newer portion of the caps are joined together.                                      |              |     |          |       |           |            |            |            |            | ZHEB       |
| 08/06/2001 - 2 * 14.50 = 29.00m  |              |     |          |       |           |            |            |            |            | NHGN       |
| 01/14/1999 - None  |              |     |          |       |           |            |            |            |            | UAIV       |
| 04/01/1996 - None  |              |     |          |       |           |            |            |            |            | YDNF       |
| 02/01/1994 - None  |              |     |          |       |           |            |            |            |            | REFI       |
| Inspection Notes:  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
| Element 301 - Pourable Joint Seal Bents 2 and 3  |              |     |          |       |           |            |            |            |            |            |
|  | 1            | 3   | 20       | m.    |           | 90         | 10         | 0          |            |            |
|  |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :  |              |     |          |       |           |            |            |            |            |            |
| 06/28/2012 - Joint steel in the older portion of the deck only. Steel is solid when tapped on. Delaminations and spalls along the edge of the steel. No sealant in the joints. |              |     |          |       |           |            |            |            |            | ZRGZ       |
| 05/07/2010 - No change from the previous inspections and in mostly Good condition.   |              |     |          |       |           |            |            |            |            | HZMS       |
| 06/16/2008 - Joints leak. Spalls along the steel guard angles. The steel sounds solid when tapped on.  |              |     |          |       |           |            |            |            |            | RZDZ       |
| 05/31/2007 - None  |              |     |          |       |           |            |            |            |            | EVHZ       |
| 05/04/2005 - 10.21 * 2 = 20.42m Double guard angle type joints in the older portions of the deck. When newer deck was added, there was no continuation of the joints.          |              |     |          |       |           |            |            |            |            | FZDZ       |
| Inspection Notes:  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
| Element 310 - Elastomeric Bearing New girders at Bent 2 and 3  |              |     |          |       |           |            |            |            |            |            |
|  | 1            | 1   | 4        | ea.   |           | 100        | 0          | 0          |            |            |
|  |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :  |              |     |          |       |           |            |            |            |            |            |
| 06/28/2012 - Rubber portion is Good. Spot rust on the steel portion of the bearings.   |              |     |          |       |           |            |            |            |            | ZRGZ       |
| 05/07/2010 - No change from the previous inspections and in Good condition.  |              |     |          |       |           |            |            |            |            | HZMS       |
| 06/16/2008 - Unchanged. Spot rust on the steel portions and bird debris starting to build up.  |              |     |          |       |           |            |            |            |            | RZDZ       |
| 05/31/2007 - None  |              |     |          |       |           |            |            |            |            | EVHZ       |
| 05/04/2005 - Spot rust on the steel portions of the bearings.  |              |     |          |       |           |            |            |            |            | FZDZ       |
| 04/30/2003 - Some minor spot rust forming on the steel portion of the bearings.  |              |     |          |       |           |            |            |            |            | ZHEB       |
| 08/06/2001 - Bent #2 & #3 under the new girders.   |              |     |          |       |           |            |            |            |            | NHGN       |
| Inspection Notes:  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |

**INITIAL ASSESSMENT FORM FOR STRUCTURE :****I00315001+00691**

Continue

\*\*\*\*\* Span : Main-0 - (cont.) \*\*\*\*\*

| Element Description  |              |     |          |       |           |            |            |            |            |            |
|--|--------------|-----|----------|-------|-----------|------------|------------|------------|------------|------------|
| Smart Flag   | Scale Factor | Env | Quantity | Units | Insp Each | Pct Stat 1 | Pct Stat 2 | Pct Stat 3 | Pct Stat 4 | Pct Stat 5 |
| Element 311 - Moveable Bearing Bent 2 and 3 under Older Girders  |              |     |          |       |           |            |            |            |            |            |
|  | 1            | 1   | 10       | ea.   |           | 90         | 10         | 0          |            |            |
|  |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :  |              |     |          |       |           |            |            |            |            |            |
| 06/28/2012 - Alignment was Good today. Some rust, paint loss, and debris.  |              |     |          |       |           |            |            |            |            | ZRGZ       |
| 05/07/2010 - No change from the previous inspections and in mostly Good condition.   |              |     |          |       |           |            |            |            |            | HZMS       |
| 06/16/2008 - Spot rust from leakage. Alignment is Good.  |              |     |          |       |           |            |            |            |            | RZDZ       |
| 05/31/2007 - None  |              |     |          |       |           |            |            |            |            | EVHZ       |
| 05/04/2005 - Some rusty spots and scale.   |              |     |          |       |           |            |            |            |            | FZDZ       |
| 04/30/2003 - Rusty spots as these joints are leaking some. Also dirt and pack rust between bottom of the rocker and bottom plate of the bearings.  |              |     |          |       |           |            |            |            |            | ZHEB       |
| 08/06/2001 - Bent #2 & #3 under the original girders. Some rust and pitting.   |              |     |          |       |           |            |            |            |            | NHGN       |
| 01/14/1999 - None  |              |     |          |       |           |            |            |            |            | UAIV       |
| 04/01/1996 - None  |              |     |          |       |           |            |            |            |            | YDNF       |
| 02/01/1994 - None  |              |     |          |       |           |            |            |            |            | REFI       |
| Inspection Notes:  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
| Element 331 - Conc Bridge Railing  |              |     |          |       |           |            |            |            |            |            |
|  | 1            | 3   | 108      | m.    |           | 95         | 5          | 0          | 0          |            |
|  |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :  |              |     |          |       |           |            |            |            |            |            |
| 06/28/2012 - Right barrier has a spalled section in Span 2. Retro-fitted barrier on the Left curb is in Good condition with some shrinkage cracks. |              |     |          |       |           |            |            |            |            | ZRGZ       |
| 05/07/2010 - No change from the previous inspections and in mostly Good condition.   |              |     |          |       |           |            |            |            |            | HZMS       |
| 06/16/2008 - Minor and tight surface shrinkage cracks. Left rail sets on top of older curb.  |              |     |          |       |           |            |            |            |            | RZDZ       |
| 05/31/2007 - None  |              |     |          |       |           |            |            |            |            | EVHZ       |
| 05/04/2005 - Same as previously reported.  |              |     |          |       |           |            |            |            |            | FZDZ       |
| 04/30/2003 - Vertical cracks throughout both rails. Some minor scrapes to rails and a few small popouts of the rail concrete.                      |              |     |          |       |           |            |            |            |            | ZHEB       |
| 08/06/2001 - 54.25 * 2 = 108.50m   |              |     |          |       |           |            |            |            |            | NHGN       |
| 01/14/1999 - None  |              |     |          |       |           |            |            |            |            | UAIV       |
| 04/01/1996 - None  |              |     |          |       |           |            |            |            |            | YDNF       |
| 02/01/1994 - None  |              |     |          |       |           |            |            |            |            | REFI       |
| Inspection Notes:  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |

**I00315001+00691**

**Continue**

\*\*\*\*\* Span : Main-0 - (cont.) \*\*\*\*\*

| Element Description                |              |     |          |       |           |            |            |            |            |            |
|------------------------------------|--------------|-----|----------|-------|-----------|------------|------------|------------|------------|------------|
| Smart Flag                         | Scale Factor | Env | Quantity | Units | Insp Each | Pct Stat 1 | Pct Stat 2 | Pct Stat 3 | Pct Stat 4 | Pct Stat 5 |
| Element 358 - Deck Cracking SmFlag |              |     |          |       |           |            |            |            |            |            |
| X                                  | 1            | 1   | 1        | ea.   | X         | 0          | 0          | 100        | 0          |            |
|                                    |              |     |          |       |           | %          | %          | %          | %          | %          |

Previous Inspection Notes :

06/28/2012 - The worse areas of cracking are showing lots of spalling and delaminated areas. ZRGZ

05/07/2010 - No change. HZMS

06/16/2008 - Many of the cracks are wider, 0.5 to 1.0mm, and are open. Some of the cracks have scaling along their edges.

05/31/2007 - None EVHZ

05/04/2005 - Add some cracking over the rebar in Span 2 to the previous reports. FZDZ

04/30/2003 - Tight transverse and mapping cracks throughout. Mostly on the older portion of the deck.

08/06/2001 - No change.

01/14/1999 - Small, tight tranverse cracking throughout the deck.

Inspection Notes:

### General Inspection Notes

06/28/2012 - Access is tough at this bridge due to erosion and fences. ZRGZ

05/07/2010 - None HZMS

06/16/2008 - Deck is getting worse. RZDZ

Some asphalt placed in the erosion at the NE corner of the bridge.

05/31/2007 - None EVHZ

05/04/2005 - NBI 58, deck, rated at a "6" due to delaminations and minor spalling.

04/30/2003 - NBI 60, substructure, rated at a "7" due to some cracking in the substructure concrete.

08/06/2001 - None NHG

01/14/1999 - None UAIV

04/01/1996 - Sufficiency Rating Calculation Accepted by ops\$u5963 at 3/11/97 10:45:05

Sufficiency Rating Calculation Accepted by ops\$u9004 at 2/19/97 14:15:35

02/01/1994 - REF1

08/01/1992 - Updated with tape 1994

01/01/1991 - Updated with tape 1992 NB92

03/01/1989 - Updated with tape 1991

04/01/1987 - Updated with tape 1989 NB89

09/01/1984 - Updated with tape 1986

[illegible]

|  |  |
|--|--|
|  |  |
|--|--|

|  |  |
|--|--|
|  |  |
|  |  |

|  |
|--|
|  |
|  |

**INITIAL ASSESSMENT FORM FOR STRUCTURE :****I00315001+00692**

Location : GREAT FALLS Structure Name:

**General Location Data**MDT Maintenance Section : **31-01 Great Falls**District Code, Number, Location : **03 Dist 3 GREAT FALLS**Division Code, Location : **31 GREAT FALLS**County Code, Location : **013 CASCADE**City Code, Location : **32800 GREAT FALLS**Kind fo Hwy Code, Description : **1 1 Interstate Hwy**Signed Route Number : **00315**Str Owner Code, Description : **1 State Highway Agency**Maintained by Code, Description : **1 State Highway Agency**Intersecting Feature : **BNSF RAILROAD**Kilometer Post, Mile Post : **1.71 km 1.06**Structure on the State Highway System : ☒ Latitude : **47°29'17"**Structure on the National Highway System : ☒ Longitude : **111°20'07"**Str Meet or Exceed NBIS Bridge Length : ☒**Construction Data**Construction Project Number : **IR 315-5(12)1F**Construction Station Number : **29+98.00**Construction Drawing Number : **6825**Construction Year : **1967**Reconstruction Year : **1996****Traffic Data**Current ADT : **25,500** ADT Count Year : **2009** Percent Trucks : **2 %****Structure Loading, Rating and Posting Data****Loading Data :**

|                          |                  |                               |
|--------------------------|------------------|-------------------------------|
| Design Loading :         |                  | <b>5 MS 18 (HS 20)</b>        |
| Inventory Load, Design : | <b>32.6 mton</b> | <b>B ASD Assigned</b>         |
| Operating Load, Design : | <b>33.5 mton</b> | <b>B ASD Assigned</b>         |
| Posting :                |                  | <b>5 At/Above Legal Loads</b> |

**Rating Data :**

|                     | Operating    | Inventory | Posting |
|---------------------|--------------|-----------|---------|
| Truck 1 Type 3 :    |              |           |         |
| Truck 2 Type 3-S3 : |              |           |         |
| Truck 3 Type 3-3 :  | <b>78.98</b> |           |         |

**Structure, Roadway and Clearance Data****Structure Deck, Roadway and Span Data :**

Structure Length : **63.40 m**  
 Deck Area : **767.00 m sq**  
 Deck Roadway Width : **11.18 m**  
 Approach Roadway Width : **11.18 m**  
 Median Code, Description : **0 No median**

**Structure Vertical and Horizontal Clearance Data :**

Vertical Clearance Over the Structure : **99.99 m**  
 Reference Feature for Vertical Clearance : **R Railroad beneath struc**  
 Vertical Clearance Under the Structure : **6.93 m**  
 Reference Feature for Lateral Underclearance : **R Railroad beneath struc**  
 Minimum Lateral Under Clearance Right : **3.96 m**  
 Minimum Lateral Under Clearance Left : **0.00 m**

**Span Data****Main Span**

Number Spans : **1**  
 Material Type Code, Description : **3 Steel**  
 Span Design Code, Description : **2 Stringer/Multi-beam or Girder Deck**

Deck Structure Type : **1 Concrete Cast-in-Place**  
 Deck Surfacing Type : **1 Monolithic concrete (concurrently placed with struct**  
 Deck Protection Type : **0 None**  
 Deck Membrain Type : **0 None**

**Approach Span**

Number of Spans : **4**  
 Material Type Code, Description : **5 Prestressed concrete**  
 Span Design Code, Description : **2 Stringer/Multi-beam or Girder**

**Structure Vertical and Horizontal Clearance Data Inventory Route :**

| Over / Under Direction<br>Name | Inventory<br>Route | South, West or Bi-directional Travel |          |            | North or East Travel |          |            |
|--------------------------------|--------------------|--------------------------------------|----------|------------|----------------------|----------|------------|
|                                |                    | Direction                            | Vertical | Horizontal | Direction            | Vertical | Horizontal |
| Route On Structure             | I00315             | West                                 | 99.99 m  | 11.18 m    | N/A                  |          |            |
| I-315 AT EXIT 0 - WB           |                    |                                      |          |            |                      |          |            |



I00315001+00692

Continue

**Inspection Data**Sufficiency Rating : **93.8**Structure Status : **Not Deficient**Inspection Due Date : **16 June 2015**(91) Inspection Frequency (months) : **24****NBI Inspection Data**

(90) Date of Last Inspection : 17 June 2013

Last Inspected By : Charles Pepos - 107

(90) Inspection Date :

Inspected By :

(58) Deck Rating : 5

(68) Deck Geometry : 5

(36A) Bridge Rail Rating : 1

(62) Culvert Rating : N

(59) Superstructure Rating : 7

(67) Structure Rating : 6

(36B) Transition Rating : 1

(61) Channel Rating : N

(60) Substructure Rating : 6

(69) Under Clearance : 5

(36C) Approach Rail Rating : 1

(71) Waterway Adequacy : N

(72) App Rdwy Align : 8

(41) Posting Status : A

(36D) End Rail Rating : 1

(113) Scour Critical : N

Unrepaired Spalls : 0 m sq

Deck Surfacing Depth : 0.00 in

**Inspection Hours**

Crew Hours for inspection : 4

Snooper Required : Y

Helper Hours : 0

Snooper Hours for inspection : 2

Special Crew Hours : 0

Flagger Hours : 0

Special Equipment Hours : 0

| Inspection Work Candidates  |                   | Status   | Priority | Effected<br>Structure<br>Unit | Scope of<br>Work         | Action            | Covered<br>Condition<br>States |
|---|-------------------|----------|----------|-------------------------------|--------------------------|-------------------|--------------------------------|
| Candidate ID  | Date<br>Requested |          |          |                               |                          |                   |                                |
| D31-FY2003-000437   | 27 June 2003      | Approved | High     | All Spans                     | 301 Pourable Joint Seal  | Min Repair        |                                |
| Seal leaking joints.  |                   |          |          |                               |                          |                   |                                |
| Approved. DRC   |                   |          |          |                               |                          |                   |                                |
| D31-FY2003-000436   | 27 June 2003      | Approved | Low      | A Approach                    | 12 Bare Concrete Deck    | Min Repair        |                                |
| Repair pot hole starting in the deck near centerline over Bent 4. |                   |          |          |                               |                          |                   |                                |
| 05/31/2007 Add repairs to the spalls and delamiantions also.      |                   |          |          |                               |                          |                   |                                |
| 06/15/2011 More starting to spall.                                |                   |          |          |                               |                          |                   |                                |
| Approved. DRC   |                   |          |          |                               |                          |                   |                                |
| D31-FY2004-000081   | 28 January 2004   | Approved | Low      | All Spans                     | Bridge                   | Spot Paint (flex) |                                |
| Clean pigeon debris from caps. Re-paint steel as needed.          |                   |          |          |                               |                          |                   |                                |
| 05/31/2007 Some done with during snooper inspection.              |                   |          |          |                               |                          |                   |                                |
| Approved. DRC   |                   |          |          |                               |                          |                   |                                |
| D31-FY2006-000003   | 18 October 2005   | Approved | Low      | A Approach                    | 109 P/S Conc Open Girder | Min Repair        |                                |
| Clean dirt/debris from along the Right girder in Span 5.          |                   |          |          |                               |                          |                   |                                |
| 06/15/2011 Some work has been done.                               |                   |          |          |                               |                          |                   |                                |
| Approved. DRC   |                   |          |          |                               |                          |                   |                                |

Late Reason:

Inspection Date: 06/17/2013

**I00315001+00692**

Continue

**Element Inspection Data**

\*\*\*\*\* Span : Main-0 - STEEL WF - SPAN 3 \*\*\*\*\*

| Element Description  |              |     |          |       |           |            |            |            |            |            |
|--|--------------|-----|----------|-------|-----------|------------|------------|------------|------------|------------|
| Smart Flag   | Scale Factor | Env | Quantity | Units | Insp Each | Pct Stat 1 | Pct Stat 2 | Pct Stat 3 | Pct Stat 4 | Pct Stat 5 |
| Element 12 - Bare Concrete Deck  |              |     |          |       |           |            |            |            |            |            |
|  | 1            | 3   | 190      | sq.m. | X         | 0          | 0          | 100        | 0          | 0          |
|  |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :  |              |     |          |       |           |            |            |            |            |            |
| 06/17/2013 - Cracking with delaminations and spalling in this Span. Some patching done, but the patches are starting to fail. RZEV   |              |     |          |       |           |            |            |            |            |            |
| 10-2013 deck sourvy found 7.2 percetn spalls/delaminations.  |              |     |          |       |           |            |            |            |            |            |
| 06/16/2011 - More of the delaminations are starting to spall and leaving potholes. Some patching has been done since the last inspection. RMGH   |              |     |          |       |           |            |            |            |            |            |
| 06/30/2009 - Wear in wheel paths to the aggregate. Poor skid resistance. Spalls throught span and estimate greater than 3 percent delamination. ZZDZ   |              |     |          |       |           |            |            |            |            |            |
| 05/31/2007 - Wear to the concrete surface. Left in Condition State 2 as estimated less than 2 percent of the surface showing spalls/distress. EZHZ   |              |     |          |       |           |            |            |            |            |            |
| Some asphalt patching done on the spalls, but blowing out again.   |              |     |          |       |           |            |            |            |            |            |
| 05/04/2005 - Tight mapping cracks in the deck surface. 1 m2 delamination and spall near centerline at Bent 4. Wear in the wheel paths from studded tires. (12.09 * 15.70 = 189.81) Nate. FZMK  |              |     |          |       |           |            |            |            |            |            |
| 04/30/2003 - Tight cracking throughout the deck. Studded tire wear in the wheel paths with exposed aggregate. There is a section of delamination and a pothole on the centerline near Bent 4, 1 sq m. ZZEB   |              |     |          |       |           |            |            |            |            |            |
| 08/06/2001 - 12.09 * 15.85 = 191.62 NHGO   |              |     |          |       |           |            |            |            |            |            |
| Some small, tight transverse cracking throughout. No brooming left for low skid resistance. Exposed aggregate surface in the wheel paths from studded tire wear.   |              |     |          |       |           |            |            |            |            |            |
| 01/14/1999 - None DCHF   |              |     |          |       |           |            |            |            |            |            |
| 04/01/1996 - None YDNF   |              |     |          |       |           |            |            |            |            |            |
| 02/01/1994 - None REFI   |              |     |          |       |           |            |            |            |            |            |
| Inspection Notes:  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
| Element 107 - Paint Stl Opn Girder   |              |     |          |       |           |            |            |            |            |            |
|  | 1            | 1   | 79       | m.    |           | 85         | 10         | 5          | 0          | 0          |
|  |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :  |              |     |          |       |           |            |            |            |            |            |
| 06/17/2013 - Rust blisters with minor surface pitting under the worst rust blisters. Girders are dirty and grimey where de-icer has sat on them. RZEV  |              |     |          |       |           |            |            |            |            |            |
| Faded paint and peeling paint in the rust blister areas where mositure can collect.  |              |     |          |       |           |            |            |            |            |            |
| 06/16/2011 - Rust, scale, and surface pitting to girders under areas that leak. Rust blisters on the lower flanges where water can collect. Paint is faded. RMGH   |              |     |          |       |           |            |            |            |            |            |
| 06/30/2009 - Same comments as past inspection and add rust blisters under areas that leak and minor surface pitting under the rust blisters. ZZDZ  |              |     |          |       |           |            |            |            |            |            |
| Some spot painting done during snooper inspection.   |              |     |          |       |           |            |            |            |            |            |
| 05/31/2007 - Areas on the ends of the girders under joints show the worse rusty spots and loss of paint system. Ends at Bent 3 show pitting and are rusty with paint system failure. The diaphragm vertical stiffener from the new girder, G1, to the older girder is welded solid across the top of the bottom flange; no problems observed and G2 has a hole where added diaphragm bracket was mis-drilled; photos. EZHZ |              |     |          |       |           |            |            |            |            |            |
| 05/04/2005 - Minor rust and paint loss. Mostly near the leaking joints and the original girders. (5 * 15.70 = 78.50) Nate. FZMK  |              |     |          |       |           |            |            |            |            |            |
| 04/30/2003 - Minor spot rust with some paint loss; especially under leaking joint areas and where there is pigeon debris. ZZEB   |              |     |          |       |           |            |            |            |            |            |
| 08/06/2001 - 5 * 15.85 = 79.25m No change from the last report. NHGO   |              |     |          |       |           |            |            |            |            |            |
| 01/14/1999 - Minor rust on the surface. DCHF   |              |     |          |       |           |            |            |            |            |            |
| 04/01/1996 - MINOR SURFACE RUST ON ORIGINAL BEAMS YDNF   |              |     |          |       |           |            |            |            |            |            |
| 02/01/1994 - None REFI   |              |     |          |       |           |            |            |            |            |            |
| Inspection Notes:  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |

# INITIAL ASSESSMENT FORM FOR STRUCTURE :

**I00315001+00692**

Continue

\*\*\*\*\* Span : Main-0 - STEEL WF - SPAN 3 (cont.) \*\*\*\*\*

| Element Description  |              |     |          |       |           |            |            |            |            |            |
|--|--------------|-----|----------|-------|-----------|------------|------------|------------|------------|------------|
| Smart Flag   | Scale Factor | Env | Quantity | Units | Insp Each | Pct Stat 1 | Pct Stat 2 | Pct Stat 3 | Pct Stat 4 | Pct Stat 5 |
| Element 205 - R/Conc Column Bents 3 and 4  |              |     |          |       |           |            |            |            |            |            |
|  | 1            | 1   | 6        | ea.   |           | 95         | 5          | 0          | 0          |            |
|  |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :  |              |     |          |       |           |            |            |            |            |            |
| 06/17/2013 - Some tight surface shrinkage cracks and a couple have small spalls on the corners from construction activity.   |              |     |          |       |           |            |            |            |            | RZEV       |
| 06/16/2011 - Generally in Good condition. Small spall on a couple of the columns.  |              |     |          |       |           |            |            |            |            | RMGH       |
| 06/30/2009 - Tight surface shrinkage cracks. Some staining of the concrete from leakage and bird debris.   |              |     |          |       |           |            |            |            |            | ZZDZ       |
| 05/31/2007 - Right column at Bent 3 has a small surface spall at a rebar chair foot. Tight surface shrinkage cracks noted.   |              |     |          |       |           |            |            |            |            | EZHZ       |
| 05/04/2005 - A couple of the columns have tight cracks at the connection area with the cap.  |              |     |          |       |           |            |            |            |            | FZMK       |
| 04/30/2003 - Surface shrinkage cracks.   |              |     |          |       |           |            |            |            |            | ZZEB       |
| 08/06/2001 - None  |              |     |          |       |           |            |            |            |            | NHGO       |
| 01/14/1999 - None  |              |     |          |       |           |            |            |            |            | DCHF       |
| 04/01/1996 - None  |              |     |          |       |           |            |            |            |            | YDNF       |
| 02/01/1994 - None  |              |     |          |       |           |            |            |            |            | REFI       |
| Inspection Notes:  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
| Element 234 - R/Conc Cap Bents 3 and 4   |              |     |          |       |           |            |            |            |            |            |
|  | 1            | 1   | 24       | m.    |           | 90         | 5          | 5          | 0          |            |
|  |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :  |              |     |          |       |           |            |            |            |            |            |
| 06/17/2013 - Small delamination on the Span 3 face of Bent 4's cap. Lots of staining from joint leakage. Small surface spalls in the underside of the cap from rebar chair feet.   |              |     |          |       |           |            |            |            |            | RZEV       |
| 06/16/2011 - Photo of delaminations on Bent 4's cap. Staining from leakage. Some tight shrinkage cracks. Small spall on the surface near the rebar chair feet.   |              |     |          |       |           |            |            |            |            | RMGH       |
| 06/30/2009 - 5 percent in stste 3 for small delaminationon bent 4 cap. Staining from bird debris and leakage on cap. Several small surface spalls near exposed reinforcing chair feet.                                   |              |     |          |       |           |            |            |            |            | ZZDZ       |
| 05/31/2007 - Same as past inspections and add minor surface spalls on the underside of the older portion of the caps from rebar chair feet. Bent 4's cap has (2) spalls/delaminated areas on the Span 4 edge at the top. |              |     |          |       |           |            |            |            |            | EZHZ       |
| 05/04/2005 - Tight surface shrinkage cracks. Construction joint between the new to old cap has some minor cracking with minor loose areas along the crack edge; very minor.  |              |     |          |       |           |            |            |            |            | FZMK       |
| 04/30/2003 - Tight surface shrinkage cracks. Staining of concrete due to leaking joints.   |              |     |          |       |           |            |            |            |            | ZZEB       |
| 08/06/2001 - 12.09 * 2 = 24.19m  |              |     |          |       |           |            |            |            |            | NHGO       |
| 01/14/1999 - None  |              |     |          |       |           |            |            |            |            | DCHF       |
| 04/01/1996 - None  |              |     |          |       |           |            |            |            |            | YDNF       |
| 02/01/1994 - None  |              |     |          |       |           |            |            |            |            | REFI       |
| Inspection Notes:  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |





# INITIAL ASSESSMENT FORM FOR STRUCTURE :

**I00315001+00692**

Continue

\*\*\*\*\* Span : Main-0 - STEEL WF - SPAN 3 (cont.) \*\*\*\*\*

| Element Description  |              |     |          |       |           |            |            |            |            |            |
|--|--------------|-----|----------|-------|-----------|------------|------------|------------|------------|------------|
| Smart Flag   | Scale Factor | Env | Quantity | Units | Insp Each | Pct Stat 1 | Pct Stat 2 | Pct Stat 3 | Pct Stat 4 | Pct Stat 5 |
| Element 301 - Pourable Joint Seal Bents 3 and 4  |              |     |          |       |           |            |            |            |            |            |
|  | 1            | 3   | 24       | m.    |           | 60         | 20         | 20         |            |            |
|  |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :  |              |     |          |       |           |            |            |            |            |            |
| 06/17/2013 - Sealant is pulling loose and/or is missing in some areas along the joint; photo. Spalling along the joint edges. Material that makes up the headers appears to be sound.          |              |     |          |       |           |            |            |            |            | RZEV       |
| 06/16/2011 - Loose and missing sealant. Header material of the joints is in Good condition. Deck spalls just off of the joint headers.   |              |     |          |       |           |            |            |            |            | RMGH       |
| 06/30/2009 - More small spalls along joint edges. Some sealant is loose with lakage evident at both bents.   |              |     |          |       |           |            |            |            |            | ZZDZ       |
| 05/31/2007 - Joint is sound except where gland is torn or missing. Minor spall along the edges of the joint over Bent 4.   |              |     |          |       |           |            |            |            |            | EZHZ       |
| 05/04/2005 - Spalls along both sides of the joint at Bent 4. Some areas where the sealant has failed and leaking is evident. Most of the sanding material is cleaned out in the traffic lanes. |              |     |          |       |           |            |            |            |            | FZMK       |
| 04/30/2003 - Both joints are leaking with the gland falling out. Concrete along the joints is mostly sound except near centerline of Bent 4 where there is some spalling.                      |              |     |          |       |           |            |            |            |            | ZZEB       |
| 08/06/2001 - 2 * 12.09 = 24.18m  |              |     |          |       |           |            |            |            |            | NHGO       |
| 01/14/1999 - None  |              |     |          |       |           |            |            |            |            | DCHF       |
| 04/01/1996 - None  |              |     |          |       |           |            |            |            |            | YDNF       |
| 02/01/1994 - None  |              |     |          |       |           |            |            |            |            | REFI       |
| Inspection Notes:  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
| Element 310 - Elastomeric Bearing Under New Girders  |              |     |          |       |           |            |            |            |            |            |
|  | 1            | 1   | 2        | ea.   |           | 95         | 5          | 0          |            |            |
|  |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :  |              |     |          |       |           |            |            |            |            |            |
| 06/17/2013 - Rubber portion of the bearings is in Good condition with some tight surface rust and faded paint on the steel portions.   |              |     |          |       |           |            |            |            |            | RZEV       |
| 06/16/2011 - Spot rust on the steel portions of the bearings. Rubber areas are Good.   |              |     |          |       |           |            |            |            |            | RMGH       |
| 06/30/2009 - Unchanged from prior reports. Some spot rust on steel portions with spot painting done during snooper inspection.   |              |     |          |       |           |            |            |            |            | ZZDZ       |
| 05/31/2007 - Minor spot rust and faded paint on the steel portions. A minor tear in the rubber of the bearing at Bent 3; see photo.  |              |     |          |       |           |            |            |            |            | EZHZ       |
| 05/04/2005 - Some spot rust and minor paint loss.  |              |     |          |       |           |            |            |            |            | FZMK       |
| 04/30/2003 - One slotted and one fixed(Bent 4). Some spot rust on steel portions of the bearings.  |              |     |          |       |           |            |            |            |            | ZZEB       |
| 08/06/2001 - Under the new girder; left most.  |              |     |          |       |           |            |            |            |            | NHGO       |
| 01/14/1999 - None  |              |     |          |       |           |            |            |            |            | DCHF       |
| 04/01/1996 - None  |              |     |          |       |           |            |            |            |            | YDNF       |
| 02/01/1994 - None  |              |     |          |       |           |            |            |            |            | REFI       |
| Inspection Notes:  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |



# INITIAL ASSESSMENT FORM FOR STRUCTURE :

**I00315001+00692**

Continue

\*\*\*\*\* Span : Main-0 - STEEL WF - SPAN 3 (cont.) \*\*\*\*\*

| Element Description  |              |     |          |       |           |            |            |            |            |            |
|--|--------------|-----|----------|-------|-----------|------------|------------|------------|------------|------------|
| Smart Flag   | Scale Factor | Env | Quantity | Units | Insp Each | Pct Stat 1 | Pct Stat 2 | Pct Stat 3 | Pct Stat 4 | Pct Stat 5 |
| Element 311 - Moveable Bearing Bent 3  |              |     |          |       |           |            |            |            |            |            |
|  | 1            | 3   | 4        | ea.   |           | 90         | 10         | 0          |            |            |
|  |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :  |              |     |          |       |           |            |            |            |            |            |
| 06/17/2013 - Bearing alignment was Good as mostly plumb; 70F. Staining from joint leakage with rust, scale, and paint loss also. |              |     |          |       |           |            |            |            |            | RZEV       |
| 06/16/2011 - Good alignment of the bearings. Some paint loss and debris at the bearings.   |              |     |          |       |           |            |            |            |            | RMGH       |
| 06/30/2009 - Some debris and spot rust. Alignment is good. Blew off and spot painted during snooper inspection.                  |              |     |          |       |           |            |            |            |            | ZZDZ       |
| 05/31/2007 - Alignment looks Good. Rust, debris, and staining. Blew off and spot overcoat painted.                               |              |     |          |       |           |            |            |            |            | EZHZ       |
| 05/04/2005 - Rusty spots, scale, and some debris at the bearings with minor paint loss.  |              |     |          |       |           |            |            |            |            | FZMK       |
| 04/30/2003 - Rusty spots with some debris around the bearings. Moved to Env. State 3 due to leaking joint.                       |              |     |          |       |           |            |            |            |            | ZZEB       |
| Inspection Notes:  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
| Element 313 - Fixed Bearing Bent 4   |              |     |          |       |           |            |            |            |            |            |
|  | 1            | 1   | 4        | ea.   |           | 90         | 10         | 0          |            |            |
|  |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :  |              |     |          |       |           |            |            |            |            |            |
| 06/17/2013 - Rust, scale, debris, peeling paint, and faded paint.  |              |     |          |       |           |            |            |            |            | RZEV       |
| 06/16/2011 - Spot rust, some debris, and scale on the bearings.  |              |     |          |       |           |            |            |            |            | RMGH       |
| 06/30/2009 - Rusty areas, dirt, debris, and scale on steel portions. Some spot painting done.                                    |              |     |          |       |           |            |            |            |            | ZZDZ       |
| 05/31/2007 - Unchanged with lots of new nests. Some areas blew off and spot overcoat painted.                                    |              |     |          |       |           |            |            |            |            | EZHZ       |
| 05/04/2005 - Spot rust, minor paint loss, and bird debris at the bearings.   |              |     |          |       |           |            |            |            |            | FZMK       |
| 04/30/2003 - Some rust and paint loss.   |              |     |          |       |           |            |            |            |            | ZZEB       |
| Inspection Notes:  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
| Element 331 - Conc Bridge Railing  |              |     |          |       |           |            |            |            |            |            |
|  | 1            | 3   | 31       | m.    |           | 95         | 5          | 0          | 0          |            |
|  |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :  |              |     |          |       |           |            |            |            |            |            |
| 06/17/2013 - Generally in Good condition. Left side has a small spall on its' backside. Random shrinkage cracks.                 |              |     |          |       |           |            |            |            |            | RZEV       |
| 06/16/2011 - Generally in Good condition with some random vertical cracking throughout.  |              |     |          |       |           |            |            |            |            | RMGH       |
| 06/30/2009 - Generally good condition. Some cracking between chamfered areas on both side of structure.                          |              |     |          |       |           |            |            |            |            | ZZDZ       |
| 05/31/2007 - Minor popouts and tight surface shrinkage cracks.   |              |     |          |       |           |            |            |            |            | EZHZ       |
| 05/04/2005 - No change from previous reports. (15.70 * 2 = 31.40) Nate.  |              |     |          |       |           |            |            |            |            | FZMK       |
| 04/30/2003 - Vertical cracks throughout both rails. Some minor popouts in the concrete of the rails.                             |              |     |          |       |           |            |            |            |            | ZZEB       |
| 08/06/2001 - 15.85 * 2 = 31.70m  |              |     |          |       |           |            |            |            |            | NHGO       |
| 01/14/1999 - None  |              |     |          |       |           |            |            |            |            | DCHF       |
| 04/01/1996 - None  |              |     |          |       |           |            |            |            |            | YDNF       |
| 02/01/1994 - None  |              |     |          |       |           |            |            |            |            | REFI       |
| Inspection Notes:  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |

**INITIAL ASSESSMENT FORM FOR STRUCTURE :****I00315001+00692**

Continue

\*\*\*\*\* Span : Main-0 - STEEL WF - SPAN 3 (cont.) \*\*\*\*\*

| Element Description  |              |     |          |       |           |            |            |            |            |            |
|--|--------------|-----|----------|-------|-----------|------------|------------|------------|------------|------------|
| Smart Flag   | Scale Factor | Env | Quantity | Units | Insp Each | Pct Stat 1 | Pct Stat 2 | Pct Stat 3 | Pct Stat 4 | Pct Stat 5 |
| Element 358 - Deck Cracking SmFlag   |              |     |          |       |           |            |            |            |            |            |
| X  | 1            | 3   | 1        | ea.   | X         | 0          | 0          | 100        | 0          |            |
|  |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :  |              |     |          |       |           |            |            |            |            |            |
| 06/17/2013 - Unchanged from previous report.   |              |     |          |       |           |            |            |            |            | RZEV       |
| 06/16/2011 - Numerous cracks in the delaminated areas with spalling at the wider cracks. |              |     |          |       |           |            |            |            |            | RMGH       |
| Inspection Notes:  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |

\*\*\*\*\* Span : Appr-1 - P/S CONC SPANS - 1,2,4,and 5 \*\*\*\*\*

| Element Description   |              |     |          |       |           |            |            |            |            |            |
|---|--------------|-----|----------|-------|-----------|------------|------------|------------|------------|------------|
| Smart Flag  | Scale Factor | Env | Quantity | Units | Insp Each | Pct Stat 1 | Pct Stat 2 | Pct Stat 3 | Pct Stat 4 | Pct Stat 5 |
| Element 12 - Bare Concrete Deck   |              |     |          |       |           |            |            |            |            |            |
|   | 1            | 3   | 569      | sq.m. | X         | 0          | 0          | 100        | 0          | 0          |
|   |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :   |              |     |          |       |           |            |            |            |            |            |
| 06/17/2013 - Mapping cracks, wear, delaminations, and spalling in some spots. Some exposed rebar in the deepest spalls.   |              |     |          |       |           |            |            |            |            | RZEV       |
| 06/16/2011 - Wear from studded tires. Some of the delaminated areas are stating to spall and need patching.   |              |     |          |       |           |            |            |            |            | RMGH       |
| 06/30/2009 - Wear in the wheel paths. Poor skid resistance. Small spalls and delaminations in all spans. Tight transverse cracking over unjointed bents. Estimate 3 percent delamination.                 |              |     |          |       |           |            |            |            |            | ZZDZ       |
| 05/31/2007 - Poor skid resistance. Studded tire wear with exposed aggregate look on the surface. Left in Condition State 2 as estimated at 2 percent or less distressed/delaminated areas.                |              |     |          |       |           |            |            |            |            | EZHZ       |
| 05/04/2005 - Tight mapping cracks throughout. Small delaminated area is starting to spall near Centerline of Bent 4. Very little skid resistance remains. (47.09 * 12.09 = 569.32) Nate.                  |              |     |          |       |           |            |            |            |            | FZMK       |
| 04/30/2003 - Tight cracking throughout the deck. Studded tire wear in the wheel paths with exposed aggregate. Very little skid resistance left. Small pothole and delamination near centerline at Bent 4. |              |     |          |       |           |            |            |            |            | ZZEB       |
| 08/06/2001 - 47.55 * 12.09 = 574.88   |              |     |          |       |           |            |            |            |            | NHGO       |
| Small & tight transverse cracking throughout. No broom marks left for poor skid resistance. Studded tire wear in the wheel paths.   |              |     |          |       |           |            |            |            |            |            |
| 01/14/1999 - Spans #1, 2, 4, & 5  |              |     |          |       |           |            |            |            |            | DCHF       |
| 04/01/1996 - _  |              |     |          |       |           |            |            |            |            | YDNF       |
| Inspection Notes:   |              |     |          |       |           |            |            |            |            |            |
|   |              |     |          |       |           |            |            |            |            |            |
|   |              |     |          |       |           |            |            |            |            |            |

**INITIAL ASSESSMENT FORM FOR STRUCTURE :****I00315001+00692**

Continue

\*\*\*\*\* Span : Appr-1 - P/S CONC SPANS - 1,2,4,and 5 (cont.) \*\*\*\*\*

| Element Description  |              |     |          |       |           |            |            |            |            |            |
|--|--------------|-----|----------|-------|-----------|------------|------------|------------|------------|------------|
| Smart Flag   | Scale Factor | Env | Quantity | Units | Insp Each | Pct Stat 1 | Pct Stat 2 | Pct Stat 3 | Pct Stat 4 | Pct Stat 5 |
| Element 109 - P/S Conc Open Girder   |              |     |          |       |           |            |            |            |            |            |
|  | 1            | 1   | 235      | m.    |           | 95         | 5          | 0          | 0          |            |
|  |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :  |              |     |          |       |           |            |            |            |            |            |
| 06/17/2013 - Generally in Good condition. Diagonal crack/spall on G2 and G3 at Bent 3 has not changed.   |              |     |          |       |           |            |            |            |            | RZEV       |
| 06/16/2011 - G2 at Bent 3 has a diagonal crack from the bearing and has not changed since the last inspection. Spall on G3 has also not changed.   |              |     |          |       |           |            |            |            |            | RMGH       |
| 06/30/2009 - Same comments as past inspections.  |              |     |          |       |           |            |            |            |            | ZZDZ       |
| 05/31/2007 - Unchanged and add that G2 bearing area at Bent 3 has a diagonal crack at 45 degrees in the direction of shear at the Span side of the sole plate; photo to Helena-D. Crumley. G3 at Bent 3 is spalled on the Span side behind the sole Plate; photos to Helena-D. Crumley.  |              |     |          |       |           |            |            |            |            | EZHZ       |
| 05/04/2005 - Minor and tight cracks on the ends of the girders near both Abutments; girders are embedded in the backwalls. 2nd girder from the Right in Span 1 has several small hits on its' lower flange with small areas of section loss; probably from construction activities when the structure was widened. No cracks visible in the hit areas and no exposed tendons. (47.09 * 5 = 235.45) |              |     |          |       |           |            |            |            |            | FZMK       |
| 04/30/2003 - Some minor cracking on the ends of the girders. Graffiti on girders near the Abutments.   |              |     |          |       |           |            |            |            |            | ZZEB       |
| 08/06/2001 - 47.55 * 5 = 237.75m   |              |     |          |       |           |            |            |            |            | NHGO       |
| 01/14/1999 - None  |              |     |          |       |           |            |            |            |            | DCHF       |
| 04/01/1996 - INCLUDES SPANS 1,2,4,5  |              |     |          |       |           |            |            |            |            | YDNF       |
| 02/01/1994 - None  |              |     |          |       |           |            |            |            |            | REFI       |
| Inspection Notes:  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
| Element 205 - R/Conc Column Bents 2 and 5  |              |     |          |       |           |            |            |            |            |            |
|  | 1            | 1   | 6        | ea.   |           | 95         | 5          | 0          | 0          |            |
|  |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :  |              |     |          |       |           |            |            |            |            |            |
| 06/17/2013 - Generally in Good condition. Some tight shrinkage cracks and some small spalls along the scrapes. Bent 2's middle column has a 6" x 6" spall on the back-Left corner.   |              |     |          |       |           |            |            |            |            | RZEV       |
| 06/16/2011 - Generally in Good condition. Same on small spall on center column at Bent 2.  |              |     |          |       |           |            |            |            |            | RMGH       |
| 06/30/2009 - Generally good condition. One small spall on center column at bent 2.   |              |     |          |       |           |            |            |            |            | ZZDZ       |
| 05/31/2007 - Same as past inspections and a couple of small surface spall from rebar chair feet.   |              |     |          |       |           |            |            |            |            | EZHZ       |
| 05/04/2005 - Tight surface shrinkage cracks on all of the columns. Some wider but still tight cracks at the cap to column construction joint area.   |              |     |          |       |           |            |            |            |            | FZMK       |
| 04/30/2003 - Tight surface shrinkage cracks.   |              |     |          |       |           |            |            |            |            | ZZEB       |
| 08/06/2001 - Bent #2 & 5.  |              |     |          |       |           |            |            |            |            | NHGO       |
| 01/14/1999 - None  |              |     |          |       |           |            |            |            |            | DCHF       |
| 04/01/1996 - _   |              |     |          |       |           |            |            |            |            | YDNF       |
| Inspection Notes:  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |



# INITIAL ASSESSMENT FORM FOR STRUCTURE :

**I00315001+00692**

Continue

\*\*\*\*\* Span : Appr-1 - P/S CONC SPANS - 1,2,4,and 5 (cont.) \*\*\*\*\*

| Element Description   |              |     |          |       |           |            |            |            |            |            |
|---|--------------|-----|----------|-------|-----------|------------|------------|------------|------------|------------|
| Smart Flag  | Scale Factor | Env | Quantity | Units | Insp Each | Pct Stat 1 | Pct Stat 2 | Pct Stat 3 | Pct Stat 4 | Pct Stat 5 |
| Element 215 - R/Conc Abutment 1 and 6   |              |     |          |       |           |            |            |            |            |            |
|   | 1            | 1   | 35       | m.    |           | 95         | 5          | 0          | 0          |            |
|   |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :   |              |     |          |       |           |            |            |            |            |            |
| 06/17/2013 - Generally in Good condition. Some small spalls at the backwall to cap connection area.   |              |     |          |       |           |            |            |            |            | RZEV       |
| 06/16/2011 - Same comments as the previous inspections.   |              |     |          |       |           |            |            |            |            | RMGH       |
| 06/30/2009 - Good condition. Small spalls along backwall/cap connection area. Tight cracking in both abutment caps.   |              |     |          |       |           |            |            |            |            | ZZDZ       |
| 05/31/2007 - Tight surface shrinkage cracks, but in generally Good condition.   |              |     |          |       |           |            |            |            |            | EZHZ       |
| 05/04/2005 - Both backwalls have tight cracks. Same on the erosion near the SE corner of Abutment 1.  |              |     |          |       |           |            |            |            |            | FZMK       |
| 04/30/2003 - Some minor and tight cracks in the backwalls. Very minor erosion near the SE corner that is allowing dirt/debris to get on the girder near the Abutment.   |              |     |          |       |           |            |            |            |            | ZZEB       |
| 08/06/2001 - $(12.09 * 2) + (2.60 * 4) = 34.58m$  |              |     |          |       |           |            |            |            |            | NHGO       |
| 01/14/1999 - None   |              |     |          |       |           |            |            |            |            | DCHF       |
| 04/01/1996 - None   |              |     |          |       |           |            |            |            |            | YDNF       |
| 02/01/1994 - None   |              |     |          |       |           |            |            |            |            | REFI       |
| Inspection Notes:   |              |     |          |       |           |            |            |            |            |            |
|   |              |     |          |       |           |            |            |            |            |            |
|   |              |     |          |       |           |            |            |            |            |            |
| Element 234 - R/Conc Cap Bents 2 and 5  |              |     |          |       |           |            |            |            |            |            |
|   | 1            | 1   | 24       | m.    |           | 90         | 5          | 5          | 0          |            |
|   |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :   |              |     |          |       |           |            |            |            |            |            |
| 06/17/2013 - Bird nests and debris on the tops of the caps. Small delamination on Bent 5's cap near the connections to the columns. Small surface spalls on the bottoms of the caps from rebar chair feet.            |              |     |          |       |           |            |            |            |            | RZEV       |
| 06/16/2011 - Unchanged and more bird debris on the caps.  |              |     |          |       |           |            |            |            |            | RMGH       |
| 06/30/2009 - 5 percent into state 3 for small delamination on bent 5 cap and along construction joints at columns. Several small surface spalls on exposed rusty rebar chair feet. Bird nests and debris on all caps. |              |     |          |       |           |            |            |            |            | ZZDZ       |
| 05/31/2007 - Minor delamination on the Span 5 side of Bent 5's cap. Also some minor surface spalls on the bottom side of the older portion of the cap from exposed rebar chair feet.                                  |              |     |          |       |           |            |            |            |            | EZHZ       |
| 05/04/2005 - Unchanged from the last reports.   |              |     |          |       |           |            |            |            |            | FZMK       |
| 04/30/2003 - Tight crack at the new to old connection in the caps. Surface shrinkage cracks throughout. Some delamination noted at Bent 5 on the Span 5 side of it.   |              |     |          |       |           |            |            |            |            | ZZEB       |
| 08/06/2001 - $12.09 * 2 = 24.18m$   |              |     |          |       |           |            |            |            |            | NHGO       |
| 01/14/1999 - _  |              |     |          |       |           |            |            |            |            | DCHF       |
| Inspection Notes:   |              |     |          |       |           |            |            |            |            |            |
|   |              |     |          |       |           |            |            |            |            |            |
|   |              |     |          |       |           |            |            |            |            |            |
| Element 310 - Elastomeric Bearing Bent 3 and 5 - Under Newer Girder   |              |     |          |       |           |            |            |            |            |            |
|   | 1            | 1   | 2        | ea.   |           | 95         | 5          | 0          |            |            |
|   |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :   |              |     |          |       |           |            |            |            |            |            |
| 06/17/2013 - Good condition. Rubber is Good. Spot rust on the steel portions of the bearings with faded paint.  |              |     |          |       |           |            |            |            |            | RZEV       |
| 06/16/2011 - Spot rust on the steel portions. Rubber portions are Good.   |              |     |          |       |           |            |            |            |            | RMGH       |
| 06/30/2009 - Spot rust and staining on steel portions. Small tear on pad is unchanged and not a problem.  |              |     |          |       |           |            |            |            |            | ZZDZ       |
| 05/31/2007 - Spot rust on the steel portions. Minor tear on the outer edge of the pads as noted in last snooper inspection, but not a problem. Tears are minor and have not gotten any worse.                         |              |     |          |       |           |            |            |            |            | EZHZ       |
| 05/04/2005 - Minor rust and paint loss with minor tears starting on a couple of the elastomeric pads. Lots of pigeon debris around them also.   |              |     |          |       |           |            |            |            |            | FZMK       |
| 04/30/2003 - Some rust and pitting with minor paint loss.   |              |     |          |       |           |            |            |            |            | ZZEB       |
| Inspection Notes:   |              |     |          |       |           |            |            |            |            |            |
|   |              |     |          |       |           |            |            |            |            |            |
|   |              |     |          |       |           |            |            |            |            |            |

**INITIAL ASSESSMENT FORM FOR STRUCTURE :****I00315001+00692**

Continue

\*\*\*\*\* Span : Appr-1 - P/S CONC SPANS - 1,2,4,and 5 (cont.) \*\*\*\*\*

| Element Description  |              |     |          |       |           |            |            |            |            |            |
|--|--------------|-----|----------|-------|-----------|------------|------------|------------|------------|------------|
| Smart Flag   | Scale Factor | Env | Quantity | Units | Insp Each | Pct Stat 1 | Pct Stat 2 | Pct Stat 3 | Pct Stat 4 | Pct Stat 5 |
| Element 313 - Fixed Bearing  |              |     |          |       |           |            |            |            |            |            |
|  | 1            | 1   | 38       | ea.   |           | 90         | 10         | 0          |            |            |
|  |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :  |              |     |          |       |           |            |            |            |            |            |
| 06/17/2013 - Rust, scale, debris, and paint loss.  |              |     |          |       |           |            |            |            |            | RZEV       |
| 06/16/2011 - Rust, paint loss, scale, and debris.  |              |     |          |       |           |            |            |            |            | RMGH       |
| 06/30/2009 - Spot rust, paint fade, and some debris. The worst paint loss is on abutment bearings.   |              |     |          |       |           |            |            |            |            | ZZDZ       |
| 05/31/2007 - Spot rust, paint loss, and pigeon debris on the bearings. Left Abutment bearings in the quantity as (1) anchor bolt per bearing is visible. Blown off and spot overcoat painted if they were dry. |              |     |          |       |           |            |            |            |            | EZHZ       |
| 05/04/2005 - Minor rust, paint loss, and pigeon debris.  |              |     |          |       |           |            |            |            |            | FZMK       |
| 04/30/2003 - Spot rust on the bearings. Some debris from birds, etc.   |              |     |          |       |           |            |            |            |            | ZZEB       |
| 08/06/2001 - Minor rust and pitting.   |              |     |          |       |           |            |            |            |            | NHGO       |
| 01/14/1999 - None  |              |     |          |       |           |            |            |            |            | DCHF       |
| 04/01/1996 - _   |              |     |          |       |           |            |            |            |            | YDNF       |
| Inspection Notes:  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
| Element 331 - Conc Bridge Railing  |              |     |          |       |           |            |            |            |            |            |
|  | 1            | 3   | 94       | m.    |           | 95         | 5          | 0          | 0          |            |
|  |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :  |              |     |          |       |           |            |            |            |            |            |
| 06/17/2013 - Generally in Good condition. Small spalls on the backside of the barrier at bolt-ups to the W-Beam. Random shrinkage cracking.  |              |     |          |       |           |            |            |            |            | RZEV       |
| 06/16/2011 - Generally in Good condition. Random vertical cracks throughout.   |              |     |          |       |           |            |            |            |            | RMGH       |
| 06/30/2009 - Tight surface shrinkage cracks throughout. Small surface popouts and vertical cracking in all spans. Generally good condition.  |              |     |          |       |           |            |            |            |            | ZZDZ       |
| 05/31/2007 - Minor popouts and tight shrinkage cracks.   |              |     |          |       |           |            |            |            |            | EZHZ       |
| 05/04/2005 - Same as previous reports. (47.09 * 2 = 94.18) Nate.   |              |     |          |       |           |            |            |            |            | FZMK       |
| 04/30/2003 - Vertical cracks throughout both rails with some minor concrete popouts.   |              |     |          |       |           |            |            |            |            | ZZEB       |
| 08/06/2001 - 47.55 * 2 = 95.10m  |              |     |          |       |           |            |            |            |            | NHGO       |
| 01/14/1999 - None  |              |     |          |       |           |            |            |            |            | DCHF       |
| 04/01/1996 - _   |              |     |          |       |           |            |            |            |            | YDNF       |
| Inspection Notes:  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |

**I00315001+00692**

**Continue**

## General Inspection Notes

06/17/2013 - End shoes at East Abutment, 6, are lapped against traffic flow.

RZEV

Homeless person living under Span 5. Wasn't happy about the intrusion during the inspection.

06/16/2011 - End shoes on the W-Beam at the bridge ends are lapped against traffic on the East end of the structure.

RMGH

Homeless household along with a fire pit near Abutment 6.

06/30/2009 - NBI 58, deck, rated at "5" due to increasing delaminations and spalling in deck surface.

ZZDZ

W-beam end shoes at abutment 6 are lapped against traffic flow.

05/31/2007 - NBI 59, superstructure, rated a "6" due to rust, scale, and minor pitting of the steel girders in the main span.

EZHZ

Areas under the joints were very wet from overnight rain and could not be cleaned and overcoat painted very well.

05/04/2005 - NBI 58, deck, rated at a "6" due to delamination, minor potholes, and wear to the surface.

FZMK

NBI 60, substructure, rated at a "7" due to minor cracking at the construction joints and small popouts in the bottoms of the caps from exposed rebar chairs.

04/30/2003 - None

ZZEB

00/00/0004 N

08/06/2001 - None

NHGO

01/14/1999 - None

DCHF

01/14/1999 None

04/01/1996 - Sufficiency Rating Calculation Accepted by ops\$u5963 at 3/11/96 14:15:35  
Sufficiency Rating Calculation Accepted by ops\$u9004 at 2/19/97 14:15:35

02/01/1994 -

08/01/1992 - Updated with tape 1994

01/01/1991 - Updated with tape 1992

03/01/1989 - Updated with tape 1991

04/01/1987 - Updated with tape 1989

09/01/1984 - Updated with tape 1986



## INITIAL ASSESSMENT FORM FOR STRUCTURE :

I00315001+00693

Location : GREAT FALLS Structure Name:

## General Location Data

MDT Maintenance Section : 31-01 Great Falls

District Code, Number, Location : 03 Dist 3 GREAT FALLS

Division Code, Location : 31 GREAT FALLS

County Code, Location : 013 CASCADE

City Code, Location : 00000 RURAL AREA

Kind fo Hwy Code, Description : 8 8 Other (incl toll rds)

Signed Route Number : 00315

Str Owner Code, Description : 1 State Highway Agency

Maintained by Code, Description : 1 State Highway Agency

Intersecting Feature : BNSF RAILROAD

Kilometer Post, Mile Post : 1.71 km 1.06

Structure on the State Highway System : ☐ Latitude : 47°29'18"Structure on the National Highway System : ☐ Longitude : 111°20'06"Str Meet or Exceed NBIS Bridge Length : ☒

## Construction Data

Construction Project Number : IR 315-5(12)1F

Construction Station Number : 6+55.00

Construction Drawing Number : 15924

Construction Year : 1996

Reconstruction Year :

## Traffic Data

Current ADT : 25,500 ADT Count Year : 2009 Percent Trucks : 2 %

## Structure Loading, Rating and Posting Data

## Loading Data :

|                          |           |                        |
|--------------------------|-----------|------------------------|
| Design Loading :         |           | 5 MS 18 (HS 20)        |
| Inventory Load, Design : | 32.6 mton | A LFD Assigned         |
| Operating Load, Design : | 32.6 mton | A LFD Assigned         |
| Posting :                |           | 5 At/Above Legal Loads |

## Rating Data :

|                     | Operating | Inventory | Posting |
|---------------------|-----------|-----------|---------|
| Truck 1 Type 3 :    |           |           |         |
| Truck 2 Type 3-S3 : |           |           |         |
| Truck 3 Type 3-3 :  | 48.6      |           |         |

## Structure, Roadway and Clearance Data

## Structure Deck, Roadway and Span Data :

Structure Length : 56.69 m  
 Deck Area : 456.00 m sq  
 Deck Roadway Width : 7.11 m  
 Approach Roadway Width : 7.20 m  
 Median Code, Description : 0 No median

## Structure Vertical and Horizontal Clearance Data :

Vertical Clearance Over the Structure : 99.99 m  
 Reference Feature for Vertical Clearance : R Railroad beneath struc  
 Vertical Clearance Under the Structure : 6.98 m  
 Reference Feature for Lateral Underclearance : R Railroad beneath struc  
 Minimum Lateral Under Clearance Right : 1.70 m  
 Minimum Lateral Under Clearance Left : 0.00 m

## Span Data

## Main Span

Number Spans : 5  
 Material Type Code, Description : 5 Prestressed concrete  
 Span Design Code, Description : 2 Stringer/Multi-beam or Girder Deck

Deck Structure Type : 1 Concrete Cast-in-Place  
 Deck Surfacing Type : 1 Monolithic concrete (concurrently placed with struct  
 Deck Protection Type : 1 Epoxy Coated Reinforcing  
 Deck Membrain Type : 0 None

## Approach Span

Number of Spans : 0  
 Material Type Code, Description :  
 Span Design Code, Description :



## Structure Vertical and Horizontal Clearance Data Inventory Route :

| Over / Under Direction Name | Inventory Route | South, West or Bi-directional Travel |          |            | North or East Travel |          |            |
|-----------------------------|-----------------|--------------------------------------|----------|------------|----------------------|----------|------------|
|                             |                 | Direction                            | Vertical | Horizontal | Direction            | Vertical | Horizontal |
| Route On Structure          | I00315          | West                                 | 99.99 m  | 7.11 m     | N/A                  |          |            |
| -315 AT EXIT 0-WB OFF RAM   |                 |                                      |          |            |                      |          |            |



# INITIAL ASSESSMENT FORM FOR STRUCTURE :

**I00315001+00693**

Continue

## Inspection Data

Sufficiency Rating : **94**

Structure Status : **Functionally Obsolete**

Inspection Due Date : **16 June 2015**

(91) Inspection Frequency (months) : **48**

## NBI Inspection Data

(90) Date of Last Inspection : **16 June 2011**

Last Inspected By : **Charles Pepos - 107**

(90) Inspection Date :

Inspected By :

(58) Deck Rating : **7**

(68) Deck Geometry : **6**

(36A) Bridge Rail Rating : **1**

(62) Culvert Rating : **N**

(59) Superstructure Rating : **8**

(67) Structure Rating : **7**

(36B) Transition Rating : **1**

(61) Channel Rating : **N**

(60) Substructure Rating : **7**

(69) Under Clearance : **3**

(36C) Approach Rail Rating : **1**

(71) Waterway Adequacy : **N**

(72) App Rdwy Align : **7**

(41) Posting Status : **A**

(36D) End Rail Rating : **1**

(113) Scour Critical : **N**

Unrepaired Spalls : **0 m sq**

Deck Surfacing Depth : **0.00 in**

## Inspection Hours

Crew Hours for inspection : **2**

Snooper Required :

Helper Hours : **0**

Snooper Hours for inspection : **0**

Special Crew Hours : **0**

Flagger Hours : **0**

Special Equipment Hours : **0**

| Inspection Work Candidates  |                    | Status          | Priority    | Effected<br>Structure<br>Unit | Scope of<br>Work         | Action     | Covered<br>Condition<br>States |          |          |          |          |
|---|--------------------|-----------------|-------------|-------------------------------|--------------------------|------------|--------------------------------|----------|----------|----------|----------|
| Candidate ID  | Date<br>Requested  |                 |             |                               |                          |            |                                |          |          |          |          |
| <b>D31-FY2003-000401</b>  | <b>09 May 2003</b> | <b>Approved</b> | <b>High</b> | M Main                        | 300 Strip Seal Exp Joint | Min Repair | <b>X</b>                       | <b>X</b> | <b>X</b> | <b>X</b> | <b>X</b> |
| Clean dirt and debris out of the joint at Abutment 1.<br>06/16/2011 Full of sanding material today. |                    |                 |             |                               |                          |            |                                |          |          |          |          |
| Approved. DRC   |                    |                 |             |                               |                          |            |                                |          |          |          |          |
|   |                    |                 |             |                               |                          |            |                                |          |          |          |          |
|   |                    |                 |             |                               |                          |            |                                |          |          |          |          |
|   |                    |                 |             |                               |                          |            |                                |          |          |          |          |

Late Reason:

Inspection Date: 06/16/2011

# INITIAL ASSESSMENT FORM FOR STRUCTURE :

**I00315001+00693**

Continue

## Element Inspection Data

\*\*\*\*\* Span : Main-0 - Spans 1,2,3,4,&amp;5 \*\*\*\*\*

| Element Description  |              |     |          |       |           |            |            |            |            |            |
|--|--------------|-----|----------|-------|-----------|------------|------------|------------|------------|------------|
| Smart Flag   | Scale Factor | Env | Quantity | Units | Insp Each | Pct Stat 1 | Pct Stat 2 | Pct Stat 3 | Pct Stat 4 | Pct Stat 5 |
| Element 26 - Conc Deck/Coatd Bars  |              |     |          |       |           |            |            |            |            |            |
|  | 1            | 3   | 456      | sq.m. | X         | 100        | 0          | 0          | 0          | 0          |
|  |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :  |              |     |          |       |           |            |            |            |            |            |
| 06/16/2011 - Wear in the wheel paths from studded tires. Small and shallow surface spalls in the concrete past the edge of the joint steel.                            |              |     |          |       |           |            |            |            |            | RZGM       |
| 05/31/2007 - Minor studded tire wear. Good skid resistance. Wider cracks over the Bents; 0.5mm   |              |     |          |       |           |            |            |            |            | EZH Z      |
| 05/04/2005 - Studded tire wear in the wheel paths. Small loose concrete along portions of the joint at Abutment 1. Wider cracks over all of the Bents.                 |              |     |          |       |           |            |            |            |            | EZFQ       |
| 04/30/2003 - Same comments as previous report and add studded tire wear in the wheel paths with exposed aggregate.   |              |     |          |       |           |            |            |            |            | BDHZ       |
| 08/06/2001 - Transverse cracks at all (4) bents. Transverse cracks, mostly small & tight, in the west half with some minor efflorescence underneath.                   |              |     |          |       |           |            |            |            |            | NHGO       |
| 12/23/1998 - 56.69 * 8.05 = 456.35   |              |     |          |       |           |            |            |            |            | AHBS       |
| Inspection Notes:  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
| Element 109 - P/S Conc Open Girder   |              |     |          |       |           |            |            |            |            |            |
|  | 1            | 1   | 227      | m.    |           | 100        | 0          | 0          | 0          |            |
|  |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :  |              |     |          |       |           |            |            |            |            |            |
| 06/16/2011 - Good condition.   |              |     |          |       |           |            |            |            |            | RZGM       |
| 05/31/2007 - No problems observed.   |              |     |          |       |           |            |            |            |            | EZH Z      |
| 05/04/2005 - No problems noted. (55.40 * 4 = 221.60 NMS)   |              |     |          |       |           |            |            |            |            | EZFQ       |
| 04/30/2003 - No problems noted. Some graffiti on girders near the Abutments.   |              |     |          |       |           |            |            |            |            | BDHZ       |
| 08/06/2001 - None  |              |     |          |       |           |            |            |            |            | NHGO       |
| 12/23/1998 - 56.69 * 4 = 226.76m   |              |     |          |       |           |            |            |            |            | AHBS       |
| Inspection Notes:  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
| Element 205 - R/Conc Column Bents 2, 3, 4, and 5   |              |     |          |       |           |            |            |            |            |            |
|  | 1            | 1   | 8        | ea.   |           | 95         | 5          | 0          | 0          |            |
|  |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :  |              |     |          |       |           |            |            |            |            |            |
| 06/16/2011 - One small spall on the Left column at Bent 3 for Condition State 2. Several peeling sack patches at the construction joints.                              |              |     |          |       |           |            |            |            |            | RZGM       |
| 05/31/2007 - Tight surface shrinkage cracks. Placed 5 percent into Condition State 2 as sacked patches are delaminated or peeling where installed. None are a problem. |              |     |          |       |           |            |            |            |            | EZH Z      |
| 05/04/2005 - Minor surface shrinkage cracks.   |              |     |          |       |           |            |            |            |            | EZFQ       |
| 04/30/2003 - Minor surface shrinkage cracks. No problems noted.  |              |     |          |       |           |            |            |            |            | BDHZ       |
| 08/06/2001 - None  |              |     |          |       |           |            |            |            |            | NHGO       |
| 12/23/1998 - None  |              |     |          |       |           |            |            |            |            | AHBS       |
| Inspection Notes:  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |

**INITIAL ASSESSMENT FORM FOR STRUCTURE :****I00315001+00693**

Continue

\*\*\*\*\* Span : Main-0 - Spans 1,2,3,4,&amp;5 (cont.) \*\*\*\*\*

| Element Description  |              |     |          |       |           |            |            |            |            |            |
|--|--------------|-----|----------|-------|-----------|------------|------------|------------|------------|------------|
| Smart Flag   | Scale Factor | Env | Quantity | Units | Insp Each | Pct Stat 1 | Pct Stat 2 | Pct Stat 3 | Pct Stat 4 | Pct Stat 5 |
| Element 215 - R/Conc Abutment 1 and 6  |              |     |          |       |           |            |            |            |            |            |
|  | 1            | 1   | 24       | m.    |           | 95         | 5          | 0          | 0          |            |
|  |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :  |              |     |          |       |           |            |            |            |            |            |
| 06/16/2011 - Generally in Good condition. Some tight cracking in both Backwalls and one small spall on Abutment 1's backwall.  |              |     |          |       |           |            |            |            |            | RZGM       |
| 05/31/2007 - Same as prior inspection reports.   |              |     |          |       |           |            |            |            |            | EZHZ       |
| 05/04/2005 - Tight cracks in both of the backwalls. Worse crack is on the Right end of Abutment 1. Minor erosion and mostly on the Right side of Abutment 6.   |              |     |          |       |           |            |            |            |            | EZFQ       |
| 04/30/2003 - Some tight cracks in both Abutment backwalls. Still some minor erosion at the wingwalls.  |              |     |          |       |           |            |            |            |            | BDHZ       |
| 08/06/2001 - No change from the last report.   |              |     |          |       |           |            |            |            |            | NHGO       |
| 12/23/1998 - $11.58 + 12.34 = 23.92\text{m}$   |              |     |          |       |           |            |            |            |            | AHBS       |
| Some erosion around three(3) of the wingwalls.   |              |     |          |       |           |            |            |            |            |            |
| Inspection Notes:  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
| Element 234 - R/Conc Cap Bents 2, 3, 4, and 5  |              |     |          |       |           |            |            |            |            |            |
|  | 1            | 1   | 37       | m.    |           | 95         | 5          | 0          | 0          |            |
|  |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :  |              |     |          |       |           |            |            |            |            |            |
| 06/16/2011 - Generally in Good condition. One small spall in sack patch at Bent 4. Some tight vertical cracks at steps in the caps.  |              |     |          |       |           |            |            |            |            | RZGM       |
| 05/31/2007 - Minor and tight cracks at the construction joint to the column. Placed 5 percent into Condition State 2 due to sacked patches showing minor delaminations and/or peeling. None are a problem. |              |     |          |       |           |            |            |            |            | EZHZ       |
| 05/04/2005 - Minor and tight cracks at the cap to column connections.  |              |     |          |       |           |            |            |            |            | EZFQ       |
| 04/30/2003 - Minor surface shrinkage cracks. No problems noted.  |              |     |          |       |           |            |            |            |            | BDHZ       |
| 08/06/2001 - Dropped caps at the abutments. $9.14 * 4 = 36.56\text{m}$   |              |     |          |       |           |            |            |            |            | NHGO       |
| 12/23/1998 - $(9.14 * 4) + (2 * 8.69) = 53.94\text{m}$   |              |     |          |       |           |            |            |            |            | AHBS       |
| Inspection Notes:  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
| Element 300 - Strip Seal Exp Joint   |              |     |          |       |           |            |            |            |            |            |
|  | 1            | 3   | 8        | m.    |           | 95         | 5          | 0          |            |            |
|  |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :  |              |     |          |       |           |            |            |            |            |            |
| 06/16/2011 - Joint steel sounded solid when tapped on. Rubber gland is full of sanding material. Wet spot from apparent leaking near centerline.   |              |     |          |       |           |            |            |            |            | RZGM       |
| 05/31/2007 - Full of debris today. Damp near centerline on the cap, so may have a slight leak there. Steel portions sound solid when tapped on.  |              |     |          |       |           |            |            |            |            | EZHZ       |
| 05/04/2005 - Same as previously reported. Full of sanding material today.  |              |     |          |       |           |            |            |            |            | EZFQ       |
| 04/30/2003 - Full of dirt/sanding material/ May be a small tear near centerline. Added cleaning as a work element.   |              |     |          |       |           |            |            |            |            | BDHZ       |
| 08/06/2001 - Full of dirt and sanding material.  |              |     |          |       |           |            |            |            |            | NHGO       |
| 12/23/1998 - $8.05 * 1 = 8.05\text{m}$   |              |     |          |       |           |            |            |            |            | AHBS       |
| Inspection Notes:  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |

**INITIAL ASSESSMENT FORM FOR STRUCTURE :****I00315001+00693**

Continue

\*\*\*\*\* Span : Main-0 - Spans 1,2,3,4,&amp;5 (cont.) \*\*\*\*\*

| Element Description  |              |     |          |       |           |            |            |            |            |            |
|--|--------------|-----|----------|-------|-----------|------------|------------|------------|------------|------------|
| Smart Flag   | Scale Factor | Env | Quantity | Units | Insp Each | Pct Stat 1 | Pct Stat 2 | Pct Stat 3 | Pct Stat 4 | Pct Stat 5 |
| Element 310 - Elastomeric Bearing  |              |     |          |       |           |            |            |            |            |            |
|  | 1            | 1   | 4        | ea.   |           | 100        | 0          | 0          |            |            |
|  |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :  |              |     |          |       |           |            |            |            |            |            |
| 06/16/2011 - Good condition. Some fading of the paint on the steel portions.                                       |              |     |          |       |           |            |            |            |            | RZGM       |
| 05/31/2007 - No problems observed.   |              |     |          |       |           |            |            |            |            | EZHZ       |
| 05/04/2005 - Same as last report.  |              |     |          |       |           |            |            |            |            | EZFQ       |
| 04/30/2003 - Minor spot rust forming on painted surfaces. Spots rub off with some effort. Not a problem as of yet. |              |     |          |       |           |            |            |            |            | BDHZ       |
| 08/06/2001 - At Abutment #6.   |              |     |          |       |           |            |            |            |            | NHGO       |
| 12/23/1998 - None  |              |     |          |       |           |            |            |            |            | AHBS       |
| Inspection Notes:  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
| Element 313 - Fixed Bearing  |              |     |          |       |           |            |            |            |            |            |
|  | 1            | 1   | 36       | ea.   |           | 95         | 5          | 0          |            |            |
|  |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :  |              |     |          |       |           |            |            |            |            |            |
| 06/16/2011 - Spot rust and some bird debris.   |              |     |          |       |           |            |            |            |            | RZGM       |
| 05/31/2007 - Minor spot rust on the bearings and bird nests/debris starting to build up.                           |              |     |          |       |           |            |            |            |            | EZHZ       |
| 05/04/2005 - Minor spot rust and some bird nests/debris.   |              |     |          |       |           |            |            |            |            | EZFQ       |
| 04/30/2003 - Minor spot rust forming on painted surfaces.  |              |     |          |       |           |            |            |            |            | BDHZ       |
| 08/06/2001 - None  |              |     |          |       |           |            |            |            |            | NHGO       |
| 12/23/1998 - None  |              |     |          |       |           |            |            |            |            | AHBS       |
| Inspection Notes:  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
| Element 331 - Conc Bridge Railing  |              |     |          |       |           |            |            |            |            |            |
|  | 1            | 3   | 113      | m.    |           | 95         | 5          | 0          | 0          |            |
|  |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :  |              |     |          |       |           |            |            |            |            |            |
| 06/16/2011 - Minor popouts and scrapes on both barriers. Random vertical cracking throughout.                      |              |     |          |       |           |            |            |            |            | RZGM       |
| 05/31/2007 - Minor popouts and tight surface shrinkage cracks.   |              |     |          |       |           |            |            |            |            | EZHZ       |
| 05/04/2005 - Same as last report.  |              |     |          |       |           |            |            |            |            | EZFQ       |
| 04/30/2003 - Vertical cracking throughout; mostly very tight. Some minor popouts on rails concrete surfaces.       |              |     |          |       |           |            |            |            |            | BDHZ       |
| 08/06/2001 - None  |              |     |          |       |           |            |            |            |            | NHGO       |
| 12/23/1998 - 56.69 * 2 = 113.38m   |              |     |          |       |           |            |            |            |            | AHBS       |
| Inspection Notes:  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |

[illegible]

**INITIAL ASSESSMENT FORM FOR STRUCTURE :****U05210000+01601**

Location : GREAT FALLS Structure Name:

**General Location Data**MDT Maintenance Section : **31-01 Great Falls**District Code, Number, Location : **03 Dist 3 GREAT FALLS**Division Code, Location : **31 GREAT FALLS**County Code, Location : **013 CASCADE**City Code, Location : **32800 GREAT FALLS**Kind fo Hwy Code, Description : **2 2 U.S. Numbered Hwy**Signed Route Number : **00103**Str Owner Code, Description : **1 State Highway Agency**Maintained by Code, Description : **1 State Highway Agency**Intersecting Feature : **CITY ST, BNSF RAILROAD**Kilometer Post, Mile Post : **0.26 km 0.16**Structure on the State Highway System : ☒ Latitude : **47°30'28"**Structure on the National Highway System : ☒ Longitude : **111°20'26"**Str Meet or Exceed NBIS Bridge Length : ☒**Construction Data**Construction Project Number : **IG 15-5(28)274**Construction Station Number : **21+54.00**Construction Drawing Number : **7789**Construction Year : **1967**

Reconstruction Year :

**Traffic Data**Current ADT : **11,330** ADT Count Year : **2009** Percent Trucks : **2 %****Structure Loading, Rating and Posting Data****Loading Data :**

|                          |                  |                               |
|--------------------------|------------------|-------------------------------|
| Design Loading :         |                  | <b>5 MS 18 (HS 20)</b>        |
| Inventory Load, Design : | <b>32.6 mton</b> | <b>B ASD Assigned</b>         |
| Operating Load, Design : | <b>32.6 mton</b> | <b>B ASD Assigned</b>         |
| Posting :                |                  | <b>5 At/Above Legal Loads</b> |

**Rating Data :**

|                     | Operating | Inventory | Posting |
|---------------------|-----------|-----------|---------|
| Truck 1 Type 3 :    |           |           |         |
| Truck 2 Type 3-S3 : |           |           |         |
| Truck 3 Type 3-3 :  | <b>85</b> |           |         |

**Structure, Roadway and Clearance Data****Structure Deck, Roadway and Span Data :**

Structure Length : **167.94 m**  
 Deck Area : **2,684.00 m sq**  
 Deck Roadway Width : **8.32 m**  
 Approach Roadway Width : **8.32 m**  
 Median Code, Description : **0 No median**

**Structure Vertical and Horizontal Clearance Data :**

Vertical Clearance Over the Structure : **99.99 m**  
 Reference Feature for Vertical Clearance : **R Railroad beneath struc**  
 Vertical Clearance Under the Structure : **5.16 m**  
 Reference Feature for Lateral Underclearance : **R Railroad beneath struc**  
 Minimum Lateral Under Clearance Right : **1.52 m**  
 Minimum Lateral Under Clearance Left : **0.00 m**

**Span Data****Main Span**

Number Spans : **4**  
 Material Type Code, Description : **4 Steel continuous**  
 Span Design Code, Description : **2 Stringer/Multi-beam or Girder Deck**

Deck Structure Type : **1 Concrete Cast-in-Place**  
 Deck Surfacing Type : **3 Latex Concrete or similar additive**  
 Deck Protection Type : **0 None**  
 Deck Membrain Type : **0 None**

**Approach Span**

Number of Spans : **2**  
 Material Type Code, Description : **3 Steel**  
 Span Design Code, Description : **2 Stringer/Multi-beam or Girder**

**Structure Vertical and Horizontal Clearance Data Inventory Route :**

| Over / Under Direction Name | Inventory Route | South, West or Bi-directional Travel |          |            | North or East Travel |          |            |
|-----------------------------|-----------------|--------------------------------------|----------|------------|----------------------|----------|------------|
|                             |                 | Direction                            | Vertical | Horizontal | Direction            | Vertical | Horizontal |
| One Route Under             | -1              | Both                                 | 5.16 m   | 7.32 m     | N/A                  |          |            |
| GAULT AVE.                  |                 |                                      |          |            |                      |          |            |
| Route On Structure          | N00103          | N/A                                  |          |            | East                 | 99.99 m  | 8.32 m     |
| CENTRAL AVE WEST - EB       |                 |                                      |          |            |                      |          |            |

## Inspection Data

Inspection Due Date : 12 September 2014

Sufficiency Rating : 91.4

(91) Inspection Frequency (months) : 24

Structure Status : Functionally Obsolete

Next Other Insp Due Date : 23 Aug 2016

Other Insp Type : Pin and Hanger

## NBI Inspection Data

(90) Date of Last Inspection : 12 September 2012

Last Inspected By : Charles Pepos - 107

(90) Inspection Date :

Inspected By :

(58) Deck Rating : 6

(68) Deck Geometry : 3

(36A) Bridge Rail Rating : 1

(62) Culvert Rating : N

(59) Superstructure Rating : 6

(67) Structure Rating : 6

(36B) Transition Rating : 1

(61) Channel Rating : N

(60) Substructure Rating : 6

(69) Under Clearance : 3

(36C) Approach Rail Rating : 1

(71) Waterway Adequacy : N

(72) App Rdwy Align : 7

(41) Posting Status : A

(36D) End Rail Rating : 1

(113) Scour Critical : N

Unrepaired Spalls : 0 m sq

Deck Surfacing Depth : 0.00 in

## Inspection Hours

Crew Hours for inspection : 7

Snooper Required : Y

Helper Hours : 0

Snooper Hours for inspection : 5

Special Crew Hours : 16

Flagger Hours : 0

Special Equipment Hours : 16

| Inspection Work Candidates   |                   | Status       | Priority | Effected Structure Unit | Scope of Work            | Action            | Covered Condition States |
|--|-------------------|--------------|----------|-------------------------|--------------------------|-------------------|--------------------------|
| Candidate ID   | Date Requested    |              |          |                         |                          |                   |                          |
| D31-FY2005-000060  | 15 October 2004   | Approved     | Low      | All Spans               | Bridge                   | Spot Paint (flex) |                          |
| Clean and paint bearings.<br>10-12-2006: Some spot overcoat painting of the bearings.<br>Approved. DRC |                   |              |          |                         |                          |                   |                          |
| D31-FY2005-000061  | 15 October 2004   | Approved     | High     | All Spans               | 301 Pourable Joint Seal  | Min Repair        |                          |
| Reseal the joints.<br>Approved. DRC  |                   |              |          |                         |                          |                   |                          |
| D31-FY2011-000150  | 07 February 2011  | Not Approved | Medium   | All Spans               | 107 Paint Stl Opn Girder | Min Repair        |                          |
| Clean and paint girders.<br>10-12-2006: Some spot overcoat painting of the girders.                    |                   |              |          |                         |                          |                   |                          |
| D31-FY2011-000151  | 07 February 2011  | Not Approved | Medium   | All Spans               | 334 Metal Rail Coated    | Repl Paint        |                          |
| Clean and paint rail.  |                   |              |          |                         |                          |                   |                          |
| D31-FY2012-000086  | 13 September 2012 | Not Approved | Medium   | All Spans               | 234 R/Conc Cap           | Rehab Elem        |                          |
| Repair spalls/delaminated areas on caps and columns, especially those on Bent 3.                       |                   |              |          |                         |                          |                   |                          |

Late Reason:

Inspection Date: 09/12/2012

**U05210000+01601**

Continue

**Element Inspection Data**

\*\*\*\*\* Span : Main-0 - Steel Girder over RR - Spans 3 thru 6 \*\*\*\*\*

| Element Description   |              |     |          |       |           |            |            |            |            |            |
|---|--------------|-----|----------|-------|-----------|------------|------------|------------|------------|------------|
| Smart Flag  | Scale Factor | Env | Quantity | Units | Insp Each | Pct Stat 1 | Pct Stat 2 | Pct Stat 3 | Pct Stat 4 | Pct Stat 5 |
| Element 12 - Bare Concrete Deck Latex Surface   |              |     |          |       |           |            |            |            |            |            |
|   | 1            | 3   | 2293     | sq.m. | X         | 0          | 100        | 0          | 0          | 0          |
|   |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :   |              |     |          |       |           |            |            |            |            |            |
| 09/12/2012 - Wear in wheel paths from studded tires. Cracking in all spans. Small delaminations and spalls along edges of joint steel. MWHP   |              |     |          |       |           |            |            |            |            |            |
| 09/20/2010 - Wear in the wheel paths has reduced depth of traction grooves to "0" in areas. Small surface delaminations and small spalls along joint steel. Lots of cracking in all Spans. WZBZ   |              |     |          |       |           |            |            |            |            |            |
| 09/24/2008 - Wear in the wheel paths. Small spalls and delaminations along edges of the joint steel. Transverse and mapping cracks in all of the Spans. YQCZ  |              |     |          |       |           |            |            |            |            |            |
| 07/25/2006 - Wear in the wheel paths. Small delamiantions along the expansion joint steel. Some mapping cracks in the latex in all of the spans. NZDN   |              |     |          |       |           |            |            |            |            |            |
| 09/29/2004 - Put deck into Condition State 2 due to small delaminations along the joints. ZZIO  |              |     |          |       |           |            |            |            |            |            |
| 10/21/2002 - (79.40 * 15.98) [(15.98 18.40)/2 * 32.8] (18.40 * 25.0) = 2292.6 Put deck back to a "12" as hydromilled and replace material with Latex concrete to original deck elevations. Also Class B repairs. Transverse cracking in all spans. May need to address the cracking on next inspection. VIKC  |              |     |          |       |           |            |            |            |            |            |
| 08/30/2000 - (79.40* 15.98) [(15.98 18.40) / 2 * 32.8] )18.40 * 25.0) = 2292.6 FILQ   |              |     |          |       |           |            |            |            |            |            |
| Repair of delaminated areas in 1999 with hydrodemolition. Replaced with latex concrete and an overlay of the entire structure with latex concrete/ 06/03/1998 - Numerous small, tight transverse cracking throughout the deck with some small areas of delamination when it was checked several years ago. Studded tires have left a fairly smooth wear surface. XKGJ                 |              |     |          |       |           |            |            |            |            |            |
| 12/01/1995 - None YDNF  |              |     |          |       |           |            |            |            |            |            |
| Inspection Notes:   |              |     |          |       |           |            |            |            |            |            |
|   |              |     |          |       |           |            |            |            |            |            |
|   |              |     |          |       |           |            |            |            |            |            |
| Element 107 - Paint Stl Opn Girder  |              |     |          |       |           |            |            |            |            |            |
|   | 1            | 2   | 607      | m.    |           | 85         | 10         | 5          | 0          | 0          |
|   |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :   |              |     |          |       |           |            |            |            |            |            |
| 09/12/2012 - Lower flange tops in areas that collect water are rusted and some surface pitting under rust blisters. Faded and chalking paint. diagonal bracing between G2 and G3 where removed in 2012 and intersecting welds drilled in reversal areas. Girders are dirty from train exhaust. MWHP   |              |     |          |       |           |            |            |            |            |            |
| 09/20/2010 - Crack on G3S4L Gusset is unchanged. Lots of debris and grime on the girders. Rust blisters with minor surface pitting. Lots of pigeon nests along the girder connections. WZBZ   |              |     |          |       |           |            |            |            |            |            |
| 09/24/2008 - G3S4L near pin connection has a crack on the gusset weld for the diagonal brace. Rusty spots, scale, paint loss, and minor surface pitting in areas where water can sit on the girders. YQCZ   |              |     |          |       |           |            |            |            |            |            |
| 07/25/2006 - Rust spots, pitting, some pack rust, and paint loss; especially under the joints. Left two(2) girders have some missing bolts in the bearings to girders connection. Outer girders have rust blisters on the lower flange tops and lower portion of the webs and near leaky joints. Bolts on a diagonal bracing was missing and replaced during snooper inspection. NZDN |              |     |          |       |           |            |            |            |            |            |
| 09/29/2004 - Some rust spots, peeling paint and pitting of the girders, especially under the joints and on the lower portions of the web/lower flange. 2nd girder from the right in Span 3 is very rusty with paint peeling for 20 feet. ZZIO   |              |     |          |       |           |            |            |            |            |            |
| 10/21/2002 - Minor rusty spots under leaking joints and along the bottom flange/web area. VIKC  |              |     |          |       |           |            |            |            |            |            |
| 08/30/2000 - (4 * 137.20) + 32.8 + 25.0 = 606.6m FILQ   |              |     |          |       |           |            |            |            |            |            |
| Some rust and pitting. XKGJ   |              |     |          |       |           |            |            |            |            |            |
| 06/03/1998 - Some early signs of rust & pitting. YDNF   |              |     |          |       |           |            |            |            |            |            |
| 12/01/1995 - None REFI  |              |     |          |       |           |            |            |            |            |            |
| 02/01/1994 - None   |              |     |          |       |           |            |            |            |            |            |
| Inspection Notes:   |              |     |          |       |           |            |            |            |            |            |
|   |              |     |          |       |           |            |            |            |            |            |
|   |              |     |          |       |           |            |            |            |            |            |





\*\*\*\*\* Span : Main-0 - Steel Girder over RR - Spans 3 thru 6 (cont.) \*\*\*\*\*

| Element Description   |              |     |          |       |           |            |            |            |            |            |
|---|--------------|-----|----------|-------|-----------|------------|------------|------------|------------|------------|
| Smart Flag  | Scale Factor | Env | Quantity | Units | Insp Each | Pct Stat 1 | Pct Stat 2 | Pct Stat 3 | Pct Stat 4 | Pct Stat 5 |
| Element 161 - Paint Stl Pin/Hanger (4) Pin and Hanger Assemblies plus (4) End Girder Connection Pins  |              |     |          |       |           |            |            |            |            |            |
|   | 1            | 3   | 8        | ea.   |           | 95         | 5          | 0          | 0          | 0          |
|   |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :   |              |     |          |       |           |            |            |            |            |            |
| 09/12/2012 - Pins and hangers where UT tested in August 2012. No serious problems observed (see Collins Engineering report).  |              |     |          |       |           |            |            |            |            | MWHP       |
| 09/20/2010 - Still Good paint where re-painted by UT inspectors. Refer to report by Collins Engineering. No "noteables" were found in the UT inspection with little to no wear also noted.                                |              |     |          |       |           |            |            |            |            | WZBZ       |
| 09/24/2008 - Will be UT'd this Fall. Some minor rust on the pins and hangers.   |              |     |          |       |           |            |            |            |            | YQCZ       |
| 07/25/2006 - Some spot rust showing through areas that were tested and re-painted. Testing in 2005 showed no significant wear or problems.  |              |     |          |       |           |            |            |            |            | NZDN       |
| 09/29/2004 - Ends of the pins, nuts, and hangers showing some minor rust where they were cleaned in 2001 for UT testing.  |              |     |          |       |           |            |            |            |            | ZZIO       |
| 10/21/2002 - See 2001 NDT report. Some minor wear of several pins.  |              |     |          |       |           |            |            |            |            | VIKC       |
| 08/30/2000 - Some minor rust and pitting.   |              |     |          |       |           |            |            |            |            | FILQ       |
| 06/03/1998 - Some minor rust & pitting. Eight(8) sets of the pins have been UDT'ed and were ok.   |              |     |          |       |           |            |            |            |            | XKGJ       |
| 12/01/1995 - None   |              |     |          |       |           |            |            |            |            | YDNF       |
| 02/01/1994 - None   |              |     |          |       |           |            |            |            |            | REFI       |
| Inspection Notes:   |              |     |          |       |           |            |            |            |            |            |
|   |              |     |          |       |           |            |            |            |            |            |
|   |              |     |          |       |           |            |            |            |            |            |
| Element 205 - R/Conc Column (2) at Bent 3, 4, 5, and (3) at 6   |              |     |          |       |           |            |            |            |            |            |
|   | 1            | 1   | 9        | ea.   |           | 90         | 5          | 5          | 0          |            |
|   |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :   |              |     |          |       |           |            |            |            |            |            |
| 09/12/2012 - Right column at Bent 5 has vertical cracking along corners and areas are delaminated. Some spall/scrapes on columns. Shallow tie wire has caused surface spalls and rust on some columns.                    |              |     |          |       |           |            |            |            |            | MWHP       |
| 09/20/2010 - Bent 3's Right column has a delaminated edge and cracking; photo. Some tight cracks and small surface spalls from shallow tie wire.  |              |     |          |       |           |            |            |            |            | WZBZ       |
| 09/24/2008 - Some tight cracks and small spalls. Condition State 3 for delaminations on edges. Some painted areas to cover graffiti.  |              |     |          |       |           |            |            |            |            | YQCZ       |
| 07/25/2006 - Same as past inspections with some small areas of delamination on the edges of the columns where cracked. Middle column at Bent 6 has some spalls from being hot from campfires.                             |              |     |          |       |           |            |            |            |            | NZDN       |
| 09/29/2004 - Much graffiti painted on the columns and smoke/soot from camp fires. Mapping surface shrinkage cracks. Vertical cracking on the Right column at Bent 3. Tight cracking at the construction joint to the cap. |              |     |          |       |           |            |            |            |            | ZZIO       |
| 10/21/2002 - Small, tight shrinkage cracks. Graffiti and smoke from fires started by homeless people under the structure.   |              |     |          |       |           |            |            |            |            | VIKC       |
| 08/30/2000 - No change.   |              |     |          |       |           |            |            |            |            | FILQ       |
| 06/03/1998 - Some hairline, tight cracks in the concrete.   |              |     |          |       |           |            |            |            |            | XKGJ       |
| Inspection Notes:   |              |     |          |       |           |            |            |            |            |            |
|   |              |     |          |       |           |            |            |            |            |            |
|   |              |     |          |       |           |            |            |            |            |            |



\*\*\*\*\* Span : Main-0 - Steel Girder over RR - Spans 3 thru 6 (cont.) \*\*\*\*\*

| Element Description  |              |     |          |       |           |            |            |            |            |            |
|--|--------------|-----|----------|-------|-----------|------------|------------|------------|------------|------------|
| Smart Flag   | Scale Factor | Env | Quantity | Units | Insp Each | Pct Stat 1 | Pct Stat 2 | Pct Stat 3 | Pct Stat 4 | Pct Stat 5 |
| Element 215 - R/Conc Abutment East - Abutment 7  |              |     |          |       |           |            |            |            |            |            |
|  | 1            | 1   | 26       | m.    |           | 95         | 5          | 0          | 0          |            |
|  |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :  |              |     |          |       |           |            |            |            |            |            |
| 09/12/2012 - Most of area was stacked full of homeless people's belongings. Today some tight cracks observed. Small spall near G3 embedment. Lots of soot from homeless campfires.                       |              |     |          |       |           |            |            |            |            | MWHP       |
| 09/20/2010 - Unchanged from prior inspections. Lots of soot and graffiti by homeless people. Some tight cracks under a couple of the bearings.   |              |     |          |       |           |            |            |            |            | WZBZ       |
| 09/24/2008 - Tight cracks in backwall between girders as a couple of small spalls along the edges of the embedded girders. Tight cracks under a couple of the girders in the Abutment cap.               |              |     |          |       |           |            |            |            |            | YQCZ       |
| 07/25/2006 - Same on tight cracks. There is one small spall where girders is embedded on the backwall.   |              |     |          |       |           |            |            |            |            | NZDN       |
| 09/29/2004 - Tight cracks in the backwall concrete. Minor erosion on the right wingwall.   |              |     |          |       |           |            |            |            |            | ZZIO       |
| 10/21/2002 - Minor, tight cracks in backwall concrete.   |              |     |          |       |           |            |            |            |            | VIKC       |
| 08/30/2000 - 14.60 + 1.55 + 9.70 = 25.80 East abutment only.   |              |     |          |       |           |            |            |            |            | FILQ       |
| No change.   |              |     |          |       |           |            |            |            |            |            |
| 06/03/1998 - Some minor erosion @ the wingwalls.   |              |     |          |       |           |            |            |            |            | XKGJ       |
| 12/01/1995 - None  |              |     |          |       |           |            |            |            |            | YDNF       |
| 02/01/1994 - None  |              |     |          |       |           |            |            |            |            | REFI       |
| Inspection Notes:  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
| Element 234 - R/Conc Cap Bents 3 thru 6  |              |     |          |       |           |            |            |            |            |            |
|  | 1            | 1   | 61       | m.    |           | 85         | 10         | 5          | 0          |            |
|  |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :  |              |     |          |       |           |            |            |            |            |            |
| 09/12/2012 - Undersides show surface spalls, staining, and exposed rusty chair feet. Face of Bent 3 cap on span 2 side has large delamination and spalls (photo). Those under leaky areas show staining. |              |     |          |       |           |            |            |            |            | MWHP       |
| 09/20/2010 - Delaminated areas. Cracking and minor spalls; photo of Bent 3's cap. Surface spalls and delaminations due to rebar chair feet. Some staining from leaky joints.                             |              |     |          |       |           |            |            |            |            | WZBZ       |
| 09/24/2008 - Unchanged. Some of the delaminations started to spall on the shallow tie wire and exposed rebar chair feet.   |              |     |          |       |           |            |            |            |            | YQCZ       |
| 07/25/2006 - Surface spalls on the underside of the caps from shallow rebar chairs. Bent 3's cap has some spalls on the Right half on Span 2 side with some staining in the area.                        |              |     |          |       |           |            |            |            |            | NZDN       |
| 09/29/2004 - Minor rusty spots with small spalls from exposed and rusty rebar chairs on the bottom of the caps. Staining from leaking joints. Some pigeon debris/nests.                                  |              |     |          |       |           |            |            |            |            | ZZIO       |
| 10/21/2002 - Same as previous report. Add some staining of the concrete under leaking joints.  |              |     |          |       |           |            |            |            |            | VIKC       |
| 08/30/2000 - (3 * 14.60) + 17.19 = 60.99m  |              |     |          |       |           |            |            |            |            | FILQ       |
| No change plus also noted some rusty resteel chairs at a couple of spots.  |              |     |          |       |           |            |            |            |            |            |
| 06/03/1998 - Some sanding material on some of the caps.  |              |     |          |       |           |            |            |            |            | XKGJ       |
| 12/01/1995 - None  |              |     |          |       |           |            |            |            |            | YDNF       |
| 02/01/1994 - None  |              |     |          |       |           |            |            |            |            | REFI       |
| Inspection Notes:  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |

**INITIAL ASSESSMENT FORM FOR STRUCTURE :****U05210000+01601**

Continue

\*\*\*\*\* Span : Main-0 - Steel Girder over RR - Spans 3 thru 6 (cont.) \*\*\*\*\*

| Element Description   |              |     |          |       |           |            |            |            |            |            |
|---|--------------|-----|----------|-------|-----------|------------|------------|------------|------------|------------|
| Smart Flag  | Scale Factor | Env | Quantity | Units | Insp Each | Pct Stat 1 | Pct Stat 2 | Pct Stat 3 | Pct Stat 4 | Pct Stat 5 |
| Element 301 - Pourable Joint Seal   |              |     |          |       |           |            |            |            |            |            |
|   | 1            | 3   | 29       | m.    |           | 60         | 25         | 15         |            |            |
|   |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :   |              |     |          |       |           |            |            |            |            |            |
| 09/12/2012 - Steel portion sounds solid when tapped on. More sealant has pulled out and failed.   |              |     |          |       |           |            |            |            |            | MWHP       |
| 09/20/2010 - Some missing sealant, some loose sealant, and steel portion sounds solid when tapped on.   |              |     |          |       |           |            |            |            |            | WZBZ       |
| 09/24/2008 - Steel portions are sound. Sealant has lost bond in several areas and debris is pushing sealant down.   |              |     |          |       |           |            |            |            |            | YQCZ       |
| 07/25/2006 - Unchanged from previous reports.   |              |     |          |       |           |            |            |            |            | NZDN       |
| 09/29/2004 - Several areas where the joint sealant has lost adhesion and is pulling away from the guard angles. Dirt/debris in portions of the joint.   |              |     |          |       |           |            |            |            |            | ZZIO       |
| 10/21/2002 - Dirt and debris in joints. Some material has been pushed out by the dirt and debris. Joints leaking in these areas.  |              |     |          |       |           |            |            |            |            | VIKC       |
| 08/30/2000 - 2 * 14.60 = 29.20 "Dow corning" sytle.   |              |     |          |       |           |            |            |            |            | FILQ       |
| Some material is missing.   |              |     |          |       |           |            |            |            |            |            |
| 06/03/1998 - _  |              |     |          |       |           |            |            |            |            | XKGJ       |
| Inspection Notes:   |              |     |          |       |           |            |            |            |            |            |
|   |              |     |          |       |           |            |            |            |            |            |
|   |              |     |          |       |           |            |            |            |            |            |
| Element 305 - Assm Jt w/o Seal  |              |     |          |       |           |            |            |            |            |            |
|   | 1            | 3   | 32       | m.    |           | 90         | 10         | 0          |            |            |
|   |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :   |              |     |          |       |           |            |            |            |            |            |
| 09/12/2012 - Some spalling on underside of deck at joints. Top portions sound solid when tapped on. Finger alignment is good with some fingers touching slightly.   |              |     |          |       |           |            |            |            |            | MWHP       |
| 09/20/2010 - Good finger alignment and prior inspection comments on underside of the deck in this area still apply.   |              |     |          |       |           |            |            |            |            | WZBZ       |
| 09/24/2008 - Finger alignment is mostly Good with some edges slightly touching. Some spalling of the header concrete on the underside of the joint. Rusty and scale on the lower portions of the joint's steel. |              |     |          |       |           |            |            |            |            | YQCZ       |
| 07/25/2006 - Finger alignment is Good. Steel sounds solid when tapped on. A couple of small delaminations/spalls along the joint's edge.  |              |     |          |       |           |            |            |            |            | NZDN       |
| 09/29/2004 - Joints are solid when tapped on. A couple of very small delaminated areas on the joint edges. Finger joint is in Good alignment.   |              |     |          |       |           |            |            |            |            | ZZIO       |
| 10/21/2002 - Rusty spots. Both joints leak as this is the nature of these types of joints.  |              |     |          |       |           |            |            |            |            | VIKC       |
| 08/30/2000 - 14.60 + 17.19 = 31.79m One finger and one(1) sliding plate joints.   |              |     |          |       |           |            |            |            |            | FILQ       |
| Some rust and pitting and also leaking onto the girders and steel below them.   |              |     |          |       |           |            |            |            |            |            |
| 06/03/1998 - Some rust & pitting. One(1) finger & (1) Sliding Plate joint.  |              |     |          |       |           |            |            |            |            | XKGJ       |
| 12/01/1995 - None   |              |     |          |       |           |            |            |            |            | YDNF       |
| 02/01/1994 - None   |              |     |          |       |           |            |            |            |            | REFI       |
| Inspection Notes:   |              |     |          |       |           |            |            |            |            |            |
|   |              |     |          |       |           |            |            |            |            |            |
|   |              |     |          |       |           |            |            |            |            |            |

**INITIAL ASSESSMENT FORM FOR STRUCTURE :****U05210000+01601**

Continue

\*\*\*\*\* Span : Main-0 - Steel Girder over RR - Spans 3 thru 6 (cont.) \*\*\*\*\*

| Element Description   |              |     |          |       |           |            |            |            |            |            |
|---|--------------|-----|----------|-------|-----------|------------|------------|------------|------------|------------|
| Smart Flag  | Scale Factor | Env | Quantity | Units | Insp Each | Pct Stat 1 | Pct Stat 2 | Pct Stat 3 | Pct Stat 4 | Pct Stat 5 |
| Element 311 - Moveable Bearing  |              |     |          |       |           |            |            |            |            |            |
|   | 1            | 3   | 14       | ea.   |           | 85         | 15         | 0          |            |            |
|   |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :   |              |     |          |       |           |            |            |            |            |            |
| 09/12/2012 - Bearings are towards expansion at 75 degrees F and tolerable. Lots of debris and spot rust on bearings.                                |              |     |          |       |           |            |            |            |            | MWHP       |
| 09/20/2010 - Bearings are towards expansion today; 55F. Debris, rust, and paint loss.   |              |     |          |       |           |            |            |            |            | WZBZ       |
| 09/24/2008 - Some slight alignment towards expansion today; 40F. Some dirt and debris. Some overcoat painting done.                                 |              |     |          |       |           |            |            |            |            | YQCZ       |
| 07/25/2006 - Rusty spots, debris, scale and paint loss. Alignment is tolerable today. Blew off and spot overcoat painted during snooper inspection. |              |     |          |       |           |            |            |            |            | NZDN       |
| 09/29/2004 - Rusty spots, scale, paint peel, and pitting on those under the leaking joints. Some pigeon debris/nests near some of the bearings.     |              |     |          |       |           |            |            |            |            | ZZIO       |
| 10/21/2002 - Rusty and pitting as these are under the leaking joints.   |              |     |          |       |           |            |            |            |            | VIKC       |
| 08/30/2000 - No change.   |              |     |          |       |           |            |            |            |            | FILQ       |
| 06/03/1998 - Some rust & pitting.   |              |     |          |       |           |            |            |            |            | XKGJ       |
| 12/01/1995 - None   |              |     |          |       |           |            |            |            |            | YDNF       |
| 02/01/1994 - None   |              |     |          |       |           |            |            |            |            | REFI       |
| Inspection Notes:   |              |     |          |       |           |            |            |            |            |            |
|   |              |     |          |       |           |            |            |            |            |            |
|   |              |     |          |       |           |            |            |            |            |            |
| Element 313 - Fixed Bearing   |              |     |          |       |           |            |            |            |            |            |
|   | 1            | 2   | 14       | ea.   |           | 90         | 10         | 0          |            |            |
|   |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :   |              |     |          |       |           |            |            |            |            |            |
| 09/12/2012 - Dirt, debris, and spot rust on bearings.   |              |     |          |       |           |            |            |            |            | MWHP       |
| 09/20/2010 - Debris, dirt, spot rust, and faded paint.  |              |     |          |       |           |            |            |            |            | WZBZ       |
| 09/24/2008 - Some cleaning and overcoat painting done. Lots of debris and dirt. Rusty spots and paint loss.   |              |     |          |       |           |            |            |            |            | YQCZ       |
| 07/25/2006 - Same as past inspections and blew off/spot overcoat painted during snooper inspection.   |              |     |          |       |           |            |            |            |            | NZDN       |
| 09/29/2004 - Spot rust, paint loss, and minor pitting. Some pigeon debris near some of the bearings.  |              |     |          |       |           |            |            |            |            | ZZIO       |
| 10/21/2002 - Minor rust and pitting.  |              |     |          |       |           |            |            |            |            | VIKC       |
| 08/30/2000 - No change.   |              |     |          |       |           |            |            |            |            | FILQ       |
| 06/03/1998 - Some rust & pitting.   |              |     |          |       |           |            |            |            |            | XKGJ       |
| 12/01/1995 - None   |              |     |          |       |           |            |            |            |            | YDNF       |
| 02/01/1994 - None   |              |     |          |       |           |            |            |            |            | REFI       |
| Inspection Notes:   |              |     |          |       |           |            |            |            |            |            |
|   |              |     |          |       |           |            |            |            |            |            |
|   |              |     |          |       |           |            |            |            |            |            |

# INITIAL ASSESSMENT FORM FOR STRUCTURE :

**U05210000+01601**

Continue

\*\*\*\*\* Span : Main-0 - Steel Girder over RR - Spans 3 thru 6 (cont.) \*\*\*\*\*

| Element Description  |              |     |          |       |           |            |            |            |            |            |
|--|--------------|-----|----------|-------|-----------|------------|------------|------------|------------|------------|
| Smart Flag   | Scale Factor | Env | Quantity | Units | Insp Each | Pct Stat 1 | Pct Stat 2 | Pct Stat 3 | Pct Stat 4 | Pct Stat 5 |
| Element 331 - Conc Bridge Railing  |              |     |          |       |           |            |            |            |            |            |
|  | 1            | 3   | 270      | m.    |           | 95         | 5          | 0          | 0          |            |
|  |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :  |              |     |          |       |           |            |            |            |            |            |
| 09/12/2012 - Vertical cracks and some mapping cracks on backs of barriers. Spalls where top hand rail was removed.   |              |     |          |       |           |            |            |            |            | MWHP       |
| 09/20/2010 - Unchanged from prior inspections comments.  |              |     |          |       |           |            |            |            |            | WZBZ       |
| 09/24/2008 - Vertical cracks in the relief cuts. Small spalls in some areas on the Right rail where the handrail on top was removed.   |              |     |          |       |           |            |            |            |            | YQCZ       |
| 07/25/2006 - Same as past inspections.   |              |     |          |       |           |            |            |            |            | NZDN       |
| 09/29/2004 - Vertical cracking between the relief cuts. Surface shrinkage cracks. A couple of small areas of fracture concrete along the tops of the barrier where the handrail was removed. |              |     |          |       |           |            |            |            |            | ZZIO       |
| 10/21/2002 - Pedestrian hand rail removed by Maintenance. Minor, vertical cracks and shrinkage cracks throughout.  |              |     |          |       |           |            |            |            |            | VIKC       |
| 08/30/2000 - Replaced steel rail with concrete barrier rail in 1999.   |              |     |          |       |           |            |            |            |            | FILQ       |
| 06/03/1998 - Some rust & pitting of the rail and posts.  |              |     |          |       |           |            |            |            |            | XKGJ       |
| 12/01/1995 - None  |              |     |          |       |           |            |            |            |            | YDNF       |
| 02/01/1994 - None  |              |     |          |       |           |            |            |            |            | REFI       |
| Inspection Notes:  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
| Element 334 - Metal Rail Coated W-Beam, Pipe Handrail, and Guard Fence w\ Steel Posts  |              |     |          |       |           |            |            |            |            |            |
|  | 1            | 3   | 137      | m.    |           | 80         | 20         | 0          | 0          | 0          |
|  |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :  |              |     |          |       |           |            |            |            |            |            |
| 09/12/2012 - Rust, scale, and paint loss on rail posts and pipes. Guard fence and fabric has a bend where a luminaire pole fell into it.   |              |     |          |       |           |            |            |            |            | MWHP       |
| 09/20/2010 - Rust, scale, and paint loss to the posts and pipe. Guard fence posts and fabric are in Good condition.  |              |     |          |       |           |            |            |            |            | WZBZ       |
| 09/24/2008 - Some rust, scale, and paint loss on the rail posts and pipes. The guard fence is in Good condition.   |              |     |          |       |           |            |            |            |            | YQCZ       |
| 07/25/2006 - Same as past inspections.   |              |     |          |       |           |            |            |            |            | NZDN       |
| 09/29/2004 - Rusty spots on the rail posts and pipes. Guard fence is in Good condition.  |              |     |          |       |           |            |            |            |            | ZZIO       |
| 10/21/2002 - Rusty spots and pitting throughout. Guard fence is in Good condition.   |              |     |          |       |           |            |            |            |            | VIKC       |
| 08/30/2000 - 137.2x1=137.2 Sidewalk has existing metal rail and guard fence was added during 1999 construction. Minor rust on existing rail and posts.                                       |              |     |          |       |           |            |            |            |            | FILQ       |
| Inspection Notes:  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
| Element 357 - Sup Pack Rust SmFlag   |              |     |          |       |           |            |            |            |            |            |
| X  | 1            | 2   | 1        | ea.   | X         | 0          | 100        | 0          | 0          |            |
|  |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :  |              |     |          |       |           |            |            |            |            |            |
| 09/12/2012 - Swelling and cracking of welds on diaphragms lower members where water can get to them.   |              |     |          |       |           |            |            |            |            | MWHP       |
| 09/20/2010 - Unchanged from prior inspections comments.  |              |     |          |       |           |            |            |            |            | WZBZ       |
| 09/24/2008 - Diaphragms under leaky joints show pack rust with swelling and cracking of welds.   |              |     |          |       |           |            |            |            |            | YQCZ       |
| Inspection Notes:  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |

**INITIAL ASSESSMENT FORM FOR STRUCTURE :****U05210000+01601**

Continue

\*\*\*\*\* Span : Main-0 - Steel Girder over RR - Spans 3 thru 6 (cont.) \*\*\*\*\*

| Element Description  |              |     |          |       |           |            |            |            |            |            |
|--|--------------|-----|----------|-------|-----------|------------|------------|------------|------------|------------|
| Smart Flag   | Scale Factor | Env | Quantity | Units | Insp Each | Pct Stat 1 | Pct Stat 2 | Pct Stat 3 | Pct Stat 4 | Pct Stat 5 |
| Element 358 - Deck Cracking SmFlag   |              |     |          |       |           |            |            |            |            |            |
| X  | 1            | 3   | 1        | ea.   | X         | 0          | 100        | 0          | 0          |            |
|  |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :  |              |     |          |       |           |            |            |            |            |            |
| 09/12/2012 - Both size and density apply.  |              |     |          |       |           |            |            |            |            | MWHP       |
| 09/20/2010 - Unchanged from prior inspections comments.  |              |     |          |       |           |            |            |            |            | WZBZ       |
| 09/24/2008 - Lots of wider cracks, near 1.0mm, in all Spans and some areas were density comes into play. |              |     |          |       |           |            |            |            |            | YQCZ       |
| Inspection Notes:  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |

\*\*\*\*\* Span : Appr-1 - Steel Girder - Spans 1 and 2 \*\*\*\*\*

| Element Description  |              |     |          |       |           |            |            |            |            |            |
|--|--------------|-----|----------|-------|-----------|------------|------------|------------|------------|------------|
| Smart Flag   | Scale Factor | Env | Quantity | Units | Insp Each | Pct Stat 1 | Pct Stat 2 | Pct Stat 3 | Pct Stat 4 | Pct Stat 5 |
| Element 12 - Bare Concrete Deck  |              |     |          |       |           |            |            |            |            |            |
|  | 1            | 3   | 491      | sq.m. | X         | 0          | 100        | 0          | 0          | 0          |
|  |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :  |              |     |          |       |           |            |            |            |            |            |
| 09/12/2012 - Studded tire wear in wheel paths. Spalls/delaminations along edges of joint steel. Random cracking in both spans.   |              |     |          |       |           |            |            |            |            | MWHP       |
| 09/20/2010 - Transverse and mapping cracks. Wear in the wheel paths. Small surface spalls and delaminations along the joint steel.   |              |     |          |       |           |            |            |            |            | WZBZ       |
| 09/24/2008 - Some transverse and mapping cracks. Small spalls and delaminations along the joint steel edges. Wear in the wheel paths.  |              |     |          |       |           |            |            |            |            | YQCZ       |
| 07/25/2006 - Same as past inspections.   |              |     |          |       |           |            |            |            |            | NZDN       |
| 09/29/2004 - Put into Condition State 2 due to small delaminations along the joints. Some mapping cracks in both spans.  |              |     |          |       |           |            |            |            |            | ZZIO       |
| 10/21/2002 - 15.98 * 30.74 = 491.23 Changed element back to a "12", as Latex concrete was placed to the same elevation it was prior to hydromilling and class B repair. Numerous, transverse cracks that may need to be re-evaluated at the next inspection; smart flag. |              |     |          |       |           |            |            |            |            | VIKC       |
| Inspection Notes:  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
| Element 107 - Paint Stl Opn Girder   |              |     |          |       |           |            |            |            |            |            |
|  | 1            | 2   | 123      | m.    |           | 90         | 5          | 5          | 0          | 0          |
|  |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :  |              |     |          |       |           |            |            |            |            |            |
| 09/12/2012 - Steel is in good condition. Some rust blisters with minor surface pitting on tops of bottom flange. Faded and chalky paint. Smoke on those near Abutment 1 from camp fires.   |              |     |          |       |           |            |            |            |            | MWHP       |
| 09/20/2010 - Some rust blisters on tops of the bottom flanges where moisture can collect. Minor surface pitting under the blisters. Dirty and chalky paint with some spot rust on the majority of area.  |              |     |          |       |           |            |            |            |            | WZBZ       |
| 09/24/2008 - Paint loss, rusty spots, surface pitting, and very dirty girders. Deicer drips in many areas.   |              |     |          |       |           |            |            |            |            | YQCZ       |
| 07/25/2006 - Rusty spots, paint loss and pitting in areas under leaky joints. Water runs back towards Abutment 1 on the lower flange of the girders. Lots of dirt/grime on the girders. Lower flanges are sticky from de-icer.   |              |     |          |       |           |            |            |            |            | NZDN       |
| 09/29/2004 - Lower flange/web portions show rusty spots, peeling paint, and pitting.   |              |     |          |       |           |            |            |            |            | ZZIO       |
| 10/21/2002 - Rusty and pitting under leaking joints. Rusty spots along bottom flange/web area.   |              |     |          |       |           |            |            |            |            | VIKC       |
| 08/30/2000 - 4 * 30.74 = 122.96  |              |     |          |       |           |            |            |            |            | FILQ       |
| Some areas of rust and pitting.  |              |     |          |       |           |            |            |            |            |            |
| 06/03/1998 - Some areas of rust & pitting.   |              |     |          |       |           |            |            |            |            | XKGJ       |
| Inspection Notes:  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |

\*\*\*\*\* Span : Appr-1 - Steel Girder - Spans 1 and 2 (cont.) \*\*\*\*\*

| Element Description  |              |     |          |       |           |            |            |            |            |            |
|--|--------------|-----|----------|-------|-----------|------------|------------|------------|------------|------------|
| Smart Flag   | Scale Factor | Env | Quantity | Units | Insp Each | Pct Stat 1 | Pct Stat 2 | Pct Stat 3 | Pct Stat 4 | Pct Stat 5 |
| Element 161 - Paint Stl Pin/Hanger Bent 3 - End Girder Connection Pins   |              |     |          |       |           |            |            |            |            |            |
|  | 1            | 2   | 4        | ea.   |           | 95         | 5          | 0          | 0          | 0          |
|  |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :  |              |     |          |       |           |            |            |            |            |            |
| 09/12/2012 - Pins were UT tested in August 2012 and no significant problems were observed (see Collins Engineering report).  |              |     |          |       |           |            |            |            |            | MWHP       |
| 09/20/2010 - Still Good paint where re-painted by UT inspectors. Refer to report by Collins Engineering. No "noteables" were found in the UT inspection with little to no wear also noted. |              |     |          |       |           |            |            |            |            | WZBZ       |
| 09/24/2008 - Ut'd recently. See report. Some minor rust showing.   |              |     |          |       |           |            |            |            |            | YQCZ       |
| 07/25/2006 - No problems found in 2005 UT inspection. Spot rust on the ends of the pins. Wired brushed and re-painted.   |              |     |          |       |           |            |            |            |            | NZDN       |
| 09/29/2004 - Paint is worn off the areas that were cleaned for UT inspections in 2001 with some surface rust.  |              |     |          |       |           |            |            |            |            | ZZIO       |
| 10/21/2002 - See NDT report from 2001. No problems noted.  |              |     |          |       |           |            |            |            |            | VIKC       |
| Inspection Notes:  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
| Element 205 - R/Conc Column Bent 2   |              |     |          |       |           |            |            |            |            |            |
|  | 1            | 1   | 2        | ea.   |           | 95         | 5          | 0          | 0          |            |
|  |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :  |              |     |          |       |           |            |            |            |            |            |
| 09/12/2012 - Tight surface shrinkage cracks and small surface spall from tie wire.   |              |     |          |       |           |            |            |            |            | MWHP       |
| 09/20/2010 - Tight surface shrinkage cracks. Some shallow surface staining and spalls from tie wire.   |              |     |          |       |           |            |            |            |            | WZBZ       |
| 09/24/2008 - Tight shrinkage cracks in areas. Columns have been painted to cover graffiti.   |              |     |          |       |           |            |            |            |            | YQCZ       |
| 07/25/2006 - Same on tight cracks. Graffiti has been painted over.   |              |     |          |       |           |            |            |            |            | NZDN       |
| 09/29/2004 - Tight shrinkage surface cracks. Tight cracking on the construction joints.  |              |     |          |       |           |            |            |            |            | ZZIO       |
| 10/21/2002 - Some tight, shrinkage cracks throughout.  |              |     |          |       |           |            |            |            |            | VIKC       |
| 08/30/2000 - None  |              |     |          |       |           |            |            |            |            | FILQ       |
| 06/03/1998 - _   |              |     |          |       |           |            |            |            |            | XKGJ       |
| Inspection Notes:  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
| Element 215 - R/Conc Abutment 1 - West   |              |     |          |       |           |            |            |            |            |            |
|  | 1            | 1   | 20       | m.    |           | 95         | 5          | 0          | 0          |            |
|  |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :  |              |     |          |       |           |            |            |            |            |            |
| 09/12/2012 - Smokey and sooted from homeless campfires. Some tight cracks in backwall and a small spall near G2 embedded bearing.  |              |     |          |       |           |            |            |            |            | MWHP       |
| 09/20/2010 - Some tight vertical cracks near centerline of roadway and a small spalled area near G2's bearing. One tent and campfire going today.  |              |     |          |       |           |            |            |            |            | WZBZ       |
| 09/24/2008 - Same as past comments. Generally in Good condition.   |              |     |          |       |           |            |            |            |            | YQCZ       |
| 07/25/2006 - Same with one small area spalled where G2 is embedded.  |              |     |          |       |           |            |            |            |            | NZDN       |
| 09/29/2004 - Tight vertical cracks on the backwall concrete. Some cracks have minor efflorescence.   |              |     |          |       |           |            |            |            |            | ZZIO       |
| 10/21/2002 - Tight, vertical cracks in the backwall concrete.  |              |     |          |       |           |            |            |            |            | VIKC       |
| 08/30/2000 - 15.98 + 1.30 + 2.80 = 20.08m  |              |     |          |       |           |            |            |            |            | FILQ       |
| 06/03/1998 - None  |              |     |          |       |           |            |            |            |            | XKGJ       |
| Inspection Notes:  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |

**INITIAL ASSESSMENT FORM FOR STRUCTURE :****U05210000+01601**

Continue

\*\*\*\*\* Span : Appr-1 - Steel Girder - Spans 1 and 2 (cont.) \*\*\*\*\*

| Element Description  |              |     |          |       |           |            |            |            |            |            |
|--|--------------|-----|----------|-------|-----------|------------|------------|------------|------------|------------|
| Smart Flag   | Scale Factor | Env | Quantity | Units | Insp Each | Pct Stat 1 | Pct Stat 2 | Pct Stat 3 | Pct Stat 4 | Pct Stat 5 |
| Element 234 - R/Conc Cap Bent 2  |              |     |          |       |           |            |            |            |            |            |
|  | 1            | 1   | 16       | m.    |           | 90         | 5          | 5          | 0          |            |
|  |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :  |              |     |          |       |           |            |            |            |            |            |
| 09/12/2012 - Spalled areas with exposed rusty rebar and chair feet. Shallow surface delamination.  |              |     |          |       |           |            |            |            |            | MWHP       |
| 09/20/2010 - Same as previous inspection comments.   |              |     |          |       |           |            |            |            |            | WZBZ       |
| 09/24/2008 - Condition State 3 due to delaminations. Cracks at the steps and lots of dirt/debris.  |              |     |          |       |           |            |            |            |            | YQCZ       |
| 07/25/2006 - Surface spalls where rebar chairs are exposed on the bottom of the caps.  |              |     |          |       |           |            |            |            |            | NZDN       |
| 09/29/2004 - Minor rust stains with small spalled sections on the areas where the rebar chairs are exposed; mainly on the bottom of the caps.  |              |     |          |       |           |            |            |            |            | ZZIO       |
| 10/21/2002 - ok  |              |     |          |       |           |            |            |            |            | VIKC       |
| 08/30/2000 - 15.98 * 1 = 15.98m  |              |     |          |       |           |            |            |            |            | FILQ       |
| 06/03/1998 - None  |              |     |          |       |           |            |            |            |            | XKGJ       |
| Inspection Notes:  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
| Element 305 - Assm Jt w/o Seal   |              |     |          |       |           |            |            |            |            |            |
|  | 1            | 3   | 16       | m.    |           | 90         | 10         | 0          |            |            |
|  |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :  |              |     |          |       |           |            |            |            |            |            |
| 09/12/2012 - Steel portions sound solid when tapped on. Minor spalling on underside of deck at joint. Small spalls/delaminations along joint steel.  |              |     |          |       |           |            |            |            |            | MWHP       |
| 09/20/2010 - Steel sounds solid when tapped on. Some small spalls and delaminations in the concrete along the joint's edge. Minor spalling and staining of the header concrete on the underside of the deck. |              |     |          |       |           |            |            |            |            | WZBZ       |
| 09/24/2008 - Steel sounds solid when tapped on. Small spalls and delaminations along the joint edges. Some spalling and staining of the header concrete on the underside of the deck in the header area.     |              |     |          |       |           |            |            |            |            | YQCZ       |
| 07/25/2006 - Steel sounds solid when tapped on. Small delamination spalled area along the joint.   |              |     |          |       |           |            |            |            |            | NZDN       |
| 09/29/2004 - Joint leaks. Small piece of delamination along the joint edge.  |              |     |          |       |           |            |            |            |            | ZZIO       |
| 10/21/2002 - Minor rust spots. Some leaking as this is the nature of these joints.   |              |     |          |       |           |            |            |            |            | VIKC       |
| 08/30/2000 - 15.98 * 1 = 15.98m Sliding plate.   |              |     |          |       |           |            |            |            |            | FILQ       |
| Leaking.   |              |     |          |       |           |            |            |            |            | XKGJ       |
| 06/03/1998 - _   |              |     |          |       |           |            |            |            |            |            |
| Inspection Notes:  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
| Element 311 - Moveable Bearing Bent 2 and 3  |              |     |          |       |           |            |            |            |            |            |
|  | 1            | 3   | 8        | ea.   |           | 90         | 10         | 0          |            |            |
|  |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :  |              |     |          |       |           |            |            |            |            |            |
| 09/12/2012 - Bearings are towards expansion but tolerable 75 degrees F. Spot rust, stained, and debris.  |              |     |          |       |           |            |            |            |            | MWHP       |
| 09/20/2010 - Bearings in slight to moderate expansion. Some spot rust, dirt, and debris on the bearings.   |              |     |          |       |           |            |            |            |            | WZBZ       |
| 09/24/2008 - Slight rotation towards expansion; 55F when under the area. Some overcoat painting and cleaning done.   |              |     |          |       |           |            |            |            |            | YQCZ       |
| 07/25/2006 - Same as past inspections and alignment is Good.   |              |     |          |       |           |            |            |            |            | NZDN       |
| 09/29/2004 - Spot rust and pitting from leaking joint. Some pigeon debris/nests near bearings.   |              |     |          |       |           |            |            |            |            | ZZIO       |
| 10/21/2002 - Rusty and pitting under leaking joints.   |              |     |          |       |           |            |            |            |            | VIKC       |
| 08/30/2000 - Some rust and pitting.  |              |     |          |       |           |            |            |            |            | FILQ       |
| 06/03/1998 - Some rust & pitting.  |              |     |          |       |           |            |            |            |            | XKGJ       |
| Inspection Notes:  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |





\*\*\*\*\* Span : Appr-1 - Steel Girder - Spans 1 and 2 (cont.) \*\*\*\*\*

| Element Description  |              |     |          |       |           |            |            |            |            |            |
|--|--------------|-----|----------|-------|-----------|------------|------------|------------|------------|------------|
| Smart Flag   | Scale Factor | Env | Quantity | Units | Insp Each | Pct Stat 1 | Pct Stat 2 | Pct Stat 3 | Pct Stat 4 | Pct Stat 5 |
| Element 313 - Fixed Bearing Abutment 1   |              |     |          |       |           |            |            |            |            |            |
|  | 1            | 2   | 4        | ea.   |           | 90         | 10         | 0          |            |            |
|  |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :  |              |     |          |       |           |            |            |            |            |            |
| 09/12/2012 - Spot rust, staining, faded paint, and some debris.  |              |     |          |       |           |            |            |            |            | MWHP       |
| 09/20/2010 - Spot rust, debris, and faded paint.   |              |     |          |       |           |            |            |            |            | WZBZ       |
| 09/24/2008 - No change.  |              |     |          |       |           |            |            |            |            | YQCZ       |
| 07/25/2006 - Same as past inspections.   |              |     |          |       |           |            |            |            |            | NZDN       |
| 09/29/2004 - Spot rust and pitting on the bearings. Some pigeon debris/nests on and around the bearings.   |              |     |          |       |           |            |            |            |            | ZZIO       |
| 10/21/2002 - Some rust and scale on Abutment bearings.   |              |     |          |       |           |            |            |            |            | VIKC       |
| 08/30/2000 - Some rust and pitting.  |              |     |          |       |           |            |            |            |            | FILQ       |
| 06/03/1998 - Some rust & pitting.  |              |     |          |       |           |            |            |            |            | XKGJ       |
| Inspection Notes:  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
| Element 321 - R/Conc Approach Slab   |              |     |          |       |           |            |            |            |            |            |
|  | 1            | 3   | 1        | ea.   |           | 0          | 100        | 0          | 0          |            |
|  |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :  |              |     |          |       |           |            |            |            |            |            |
| 09/12/2012 - Bump onto bridge from settlement in approach slab and roadway.  |              |     |          |       |           |            |            |            |            | MWHP       |
| 09/20/2010 - Same as previous inspection comments.   |              |     |          |       |           |            |            |            |            | WZBZ       |
| 09/24/2008 - Settlement of the slab is allowing a big bump onto the structure. Sealant in the joint between the slab and bridge end is leaking and loose in areas.         |              |     |          |       |           |            |            |            |            | YQCZ       |
| 07/25/2006 - Put into condition State 2 due to settlement of the slab.   |              |     |          |       |           |            |            |            |            | NZDN       |
| 09/29/2004 - Minor settlement. Joint between the slab and the structure is leaking as adhesion of the sealant is broken.   |              |     |          |       |           |            |            |            |            | ZZIO       |
| 10/21/2002 - Minor settlement.   |              |     |          |       |           |            |            |            |            | VIKC       |
| 08/30/2000 - None  |              |     |          |       |           |            |            |            |            | FILQ       |
| 06/03/1998 - _   |              |     |          |       |           |            |            |            |            | XKGJ       |
| Inspection Notes:  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
| Element 331 - Conc Bridge Railing  |              |     |          |       |           |            |            |            |            |            |
|  | 1            | 3   | 61       | m.    |           | 95         | 5          | 0          | 0          |            |
|  |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :  |              |     |          |       |           |            |            |            |            |            |
| 09/12/2012 - Vertical and mapping cracks. Spalls on tops of barrier where hand rail was removed.   |              |     |          |       |           |            |            |            |            | MWHP       |
| 09/20/2010 - Same as previous inspection comments.   |              |     |          |       |           |            |            |            |            | WZBZ       |
| 09/24/2008 - Vertical cracks at the relief cuts. Some spalls on the top where the Right handrail was removed.  |              |     |          |       |           |            |            |            |            | YQCZ       |
| 07/25/2006 - Same as last inspection.  |              |     |          |       |           |            |            |            |            | NZDN       |
| 09/29/2004 - Vertical cracking between the relief cuts. Some minor pieces of concrete were fractured from when the metal handrail was removed from the top of the barrier. |              |     |          |       |           |            |            |            |            | ZZIO       |
| 10/21/2002 - Vertical cracking and shrinkage cracks throughout.  |              |     |          |       |           |            |            |            |            | VIKC       |
| 08/30/2000 - 30.74 * 2 = 61.48m New concrete rail in 1999.   |              |     |          |       |           |            |            |            |            | FILQ       |
| 06/03/1998 - 30.74 * 2 = 61.48   |              |     |          |       |           |            |            |            |            | XKGJ       |
| Some rust & pitting of the rail posts and bridge rail.   |              |     |          |       |           |            |            |            |            |            |
| Inspection Notes:  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |

**U05210000+01601**

**Continue**

**\* \* \* \* \* Span : Appr-1 - Steel Girder - Spans 1 and 2 (cont.) \* \* \* \* \***

| Element Description   |              |     |          |       |           |            |            |            |            |            |
|---|--------------|-----|----------|-------|-----------|------------|------------|------------|------------|------------|
| Smart Flag  | Scale Factor | Env | Quantity | Units | Insp Each | Pct Stat 1 | Pct Stat 2 | Pct Stat 3 | Pct Stat 4 | Pct Stat 5 |
| Element 334 - Metal Rail Coated W-Beam, Pipe Handrail, and Guard Fence w\ Steel Posts |              |     |          |       |           |            |            |            |            |            |
|   | 1            | 3   | 31       | m.    |           | 80         | 20         | 0          | 0          | 0          |
|   |              |     |          |       |           | %          | %          | %          | %          | %          |

Previous Inspection Notes :

09/12/2012 - Rust, scale, paint loss, and scrapes on pipe and posts. Gaurd fence is in good condition. MWHP

09/20/2010 - Rust, scale, paint loss, and minor surface pitting to the posts, W-Beam rail, and handrail. Guard fence posts and fabric are in Good condition.

|   |      |
|---|------|
| 09/24/2008 - Rust, paint loss, scale, and fading of the coating system on the rail posts and pipes. guard fence is in Good condition. | YQCZ |
|---|------|

07/25/2006 - Same as last inspection. NZDN

09/29/2004 - Rail posts and pipes ave some spot rust throughout. The guard fence is in place and in Good condition.

10/21/2002 - Rusty and pitting throughout. Guard fence is in Good condition.

08/30/2000 - 31.74x1=30.74 Sidewalk has existing metal rail and guard fence was added during 1999 construction. Minor rus on existing rail and posts.

Inspection Notes:

### General Inspection Notes

09/12/2012 - Area under east abutment has a small village of homeless people. Lots of soot on underside in area from camp fires. MWHP

Non-destructive testing of the pin and hanger connections performed by Collins Engineers. CRH

09/20/2010 - Lots of campers beneath the bridge today.

09/24/2008 - Showed 31-01B where bolts need to be installed in the bearings at Bent 6. YQCZ

07/25/2006 - NBI 58, deck, rated a "6" due to wear and delamiantions.

NBI 59, superstructure, rated a "6" due to rust, scale, and pitting in portions of the girders.

NBI 60, substructure, rated a "6" due to spalls in the columns and caps.

09/29/2004 - Deck cracking is about the same as the last inspection.

10/21/2002 - Deck cracking appears to have gotten worse since the traffic control island was placed on the structure. Unsure if extra dead load has caused cracks to get worse or if the deicer is causing some crack problems to worsen

08/30/2000 - Doubful that I can snoop this bridge anymore due to guard fence that was placed in 1999.

06/03/1998 - None XKGJ

12/01/1995 - Sufficiency Rating Calculation Accepted by ops\$u5963 at 3/11/97 10:45:45  
Sufficiency Rating Calculation Accepted by ops\$u9004 at 2/19/97 14:25:13

02/01/1994 - REF

08/01/1992 - Updated with tape 1994

01/01/1991 - Updated with tape 1992

04/01/1989 - Updated with tape 1991

04/01/1987 - Updated with tape 1989

09/01/1984 - Updated with tape 1986

07/01/1981 - Updated with tape 1984

04/01/1979 - Updated with tape 1980

**INITIAL ASSESSMENT FORM FOR STRUCTURE :****U05210000+01602**

Location : GREAT FALLS Structure Name:

**General Location Data**MDT Maintenance Section : **31-01 Great Falls**District Code, Number, Location : **03 Dist 3 GREAT FALLS**Division Code, Location : **31 GREAT FALLS**County Code, Location : **013 CASCADE**City Code, Location : **32800 GREAT FALLS**Kind fo Hwy Code, Description : **3 3 State Hwy**Signed Route Number : **00103**Str Owner Code, Description : **1 State Highway Agency**Maintained by Code, Description : **1 State Highway Agency**Intersecting Feature : **CITY ST, BNSF RAILROAD**Kilometer Post, Mile Post : **0.26 km 0.16**Structure on the State Highway System : ☒ Latitude : **47°30'29"**Structure on the National Highway System : ☒ Longitude : **111°20'27"**Str Meet or Exceed NBIS Bridge Length : ☒**Construction Data**Construction Project Number : **IG 15-5(28)274**Construction Station Number : **21+54.00**Construction Drawing Number : **7789**Construction Year : **1967**

Reconstruction Year :

**Traffic Data**Current ADT : **11,330** ADT Count Year : **2009** Percent Trucks : **2 %****Structure Loading, Rating and Posting Data****Loading Data :**

|                          |                  |                               |
|--------------------------|------------------|-------------------------------|
| Design Loading :         |                  | <b>5 MS 18 (HS 20)</b>        |
| Inventory Load, Design : | <b>32.6 mton</b> | <b>B ASD Assigned</b>         |
| Operating Load, Design : | <b>32.6 mton</b> | <b>B ASD Assigned</b>         |
| Posting :                |                  | <b>5 At/Above Legal Loads</b> |

**Rating Data :**

|                     | Operating | Inventory | Posting |
|---------------------|-----------|-----------|---------|
| Truck 1 Type 3 :    |           |           |         |
| Truck 2 Type 3-S3 : |           |           |         |
| Truck 3 Type 3-3 :  | <b>85</b> |           |         |

**Structure, Roadway and Clearance Data****Structure Deck, Roadway and Span Data :**

Structure Length : **167.94 m**  
 Deck Area : **1,781.00 m sq**  
 Deck Roadway Width : **8.32 m**  
 Approach Roadway Width : **9.14 m**  
 Median Code, Description : **0 No median**

**Structure Vertical and Horizontal Clearance Data :**

Vertical Clearance Over the Structure : **99.99 m**  
 Reference Feature for Vertical Clearance : **R Railroad beneath struc**  
 Vertical Clearance Under the Structure : **5.11 m**  
 Reference Feature for Lateral Underclearance : **R Railroad beneath struc**  
 Minimum Lateral Under Clearance Right : **1.50 m**  
 Minimum Lateral Under Clearance Left : **0.00 m**

**Span Data****Main Span**

Number Spans : **4**  
 Material Type Code, Description : **4 Steel continuous**  
 Span Design Code, Description : **2 Stringer/Multi-beam or Girder Deck**

Deck Structure Type : **1 Concrete Cast-in-Place**  
 Deck Surfacing Type : **3 Latex Concrete or similar additive**  
 Deck Protection Type : **0 None**  
 Deck Membrain Type : **0 None**

**Approach Span**

Number of Spans : **2**  
 Material Type Code, Description : **3 Steel**  
 Span Design Code, Description : **2 Stringer/Multi-beam or Girder**

**Structure Vertical and Horizontal Clearance Data Inventory Route :**

| Over / Under Direction Name | Inventory Route | South, West or Bi-directional Travel |          |            | North or East Travel |          |            |
|-----------------------------|-----------------|--------------------------------------|----------|------------|----------------------|----------|------------|
|                             |                 | Direction                            | Vertical | Horizontal | Direction            | Vertical | Horizontal |
| One Route Under             | -1              | N/A                                  | 5.11 m   | 7.32 m     | N/A                  |          |            |
| GUALT AVE                   |                 |                                      |          |            |                      |          |            |
| Route On Structure          | N00103          | Both                                 | 99.99 m  | 8.32 m     | N/A                  |          |            |
| CENTRAL AVE. WEST - WB      |                 |                                      |          |            |                      |          |            |



# INITIAL ASSESSMENT FORM FOR STRUCTURE :

**U05210000+01602**

Continue

## Inspection Data

Sufficiency Rating : **76.3**

Structure Status : **Func Obs - Elg Rehab**

Inspection Due Date : **13 September 2014**

(91) Inspection Frequency (months) : **24**

Next Other Insp Due Date : **22 Aug 2016**

Other Insp Type : **Pin and Hanger**

## NBI Inspection Data

(90) Date of Last Inspection : **13 September 2012**

Last Inspected By : **Charles Pepos - 107**

(90) Inspection Date :

Inspected By :

(58) Deck Rating : **6**

(68) Deck Geometry : **3**

(36A) Bridge Rail Rating : **1**

(62) Culvert Rating : **N**

(59) Superstructure Rating : **6**

(67) Structure Rating : **6**

(36B) Transition Rating : **1**

(61) Channel Rating : **N**

(60) Substructure Rating : **6**

(69) Under Clearance : **3**

(36C) Approach Rail Rating : **1**

(71) Waterway Adequacy : **N**

(72) App Rdwy Align : **7**

(41) Posting Status : **A**

(36D) End Rail Rating : **1**

(113) Scour Critical : **N**

Unrepaired Spalls : **0 m sq**

Deck Surfacing Depth : **0.00 in**

## Inspection Hours

Crew Hours for inspection : **7**

Snooper Required : **Y**

Helper Hours : **0**

Snooper Hours for inspection : **5**

Special Crew Hours : **13.5**

Flagger Hours : **0**

Special Equipment Hours : **13.5**

| Inspection Work Candidates  |                         | Status              | Priority      | Effected Structure Unit | Scope of Work           | Action            | Covered Condition States |
|---|-------------------------|---------------------|---------------|-------------------------|-------------------------|-------------------|--------------------------|
| Candidate ID  | Date Requested          |                     |               |                         |                         |                   |                          |
| <b>D31-FY2005-000058</b>  | <b>15 October 2004</b>  | <b>Approved</b>     | <b>Low</b>    | All Spans               | Bridge                  | Spot Paint (flex) |                          |
| Clean and paint Girders.<br>2006 - Some overcoat painting and cleaning done.<br>Approved. DRC |                         |                     |               |                         |                         |                   |                          |
|   |                         |                     |               |                         |                         |                   |                          |
| <b>D31-FY2005-000059</b>  | <b>15 October 2004</b>  | <b>Approved</b>     | <b>High</b>   | All Spans               | 301 Pourable Joint Seal | Min Repair        |                          |
| Reaseal these joints.<br>Approved. DRC  |                         |                     |               |                         |                         |                   |                          |
|   |                         |                     |               |                         |                         |                   |                          |
| <b>D31-FY2011-000152</b>  | <b>07 February 2011</b> | <b>Not Approved</b> | <b>Medium</b> | All Spans               | Bridge                  | Spot Paint (flex) |                          |
| Clean and paint Bearings.<br>2006 - Some overcoat painting and cleaning done.                 |                         |                     |               |                         |                         |                   |                          |
|   |                         |                     |               |                         |                         |                   |                          |
| <b>D31-FY2011-000153</b>  | <b>07 February 2011</b> | <b>Not Approved</b> | <b>Low</b>    | All Spans               | 334 Metal Rail Coated   | Repl Paint        |                          |
| Clean and paint Rail Posts.   |                         |                     |               |                         |                         |                   |                          |
|   |                         |                     |               |                         |                         |                   |                          |

Late Reason:

Inspection Date: 09/13/2012

**U05210000+01602**

Continue

**Element Inspection Data**

\*\*\*\*\* Span : Main-0 - Steel Girders over RR - Spans 3 thru 6 \*\*\*\*\*

| Element Description  |              |     |          |       |           |            |            |            |            |            |
|--|--------------|-----|----------|-------|-----------|------------|------------|------------|------------|------------|
| Smart Flag   | Scale Factor | Env | Quantity | Units | Insp Each | Pct Stat 1 | Pct Stat 2 | Pct Stat 3 | Pct Stat 4 | Pct Stat 5 |
| Element 12 - Bare Concrete Deck  |              |     |          |       |           |            |            |            |            |            |
|  | 1            | 3   | 2003     | sq.m. | X         | 0          | 100        | 0          | 0          | 0          |
|  |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :  |              |     |          |       |           |            |            |            |            |            |
| 09/13/2012 - Studded tire wear in wheel paths. Spalls/Delaminations along edges of joint steel. Mapping cracks in all spans.   |              |     |          |       |           |            |            |            |            | NLGQ       |
| 09/21/2010 - Lots of tight mapping cracks. Wear in the wheel paths. Small spalls and delaminations along joint steel.  |              |     |          |       |           |            |            |            |            | WZBZ       |
| 09/23/2008 - Wear in the wheel paths. Transverse and mapping cracks in areas. Small spalls and surface delaminations along the joint edges.  |              |     |          |       |           |            |            |            |            | YZCZ       |
| 10/13/2006 - Wear in the wheel paths. Right lane has more mapping cracks in it. Spalls/Delaminations along the joint anchorage's steel.  |              |     |          |       |           |            |            |            |            | NADO       |
| 09/29/2004 - Put the deck into Condition State 2 as there are some small areas of delamination along the joint edges.  |              |     |          |       |           |            |            |            |            | ZAIP       |
| 10/21/2002 - 14.60 * 137.20 = 2003.12 Deck element changed to a "12" as the Latex concrete was placed back to the original depths after the 1999 hydromill and Class B repair operations. Cracks in latex where sealed in 1999 with HMWM. Many tight transverse deck cracks. MDT Maintenance is spraying the deck with freeze guard. Cracks are soaking ip the freeze guard. |              |     |          |       |           |            |            |            |            | VZKC       |
| 08/30/2000 - New Latex concrete overlay in 1999 with some transverse cracking(small and tight). Cracks sealed with HMWM before construction was completed. Delaminated areas were removed by hydrodemolition and replaced with latex concrete.   |              |     |          |       |           |            |            |            |            | FIKL       |
| 06/03/1998 - 14.60 * 137.20 = 2003.12. Numerous small, tight transverse cracking throughout with small areas of delamination when it was checked several years ago. Studded tires have left a fairly smooth wear surface.  |              |     |          |       |           |            |            |            |            | MHIL       |
| 12/01/1995 - None  |              |     |          |       |           |            |            |            |            | YDNF       |
| 02/01/1994 - None  |              |     |          |       |           |            |            |            |            | REFI       |
| Inspection Notes:  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
| Element 107 - Paint Stl Opn Girder   |              |     |          |       |           |            |            |            |            |            |
|  | 1            | 2   | 549      | m.    |           | 80         | 15         | 5          | 0          | 0          |
|  |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :  |              |     |          |       |           |            |            |            |            |            |
| 09/13/2012 - Rust blisters, minor surface pitting, and paint loss on tops of lower girder flanges where water and debris has collected. Diagonals between G2 and G3 were removed and intersecting welds in tension reversal zones were drilled early in 2012 under statewide steel rehab job.  |              |     |          |       |           |            |            |            |            | NLGQ       |
| 09/21/2010 - Dirty, grime, bird debris, and rust blisters on top of the bottom flanges. Some surface pitting under rust blisters. Faded and chalky paint.  |              |     |          |       |           |            |            |            |            | WZBZ       |
| 09/23/2008 - Rust, scale, paint loss, and some surface pitting under rust blisters. Outer girders and areas under leaky joints are the worse. Very dirty from diesel smoke, bird debris, and de-icer.  |              |     |          |       |           |            |            |            |            | YZCZ       |
| 10/13/2006 - Rust, scale, pitting and paint loss. Most notiable under joints, outside girders, and where piegon nest/debris are built-up. Pulled most of this stuff off.   |              |     |          |       |           |            |            |            |            | NADO       |
| 09/29/2004 - Rusty, scale, peeling paint, and minor pitting; mostly under the joints and on the lower flange/web areas.  |              |     |          |       |           |            |            |            |            | ZAIP       |
| 10/21/2002 - Rusty spots throughout and some pitting. Mostly under leaking joints and on the bottom flange/lower web area.   |              |     |          |       |           |            |            |            |            | VZKC       |
| 08/30/2000 - No Change; mainly under the joints.   |              |     |          |       |           |            |            |            |            | FIKL       |
| 06/03/1998 - 4 * 137.20 = 548.80. Show some signs of early rust & pitting.   |              |     |          |       |           |            |            |            |            | MHIL       |
| 12/01/1995 - None  |              |     |          |       |           |            |            |            |            | YDNF       |
| 02/01/1994 - None  |              |     |          |       |           |            |            |            |            | REFI       |
| Inspection Notes:  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |

**INITIAL ASSESSMENT FORM FOR STRUCTURE :****U05210000+01602**

Continue

\*\*\*\*\* Span : Main-0 - Steel Girders over RR - Spans 3 thru 6 (cont.) \*\*\*\*\*

| Element Description  |              |     |          |       |           |            |            |            |            |            |
|--|--------------|-----|----------|-------|-----------|------------|------------|------------|------------|------------|
| Smart Flag   | Scale Factor | Env | Quantity | Units | Insp Each | Pct Stat 1 | Pct Stat 2 | Pct Stat 3 | Pct Stat 4 | Pct Stat 5 |
| Element 161 - Paint Stl Pin/Hanger (4) Pin and Hanger Assemblies plus (4) End Girder Connection Pins   |              |     |          |       |           |            |            |            |            |            |
|  | 1            | 3   | 12       | ea.   |           | 95         | 5          | 0          | 0          | 0          |
|  |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :  |              |     |          |       |           |            |            |            |            |            |
| 09/13/2012 - Pins and hangers were UT tested in August 2012 and no excessive wear was noted (see Collins Engineering reports).   |              |     |          |       |           |            |            |            |            | NLGQ       |
| 09/21/2010 - Still Good paint where re-painted by UT inspectors. Refer to report by Collins Engineering. No "noteables" were found in the UT inspection with little to no wear also noted.   |              |     |          |       |           |            |            |            |            | WZBZ       |
| 09/23/2008 - 2005 UT showed no problems. Some minor rust on the pins and hangers.  |              |     |          |       |           |            |            |            |            | YZCZ       |
| 10/13/2006 - Showed ok in 2005 UT testing.   |              |     |          |       |           |            |            |            |            | NADO       |
| 09/29/2004 - Ends of the pins, nuts, and hangers are showing some minor rust where the paint was removed for UT testing. No major wear or problems noted in UT inspection in 2001.   |              |     |          |       |           |            |            |            |            | ZAIP       |
| 10/21/2002 - See Bills report from 2001.   |              |     |          |       |           |            |            |            |            | VZKC       |
| 08/30/2000 - No Change; mainly under the joints.   |              |     |          |       |           |            |            |            |            | FIKL       |
| 06/03/1998 - Some minor rusting and pitting. Eight(8) pins have been UDT'ed and are ok.  |              |     |          |       |           |            |            |            |            | MHIL       |
| 12/01/1995 - None  |              |     |          |       |           |            |            |            |            | YDNF       |
| 02/01/1994 - None  |              |     |          |       |           |            |            |            |            | REFI       |
| Inspection Notes:  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
| Element 205 - R/Conc Column Bent 3, 4, 5, 6, and 7   |              |     |          |       |           |            |            |            |            |            |
|  | 1            | 1   | 8        | ea.   |           | 90         | 5          | 5          | 0          |            |
|  |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :  |              |     |          |       |           |            |            |            |            |            |
| 09/13/2012 - Shallow surface delaminations near tie wire or reinforcing chair feet. Some columns have tight vertical cracks near their corners. Scrapes and shallow spalls on some.  |              |     |          |       |           |            |            |            |            | NLGQ       |
| 09/21/2010 - Tight surface shrinkage cracks with some cracking on the edges. Some surface spalls from shallow tie wire.  |              |     |          |       |           |            |            |            |            | WZBZ       |
| 09/23/2008 - Tight cracking in most of the columns. Some surface spalls and small delaminations from shallow tie wire or exposed feet of the rebar chairs. Right column at Bent 3 has not gotten any worse.  |              |     |          |       |           |            |            |            |            | YZCZ       |
| 10/13/2006 - Same as past inspections with surface spalling where rebar chairs are exposed. Bent 3's Right column has a small spall on the edge with some staining. 5 percent in Condition State 3 is probably pushing it for the staining and spalls. |              |     |          |       |           |            |            |            |            | NADO       |
| 09/29/2004 - Tight cracks and shrinkage cracks on most of the columns. Tight cracks near construction joints to the caps. Some rust stains from exposed rebar chairs and/or wire.  |              |     |          |       |           |            |            |            |            | ZAIP       |
| 10/21/2002 - Some tight cracks throughout. Graffiti and smoked areas from homeless people under the structure.   |              |     |          |       |           |            |            |            |            | VZKC       |
| 08/30/2000 - No Change.  |              |     |          |       |           |            |            |            |            | FIKL       |
| 06/03/1998 - Some hairline, tight cracking in the concrete.  |              |     |          |       |           |            |            |            |            | MHIL       |
| 12/01/1995 - None  |              |     |          |       |           |            |            |            |            | YDNF       |
| 02/01/1994 - None  |              |     |          |       |           |            |            |            |            | REFI       |
| Inspection Notes:  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |

**INITIAL ASSESSMENT FORM FOR STRUCTURE :****U05210000+01602**

Continue

\*\*\*\*\* Span : Main-0 - Steel Girders over RR - Spans 3 thru 6 (cont.) \*\*\*\*\*

| Element Description   |              |     |          |       |           |            |            |            |            |            |
|---|--------------|-----|----------|-------|-----------|------------|------------|------------|------------|------------|
| Smart Flag  | Scale Factor | Env | Quantity | Units | Insp Each | Pct Stat 1 | Pct Stat 2 | Pct Stat 3 | Pct Stat 4 | Pct Stat 5 |
| Element 215 - R/Conc Abutment East Abutment (7)   |              |     |          |       |           |            |            |            |            |            |
|   | 1            | 2   | 26       | m.    |           | 95         | 5          | 0          | 0          |            |
|   |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :   |              |     |          |       |           |            |            |            |            |            |
| 09/13/2012 - Some tight cracking in backwall and cap. Small spall near embedded bearings and along cap/backwall connection. Lots of belongings of homeless people stacked on backwalls. NLGQ  |              |     |          |       |           |            |            |            |            |            |
| 09/21/2010 - Tight cracks in the backwall and under G3. A couple of small spalls near bearing embedments. One camper between G2 and G3 today. WZBZ  |              |     |          |       |           |            |            |            |            |            |
| 09/23/2008 - Some tight cracks in the backwall and cap. Small spalls along the edges of the girders where they are embedded into the backwalls. YZCZ  |              |     |          |       |           |            |            |            |            |            |
| 10/13/2006 - Unchanged from previous inspections. NADO  |              |     |          |       |           |            |            |            |            |            |
| 09/29/2004 - Minor spalling and deteriorated concrete where the girders meet the backwalls. Minor erosion at the Left wingwall. ZAIP  |              |     |          |       |           |            |            |            |            |            |
| 10/21/2002 - (14.060 1.55 9.70 = 25.80m Minor erosion at wingwall. Some minor concrete deterioration where girders meet the backwalls. VZKC   |              |     |          |       |           |            |            |            |            |            |
| Inspection Notes:   |              |     |          |       |           |            |            |            |            |            |
|   |              |     |          |       |           |            |            |            |            |            |
|   |              |     |          |       |           |            |            |            |            |            |
| Element 234 - R/Conc Cap Bent 3, 4, 5, 6, and 7   |              |     |          |       |           |            |            |            |            |            |
|   | 1            | 2   | 58       | m.    |           | 85         | 10         | 5          | 0          |            |
|   |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :   |              |     |          |       |           |            |            |            |            |            |
| 09/13/2012 - Bent 3 cap has a delamination on Span 2 face along with some spalling (photo). Surface spalls/delaminations on underside of caps from reinforcing chair feet. NLGQ   |              |     |          |       |           |            |            |            |            |            |
| 09/21/2010 - Staining from moisture and rebar chair feet. Delaminated and cracked areas on most of the caps. Some surface spalls and delaminations from shallow tie wire. WZBZ  |              |     |          |       |           |            |            |            |            |            |
| 09/23/2008 - Spalls, cracking, and delaminations in most of the caps. Underside of the caps show surface spalls/delaminations from exposed rebar chair feet. Some staining on the Right end of Bent 3's cap at delamination under G4S2 side. YZCZ |              |     |          |       |           |            |            |            |            |            |
| 10/13/2006 - Caps show surface spalls from shallow rebar chairs. Some minor staining in delaminated areas. 5 percent in Condition State 3 is maybe a little strong. NADO  |              |     |          |       |           |            |            |            |            |            |
| 09/29/2004 - Some minor spalled areas on bottoms of the caps where rebar chairs are exposed and rusting. Some minor cracking under the beam seats. ZAIP   |              |     |          |       |           |            |            |            |            |            |
| 10/21/2002 - Same as previous report. Some staining in areas where joints leak. VZKC  |              |     |          |       |           |            |            |            |            |            |
| 08/30/2000 - 4 * 14.60 = 58.40m Env. #2 as some under leaking joints. FIKL  |              |     |          |       |           |            |            |            |            |            |
| 06/03/1998 - 5 * 14.60. Some sanding material on some of the caps. MHIL   |              |     |          |       |           |            |            |            |            |            |
| 12/01/1995 - None YDNF  |              |     |          |       |           |            |            |            |            |            |
| 02/01/1994 - None REFI  |              |     |          |       |           |            |            |            |            |            |
| Inspection Notes:   |              |     |          |       |           |            |            |            |            |            |
|   |              |     |          |       |           |            |            |            |            |            |
|   |              |     |          |       |           |            |            |            |            |            |

**INITIAL ASSESSMENT FORM FOR STRUCTURE :****U05210000+01602**

Continue

\*\*\*\*\* Span : Main-0 - Steel Girders over RR - Spans 3 thru 6 (cont.) \*\*\*\*\*

| Element Description  |              |     |          |       |           |            |            |            |            |            |
|--|--------------|-----|----------|-------|-----------|------------|------------|------------|------------|------------|
| Smart Flag   | Scale Factor | Env | Quantity | Units | Insp Each | Pct Stat 1 | Pct Stat 2 | Pct Stat 3 | Pct Stat 4 | Pct Stat 5 |
| Element 301 - Pourable Joint Seal  |              |     |          |       |           |            |            |            |            |            |
|  | 1            | 3   | 29       | m.    |           | 60         | 25         | 15         |            |            |
|  |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :  |              |     |          |       |           |            |            |            |            |            |
| 09/13/2012 - Steel portions sound solid when tapped on. Minor spalling and deterioration on underside of deck and joints. Sealant is loose, torn, and missing in joints. Small delaminations/spalls along edge of joint steel.         |              |     |          |       |           |            |            |            |            | NLGQ       |
| 09/21/2010 - Several areas of loose and pushed down sealant. Some small areas of torn sealant.   |              |     |          |       |           |            |            |            |            | WZBZ       |
| 09/23/2008 - Leaky, sanding material pushed in, and loose sealant along the joints edges. Some small surface mortar spalls/delaminations along the steel edges.  |              |     |          |       |           |            |            |            |            | YZCZ       |
| 10/13/2006 - Unchanged from previous reports.  |              |     |          |       |           |            |            |            |            | NADO       |
| 09/29/2004 - Several areas where the sealant has lost contact and is pulling away. Joints are leaking. Some debris/dirt in the joints and this is putting pressure on the sealant.   |              |     |          |       |           |            |            |            |            | ZAIP       |
| 10/21/2002 - Sanding material and debris in joints. Some areas where Dow Corning has pulled away or been forced open from debris in the joints.  |              |     |          |       |           |            |            |            |            | VZKC       |
| 08/30/2000 - 14.60 * 2 = 29.20m "Dow corning"  |              |     |          |       |           |            |            |            |            | FIKL       |
| Some missing material and sanding material in the joint.   |              |     |          |       |           |            |            |            |            |            |
| Inspection Notes:  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
| Element 305 - Assm Jt w/o Seal   |              |     |          |       |           |            |            |            |            |            |
|  | 1            | 3   | 29       | m.    |           | 90         | 10         | 0          |            |            |
|  |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :  |              |     |          |       |           |            |            |            |            |            |
| 09/13/2012 - Steel sounds solid when tapped on and finger alignment is good. Small spalls/delaminations along edge of joint steel. Minor spalling and deterioration on underside of deck at joint area.                                |              |     |          |       |           |            |            |            |            | NLGQ       |
| 09/21/2010 - Good alignment on the fingers. Small spalls and surface delaminations along the joint edges. Steel sounds solid when tapped on. Minor deterioration and spalling of the deck concrete on the bottom side under the steel. |              |     |          |       |           |            |            |            |            | WZBZ       |
| 09/23/2008 - Steel sounds solid when tapped on. Finger alignment is Good. Some cracking and small spalls along the underside of the deck edges at the joints.  |              |     |          |       |           |            |            |            |            | YZCZ       |
| 10/13/2006 - Steel portions of the joints sound solid when tapped on. Some delaminations/spalls along the steel. Finger alignment is Good this summer.   |              |     |          |       |           |            |            |            |            | NADO       |
| 09/29/2004 - West most sliding plate has a small section of delamination on its' edge, 8 to 12". Finger joint alignment is Good.   |              |     |          |       |           |            |            |            |            | ZAIP       |
| 10/21/2002 - Minor rusty spots. Joints are in good alignment.  |              |     |          |       |           |            |            |            |            | VZKC       |
| 08/30/2000 - No Change.  |              |     |          |       |           |            |            |            |            | FIKL       |
| 06/03/1998 - 14.60 * 2. Some rust and pitting. (1) Finger & (1) Sliding Plate Joints.  |              |     |          |       |           |            |            |            |            | MHIL       |
| 12/01/1995 - None  |              |     |          |       |           |            |            |            |            | YDNF       |
| 02/01/1994 - None  |              |     |          |       |           |            |            |            |            | REFI       |
| Inspection Notes:  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |



# INITIAL ASSESSMENT FORM FOR STRUCTURE :

**U05210000+01602**

Continue

\*\*\*\*\* Span : Main-0 - Steel Girders over RR - Spans 3 thru 6 (cont.) \*\*\*\*\*

| Element Description   |              |     |          |       |           |            |            |            |            |            |
|---|--------------|-----|----------|-------|-----------|------------|------------|------------|------------|------------|
| Smart Flag  | Scale Factor | Env | Quantity | Units | Insp Each | Pct Stat 1 | Pct Stat 2 | Pct Stat 3 | Pct Stat 4 | Pct Stat 5 |
| Element 311 - Moveable Bearing  |              |     |          |       |           |            |            |            |            |            |
|   | 1            | 3   | 12       | ea.   |           | 85         | 10         | 5          |            |            |
|   |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :   |              |     |          |       |           |            |            |            |            |            |
| 09/13/2012 - Minor bend on anchor bolts at Bent 3. Bearings near maximum expansion (70 degrees F). Rusty spots, scale, paint loss, and debris at bearings.                                |              |     |          |       |           |            |            |            |            | NLGQ       |
| 09/21/2010 - Near maximum movement in expansion at Bent 3; 50F. Rusty spots, dirt, and some peeling paint. Lots of pigeons nesting near the bearings.                                     |              |     |          |       |           |            |            |            |            | WZBZ       |
| 09/23/2008 - Rusty spots, debris, and paint loss. Some overcoat painting done. Alignment of the bearings at Bent 2 are in expansion and near maximum movement; 48F for Condition State 3. |              |     |          |       |           |            |            |            |            | YZCZ       |
| 10/13/2006 - Rust, scale, paint loss and debris. 5 percent in Condition State 3 for the alignment of rockers at Bent 3; still tolerable. Clean and overcoat painted.                      |              |     |          |       |           |            |            |            |            | NADO       |
| 09/29/2004 - Rusty spots. Some scale, peeling paint, and pitting. Pigeon nest and debris near the bearings.   |              |     |          |       |           |            |            |            |            | ZAIP       |
| 10/21/2002 - Minor rusting spots and debris.  |              |     |          |       |           |            |            |            |            | VZKC       |
| 08/30/2000 - No Change.   |              |     |          |       |           |            |            |            |            | FIKL       |
| 06/03/1998 - Some rust & pitting.   |              |     |          |       |           |            |            |            |            | MHIL       |
| 12/01/1995 - None   |              |     |          |       |           |            |            |            |            | YDNF       |
| 02/01/1994 - None   |              |     |          |       |           |            |            |            |            | REFI       |
| Inspection Notes:   |              |     |          |       |           |            |            |            |            |            |
|   |              |     |          |       |           |            |            |            |            |            |
|   |              |     |          |       |           |            |            |            |            |            |
| Element 313 - Fixed Bearing   |              |     |          |       |           |            |            |            |            |            |
|   | 1            | 3   | 12       | ea.   |           | 95         | 5          | 0          |            |            |
|   |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :   |              |     |          |       |           |            |            |            |            |            |
| 09/13/2012 - Spot rust and fading paint.  |              |     |          |       |           |            |            |            |            | NLGQ       |
| 09/21/2010 - Some dirt and grime. Paint still looks Good with only some spot rust.  |              |     |          |       |           |            |            |            |            | WZBZ       |
| 09/23/2008 - Some spot rust. Cleaned and overcoat spot painted.   |              |     |          |       |           |            |            |            |            | YZCZ       |
| 10/13/2006 - Same as previous reports. Clean and overcoat painted.  |              |     |          |       |           |            |            |            |            | NADO       |
| 09/29/2004 - Rust spots and pitting. Pigeon nest around some of the bearings.   |              |     |          |       |           |            |            |            |            | ZAIP       |
| 10/21/2002 - Minor rusting spots and pits.  |              |     |          |       |           |            |            |            |            | VZKC       |
| 08/30/2000 - No change.   |              |     |          |       |           |            |            |            |            | FIKL       |
| 06/03/1998 - Some rust & pitting.   |              |     |          |       |           |            |            |            |            | MHIL       |
| 12/01/1995 - None   |              |     |          |       |           |            |            |            |            | YDNF       |
| 02/01/1994 - None   |              |     |          |       |           |            |            |            |            | REFI       |
| Inspection Notes:   |              |     |          |       |           |            |            |            |            |            |
|   |              |     |          |       |           |            |            |            |            |            |
|   |              |     |          |       |           |            |            |            |            |            |

**INITIAL ASSESSMENT FORM FOR STRUCTURE :****U05210000+01602**

Continue

\*\*\*\*\* Span : Main-0 - Steel Girders over RR - Spans 3 thru 6 (cont.) \*\*\*\*\*

| Element Description  |              |     |          |       |           |            |            |            |            |            |
|--|--------------|-----|----------|-------|-----------|------------|------------|------------|------------|------------|
| Smart Flag   | Scale Factor | Env | Quantity | Units | Insp Each | Pct Stat 1 | Pct Stat 2 | Pct Stat 3 | Pct Stat 4 | Pct Stat 5 |
| Element 331 - Conc Bridge Railing  |              |     |          |       |           |            |            |            |            |            |
|  | 1            | 3   | 274      | m.    |           | 95         | 5          | 0          | 0          |            |
|  |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :  |              |     |          |       |           |            |            |            |            |            |
| 09/13/2012 - Random shrinkage cracks. Top of barrier has some spalls where hand rail was removed.  |              |     |          |       |           |            |            |            |            | NLGQ       |
| 09/21/2010 - Unchanged from past inspection comments.  |              |     |          |       |           |            |            |            |            | WZBZ       |
| 09/23/2008 - Vertical cracks at relief cuts. Small surface spalls where hand rail was removed from the top of the Left rail.                                 |              |     |          |       |           |            |            |            |            | YZCZ       |
| 10/13/2006 - Same as past inspection reports.  |              |     |          |       |           |            |            |            |            | NADO       |
| 09/29/2004 - Minor vertical cracking between relief cuts. Some areas of fractured concrete where the hand rail was removed from the top of the barrier rail. |              |     |          |       |           |            |            |            |            | ZAIP       |
| 10/21/2002 - Some vertical cracks and mapping/shrinkage cracks.  |              |     |          |       |           |            |            |            |            | VZKC       |
| 08/30/2000 - Changed from metal rail to concrete rail in 1999.   |              |     |          |       |           |            |            |            |            | FIKL       |
| 06/03/1998 - 137.20 * 2 = 274.4. Some rust & pting of the rail & rail posts.   |              |     |          |       |           |            |            |            |            | MHIL       |
| 12/01/1995 - None  |              |     |          |       |           |            |            |            |            | YDNF       |
| 02/01/1994 - None  |              |     |          |       |           |            |            |            |            | REFI       |
| Inspection Notes:  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
| Element 334 - Metal Rail Coated W-Beam and Round Steel Pipe w/ Guard Fence and Steel Posts   |              |     |          |       |           |            |            |            |            |            |
|  | 1            | 3   | 137      | m.    |           | 80         | 20         | 0          | 0          | 0          |
|  |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :  |              |     |          |       |           |            |            |            |            |            |
| 09/13/2012 - Rust, scale, paint loss, and peeling paint on posts and pipe rail. Gaurd fence and fabric in good condition.                                    |              |     |          |       |           |            |            |            |            | NLGQ       |
| 09/21/2010 - Spot rust, scale, peeling paint, and faded paint on the posts and pipe rail. Guard fence posts and fabric are in Good condition.                |              |     |          |       |           |            |            |            |            | WZBZ       |
| 09/23/2008 - Same comments as past inspections.  |              |     |          |       |           |            |            |            |            | YZCZ       |
| 10/13/2006 - Paint system is pitted, flaking, and rusty throughout. W-Beam has some spot rust. Guard fence is in Good condition.                             |              |     |          |       |           |            |            |            |            | NADO       |
| 09/29/2004 - Rust spots on the rail posts and pipe. Some spot rust on the W-Beam rail. Guard fence is in Good condition.                                     |              |     |          |       |           |            |            |            |            | ZAIP       |
| 10/21/2002 - Rusty spots with some pitting. Guard fence is in Good condition.  |              |     |          |       |           |            |            |            |            | VZKC       |
| 08/30/2000 - Rail along sidewalk is metal rail and new guard fence added during 1999 construction. Some minor rust on posts and existing w-beam.             |              |     |          |       |           |            |            |            |            | FIKL       |
| Inspection Notes:  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
| Element 357 - Sup Pack Rust SmFlag   |              |     |          |       |           |            |            |            |            |            |
| X  | 1            | 1   | 1        | ea.   | X         | 0          | 100        | 0          | 0          |            |
|  |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :  |              |     |          |       |           |            |            |            |            |            |
| 09/13/2012 - Lower angles on diaphragms show spreading and cracked welds from pack rust.   |              |     |          |       |           |            |            |            |            | NLGQ       |
| 09/21/2010 - Unchanged from past inspection comments.  |              |     |          |       |           |            |            |            |            | WZBZ       |
| 09/23/2008 - Added due to pack rust at the diaphragms under leaky joints. Some swelling has cracked welds; photo.  |              |     |          |       |           |            |            |            |            | YZCZ       |
| Inspection Notes:  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |

**INITIAL ASSESSMENT FORM FOR STRUCTURE :****U05210000+01602**

Continue

\*\*\*\*\* Span : Main-0 - Steel Girders over RR - Spans 3 thru 6 (cont.) \*\*\*\*\*

| Element Description  |              |     |          |       |           |            |            |            |            |            |
|--|--------------|-----|----------|-------|-----------|------------|------------|------------|------------|------------|
| Smart Flag   | Scale Factor | Env | Quantity | Units | Insp Each | Pct Stat 1 | Pct Stat 2 | Pct Stat 3 | Pct Stat 4 | Pct Stat 5 |
| Element 358 - Deck Cracking SmFlag   |              |     |          |       |           |            |            |            |            |            |
| X  | 1            | 3   | 1        | ea.   | X         | 0          | 100        | 0          | 0          |            |
|  |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :  |              |     |          |       |           |            |            |            |            |            |
| 09/13/2012 - Due to size and density.  |              |     |          |       |           |            |            |            |            | NLGQ       |
| 09/21/2010 - Unchanged from past inspection comments and not yet in Condition State 3.                     |              |     |          |       |           |            |            |            |            | WZBZ       |
| 09/23/2008 - Added due to the size of some of the cracks, 1.00mm, and density of the cracks in some areas. |              |     |          |       |           |            |            |            |            | YZCZ       |
| Inspection Notes:  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |

\*\*\*\*\* Span : Appr-1 - Steel Girders - Span 1 and 2 \*\*\*\*\*

| Element Description  |              |     |          |       |           |            |            |            |            |            |
|--|--------------|-----|----------|-------|-----------|------------|------------|------------|------------|------------|
| Smart Flag   | Scale Factor | Env | Quantity | Units | Insp Each | Pct Stat 1 | Pct Stat 2 | Pct Stat 3 | Pct Stat 4 | Pct Stat 5 |
| Element 12 - Bare Concrete Deck  |              |     |          |       |           |            |            |            |            |            |
|  | 1            | 3   | 449      | sq.m. | X         | 0          | 100        | 0          | 0          | 0          |
|  |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :  |              |     |          |       |           |            |            |            |            |            |
| 09/13/2012 - Studded tire wear in wheel paths. Mapping cracks in both spans. Shallow spalls/delaminations along joint steel.                                     |              |     |          |       |           |            |            |            |            | NLGQ       |
| 09/21/2010 - Tight mapping cracks. Minor spalls and delaminations along joint edges. Wear in the wheel paths.  |              |     |          |       |           |            |            |            |            | WZBZ       |
| 09/23/2008 - Wear in the wheel paths. Transverse and mapping cracks in areas. Small spalls/delaminations along the joint edges.                                  |              |     |          |       |           |            |            |            |            | YZCZ       |
| 10/13/2006 - Same comments as past inspections.  |              |     |          |       |           |            |            |            |            | NADO       |
| 09/29/2004 - Had to move to Condition State 2 due to small delaminations along the joints. Some mapping cracks in the spans.                                     |              |     |          |       |           |            |            |            |            | ZAIP       |
| 10/21/2002 - 14.60 * 30.74 = 448.8 Changed Element to "12" as the Latexx concrete was only placed to the existing levels after hydromilling and Class B repairs. |              |     |          |       |           |            |            |            |            | VZKC       |
| Inspection Notes:  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
| Element 107 - Paint Stl Opn Girder   |              |     |          |       |           |            |            |            |            |            |
|  | 1            | 2   | 123      | m.    |           | 90         | 5          | 5          | 0          | 0          |
|  |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :  |              |     |          |       |           |            |            |            |            |            |
| 09/13/2012 - Rust blisters with some surface pitting on tops of bottom flange where moisture collects. Girders are dirty and have faded paint.                   |              |     |          |       |           |            |            |            |            | NLGQ       |
| 09/21/2010 - Dirty, grimey, and faded paint. Minor rust blisters with surface pitting.   |              |     |          |       |           |            |            |            |            | WZBZ       |
| 09/23/2008 - Rust, scale, minor surface pitting, and paint loss; worse in areas that the deicer and water collects. Girders are dirty.                           |              |     |          |       |           |            |            |            |            | YZCZ       |
| 10/13/2006 - Rust, scale, peeling paint, paint loss, and pitting; mainly in areas under/near leaky joints.   |              |     |          |       |           |            |            |            |            | NADO       |
| 09/29/2004 - Unchanged from previous reports.  |              |     |          |       |           |            |            |            |            | ZAIP       |
| 10/21/2002 - Rusty spots with some minor pitting under joints and on the bottom flange/lower web area.   |              |     |          |       |           |            |            |            |            | VZKC       |
| 08/30/2000 - No Change.  |              |     |          |       |           |            |            |            |            | FIKL       |
| 06/03/1998 - 4 * 30.74 = 122.96. Some areas of rust & pitting.   |              |     |          |       |           |            |            |            |            | MHIL       |
| Inspection Notes:  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |

# INITIAL ASSESSMENT FORM FOR STRUCTURE :

## U05210000+01602

Continue

\*\*\*\*\* Span : Appr-1 - Steel Girders - Span 1 and 2 (cont.) \*\*\*\*\*

| Element Description  |              |     |          |       |           |            |            |            |            |            |
|--|--------------|-----|----------|-------|-----------|------------|------------|------------|------------|------------|
| Smart Flag   | Scale Factor | Env | Quantity | Units | Insp Each | Pct Stat 1 | Pct Stat 2 | Pct Stat 3 | Pct Stat 4 | Pct Stat 5 |
| Element 161 - Paint Stl Pin/Hanger Bent 3 - Pins Only  |              |     |          |       |           |            |            |            |            |            |
|  | 1            | 3   | 4        | ea.   |           | 100        | 0          | 0          | 0          | 0          |
|  |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :  |              |     |          |       |           |            |            |            |            |            |
| 09/13/2012 - Pins were UT tested in August 2012 and no significant wear was observed.  |              |     |          |       |           |            |            |            |            | NLGQ       |
| 09/21/2010 - Still Good paint where re-painted by UT inspectors. Refer to report by Collins Engineering. No "noteables" were found in the UT inspection with little to no wear also noted. |              |     |          |       |           |            |            |            |            | WZBZ       |
| 09/23/2008 - Cleaned and re-painted after UT testing this summer. See report for findings.   |              |     |          |       |           |            |            |            |            | YZCZ       |
| 10/13/2006 - UT testing in 2005 showed no problems.  |              |     |          |       |           |            |            |            |            | NADO       |
| 09/29/2004 - Minor rust where paint has weathered off of the pins from where they were cleaned for UT inspection.  |              |     |          |       |           |            |            |            |            | ZAIP       |
| 10/21/2002 - Girder to Girder connection. No problems noted when inspected/NDT'd in 2001.  |              |     |          |       |           |            |            |            |            | VZKC       |
| Inspection Notes:  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
| Element 205 - R/Conc Column Bent 2   |              |     |          |       |           |            |            |            |            |            |
|  | 1            | 1   | 2        | ea.   |           | 95         | 5          | 0          | 0          |            |
|  |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :  |              |     |          |       |           |            |            |            |            |            |
| 09/13/2012 - Tight surface shrinkage cracks and a small shallow spall from tie wire.   |              |     |          |       |           |            |            |            |            | NLGQ       |
| 09/21/2010 - Some tight surface shrinkage cracks. Left column has tight cracks on the Left-Back corners of the column.   |              |     |          |       |           |            |            |            |            | WZBZ       |
| 09/23/2008 - Both columns show tight shrinkage cracks. Generally in Good condition.  |              |     |          |       |           |            |            |            |            | YZCZ       |
| 10/13/2006 - No change except that the graffiti has been painted over.   |              |     |          |       |           |            |            |            |            | NADO       |
| 09/29/2004 - Tight shrinkage cracks. Tight cracks at the construction joint near the caps. Graffiti on both columns.   |              |     |          |       |           |            |            |            |            | ZAIP       |
| 10/21/2002 - Minor shrinkage cracks throughout. Some graffiti from homeless village/camp under the structure.  |              |     |          |       |           |            |            |            |            | VZKC       |
| 08/30/2000 - None  |              |     |          |       |           |            |            |            |            | FIKL       |
| 06/03/1998 - _   |              |     |          |       |           |            |            |            |            | MHIL       |
| Inspection Notes:  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
| Element 215 - R/Conc Abutment Abutment 1 - West  |              |     |          |       |           |            |            |            |            |            |
|  | 1            | 1   | 19       | m.    |           | 95         | 5          | 0          | 0          |            |
|  |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :  |              |     |          |       |           |            |            |            |            |            |
| 09/13/2012 - Generally good condition. Some tight cracks and few small spalls near cap/backwall connection and near embedded bearings.   |              |     |          |       |           |            |            |            |            | NLGQ       |
| 09/21/2010 - Unchanged from past inspection comments. Good condition. Fence on the Left end of the Abutment is broken over by homeless traffic.  |              |     |          |       |           |            |            |            |            | WZBZ       |
| 09/23/2008 - Tight cracks in the backwall and under a couple of the girders in the cap. Small spalls at a couple of the girders edges where embedded in the backwall.                      |              |     |          |       |           |            |            |            |            | YZCZ       |
| 10/13/2006 - Minor delaminations where the girders are embedded in the backwalls. Some tight cracks between the girders. Still minor erosion at the corners.                               |              |     |          |       |           |            |            |            |            | NADO       |
| 09/29/2004 - Same as previous report.  |              |     |          |       |           |            |            |            |            | ZAIP       |
| 10/21/2002 - Minor concrete popouts and deterioration where girders are embedded in backwall. Minor erosion at wingwall.   |              |     |          |       |           |            |            |            |            | VZKC       |
| 08/30/2000 - No change.  |              |     |          |       |           |            |            |            |            | FIKL       |
| 06/03/1998 - 14.60 + 1.30 + 2.80 = 18.7. Some erosion @ the wingwalls.   |              |     |          |       |           |            |            |            |            | MHIL       |
| Inspection Notes:  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |



U05210000+01602

Continue

\*\*\*\*\* Span : Appr-1 - Steel Girders - Span 1 and 2 (cont.) \*\*\*\*\*

| Element Description  |              |     |          |       |           |            |            |            |            |            |
|--|--------------|-----|----------|-------|-----------|------------|------------|------------|------------|------------|
| Smart Flag   | Scale Factor | Env | Quantity | Units | Insp Each | Pct Stat 1 | Pct Stat 2 | Pct Stat 3 | Pct Stat 4 | Pct Stat 5 |
| Element 234 - R/Conc Cap Bent 2  |              |     |          |       |           |            |            |            |            |            |
|  | 1            | 1   | 15       | m.    |           | 90         | 5          | 5          | 0          |            |
|  |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :  |              |     |          |       |           |            |            |            |            |            |
| 09/13/2012 - Spall with exposed rebar and some shallow surface delaminations.  |              |     |          |       |           |            |            |            |            | NLGQ       |
| 09/21/2010 - Small delaminations and spalls on the cap. Surface spall from tie wire and rebar chair feet.  |              |     |          |       |           |            |            |            |            | WZBZ       |
| 09/23/2008 - Shallow surface delaminations; Condition State 3. Some small surface spalls from shallow tie wire and rebar chair feet; Condition State 2.    |              |     |          |       |           |            |            |            |            | YZCZ       |
| 10/13/2006 - Surface spalls on the underside of the cap from shallow rebar chairs. Cap is stained from leaky joint above.                                  |              |     |          |       |           |            |            |            |            | NADO       |
| 09/29/2004 - Minor rust stains and spalling where chairs are exposed on the bottom side of the cap. Staining from leaking joint.                           |              |     |          |       |           |            |            |            |            | ZAIP       |
| 10/21/2002 - ok  |              |     |          |       |           |            |            |            |            | VZKC       |
| 08/30/2000 - 14.60 * 1 = 14.60m  |              |     |          |       |           |            |            |            |            | FIKL       |
| 06/03/1998 - 14.60 * 2 = 29.2  |              |     |          |       |           |            |            |            |            | MHIL       |
| Inspection Notes:  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
| Element 305 - Assm Jt w/o Seal   |              |     |          |       |           |            |            |            |            |            |
|  | 1            | 3   | 15       | m.    |           | 90         | 10         | 0          |            |            |
|  |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :  |              |     |          |       |           |            |            |            |            |            |
| 09/13/2012 - Steel sounds solid when tapped on. Some delaminations/spalls along edges of joint steel.  |              |     |          |       |           |            |            |            |            | NLGQ       |
| 09/21/2010 - Small spalls along the joint steel edge. Steel sounds solid when tapped on.   |              |     |          |       |           |            |            |            |            | WZBZ       |
| 09/23/2008 - Steel sounds solid when tapped on. Some small surface spalls and delaminations along the joint edges.   |              |     |          |       |           |            |            |            |            | YZCZ       |
| 10/13/2006 - Steel all sounds solid when tapped on. Small spots of delaminated concrete and small spalls in a couple of areas along the joint's anchorage. |              |     |          |       |           |            |            |            |            | NADO       |
| 09/29/2004 - Small spot of delamination on the joint edge, 4" . Leaky also.  |              |     |          |       |           |            |            |            |            | ZAIP       |
| 10/21/2002 - Minor rusty spots. Leaking as normal for a sliding plate joint.   |              |     |          |       |           |            |            |            |            | VZKC       |
| 08/30/2000 - Leaking.  |              |     |          |       |           |            |            |            |            | FIKL       |
| 06/03/1998 - Sliding Plate.  |              |     |          |       |           |            |            |            |            | MHIL       |
| Inspection Notes:  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
| Element 311 - Moveable Bearing   |              |     |          |       |           |            |            |            |            |            |
|  | 1            | 3   | 8        | ea.   |           | 95         | 5          | 0          |            |            |
|  |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :  |              |     |          |       |           |            |            |            |            |            |
| 09/13/2012 - Bearings are towards slight expansion (65 degeers F). Paint is faded, dirty, and has spot rust.   |              |     |          |       |           |            |            |            |            | NLGQ       |
| 09/21/2010 - Slight expansion; 50F. Some spot rust and debris.   |              |     |          |       |           |            |            |            |            | WZBZ       |
| 09/23/2008 - Good to Fair alignment today as slightly in expansion; 48F. Some cleaning and overcoat painting done.   |              |     |          |       |           |            |            |            |            | YZCZ       |
| 10/13/2006 - Rust, scale, and some paint loss. Alignment is Good.  |              |     |          |       |           |            |            |            |            | NADO       |
| 09/29/2004 - Spot rust and pitting from leaking joint.   |              |     |          |       |           |            |            |            |            | ZAIP       |
| 10/21/2002 - Minor rusty spots with some pitting under leaking joints.   |              |     |          |       |           |            |            |            |            | VZKC       |
| 08/30/2000 - No change.  |              |     |          |       |           |            |            |            |            | FIKL       |
| 06/03/1998 - Some rust & pitting.  |              |     |          |       |           |            |            |            |            | MHIL       |
| Inspection Notes:  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |

**INITIAL ASSESSMENT FORM FOR STRUCTURE :****U05210000+01602**

Continue

\*\*\*\*\* Span : Appr-1 - Steel Girders - Span 1 and 2 (cont.) \*\*\*\*\*

| Element Description  |              |     |          |       |           |            |            |            |            |            |
|--|--------------|-----|----------|-------|-----------|------------|------------|------------|------------|------------|
| Smart Flag   | Scale Factor | Env | Quantity | Units | Insp Each | Pct Stat 1 | Pct Stat 2 | Pct Stat 3 | Pct Stat 4 | Pct Stat 5 |
| Element 313 - Fixed Bearing Abutment 1   |              |     |          |       |           |            |            |            |            |            |
|  | 1            | 2   | 4        | ea.   |           | 95         | 5          | 0          |            |            |
|  |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :  |              |     |          |       |           |            |            |            |            |            |
| 09/13/2012 - Spot rust and faded paint.  |              |     |          |       |           |            |            |            |            | NLGQ       |
| 09/21/2010 - Spot rust and some soot from campfires on G1 and G2 bearing areas.  |              |     |          |       |           |            |            |            |            | WZBZ       |
| 09/23/2008 - Some overcoat painting has been done.   |              |     |          |       |           |            |            |            |            | YZCZ       |
| 10/13/2006 - Some rust, paint loss, and flaking paint where visible.   |              |     |          |       |           |            |            |            |            | NADO       |
| 09/29/2004 - Same as previous report.  |              |     |          |       |           |            |            |            |            | ZAIP       |
| 10/21/2002 - Rusty spots where visible.  |              |     |          |       |           |            |            |            |            | VZKC       |
| 08/30/2000 - No change.  |              |     |          |       |           |            |            |            |            | FIKL       |
| 06/03/1998 - Some rust & pitting.  |              |     |          |       |           |            |            |            |            | MHIL       |
| Inspection Notes:  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
| Element 321 - R/Conc Approach Slab West - Abutment 1   |              |     |          |       |           |            |            |            |            |            |
|  | 1            | 3   | 1        | ea.   |           | 0          | 100        | 0          | 0          |            |
|  |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :  |              |     |          |       |           |            |            |            |            |            |
| 09/13/2012 - Slab shows settlement and a bump. Sealant between slab and bridge end is torn most of length.   |              |     |          |       |           |            |            |            |            | NLGQ       |
| 09/21/2010 - Torn and loose sealant in the joint between the slab and bridge end. Settlement in the slab and approach roadway.                             |              |     |          |       |           |            |            |            |            | WZBZ       |
| 09/23/2008 - Same as past inspections.   |              |     |          |       |           |            |            |            |            | YZCZ       |
| 10/13/2006 - Put into Condition State 2 due to settlement. Joint between the slab and bridge is leaking into the approach fill.                            |              |     |          |       |           |            |            |            |            | NADO       |
| 09/29/2004 - Big bump for the off going traffic. Joint between the slab and bridge is leaking. Some of the sealant has lost its' bond to the guard angles. |              |     |          |       |           |            |            |            |            | ZAIP       |
| 10/21/2002 - Bump going off of the structure due to settlement of approach slab.   |              |     |          |       |           |            |            |            |            | VZKC       |
| 08/30/2000 - None  |              |     |          |       |           |            |            |            |            | FIKL       |
| 06/03/1998 - _   |              |     |          |       |           |            |            |            |            | MHIL       |
| Inspection Notes:  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
| Element 331 - Conc Bridge Railing  |              |     |          |       |           |            |            |            |            |            |
|  | 1            | 3   | 61       | m.    |           | 95         | 5          | 0          | 0          |            |
|  |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :  |              |     |          |       |           |            |            |            |            |            |
| 09/13/2012 - Tight shrinkage cracking. Small spalls where hand rail was removed.   |              |     |          |       |           |            |            |            |            | NLGQ       |
| 09/21/2010 - Unchanged from past inspection comments.  |              |     |          |       |           |            |            |            |            | WZBZ       |
| 09/23/2008 - Vertical cracking along the relief cuts. Small spalls where handrail was removed on the Left rail.  |              |     |          |       |           |            |            |            |            | YZCZ       |
| 10/13/2006 - Same as past reports.   |              |     |          |       |           |            |            |            |            | NADO       |
| 09/29/2004 - Vertical cracking between the relief cuts. Some fractured concrete where the hand rail was removed.   |              |     |          |       |           |            |            |            |            | ZAIP       |
| 10/21/2002 - Minor vertical cracks and some shrinkage cracks throughout.   |              |     |          |       |           |            |            |            |            | VZKC       |
| 08/30/2000 - Replaced metal rail with concrete barrier in 1999.  |              |     |          |       |           |            |            |            |            | FIKL       |
| 06/03/1998 - 30.74 * 2 = 61.48. Some rust & pitting of the rail posts & bridge rail.   |              |     |          |       |           |            |            |            |            | MHIL       |
| Inspection Notes:  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |

**U05210000+01602**

**Continue**

\* \* \* \* \* Span : Appr-1 - Steel Girders - Span 1 and 2 (cont.) \* \* \* \* \*

| Element Description  |              |     |          |       |           |            |            |            |            |            |
|--|--------------|-----|----------|-------|-----------|------------|------------|------------|------------|------------|
| Smart Flag   | Scale Factor | Env | Quantity | Units | Insp Each | Pct Stat 1 | Pct Stat 2 | Pct Stat 3 | Pct Stat 4 | Pct Stat 5 |
| Element 334 - Metal Rail Coated W-Beam and Round Steel Pipe w\ Guard Fence and Steel Posts |              |     |          |       |           |            |            |            |            |            |
|  | 1            | 3   | 31       | m.    |           | 80         | 20         | 0          | 0          | 0          |
|  |              |     |          |       |           | %          | %          | %          | %          | %          |

Previous Inspection Notes :

09/13/2012 - Rust, scale, and peeling paint on rail posts and pipes. Gaurd fence and fabric in good condition.

09/21/2010 - Spot rust, scale, and peeling paint on the posts and pipe. Guard fence posts and fabrics are in Good condition.

09/23/2008 - Unchanged. YZCZ

10/13/2006 - Paint is pitted, flaking, and rusty spots throughout. Guard fence is in Good condition.

09/29/2004 - Minor rust spots on the rail posts and pipes. Guard fence is in Good condition.

10/21/2002 - Minor rusting and pitting throughout. The guard fence is in Good condition.

08/30/2000 - 30.74x1=30.74 Rail along sidewalk is metal rail and new guard fence was added during 1999 construction. Minor rust on posts and existing w-beam.

Inspection Notes:

### General Inspection Notes

09/13/2012 - Big bump going off of bridge from approach slab settlement. NLGO

Non-destructive pin and hanger testing performed by Collins Engineers. CRH

09/21/2010 - NBI 72, roadway alignment, rated a "7" as bridge is slightly narrower than the approach roadway.

Several homeless people under the bridge today.

09/23/2008 - Lots of campers under the bridge today. YZCZ

10/13/2006 - NBI 58, deck, rated a "6" due to wear and small delaminations along the joints.

NBI 59, superstructure, rated a "6" due to rust, scale, and pitting of the girders.

NBI 60, substructure, rated a "6" due to spalls and delaminations in the caps and columns.

09/29/2004 - Cleaning of the bearings and caps could be done with ladders and/or bucket truck from the underside of the structure. Cap on the electrical is loose and one is missing.

10/21/2002 - Some of the caps that the electrical pull boxes are missing on the sidewalk allowing wires to be exposed.

08/30/2000 - Doubtful if the snoopers can be used anymore as new guard fence in 1999.

02-28 and 03-01-2001: Cleaning, UT inspection, and mag. particle inspection of the (4) pin & hanger assemblies and the (8) pins on th is structure. Nothing foundwith mag. particle inspection of note. Some minor wear on a couple of the pins was found and noted in the proper report. 06/03/1998 - .48m curb on the right and a 1.52m sidewalk on the left with inside of curb to inside of sidewalk as 8.61m.

12/01/1995 - Sufficiency Rating Calculation Accepted by ops\$u5963 at 3/11/97 10:45:45

Sufficiency Rating Calculation Accepted by ops\$u9004 at 2/19/97 14:25:13

02/01/1994 - REF

08/01/1992 - Updated with tape 1994

01/01/1991 - Updated with tape 1992

04/01/1989 - Updated with tape 1991 NB91

04/01/1987 - Updated with tape 1989 NB89

09/01/1984 - Updated with tape 1986

07/01/1981 - Updated with tape 1984



## INITIAL ASSESSMENT FORM FOR STRUCTURE :

P00060094+08281

Location : GREAT FALLS Structure Name: GF Warden Br-WB

## General Location Data

MDT Maintenance Section : 31-01 Great Falls

District Code, Number, Location : 03 Dist 3 GREAT FALLS

Division Code, Location : 31 GREAT FALLS

County Code, Location : 013 CASCADE

City Code, Location : 32800 GREAT FALLS

Kind fo Hwy Code, Description : 2 2 U.S. Numbered Hwy

Signed Route Number : 00089

Str Owner Code, Description : 1 State Highway Agency

Maintained by Code, Description : 1 State Highway Agency

Intersecting Feature : MISSOURI RV, U5205, BNSF

Kilometer Post, Mile Post : 152.60 km 94.82

Structure on the State Highway System : ☒ Latitude : 47°29'37"Structure on the National Highway System : ☒ Longitude : 111°18'41"Str Meet or Exceed NBIS Bridge Length : ☒

## Construction Data

Construction Project Number : F 60-2(5)92 1 2

Construction Station Number : 46+06.00

Construction Drawing Number : 12646

Construction Year : 1983

Reconstruction Year :

## Traffic Data

Current ADT : 37,380 ADT Count Year : 2009 Percent Trucks : 2 %

## Structure Loading, Rating and Posting Data

## Loading Data :

|                          |           |                        |
|--------------------------|-----------|------------------------|
| Design Loading :         |           | 5 MS 18 (HS 20)        |
| Inventory Load, Design : | 32.6 mton | B ASD Assigned         |
| Operating Load, Design : | 32.6 mton | B ASD Assigned         |
| Posting :                |           | 5 At/Above Legal Loads |

## Rating Data :

|                     | Operating | Inventory | Posting |
|---------------------|-----------|-----------|---------|
| Truck 1 Type 3 :    |           |           |         |
| Truck 2 Type 3-S3 : |           |           |         |
| Truck 3 Type 3-3 :  | 48.6      |           |         |

## Structure, Roadway and Clearance Data

## Structure Deck, Roadway and Span Data :

Structure Length : 646.79 m  
 Deck Area : 10,192.00 m sq  
 Deck Roadway Width : 12.10 m  
 Approach Roadway Width : 12.19 m  
 Median Code, Description : 0 No median

## Structure Vertical and Horizontal Clearance Data :

Vertical Clearance Over the Structure : 99.99 m  
 Reference Feature for Vertical Clearance : H Hwy beneath struct  
 Vertical Clearance Under the Structure : 6.46 m  
 Reference Feature for Lateral Underclearance : H Hwy beneath struct  
 Minimum Lateral Under Clearance Right : 7.40 m  
 Minimum Lateral Under Clearance Left : 0.00 m

## Span Data

## Main Span

Number Spans : 6  
 Material Type Code, Description : 4 Steel continuous  
 Span Design Code, Description : 2 Stringer/Multi-beam or Girder  
 Deck

Deck Structure Type : 1 Concrete Cast-in-Place  
 Deck Surfacing Type : 1 Monolithic concrete (concurrently placed with struct  
 Deck Protection Type : 0 None  
 Deck Membrain Type : 0 None

## Approach Span

Number of Spans : 14  
 Material Type Code, Description : 5 Prestressed concrete  
 Span Design Code, Description : 2 Stringer/Multi-beam or Girder



## Structure Vertical and Horizontal Clearance Data Inventory Route :

| Over / Under Direction Name | Inventory Route | South, West or Bi-directional Travel |          |            | North or East Travel |          |            |
|-----------------------------|-----------------|--------------------------------------|----------|------------|----------------------|----------|------------|
|                             |                 | Direction                            | Vertical | Horizontal | Direction            | Vertical | Horizontal |
| One Route Under             | U05205          | Both                                 | 6.46 m   | 7.32 m     | N/A                  |          |            |
| RIVER ROAD                  |                 |                                      |          |            |                      |          |            |
| Route On Structure          | P00060          | West                                 | 99.99 m  | 12.10 m    | N/A                  |          |            |
| 10TH AVE SOUTH WB           |                 |                                      |          |            |                      |          |            |



2003-08-05: Cleaned left half of the finger toughs today. W.A.Lay



## INITIAL ASSESSMENT FORM FOR STRUCTURE :

**P00060094+08281**

Continue

| Inspection Work Candidates  |                 | Status       | Priority | Effected Structure Unit | Scope of Work        | Action       | Covered Condition States |
|---|-----------------|--------------|----------|-------------------------|----------------------|--------------|--------------------------|
| Candidate ID  | Date Requested  |              |          |                         |                      |              |                          |
|   |                 |              |          |                         |                      |              |                          |
|   |                 |              |          |                         |                      |              |                          |
|   |                 |              |          |                         |                      |              |                          |
| D31-FY2013-000004   | 02 October 2012 | Not Approved | High     | A Approach              | 305 Assm Jt w/o Seal | Rehab Elem   |                          |
| Repair the loose finger joint at Bent 8 on the Left side of the bridge. |                 |              |          |                         |                      |              |                          |
|   |                 |              |          |                         |                      |              |                          |
|   |                 |              |          |                         |                      |              |                          |
|   |                 |              |          |                         |                      |              |                          |
| D31-FY2013-000005   | 02 October 2012 | Not Approved | High     | All Spans               | Bridge               | Rehab (flex) |                          |
| Repair the spalls along all of the joints.                              |                 |              |          |                         |                      |              |                          |
|   |                 |              |          |                         |                      |              |                          |
|   |                 |              |          |                         |                      |              |                          |
|   |                 |              |          |                         |                      |              |                          |

Late Reason:

Inspection Date: 09/19/2012

### Element Inspection Data

\*\*\*\*\* Span : Main-0 - Steel Girder Spans 14 - 19 \*\*\*\*\*

| Element Description   |              |     |          |       |           |            |            |            |            |            |
|---|--------------|-----|----------|-------|-----------|------------|------------|------------|------------|------------|
| Smart Flag  | Scale Factor | Env | Quantity | Units | Insp Each | Pct Stat 1 | Pct Stat 2 | Pct Stat 3 | Pct Stat 4 | Pct Stat 5 |
| Element 12 - Bare Concrete Deck   |              |     |          |       |           |            |            |            |            |            |
|   | 1            | 3   | 4618     | sq.m. | X         | 0          | 100        | 0          | 0          | 0          |
|   |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :   |              |     |          |       |           |            |            |            |            |            |
| 09/19/2012 - Random spalled areas in most of the Spans and delaminations along the joint edges. Some cracked areas with delaminations in Spans 15 thru 17. Some spalls have been patched with the velocity patcher.       |              |     |          |       |           |            |            |            |            | ZZJO       |
| 09/27/2010 - Small spalls and delaminations along the joint edges. Steel sounds solid when tapped on.   |              |     |          |       |           |            |            |            |            | EZJZ       |
| 06/20/2008 - Same as past inspections and add some spalling and delamiantions along the joint edges.  |              |     |          |       |           |            |            |            |            | OZKZ       |
| 08/17/2006 - None   |              |     |          |       |           |            |            |            |            | TZCZ       |
| 10/06/2004 - Transverse cracking throughout with some cracks that are wider and open. Spalling along joint edges. Some areas of mapping cracks, mostly in the Left lane. Some wear in the wheel paths.                    |              |     |          |       |           |            |            |            |            | GIDZ       |
| 10/21/2002 - Same as last report and add some minor delamination noted with a small spalled area at one joint.  |              |     |          |       |           |            |            |            |            | IZHX       |
| 08/23/2000 - 293 * 15.76 = 4617.68  |              |     |          |       |           |            |            |            |            | FIAS       |
| No change from previous report plus some delaminations noted on spot checks near the joints.  |              |     |          |       |           |            |            |            |            |            |
| 12/11/1997 - Deck has mapping cracks throughout.  |              |     |          |       |           |            |            |            |            | FKAR       |
| 10/01/1995 - None   |              |     |          |       |           |            |            |            |            | YDNF       |
| 09/01/1992 - None   |              |     |          |       |           |            |            |            |            | REFI       |
| Inspection Notes:   |              |     |          |       |           |            |            |            |            |            |
|   |              |     |          |       |           |            |            |            |            |            |
|   |              |     |          |       |           |            |            |            |            |            |
| Element 107 - Paint Stl Opn Girder  |              |     |          |       |           |            |            |            |            |            |
|   | 1            | 2   | 1465     | m.    |           | 90         | 10         | 0          | 0          | 0          |
|   |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :   |              |     |          |       |           |            |            |            |            |            |
| 09/19/2012 - Minor peeling paint in areas. Rust blisters with minor surface pitting near joints that leak. Faded and dirty paint throughout the girders.  |              |     |          |       |           |            |            |            |            | ZZJO       |
| 09/27/2010 - Rust blisters, scale, and minor paint loss on tops of the lower flanges of the outer girders. Wose areas are where water can leak onto the girders from joints or drains.                                    |              |     |          |       |           |            |            |            |            | EZJZ       |
| 06/20/2008 - Rust, scale, and paint loss on the lower web and bottom flanges; especially near leaky joints and downspouts.  |              |     |          |       |           |            |            |            |            | OZKZ       |
| 08/17/2006 - None   |              |     |          |       |           |            |            |            |            | TZCZ       |
| 10/06/2004 - Spot rust and some paint fade on the lower portions of the web and bottom flanges; especially near leaking joints.   |              |     |          |       |           |            |            |            |            | GIDZ       |
| 10/21/2002 - Some paint loss along the under side of the girders near drains, more so on G5. Some speckled rust starting on the left side of the web and bottom flange of G1. A 4" x 1"(h) 1' back of Pier 19 for G1S18R. |              |     |          |       |           |            |            |            |            | IZHX       |
| 08/23/2000 - 293 * 5 = 1465.0m  |              |     |          |       |           |            |            |            |            | FIAS       |
| Some rust and pitting.  |              |     |          |       |           |            |            |            |            |            |
| 12/11/1997 - None   |              |     |          |       |           |            |            |            |            | FKAR       |
| 10/01/1995 - None   |              |     |          |       |           |            |            |            |            | YDNF       |
| 09/01/1992 - None   |              |     |          |       |           |            |            |            |            | REFI       |
| Inspection Notes:   |              |     |          |       |           |            |            |            |            |            |
|   |              |     |          |       |           |            |            |            |            |            |
|   |              |     |          |       |           |            |            |            |            |            |

**INITIAL ASSESSMENT FORM FOR STRUCTURE :****P00060094+08281**

Continue

\*\*\*\*\* Span : Main-0 - Steel Girder Spans 14 - 19 (cont.) \*\*\*\*\*

| Element Description   |              |     |          |       |           |            |            |            |            |            |
|---|--------------|-----|----------|-------|-----------|------------|------------|------------|------------|------------|
| Smart Flag  | Scale Factor | Env | Quantity | Units | Insp Each | Pct Stat 1 | Pct Stat 2 | Pct Stat 3 | Pct Stat 4 | Pct Stat 5 |
| Element 205 - R/Conc Column Pier 14 thru 20   |              |     |          |       |           |            |            |            |            |            |
|   | 1            | 3   | 27       | ea.   |           | 90         | 5          | 5          | 0          |            |
|   |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :   |              |     |          |       |           |            |            |            |            |            |
| 09/19/2012 - Right column at Pier 16 has a small delaminated area.  |              |     |          |       |           |            |            |            |            | ZZJO       |
| 09/27/2010 - Tight surface shrinkage cracks. A small surface spall from exposed rebar feet. Rust on lower portions of the ice breakers.   |              |     |          |       |           |            |            |            |            | EZJZ       |
| 06/20/2008 - Same as past inspections, but Underwater II may be different.  |              |     |          |       |           |            |            |            |            | OZKZ       |
| 08/17/2006 - None   |              |     |          |       |           |            |            |            |            | TZCZ       |
| 10/06/2004 - Rust on the lower portion of the ice breakers. Tight shrinkage cracks on most columns. Minor spot rust stains from exposed rebar chair legs. Some scale below the normal waterline.  |              |     |          |       |           |            |            |            |            | GIDZ       |
| 10/21/2002 - Some minor and tight vertical shrinkage cracks throughout. Ice breakers need some paint.   |              |     |          |       |           |            |            |            |            | IZHX       |
| 08/23/2000 - Env. #3 as always wet.   |              |     |          |       |           |            |            |            |            | FIAS       |
| 12/11/1997 - (4) columns each at Piers 14 - 19 and (3) columns at Bent 20.  |              |     |          |       |           |            |            |            |            | FKAR       |
| 10/01/1995 - None   |              |     |          |       |           |            |            |            |            | YDNF       |
| 09/01/1992 - None   |              |     |          |       |           |            |            |            |            | REFI       |
| Inspection Notes:   |              |     |          |       |           |            |            |            |            |            |
|   |              |     |          |       |           |            |            |            |            |            |
|   |              |     |          |       |           |            |            |            |            |            |
| Element 220 - R/C Sub Pile Cap/Ftg Pier 15 thru 19  |              |     |          |       |           |            |            |            |            |            |
|   | 1            | 3   | 4        | ea.   |           | 100        | 0          | 0          | 0          |            |
|   |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :   |              |     |          |       |           |            |            |            |            |            |
| 09/19/2012 - None   |              |     |          |       |           |            |            |            |            | ZZJO       |
| 09/27/2010 - Per the 2011 underwater inspection by Infrastructure Engineers there is no change to the condition of this element. CRH  |              |     |          |       |           |            |            |            |            | EZJZ       |
| 06/20/2008 - See latest Underwater II report.   |              |     |          |       |           |            |            |            |            | OZKZ       |
| 08/17/2006 - Per Infrastructure Engineers August 24, 2006 underwater inspection, the pier 4 subfooting is partially exposed at the upstream nose. The pier 3 subfooting is now covered by sand and river rock. The pier 4 subfooting is exposed 10 inches high at the upstream nose and is in good condition. Timber formwork is still attached to the west face of the pier 5 footing. |              |     |          |       |           |            |            |            |            | TZCZ       |
| 10/06/2004 - Unchanged, but check the latest underwater report.   |              |     |          |       |           |            |            |            |            | GIDZ       |
| 10/21/2002 - None   |              |     |          |       |           |            |            |            |            | IZHX       |
| 08/23/2000 - LW -- underwater Inspection 7/15/98 (Guthrie Diving Co) -- All exposed footings in good condition.   |              |     |          |       |           |            |            |            |            | FIAS       |
| Inspection Notes:   |              |     |          |       |           |            |            |            |            |            |
|   |              |     |          |       |           |            |            |            |            |            |
|   |              |     |          |       |           |            |            |            |            |            |
| Element 227 - R/C Submerged Pile Pier 15 thru 19  |              |     |          |       |           |            |            |            |            |            |
|   | 1            | 3   | 20       | ea.   |           | 90         | 10         | 0          | 0          |            |
|   |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :   |              |     |          |       |           |            |            |            |            |            |
| 09/19/2012 - None   |              |     |          |       |           |            |            |            |            | ZZJO       |
| 09/27/2010 - Per the 2011 underwater inspection by Infrastructure Engineers there is no change in the condition of this element. CRH  |              |     |          |       |           |            |            |            |            | EZJZ       |
| 06/20/2008 - See latest Underwater II report.   |              |     |          |       |           |            |            |            |            | OZKZ       |
| 08/17/2006 - Per Infrastructure Engineers August 24, 2006 underwater inspection, there is vertical cracking present on piers 4 thru 7. The vertical cracking is generally 1/32" to 1/16" wide and extends from the waterline to the cap.  |              |     |          |       |           |            |            |            |            | TZCZ       |
| 10/06/2004 - Unchanged, but check the latest underwater report.   |              |     |          |       |           |            |            |            |            | GIDZ       |
| 10/21/2002 - None   |              |     |          |       |           |            |            |            |            | IZHX       |
| 08/23/2000 - LW -- Underwater Inspection 7/15/98 (Guthrie Diving Co) -- All have light scaling below waterline. Piers have 1/32" vertical cracks. No areas of significant deterioration or distress.  |              |     |          |       |           |            |            |            |            | FIAS       |
| Inspection Notes:   |              |     |          |       |           |            |            |            |            |            |
|   |              |     |          |       |           |            |            |            |            |            |
|   |              |     |          |       |           |            |            |            |            |            |

# INITIAL ASSESSMENT FORM FOR STRUCTURE :

**P00060094+08281**

Continue

\*\*\*\*\* Span : Main-0 - Steel Girder Spans 14 - 19 (cont.) \*\*\*\*\*

| Element Description  |              |     |          |       |           |            |            |            |            |            |
|--|--------------|-----|----------|-------|-----------|------------|------------|------------|------------|------------|
| Smart Flag   | Scale Factor | Env | Quantity | Units | Insp Each | Pct Stat 1 | Pct Stat 2 | Pct Stat 3 | Pct Stat 4 | Pct Stat 5 |
| Element 234 - R/Conc Cap Pier 14 thru 20   |              |     |          |       |           |            |            |            |            |            |
|  | 1            | 1   | 156      | m.    |           | 90         | 5          | 5          | 0          |            |
|  |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :  |              |     |          |       |           |            |            |            |            |            |
| 09/19/2012 - Staining on the caps under leaking joints. Tight cracks at the steps in the caps. Shallow surface spalls and popouts from rebar chair feet on the underside of the caps. Caps at Pier 15 and 16 have small surface delaminations on their Right ends. |              |     |          |       |           |            |            |            |            | ZZJO       |
| 09/27/2010 - Staining on caps under leaky joints. Some small surface spalls on the underside of the caps from exposed/rusty rebar chair feet. Tight cracks at steps in the caps. Dirt and debris in areas.   |              |     |          |       |           |            |            |            |            | EZJZ       |
| 06/20/2008 - Some dirt/debris on tops of the caps. Some tight vertical stress riser cracks at the steps in the caps. Underside of the caps show rusty rebar chair feet with minor surface spalls.  |              |     |          |       |           |            |            |            |            | OZKZ       |
| 08/17/2006 - None  |              |     |          |       |           |            |            |            |            | TZCZ       |
| 10/06/2004 - Dirt/debris on the caps. Bird nests on most of the caps on most of the caps. Stained concrete under leaky joints. Some tight vertical cracks under the bearings.  |              |     |          |       |           |            |            |            |            | GIDZ       |
| 10/21/2002 - Some small and tight shrinkage cracks throughout. Dirt and debris on top of the cap at Pier 17 under the finger joint.  |              |     |          |       |           |            |            |            |            | IZHX       |
| 08/23/2000 - 7 * 22.29 = 1563.03m  |              |     |          |       |           |            |            |            |            | FIAS       |
| 12/11/1997 -   |              |     |          |       |           |            |            |            |            | FKAR       |
| 10/01/1995 - None  |              |     |          |       |           |            |            |            |            | YDNF       |
| 09/01/1992 - None  |              |     |          |       |           |            |            |            |            | REFI       |
| Inspection Notes:  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
| Element 305 - Assm Jt w/o Seal Finger Joint at Pier 17 and Sliding Plate at Bent 14 and Pier 20  |              |     |          |       |           |            |            |            |            |            |
|  | 1            | 3   | 60       | m.    |           | 90         | 10         | 0          |            |            |
|  |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :  |              |     |          |       |           |            |            |            |            |            |
| 09/19/2012 - Spalling along the edges of the steel. Steel sounds solid when tapped on. Troughs under the joints are full of dirt and debris with some areas of the troughs showing damage.   |              |     |          |       |           |            |            |            |            | ZZJO       |
| 09/27/2010 - Troughs are full of dirt/debris. Good alignment on fingers. Steel sounds solid when tapped on. Some small spalled areas along the joint edges.  |              |     |          |       |           |            |            |            |            | EZJZ       |
| 06/20/2008 - Finger joint alignment at Pier 17 is Good. Steel sounds solid when tapped on. Trough under the joint is full of sanding material and the downspouts are plugged. Small spalls/delaminations along the joint edges.                                    |              |     |          |       |           |            |            |            |            | OZKZ       |
| 08/17/2006 - None  |              |     |          |       |           |            |            |            |            | TZCZ       |
| 10/06/2004 - Troughs under the joints are full of dirt and sanding material. Finger joint alignment is Good. Minor spalled spots along the joint edges.  |              |     |          |       |           |            |            |            |            | GIDZ       |
| 10/21/2002 - No change but the finger joint is full of sanding material on both ends by the barrier rail.  |              |     |          |       |           |            |            |            |            | IZHX       |
| 08/23/2000 - 15.76 + (2 * 22.28) = 60.32m  |              |     |          |       |           |            |            |            |            | FIAS       |
| 12/11/1997 - Sliding plate joints at Pier 20 and Bent 14. Finger joint at Pier 17. The joints themselves are sound.  |              |     |          |       |           |            |            |            |            | FKAR       |
| 10/01/1995 - None  |              |     |          |       |           |            |            |            |            | YDNF       |
| 09/01/1992 - None  |              |     |          |       |           |            |            |            |            | REFI       |
| Inspection Notes:  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |

**INITIAL ASSESSMENT FORM FOR STRUCTURE :****P00060094+08281**

Continue

\*\*\*\*\* Span : Main-0 - Steel Girder Spans 14 - 19 (cont.) \*\*\*\*\*

| Element Description   |              |     |          |       |           |            |            |            |            |            |
|---|--------------|-----|----------|-------|-----------|------------|------------|------------|------------|------------|
| Smart Flag  | Scale Factor | Env | Quantity | Units | Insp Each | Pct Stat 1 | Pct Stat 2 | Pct Stat 3 | Pct Stat 4 | Pct Stat 5 |
| Element 311 - Moveable Bearing Pier 14, 15, 17(doubles), 18, and 20   |              |     |          |       |           |            |            |            |            |            |
|   | 1            | 2   | 30       | ea.   |           | 85         | 10         | 5          |            |            |
|   |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :   |              |     |          |       |           |            |            |            |            |            |
| 09/19/2012 - Bearing for G4S17 for Span 17 has broken anchor bolts and is rocked over to its' limit; photo. Bearing anchor bolts for G5S17 are also broken. Spot rust, staining, and debris at the leaky joints.  |              |     |          |       |           |            |            |            |            | ZZJO       |
| 09/27/2010 - Spot rust and debris on some of the bearings. Alignment is ok today. Same on previously reported broken anchor bolts.  |              |     |          |       |           |            |            |            |            | EZJZ       |
| 06/20/2008 - Broken anchor bolts for both sides of G4S17 and G5S17 for Condition State 3; Bridge notified this date. Loose anchor bolts,, but still tight in their bearings as previously reported for Condition State 2. Some overcoat painting done, but still some rusty and paint loss on others. |              |     |          |       |           |            |            |            |            | OZKZ       |
| 08/17/2006 - None   |              |     |          |       |           |            |            |            |            | TZCZ       |
| 10/06/2004 - Rust spots, pitting and some paint loss on the bearings. Unchanged from previous reports when viewed by binoculars.  |              |     |          |       |           |            |            |            |            | GIDZ       |
| 10/21/2002 - Loose anchor bolts but tight in their holes at Pier 18 for G4L, G3L and R, and G2R. Some rust, pitting, minor paint loss and debris at all bearings.   |              |     |          |       |           |            |            |            |            | IZHX       |
| 08/23/2000 - Env. #2 as under joints. Some rust and pitting.  |              |     |          |       |           |            |            |            |            | FIAS       |
| 12/11/1997 - 5 shoes each at Pier 20, Pier 18, Pier 17 (two lines), Pier 15 and Bent 14   |              |     |          |       |           |            |            |            |            | FKAR       |
| 10/01/1995 - None   |              |     |          |       |           |            |            |            |            | YDNF       |
| 09/01/1992 - None   |              |     |          |       |           |            |            |            |            | REFI       |
| Inspection Notes:   |              |     |          |       |           |            |            |            |            |            |
|   |              |     |          |       |           |            |            |            |            |            |
|   |              |     |          |       |           |            |            |            |            |            |
| Element 313 - Fixed Bearing Pier 16 and 19  |              |     |          |       |           |            |            |            |            |            |
|   | 1            | 1   | 10       | ea.   |           | 95         | 5          | 0          |            |            |
|   |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :   |              |     |          |       |           |            |            |            |            |            |
| 09/19/2012 - Spot rust, paint loss, and some debris.  |              |     |          |       |           |            |            |            |            | ZZJO       |
| 09/27/2010 - Spot rust with some dirt/debris.   |              |     |          |       |           |            |            |            |            | EZJZ       |
| 06/20/2008 - Overcoat painted some, but still some rust and paint loss to others.   |              |     |          |       |           |            |            |            |            | OZKZ       |
| 08/17/2006 - None   |              |     |          |       |           |            |            |            |            | TZCZ       |
| 10/06/2004 - Some rust spots on several bearings. Unchanged from previous reports when viewed by binoculars.  |              |     |          |       |           |            |            |            |            | GIDZ       |
| 10/21/2002 - Some rust, pitting, minor paint loss and debris at all bearings.   |              |     |          |       |           |            |            |            |            | IZHX       |
| 08/23/2000 - Some rust and pitting.   |              |     |          |       |           |            |            |            |            | FIAS       |
| 12/11/1997 - Fixed shoes at Piers 16 and 19.  |              |     |          |       |           |            |            |            |            | FKAR       |
| 10/01/1995 - None   |              |     |          |       |           |            |            |            |            | YDNF       |
| 09/01/1992 - None   |              |     |          |       |           |            |            |            |            | REFI       |
| Inspection Notes:   |              |     |          |       |           |            |            |            |            |            |
|   |              |     |          |       |           |            |            |            |            |            |
|   |              |     |          |       |           |            |            |            |            |            |



\*\*\*\*\* Span : Main-0 - Steel Girder Spans 14 - 19 (cont.) \*\*\*\*\*

| Element Description   |              |     |          |       |           |            |            |            |            |            |
|---|--------------|-----|----------|-------|-----------|------------|------------|------------|------------|------------|
| Smart Flag  | Scale Factor | Env | Quantity | Units | Insp Each | Pct Stat 1 | Pct Stat 2 | Pct Stat 3 | Pct Stat 4 | Pct Stat 5 |
| Element 331 - Conc Bridge Railing   |              |     |          |       |           |            |            |            |            |            |
|   | 1            | 3   | 586      | m.    |           | 90         | 5          | 5          | 0          |            |
|   |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :   |              |     |          |       |           |            |            |            |            |            |
| 09/19/2012 - Small spalls, delaminations, and popouts throughout. Barrier has lots of surface shrinkage cracks.   |              |     |          |       |           |            |            |            |            | ZZJO       |
| 09/27/2010 - Some rubs and scrapes. Vertical cracking throughout with some small spalls and scaling along the cracks. Condition State 3 due to minor delaminations on barrier in spots. |              |     |          |       |           |            |            |            |            | EZJZ       |
| 06/20/2008 - Same on cracks every 3 to 4 ft. Many of the cracks have small delaminated and some spalled areas.  |              |     |          |       |           |            |            |            |            | OZKZ       |
| 08/17/2006 - None   |              |     |          |       |           |            |            |            |            | TZCZ       |
| 10/06/2004 - Tight vertical cracks every 3 to 4 feet.   |              |     |          |       |           |            |            |            |            | GIDZ       |
| 10/21/2002 - Minor shrinkage cracks.  |              |     |          |       |           |            |            |            |            | IZHX       |
| 08/23/2000 - 293 * 2 = 586m   |              |     |          |       |           |            |            |            |            | FIAS       |
| 12/11/1997 - Traffic rail lt. and rt. ELEMENT WAS ADDED 6/16/2000. NEED TO VERIFY CONDITION STATE(S).   |              |     |          |       |           |            |            |            |            | FKAR       |
| Inspection Notes:   |              |     |          |       |           |            |            |            |            |            |
|   |              |     |          |       |           |            |            |            |            |            |
|   |              |     |          |       |           |            |            |            |            |            |
| Element 334 - Metal Rail Coated   |              |     |          |       |           |            |            |            |            |            |
|   | 1            | 3   | 293      | m.    |           | 90         | 10         | 0          | 0          | 0          |
|   |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :   |              |     |          |       |           |            |            |            |            |            |
| 09/19/2012 - Spot rust, exposed base coat, and faded paint throughout. Chainlink fabric is in Good condition.   |              |     |          |       |           |            |            |            |            | ZZJO       |
| 09/27/2010 - Spot rust, exposed primer coat, and paint loss throughout.   |              |     |          |       |           |            |            |            |            | EZJZ       |
| 06/20/2008 - Rusty spots, paint loss, and visible prime coat throughout.  |              |     |          |       |           |            |            |            |            | OZKZ       |
| 08/17/2006 - None   |              |     |          |       |           |            |            |            |            | TZCZ       |
| 10/06/2004 - Rusty spots on the rail posts and tubes.   |              |     |          |       |           |            |            |            |            | GIDZ       |
| 10/21/2002 - Add some scrapes and paint loss throughout.  |              |     |          |       |           |            |            |            |            | IZHX       |
| 08/23/2000 - Some rust and pitting.   |              |     |          |       |           |            |            |            |            | FIAS       |
| 12/11/1997 - Pedestrian rail on North side of bridge.   |              |     |          |       |           |            |            |            |            | FKAR       |
| 10/01/1995 - None   |              |     |          |       |           |            |            |            |            | YDNF       |
| 09/01/1992 - None   |              |     |          |       |           |            |            |            |            | REFI       |
| Inspection Notes:   |              |     |          |       |           |            |            |            |            |            |
|   |              |     |          |       |           |            |            |            |            |            |
|   |              |     |          |       |           |            |            |            |            |            |
| Element 358 - Deck Cracking SmFlag  |              |     |          |       |           |            |            |            |            |            |
| X   | 1            | 3   | 1        | ea.   | X         | 0          | 100        | 0          | 0          |            |
|   |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :   |              |     |          |       |           |            |            |            |            |            |
| 09/19/2012 - Both size and density come into play.  |              |     |          |       |           |            |            |            |            | ZZJO       |
| 09/27/2010 - Lots of cracking with some small delaminations in the worse areas.   |              |     |          |       |           |            |            |            |            | EZJZ       |
| 06/20/2008 - Unchanged.   |              |     |          |       |           |            |            |            |            | OZKZ       |
| 08/17/2006 - None   |              |     |          |       |           |            |            |            |            | TZCZ       |
| 10/06/2004 - Numerous wider cracks in all spans. Cracks are mostly moderate in size, 0.50 to 1.00mm. There are a few cracks that are in the severe range of greater than 1.00mm.        |              |     |          |       |           |            |            |            |            | GIDZ       |
| Inspection Notes:   |              |     |          |       |           |            |            |            |            |            |
|   |              |     |          |       |           |            |            |            |            |            |
|   |              |     |          |       |           |            |            |            |            |            |

\*\*\*\*\* Span : Appr-1 - P/S Concrete Spans 1 thru 13 and 20 \*\*\*\*\*

| Element Description |  |  |  |  |  |  |  |  |  |  |
|---------------------|--|--|--|--|--|--|--|--|--|--|
|---------------------|--|--|--|--|--|--|--|--|--|--|

**P00060094+08281**

Continue

\*\*\*\*\* Span : Appr-1 - P/S Concrete Spans 1 thru 13 and 20 (cont.) \*\*\*\*\*

| Element Description  |              |     |          |       |           |            |            |            |            |            |
|--|--------------|-----|----------|-------|-----------|------------|------------|------------|------------|------------|
| Smart Flag   | Scale Factor | Env | Quantity | Units | Insp Each | Pct Stat 1 | Pct Stat 2 | Pct Stat 3 | Pct Stat 4 | Pct Stat 5 |
| Element 12 - Bare Concrete Deck  |              |     |          |       |           |            |            |            |            |            |
|  | 1            | 3   | 5576     | sq.m. | X         | 0          | 100        | 0          | 0          | 0          |
|  |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :  |              |     |          |       |           |            |            |            |            |            |
| 09/19/2012 - Spalls and delaminations along joint steel. Some random delaminations in most of the Spans with some potholes/spalls starting.  |              |     |          |       |           |            |            |            |            | ZZJO       |
| 09/27/2010 - Small spalls and delaminations along the joint steel. Small delaminations in the worse cracked areas.   |              |     |          |       |           |            |            |            |            | EZJZ       |
| 06/20/2008 - Wear is probably a little worse and the rest of the comments still apply.   |              |     |          |       |           |            |            |            |            | OZKZ       |
| 08/17/2006 - None  |              |     |          |       |           |            |            |            |            | TZCZ       |
| 10/06/2004 - Transverse cracking thropughout with some of the cracks wider and open; see photos. Spalling along joint edges. Some areas of mapping cracks; mainly in the left lane. Minor wear in the wheel paths. |              |     |          |       |           |            |            |            |            | GIDZ       |
| 10/21/2002 - Minor delaminations and very small spalled areas at the joints; rest is unchanged from previous reports.  |              |     |          |       |           |            |            |            |            | IZHX       |
| 08/23/2000 - No change.  |              |     |          |       |           |            |            |            |            | FIAS       |
| 12/11/1997 - Deck has minor cracking throughout.   |              |     |          |       |           |            |            |            |            | FKAR       |
| 10/01/1995 - None  |              |     |          |       |           |            |            |            |            | YDNF       |
| 09/01/1992 - 353.79 * 15.76 = 5575.73  |              |     |          |       |           |            |            |            |            | REFI       |
| Inspection Notes:  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
| Element 109 - P/S Conc Open Girder   |              |     |          |       |           |            |            |            |            |            |
|  | 1            | 1   | 2209     | m.    |           | 95         | 5          | 0          | 0          |            |
|  |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :  |              |     |          |       |           |            |            |            |            |            |
| 09/19/2012 - Minor cracks and surface spalls on ends of several of the girders. Mostly on those that get moisture on them.   |              |     |          |       |           |            |            |            |            | ZZJO       |
| 09/27/2010 - Generally Good condition. Some minor spalls and cracking on ends of several of the girders that have now exposed strands.   |              |     |          |       |           |            |            |            |            | EZJZ       |
| 06/20/2008 - No change.  |              |     |          |       |           |            |            |            |            | OZKZ       |
| 08/17/2006 - None  |              |     |          |       |           |            |            |            |            | TZCZ       |
| 10/06/2004 - Same on the girder ends at Bent 11 and left end of the left gurder at Bent 12. No other problems noted when viewed by binoculars.   |              |     |          |       |           |            |            |            |            | GIDZ       |
| 10/21/2002 - End of G2S12L at Bent 12 and several girder ends at Bent 11 have spalled concrete on their ends with exposed and rusted strand showing.   |              |     |          |       |           |            |            |            |            | IZHX       |
| 08/23/2000 - None  |              |     |          |       |           |            |            |            |            | FIAS       |
| 12/11/1997 - None  |              |     |          |       |           |            |            |            |            | FKAR       |
| 10/01/1995 - None  |              |     |          |       |           |            |            |            |            | YDNF       |
| 09/01/1992 - (6 * 321) (7 * 33) (3 * 17.25 Spans 2 and 3) = 2208.79m   |              |     |          |       |           |            |            |            |            | REFI       |
| Inspection Notes:  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |



**INITIAL ASSESSMENT FORM FOR STRUCTURE :****P00060094+08281**

Continue

\*\*\*\*\* Span : Appr-1 - P/S Concrete Spans 1 thru 13 and 20 (cont.) \*\*\*\*\*

| Element Description   |              |     |          |       |           |            |            |            |            |            |
|---|--------------|-----|----------|-------|-----------|------------|------------|------------|------------|------------|
| Smart Flag  | Scale Factor | Env | Quantity | Units | Insp Each | Pct Stat 1 | Pct Stat 2 | Pct Stat 3 | Pct Stat 4 | Pct Stat 5 |
| Element 205 - R/Conc Column Bents 2 thru 13   |              |     |          |       |           |            |            |            |            |            |
|   | 1            | 2   | 28       | ea.   |           | 90         | 5          | 5          | 0          |            |
|   |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :   |              |     |          |       |           |            |            |            |            |            |
| 09/19/2012 - Staining from joint leakage on some. Cracks on the columns of Bent 2 and 3 with a small delaminated area. Tight surface shrinkage cracks.  |              |     |          |       |           |            |            |            |            | ZZJO       |
| 09/27/2010 - Staining on those under leaky joints. Some small spalls and (1) delamination noted in the worse areas of cracking. Observed that most everything is superficial and probably caused by shallow rebar chairs.       |              |     |          |       |           |            |            |            |            | EZJZ       |
| 06/20/2008 - Same as previous report comments.  |              |     |          |       |           |            |            |            |            | OZKZ       |
| 08/17/2006 - None   |              |     |          |       |           |            |            |            |            | TZCZ       |
| 10/06/2004 - Sides of several columns have small spalling section with either rebar chair feet or shallow rebar; causing some rust stains. Small popouts on several columns. Worse areas on the columns are under leaky joints. |              |     |          |       |           |            |            |            |            | GIDZ       |
| 10/21/2002 - Minor scrapes and spalled areas with some shrinkage cracks throughout.   |              |     |          |       |           |            |            |            |            | IZHX       |
| 08/23/2000 - None   |              |     |          |       |           |            |            |            |            | FIAS       |
| 12/11/1997 - None   |              |     |          |       |           |            |            |            |            | FKAR       |
| 10/01/1995 - None   |              |     |          |       |           |            |            |            |            | YDNF       |
| 09/01/1992 - (4) locations with 3 columns and (8) locations with 2 columns.   |              |     |          |       |           |            |            |            |            | REFI       |
| Inspection Notes:   |              |     |          |       |           |            |            |            |            |            |
|   |              |     |          |       |           |            |            |            |            |            |
|   |              |     |          |       |           |            |            |            |            |            |
| Element 215 - R/Conc Abutment Abutment 1 and 22   |              |     |          |       |           |            |            |            |            |            |
|   | 1            | 1   | 52       | m.    |           | 95         | 5          | 0          | 0          |            |
|   |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :   |              |     |          |       |           |            |            |            |            |            |
| 09/19/2012 - Abutment 1 has a crack between the Right most (2) girders. Small spalls at the cap/backwall area and near the embedded bearings. Steel portion of the bearings are rusty.  |              |     |          |       |           |            |            |            |            | ZZJO       |
| 09/27/2010 - Generally Good condition. Same comments as previous inspections.   |              |     |          |       |           |            |            |            |            | EZJZ       |
| 06/20/2008 - Same as past inspections. Crack at Abutment 1 between thr Right (2) girders was leaking water in 2006. Some rust and paint loss noted on the visible portion of the bearings.                                      |              |     |          |       |           |            |            |            |            | OZKZ       |
| 08/17/2006 - None   |              |     |          |       |           |            |            |            |            | TZCZ       |
| 10/06/2004 - Both Abutment caps have tight vertical cracks with efflorescence near the structure's centerline. Minor cracks where girders are embedded in backwall concrete. Minor erosion on the Right wingwalls.              |              |     |          |       |           |            |            |            |            | GIDZ       |
| 10/21/2002 - ok   |              |     |          |       |           |            |            |            |            | IZHX       |
| 08/23/2000 - None   |              |     |          |       |           |            |            |            |            | FIAS       |
| 12/11/1997 - None   |              |     |          |       |           |            |            |            |            | FKAR       |
| 10/01/1995 - None   |              |     |          |       |           |            |            |            |            | YDNF       |
| 09/01/1992 - (22.92 2.05 1.65) = 51.98m   |              |     |          |       |           |            |            |            |            | REFI       |
| Inspection Notes:   |              |     |          |       |           |            |            |            |            |            |
|   |              |     |          |       |           |            |            |            |            |            |
|   |              |     |          |       |           |            |            |            |            |            |

**INITIAL ASSESSMENT FORM FOR STRUCTURE :****P00060094+08281**

Continue

\*\*\*\*\* Span : Appr-1 - P/S Concrete Spans 1 thru 13 and 20 (cont.) \*\*\*\*\*

| Element Description   |              |     |          |       |           |            |            |            |            |            |
|---|--------------|-----|----------|-------|-----------|------------|------------|------------|------------|------------|
| Smart Flag  | Scale Factor | Env | Quantity | Units | Insp Each | Pct Stat 1 | Pct Stat 2 | Pct Stat 3 | Pct Stat 4 | Pct Stat 5 |
| Element 234 - R/Conc Cap Bents 2 thru 13  |              |     |          |       |           |            |            |            |            |            |
|   | 1            | 1   | 215      | m.    |           | 90         | 5          | 5          | 0          |            |
|   |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :   |              |     |          |       |           |            |            |            |            |            |
| 09/19/2012 - Shallow surface spalls on the underside of the caps from rebar chair feet and the worse are those under leaky joints. Dirt and debris. Small delaminations on Bents 2, 3, and 8's caps.  |              |     |          |       |           |            |            |            |            | ZZJO       |
| 09/27/2010 - Tight cracks near steps on the caps. Lots of surface spalls on the underside of the caps from exposed rebar chair feet. Lots of pigeon nests and debris on tops of the caps.   |              |     |          |       |           |            |            |            |            | EZJZ       |
| 06/20/2008 - Tight vertical stress riser cracks at the steps in the caps. Undersides of the caps show surface spalls from exposed and rusty rebar chair feet. Worse rusty stains and spall are under the leaky joint caps.                                  |              |     |          |       |           |            |            |            |            | OZKZ       |
| 08/17/2006 - None   |              |     |          |       |           |            |            |            |            | TZCZ       |
| 10/06/2004 - Tight vertical cracks under several of the bearings. Pigeons and swallows are residing on the caps. Some staining under leaking joints. Undersides of several of the caps have spalled areas where rusty/exposed rebar chair legs are exposed. |              |     |          |       |           |            |            |            |            | GIDZ       |
| 10/21/2002 - Some vertical shrinkage cracks throughout. Dirt on the caps at Bent 11 from G2 to G6 and burying the bearings.   |              |     |          |       |           |            |            |            |            | IZHX       |
| 08/23/2000 - None   |              |     |          |       |           |            |            |            |            | FIAS       |
| 12/11/1997 - None   |              |     |          |       |           |            |            |            |            | FKAR       |
| 10/01/1995 - None   |              |     |          |       |           |            |            |            |            | YDNF       |
| 09/01/1992 - (8 * 15.76) (4 * 22.29) = 215.24m  |              |     |          |       |           |            |            |            |            | REFI       |
| Inspection Notes:   |              |     |          |       |           |            |            |            |            |            |
|   |              |     |          |       |           |            |            |            |            |            |
|   |              |     |          |       |           |            |            |            |            |            |
| Element 305 - Assm Jt w/o Seal Finger Joints - 5, 8, and 11   |              |     |          |       |           |            |            |            |            |            |
|   | 1            | 3   | 67       | m.    |           | 80         | 10         | 10         |            |            |
|   |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :   |              |     |          |       |           |            |            |            |            |            |
| 09/19/2012 - Joint at Bent 8 has a loose section in the Left lane; photo. Spalling and delamiantions along the edges of the joints.   |              |     |          |       |           |            |            |            |            | ZZJO       |
| 09-26-2012. Fixed loose section of the joint at Bent 8 in the Left lane.  |              |     |          |       |           |            |            |            |            |            |
| 09/27/2010 - Full and some damage to the troughs. Good alignment on fingers. Steel sounds solid when tapped on and some small spalls/delaminations along the joint steel.   |              |     |          |       |           |            |            |            |            | EZJZ       |
| 06/20/2008 - Same as past inspection comments.  |              |     |          |       |           |            |            |            |            | OZKZ       |
| 08/17/2006 - None   |              |     |          |       |           |            |            |            |            | TZCZ       |
| 10/06/2004 - Minor spalling along the joint edges. Finger alignment is Good. Troughs are either plugged or missing on all of the joints.  |              |     |          |       |           |            |            |            |            | GIDZ       |
| 10/21/2002 - Also add that both ends are full of sanding material.  |              |     |          |       |           |            |            |            |            | IZHX       |
| 08/23/2000 - No change.   |              |     |          |       |           |            |            |            |            | FIAS       |
| 12/11/1997 - Finger joints at Bents 5, 8, and 11. The expansion joints are sound. The rubber trough is gone and allows sanding material debris onto the caps. See photos.   |              |     |          |       |           |            |            |            |            | FKAR       |
| 10/01/1995 - None   |              |     |          |       |           |            |            |            |            | YDNF       |
| 09/01/1992 - Bents 5, 8, and 11. 22.29 * 3 - 66.87m   |              |     |          |       |           |            |            |            |            | REFI       |
| Inspection Notes:   |              |     |          |       |           |            |            |            |            |            |
|   |              |     |          |       |           |            |            |            |            |            |
|   |              |     |          |       |           |            |            |            |            |            |

**P00060094+08281**

Continue

\*\*\*\*\* Span : Appr-1 - P/S Concrete Spans 1 thru 13 and 20 (cont.) \*\*\*\*\*

| Element Description  |              |     |          |       |           |            |            |            |            |            |
|--|--------------|-----|----------|-------|-----------|------------|------------|------------|------------|------------|
| Smart Flag   | Scale Factor | Env | Quantity | Units | Insp Each | Pct Stat 1 | Pct Stat 2 | Pct Stat 3 | Pct Stat 4 | Pct Stat 5 |
| Element 311 - Moveable Bearing Bents 5, 8, 11, 14, and Pier 20   |              |     |          |       |           |            |            |            |            |            |
|  | 1            | 2   | 49       | ea.   |           | 80         | 20         | 0          |            |            |
|  |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :  |              |     |          |       |           |            |            |            |            |            |
| 09/19/2012 - Alignment was ok. Dirt, debris, and bird nest on the bearings. Rust, scale, paint loss, and staining.                                   |              |     |          |       |           |            |            |            |            | ZZJO       |
| 09/27/2010 - Fair to Good alignment. Lots of debris on the bearings. Staining from leaky joints above. Rust, scale, and paint loss.                  |              |     |          |       |           |            |            |            |            | EZJZ       |
| 06/20/2008 - Rusty spots, paint loss, and debris. Alignment appeared to be Good.   |              |     |          |       |           |            |            |            |            | OZKZ       |
| 08/17/2006 - None  |              |     |          |       |           |            |            |            |            | TZCZ       |
| 10/06/2004 - Bent anchor bolts. Rusty spots, scale, and pitting on most of the bearings. Rest is from previous reports when viewed by binoculars.    |              |     |          |       |           |            |            |            |            | GIDZ       |
| 10/21/2002 - All have bent anchor bolts except at Pier 20. All show some rust and minor paint loss with those at Bent 11 buried in sanding material. |              |     |          |       |           |            |            |            |            | IZHX       |
| 08/23/2000 - Env. State 2 as under leaky joints. Rust and pitting; rest is unchanged.  |              |     |          |       |           |            |            |            |            | FIAS       |
| 12/11/1997 - Debris is covering the bearing devices to some extent. The anchor bolts are bent over due to excessive movement - see photos.           |              |     |          |       |           |            |            |            |            | FKAR       |
| 10/01/1995 - None  |              |     |          |       |           |            |            |            |            | YDNF       |
| 09/01/1992 - (12) each at Bents 5, 8, and 11 plus (6) at Bent 14 plus (7) at Pier 20.  |              |     |          |       |           |            |            |            |            | REFI       |
| Inspection Notes:  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
| Element 313 - Fixed Bearing Bent 2, 3, 4, 6, 7, 9, 10, 12, and 13  |              |     |          |       |           |            |            |            |            |            |
|  | 1            | 1   | 120      | ea.   |           | 90         | 10         | 0          |            |            |
|  |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :  |              |     |          |       |           |            |            |            |            |            |
| 09/19/2012 - Spot rust, paint loss, scale, and debris.   |              |     |          |       |           |            |            |            |            | ZZJO       |
| 09/27/2010 - Rust, paint loss, scale, and lots of bird debris.   |              |     |          |       |           |            |            |            |            | EZJZ       |
| 06/20/2008 - Rusty spots, paint loss, and debris. Dropped Abutment bearings.   |              |     |          |       |           |            |            |            |            | OZKZ       |
| 08/17/2006 - None  |              |     |          |       |           |            |            |            |            | TZCZ       |
| 10/06/2004 - Rust spots and pitting. Some debris near the bearings from bird debris when viewed by binoculars.                                       |              |     |          |       |           |            |            |            |            | GIDZ       |
| 10/21/2002 - Some rust, pitting, and minor paint loss throughout.  |              |     |          |       |           |            |            |            |            | IZHX       |
| 08/23/2000 - Some rust and pitting   |              |     |          |       |           |            |            |            |            | FIAS       |
| 12/11/1997 - None  |              |     |          |       |           |            |            |            |            | FKAR       |
| 10/01/1995 - None  |              |     |          |       |           |            |            |            |            | YDNF       |
| 09/01/1992 - (7) at Abutment 1, (7) at Abutment 21, plus (15) at Bent 2, (18) at Bent 3, (15) at Bent 4, (12) at Bent 6, 7, 9, 10, 12, and 13        |              |     |          |       |           |            |            |            |            | REFI       |
| Inspection Notes:  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |

# INITIAL ASSESSMENT FORM FOR STRUCTURE :

**P00060094+08281**

Continue

\*\*\*\*\* Span : Appr-1 - P/S Concrete Spans 1 thru 13 and 20 (cont.) \*\*\*\*\*

| Element Description  |              |     |          |       |           |            |            |            |            |            |
|--|--------------|-----|----------|-------|-----------|------------|------------|------------|------------|------------|
| Smart Flag   | Scale Factor | Env | Quantity | Units | Insp Each | Pct Stat 1 | Pct Stat 2 | Pct Stat 3 | Pct Stat 4 | Pct Stat 5 |
| Element 331 - Conc Bridge Railing Left and Right vehicle rail  |              |     |          |       |           |            |            |            |            |            |
|  | 1            | 3   | 708      | m.    |           | 90         | 5          | 5          | 0          |            |
|  |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :  |              |     |          |       |           |            |            |            |            |            |
| 09/19/2012 - Small spalls, delaminations, and popouts throughout. Barrier has a lot of surface shrinkage cracks.   |              |     |          |       |           |            |            |            |            | ZZJO       |
| 09/27/2010 - Some rubs and scrapes. Vertical cracking throughout with small spalls and scaling along cracks. Condition State 3 due to small delaminations on barrier in spots. |              |     |          |       |           |            |            |            |            | EZJZ       |
| 06/20/2008 - Same on cracks every 3 to 4 ft with many of the cracks showing small spalls or delaminated areas.   |              |     |          |       |           |            |            |            |            | OZKZ       |
| 08/17/2006 - None  |              |     |          |       |           |            |            |            |            | TZCZ       |
| 10/06/2004 - Minor and tight vertical cracks every 3 to 4 feet.  |              |     |          |       |           |            |            |            |            | GIDZ       |
| 10/21/2002 - Minor dings, scrapes, and shrinkage cracks.   |              |     |          |       |           |            |            |            |            | IZHX       |
| 08/23/2000 - None  |              |     |          |       |           |            |            |            |            | FIAS       |
| 12/11/1997 - None  |              |     |          |       |           |            |            |            |            | FKAR       |
| 10/01/1995 - None  |              |     |          |       |           |            |            |            |            | YDNF       |
| 09/01/1992 - 353.79 * 707.58m  |              |     |          |       |           |            |            |            |            | REFI       |
| Inspection Notes:  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
| Element 334 - Metal Rail Coated Right Pedestrian Rail  |              |     |          |       |           |            |            |            |            |            |
|  | 1            | 3   | 354      | m.    |           | 90         | 10         | 0          | 0          | 0          |
|  |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :  |              |     |          |       |           |            |            |            |            |            |
| 09/19/2012 - Spot rust, exposed base coat, and faded paint throughout. Chainlink fabric is in Good condition.  |              |     |          |       |           |            |            |            |            | ZZJO       |
| 09/27/2010 - Spot rust, exposed primer coat, and paint loss throughout.  |              |     |          |       |           |            |            |            |            | EZJZ       |
| 06/20/2008 - Rusty spots, paint loss, and prime coat visible throughout.   |              |     |          |       |           |            |            |            |            | OZKZ       |
| 08/17/2006 - None  |              |     |          |       |           |            |            |            |            | TZCZ       |
| 10/06/2004 - Rail posts and box beams show rust spots. Hand rail on top of the barrier rail has rust spots.  |              |     |          |       |           |            |            |            |            | GIDZ       |
| 10/21/2002 - Add some scrapes and minor paint loss.  |              |     |          |       |           |            |            |            |            | IZHX       |
| 08/23/2000 - Some rust and pitting.  |              |     |          |       |           |            |            |            |            | FIAS       |
| 12/11/1997 - None  |              |     |          |       |           |            |            |            |            | FKAR       |
| 10/01/1995 - None  |              |     |          |       |           |            |            |            |            | YDNF       |
| 09/01/1992 - Pedestrian rail on the right outside of the bridge. 353.79 * 1 = 353.79m  |              |     |          |       |           |            |            |            |            | REFI       |
| Inspection Notes:  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |

**P00060094+08281**

**Continue**

## General Inspection Notes

09/19/2012 - David Crumley was notified about the finger joint failing at Bent 8 on 09-18-2012. He set up a check for 09-21-2012 in the am with 31-01 and Bill Lay. He and 31-01's crew with Charlie and Henry repaired the joint on 09-26-2012.

ZZJO

09/27/2010 - Deck cracks are more visible after a brief shower.

EZJZ

From the 2011 underwater inspection by Infrastructure Engineers there is no change to the channel or scour conditions at this bridge. There is light timber debris at the upstream nose of Piers 3 and 4. CRH

06/20/2008 - NBI 59, superstructure, rated a "6" due to broken or loose anchor bolts in the Main span.

OZKZ

08/17/2006 - Per Infrastructure Engineers August 24, 2006 underwater inspection, There are no significant defects present below the high waterline. There is no significant local or general scour present at the bridge site. There are no significant restrictions in the channel that will adversely impact flow. There is a local scour cone 5 feet in diameter by 3 feet deep at the upstream nose of pier 6. Construction debris at the upstream nose of pier 5 and the downstream nose of pier 4. Debris consists of rebar protruding from the mudline 3 feet high with a 55 gallon barrel along side of it. ITEM 61 CHANGED PER INFRASTRUCTURE ENGINEERS UNDERWATER INSPECTION.

10/06/2004 - NBI 58, deck, rates at a "6" due to cracking in all spans and spalls along the joint edges.

NBI 60, substructure, rated at a "6" due to minor spalls on the underside of some caps and minor/tight cracks in the columns.

10/21/2002 - None

IZHX

08/23/2000 - None

12/11/1997 - None

10/01/1995 - Sufficiency Rating Calculation Accepted by ops\$u5963 at 3/11/97 10:45:22

Sufficiency Rating Calculation Accepted by ops\$u5963 at 2/26/97 10:59:10

Sufficiency Rating Calculation Accepted by ops\$u9004 at 2/19/97 14:23:33

09/01/1992 -

01/01/1991 - Updated with tape 1993

05/01/1989 - Updated with tape 1991

04/01/1987 - Updated with tape 1989

NB89

10/01/1984 - Updated with tape 1986

NB86



## INITIAL ASSESSMENT FORM FOR STRUCTURE :

P00060094+08282

Location : GREAT FALLS Structure Name: GF Warden-EB

## General Location Data

District Code, Number, Location : 03 Dist 3 GREAT FALLS

County Code, Location : 013 CASCADE

Kind fo Hwy Code, Description : 2 2 U.S. Numbered Hwy

Str Owner Code, Description : 1 State Highway Agency

Intersecting Feature : MISSOURI RV, U5205, BNSF

Structure on the State Highway System : ☒ Latitude : 47°29'37"Structure on the National Highway System : ☒ Longitude : 111°18'39"Str Meet or Exceed NBIS Bridge Length : ☒

MDT Maintenance Section : 31-01 Great Falls

Division Code, Location : 31 GREAT FALLS

City Code, Location : 32800 GREAT FALLS

Signed Route Number : 00089

Maintained by Code, Description : 1 State Highway Agency

Kilometer Post, Mile Post : 152.60 km 94.82

## Construction Data

Construction Project Number : FGU 388 1 2

Construction Station Number : 45+89.00

Construction Drawing Number : 2926

Construction Year : 1951

Reconstruction Year :

## Traffic Data

Current ADT : 37,380 ADT Count Year : 2009 Percent Trucks : 2 %

## Structure Loading, Rating and Posting Data

## Loading Data :

|                          |           |                        |
|--------------------------|-----------|------------------------|
| Design Loading :         |           | 5 MS 18 (HS 20)        |
| Inventory Load, Design : | 32.6 mton | B ASD Assigned         |
| Operating Load, Design : | 32.6 mton | B ASD Assigned         |
| Posting :                |           | 5 At/Above Legal Loads |

## Rating Data :

|                     | Operating | Inventory | Posting |
|---------------------|-----------|-----------|---------|
| Truck 1 Type 3 :    |           |           |         |
| Truck 2 Type 3-S3 : |           |           |         |
| Truck 3 Type 3-3 :  | 86        |           |         |

## Structure, Roadway and Clearance Data

## Structure Deck, Roadway and Span Data :

Structure Length : 637.90 m  
 Deck Area : 6,960.00 m sq  
 Deck Roadway Width : 8.53 m  
 Approach Roadway Width : 10.90 m  
 Median Code, Description : 0 No median

## Structure Vertical and Horizontal Clearance Data :

Vertical Clearance Over the Structure : 99.99 m  
 Reference Feature for Vertical Clearance : H Hwy beneath struct  
 Vertical Clearance Under the Structure : 5.49 m  
 Reference Feature for Lateral Underclearance : H Hwy beneath struct  
 Minimum Lateral Under Clearance Right : 3.50 m  
 Minimum Lateral Under Clearance Left : 0.00 m

## Span Data

## Main Span

Number Spans : 6  
 Material Type Code, Description : 4 Steel continuous  
 Span Design Code, Description : 3 Girder and Floorbeam System  
 Deck

Deck Structure Type : 1 Concrete Cast-in-Place  
 Deck Surfacing Type : 3 Latex Concrete or similar additive  
 Deck Protection Type : 0 None  
 Deck Membrain Type : 0 None

## Approach Span

Number of Spans : 21  
 Material Type Code, Description : 4 Steel continuous  
 Span Design Code, Description : 2 Stringer/Multi-beam or Girder



## Structure Vertical and Horizontal Clearance Data Inventory Route :

| Over / Under Direction Name | Inventory Route | South, West or Bi-directional Travel |          |            | North or East Travel |          |            |
|-----------------------------|-----------------|--------------------------------------|----------|------------|----------------------|----------|------------|
|                             |                 | Direction                            | Vertical | Horizontal | Direction            | Vertical | Horizontal |
| One Route Under             | U05205          | Both                                 | 5.49 m   | 7.92 m     | N/A                  |          |            |
| RIVER ROAD / U05205         |                 |                                      |          |            |                      |          |            |
| Route On Structure          | P00060          | N/A                                  | 99.99 m  | 8.53 m     | East                 |          |            |
| 10TH AVE. SOUTH - EB        |                 |                                      |          |            |                      |          |            |



## INITIAL ASSESSMENT FORM FOR STRUCTURE :

P00060094+08282

Continue

## Inspection Data

Sufficiency Rating : **75.7**Structure Status : **Func Obs - Elg Rehab**Inspection Due Date : **05 September 2015**(91) Inspection Frequency (months) : **24**Next Fracture Critical Due Date : **05 Sep 2015**Fracture Critical Detail : **1 or 2 Stl-girder systms**Next Under Water Insp : **15 Nov 2016**Under Water Insp Type : **Type II**

## NBI Inspection Data

(90) Date of Last Inspection : 05 September 2013

Last Inspected By : Charles Pepos - 107

(90) Inspection Date :

Inspected By :

(58) Deck Rating : 7

(68) Deck Geometry : 3

(36A) Bridge Rail Rating : 0

(62) Culvert Rating : N

(59) Superstructure Rating : 6

(67) Structure Rating : 6

(36B) Transition Rating : 0

(61) Channel Rating : 7

(60) Substructure Rating : 6

(69) Under Clearance : 7

(36C) Approach Rail Rating : 1

(71) Waterway Adequacy : 8

(72) App Rdwy Align : 7

(41) Posting Status : A

(36D) End Rail Rating : 1

(113) Scour Critical : 5

Unrepaired Spalls : 0 m sq

Deck Surfacing Depth : 0.00 in

## Inspection Hours

Crew Hours for inspection : 35

Snooper Required : Y

Helper Hours : 0

Snooper Hours for inspection : 17

Special Crew Hours : 12

Flagger Hours : 0

Special Equipment Hours : -1

| Inspection Work Candidates  |                  | Status       | Priority | Effected Structure Unit | Scope of Work            | Action            | Covered Condition States |
|---|------------------|--------------|----------|-------------------------|--------------------------|-------------------|--------------------------|
| Candidate ID  | Date Requested   |              |          |                         |                          |                   |                          |
| D31-FY2006-000012   | 19 October 2005  | Approved     | Medium   | All Spans               | Bridge                   | Spot Paint (flex) |                          |
| Clean and paint the bearings.<br>08/27/2007 Blew off and overcoat painted bearings on Main Span during snooper inspection.<br>09/06/2011 Did this again.<br>Approved. DRC |                  |              |          |                         |                          |                   |                          |
| D31-FY2006-000014   | 19 October 2005  | Approved     | High     | M Main                  | 305 Assm Jt w/o Seal     | Rehab Elem        |                          |
| Repair the drain trough under the finger joint at Bent 21.<br>Approved. DRC   |                  |              |          |                         |                          |                   |                          |
| D31-FY2006-000011   | 19 October 2005  | Approved     | Medium   | A Approach              | 205 R/Conc Column        | Min Repair        |                          |
| Repair spalling/delaminated concrete on Columns at Bents 3 and 4.<br>Approved. DRC  |                  |              |          |                         |                          |                   |                          |
| D31-FY2011-000135   | 07 February 2011 | Not Approved | Medium   | All Spans               | 107 Paint Stl Opn Girder | Min Repair        |                          |
| Clean and paint the girders as needed.  |                  |              |          |                         |                          |                   |                          |
| D31-FY2011-000134   | 07 February 2011 | Not Approved | Medium   | All Spans               | 334 Metal Rail Coated    | Repl Paint        |                          |
| Clean and paint the bridge rail.  |                  |              |          |                         |                          |                   |                          |

Late Reason:

Inspection Date: 09/05/2013

**P00060094+08282**

Continue

**Element Inspection Data**

\*\*\*\*\* Span : Main-0 - Steel Girder - Spans 21 thru 26 \*\*\*\*\*

| Element Description  |              |     |          |       |           |            |            |            |            |            |
|--|--------------|-----|----------|-------|-----------|------------|------------|------------|------------|------------|
| Smart Flag   | Scale Factor | Env | Quantity | Units | Insp Each | Pct Stat 1 | Pct Stat 2 | Pct Stat 3 | Pct Stat 4 | Pct Stat 5 |
| Element 12 - Bare Concrete Deck 2011 Mill and Overlay w\ Silica Fume   |              |     |          |       |           |            |            |            |            |            |
|  | 1            | 3   | 3226     | sq.m. | X         | 100        | 0          | 0          | 0          | 0          |
|  |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :  |              |     |          |       |           |            |            |            |            |            |
| 09/05/2013 - Mapping cracks reflecting up through the 2011 overlay. No delaminations found during chaining in the closed Right lane.   |              |     |          |       |           |            |            |            |            | FPDZ       |
| 09/06/2011 - Removed and replaced 2" of the existing surface with Silica Fume Concrete in June 2011.   |              |     |          |       |           |            |            |            |            | GCCY       |
| 08/25/2009 - Mapping cracks in all spans. Delaminated and spalled concrete along the joints. Poor skid resistance remains. Deck was evaluated by Helena earlier this summer and their report is on file in Helena.   |              |     |          |       |           |            |            |            |            | ZQDZ       |
| 08/27/2007 - Quick chain drag showed delaminations or spalls every 20 to 30 ft or less than 10 percent for Condition State 3; may be more with a more through evaluation. Delaminations/spalls concrete at the joint anchorages. Rest of the previous comments still apply.  |              |     |          |       |           |            |            |            |            | ZZBZ       |
| 06/28/2005 - Tight mapping cracks in all spans with some areas that are delaminated. Some areas of spalling along the edges of the joints. May be nearing the 2 percent limit for Condition State 2. Very little ski resistance remaining. (295.66 * 10.91 = 3225.65) Nate   |              |     |          |       |           |            |            |            |            | SZMI       |
| 07/24/2003 - Same as previous report. Some delamination at the drain scuppers with exposed and rusty reinforcing on the underside of the deck soffits. Also covered with deck soffit smart flag.   |              |     |          |       |           |            |            |            |            | YADZ       |
| 09/27/2001 - 306.75 * 10.91 = 3346.64 Tight mapping cracks throughout the deck area. Minor spalling at all the joints. Some cracks are wide with efflorescence on the under side of the deck. Wear in the wheel paths.   |              |     |          |       |           |            |            |            |            | NIBL       |
| 09/02/1998 - Small, tight cracks throughout the deck.  |              |     |          |       |           |            |            |            |            | GKLH       |
| 09/01/1992 - None  |              |     |          |       |           |            |            |            |            | REFI       |
| Inspection Notes:  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
| Element 107 - Paint Stl Opn Girder   |              |     |          |       |           |            |            |            |            |            |
|  | 1            | 2   | 591      | m.    |           | 75         | 15         | 5          | 5          | 0          |
|  |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :  |              |     |          |       |           |            |            |            |            |            |
| 09/05/2013 - Faded and dirty paint. Rust blisters w\ surface pitting under the blisters. Worst areas are under leaking joints. Not much leakage since the 2011 deck/joint rehab.   |              |     |          |       |           |            |            |            |            | FPDZ       |
| 09/06/2011 - No change from previous inspections except a little more paint loss and rust noted.   |              |     |          |       |           |            |            |            |            | GCCY       |
| 08/25/2009 - Paint is faded, dirty, peeling, and scaling in areas that moisture can get to the girders. Lots of heavy rust blisters in areas with surface pitting under the blisters. Bottom flange top side is sticky from the deicer placed on the deck.   |              |     |          |       |           |            |            |            |            | ZQDZ       |
| 08/27/2007 - G2 at Pier 26 has some deep surface corrosion, 1/8 ", at the lower web longitudinal stiffener. Outside of the girders and under leaky joints show the worse paint loss and rust. Paint is very dirty in areas that mag. chloride/sanding material has accumulated.  |              |     |          |       |           |            |            |            |            | ZZBZ       |
| 06/28/2005 - Rust, pack rust, pitting, paint loss, and paint peel; especially under or near leaky joints. Some area on the lower portions of the web have pack rust blisters, mostly still tight, on them. Mag chloride/dirt laying on the outside of the girders on the top of the bottom flange. (295.66 * 2 = 591.32) Nate. |              |     |          |       |           |            |            |            |            | SZMI       |
| 07/24/2003 - Rusty spots with pack rust and minor section loss on girder webs; especially under leaking joints. See photos from past FC inspections.   |              |     |          |       |           |            |            |            |            | YADZ       |
| 09/27/2001 - 306.75 * 2 = 613.50m  |              |     |          |       |           |            |            |            |            | NIBL       |
| Rusty spots under all the joints and near the drains.  |              |     |          |       |           |            |            |            |            |            |
| 09/02/1998 - None  |              |     |          |       |           |            |            |            |            | GKLH       |
| 09/01/1992 - None  |              |     |          |       |           |            |            |            |            | REFI       |
| Inspection Notes:  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |



# INITIAL ASSESSMENT FORM FOR STRUCTURE :

**P00060094+08282**

Continue

\*\*\*\*\* Span : Main-0 - Steel Girder - Spans 21 thru 26 (cont.) \*\*\*\*\*

| Element Description  |              |     |          |       |           |            |            |            |            |            |
|--|--------------|-----|----------|-------|-----------|------------|------------|------------|------------|------------|
| Smart Flag   | Scale Factor | Env | Quantity | Units | Insp Each | Pct Stat 1 | Pct Stat 2 | Pct Stat 3 | Pct Stat 4 | Pct Stat 5 |
| Element 113 - Paint Stl Stringer   |              |     |          |       |           |            |            |            |            |            |
|  | 1            | 1   | 887      | m.    |           | 90         | 10         | 0          | 0          | 0          |
|  |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :  |              |     |          |       |           |            |            |            |            |            |
| 09/05/2013 - Some paint loss and peeling paint in areas. Generally in Good paint system. Stringers are dirty.  |              |     |          |       |           |            |            |            |            | FPDZ       |
| 09/06/2011 - No change from previous inspections except alittle more paint loss and rust noted.  |              |     |          |       |           |            |            |            |            | GCCY       |
| 08/25/2009 - Paint is generally in good condition. Some rust and scale in area near joints.  |              |     |          |       |           |            |            |            |            | ZQDZ       |
| 08/27/2007 - Same as past comments on rust at the deck to stringer flange area.  |              |     |          |       |           |            |            |            |            | ZZBZ       |
| 06/28/2005 - Some rusty spots on the edges of the top flange where they meet the concrete deck. Some rusty spots and staining where the stringers are in the area of leaking joints. (295.66 * 3 = 886.98      |              |     |          |       |           |            |            |            |            | SZMI       |
| 07/24/2003 - Minor rusty spots on the underside of the flanges; mainly near concrete connections under and near leaking joints.  |              |     |          |       |           |            |            |            |            | YADZ       |
| 09/27/2001 - 3 * 306.75 = 920.25m  |              |     |          |       |           |            |            |            |            | NIBL       |
| Minor rust spots; mostly at the top flange to concrete connection and under the joints.  |              |     |          |       |           |            |            |            |            | GKLH       |
| 09/02/1998 -   |              |     |          |       |           |            |            |            |            |            |
| Inspection Notes:  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
| Element 152 - Paint Stl Floor Beam   |              |     |          |       |           |            |            |            |            |            |
|  | 1            | 2   | 458      | m.    |           | 80         | 10         | 5          | 5          | 0          |
|  |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :  |              |     |          |       |           |            |            |            |            |            |
| 09/05/2013 - Faded and dirty paint, rust blisters, and surface pitting in those areas of past leakage and where water can gather.  |              |     |          |       |           |            |            |            |            | FPDZ       |
| 09/06/2011 - No change from previous inspections except alittle more paint loss and rust noted.  |              |     |          |       |           |            |            |            |            | GCCY       |
| 08/25/2009 - Floorbeams show dirty paint, some peeling, and rust blisters on those under the leaky joints. No change on 3rd floorbeam back from pier 25 on loose rivot.  |              |     |          |       |           |            |            |            |            | ZQDZ       |
| 08/27/2007 - Floorbeams under leaky joints show rust blisters, pitting, paint loss, and minor section loss in open rust blisters. 3rd floorbeam back of Pier 25 in span 24 has (1) loose rivet; not a problem. |              |     |          |       |           |            |            |            |            | ZZBZ       |
| 06/28/2005 - Same comments with paint loss, pitting and some tight pack rust also noted and mostly near the leaking joints.  |              |     |          |       |           |            |            |            |            | SZMI       |
| 07/24/2003 - Rusty spots throughout the floorbeams. Worse rust is in areas under leaking joints. Those floorbeams under leaking joints show some minor rust blisters and pack rust at connections.             |              |     |          |       |           |            |            |            |            | YADZ       |
| 09/27/2001 - 10.91 * 42 = 458.22m All are in contact with the steel stringers.   |              |     |          |       |           |            |            |            |            | NIBL       |
| Rusty spots; especially under the joints. Need to verify number when snooper inspected.  |              |     |          |       |           |            |            |            |            | GKLH       |
| 09/02/1998 - None  |              |     |          |       |           |            |            |            |            |            |
| Inspection Notes:  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |

**P00060094+08282**

Continue

\*\*\*\*\* Span : Main-0 - Steel Girder - Spans 21 thru 26 (cont.) \*\*\*\*\*

| Element Description  |              |     |          |       |           |            |            |            |            |            |
|--|--------------|-----|----------|-------|-----------|------------|------------|------------|------------|------------|
| Smart Flag   | Scale Factor | Env | Quantity | Units | Insp Each | Pct Stat 1 | Pct Stat 2 | Pct Stat 3 | Pct Stat 4 | Pct Stat 5 |
| Element 205 - R/Conc Column Pier 21 thru 26  |              |     |          |       |           |            |            |            |            |            |
|  | 1            | 3   | 8        | ea.   |           | 90         | 5          | 5          | 0          |            |
|  |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :  |              |     |          |       |           |            |            |            |            |            |
| 09/05/2013 - Spalls and delamination along edges of the ice breaker's steel. Tight cracks from corners of ice breakers steel on Pier 22 and 23.  |              |     |          |       |           |            |            |            |            | FPDZ       |
| 09/06/2011 - No change from previous inspections.  |              |     |          |       |           |            |            |            |            | GCCY       |
| 08/25/2009 - Some tight cracking behind the ice breakers with small spalls and a couple of small delaminations. Some rust and scale on ice breaker steel.  |              |     |          |       |           |            |            |            |            | ZQDZ       |
| 08/27/2007 - Pier 23's column has a small spall with staining at the top-West corner of the ice breaker. Rusty spots throughout the ice breakers.  |              |     |          |       |           |            |            |            |            | ZZBZ       |
| 06/28/2005 - Unchanged from previous reports. Per Infrastructure Engineers August 24, 2006 underwater inspection, the steel ice breakers are separating from the concrete at piers 3 and 7.  |              |     |          |       |           |            |            |            |            | SZMI       |
| 07/24/2003 - Minor shrinkage cracks in columns 21 thru 26. Rusty steel on the upstream ice breaker.  |              |     |          |       |           |            |            |            |            | YADZ       |
| 09/27/2001 - Minor shrinkage cracks. Need to look at the columns closer when snoopered or with a boat to get closer to them.   |              |     |          |       |           |            |            |            |            | NIBL       |
| 09/02/1998 - Two columns at Bent 27(Tower Span). One column at Piers 21 - 26.  |              |     |          |       |           |            |            |            |            | GKLH       |
| Inspection Notes:  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
| Element 220 - R/C Sub Pile Cap/Ftg Pier 24 and 25  |              |     |          |       |           |            |            |            |            |            |
|  | 1            | 3   | 2        | ea.   |           | 100        | 0          | 0          | 0          |            |
|  |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :  |              |     |          |       |           |            |            |            |            |            |
| 09/05/2013 - Refer to UW INSpection.   |              |     |          |       |           |            |            |            |            | FPDZ       |
| 09/06/2011 - Per the 2011 underwater inspection report by Infrastructure Engineers there is no change to this element since the 2006 inspection. CRH   |              |     |          |       |           |            |            |            |            | GCCY       |
| 08/25/2009 - Information is in latest underwater inspection.   |              |     |          |       |           |            |            |            |            | ZQDZ       |
| 08/27/2007 - Check on the latest Underwater II report.   |              |     |          |       |           |            |            |            |            | ZZBZ       |
| 06/28/2005 - Unchanged until the next underwater inspection. Per Infrastructure Engineers August 24, 2006 underwater inspection, there is insufficient clear cover exposing secondary rebar at the top of the footing on the west side of pier 5.    |              |     |          |       |           |            |            |            |            | SZMI       |
| 07/24/2003 - Information from Guthrie Diving Co.'s underwater report.  |              |     |          |       |           |            |            |            |            | YADZ       |
| 09/27/2001 - None  |              |     |          |       |           |            |            |            |            | NIBL       |
| 09/02/1998 - LW - Piers 4 & 5 Underwater Inspection 7/15/98 (Guthrie Diving Co) -- Exposed footings in good condition  |              |     |          |       |           |            |            |            |            | GKLH       |
| Inspection Notes:  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
| Element 227 - R/C Submerged Pile Pier 22 thru 26   |              |     |          |       |           |            |            |            |            |            |
|  | 1            | 3   | 5        | ea.   |           | 90         | 10         | 0          | 0          |            |
|  |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :  |              |     |          |       |           |            |            |            |            |            |
| 09/05/2013 - Refer to UW INSpection.   |              |     |          |       |           |            |            |            |            | FPDZ       |
| 09/06/2011 - Per the 2011 underwater inspection by Infrastructure Engineers spalling is present at the concrete and steel ice breaker interfaces of the substructures. The steel Ice breakers are separating from the concrete at Piers 3 and 7. CRH |              |     |          |       |           |            |            |            |            | GCCY       |
| 08/25/2009 - Information is on the past underwater inspection.   |              |     |          |       |           |            |            |            |            | ZQDZ       |
| 08/27/2007 - Check on the latest Underwater II report.   |              |     |          |       |           |            |            |            |            | ZZBZ       |
| 06/28/2005 - Unchanged until the next underwater inspection. Condition states changed Per Infrastructure Engineers August 24, 2006 underwater inspection. Spalling is present at the concrete/steel interfaces of the substructures.                 |              |     |          |       |           |            |            |            |            | SZMI       |
| 07/24/2003 - Information from Guthrie Diving Co.'s underwater report.  |              |     |          |       |           |            |            |            |            | YADZ       |
| 09/27/2001 - None  |              |     |          |       |           |            |            |            |            | NIBL       |
| 09/02/1998 - LW -- Piers 3,4,5,6,&7 Underwater Inspection 7/15/98 (Guthrie Diving Co) -- All piers in good condition with light scaling below waterline. No areas of significant deterioration or distress.  |              |     |          |       |           |            |            |            |            | GKLH       |
| Inspection Notes:  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |

# INITIAL ASSESSMENT FORM FOR STRUCTURE :

**P00060094+08282**

Continue

\*\*\*\*\* Span : Main-0 - Steel Girder - Spans 21 thru 26 (cont.) \*\*\*\*\*

| Element Description   |              |     |          |       |           |            |            |            |            |            |
|---|--------------|-----|----------|-------|-----------|------------|------------|------------|------------|------------|
| Smart Flag  | Scale Factor | Env | Quantity | Units | Insp Each | Pct Stat 1 | Pct Stat 2 | Pct Stat 3 | Pct Stat 4 | Pct Stat 5 |
| Element 234 - R/Conc Cap Pier 21 thru 26  |              |     |          |       |           |            |            |            |            |            |
|   | 1            | 2   | 65       | m.    |           | 90         | 5          | 5          | 0          |            |
|   |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :   |              |     |          |       |           |            |            |            |            |            |
| 09/05/2013 - Spall with exposed rebar on centerline of Pier 23's cap. Some delaminations noted on all of the caps; mostly small surface type.   |              |     |          |       |           |            |            |            |            | FPDZ       |
| 09/06/2011 - No change from previous inspections. Blown off during the snooper inspections.   |              |     |          |       |           |            |            |            |            | GCCY       |
| 08/25/2009 - Same comments as the past inspection with a couple more of the caps showing some diagonal cracks. Caps also have some staining from leaking deck or bird debris.   |              |     |          |       |           |            |            |            |            | ZQDZ       |
| 08/27/2007 - Cap at Pier 24 has a spall with exposed rebar on the Top-Left side on the underside of the cap. Cap at Pier 23 has a diagonal crack from G1 to the column connection area; digital photo 2115.                 |              |     |          |       |           |            |            |            |            | ZZBZ       |
| 06/28/2005 - Tight and minor cracks at ends of several caps.  |              |     |          |       |           |            |            |            |            | SZMI       |
| 07/24/2003 - Unchanged from previous reports. Some staining of concrete under leaking joints.   |              |     |          |       |           |            |            |            |            | YADZ       |
| 09/27/2001 - 6 * 10.91 = 65.46m   |              |     |          |       |           |            |            |            |            | NIBL       |
| Minor cracking on hammer heads. Need to be looked at with snooper.  |              |     |          |       |           |            |            |            |            |            |
| 09/02/1998 - Some cracking, but minor at this time.   |              |     |          |       |           |            |            |            |            | GKLH       |
| 09/01/1992 - None   |              |     |          |       |           |            |            |            |            | REFI       |
| Inspection Notes:   |              |     |          |       |           |            |            |            |            |            |
|   |              |     |          |       |           |            |            |            |            |            |
|   |              |     |          |       |           |            |            |            |            |            |
| Element 301 - Pourable Joint Seal Pier 22, 23, 25, and 26   |              |     |          |       |           |            |            |            |            |            |
|   | 1            | 3   | 44       | m.    |           | 95         | 5          | 0          |            |            |
|   |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :   |              |     |          |       |           |            |            |            |            |            |
| 09/05/2013 - Sealant is generally in Good condition with a small area of Pier 23's where the sealant is loose. Steel portions sound solid when tapped on.   |              |     |          |       |           |            |            |            |            | FPDZ       |
| 09/06/2011 - New sealant in June 2011.  |              |     |          |       |           |            |            |            |            | GCCY       |
| 08/25/2009 - Torn and missing sealant in all joints. Some spalling and delamination along the edges of the joint steel.   |              |     |          |       |           |            |            |            |            | ZQDZ       |
| 08/27/2007 - All have torn or missing sealant with leakage noted underneath. All have some delaminations/spalls in the concrete along the anchorages. Some nicks to the guard angles.                                       |              |     |          |       |           |            |            |            |            | ZZBZ       |
| 06/28/2005 - Loose and torn sealant in all (4) joints. Some dirt/debris in sealant areas. Minor delamination with some small spalls along the joint angle anchorages. Caps under the joints are wet from an overnight rain. |              |     |          |       |           |            |            |            |            | SZMI       |
| 07/24/2003 - Same as last report.   |              |     |          |       |           |            |            |            |            | YADZ       |
| 09/27/2001 - 4 * 10.91 = 43.64m   |              |     |          |       |           |            |            |            |            | NIBL       |
| Double guard angle pourable joints. Some areas of loose sealant.  |              |     |          |       |           |            |            |            |            |            |
| Inspection Notes:   |              |     |          |       |           |            |            |            |            |            |
|   |              |     |          |       |           |            |            |            |            |            |
|   |              |     |          |       |           |            |            |            |            |            |

**INITIAL ASSESSMENT FORM FOR STRUCTURE :****P00060094+08282**

Continue

\*\*\*\*\* Span : Main-0 - Steel Girder - Spans 21 thru 26 (cont.) \*\*\*\*\*

| Element Description  |              |     |          |       |           |            |            |            |            |            |
|--|--------------|-----|----------|-------|-----------|------------|------------|------------|------------|------------|
| Smart Flag   | Scale Factor | Env | Quantity | Units | Insp Each | Pct Stat 1 | Pct Stat 2 | Pct Stat 3 | Pct Stat 4 | Pct Stat 5 |
| Element 303 - Assembly Joint/Seal Acme Joints - Pier 24 and Bent 27  |              |     |          |       |           |            |            |            |            |            |
|  | 1            | 3   | 22       | m.    |           | 95         | 5          | 0          |            |            |
|  |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :  |              |     |          |       |           |            |            |            |            |            |
| 09/05/2013 - Small portion on the Left side of the joint at Pier 24's has broken off. Gland appears to be in Good condition.   |              |     |          |       |           |            |            |            |            | FPDZ       |
| 09/06/2011 - New joints in June 2011.  |              |     |          |       |           |            |            |            |            | GCCY       |
| 08/25/2009 - Tears in the gland in areas, leakage, and some minor damage to the joint system. Small delaminations and spalls along the edges.  |              |     |          |       |           |            |            |            |            | ZQDZ       |
| 08/27/2007 - Tears and damage to the joints themselves. Anchorage concrete has delamiantions or spalls. Nicks to the metal anchorages also noted.  |              |     |          |       |           |            |            |            |            | ZZBZ       |
| 06/28/2005 - Minor delaminations and spalling along the joint anchorages. Some areas where gland is pushed down. Leakage evident after last nights rain.   |              |     |          |       |           |            |            |            |            | SZMI       |
| 07/24/2003 - Same as last report.  |              |     |          |       |           |            |            |            |            | YADZ       |
| 09/27/2001 - 2 * 10.91 =21.82m Acme joints.  |              |     |          |       |           |            |            |            |            | NIBL       |
| Areas of loose anchorage plates. Concrete spalling along the anchorages.   |              |     |          |       |           |            |            |            |            |            |
| Inspection Notes:  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
| Element 305 - Assm Jt w/o Seal Finger Joint at Pier 21   |              |     |          |       |           |            |            |            |            |            |
|  | 1            | 3   | 11       | m.    |           | 90         | 10         | 0          |            |            |
|  |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :  |              |     |          |       |           |            |            |            |            |            |
| 09/05/2013 - Some spalling on the underside of the deck at the joint. Steel sounds solid when tapped on. Finger alignment looks Good.  |              |     |          |       |           |            |            |            |            | FPDZ       |
| 09/06/2011 - No change from previous inspections.  |              |     |          |       |           |            |            |            |            | GCCY       |
| 08/25/2009 - Good alignment on the fingers, steel sounds solid when tapped on, and some small spalls/delaminations along edges of joints. Trough under joint is torn up and needs some repair/modifications. |              |     |          |       |           |            |            |            |            | ZQDZ       |
| 08/27/2007 - No change from the previous reports.  |              |     |          |       |           |            |            |            |            | ZZBZ       |
| 06/28/2005 - Minor spalling and delamination along the joint edges. Finger alignment is Good. Trough and drain system needs some work.   |              |     |          |       |           |            |            |            |            | SZMI       |
| 07/24/2003 - Trough and drain system is in need of cleaning and repair.  |              |     |          |       |           |            |            |            |            | YADZ       |
| 09/27/2001 - 10.91 * 1 = 10.91m  |              |     |          |       |           |            |            |            |            | NIBL       |
| Rusty areas. Some spalling of anchorage.   |              |     |          |       |           |            |            |            |            |            |
| 09/02/1998 -   |              |     |          |       |           |            |            |            |            | GKLH       |
| 09/01/1992 - None  |              |     |          |       |           |            |            |            |            | REFI       |
| Inspection Notes:  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |

# INITIAL ASSESSMENT FORM FOR STRUCTURE :

P00060094+08282

Continue

\*\*\*\*\* Span : Main-0 - Steel Girder - Spans 21 thru 26 (cont.) \*\*\*\*\*

| Element Description   |              |     |          |       |           |            |            |            |            |            |
|---|--------------|-----|----------|-------|-----------|------------|------------|------------|------------|------------|
| Smart Flag  | Scale Factor | Env | Quantity | Units | Insp Each | Pct Stat 1 | Pct Stat 2 | Pct Stat 3 | Pct Stat 4 | Pct Stat 5 |
| Element 311 - Moveable Bearing  |              |     |          |       |           |            |            |            |            |            |
|   | 1            | 3   | 12       | ea.   |           | 90         | 10         | 0          |            |            |
|   |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :   |              |     |          |       |           |            |            |            |            |            |
| 09/05/2013 - Spot rust and paint loss. Bearing alignment was to expansion slightly today; 85F.  |              |     |          |       |           |            |            |            |            | FPDZ       |
| 09/06/2011 - No change from previous inspections. Blown off and overcoat painted during the snooper inspection.   |              |     |          |       |           |            |            |            |            | GCCY       |
| 08/25/2009 - Bearings were cleaned some and spot painted. Bearings at Bent 27 tower span, are rocked towards expansion. Remaining bearing alignments are good.  |              |     |          |       |           |            |            |            |            | ZQDZ       |
| 08/27/2007 - Bearings were blown off and overcoat painted during the snooper inspection. Alignment was tolerable except for those at Bent 27/Tower Span. These are at maximum expansion/ahead on line. These have been that way for a long time also. |              |     |          |       |           |            |            |            |            | ZZBZ       |
| 06/28/2005 - Rusty, pitting, pack rust-tight, and paint loss.   |              |     |          |       |           |            |            |            |            | SZMI       |
| 07/24/2003 - Rusty with some debris from bird nests and sanding material. Some cleaning done when snooper inspection was done.  |              |     |          |       |           |            |            |            |            | YADZ       |
| 09/27/2001 - Env. State #3 due to leaking joints.   |              |     |          |       |           |            |            |            |            | NIBL       |
| Debris from bird nests and some sanding material where visible. Need to verify numbers and condition when snoopered.  |              |     |          |       |           |            |            |            |            |            |
| 09/02/1998 - None   |              |     |          |       |           |            |            |            |            | GKLH       |
| 09/01/1992 - None   |              |     |          |       |           |            |            |            |            | REFI       |
| Inspection Notes:   |              |     |          |       |           |            |            |            |            |            |
|   |              |     |          |       |           |            |            |            |            |            |
|   |              |     |          |       |           |            |            |            |            |            |
| Element 313 - Fixed Bearing   |              |     |          |       |           |            |            |            |            |            |
|   | 1            | 1   | 4        | ea.   |           | 95         | 5          | 0          |            |            |
|   |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :   |              |     |          |       |           |            |            |            |            |            |
| 09/05/2013 - Steel portion is Good. Some faded and missing paint with spot rust.  |              |     |          |       |           |            |            |            |            | FPDZ       |
| 09/06/2011 - No change from previous inspections. Blown off and overcoat painted during the snooper inspection.   |              |     |          |       |           |            |            |            |            | GCCY       |
| 08/25/2009 - Spot rust and scale. Bearings were spot painted where able to get at.  |              |     |          |       |           |            |            |            |            | ZQDZ       |
| 08/27/2007 - Blown off and overcoat painted as needed.  |              |     |          |       |           |            |            |            |            | ZZBZ       |
| 06/28/2005 - Some rust, pitting, and paint loss.  |              |     |          |       |           |            |            |            |            | SZMI       |
| 07/24/2003 - Some minor rusty spots and minor debris near bearings. Some cleaning was done when snooper inspection was done.  |              |     |          |       |           |            |            |            |            | YADZ       |
| 09/27/2001 - Rusty spots. Need to verify numbers and conditions when snoopered.   |              |     |          |       |           |            |            |            |            | NIBL       |
| 09/02/1998 - None   |              |     |          |       |           |            |            |            |            | GKLH       |
| 09/01/1992 - None   |              |     |          |       |           |            |            |            |            | REFI       |
| Inspection Notes:   |              |     |          |       |           |            |            |            |            |            |
|   |              |     |          |       |           |            |            |            |            |            |
|   |              |     |          |       |           |            |            |            |            |            |

# INITIAL ASSESSMENT FORM FOR STRUCTURE :

P00060094+08282

Continue

\*\*\*\*\* Span : Main-0 - Steel Girder - Spans 21 thru 26 (cont.) \*\*\*\*\*

| Element Description   |              |     |          |       |           |            |            |            |            |            |
|---|--------------|-----|----------|-------|-----------|------------|------------|------------|------------|------------|
| Smart Flag  | Scale Factor | Env | Quantity | Units | Insp Each | Pct Stat 1 | Pct Stat 2 | Pct Stat 3 | Pct Stat 4 | Pct Stat 5 |
| Element 334 - Metal Rail Coated   |              |     |          |       |           |            |            |            |            |            |
|   | 1            | 3   | 591      | m.    |           | 60         | 25         | 10         | 5          | 0          |
|   |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :   |              |     |          |       |           |            |            |            |            |            |
| 09/05/2013 - Rusty spots, thin paint, exposed base paint, rusted post webs at the curb line with section loss to the webs. On-going repairs to the rails. Delaminated and spalling on the curbs.  |              |     |          |       |           |            |            |            |            | FPDZ       |
| 09/06/2011 - No change from previous inspections. Reaired some rail on the Left side in June 2011. Noted seveal posts and panels damaged over the Labor Day Weekend on the Righ side near the West Abutment.  |              |     |          |       |           |            |            |            |            | GCCY       |
| 08/25/2009 - Same comments as past inspections. Several post have been repaired where webs have been rotted away.   |              |     |          |       |           |            |            |            |            | ZQDZ       |
| 08/27/2007 - 5th post from Pier 26 on the Right/Median side is broken loose from the concrete. One bent post in Span 23 on the Right side. Lots of rust in the lower rail post webs causing section loss. Posts have been hit and bent over as web crumples. Most of the top coat of paint is faded to the primer coat. |              |     |          |       |           |            |            |            |            | ZZBZ       |
| 2007/09/10. Bent posts straightened and fixed today.  |              |     |          |       |           |            |            |            |            |            |
| 06/28/2005 - Faded paint and rust spots where paint is chipped off. Red primer coat is coming through in most of the rail. A couple of areas rattle under traffic. (295.66 * 2 = 591.32) Nate   |              |     |          |       |           |            |            |            |            | SZMI       |
| 07/24/2003 - Same as last report.   |              |     |          |       |           |            |            |            |            | YADZ       |
| 09/27/2001 - 306.75 * 2 = 613.50m   |              |     |          |       |           |            |            |            |            | NIBL       |
| Paint is chalky and pitted from sanding material. Rusty spots throughout. Rattling with some loose areas noted when traffic is crossing.  |              |     |          |       |           |            |            |            |            | GKLB       |
| 09/02/1998 - Minor areas of rust throughout.  |              |     |          |       |           |            |            |            |            |            |
| 09/01/1992 - None   |              |     |          |       |           |            |            |            |            | REFI       |
| Inspection Notes:   |              |     |          |       |           |            |            |            |            |            |
|   |              |     |          |       |           |            |            |            |            |            |
|   |              |     |          |       |           |            |            |            |            |            |
| Element 357 - Sup Pack Rust SmFlag none   |              |     |          |       |           |            |            |            |            |            |
| X   | 1            | 3   | 1        | ea.   | X         | 0          | 100        | 0          | 0          |            |
|   |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :   |              |     |          |       |           |            |            |            |            |            |
| 09/05/2013 - Swelling between connection plates. No distress visible to the rivets.   |              |     |          |       |           |            |            |            |            | FPDZ       |
| 09/06/2011 - No change from previous inspections.   |              |     |          |       |           |            |            |            |            | GCCY       |
| 08/25/2009 - Minor swelling between some of the conection plates exists.  |              |     |          |       |           |            |            |            |            | ZQDZ       |
| Inspection Notes:   |              |     |          |       |           |            |            |            |            |            |
|   |              |     |          |       |           |            |            |            |            |            |
|   |              |     |          |       |           |            |            |            |            |            |
| Element 358 - Deck Cracking SmFlag none   |              |     |          |       |           |            |            |            |            |            |
| X   | 1            | 3   | 1        | ea.   | X         | 0          | 100        | 0          | 0          |            |
|   |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :   |              |     |          |       |           |            |            |            |            |            |
| 09/05/2013 - Mapping cracks in all Spans. Condition State 2 due to quantity.  |              |     |          |       |           |            |            |            |            | FPDZ       |
| 09/06/2011 - Removed and replaced 2" of the existing surface with Silica Fume Concrete in June 2011.  |              |     |          |       |           |            |            |            |            | GCCY       |
| 08/25/2009 - Added due to the quantity and size of cracking in this deck.   |              |     |          |       |           |            |            |            |            | ZQDZ       |
| Inspection Notes:   |              |     |          |       |           |            |            |            |            |            |
|   |              |     |          |       |           |            |            |            |            |            |
|   |              |     |          |       |           |            |            |            |            |            |

**INITIAL ASSESSMENT FORM FOR STRUCTURE :****P00060094+08282**

Continue

\*\*\*\*\* Span : Main-0 - Steel Girder - Spans 21 thru 26 (cont.) \*\*\*\*\*

| Element Description   |              |     |          |       |           |            |            |            |            |            |
|---|--------------|-----|----------|-------|-----------|------------|------------|------------|------------|------------|
| Smart Flag  | Scale Factor | Env | Quantity | Units | Insp Each | Pct Stat 1 | Pct Stat 2 | Pct Stat 3 | Pct Stat 4 | Pct Stat 5 |
| Element 359 - Soffit Smart Flag   |              |     |          |       |           |            |            |            |            |            |
| X   | 1            | 1   | 1        | ea.   | X         | 0          | 0          | 0          | 100        | 0          |
|   |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :   |              |     |          |       |           |            |            |            |            |            |
| 09/05/2013 - Spalling and deteriorated concrete throughout. Exposed and rusty rebar under post areas with delaminated concrete.   |              |     |          |       |           |            |            |            |            | FPDZ       |
| 09/06/2011 - No change from previous inspections, but continueing to get worse.   |              |     |          |       |           |            |            |            |            | GCCY       |
| 08/25/2009 - Outlets on the drains show deteriorated and crumbling concrete with exposed and rusty reinforcing steel. Spalling and delaminated areas throughout underside of the curbs. |              |     |          |       |           |            |            |            |            | ZQDZ       |
| 08/27/2007 - Same and lots of it throughout the bridge; see photos.   |              |     |          |       |           |            |            |            |            | ZZBZ       |
| 06/28/2005 - Unchanged from last report or maybe slightly more deterioration/spalling.  |              |     |          |       |           |            |            |            |            | SZMI       |
| 07/24/2003 - The outlets of the drain scuppers are deteriorating with some exposed and rusting reinforcing steel. Some deteriorating concrete is falling off and/or is loose.           |              |     |          |       |           |            |            |            |            | YADZ       |
| Inspection Notes:   |              |     |          |       |           |            |            |            |            |            |
|   |              |     |          |       |           |            |            |            |            |            |
|   |              |     |          |       |           |            |            |            |            |            |

\*\*\*\*\* Span : Appr-1 - Steel Girders - Spans 1 thru 20 \*\*\*\*\*

| Element Description   |              |     |          |       |           |            |            |            |            |            |
|---|--------------|-----|----------|-------|-----------|------------|------------|------------|------------|------------|
| Smart Flag  | Scale Factor | Env | Quantity | Units | Insp Each | Pct Stat 1 | Pct Stat 2 | Pct Stat 3 | Pct Stat 4 | Pct Stat 5 |
| Element 12 - Bare Concrete Deck   |              |     |          |       |           |            |            |            |            |            |
|   | 1            | 3   | 3609     | sq.m. | X         | 0          | 100        | 0          | 0          | 0          |
|   |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :   |              |     |          |       |           |            |            |            |            |            |
| 09/05/2013 - (1) small delamination found along Bent 5 and Bent 9's joints. Deck looks Good with minor wear in the wheel paths. Lots of mapping cracks.   |              |     |          |       |           |            |            |            |            | FPDZ       |
| 09/06/2011 - Removed and replaced 2" of the existing surface with Silica Fume Concrete in June 2011.  |              |     |          |       |           |            |            |            |            | GCCY       |
| 08/25/2009 - Poor skid resistance, and wear from studded tires. Helena did an indepth scan of delamination and spalling in the deck this past summer and their report is in Helena.   |              |     |          |       |           |            |            |            |            | ZQDZ       |
| 08/27/2007 - Quick chain drag showed delaminations or spalls every 30 to 40 ft or less than 10 percent for Condition State 3; may be more with a more through evaluation. Delaimantions/spalls concrete at the joint anchorages. Rest of the previous comments still apply. |              |     |          |       |           |            |            |            |            | ZZBZ       |
| 06/28/2005 - Mapping cracks throughout all spans with some small areas of delamination and spalling; probably less than 2 percent. Very little skid resistance with wear in the wheel paths. (330.83 * 10.91 = 3609.36) Nate.   |              |     |          |       |           |            |            |            |            | SZMI       |
| 07/24/2003 - Same on deck comments and on scuppers. Wear on deck with some exposed aggregate. Tight mapping cracks throughout the deck. Soffitt smart flag for popouts around scuppers.   |              |     |          |       |           |            |            |            |            | YADZ       |
| 09/27/2001 - 331.12 * 10.91 = 3613.39 Cracking throughout. Some concrete is popping out under all drain scuppers with some exposed reinforcing steel. Some concrete popouts along the top flange of the main girders.   |              |     |          |       |           |            |            |            |            | NIBL       |
| 09/02/1998 - minor cracking throughout.   |              |     |          |       |           |            |            |            |            | GKLH       |
| Inspection Notes:   |              |     |          |       |           |            |            |            |            |            |
|   |              |     |          |       |           |            |            |            |            |            |
|   |              |     |          |       |           |            |            |            |            |            |



# INITIAL ASSESSMENT FORM FOR STRUCTURE :

**P00060094+08282**

Continue

\*\*\*\*\* Span : Appr-1 - Steel Girders - Spans 1 thru 20 (cont.) \*\*\*\*\*

| Element Description   |              |     |          |       |           |            |            |            |            |            |
|---|--------------|-----|----------|-------|-----------|------------|------------|------------|------------|------------|
| Smart Flag  | Scale Factor | Env | Quantity | Units | Insp Each | Pct Stat 1 | Pct Stat 2 | Pct Stat 3 | Pct Stat 4 | Pct Stat 5 |
| Element 107 - Paint Stl Opn Girder  |              |     |          |       |           |            |            |            |            |            |
|   | 1            | 2   | 1323     | m.    |           | 80         | 10         | 5          | 5          | 0          |
|   |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :   |              |     |          |       |           |            |            |            |            |            |
| 09/05/2013 - Bottom flanges have rust blisters and minor pitting on their tops. Areas near the joints have heavy rust and paint loss from past leakage. Faded and dirty paint.  |              |     |          |       |           |            |            |            |            | FPDZ       |
| 09/06/2011 - No change from previous inspections with a little more paint loss and rust noted.  |              |     |          |       |           |            |            |            |            | GCCY       |
| 08/25/2009 - Rust blisters with some minor surface pitting on the tops of the bottom flanges in areas that moisture is collecting. Rust and some cracking of the welds on the bottom cover plates in areas that water has gotten between the cover and bottom flange. |              |     |          |       |           |            |            |            |            | ZQDZ       |
| 08/27/2007 - Spots of rust on the bottom flanges of the outside girders; especially where the drains are dumping water onto them. Rust blisters show surface pitting when cleaned off. Also the same as previous comments.  |              |     |          |       |           |            |            |            |            | ZZBZ       |
| 06/28/2005 - Rust and scale along the underside of the deck where the top flange is against the concrete. Areas under leaky joints are the worse. (4 * 330.83 = 1323.32) Nate.  |              |     |          |       |           |            |            |            |            | SZMI       |
| 07/24/2003 - Rusty spots along the upper flanges to concrete area. Ends of girders under leaking joints show some minor blistering rust.  |              |     |          |       |           |            |            |            |            | YADZ       |
| 09/27/2001 - 4 * 331.2m = 1324.8m   |              |     |          |       |           |            |            |            |            | NIBL       |
| Rusty spots under the joints with some rust spots at the top flange to concrete connection.   |              |     |          |       |           |            |            |            |            |            |
| 09/02/1998 -  |              |     |          |       |           |            |            |            |            | GKLH       |
| Inspection Notes:   |              |     |          |       |           |            |            |            |            |            |
|   |              |     |          |       |           |            |            |            |            |            |
|   |              |     |          |       |           |            |            |            |            |            |
| Element 178 - Painted Trans Girder Bent 21  |              |     |          |       |           |            |            |            |            |            |
|   | 1            | 3   | 11       | m.    |           | 80         | 15         | 5          | 0          | 0          |
|   |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :   |              |     |          |       |           |            |            |            |            |            |
| 09/05/2013 - Heavy rust, scale, rust blisters, and surface pitting where water can sit.   |              |     |          |       |           |            |            |            |            | FPDZ       |
| 09/06/2011 - No change from previous inspections with a little more paint loss and rust noted.  |              |     |          |       |           |            |            |            |            | GCCY       |
| 08/25/2009 - Dirty. rust, scale and some active corrosion in areas that moisture is collecting.   |              |     |          |       |           |            |            |            |            | ZQDZ       |
| 08/27/2007 - Dirty, stained, and some rusty spots.  |              |     |          |       |           |            |            |            |            | ZZBZ       |
| 06/28/2005 - Same as last report.   |              |     |          |       |           |            |            |            |            | SZMI       |
| 07/24/2003 - Step up girder to make up difference in girder heights. (4) girders on top and supported by (2) bearings. Some areas of rust throughout.   |              |     |          |       |           |            |            |            |            | YADZ       |
| 09/27/2001 - 10.91 * 1 = 10.91m Env. State #3 as under an open joint.   |              |     |          |       |           |            |            |            |            | NIBL       |
| Rusty spots at the connections.   |              |     |          |       |           |            |            |            |            |            |
| Inspection Notes:   |              |     |          |       |           |            |            |            |            |            |
|   |              |     |          |       |           |            |            |            |            |            |
|   |              |     |          |       |           |            |            |            |            |            |



**INITIAL ASSESSMENT FORM FOR STRUCTURE :****P00060094+08282**

Continue

\*\*\*\*\* Span : Appr-1 - Steel Girders - Spans 1 thru 20 (cont.) \*\*\*\*\*

| Element Description  |              |     |          |       |           |            |            |            |            |            |
|--|--------------|-----|----------|-------|-----------|------------|------------|------------|------------|------------|
| Smart Flag   | Scale Factor | Env | Quantity | Units | Insp Each | Pct Stat 1 | Pct Stat 2 | Pct Stat 3 | Pct Stat 4 | Pct Stat 5 |
| Element 205 - R/Conc Column Bent 2 thru 20   |              |     |          |       |           |            |            |            |            |            |
|  | 1            | 2   | 23       | ea.   |           | 85         | 10         | 5          | 0          |            |
|  |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :  |              |     |          |       |           |            |            |            |            |            |
| 09/05/2013 - Spalling and delaminations on Bent 5's. Vertical cracking along edges on some. Surface spalls from shallow tie wire. Staining on those under leaky areas.                                       |              |     |          |       |           |            |            |            |            | FPDZ       |
| 09/06/2011 - No change from previous inspections.  |              |     |          |       |           |            |            |            |            | GCCY       |
| 08/25/2009 - Delams and spalls on bent 5 about 6 feet up. Several with small spalls and staining on those that have some leakage from above.   |              |     |          |       |           |            |            |            |            | ZQDZ       |
| 08/27/2007 - 5 percent in Condition State 3 for exposed rebar chair feet. Also exposed rebar and rust at Bent 3 thru 5. Several have small delamiated areas. Bent 9's column has a spall on the Left corner. |              |     |          |       |           |            |            |            |            | ZZBZ       |
| 06/28/2005 - Columns at Bents 3 thru 5 have some spalls on them. Rebar is rusted in these areas. Same on the shrinkage cracks.   |              |     |          |       |           |            |            |            |            | SZMI       |
| 07/24/2003 - Minor and tight shrinkage cracks on surface of concrete of most columns. Some scrapes on a couple of the columns from vehicle activity under the structure.                                     |              |     |          |       |           |            |            |            |            | YADZ       |
| 09/27/2001 - Minor cracking throughout. Minor shrinkage cracks.  |              |     |          |       |           |            |            |            |            | NIBL       |
| 09/02/1998 - 4 bents with 2 columns per (+) 15 bents with 1 column per = 23  |              |     |          |       |           |            |            |            |            | GKLH       |
| Inspection Notes:  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
| Element 215 - R/Conc Abutment Abutment 1-East  |              |     |          |       |           |            |            |            |            |            |
|  | 1            | 2   | 15       | m.    |           | 95         | 5          | 0          | 0          |            |
|  |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :  |              |     |          |       |           |            |            |            |            |            |
| 09/05/2013 - Generally Good condition. Some tight cracks in the backwall concrete. Water leaking through the backwall to cap areas. Small spall on the Left wignwall edge at the groundline.                 |              |     |          |       |           |            |            |            |            | FPDZ       |
| 09/06/2011 - No change from previous inspections.  |              |     |          |       |           |            |            |            |            | GCCY       |
| 08/25/2009 - Tight cracks in abutment backwalls and wingwalls. Area is damp from leakage. All prior remarks still apply.   |              |     |          |       |           |            |            |            |            | ZQDZ       |
| 08/27/2007 - leaking at Abutment has area is damp. Lots of sanding material on the cap. Tight cracks in the Abutment's backwall and wingwalls. Some moderate erosion from under the Abutment towards Bent 2. |              |     |          |       |           |            |            |            |            | ZZBZ       |
| 06/28/2005 - Same as last report and add some small spalls where the girders are embedded.   |              |     |          |       |           |            |            |            |            | SZMI       |
| 07/24/2003 - Minor and tight cracking in Abutment backwall. Some graffti painted on the backwall and girder ends.  |              |     |          |       |           |            |            |            |            | YADZ       |
| 09/27/2001 - 14.81 * 1 = 14.81m  |              |     |          |       |           |            |            |            |            | NIBL       |
| Minor cracking in the Abutment backwalls.  |              |     |          |       |           |            |            |            |            |            |
| 09/02/1998 - _   |              |     |          |       |           |            |            |            |            | GKLH       |
| Inspection Notes:  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |

\*\*\*\*\* Span : Appr-1 - Steel Girders - Spans 1 thru 20 (cont.) \*\*\*\*\*

| Element Description   |              |     |          |       |           |            |            |            |            |            |
|---|--------------|-----|----------|-------|-----------|------------|------------|------------|------------|------------|
| Smart Flag  | Scale Factor | Env | Quantity | Units | Insp Each | Pct Stat 1 | Pct Stat 2 | Pct Stat 3 | Pct Stat 4 | Pct Stat 5 |
| Element 234 - R/Conc Cap Bents 2 thru 20  |              |     |          |       |           |            |            |            |            |            |
|   | 1            | 2   | 219      | m.    |           | 85         | 10         | 5          | 0          |            |
|   |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :   |              |     |          |       |           |            |            |            |            |            |
| 09/05/2013 - Staining on those that had leaking deck joints. Spalling from shallow rebar chairs and tie wire. Cracks with efflorescence on ends of some of the caps. Delaminations on Bent 6, 9, and 15.  |              |     |          |       |           |            |            |            |            | FPDZ       |
| 09/06/2011 - No change from previous inspections.   |              |     |          |       |           |            |            |            |            | GCCY       |
| 08/25/2009 - Same comments as prior inspections.  |              |     |          |       |           |            |            |            |            | ZQDZ       |
| 08/27/2007 - Bent 4 has delaminated area with some spalls and rusty rebar on its Left end and under G1. Bent 5's cap has a spall on the Span 4 side's Left corner. Bent 6 has a 2'(w) x 1'(h) delamination under G1S6. Bent 15's cap has a 1' x 1' spall on the underside of the Right end and a delaminated area near centerline on the Span 15 side. Lots of rusty rebar chair feet on the underside of some of the caps. Lots of staining under leaky joints also noted with some sanding material also. |              |     |          |       |           |            |            |            |            | ZZBZ       |
| 06/28/2005 - Same as previous reports. Add that the Left end of the caps under the bearings at Bents 3 and 4 show some cracking and spalling starting. Staining from leaking joints.  |              |     |          |       |           |            |            |            |            | SZMI       |
| 07/24/2003 - Same as previous and add that the south end of the cap at Bent 2 is cracked with delaminated concrete. Some minor delaminations also noted at Bent 3 and 4 in the column to cap connection areas.  |              |     |          |       |           |            |            |            |            | YADZ       |
| 09/27/2001 - (5 * 10.91) + (4 * 13.84) = 219.01m  |              |     |          |       |           |            |            |            |            | NIBL       |
| Minor cracks at ends of several caps. Need to look at with snoopers for condition state.  |              |     |          |       |           |            |            |            |            |            |
| 09/02/1998 - Some cracking, but minor   |              |     |          |       |           |            |            |            |            | GKLH       |
| Inspection Notes:   |              |     |          |       |           |            |            |            |            |            |
|   |              |     |          |       |           |            |            |            |            |            |
|   |              |     |          |       |           |            |            |            |            |            |
| Element 301 - Pourable Joint Seal Bents 3(skewed), 5(Skewed), 6, 9, 12, 15, and 18  |              |     |          |       |           |            |            |            |            |            |
|   | 1            | 3   | 82       | m.    |           | 95         | 5          | 0          |            |            |
|   |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :   |              |     |          |       |           |            |            |            |            |            |
| 09/05/2013 - Generally in Good condition. A couple of small tears in the sealant at Bents 3, 6, and 12. Sealant looks adhered in most of the areas of the joints.   |              |     |          |       |           |            |            |            |            | FPDZ       |
| 09/06/2011 - New Silicone sealant and joints in June 2011.  |              |     |          |       |           |            |            |            |            | GCCY       |
| 08/25/2009 - Torn and missing joint material. Spalling and delaminations along edges of joint steel. Most of the steel sounded solid when it was tapped on.   |              |     |          |       |           |            |            |            |            | ZQDZ       |
| 08/27/2007 - Some loose or missing joint material. Some delaminated concrete along the joint anchorages, but the steel sounds solid when tapped on.   |              |     |          |       |           |            |            |            |            | ZZBZ       |
| 06/28/2005 - These joints could be compression joint glands. Same as previous reports with loose material and dealaminations along the joint edges.   |              |     |          |       |           |            |            |            |            | SZMI       |
| 07/24/2003 - Leaking. Areas of loose joint material. Minor spalling and delaminations along the joint anchorages.   |              |     |          |       |           |            |            |            |            | YADZ       |
| 09/27/2001 - (5 * 10.91) + (2 * 13.84) = 82.23m (2) joints skewed and (5) are perpendicular.  |              |     |          |       |           |            |            |            |            | NIBL       |
| Glands are up & down with some tears in them. Leaking. Some concrete is spalled along both sides of the anchorages.   |              |     |          |       |           |            |            |            |            |            |
| 09/02/1998 - Sliding Plate Joints at Bents 11, 14, 17, 20, 23, 24 & 26.   |              |     |          |       |           |            |            |            |            | GKLH       |
| Inspection Notes:   |              |     |          |       |           |            |            |            |            |            |
|   |              |     |          |       |           |            |            |            |            |            |
|   |              |     |          |       |           |            |            |            |            |            |

**INITIAL ASSESSMENT FORM FOR STRUCTURE :****P00060094+08282**

Continue

\*\*\*\*\* Span : Appr-1 - Steel Girders - Spans 1 thru 20 (cont.) \*\*\*\*\*

| Element Description  |              |     |          |       |           |            |            |            |            |            |
|--|--------------|-----|----------|-------|-----------|------------|------------|------------|------------|------------|
| Smart Flag   | Scale Factor | Env | Quantity | Units | Insp Each | Pct Stat 1 | Pct Stat 2 | Pct Stat 3 | Pct Stat 4 | Pct Stat 5 |
| Element 311 - Moveable Bearing   |              |     |          |       |           |            |            |            |            |            |
|  | 1            | 3   | 56       | ea.   |           | 80         | 15         | 5          |            |            |
|  |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :  |              |     |          |       |           |            |            |            |            |            |
| 09/05/2013 - Some of the bearings are at maximum movement with bending of the anchor bolts; 90F. Debris, faded paint, rust, and scale on the bearings.   |              |     |          |       |           |            |            |            |            | FPDZ       |
| 09/06/2011 - No change from previous inspections.  |              |     |          |       |           |            |            |            |            | GCCY       |
| 08/25/2009 - Some cleaning and spot painting was done during the snooper inspection. Left 5 percent in state 3 for alignment.  |              |     |          |       |           |            |            |            |            | ZQDZ       |
| 08/27/2007 - Bearings at Bent 2 thru 6 and 19 thru 21 were blown off and overcoated painted. Several of the bearings are at maximum movement with bending of the pins at G1 and G4. Additional comments on attached paperwork. |              |     |          |       |           |            |            |            |            | ZZBZ       |
| 06/28/2005 - Areas of rust, paint losse, and debris.   |              |     |          |       |           |            |            |            |            | SZMI       |
| 07/24/2003 - Still need to verify numbers with next snooper inspection.  |              |     |          |       |           |            |            |            |            | YADZ       |
| 09/27/2001 - Rusty with some debris. Verify numbers and condition with snooper.  |              |     |          |       |           |            |            |            |            | NIBL       |
| 09/02/1998 - _   |              |     |          |       |           |            |            |            |            | GKLH       |
| Inspection Notes:  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
| Element 313 - Fixed Bearing  |              |     |          |       |           |            |            |            |            |            |
|  | 1            | 2   | 56       | ea.   |           | 90         | 10         | 0          |            |            |
|  |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :  |              |     |          |       |           |            |            |            |            |            |
| 09/05/2013 - Dirty, rust, paint loss, and scale.   |              |     |          |       |           |            |            |            |            | FPDZ       |
| 09/06/2011 - No change from previous inspections.  |              |     |          |       |           |            |            |            |            | GCCY       |
| 08/25/2009 - Dirty, some rust, debris, and scale. Some cleaning and spot painting was done during the snooper inspection.  |              |     |          |       |           |            |            |            |            | ZQDZ       |
| 08/27/2007 - 5 percent in Condition State 3 due to rust and pitting. Some dirt and debris also noted. Some blowing off and overcoat painting of some of the bearings.  |              |     |          |       |           |            |            |            |            | ZZBZ       |
| 06/28/2005 - Areas of rust, paint loss, and debris.  |              |     |          |       |           |            |            |            |            | SZMI       |
| 07/24/2003 - Still need to verify numbers with next snooper inspection.  |              |     |          |       |           |            |            |            |            | YADZ       |
| 09/27/2001 - Rusty spots throughout. Need to verify numbers and condition with snooper.  |              |     |          |       |           |            |            |            |            | NIBL       |
| 09/02/1998 - _   |              |     |          |       |           |            |            |            |            | GKLH       |
| Inspection Notes:  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |
|  |              |     |          |       |           |            |            |            |            |            |

**INITIAL ASSESSMENT FORM FOR STRUCTURE :****P00060094+08282**

Continue

**\*\*\*\*\* Span : Appr-1 - Steel Girders - Spans 1 thru 20 (cont.) \*\*\*\*\***

| Element Description   |              |     |          |       |           |            |            |            |            |            |
|---|--------------|-----|----------|-------|-----------|------------|------------|------------|------------|------------|
| Smart Flag  | Scale Factor | Env | Quantity | Units | Insp Each | Pct Stat 1 | Pct Stat 2 | Pct Stat 3 | Pct Stat 4 | Pct Stat 5 |
| Element 334 - Metal Rail Coated   |              |     |          |       |           |            |            |            |            |            |
|   | 1            | 3   | 662      | m.    |           | 60         | 25         | 10         | 5          | 0          |
|   |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :   |              |     |          |       |           |            |            |            |            |            |
| 09/05/2013 - Rusty spots, thin paint, exposed base paint, rusted post webs at the curb line with section loss to the webs. On-going repairs to the rails. Delaminated and spalling on the curbs.  |              |     |          |       |           |            |            |            |            | FPDZ       |
| 09/06/2011 - No change from previous inspections. Replaced rail posts and panels in (2) areas in June 2011.   |              |     |          |       |           |            |            |            |            | GCCY       |
| 08/25/2009 - Sanding material packed in the posts webs near the curbs has rusted and weakened the posts. This span is in the best condition, but still has rust, minor paint loss, and top coat worn down to a faded primer coat. Some posts that were bent over have been repaired by reinforcing the web in the rotted areas. |              |     |          |       |           |            |            |            |            | ZQDZ       |
| 08/27/2007 - Lots of rust in the lower rail post webs causing section loss. Posts have been hit and bent over as web crumples. Most of the top coat of paint is faded to the primer coat.   |              |     |          |       |           |            |            |            |            | ZZBZ       |
| 06/28/2005 - Faded paint and rust where paint is chipped off. Red prime coat is coming through throughout. A rattle on the Right rail near Bent 2. (330.83 * 2 = 661.66) Nate.  |              |     |          |       |           |            |            |            |            | SZMI       |
| 07/24/2003 - Same as previous report. Rail is rattling on the North side of the structure bear Bent 2 under heavy loads in the left traffic lane.   |              |     |          |       |           |            |            |            |            | YADZ       |
| 09/27/2001 - 331.2 * 2 = 662.4m   |              |     |          |       |           |            |            |            |            | NIBL       |
| Rusty spots. Chaulky paint with some chips in the paint system.   |              |     |          |       |           |            |            |            |            | GKLH       |
| 09/02/1998 - Some rusing throughout.  |              |     |          |       |           |            |            |            |            |            |
| Inspection Notes:   |              |     |          |       |           |            |            |            |            |            |
|   |              |     |          |       |           |            |            |            |            |            |
|   |              |     |          |       |           |            |            |            |            |            |

**\*\*\*\*\* Span : Appr-2 - Tower Abutment - Span 27 \*\*\*\*\***

| Element Description   |              |     |          |       |           |            |            |            |            |            |
|---|--------------|-----|----------|-------|-----------|------------|------------|------------|------------|------------|
| Smart Flag  | Scale Factor | Env | Quantity | Units | Insp Each | Pct Stat 1 | Pct Stat 2 | Pct Stat 3 | Pct Stat 4 | Pct Stat 5 |
| Element 62 - Bare Top Flang   |              |     |          |       |           |            |            |            |            |            |
|   | 1            | 3   | 123      | sq.m. | X         | 100        | 0          | 0          | 0          | 0          |
|   |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :   |              |     |          |       |           |            |            |            |            |            |
| 09/05/2013 - Generally in Good condition with some random mapping cracks. Wear in the wheel paths.  |              |     |          |       |           |            |            |            |            | FPDZ       |
| 09/06/2011 - Removed and then replaced top 2" with Silica Fume Concrete in June 2011.   |              |     |          |       |           |            |            |            |            | GCCY       |
| 08/25/2009 - Wear from studded tires. Small delaminated area near the guard angle.  |              |     |          |       |           |            |            |            |            | ZQDZ       |
| 08/27/2007 - 11.30 * 10.91 = 123.28 Some wear in the wheel paths with reduced skid resistance. Some delamianted concrete along the joint. Some tight mapping cracks throughout. |              |     |          |       |           |            |            |            |            | ZZBZ       |
| Inspection Notes:   |              |     |          |       |           |            |            |            |            |            |
|   |              |     |          |       |           |            |            |            |            |            |
|   |              |     |          |       |           |            |            |            |            |            |

# INITIAL ASSESSMENT FORM FOR STRUCTURE :

P00060094+08282

Continue

\*\*\*\*\* Span : Appr-2 - Tower Abutment - Span 27 (cont.) \*\*\*\*\*

| Element Description   |              |     |          |       |           |            |            |            |            |            |
|---|--------------|-----|----------|-------|-----------|------------|------------|------------|------------|------------|
| Smart Flag  | Scale Factor | Env | Quantity | Units | Insp Each | Pct Stat 1 | Pct Stat 2 | Pct Stat 3 | Pct Stat 4 | Pct Stat 5 |
| Element 215 - R/Conc Abutment Abutment 27   |              |     |          |       |           |            |            |            |            |            |
|   | 1            | 2   | 33       | m.    |           | 95         | 5          | 0          | 0          |            |
|   |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :   |              |     |          |       |           |            |            |            |            |            |
| 09/05/2013 - Some tight cracking in areas near the end posts. Face of the backwall has some tight cracks.   |              |     |          |       |           |            |            |            |            | FPDZ       |
| 09/06/2011 - No change from previous inspections.   |              |     |          |       |           |            |            |            |            | GCCY       |
| 08/25/2009 - Minor and tight cracking in Abutment backwall. Some graffiti painted on the backwall and girder ends. Some dirt and debris sitting area of the bearings.   |              |     |          |       |           |            |            |            |            | ZQDZ       |
| 08/27/2007 - No change with some sanding material around the bearings.  |              |     |          |       |           |            |            |            |            | ZZBZ       |
| 06/28/2005 - Same as previous reports. No major problems noted.   |              |     |          |       |           |            |            |            |            | SZMI       |
| 07/24/2003 - 11.38 11.50 11.50 = 33.38m Abutment face and u-style wingwalls. Tight shrinkage cracks on the Abutment backwall face.  |              |     |          |       |           |            |            |            |            | YADZ       |
| 09/27/2001 - 11.38 * 1 = 11.38m   |              |     |          |       |           |            |            |            |            | NIBL       |
| 09/02/1998 - None   |              |     |          |       |           |            |            |            |            | GKLH       |
| 09/01/1992 - None   |              |     |          |       |           |            |            |            |            | REFI       |
| Inspection Notes:   |              |     |          |       |           |            |            |            |            |            |
|   |              |     |          |       |           |            |            |            |            |            |
|   |              |     |          |       |           |            |            |            |            |            |
| Element 334 - Metal Rail Coated   |              |     |          |       |           |            |            |            |            |            |
|   | 1            | 3   | 22       | m.    |           | 70         | 25         | 5          | 0          | 0          |
|   |              |     |          |       |           | %          | %          | %          | %          | %          |
| Previous Inspection Notes :   |              |     |          |       |           |            |            |            |            |            |
| 09/05/2013 - Rusty spots, thin paint, exposed base paint, rusted post webs at the curb line with section loss to the webs. Scrapes and dings from past traffic hits.  |              |     |          |       |           |            |            |            |            | FPDZ       |
| 09/06/2011 - No change from previous inspections.   |              |     |          |       |           |            |            |            |            | GCCY       |
| 08/25/2009 - Sanding material packed in the posts webs near the curbs. Concrete end posts are in good condition.  |              |     |          |       |           |            |            |            |            | ZQDZ       |
| 08/27/2007 - Sanding material packed in the posts webs near the curbs has rusted and weakened the posts. This span is in the best condition, but still has rust, minor paint loss, and top coat worn down to a faded primer coat. |              |     |          |       |           |            |            |            |            | ZZBZ       |
| 06/28/2005 - Concrete end posts have tight shrinkage cracks. Rust and faded paint on steel. Some chips in the paint and primer coat is visible on the steel in areas. (10.82 * 2 = 21.64) Nate.                                   |              |     |          |       |           |            |            |            |            | SZMI       |
| 07/24/2003 - Same as previous report.   |              |     |          |       |           |            |            |            |            | YADZ       |
| 09/27/2001 - 11.3 * 2 = 22.6m   |              |     |          |       |           |            |            |            |            | NIBL       |
| Rusty spots. Chips from sanding material and debris. Paint is chalky.   |              |     |          |       |           |            |            |            |            | GKLH       |
| 09/02/1998 - _  |              |     |          |       |           |            |            |            |            |            |
| Inspection Notes:   |              |     |          |       |           |            |            |            |            |            |
|   |              |     |          |       |           |            |            |            |            |            |
|   |              |     |          |       |           |            |            |            |            |            |



|   |      |
|---|------|
| 09/05/2013 - Snooper truck used on the River Spans and Havre bucket truck on the ground Spans.  | FPDZ |
| 09/06/2011 - None   | GCCY |
| 08/25/2009 - Paul from Helena Bridge and Crew checked this deck for delaminatin with groung penetrating radar and chain dragging this past summer.  | ZQDZ |
| Watch the alignmnet or any more movement of the bearings on the West end as nearly touching the Tower Abutment wall.  |      |
| 08/27/2007 - None   | ZZBZ |
| 06/28/2005 - NBI 58, deck, rated at a "5" due to delaminations and spalling of the deck surface; especially at the joints.  | SZMI |
| NBI 60, substructure, rated at a "6" due to spalling and deteriorating concrete at columns for Bents 3 and 4. Also some spalling under bearings at Left-Outside of Bents 3 and 4. Per Infrastructure Engineers August 24, 2006 underwater inspection, the inspected substructure units are in satisfactory condition. There is no significant local or general scour present at the bridge site. There are no significant restrictions in the channel that will adversely impact flow. ITEM 61 CHANGED PER INFRASTRUCTURE ENGINEEERS UNDERWATER INSPECTION. |      |
| 07/24/2003 - Some photos of rust blisters and section loss on the main span girder webs taken during FC inspection.   | YADZ |
| 09/27/2001 - Studded tire wear in the wheel paths.  | NIBL |
| 09/02/1998 - None   | GKLH |
| 09/01/1992 - Sufficiency Rating Calculation Accepted by ops\$u5963 at 2/26/97 11:10:39  | REFI |
| Sufficiency Rating Calculation Accepted by ops\$u9004 at 2/19/97 14:23:34   |      |
| 01/01/1991 - Updated with tape 1994   | NB94 |
| 05/01/1989 - Updated with tape 1991   | NB91 |
| 04/01/1987 - Updated with tape 1989   | NB89 |
| 10/01/1984 - Updated with tape 1986   | NB86 |
| 02/01/1981 - Updated with tape 1984   | NB84 |

[illegible]



# APPENDIX B

---

## *Traffic Data Collection*



Robert Peccia & Associates  
825 Custer Ave

Helena, Montana, United States 59604  
406-447-5000 scottr@rpa-hln.com

Count Name: 01-TriHillFrontage\_AirportRd TMC  
Site Code: TMC-01  
Start Date: 07/16/2014  
Page No: 1

## Turning Movement Data

| Start Time             | Airport Rd<br>Southbound |       |      |            | Tri Hill Frontage<br>Northbound |      |      |            | Airport Rd<br>Eastbound |       |      |            | Int. Total |
|------------------------|--------------------------|-------|------|------------|---------------------------------|------|------|------------|-------------------------|-------|------|------------|------------|
|                        | Thru                     | Right | Peds | App. Total | Left                            | Thru | Peds | App. Total | Left                    | Right | Peds | App. Total |            |
| 7:00 AM                | 15                       | 13    | 0    | 28         | 4                               | 41   | 0    | 45         | 11                      | 2     | 0    | 13         | 86         |
| 7:15 AM                | 16                       | 15    | 0    | 31         | 1                               | 34   | 0    | 35         | 16                      | 4     | 0    | 20         | 86         |
| 7:30 AM                | 22                       | 29    | 0    | 51         | 2                               | 54   | 0    | 56         | 20                      | 10    | 0    | 30         | 137        |
| 7:45 AM                | 24                       | 26    | 0    | 50         | 4                               | 53   | 0    | 57         | 16                      | 2     | 0    | 18         | 125        |
| Hourly Total           | 77                       | 83    | 0    | 160        | 11                              | 182  | 0    | 193        | 63                      | 18    | 0    | 81         | 434        |
| 8:00 AM                | 26                       | 19    | 0    | 45         | 2                               | 36   | 0    | 38         | 19                      | 2     | 0    | 21         | 104        |
| 8:15 AM                | 25                       | 14    | 0    | 39         | 1                               | 46   | 0    | 47         | 28                      | 5     | 0    | 33         | 119        |
| 8:30 AM                | 31                       | 13    | 0    | 44         | 0                               | 34   | 0    | 34         | 15                      | 5     | 0    | 20         | 98         |
| 8:45 AM                | 26                       | 6     | 0    | 32         | 0                               | 50   | 0    | 50         | 8                       | 2     | 0    | 10         | 92         |
| Hourly Total           | 108                      | 52    | 0    | 160        | 3                               | 166  | 0    | 169        | 70                      | 14    | 0    | 84         | 413        |
| *** BREAK ***          | -                        | -     | -    | -          | -                               | -    | -    | -          | -                       | -     | -    | -          | -          |
| 4:00 PM                | 50                       | 26    | 0    | 76         | 3                               | 48   | 0    | 51         | 21                      | 2     | 0    | 23         | 150        |
| 4:15 PM                | 37                       | 16    | 0    | 53         | 1                               | 43   | 0    | 44         | 11                      | 5     | 0    | 16         | 113        |
| 4:30 PM                | 61                       | 18    | 0    | 79         | 1                               | 50   | 0    | 51         | 14                      | 1     | 0    | 15         | 145        |
| 4:45 PM                | 45                       | 12    | 0    | 57         | 2                               | 41   | 0    | 43         | 16                      | 1     | 0    | 17         | 117        |
| Hourly Total           | 193                      | 72    | 0    | 265        | 7                               | 182  | 0    | 189        | 62                      | 9     | 0    | 71         | 525        |
| 5:00 PM                | 46                       | 21    | 0    | 67         | 3                               | 31   | 0    | 34         | 33                      | 1     | 0    | 34         | 135        |
| 5:15 PM                | 55                       | 19    | 0    | 74         | 3                               | 38   | 0    | 41         | 12                      | 4     | 0    | 16         | 131        |
| 5:30 PM                | 57                       | 16    | 0    | 73         | 4                               | 38   | 0    | 42         | 12                      | 2     | 0    | 14         | 129        |
| 5:45 PM                | 51                       | 19    | 0    | 70         | 2                               | 35   | 0    | 37         | 14                      | 5     | 0    | 19         | 126        |
| Hourly Total           | 209                      | 75    | 0    | 284        | 12                              | 142  | 0    | 154        | 71                      | 12    | 0    | 83         | 521        |
| Grand Total            | 587                      | 282   | 0    | 869        | 33                              | 672  | 0    | 705        | 266                     | 53    | 0    | 319        | 1893       |
| Approach %             | 67.5                     | 32.5  | -    | -          | 4.7                             | 95.3 | -    | -          | 83.4                    | 16.6  | -    | -          | -          |
| Total %                | 31.0                     | 14.9  | -    | 45.9       | 1.7                             | 35.5 | -    | 37.2       | 14.1                    | 2.8   | -    | 16.9       | -          |
| Motorcycles            | 17                       | 2     | -    | 19         | 0                               | 14   | -    | 14         | 1                       | 1     | -    | 2          | 35         |
| % Motorcycles          | 2.9                      | 0.7   | -    | 2.2        | 0.0                             | 2.1  | -    | 2.0        | 0.4                     | 1.9   | -    | 0.6        | 1.8        |
| Cars                   | 325                      | 168   | -    | 493        | 13                              | 343  | -    | 356        | 154                     | 15    | -    | 169        | 1018       |
| % Cars                 | 55.4                     | 59.6  | -    | 56.7       | 39.4                            | 51.0 | -    | 50.5       | 57.9                    | 28.3  | -    | 53.0       | 53.8       |
| Light Goods Vehicles   | 102                      | 87    | -    | 189        | 11                              | 112  | -    | 123        | 80                      | 25    | -    | 105        | 417        |
| % Light Goods Vehicles | 17.4                     | 30.9  | -    | 21.7       | 33.3                            | 16.7 | -    | 17.4       | 30.1                    | 47.2  | -    | 32.9       | 22.0       |
| Buses                  | 4                        | 1     | -    | 5          | 0                               | 5    | -    | 5          | 0                       | 2     | -    | 2          | 12         |
| % Buses                | 0.7                      | 0.4   | -    | 0.6        | 0.0                             | 0.7  | -    | 0.7        | 0.0                     | 3.8   | -    | 0.6        | 0.6        |
| Single-Unit Trucks     | 33                       | 19    | -    | 52         | 6                               | 45   | -    | 51         | 29                      | 7     | -    | 36         | 139        |
| % Single-Unit Trucks   | 5.6                      | 6.7   | -    | 6.0        | 18.2                            | 6.7  | -    | 7.2        | 10.9                    | 13.2  | -    | 11.3       | 7.3        |
| Articulated Trucks     | 105                      | 5     | -    | 110        | 0                               | 153  | -    | 153        | 2                       | 3     | -    | 5          | 268        |
| % Articulated Trucks   | 17.9                     | 1.8   | -    | 12.7       | 0.0                             | 22.8 | -    | 21.7       | 0.8                     | 5.7   | -    | 1.6        | 14.2       |
| Bicycles on Road       | 1                        | 0     | -    | 1          | 3                               | 0    | -    | 3          | 0                       | 0     | -    | 0          | 4          |
| % Bicycles on Road     | 0.2                      | 0.0   | -    | 0.1        | 9.1                             | 0.0  | -    | 0.4        | 0.0                     | 0.0   | -    | 0.0        | 0.2        |



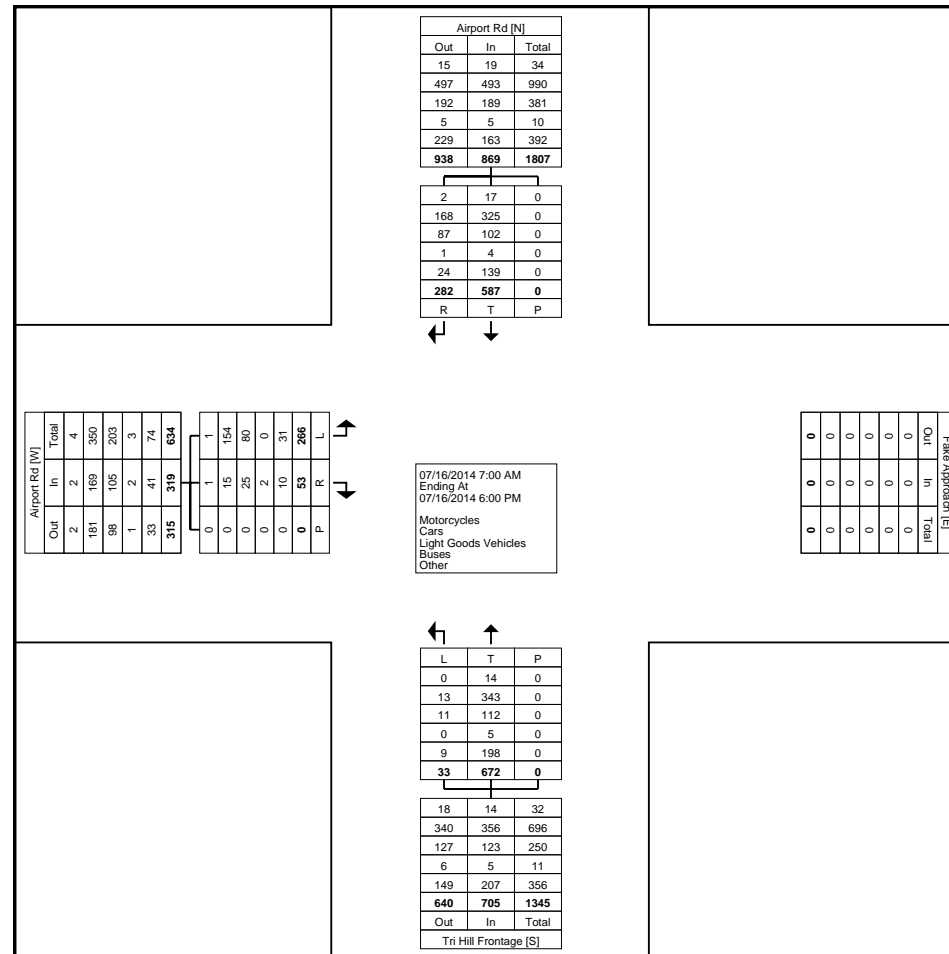
[illegible]



Robert Peccia & Associates  
825 Custer Ave

Helena, Montana, United States 59604  
406-447-5000 scott@rpa-hln.com

Count Name: 01-TriHillFrontage\_AirportRd TMC  
Site Code: TMC-01  
Start Date: 07/16/2014  
Page No: 3



Turning Movement Data Plot



Robert Peccia & Associates  
825 Custer Ave

Helena, Montana, United States 59604  
406-447-5000 scottr@rpa-hln.com

Count Name: 01-TriHillFrontage\_AirportRd TMC  
Site Code: TMC-01  
Start Date: 07/16/2014  
Page No: 4

## Turning Movement Peak Hour Data (7:30 AM)

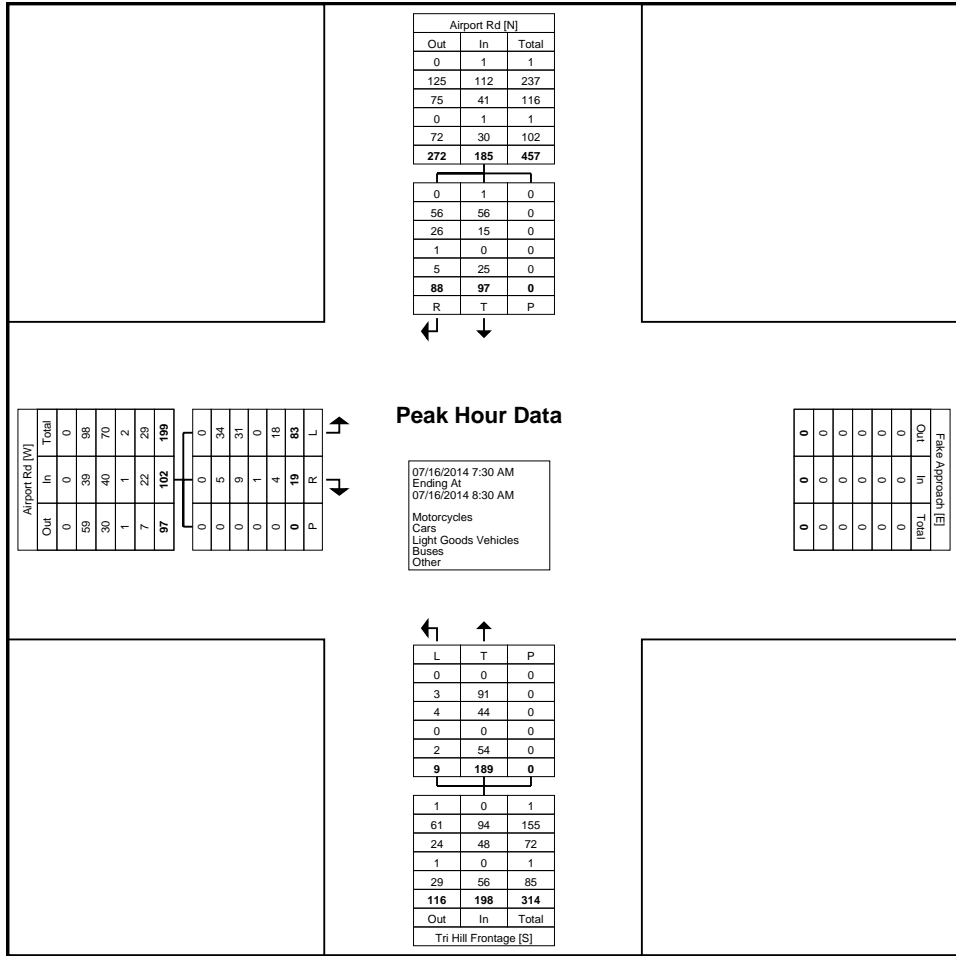
[illegible]



Robert Peccia & Associates  
825 Custer Ave

Helena, Montana, United States 59604  
406-447-5000 scottr@rpa-hln.com

Count Name: 01-TriHillFrontage\_AirportRd TMC  
Site Code: TMC-01  
Start Date: 07/16/2014  
Page No: 5



### Turning Movement Peak Hour Data Plot (7:30 AM)



Robert Peccia & Associates  
825 Custer Ave

Helena, Montana, United States 59604  
406-447-5000 [scottr@rpa-hln.com](mailto:scottr@rpa-hln.com)

Count Name: 01-TriHillFrontage\_AirportRd TMC  
Site Code: TMC-01  
Start Date: 07/16/2014  
Page No: 6

## Turning Movement Peak Hour Data (4:30 PM)

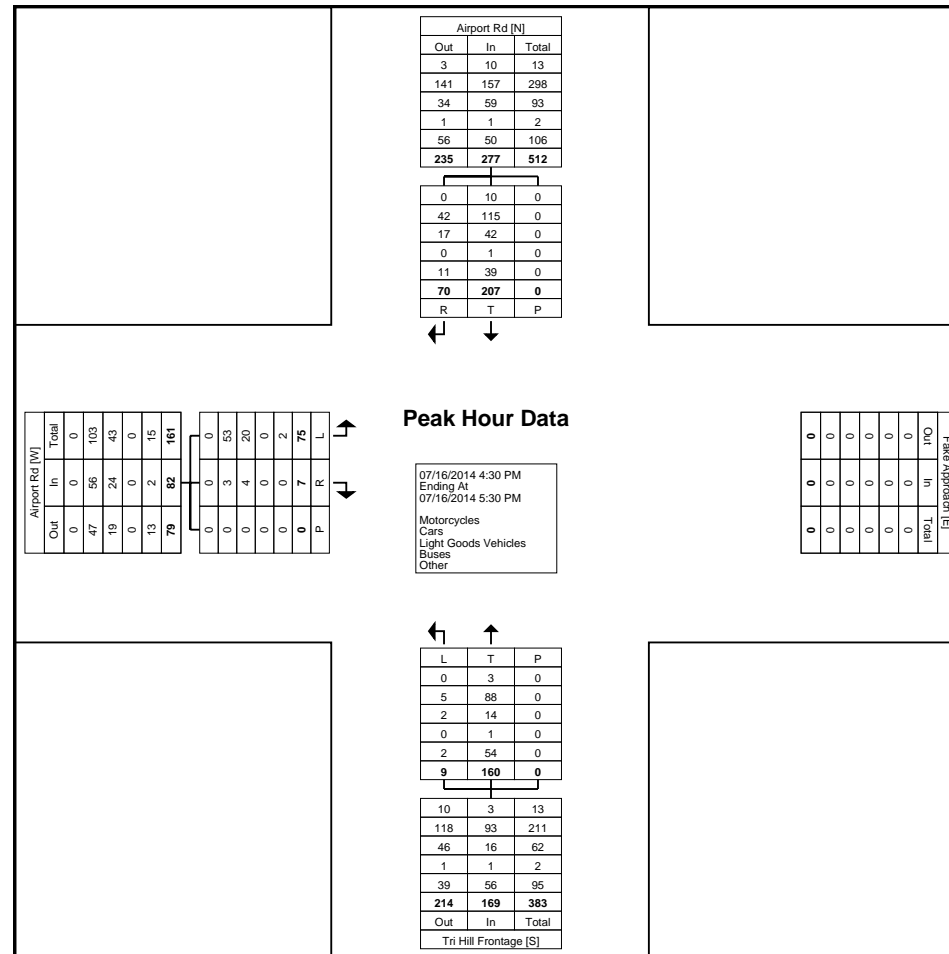
[illegible]



Robert Peccia & Associates  
825 Custer Ave

Helena, Montana, United States 59604  
406-447-5000 scott@rpa-hln.com

Count Name: 01-TriHillFrontage\_AirportRd TMC  
Site Code: TMC-01  
Start Date: 07/16/2014  
Page No: 7



Turning Movement Peak Hour Data Plot (4:30 PM)



Robert Peccia & Associates  
825 Custer Ave

Helena, Montana, United States 59604  
406-447-5000 [scottr@rpa-hln.com](mailto:scottr@rpa-hln.com)

Count Name: 01-TriHillFrontage\_AirportRd TMC  
Site Code: TMC-01  
Start Date: 07/16/2014  
Page No: 8



Robert Peccia & Associates  
825 Custer Ave

Helena, Montana, United States 59604  
406-447-5000 scottr@rpa-hln.com

Count Name: 02-I15NB\_AirportRd TMC  
Site Code: TMC-02  
Start Date: 07/16/2014  
Page No: 1

## Turning Movement Data

| Start Time             | Southbound St.<br>Southbound |      |      |            | Airport Rd<br>Northbound |      |      |            | I-15 NB On<br>Westbound |            | I-15 NB Off<br>Eastbound |      |      |      |            | Int. Total |
|------------------------|------------------------------|------|------|------------|--------------------------|------|------|------------|-------------------------|------------|--------------------------|------|------|------|------------|------------|
|                        | Thru                         | Left | Peds | App. Total | Right                    | Thru | Peds | App. Total | Peds                    | App. Total | Right                    | Thru | Left | Peds | App. Total |            |
| 7:00 AM                | 23                           | 16   | 0    | 39         | 44                       | 8    | 0    | 52         | 1                       | 0          | 6                        | 0    | 2    | 0    | 8          | 99         |
| 7:15 AM                | 28                           | 16   | 0    | 44         | 42                       | 8    | 0    | 50         | 0                       | 0          | 2                        | 1    | 1    | 0    | 4          | 98         |
| 7:30 AM                | 48                           | 16   | 0    | 64         | 64                       | 9    | 0    | 73         | 0                       | 0          | 4                        | 0    | 1    | 0    | 5          | 142        |
| 7:45 AM                | 47                           | 12   | 0    | 59         | 54                       | 15   | 0    | 69         | 0                       | 0          | 3                        | 0    | 2    | 0    | 5          | 133        |
| Hourly Total           | 146                          | 60   | 0    | 206        | 204                      | 40   | 0    | 244        | 1                       | 0          | 15                       | 1    | 6    | 0    | 22         | 472        |
| 8:00 AM                | 43                           | 28   | 0    | 71         | 47                       | 8    | 0    | 55         | 0                       | 0          | 2                        | 0    | 0    | 0    | 2          | 128        |
| 8:15 AM                | 35                           | 23   | 0    | 58         | 57                       | 17   | 0    | 74         | 0                       | 0          | 4                        | 0    | 1    | 0    | 5          | 137        |
| 8:30 AM                | 33                           | 17   | 0    | 50         | 40                       | 10   | 0    | 50         | 0                       | 0          | 8                        | 0    | 1    | 0    | 9          | 109        |
| 8:45 AM                | 29                           | 19   | 0    | 48         | 44                       | 13   | 0    | 57         | 0                       | 0          | 3                        | 0    | 0    | 0    | 3          | 108        |
| Hourly Total           | 140                          | 87   | 0    | 227        | 188                      | 48   | 0    | 236        | 0                       | 0          | 17                       | 0    | 2    | 0    | 19         | 482        |
| *** BREAK ***          | -                            | -    | -    | -          | -                        | -    | -    | -          | -                       | -          | -                        | -    | -    | -    | -          | -          |
| 4:00 PM                | 68                           | 107  | 0    | 175        | 60                       | 8    | 0    | 68         | 0                       | 0          | 8                        | 0    | 0    | 0    | 8          | 251        |
| 4:15 PM                | 46                           | 50   | 0    | 96         | 47                       | 9    | 0    | 56         | 0                       | 0          | 9                        | 1    | 0    | 0    | 10         | 162        |
| 4:30 PM                | 68                           | 111  | 0    | 179        | 47                       | 17   | 0    | 64         | 0                       | 0          | 10                       | 1    | 1    | 0    | 12         | 255        |
| 4:45 PM                | 54                           | 39   | 0    | 93         | 43                       | 13   | 0    | 56         | 0                       | 0          | 4                        | 0    | 1    | 0    | 5          | 154        |
| Hourly Total           | 236                          | 307  | 0    | 543        | 197                      | 47   | 0    | 244        | 0                       | 0          | 31                       | 2    | 2    | 0    | 35         | 822        |
| 5:00 PM                | 63                           | 53   | 0    | 116        | 55                       | 8    | 0    | 63         | 0                       | 0          | 5                        | 0    | 0    | 0    | 5          | 184        |
| 5:15 PM                | 66                           | 44   | 0    | 110        | 39                       | 12   | 0    | 51         | 0                       | 0          | 7                        | 0    | 1    | 0    | 8          | 169        |
| 5:30 PM                | 65                           | 29   | 0    | 94         | 39                       | 11   | 0    | 50         | 0                       | 0          | 7                        | 0    | 0    | 0    | 7          | 151        |
| 5:45 PM                | 59                           | 21   | 0    | 80         | 38                       | 12   | 0    | 50         | 0                       | 0          | 12                       | 0    | 0    | 0    | 12         | 142        |
| Hourly Total           | 253                          | 147  | 0    | 400        | 171                      | 43   | 0    | 214        | 0                       | 0          | 31                       | 0    | 1    | 0    | 32         | 646        |
| Grand Total            | 775                          | 601  | 0    | 1376       | 760                      | 178  | 0    | 938        | 1                       | 0          | 94                       | 3    | 11   | 0    | 108        | 2422       |
| Approach %             | 56.3                         | 43.7 | -    | -          | 81.0                     | 19.0 | -    | -          | -                       | -          | 87.0                     | 2.8  | 10.2 | -    | -          | -          |
| Total %                | 32.0                         | 24.8 | -    | 56.8       | 31.4                     | 7.3  | -    | 38.7       | -                       | 0.0        | 3.9                      | 0.1  | 0.5  | -    | 4.5        | -          |
| Motorcycles            | 18                           | 13   | -    | 31         | 12                       | 2    | -    | 14         | -                       | 0          | 2                        | 0    | 0    | -    | 2          | 47         |
| % Motorcycles          | 2.3                          | 2.2  | -    | 2.3        | 1.6                      | 1.1  | -    | 1.5        | -                       | -          | 2.1                      | 0.0  | 0.0  | -    | 1.9        | 1.9        |
| Cars                   | 425                          | 392  | -    | 817        | 409                      | 68   | -    | 477        | -                       | 0          | 36                       | 2    | 9    | -    | 47         | 1341       |
| % Cars                 | 54.8                         | 65.2 | -    | 59.4       | 53.8                     | 38.2 | -    | 50.9       | -                       | -          | 38.3                     | 66.7 | 81.8 | -    | 43.5       | 55.4       |
| Light Goods Vehicles   | 208                          | 175  | -    | 383        | 165                      | 36   | -    | 201        | -                       | 0          | 17                       | 1    | 2    | -    | 20         | 604        |
| % Light Goods Vehicles | 26.8                         | 29.1 | -    | 27.8       | 21.7                     | 20.2 | -    | 21.4       | -                       | -          | 18.1                     | 33.3 | 18.2 | -    | 18.5       | 24.9       |
| Buses                  | 5                            | 0    | -    | 5          | 2                        | 2    | -    | 4          | -                       | 0          | 0                        | 0    | 0    | -    | 0          | 9          |
| % Buses                | 0.6                          | 0.0  | -    | 0.4        | 0.3                      | 1.1  | -    | 0.4        | -                       | -          | 0.0                      | 0.0  | 0.0  | -    | 0.0        | 0.4        |
| Single-Unit Trucks     | 45                           | 13   | -    | 58         | 78                       | 17   | -    | 95         | -                       | 0          | 8                        | 0    | 0    | -    | 8          | 161        |
| % Single-Unit Trucks   | 5.8                          | 2.2  | -    | 4.2        | 10.3                     | 9.6  | -    | 10.1       | -                       | -          | 8.5                      | 0.0  | 0.0  | -    | 7.4        | 6.6        |
| Articulated Trucks     | 72                           | 8    | -    | 80         | 94                       | 53   | -    | 147        | -                       | 0          | 31                       | 0    | 0    | -    | 31         | 258        |
| % Articulated Trucks   | 9.3                          | 1.3  | -    | 5.8        | 12.4                     | 29.8 | -    | 15.7       | -                       | -          | 33.0                     | 0.0  | 0.0  | -    | 28.7       | 10.7       |
| Bicycles on Road       | 2                            | 0    | -    | 2          | 0                        | 0    | -    | 0          | -                       | 0          | 0                        | 0    | 0    | -    | 0          | 2          |
| % Bicycles on Road     | 0.3                          | 0.0  | -    | 0.1        | 0.0                      | 0.0  | -    | 0.0        | -                       | -          | 0.0                      | 0.0  | 0.0  | -    | 0.0        | 0.1        |



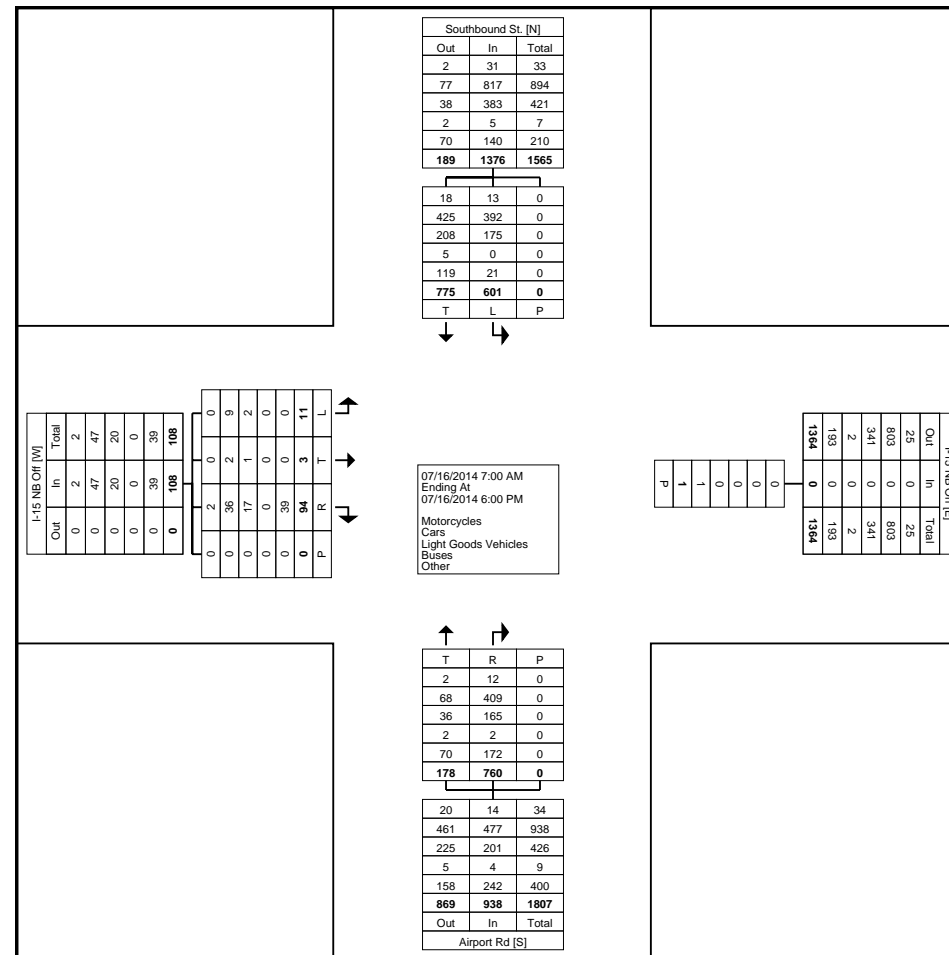
|               |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |
|---------------|---|---|---|---|---|---|---|---|-------|---|---|---|---|---|---|
| Pedestrians   | - | - | 0 | - | - | - | 0 | - | 1     | - | - | - | 0 | - | - |
| % Pedestrians | - | - | - | - | - | - | - | - | 100.0 | - | - | - | - | - | - |



Robert Peccia & Associates  
825 Custer Ave

Helena, Montana, United States 59604  
406-447-5000 scottr@rpa-hln.com

Count Name: 02-I15NB\_AirportRd TMC  
Site Code: TMC-02  
Start Date: 07/16/2014  
Page No: 3



Turning Movement Data Plot

Robert Peccia & Associates  
825 Custer Ave

Helena, Montana, United States 59604  
406-447-5000 scottr@rpa-hln.com

Count Name: 02-I15NB\_AirportRd TMC  
Site Code: TMC-02  
Start Date: 07/16/2014  
Page No: 4

### Turning Movement Peak Hour Data (7:30 AM)

[illegible]



Count Name: 02-I15NB\_AirportRd TMC  
Site Code: TMC-02  
Start Date: 07/16/2014  
Page No: 5



Robert Peccia & Associates  
825 Custer Ave

Helena, Montana, United States 59604  
406-447-5000 scottr@rpa-hln.com

Count Name: 02-I15NB\_AirportRd TMC  
Site Code: TMC-02  
Start Date: 07/16/2014  
Page No: 6

### Turning Movement Peak Hour Data (4:00 PM)

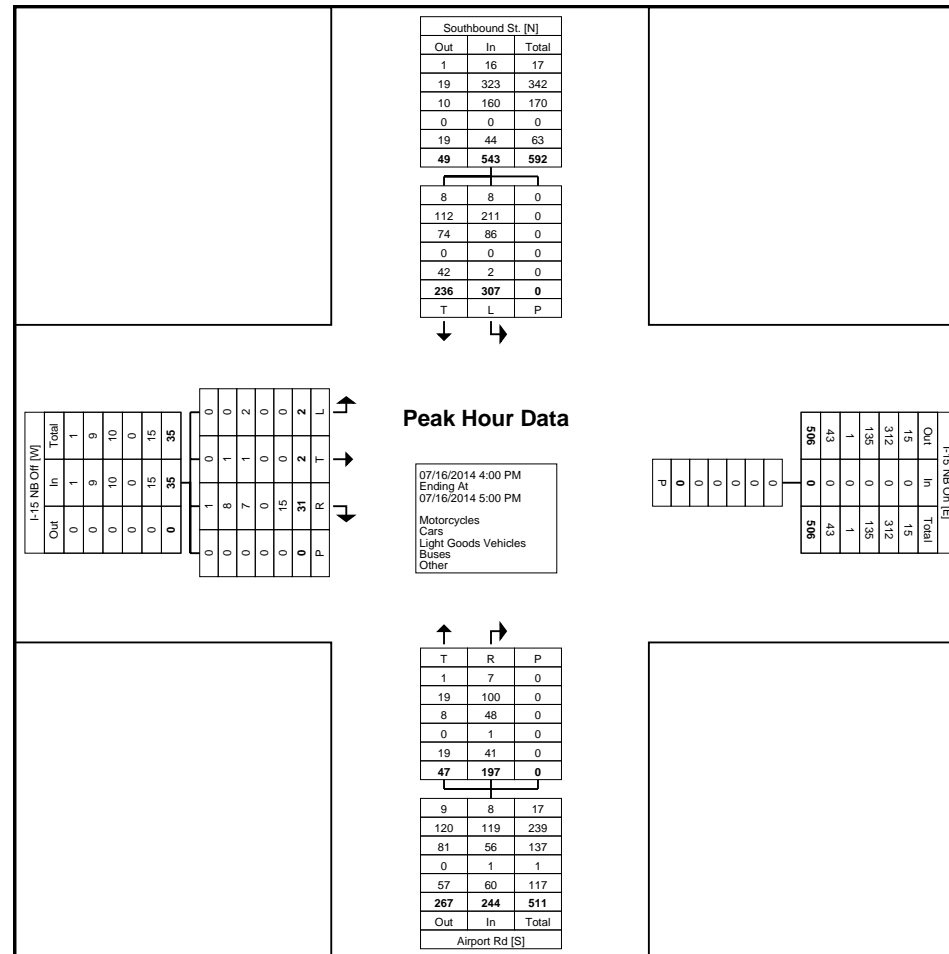
[illegible]



Robert Peccia & Associates  
825 Custer Ave

Helena, Montana, United States 59604  
406-447-5000 scott@rpa-hln.com

Count Name: 02-I15NB\_AirportRd TMC  
Site Code: TMC-02  
Start Date: 07/16/2014  
Page No: 7



Turning Movement Peak Hour Data Plot (4:00 PM)



Robert Peccia & Associates  
825 Custer Ave

Helena, Montana, United States 59604  
406-447-5000 [scottr@rpa-hln.com](mailto:scottr@rpa-hln.com)

Count Name: 02-I15NB\_AirportRd TMC  
Site Code: TMC-02  
Start Date: 07/16/2014  
Page No: 8



Robert Peccia & Associates  
825 Custer Ave

Helena, Montana, United States 59604  
406-447-5000 scottr@rpa-hln.com

Count Name: 03-I15SBOn\_AirportRd TMC  
Site Code: TMC-03  
Start Date: 07/16/2014  
Page No: 1

## Turning Movement Data

| Start Time             | Airport Rd<br>Southbound |      |       |      |            | Airport Rd<br>Northbound |      |      |            | I-15 SB On<br>Eastbound |            | Int. Total |
|------------------------|--------------------------|------|-------|------|------------|--------------------------|------|------|------------|-------------------------|------------|------------|
|                        | Right                    | Thru | Left  | Peds | App. Total | Thru                     | Left | Peds | App. Total | Peds                    | App. Total |            |
| 7:00 AM                | 0                        | 41   | 0     | 0    | 41         | 5                        | 5    | 0    | 10         | 0                       | 0          | 51         |
| 7:15 AM                | 1                        | 44   | 0     | 0    | 45         | 4                        | 5    | 0    | 9          | 0                       | 0          | 54         |
| 7:30 AM                | 1                        | 63   | 0     | 0    | 64         | 5                        | 5    | 0    | 10         | 0                       | 0          | 74         |
| 7:45 AM                | 1                        | 61   | 0     | 0    | 62         | 9                        | 9    | 0    | 18         | 0                       | 0          | 80         |
| Hourly Total           | 3                        | 209  | 0     | 0    | 212        | 23                       | 24   | 0    | 47         | 0                       | 0          | 259        |
| 8:00 AM                | 0                        | 72   | 0     | 0    | 72         | 2                        | 6    | 0    | 8          | 0                       | 0          | 80         |
| 8:15 AM                | 4                        | 55   | 0     | 0    | 59         | 7                        | 12   | 0    | 19         | 0                       | 0          | 78         |
| 8:30 AM                | 1                        | 55   | 1     | 0    | 57         | 6                        | 5    | 0    | 11         | 0                       | 0          | 68         |
| 8:45 AM                | 2                        | 48   | 0     | 0    | 50         | 8                        | 5    | 0    | 13         | 0                       | 0          | 63         |
| Hourly Total           | 7                        | 230  | 1     | 0    | 238        | 23                       | 28   | 0    | 51         | 0                       | 0          | 289        |
| *** BREAK ***          | -                        | -    | -     | -    | -          | -                        | -    | -    | -          | -                       | -          | -          |
| 4:00 PM                | 5                        | 175  | 0     | 0    | 180        | 4                        | 3    | 0    | 7          | 0                       | 0          | 187        |
| 4:15 PM                | 3                        | 94   | 0     | 0    | 97         | 4                        | 5    | 0    | 9          | 0                       | 0          | 106        |
| 4:30 PM                | 2                        | 182  | 0     | 0    | 184        | 6                        | 10   | 0    | 16         | 0                       | 0          | 200        |
| 4:45 PM                | 4                        | 91   | 0     | 0    | 95         | 7                        | 7    | 0    | 14         | 0                       | 0          | 109        |
| Hourly Total           | 14                       | 542  | 0     | 0    | 556        | 21                       | 25   | 0    | 46         | 0                       | 0          | 602        |
| 5:00 PM                | 0                        | 117  | 0     | 0    | 117        | 2                        | 6    | 0    | 8          | 0                       | 0          | 125        |
| 5:15 PM                | 2                        | 108  | 0     | 0    | 110        | 4                        | 9    | 0    | 13         | 0                       | 0          | 123        |
| 5:30 PM                | 4                        | 96   | 0     | 0    | 100        | 3                        | 6    | 0    | 9          | 0                       | 0          | 109        |
| 5:45 PM                | 1                        | 78   | 0     | 0    | 79         | 2                        | 9    | 0    | 11         | 0                       | 0          | 90         |
| Hourly Total           | 7                        | 399  | 0     | 0    | 406        | 11                       | 30   | 0    | 41         | 0                       | 0          | 447        |
| Grand Total            | 31                       | 1380 | 1     | 0    | 1412       | 78                       | 107  | 0    | 185        | 0                       | 0          | 1597       |
| Approach %             | 2.2                      | 97.7 | 0.1   | -    | -          | 42.2                     | 57.8 | -    | -          | -                       | -          | -          |
| Total %                | 1.9                      | 86.4 | 0.1   | -    | 88.4       | 4.9                      | 6.7  | -    | 11.6       | -                       | 0.0        | -          |
| Motorcycles            | 0                        | 32   | 0     | -    | 32         | 1                        | 1    | -    | 2          | -                       | 0          | 34         |
| % Motorcycles          | 0.0                      | 2.3  | 0.0   | -    | 2.3        | 1.3                      | 0.9  | -    | 1.1        | -                       | -          | 2.1        |
| Cars                   | 20                       | 765  | 1     | -    | 786        | 43                       | 25   | -    | 68         | -                       | 0          | 854        |
| % Cars                 | 64.5                     | 55.4 | 100.0 | -    | 55.7       | 55.1                     | 23.4 | -    | 36.8       | -                       | -          | 53.5       |
| Light Goods Vehicles   | 9                        | 432  | 0     | -    | 441        | 22                       | 21   | -    | 43         | -                       | 0          | 484        |
| % Light Goods Vehicles | 29.0                     | 31.3 | 0.0   | -    | 31.2       | 28.2                     | 19.6 | -    | 23.2       | -                       | -          | 30.3       |
| Buses                  | 0                        | 2    | 0     | -    | 2          | 0                        | 0    | -    | 0          | -                       | 0          | 2          |
| % Buses                | 0.0                      | 0.1  | 0.0   | -    | 0.1        | 0.0                      | 0.0  | -    | 0.0        | -                       | -          | 0.1        |
| Single-Unit Trucks     | 1                        | 61   | 0     | -    | 62         | 5                        | 10   | -    | 15         | -                       | 0          | 77         |
| % Single-Unit Trucks   | 3.2                      | 4.4  | 0.0   | -    | 4.4        | 6.4                      | 9.3  | -    | 8.1        | -                       | -          | 4.8        |
| Articulated Trucks     | 1                        | 85   | 0     | -    | 86         | 7                        | 49   | -    | 56         | -                       | 0          | 142        |
| % Articulated Trucks   | 3.2                      | 6.2  | 0.0   | -    | 6.1        | 9.0                      | 45.8 | -    | 30.3       | -                       | -          | 8.9        |
| Bicycles on Road       | 0                        | 3    | 0     | -    | 3          | 0                        | 1    | -    | 1          | -                       | 0          | 4          |
| % Bicycles on Road     | 0.0                      | 0.2  | 0.0   | -    | 0.2        | 0.0                      | 0.9  | -    | 0.5        | -                       | -          | 0.3        |



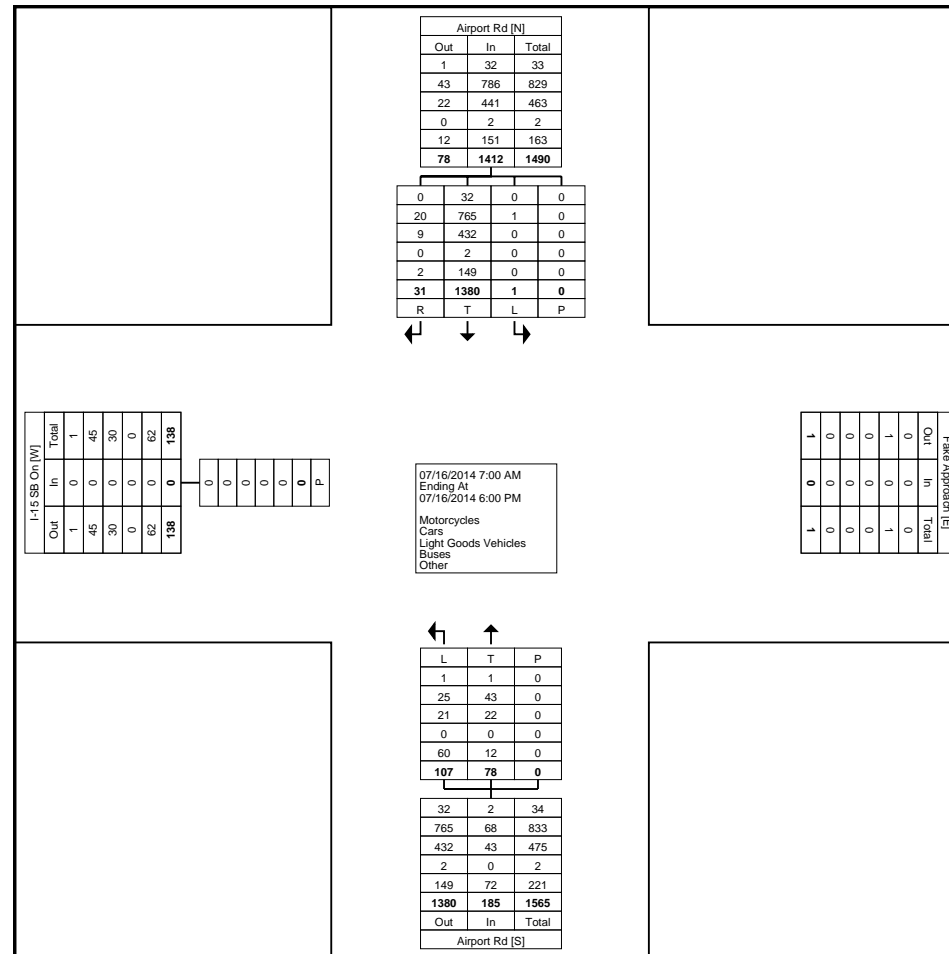




Robert Peccia & Associates  
825 Custer Ave

Helena, Montana, United States 59604  
406-447-5000 scott@rpa-hln.com

Count Name: 03-I15SBOn\_AirportRd TMC  
Site Code: TMC-03  
Start Date: 07/16/2014  
Page No: 3



Turning Movement Data Plot



Robert Peccia & Associates  
825 Custer Ave

Helena, Montana, United States 59604  
406-447-5000 scottr@rpa-hln.com

Count Name: 03-I15SBO\_n\_AirportRd TMC  
Site Code: TMC-03  
Start Date: 07/16/2014  
Page No: 4

### Turning Movement Peak Hour Data (7:30 AM)

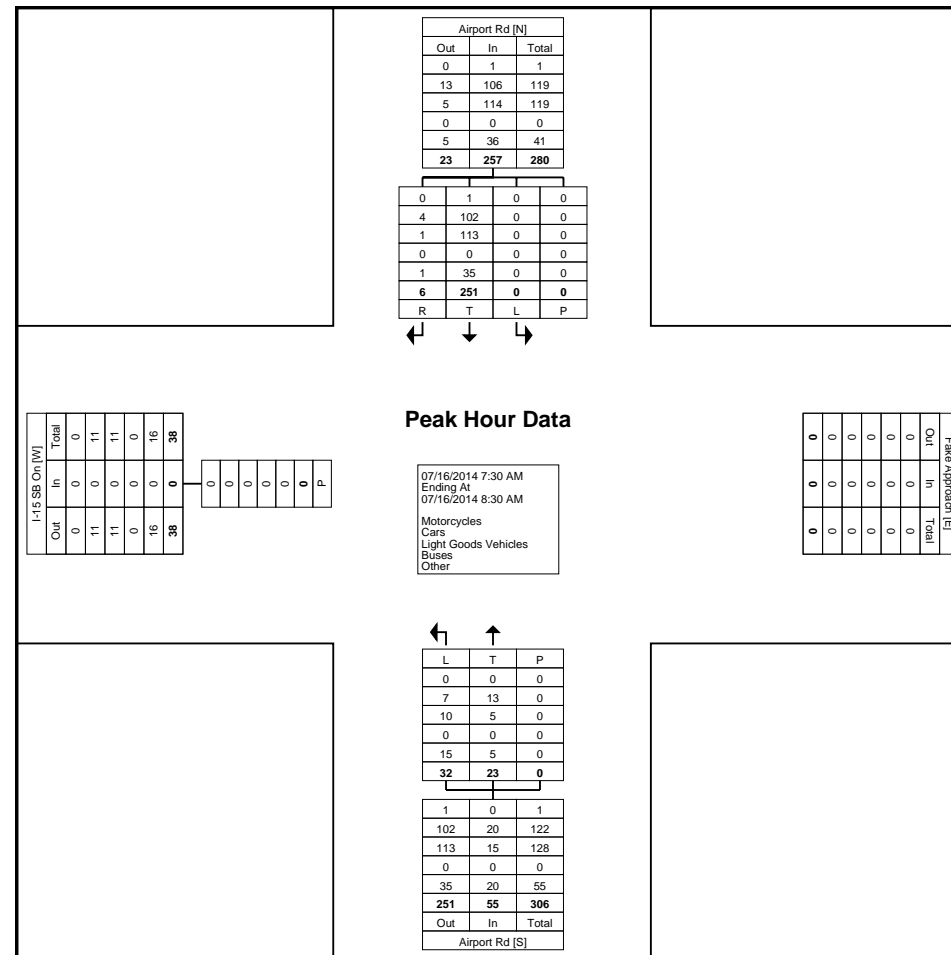
[illegible]



Robert Peccia & Associates  
825 Custer Ave

Helena, Montana, United States 59604  
406-447-5000 scott@rpa-hln.com

Count Name: 03-I15SBOn\_AirportRd TMC  
Site Code: TMC-03  
Start Date: 07/16/2014  
Page No: 5



Turning Movement Peak Hour Data Plot (7:30 AM)

Robert Peccia & Associates  
825 Custer Ave

Helena, Montana, United States 59604  
406-447-5000 scottr@rpa-hln.com

Count Name: 03-I15SBOOn\_AirportRd TMC  
Site Code: TMC-03  
Start Date: 07/16/2014  
Page No: 6

### Turning Movement Peak Hour Data (4:00 PM)

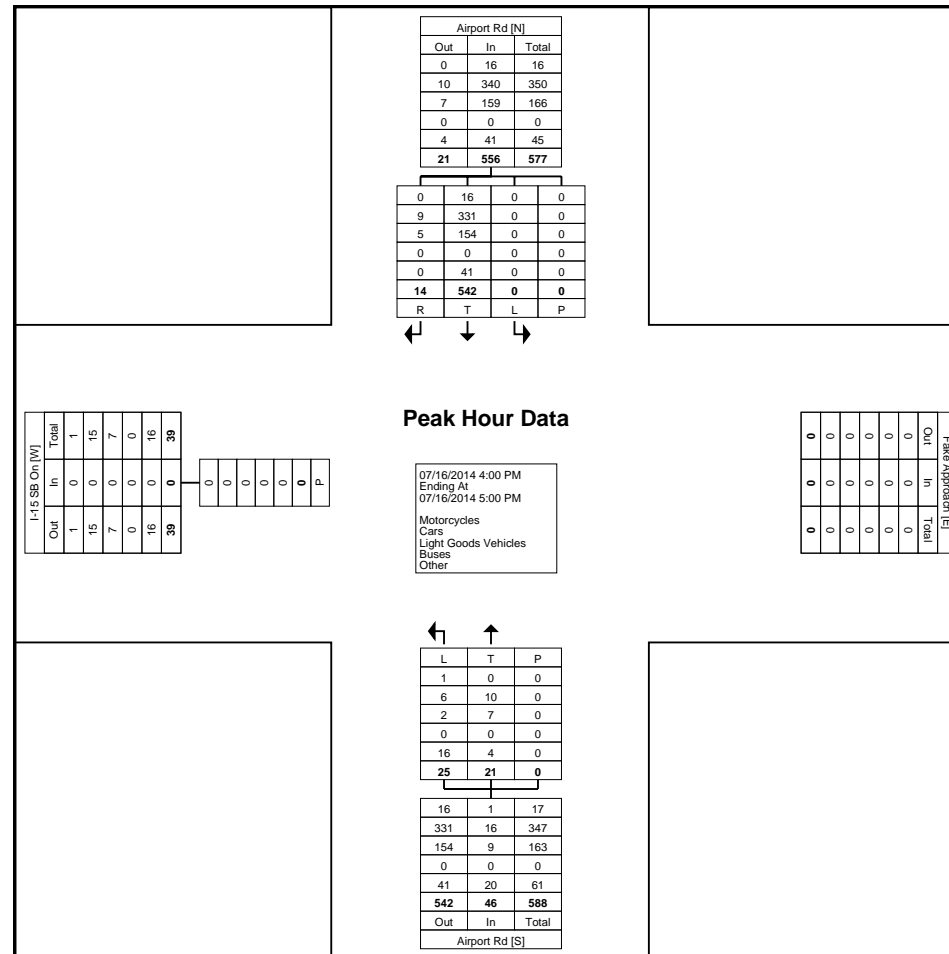
[illegible]



Robert Peccia & Associates  
825 Custer Ave

Helena, Montana, United States 59604  
406-447-5000 scott@rpa-hln.com

Count Name: 03-I15SBOn\_AirportRd TMC  
Site Code: TMC-03  
Start Date: 07/16/2014  
Page No: 7



Turning Movement Peak Hour Data Plot (4:00 PM)



Robert Peccia & Associates  
825 Custer Ave

Helena, Montana, United States 59604  
406-447-5000 scottr@rpa-hln.com

Count Name: 03-I15SBOOn\_AirportRd TMC  
Site Code: TMC-03  
Start Date: 07/16/2014  
Page No: 8



Robert Peccia & Associates  
825 Custer Ave

Helena, Montana, United States 59604  
406-447-5000 scottr@rpa-hln.com

Count Name: 04-I15SBOff\_AirportRd\_Frontage  
TMC  
Site Code: TMC-04  
Start Date: 07/16/2014  
Page No: 1

## Turning Movement Data

| Start Time             | Airport Rd<br>Southbound |      |      |            | Airport Rd<br>Northbound |      |      |            | I-15 SB Off<br>Westbound |      |      |      |            | Frontage Rd<br>Eastbound |      |      |            | Int. Total |
|------------------------|--------------------------|------|------|------------|--------------------------|------|------|------------|--------------------------|------|------|------|------------|--------------------------|------|------|------------|------------|
|                        | Right                    | Thru | Peds | App. Total | Thru                     | Left | Peds | App. Total | Right                    | Thru | Left | Peds | App. Total | Right                    | Left | Peds | App. Total |            |
| 7:00 AM                | 0                        | 13   | 0    | 13         | 5                        | 0    | 0    | 5          | 47                       | 4    | 22   | 0    | 73         | 5                        | 0    | 0    | 5          | 96         |
| 7:15 AM                | 1                        | 9    | 0    | 10         | 4                        | 0    | 0    | 4          | 34                       | 13   | 31   | 0    | 78         | 5                        | 1    | 0    | 6          | 98         |
| 7:30 AM                | 0                        | 9    | 0    | 9          | 3                        | 2    | 0    | 5          | 18                       | 13   | 43   | 0    | 74         | 12                       | 0    | 0    | 12         | 100        |
| 7:45 AM                | 1                        | 9    | 0    | 10         | 4                        | 5    | 0    | 9          | 28                       | 15   | 49   | 0    | 92         | 6                        | 3    | 0    | 9          | 120        |
| Hourly Total           | 2                        | 40   | 0    | 42         | 16                       | 7    | 0    | 23         | 127                      | 45   | 145  | 0    | 317        | 28                       | 4    | 0    | 32         | 414        |
| 8:00 AM                | 2                        | 13   | 0    | 15         | 1                        | 1    | 0    | 2          | 16                       | 13   | 36   | 0    | 65         | 21                       | 1    | 0    | 22         | 104        |
| 8:15 AM                | 0                        | 12   | 0    | 12         | 3                        | 4    | 0    | 7          | 8                        | 13   | 33   | 0    | 54         | 15                       | 1    | 0    | 16         | 89         |
| 8:30 AM                | 1                        | 13   | 0    | 14         | 2                        | 5    | 0    | 7          | 13                       | 2    | 36   | 0    | 51         | 7                        | 0    | 0    | 7          | 79         |
| 8:45 AM                | 1                        | 11   | 0    | 12         | 6                        | 2    | 0    | 8          | 17                       | 10   | 23   | 0    | 50         | 16                       | 2    | 0    | 18         | 88         |
| Hourly Total           | 4                        | 49   | 0    | 53         | 12                       | 12   | 0    | 24         | 54                       | 38   | 128  | 0    | 220        | 59                       | 4    | 0    | 63         | 360        |
| *** BREAK ***          | -                        | -    | -    | -          | -                        | -    | -    | -          | -                        | -    | -    | -    | -          | -                        | -    | -    | -          | -          |
| 4:00 PM                | 0                        | 101  | 0    | 101        | 2                        | 3    | 0    | 5          | 13                       | 4    | 61   | 0    | 78         | 19                       | 0    | 0    | 19         | 203        |
| 4:15 PM                | 0                        | 44   | 0    | 44         | 3                        | 1    | 0    | 4          | 10                       | 7    | 37   | 0    | 54         | 14                       | 0    | 0    | 14         | 116        |
| 4:30 PM                | 1                        | 105  | 0    | 106        | 5                        | 3    | 0    | 8          | 7                        | 6    | 65   | 0    | 78         | 14                       | 0    | 0    | 14         | 206        |
| 4:45 PM                | 0                        | 36   | 0    | 36         | 5                        | 1    | 0    | 6          | 17                       | 9    | 54   | 0    | 80         | 8                        | 0    | 0    | 8          | 130        |
| Hourly Total           | 1                        | 286  | 0    | 287        | 15                       | 8    | 0    | 23         | 47                       | 26   | 217  | 0    | 290        | 55                       | 0    | 0    | 55         | 655        |
| 5:00 PM                | 0                        | 40   | 0    | 40         | 2                        | 0    | 0    | 2          | 8                        | 13   | 57   | 0    | 78         | 21                       | 0    | 0    | 21         | 141        |
| 5:15 PM                | 1                        | 37   | 0    | 38         | 3                        | 1    | 0    | 4          | 10                       | 5    | 65   | 0    | 80         | 7                        | 0    | 0    | 7          | 129        |
| 5:30 PM                | 0                        | 25   | 0    | 25         | 3                        | 1    | 0    | 4          | 7                        | 4    | 65   | 0    | 76         | 11                       | 0    | 0    | 11         | 116        |
| 5:45 PM                | 0                        | 16   | 0    | 16         | 1                        | 1    | 0    | 2          | 16                       | 6    | 56   | 0    | 78         | 5                        | 0    | 0    | 5          | 101        |
| Hourly Total           | 1                        | 118  | 0    | 119        | 9                        | 3    | 0    | 12         | 41                       | 28   | 243  | 0    | 312        | 44                       | 0    | 0    | 44         | 487        |
| Grand Total            | 8                        | 493  | 0    | 501        | 52                       | 30   | 0    | 82         | 269                      | 137  | 733  | 0    | 1139       | 186                      | 8    | 0    | 194        | 1916       |
| Approach %             | 1.6                      | 98.4 | -    | -          | 63.4                     | 36.6 | -    | -          | 23.6                     | 12.0 | 64.4 | -    | -          | 95.9                     | 4.1  | -    | -          | -          |
| Total %                | 0.4                      | 25.7 | -    | 26.1       | 2.7                      | 1.6  | -    | 4.3        | 14.0                     | 7.2  | 38.3 | -    | 59.4       | 9.7                      | 0.4  | -    | 10.1       | -          |
| Motorcycles            | 0                        | 11   | -    | 11         | 0                        | 0    | -    | 0          | 6                        | 2    | 15   | -    | 23         | 4                        | 0    | -    | 4          | 38         |
| % Motorcycles          | 0.0                      | 2.2  | -    | 2.2        | 0.0                      | 0.0  | -    | 0.0        | 2.2                      | 1.5  | 2.0  | -    | 2.0        | 2.2                      | 0.0  | -    | 2.1        | 2.0        |
| Cars                   | 5                        | 320  | -    | 325        | 41                       | 10   | -    | 51         | 173                      | 87   | 363  | -    | 623        | 90                       | 4    | -    | 94         | 1093       |
| % Cars                 | 62.5                     | 64.9 | -    | 64.9       | 78.8                     | 33.3 | -    | 62.2       | 64.3                     | 63.5 | 49.5 | -    | 54.7       | 48.4                     | 50.0 | -    | 48.5       | 57.0       |
| Light Goods Vehicles   | 3                        | 149  | -    | 152        | 6                        | 13   | -    | 19         | 83                       | 37   | 218  | -    | 338        | 75                       | 3    | -    | 78         | 587        |
| % Light Goods Vehicles | 37.5                     | 30.2 | -    | 30.3       | 11.5                     | 43.3 | -    | 23.2       | 30.9                     | 27.0 | 29.7 | -    | 29.7       | 40.3                     | 37.5 | -    | 40.2       | 30.6       |
| Buses                  | 0                        | 1    | -    | 1          | 0                        | 0    | -    | 0          | 0                        | 0    | 8    | -    | 8          | 0                        | 0    | -    | 0          | 9          |
| % Buses                | 0.0                      | 0.2  | -    | 0.2        | 0.0                      | 0.0  | -    | 0.0        | 0.0                      | 0.0  | 1.1  | -    | 0.7        | 0.0                      | 0.0  | -    | 0.0        | 0.5        |
| Single-Unit Trucks     | 0                        | 6    | -    | 6          | 3                        | 2    | -    | 5          | 4                        | 2    | 46   | -    | 52         | 7                        | 0    | -    | 7          | 70         |
| % Single-Unit Trucks   | 0.0                      | 1.2  | -    | 1.2        | 5.8                      | 6.7  | -    | 6.1        | 1.5                      | 1.5  | 6.3  | -    | 4.6        | 3.8                      | 0.0  | -    | 3.6        | 3.7        |
| Articulated Trucks     | 0                        | 3    | -    | 3          | 2                        | 5    | -    | 7          | 3                        | 7    | 83   | -    | 93         | 10                       | 1    | -    | 11         | 114        |
| % Articulated Trucks   | 0.0                      | 0.6  | -    | 0.6        | 3.8                      | 16.7 | -    | 8.5        | 1.1                      | 5.1  | 11.3 | -    | 8.2        | 5.4                      | 12.5 | -    | 5.7        | 5.9        |
| Bicycles on Road       | 0                        | 3    | -    | 3          | 0                        | 0    | -    | 0          | 0                        | 2    | 0    | -    | 2          | 0                        | 0    | -    | 0          | 5          |
| % Bicycles on Road     | 0.0                      | 0.6  | -    | 0.6        | 0.0                      | 0.0  | -    | 0.0        | 0.0                      | 1.5  | 0.0  | -    | 0.2        | 0.0                      | 0.0  | -    | 0.0        | 0.3        |



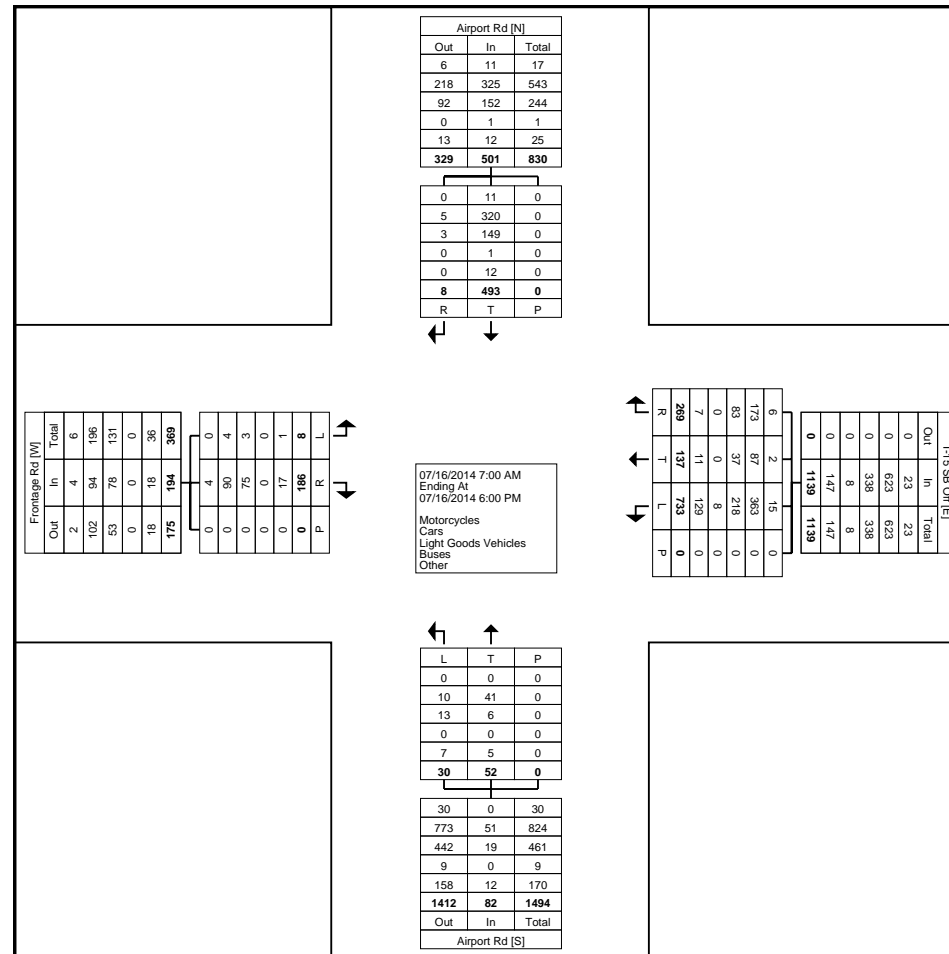
[illegible]



Robert Peccia & Associates  
825 Custer Ave

Helena, Montana, United States 59604  
406-447-5000 scott@rpa-hln.com

Count Name: 04-I15SBOff\_AirportRd\_Frontage  
TMC  
Site Code: TMC-04  
Start Date: 07/16/2014  
Page No: 3



Turning Movement Data Plot



Robert Peccia & Associates  
825 Custer Ave

Helena, Montana, United States 59604  
406-447-5000 [scottr@rpa-hln.com](mailto:scottr@rpa-hln.com)

Count Name: 04-I15SBOff\_AirportRd\_Frontage  
TMC  
Site Code: TMC-04  
Start Date: 07/16/2014  
Page No: 4

### Turning Movement Peak Hour Data (7:15 AM)

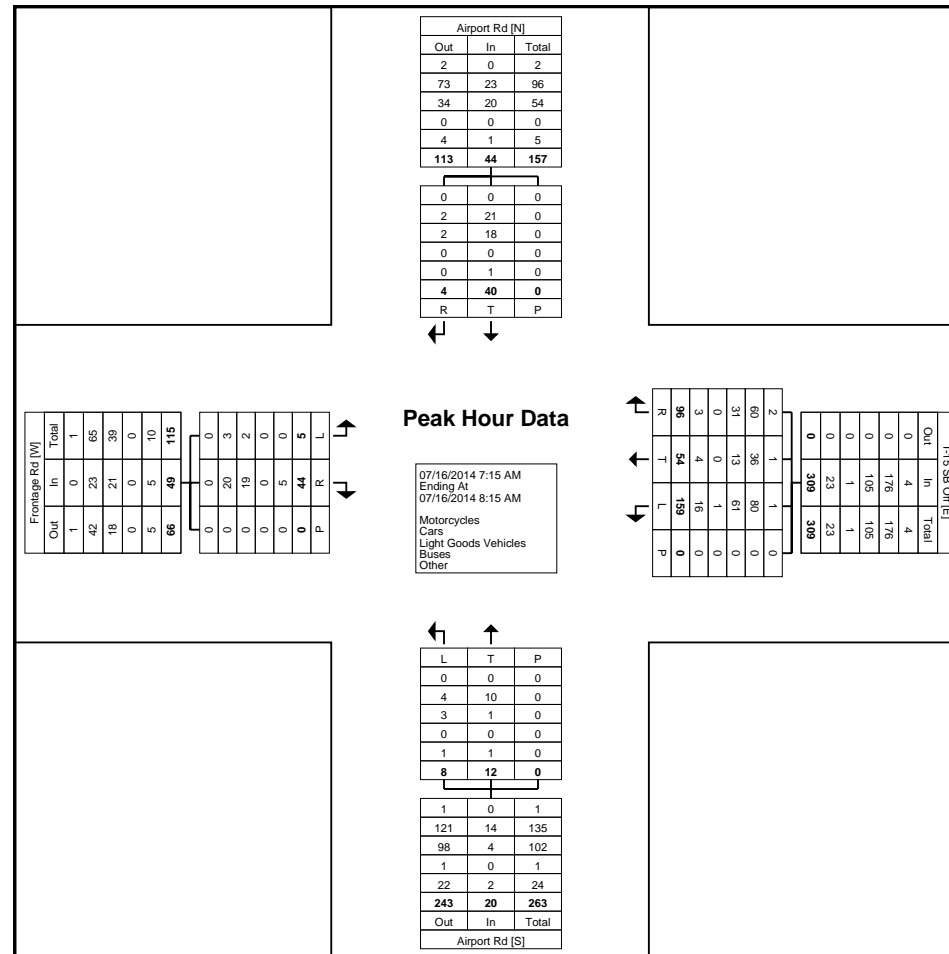
[illegible]



Robert Peccia & Associates  
825 Custer Ave

Helena, Montana, United States 59604  
406-447-5000 scott@rpa-hln.com

Count Name: 04-I15SBOff\_AirportRd\_Frontage  
TMC  
Site Code: TMC-04  
Start Date: 07/16/2014  
Page No: 5



Turning Movement Peak Hour Data Plot (7:15 AM)



Robert Peccia & Associates  
825 Custer Ave

Helena, Montana, United States 59604  
406-447-5000 [scottr@rpa-hln.com](mailto:scottr@rpa-hln.com)

Count Name: 04-I15SBOff\_AirportRd\_Frontage  
TMC  
Site Code: TMC-04  
Start Date: 07/16/2014  
Page No: 6

### Turning Movement Peak Hour Data (4:00 PM)

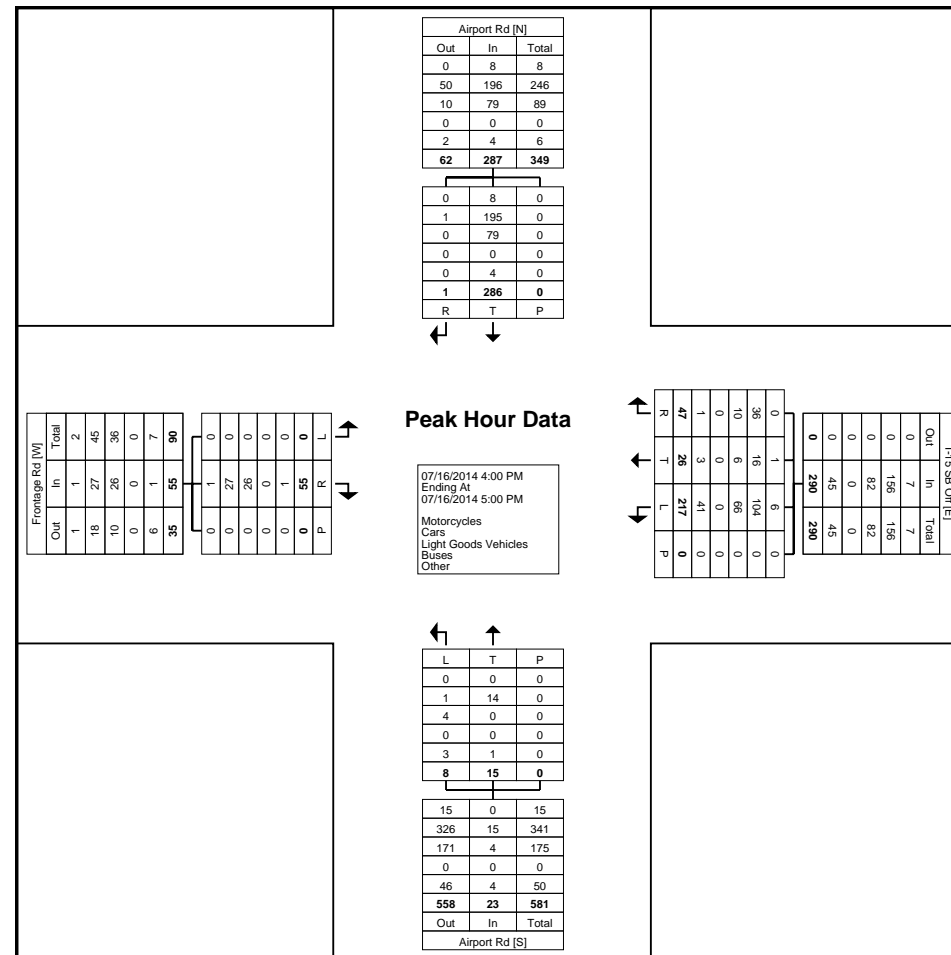
[illegible]



Robert Peccia & Associates  
825 Custer Ave

Helena, Montana, United States 59604  
406-447-5000 scott@rpa-hln.com

Count Name: 04-I15SBOff\_AirportRd\_Frontage  
TMC  
Site Code: TMC-04  
Start Date: 07/16/2014  
Page No: 7





Robert Peccia & Associates  
825 Custer Ave

Helena, Montana, United States 59604  
406-447-5000 scottr@rpa-hln.com

Count Name: 04-I15SBOff\_AirportRd\_Frontage  
TMC  
Site Code: TMC-04  
Start Date: 07/16/2014  
Page No: 8



Robert Peccia & Associates  
825 Custer Ave

Helena, Montana, United States 59604  
406-447-5000 scottr@rpa-hln.com

Count Name: 05-14thStSW\_I315EB TMC  
Site Code: TMC-05  
Start Date: 07/16/2014  
Page No: 1

## Turning Movement Data

| Start Time             | 14th St SW<br>Southbound |      |      |      |            | 14th St SW<br>Northbound |      |      |      |            | I-315 EB<br>Westbound |      |      |      |            | Marketplace<br>Eastbound |      |      |      |            | Int. Total |
|------------------------|--------------------------|------|------|------|------------|--------------------------|------|------|------|------------|-----------------------|------|------|------|------------|--------------------------|------|------|------|------------|------------|
|                        | Right                    | Thru | Left | Peds | App. Total | Right                    | Thru | Left | Peds | App. Total | Right                 | Thru | Left | Peds | App. Total | Right                    | Thru | Left | Peds | App. Total |            |
| 7:00 AM                | 15                       | 18   | 26   | 0    | 59         | 52                       | 15   | 2    | 0    | 69         | 1                     | 4    | 3    | 0    | 8          | 0                        | 6    | 4    | 0    | 10         | 146        |
| 7:15 AM                | 15                       | 15   | 31   | 0    | 61         | 66                       | 15   | 1    | 0    | 82         | 2                     | 5    | 9    | 1    | 16         | 0                        | 15   | 6    | 0    | 21         | 180        |
| 7:30 AM                | 21                       | 25   | 41   | 0    | 87         | 75                       | 21   | 4    | 0    | 100        | 0                     | 4    | 2    | 1    | 6          | 1                        | 22   | 12   | 0    | 35         | 228        |
| 7:45 AM                | 14                       | 27   | 46   | 0    | 87         | 90                       | 21   | 0    | 0    | 111        | 2                     | 9    | 5    | 0    | 16         | 1                        | 17   | 16   | 0    | 34         | 248        |
| Hourly Total           | 65                       | 85   | 144  | 0    | 294        | 283                      | 72   | 7    | 0    | 362        | 5                     | 22   | 19   | 2    | 46         | 2                        | 60   | 38   | 0    | 100        | 802        |
| 8:00 AM                | 10                       | 24   | 24   | 0    | 58         | 55                       | 9    | 2    | 0    | 66         | 1                     | 12   | 4    | 0    | 17         | 1                        | 15   | 10   | 0    | 26         | 167        |
| 8:15 AM                | 19                       | 38   | 16   | 0    | 73         | 47                       | 16   | 1    | 0    | 64         | 4                     | 3    | 9    | 0    | 16         | 0                        | 15   | 12   | 0    | 27         | 180        |
| 8:30 AM                | 25                       | 36   | 19   | 0    | 80         | 59                       | 19   | 1    | 0    | 79         | 6                     | 9    | 10   | 0    | 25         | 0                        | 13   | 8    | 0    | 21         | 205        |
| 8:45 AM                | 37                       | 48   | 22   | 0    | 107        | 55                       | 16   | 0    | 0    | 71         | 4                     | 6    | 17   | 0    | 27         | 0                        | 20   | 8    | 0    | 28         | 233        |
| Hourly Total           | 91                       | 146  | 81   | 0    | 318        | 216                      | 60   | 4    | 0    | 280        | 15                    | 30   | 40   | 0    | 85         | 1                        | 63   | 38   | 0    | 102        | 785        |
| *** BREAK ***          | -                        | -    | -    | -    | -          | -                        | -    | -    | -    | -          | -                     | -    | -    | -    | -          | -                        | -    | -    | -    | -          | -          |
| 4:00 PM                | 51                       | 80   | 11   | 0    | 142        | 79                       | 17   | 2    | 1    | 98         | 3                     | 22   | 23   | 0    | 48         | 3                        | 46   | 26   | 0    | 75         | 363        |
| 4:15 PM                | 67                       | 97   | 16   | 0    | 180        | 48                       | 16   | 0    | 0    | 64         | 4                     | 11   | 23   | 0    | 38         | 4                        | 48   | 29   | 1    | 81         | 363        |
| 4:30 PM                | 69                       | 92   | 26   | 0    | 187        | 75                       | 24   | 5    | 1    | 104        | 7                     | 17   | 27   | 0    | 51         | 2                        | 37   | 22   | 0    | 61         | 403        |
| 4:45 PM                | 77                       | 97   | 24   | 0    | 198        | 70                       | 28   | 2    | 0    | 100        | 6                     | 10   | 21   | 0    | 37         | 4                        | 51   | 30   | 0    | 85         | 420        |
| Hourly Total           | 264                      | 366  | 77   | 0    | 707        | 272                      | 85   | 9    | 2    | 366        | 20                    | 60   | 94   | 0    | 174        | 13                       | 182  | 107  | 1    | 302        | 1549       |
| 5:00 PM                | 58                       | 90   | 26   | 0    | 174        | 46                       | 11   | 3    | 0    | 60         | 12                    | 7    | 36   | 0    | 55         | 2                        | 47   | 26   | 0    | 75         | 364        |
| 5:15 PM                | 58                       | 117  | 19   | 0    | 194        | 69                       | 19   | 3    | 0    | 91         | 6                     | 16   | 18   | 0    | 40         | 2                        | 33   | 29   | 0    | 64         | 389        |
| 5:30 PM                | 56                       | 104  | 26   | 0    | 186        | 72                       | 15   | 1    | 0    | 88         | 3                     | 18   | 21   | 0    | 42         | 2                        | 42   | 32   | 0    | 76         | 392        |
| 5:45 PM                | 70                       | 98   | 19   | 0    | 187        | 72                       | 22   | 5    | 0    | 99         | 8                     | 14   | 15   | 0    | 37         | 3                        | 32   | 22   | 0    | 57         | 380        |
| Hourly Total           | 242                      | 409  | 90   | 0    | 741        | 259                      | 67   | 12   | 0    | 338        | 29                    | 55   | 90   | 0    | 174        | 9                        | 154  | 109  | 0    | 272        | 1525       |
| Grand Total            | 662                      | 1006 | 392  | 0    | 2060       | 1030                     | 284  | 32   | 2    | 1346       | 69                    | 167  | 243  | 2    | 479        | 25                       | 459  | 292  | 1    | 776        | 4661       |
| Approach %             | 32.1                     | 48.8 | 19.0 | -    | -          | 76.5                     | 21.1 | 2.4  | -    | -          | 14.4                  | 34.9 | 50.7 | -    | -          | 3.2                      | 59.1 | 37.6 | -    | -          | -          |
| Total %                | 14.2                     | 21.6 | 8.4  | -    | 44.2       | 22.1                     | 6.1  | 0.7  | -    | 28.9       | 1.5                   | 3.6  | 5.2  | -    | 10.3       | 0.5                      | 9.8  | 6.3  | -    | 16.6       | -          |
| Motorcycles            | 6                        | 4    | 4    | -    | 14         | 7                        | 5    | 0    | -    | 12         | 0                     | 1    | 2    | -    | 3          | 0                        | 2    | 4    | -    | 6          | 35         |
| % Motorcycles          | 0.9                      | 0.4  | 1.0  | -    | 0.7        | 0.7                      | 1.8  | 0.0  | -    | 0.9        | 0.0                   | 0.6  | 0.8  | -    | 0.6        | 0.0                      | 0.4  | 1.4  | -    | 0.8        | 0.8        |
| Cars                   | 489                      | 746  | 301  | -    | 1536       | 770                      | 218  | 20   | -    | 1008       | 38                    | 131  | 159  | -    | 328        | 23                       | 362  | 220  | -    | 605        | 3477       |
| % Cars                 | 73.9                     | 74.2 | 76.8 | -    | 74.6       | 74.8                     | 76.8 | 62.5 | -    | 74.9       | 55.1                  | 78.4 | 65.4 | -    | 68.5       | 92.0                     | 78.9 | 75.3 | -    | 78.0       | 74.6       |
| Light Goods Vehicles   | 161                      | 238  | 72   | -    | 471        | 236                      | 49   | 7    | -    | 292        | 22                    | 29   | 73   | -    | 124        | 2                        | 88   | 64   | -    | 154        | 1041       |
| % Light Goods Vehicles | 24.3                     | 23.7 | 18.4 | -    | 22.9       | 22.9                     | 17.3 | 21.9 | -    | 21.7       | 31.9                  | 17.4 | 30.0 | -    | 25.9       | 8.0                      | 19.2 | 21.9 | -    | 19.8       | 22.3       |
| Buses                  | 0                        | 2    | 1    | -    | 3          | 1                        | 0    | 3    | -    | 4          | 0                     | 1    | 1    | -    | 2          | 0                        | 0    | 0    | -    | 0          | 9          |
| % Buses                | 0.0                      | 0.2  | 0.3  | -    | 0.1        | 0.1                      | 0.0  | 9.4  | -    | 0.3        | 0.0                   | 0.6  | 0.4  | -    | 0.4        | 0.0                      | 0.0  | 0.0  | -    | 0.0        | 0.2        |
| Single-Unit Trucks     | 6                        | 14   | 10   | -    | 30         | 9                        | 8    | 2    | -    | 19         | 8                     | 4    | 5    | -    | 17         | 0                        | 7    | 3    | -    | 10         | 76         |
| % Single-Unit Trucks   | 0.9                      | 1.4  | 2.6  | -    | 1.5        | 0.9                      | 2.8  | 6.3  | -    | 1.4        | 11.6                  | 2.4  | 2.1  | -    | 3.5        | 0.0                      | 1.5  | 1.0  | -    | 1.3        | 1.6        |
| Articulated Trucks     | 0                        | 1    | 4    | -    | 5          | 7                        | 3    | 0    | -    | 10         | 1                     | 1    | 3    | -    | 5          | 0                        | 0    | 1    | -    | 1          | 21         |
| % Articulated Trucks   | 0.0                      | 0.1  | 1.0  | -    | 0.2        | 0.7                      | 1.1  | 0.0  | -    | 0.7        | 1.4                   | 0.6  | 1.2  | -    | 1.0        | 0.0                      | 0.0  | 0.3  | -    | 0.1        | 0.5        |
| Bicycles on Road       | 0                        | 1    | 0    | -    | 1          | 0                        | 1    | 0    | -    | 1          | 0                     | 0    | 0    | -    | 0          | 0                        | 0    | 0    | -    | 0          | 2          |



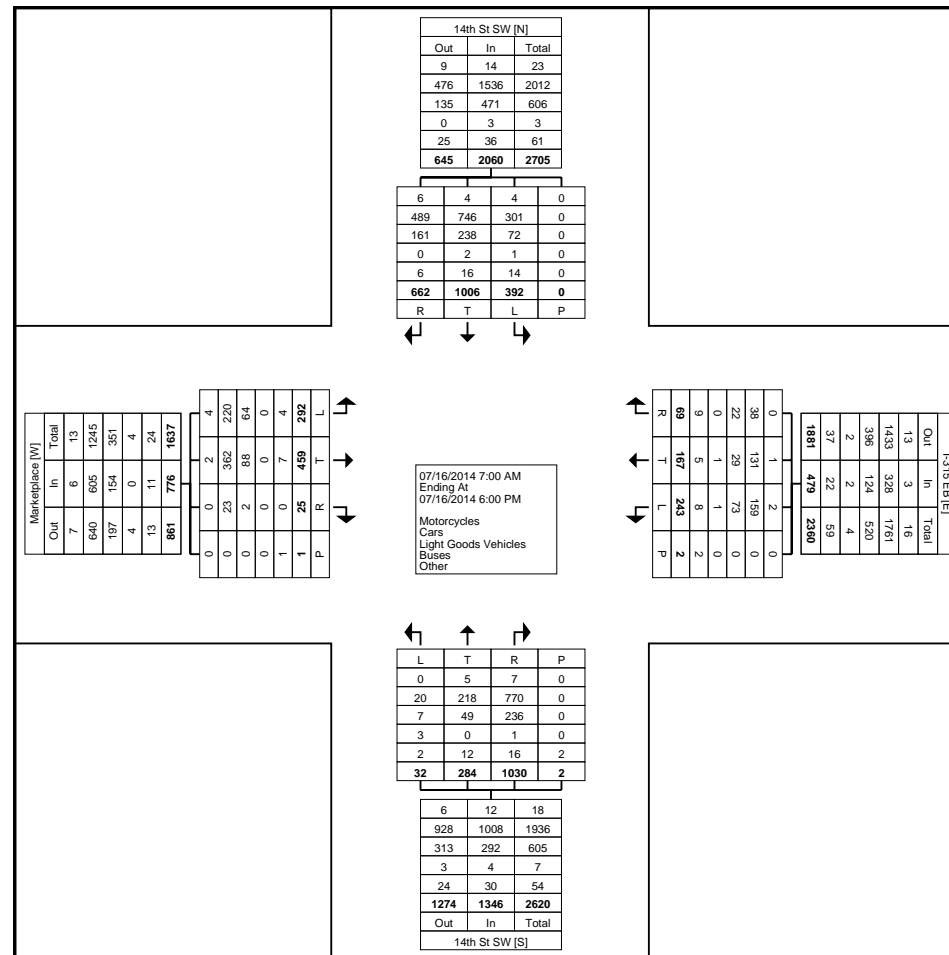
|                    |     |     |     |   |     |     |     |     |       |     |     |     |     |       |     |     |     |     |       |     |     |
|--------------------|-----|-----|-----|---|-----|-----|-----|-----|-------|-----|-----|-----|-----|-------|-----|-----|-----|-----|-------|-----|-----|
| % Bicycles on Road | 0.0 | 0.1 | 0.0 | - | 0.0 | 0.0 | 0.4 | 0.0 | -     | 0.1 | 0.0 | 0.0 | 0.0 | -     | 0.0 | 0.0 | 0.0 | 0.0 | -     | 0.0 | 0.0 |
| Pedestrians        | -   | -   | -   | 0 | -   | -   | -   | -   | 2     | -   | -   | -   | -   | 2     | -   | -   | -   | -   | 1     | -   | -   |
| % Pedestrians      | -   | -   | -   | - | -   | -   | -   | -   | 100.0 | -   | -   | -   | -   | 100.0 | -   | -   | -   | -   | 100.0 | -   | -   |



Robert Peccia & Associates  
825 Custer Ave

Helena, Montana, United States 59604  
406-447-5000 scottr@rpa-hln.com

Count Name: 05-14thStSW\_I315EB TMC  
Site Code: TMC-05  
Start Date: 07/16/2014  
Page No: 3



Turning Movement Data Plot



Robert Peccia & Associates  
825 Custer Ave

Helena, Montana, United States 59604  
406-447-5000 scottr@rpa-hln.com

Count Name: 05-14thStSW\_I315EB TMC  
Site Code: TMC-05  
Start Date: 07/16/2014  
Page No: 4

### Turning Movement Peak Hour Data (7:15 AM)

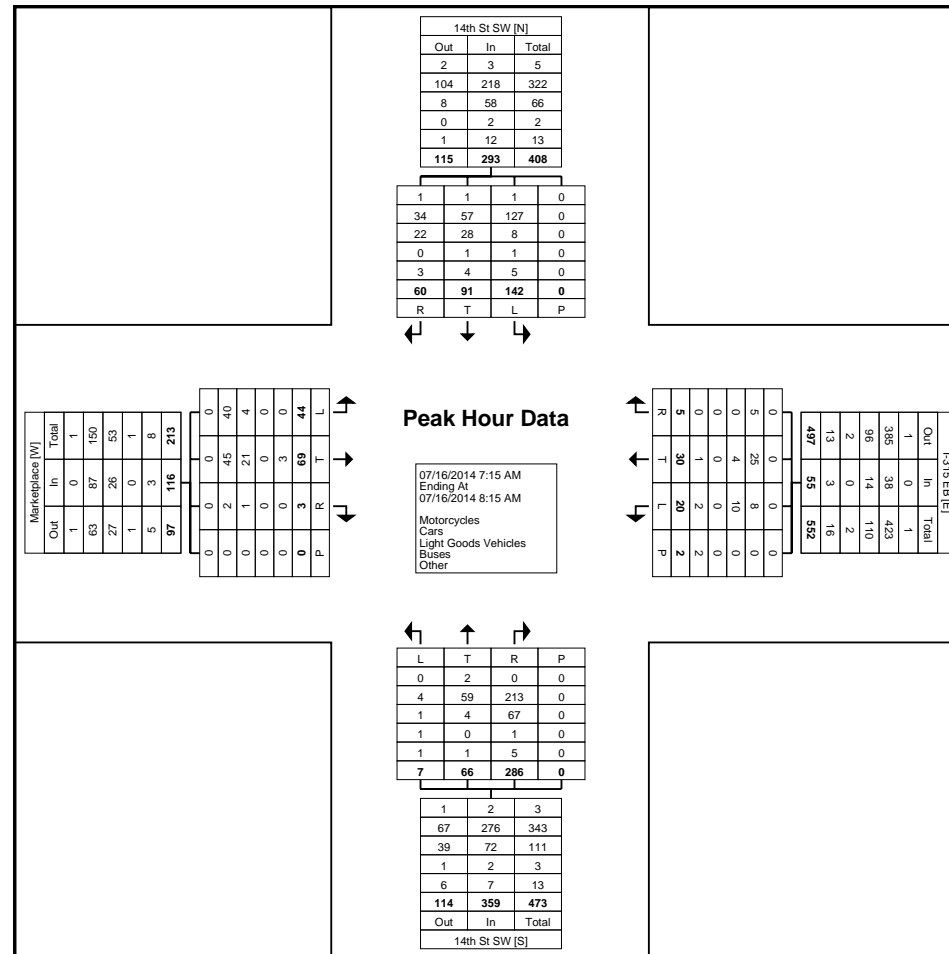
| Start Time             | 14th St SW<br>Southbound |       |       |      |            | 14th St SW<br>Northbound |       |       |      |            | I-315 EB<br>Westbound |       |       |       |            | Marketplace<br>Eastbound |       |       |      |            | Int. Total |
|------------------------|--------------------------|-------|-------|------|------------|--------------------------|-------|-------|------|------------|-----------------------|-------|-------|-------|------------|--------------------------|-------|-------|------|------------|------------|
|                        | Right                    | Thru  | Left  | Peds | App. Total | Right                    | Thru  | Left  | Peds | App. Total | Right                 | Thru  | Left  | Peds  | App. Total | Right                    | Thru  | Left  | Peds | App. Total |            |
| 7:15 AM                | 15                       | 15    | 31    | 0    | 61         | 66                       | 15    | 1     | 0    | 82         | 2                     | 5     | 9     | 1     | 16         | 0                        | 15    | 6     | 0    | 21         | 180        |
| 7:30 AM                | 21                       | 25    | 41    | 0    | 87         | 75                       | 21    | 4     | 0    | 100        | 0                     | 4     | 2     | 1     | 6          | 1                        | 22    | 12    | 0    | 35         | 228        |
| 7:45 AM                | 14                       | 27    | 46    | 0    | 87         | 90                       | 21    | 0     | 0    | 111        | 2                     | 9     | 5     | 0     | 16         | 1                        | 17    | 16    | 0    | 34         | 248        |
| 8:00 AM                | 10                       | 24    | 24    | 0    | 58         | 55                       | 9     | 2     | 0    | 66         | 1                     | 12    | 4     | 0     | 17         | 1                        | 15    | 10    | 0    | 26         | 167        |
| Total                  | 60                       | 91    | 142   | 0    | 293        | 286                      | 66    | 7     | 0    | 359        | 5                     | 30    | 20    | 2     | 55         | 3                        | 69    | 44    | 0    | 116        | 823        |
| Approach %             | 20.5                     | 31.1  | 48.5  | -    | -          | 79.7                     | 18.4  | 1.9   | -    | -          | 9.1                   | 54.5  | 36.4  | -     | -          | 2.6                      | 59.5  | 37.9  | -    | -          | -          |
| Total %                | 7.3                      | 11.1  | 17.3  | -    | 35.6       | 34.8                     | 8.0   | 0.9   | -    | 43.6       | 0.6                   | 3.6   | 2.4   | -     | 6.7        | 0.4                      | 8.4   | 5.3   | -    | 14.1       | -          |
| PHF                    | 0.714                    | 0.843 | 0.772 | -    | 0.842      | 0.794                    | 0.786 | 0.438 | -    | 0.809      | 0.625                 | 0.625 | 0.556 | -     | 0.809      | 0.750                    | 0.784 | 0.688 | -    | 0.829      | 0.830      |
| Motorcycles            | 1                        | 1     | 1     | -    | 3          | 0                        | 2     | 0     | -    | 2          | 0                     | 0     | 0     | -     | 0          | 0                        | 0     | 0     | -    | 0          | 5          |
| % Motorcycles          | 1.7                      | 1.1   | 0.7   | -    | 1.0        | 0.0                      | 3.0   | 0.0   | -    | 0.6        | 0.0                   | 0.0   | 0.0   | -     | 0.0        | 0.0                      | 0.0   | 0.0   | -    | 0.0        | 0.6        |
| Cars                   | 34                       | 57    | 127   | -    | 218        | 213                      | 59    | 4     | -    | 276        | 5                     | 25    | 8     | -     | 38         | 2                        | 45    | 40    | -    | 87         | 619        |
| % Cars                 | 56.7                     | 62.6  | 89.4  | -    | 74.4       | 74.5                     | 89.4  | 57.1  | -    | 76.9       | 100.0                 | 83.3  | 40.0  | -     | 69.1       | 66.7                     | 65.2  | 90.9  | -    | 75.0       | 75.2       |
| Light Goods Vehicles   | 22                       | 28    | 8     | -    | 58         | 67                       | 4     | 1     | -    | 72         | 0                     | 4     | 10    | -     | 14         | 1                        | 21    | 4     | -    | 26         | 170        |
| % Light Goods Vehicles | 36.7                     | 30.8  | 5.6   | -    | 19.8       | 23.4                     | 6.1   | 14.3  | -    | 20.1       | 0.0                   | 13.3  | 50.0  | -     | 25.5       | 33.3                     | 30.4  | 9.1   | -    | 22.4       | 20.7       |
| Buses                  | 0                        | 1     | 1     | -    | 2          | 1                        | 0     | 1     | -    | 2          | 0                     | 0     | 0     | -     | 0          | 0                        | 0     | 0     | -    | 0          | 4          |
| % Buses                | 0.0                      | 1.1   | 0.7   | -    | 0.7        | 0.3                      | 0.0   | 14.3  | -    | 0.6        | 0.0                   | 0.0   | 0.0   | -     | 0.0        | 0.0                      | 0.0   | 0.0   | -    | 0.0        | 0.5        |
| Single-Unit Trucks     | 3                        | 4     | 3     | -    | 10         | 5                        | 1     | 1     | -    | 7          | 0                     | 0     | 2     | -     | 2          | 0                        | 3     | 0     | -    | 3          | 22         |
| % Single-Unit Trucks   | 5.0                      | 4.4   | 2.1   | -    | 3.4        | 1.7                      | 1.5   | 14.3  | -    | 1.9        | 0.0                   | 0.0   | 10.0  | -     | 3.6        | 0.0                      | 4.3   | 0.0   | -    | 2.6        | 2.7        |
| Articulated Trucks     | 0                        | 0     | 2     | -    | 2          | 0                        | 0     | 0     | -    | 0          | 0                     | 1     | 0     | -     | 1          | 0                        | 0     | 0     | -    | 0          | 3          |
| % Articulated Trucks   | 0.0                      | 0.0   | 1.4   | -    | 0.7        | 0.0                      | 0.0   | 0.0   | -    | 0.0        | 0.0                   | 3.3   | 0.0   | -     | 1.8        | 0.0                      | 0.0   | 0.0   | -    | 0.0        | 0.4        |
| Bicycles on Road       | 0                        | 0     | 0     | -    | 0          | 0                        | 0     | 0     | -    | 0          | 0                     | 0     | 0     | -     | 0          | 0                        | 0     | 0     | -    | 0          | 0          |
| % Bicycles on Road     | 0.0                      | 0.0   | 0.0   | -    | 0.0        | 0.0                      | 0.0   | 0.0   | -    | 0.0        | 0.0                   | 0.0   | 0.0   | -     | 0.0        | 0.0                      | 0.0   | 0.0   | -    | 0.0        | 0.0        |
| Pedestrians            | -                        | -     | -     | 0    | -          | -                        | -     | -     | 0    | -          | -                     | -     | -     | 2     | -          | -                        | -     | -     | 0    | -          | -          |
| % Pedestrians          | -                        | -     | -     | -    | -          | -                        | -     | -     | -    | -          | -                     | -     | -     | 100.0 | -          | -                        | -     | -     | -    | -          | -          |



Robert Peccia & Associates  
825 Custer Ave

Helena, Montana, United States 59604  
406-447-5000 scottr@rpa-hln.com

Count Name: 05-14thStSW\_I315EB TMC  
Site Code: TMC-05  
Start Date: 07/16/2014  
Page No: 5



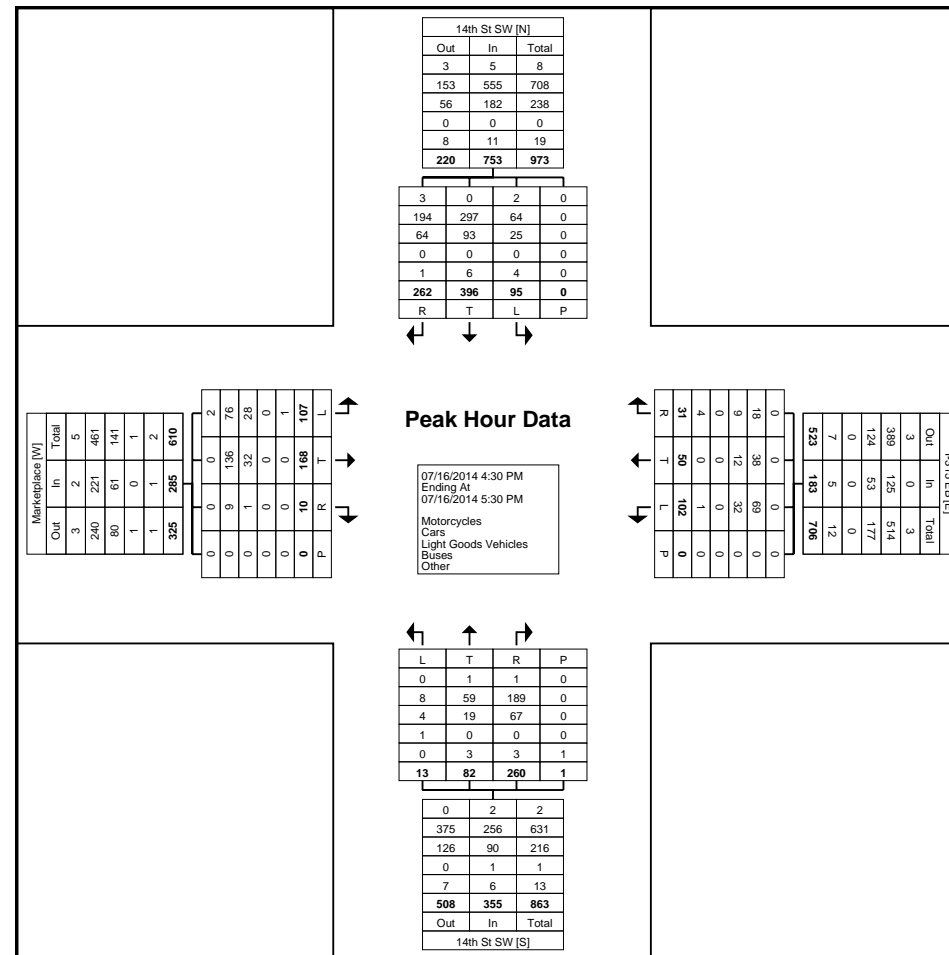
Turning Movement Peak Hour Data Plot (7:15 AM)



Robert Peccia & Associates  
825 Custer Ave

Helena, Montana, United States 59604  
406-447-5000 scottr@rpa-hln.com

Count Name: 05-14thStSW\_I315EB TMC  
Site Code: TMC-05  
Start Date: 07/16/2014  
Page No: 7



### Turning Movement Peak Hour Data Plot (4:30 PM)



Robert Peccia & Associates  
825 Custer Ave

Helena, Montana, United States 59604  
406-447-5000 [scottr@rpa-hln.com](mailto:scottr@rpa-hln.com)

Count Name: 05-14thStSW\_I315EB TMC  
Site Code: TMC-05  
Start Date: 07/16/2014  
Page No: 8



Robert Peccia & Associates  
825 Custer Ave

Helena, Montana, United States 59604  
406-447-5000 scottr@rpa-hln.com

Count Name: 06-14thStSW\_I315WB TMC  
Site Code: TMC-06  
Start Date: 07/16/2014  
Page No: 1

## Turning Movement Data

| Start Time             | 14th St SW<br>Southbound |      |      |      |            | 14th St SW<br>Northbound |      |      |      |            | I-315 WB<br>Westbound |      |      |      |            | 16th Ave SW<br>Eastbound |      |      |      |            | Int. Total |
|------------------------|--------------------------|------|------|------|------------|--------------------------|------|------|------|------------|-----------------------|------|------|------|------------|--------------------------|------|------|------|------------|------------|
|                        | Right                    | Thru | Left | Peds | App. Total | Right                    | Thru | Left | Peds | App. Total | Right                 | Thru | Left | Peds | App. Total | Right                    | Thru | Left | Peds | App. Total |            |
| 7:00 AM                | 0                        | 29   | 6    | 0    | 35         | 15                       | 4    | 1    | 0    | 20         | 9                     | 0    | 25   | 0    | 34         | 2                        | 0    | 0    | 0    | 2          | 91         |
| 7:15 AM                | 0                        | 31   | 7    | 0    | 38         | 19                       | 5    | 1    | 0    | 25         | 12                    | 1    | 28   | 1    | 41         | 3                        | 0    | 0    | 0    | 3          | 107        |
| 7:30 AM                | 0                        | 49   | 5    | 0    | 54         | 24                       | 5    | 0    | 0    | 29         | 9                     | 2    | 37   | 1    | 48         | 3                        | 2    | 0    | 0    | 5          | 136        |
| 7:45 AM                | 0                        | 45   | 13   | 0    | 58         | 28                       | 5    | 7    | 0    | 40         | 13                    | 5    | 38   | 0    | 56         | 5                        | 2    | 0    | 0    | 7          | 161        |
| Hourly Total           | 0                        | 154  | 31   | 0    | 185        | 86                       | 19   | 9    | 0    | 114        | 43                    | 8    | 128  | 2    | 179        | 13                       | 4    | 0    | 0    | 17         | 495        |
| 8:00 AM                | 0                        | 24   | 7    | 0    | 31         | 14                       | 6    | 1    | 0    | 21         | 10                    | 5    | 31   | 0    | 46         | 2                        | 1    | 0    | 0    | 3          | 101        |
| 8:15 AM                | 0                        | 18   | 1    | 0    | 19         | 24                       | 1    | 3    | 0    | 28         | 6                     | 4    | 56   | 0    | 66         | 5                        | 2    | 0    | 1    | 7          | 120        |
| 8:30 AM                | 0                        | 23   | 6    | 0    | 29         | 24                       | 11   | 0    | 0    | 35         | 6                     | 0    | 53   | 0    | 59         | 4                        | 1    | 1    | 0    | 6          | 129        |
| 8:45 AM                | 0                        | 23   | 4    | 0    | 27         | 18                       | 8    | 0    | 0    | 26         | 11                    | 0    | 80   | 0    | 91         | 3                        | 1    | 0    | 0    | 4          | 148        |
| Hourly Total           | 0                        | 88   | 18   | 0    | 106        | 80                       | 26   | 4    | 0    | 110        | 33                    | 9    | 220  | 0    | 262        | 14                       | 5    | 1    | 1    | 20         | 498        |
| *** BREAK ***          | -                        | -    | -    | -    | -          | -                        | -    | -    | -    | -          | -                     | -    | -    | -    | -          | -                        | -    | -    | -    | -          | -          |
| 4:00 PM                | 0                        | 18   | 4    | 0    | 22         | 33                       | 10   | 2    | 0    | 45         | 20                    | 3    | 121  | 0    | 144        | 1                        | 1    | 0    | 0    | 2          | 213        |
| 4:15 PM                | 0                        | 30   | 2    | 0    | 32         | 33                       | 14   | 0    | 0    | 47         | 25                    | 6    | 145  | 0    | 176        | 2                        | 1    | 0    | 0    | 3          | 258        |
| 4:30 PM                | 0                        | 37   | 5    | 0    | 42         | 29                       | 21   | 2    | 0    | 52         | 24                    | 3    | 156  | 0    | 183        | 2                        | 0    | 1    | 0    | 3          | 280        |
| 4:45 PM                | 1                        | 41   | 5    | 0    | 47         | 38                       | 22   | 2    | 0    | 62         | 32                    | 9    | 148  | 0    | 189        | 2                        | 3    | 1    | 1    | 6          | 304        |
| Hourly Total           | 1                        | 126  | 16   | 0    | 143        | 133                      | 67   | 6    | 0    | 206        | 101                   | 21   | 570  | 0    | 692        | 7                        | 5    | 2    | 1    | 14         | 1055       |
| 5:00 PM                | 0                        | 28   | 3    | 0    | 31         | 37                       | 20   | 2    | 0    | 59         | 41                    | 1    | 161  | 0    | 203        | 6                        | 1    | 0    | 0    | 7          | 300        |
| 5:15 PM                | 1                        | 27   | 8    | 0    | 36         | 32                       | 21   | 1    | 0    | 54         | 40                    | 0    | 159  | 0    | 199        | 4                        | 0    | 2    | 0    | 6          | 295        |
| 5:30 PM                | 0                        | 35   | 6    | 0    | 41         | 39                       | 13   | 0    | 0    | 52         | 29                    | 2    | 170  | 0    | 201        | 7                        | 1    | 0    | 0    | 8          | 302        |
| 5:45 PM                | 1                        | 28   | 5    | 1    | 34         | 34                       | 16   | 0    | 0    | 50         | 29                    | 3    | 158  | 0    | 190        | 2                        | 0    | 0    | 1    | 2          | 276        |
| Hourly Total           | 2                        | 118  | 22   | 1    | 142        | 142                      | 70   | 3    | 0    | 215        | 139                   | 6    | 648  | 0    | 793        | 19                       | 2    | 2    | 1    | 23         | 1173       |
| Grand Total            | 3                        | 486  | 87   | 1    | 576        | 441                      | 182  | 22   | 0    | 645        | 316                   | 44   | 1566 | 2    | 1926       | 53                       | 16   | 5    | 3    | 74         | 3221       |
| Approach %             | 0.5                      | 84.4 | 15.1 | -    | -          | 68.4                     | 28.2 | 3.4  | -    | -          | 16.4                  | 2.3  | 81.3 | -    | -          | 71.6                     | 21.6 | 6.8  | -    | -          | -          |
| Total %                | 0.1                      | 15.1 | 2.7  | -    | 17.9       | 13.7                     | 5.7  | 0.7  | -    | 20.0       | 9.8                   | 1.4  | 48.6 | -    | 59.8       | 1.6                      | 0.5  | 0.2  | -    | 2.3        | -          |
| Motorcycles            | 0                        | 6    | 0    | -    | 6          | 8                        | 0    | 1    | -    | 9          | 2                     | 2    | 8    | -    | 12         | 0                        | 0    | 0    | -    | 0          | 27         |
| % Motorcycles          | 0.0                      | 1.2  | 0.0  | -    | 1.0        | 1.8                      | 0.0  | 4.5  | -    | 1.4        | 0.6                   | 4.5  | 0.5  | -    | 0.6        | 0.0                      | 0.0  | 0.0  | -    | 0.0        | 0.8        |
| Cars                   | 2                        | 329  | 54   | -    | 385        | 315                      | 129  | 15   | -    | 459        | 232                   | 31   | 1154 | -    | 1417       | 38                       | 10   | 1    | -    | 49         | 2310       |
| % Cars                 | 66.7                     | 67.7 | 62.1 | -    | 66.8       | 71.4                     | 70.9 | 68.2 | -    | 71.2       | 73.4                  | 70.5 | 73.7 | -    | 73.6       | 71.7                     | 62.5 | 20.0 | -    | 66.2       | 71.7       |
| Light Goods Vehicles   | 1                        | 133  | 22   | -    | 156        | 107                      | 40   | 3    | -    | 150        | 68                    | 9    | 378  | -    | 455        | 12                       | 4    | 3    | -    | 19         | 780        |
| % Light Goods Vehicles | 33.3                     | 27.4 | 25.3 | -    | 27.1       | 24.3                     | 22.0 | 13.6 | -    | 23.3       | 21.5                  | 20.5 | 24.1 | -    | 23.6       | 22.6                     | 25.0 | 60.0 | -    | 25.7       | 24.2       |
| Buses                  | 0                        | 1    | 0    | -    | 1          | 0                        | 1    | 0    | -    | 1          | 1                     | 0    | 2    | -    | 3          | 0                        | 0    | 0    | -    | 0          | 5          |
| % Buses                | 0.0                      | 0.2  | 0.0  | -    | 0.2        | 0.0                      | 0.5  | 0.0  | -    | 0.2        | 0.3                   | 0.0  | 0.1  | -    | 0.2        | 0.0                      | 0.0  | 0.0  | -    | 0.0        | 0.2        |
| Single-Unit Trucks     | 0                        | 10   | 8    | -    | 18         | 8                        | 9    | 3    | -    | 20         | 11                    | 2    | 22   | -    | 35         | 2                        | 2    | 1    | -    | 5          | 78         |
| % Single-Unit Trucks   | 0.0                      | 2.1  | 9.2  | -    | 3.1        | 1.8                      | 4.9  | 13.6 | -    | 3.1        | 3.5                   | 4.5  | 1.4  | -    | 1.8        | 3.8                      | 12.5 | 20.0 | -    | 6.8        | 2.4        |
| Articulated Trucks     | 0                        | 5    | 1    | -    | 6          | 3                        | 2    | 0    | -    | 5          | 2                     | 0    | 2    | -    | 4          | 1                        | 0    | 0    | -    | 1          | 16         |
| % Articulated Trucks   | 0.0                      | 1.0  | 1.1  | -    | 1.0        | 0.7                      | 1.1  | 0.0  | -    | 0.8        | 0.6                   | 0.0  | 0.1  | -    | 0.2        | 1.9                      | 0.0  | 0.0  | -    | 1.4        | 0.5        |
| Bicycles on Road       | 0                        | 2    | 2    | -    | 4          | 0                        | 1    | 0    | -    | 1          | 0                     | 0    | 0    | -    | 0          | 0                        | 0    | 0    | -    | 0          | 5          |



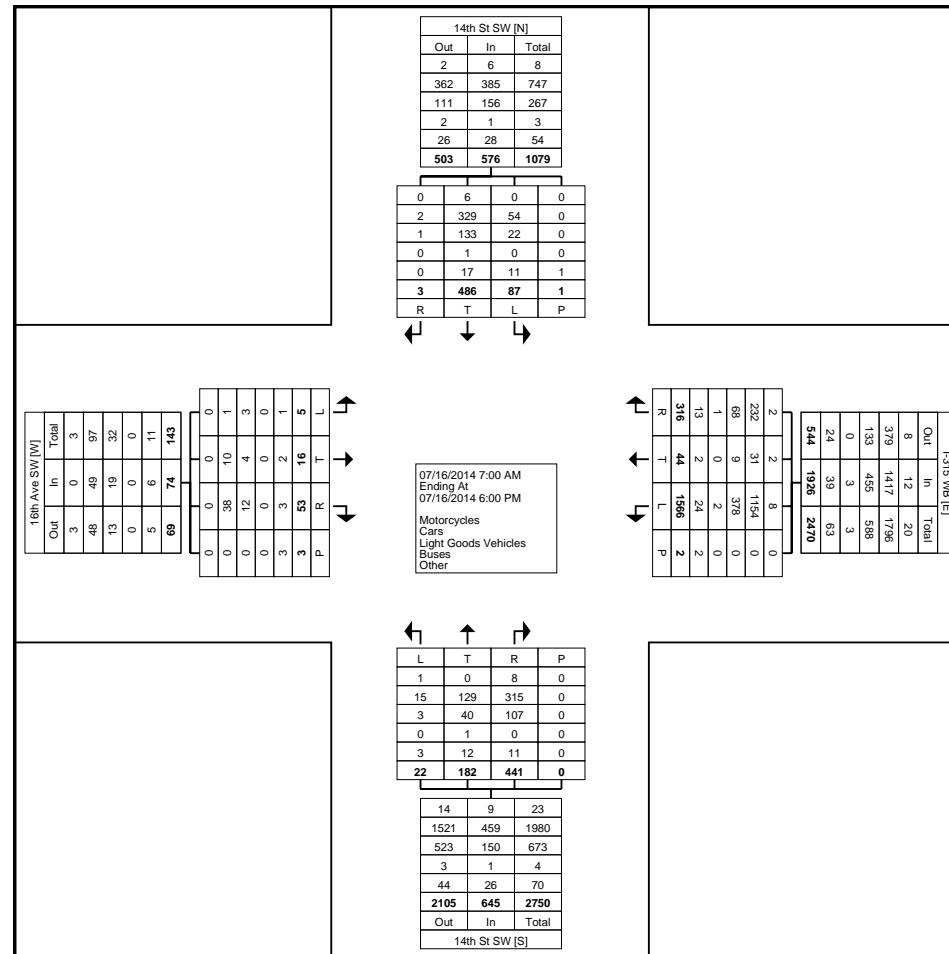
|                    |     |     |     |       |     |     |     |     |   |     |     |     |     |       |     |     |     |     |       |     |     |
|--------------------|-----|-----|-----|-------|-----|-----|-----|-----|---|-----|-----|-----|-----|-------|-----|-----|-----|-----|-------|-----|-----|
| % Bicycles on Road | 0.0 | 0.4 | 2.3 | -     | 0.7 | 0.0 | 0.5 | 0.0 | - | 0.2 | 0.0 | 0.0 | 0.0 | -     | 0.0 | 0.0 | 0.0 | 0.0 | -     | 0.0 | 0.2 |
| Pedestrians        | -   | -   | -   | 1     | -   | -   | -   | -   | 0 | -   | -   | -   | -   | 2     | -   | -   | -   | -   | 3     | -   | -   |
| % Pedestrians      | -   | -   | -   | 100.0 | -   | -   | -   | -   | - | -   | -   | -   | -   | 100.0 | -   | -   | -   | -   | 100.0 | -   | -   |



Robert Peccia & Associates  
825 Custer Ave

Helena, Montana, United States 59604  
406-447-5000 scott@rpa-hln.com

Count Name: 06-14thStSW\_I315WB TMC  
Site Code: TMC-06  
Start Date: 07/16/2014  
Page No: 3



Turning Movement Data Plot



Robert Peccia & Associates  
825 Custer Ave

Helena, Montana, United States 59604  
406-447-5000 scottr@rpa-hln.com

Count Name: 06-14thStSW\_I315WB TMC  
Site Code: TMC-06  
Start Date: 07/16/2014  
Page No: 4

### Turning Movement Peak Hour Data (7:30 AM)

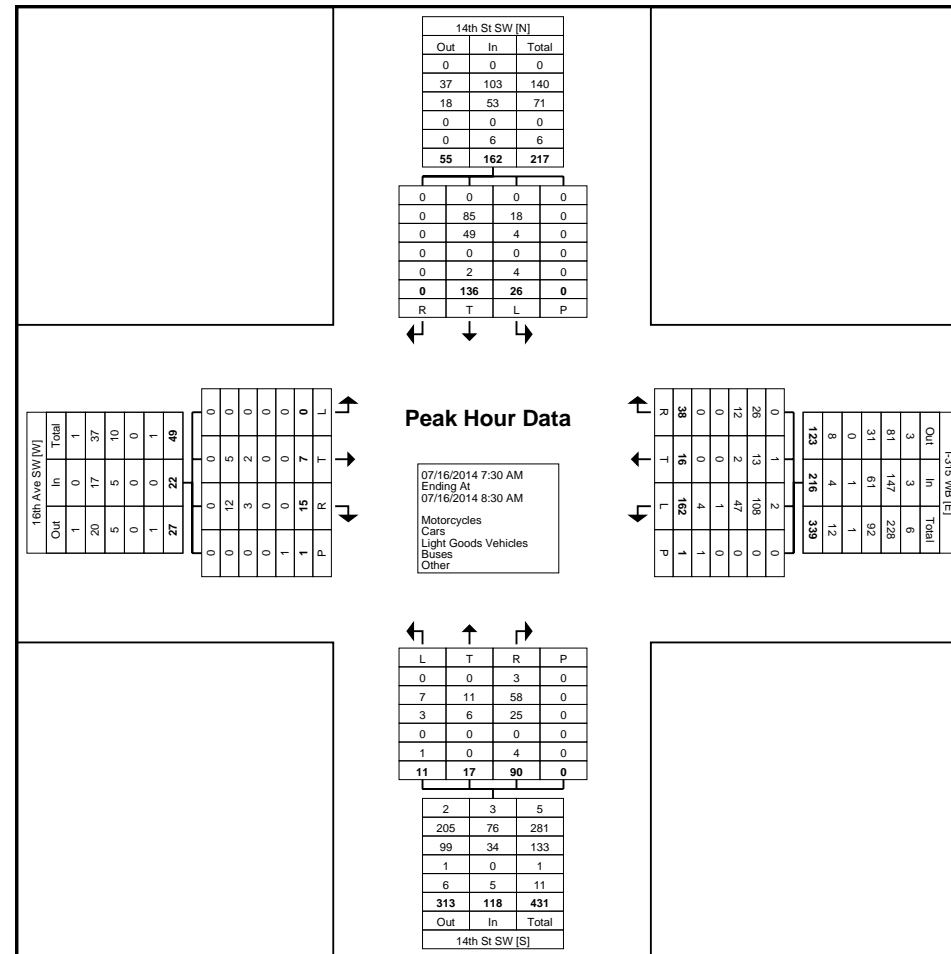
| Start Time             | 14th St SW<br>Southbound |       |       |      |            | 14th St SW<br>Northbound |       |       |      |            | I-315 WB<br>Westbound |       |       |       |            | 16th Ave SW<br>Eastbound |       |       |       |            | Int. Total |
|------------------------|--------------------------|-------|-------|------|------------|--------------------------|-------|-------|------|------------|-----------------------|-------|-------|-------|------------|--------------------------|-------|-------|-------|------------|------------|
|                        | Right                    | Thru  | Left  | Peds | App. Total | Right                    | Thru  | Left  | Peds | App. Total | Right                 | Thru  | Left  | Peds  | App. Total | Right                    | Thru  | Left  | Peds  | App. Total |            |
| 7:30 AM                | 0                        | 49    | 5     | 0    | 54         | 24                       | 5     | 0     | 0    | 29         | 9                     | 2     | 37    | 1     | 48         | 3                        | 2     | 0     | 0     | 5          | 136        |
| 7:45 AM                | 0                        | 45    | 13    | 0    | 58         | 28                       | 5     | 7     | 0    | 40         | 13                    | 5     | 38    | 0     | 56         | 5                        | 2     | 0     | 0     | 7          | 161        |
| 8:00 AM                | 0                        | 24    | 7     | 0    | 31         | 14                       | 6     | 1     | 0    | 21         | 10                    | 5     | 31    | 0     | 46         | 2                        | 1     | 0     | 0     | 3          | 101        |
| 8:15 AM                | 0                        | 18    | 1     | 0    | 19         | 24                       | 1     | 3     | 0    | 28         | 6                     | 4     | 56    | 0     | 66         | 5                        | 2     | 0     | 1     | 7          | 120        |
| Total                  | 0                        | 136   | 26    | 0    | 162        | 90                       | 17    | 11    | 0    | 118        | 38                    | 16    | 162   | 1     | 216        | 15                       | 7     | 0     | 1     | 22         | 518        |
| Approach %             | 0.0                      | 84.0  | 16.0  | -    | -          | 76.3                     | 14.4  | 9.3   | -    | -          | 17.6                  | 7.4   | 75.0  | -     | -          | 68.2                     | 31.8  | 0.0   | -     | -          | -          |
| Total %                | 0.0                      | 26.3  | 5.0   | -    | 31.3       | 17.4                     | 3.3   | 2.1   | -    | 22.8       | 7.3                   | 3.1   | 31.3  | -     | 41.7       | 2.9                      | 1.4   | 0.0   | -     | 4.2        | -          |
| PHF                    | 0.000                    | 0.694 | 0.500 | -    | 0.698      | 0.804                    | 0.708 | 0.393 | -    | 0.738      | 0.731                 | 0.800 | 0.723 | -     | 0.818      | 0.750                    | 0.875 | 0.000 | -     | 0.786      | 0.804      |
| Motorcycles            | 0                        | 0     | 0     | -    | 0          | 3                        | 0     | 0     | -    | 3          | 0                     | 1     | 2     | -     | 3          | 0                        | 0     | 0     | -     | 0          | 6          |
| % Motorcycles          | -                        | 0.0   | 0.0   | -    | 0.0        | 3.3                      | 0.0   | 0.0   | -    | 2.5        | 0.0                   | 6.3   | 1.2   | -     | 1.4        | 0.0                      | 0.0   | -     | -     | 0.0        | 1.2        |
| Cars                   | 0                        | 85    | 18    | -    | 103        | 58                       | 11    | 7     | -    | 76         | 26                    | 13    | 108   | -     | 147        | 12                       | 5     | 0     | -     | 17         | 343        |
| % Cars                 | -                        | 62.5  | 69.2  | -    | 63.6       | 64.4                     | 64.7  | 63.6  | -    | 64.4       | 68.4                  | 81.3  | 66.7  | -     | 68.1       | 80.0                     | 71.4  | -     | -     | 77.3       | 66.2       |
| Light Goods Vehicles   | 0                        | 49    | 4     | -    | 53         | 25                       | 6     | 3     | -    | 34         | 12                    | 2     | 47    | -     | 61         | 3                        | 2     | 0     | -     | 5          | 153        |
| % Light Goods Vehicles | -                        | 36.0  | 15.4  | -    | 32.7       | 27.8                     | 35.3  | 27.3  | -    | 28.8       | 31.6                  | 12.5  | 29.0  | -     | 28.2       | 20.0                     | 28.6  | -     | -     | 22.7       | 29.5       |
| Buses                  | 0                        | 0     | 0     | -    | 0          | 0                        | 0     | 0     | -    | 0          | 0                     | 0     | 1     | -     | 1          | 0                        | 0     | 0     | -     | 0          | 1          |
| % Buses                | -                        | 0.0   | 0.0   | -    | 0.0        | 0.0                      | 0.0   | 0.0   | -    | 0.0        | 0.0                   | 0.0   | 0.6   | -     | 0.5        | 0.0                      | 0.0   | -     | -     | 0.0        | 0.2        |
| Single-Unit Trucks     | 0                        | 2     | 2     | -    | 4          | 3                        | 0     | 1     | -    | 4          | 0                     | 0     | 4     | -     | 4          | 0                        | 0     | 0     | -     | 0          | 12         |
| % Single-Unit Trucks   | -                        | 1.5   | 7.7   | -    | 2.5        | 3.3                      | 0.0   | 9.1   | -    | 3.4        | 0.0                   | 0.0   | 2.5   | -     | 1.9        | 0.0                      | 0.0   | -     | -     | 0.0        | 2.3        |
| Articulated Trucks     | 0                        | 0     | 0     | -    | 0          | 1                        | 0     | 0     | -    | 1          | 0                     | 0     | 0     | -     | 0          | 0                        | 0     | 0     | -     | 0          | 1          |
| % Articulated Trucks   | -                        | 0.0   | 0.0   | -    | 0.0        | 1.1                      | 0.0   | 0.0   | -    | 0.8        | 0.0                   | 0.0   | 0.0   | -     | 0.0        | 0.0                      | 0.0   | -     | -     | 0.0        | 0.2        |
| Bicycles on Road       | 0                        | 0     | 2     | -    | 2          | 0                        | 0     | 0     | -    | 0          | 0                     | 0     | 0     | -     | 0          | 0                        | 0     | 0     | -     | 0          | 2          |
| % Bicycles on Road     | -                        | 0.0   | 7.7   | -    | 1.2        | 0.0                      | 0.0   | 0.0   | -    | 0.0        | 0.0                   | 0.0   | 0.0   | -     | 0.0        | 0.0                      | 0.0   | -     | -     | 0.0        | 0.4        |
| Pedestrians            | -                        | -     | -     | 0    | -          | -                        | -     | -     | 0    | -          | -                     | -     | -     | 1     | -          | -                        | -     | -     | 1     | -          | -          |
| % Pedestrians          | -                        | -     | -     | -    | -          | -                        | -     | -     | -    | -          | -                     | -     | -     | 100.0 | -          | -                        | -     | -     | 100.0 | -          | -          |



Robert Peccia & Associates  
825 Custer Ave

Helena, Montana, United States 59604  
406-447-5000 scottr@rpa-hln.com

Count Name: 06-14thStSW\_I315WB TMC  
Site Code: TMC-06  
Start Date: 07/16/2014  
Page No: 5



Turning Movement Peak Hour Data Plot (7:30 AM)



Robert Peccia & Associates  
825 Custer Ave

Helena, Montana, United States 59604  
406-447-5000 scottr@rpa-hln.com

Count Name: 06-14thStSW\_I315WB TMC  
Site Code: TMC-06  
Start Date: 07/16/2014  
Page No: 6

### Turning Movement Peak Hour Data (4:45 PM)

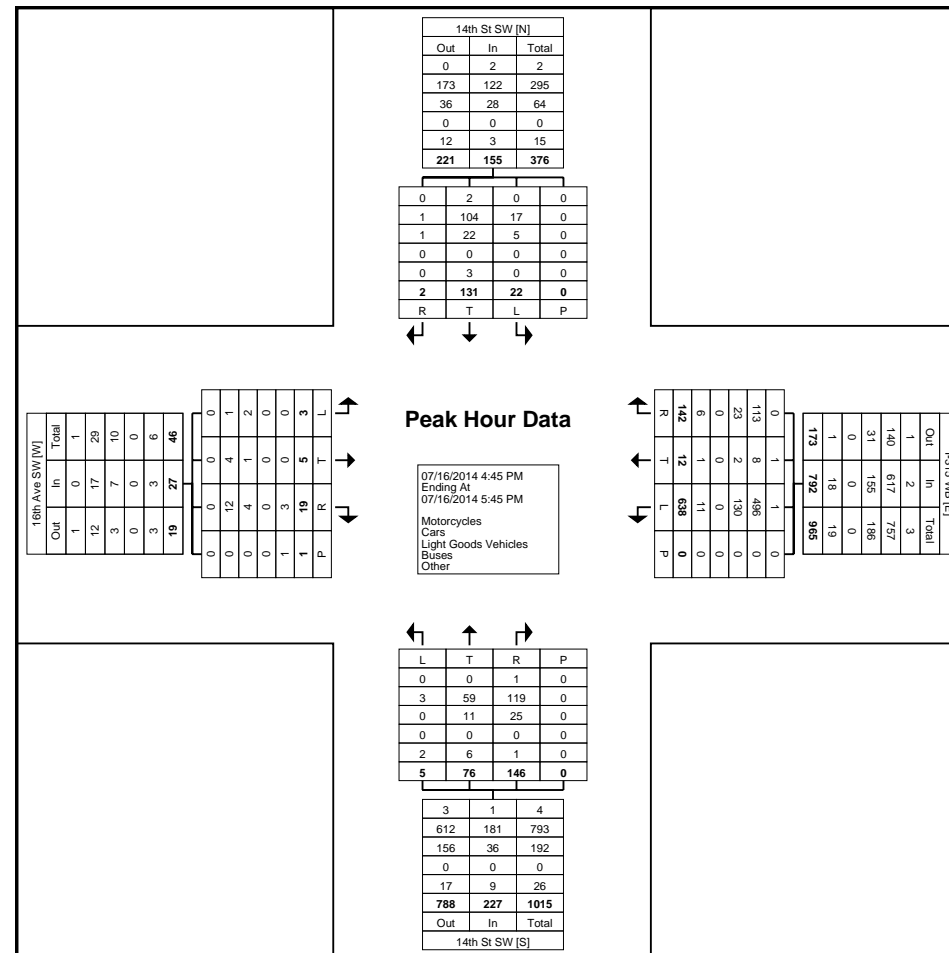
| Start Time             | 14th St SW<br>Southbound |       |       |      |            | 14th St SW<br>Northbound |       |       |      |            | I-315 WB<br>Westbound |       |       |      |            | 16th Ave SW<br>Eastbound |       |       |       |            | Int. Total |
|------------------------|--------------------------|-------|-------|------|------------|--------------------------|-------|-------|------|------------|-----------------------|-------|-------|------|------------|--------------------------|-------|-------|-------|------------|------------|
|                        | Right                    | Thru  | Left  | Peds | App. Total | Right                    | Thru  | Left  | Peds | App. Total | Right                 | Thru  | Left  | Peds | App. Total | Right                    | Thru  | Left  | Peds  | App. Total |            |
| 4:45 PM                | 1                        | 41    | 5     | 0    | 47         | 38                       | 22    | 2     | 0    | 62         | 32                    | 9     | 148   | 0    | 189        | 2                        | 3     | 1     | 1     | 6          | 304        |
| 5:00 PM                | 0                        | 28    | 3     | 0    | 31         | 37                       | 20    | 2     | 0    | 59         | 41                    | 1     | 161   | 0    | 203        | 6                        | 1     | 0     | 0     | 7          | 300        |
| 5:15 PM                | 1                        | 27    | 8     | 0    | 36         | 32                       | 21    | 1     | 0    | 54         | 40                    | 0     | 159   | 0    | 199        | 4                        | 0     | 2     | 0     | 6          | 295        |
| 5:30 PM                | 0                        | 35    | 6     | 0    | 41         | 39                       | 13    | 0     | 0    | 52         | 29                    | 2     | 170   | 0    | 201        | 7                        | 1     | 0     | 0     | 8          | 302        |
| Total                  | 2                        | 131   | 22    | 0    | 155        | 146                      | 76    | 5     | 0    | 227        | 142                   | 12    | 638   | 0    | 792        | 19                       | 5     | 3     | 1     | 27         | 1201       |
| Approach %             | 1.3                      | 84.5  | 14.2  | -    | -          | 64.3                     | 33.5  | 2.2   | -    | -          | 17.9                  | 1.5   | 80.6  | -    | -          | 70.4                     | 18.5  | 11.1  | -     | -          | -          |
| Total %                | 0.2                      | 10.9  | 1.8   | -    | 12.9       | 12.2                     | 6.3   | 0.4   | -    | 18.9       | 11.8                  | 1.0   | 53.1  | -    | 65.9       | 1.6                      | 0.4   | 0.2   | -     | 2.2        | -          |
| PHF                    | 0.500                    | 0.799 | 0.688 | -    | 0.824      | 0.936                    | 0.864 | 0.625 | -    | 0.915      | 0.866                 | 0.333 | 0.938 | -    | 0.975      | 0.679                    | 0.417 | 0.375 | -     | 0.844      | 0.988      |
| Motorcycles            | 0                        | 2     | 0     | -    | 2          | 1                        | 0     | 0     | -    | 1          | 0                     | 1     | 1     | -    | 2          | 0                        | 0     | 0     | -     | 0          | 5          |
| % Motorcycles          | 0.0                      | 1.5   | 0.0   | -    | 1.3        | 0.7                      | 0.0   | 0.0   | -    | 0.4        | 0.0                   | 8.3   | 0.2   | -    | 0.3        | 0.0                      | 0.0   | 0.0   | -     | 0.0        | 0.4        |
| Cars                   | 1                        | 104   | 17    | -    | 122        | 119                      | 59    | 3     | -    | 181        | 113                   | 8     | 496   | -    | 617        | 12                       | 4     | 1     | -     | 17         | 937        |
| % Cars                 | 50.0                     | 79.4  | 77.3  | -    | 78.7       | 81.5                     | 77.6  | 60.0  | -    | 79.7       | 79.6                  | 66.7  | 77.7  | -    | 77.9       | 63.2                     | 80.0  | 33.3  | -     | 63.0       | 78.0       |
| Light Goods Vehicles   | 1                        | 22    | 5     | -    | 28         | 25                       | 11    | 0     | -    | 36         | 23                    | 2     | 130   | -    | 155        | 4                        | 1     | 2     | -     | 7          | 226        |
| % Light Goods Vehicles | 50.0                     | 16.8  | 22.7  | -    | 18.1       | 17.1                     | 14.5  | 0.0   | -    | 15.9       | 16.2                  | 16.7  | 20.4  | -    | 19.6       | 21.1                     | 20.0  | 66.7  | -     | 25.9       | 18.8       |
| Buses                  | 0                        | 0     | 0     | -    | 0          | 0                        | 0     | 0     | -    | 0          | 0                     | 0     | 0     | -    | 0          | 0                        | 0     | 0     | -     | 0          | 0          |
| % Buses                | 0.0                      | 0.0   | 0.0   | -    | 0.0        | 0.0                      | 0.0   | 0.0   | -    | 0.0        | 0.0                   | 0.0   | 0.0   | -    | 0.0        | 0.0                      | 0.0   | 0.0   | -     | 0.0        | 0.0        |
| Single-Unit Trucks     | 0                        | 2     | 0     | -    | 2          | 1                        | 5     | 2     | -    | 8          | 4                     | 1     | 10    | -    | 15         | 2                        | 0     | 0     | -     | 2          | 27         |
| % Single-Unit Trucks   | 0.0                      | 1.5   | 0.0   | -    | 1.3        | 0.7                      | 6.6   | 40.0  | -    | 3.5        | 2.8                   | 8.3   | 1.6   | -    | 1.9        | 10.5                     | 0.0   | 0.0   | -     | 7.4        | 2.2        |
| Articulated Trucks     | 0                        | 1     | 0     | -    | 1          | 0                        | 0     | 0     | -    | 0          | 2                     | 0     | 1     | -    | 3          | 1                        | 0     | 0     | -     | 1          | 5          |
| % Articulated Trucks   | 0.0                      | 0.8   | 0.0   | -    | 0.6        | 0.0                      | 0.0   | 0.0   | -    | 0.0        | 1.4                   | 0.0   | 0.2   | -    | 0.4        | 5.3                      | 0.0   | 0.0   | -     | 3.7        | 0.4        |
| Bicycles on Road       | 0                        | 0     | 0     | -    | 0          | 0                        | 1     | 0     | -    | 1          | 0                     | 0     | 0     | -    | 0          | 0                        | 0     | 0     | -     | 0          | 1          |
| % Bicycles on Road     | 0.0                      | 0.0   | 0.0   | -    | 0.0        | 0.0                      | 1.3   | 0.0   | -    | 0.4        | 0.0                   | 0.0   | 0.0   | -    | 0.0        | 0.0                      | 0.0   | 0.0   | -     | 0.0        | 0.1        |
| Pedestrians            | -                        | -     | -     | 0    | -          | -                        | -     | -     | 0    | -          | -                     | -     | -     | 0    | -          | -                        | -     | -     | 1     | -          | -          |
| % Pedestrians          | -                        | -     | -     | -    | -          | -                        | -     | -     | -    | -          | -                     | -     | -     | -    | -          | -                        | -     | -     | 100.0 | -          | -          |



Robert Peccia & Associates  
825 Custer Ave

Helena, Montana, United States 59604  
406-447-5000 scott@rpa-hln.com

Count Name: 06-14thStSW\_I315WB TMC  
Site Code: TMC-06  
Start Date: 07/16/2014  
Page No: 7



Turning Movement Peak Hour Data Plot (4:45 PM)



Robert Peccia & Associates  
825 Custer Ave

Helena, Montana, United States 59604  
406-447-5000 scottr@rpa-hln.com

Count Name: 06-14thStSW\_I315WB TMC  
Site Code: TMC-06  
Start Date: 07/16/2014  
Page No: 8



Robert Peccia & Associates  
825 Custer Ave

Helena, Montana, United States 59604  
406-447-5000 scottr@rpa-hln.com

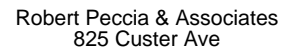
Count Name: 07-FoxFarm\_I315 TMC  
Site Code: TMC-07  
Start Date: 07/16/2014  
Page No: 1

## Turning Movement Data

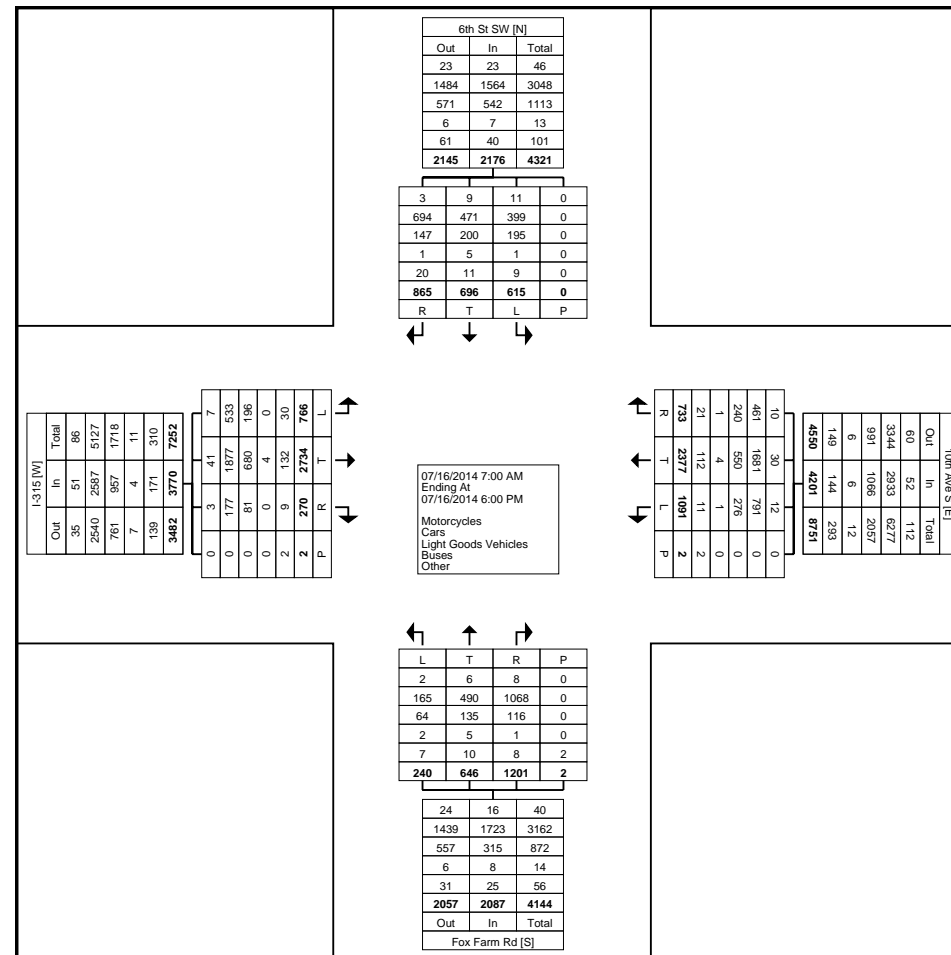
| Start Time             | 6th St SW<br>Southbound |      |      |      |            | Fox Farm Rd<br>Northbound |      |      |      |            | 10th Ave S<br>Westbound |      |      |      |            | I-315<br>Eastbound |      |      |      |            | Int. Total |
|------------------------|-------------------------|------|------|------|------------|---------------------------|------|------|------|------------|-------------------------|------|------|------|------------|--------------------|------|------|------|------------|------------|
|                        | Right                   | Thru | Left | Peds | App. Total | Right                     | Thru | Left | Peds | App. Total | Right                   | Thru | Left | Peds | App. Total | Right              | Thru | Left | Peds | App. Total |            |
| 7:00 AM                | 17                      | 15   | 21   | 0    | 53         | 79                        | 33   | 12   | 0    | 124        | 20                      | 78   | 14   | 0    | 112        | 8                  | 140  | 32   | 0    | 180        | 469        |
| 7:15 AM                | 24                      | 14   | 45   | 0    | 83         | 77                        | 33   | 7    | 0    | 117        | 41                      | 79   | 22   | 0    | 142        | 15                 | 155  | 47   | 0    | 217        | 559        |
| 7:30 AM                | 22                      | 15   | 36   | 0    | 73         | 103                       | 58   | 16   | 0    | 177        | 28                      | 99   | 21   | 0    | 148        | 15                 | 211  | 45   | 0    | 271        | 669        |
| 7:45 AM                | 32                      | 19   | 63   | 0    | 114        | 145                       | 81   | 16   | 0    | 242        | 49                      | 81   | 24   | 0    | 154        | 10                 | 244  | 50   | 0    | 304        | 814        |
| Hourly Total           | 95                      | 63   | 165  | 0    | 323        | 404                       | 205  | 51   | 0    | 660        | 138                     | 337  | 81   | 0    | 556        | 48                 | 750  | 174  | 0    | 972        | 2511       |
| 8:00 AM                | 26                      | 33   | 37   | 0    | 96         | 93                        | 38   | 5    | 0    | 136        | 26                      | 70   | 24   | 0    | 120        | 9                  | 128  | 43   | 0    | 180        | 532        |
| 8:15 AM                | 41                      | 23   | 36   | 0    | 100        | 96                        | 42   | 13   | 0    | 151        | 33                      | 85   | 32   | 0    | 150        | 11                 | 149  | 23   | 0    | 183        | 584        |
| 8:30 AM                | 36                      | 22   | 37   | 0    | 95         | 82                        | 45   | 15   | 0    | 142        | 26                      | 97   | 25   | 0    | 148        | 15                 | 147  | 30   | 0    | 192        | 577        |
| 8:45 AM                | 45                      | 27   | 38   | 0    | 110        | 99                        | 39   | 9    | 0    | 147        | 34                      | 129  | 36   | 0    | 199        | 8                  | 156  | 44   | 0    | 208        | 664        |
| Hourly Total           | 148                     | 105  | 148  | 0    | 401        | 370                       | 164  | 42   | 0    | 576        | 119                     | 381  | 117  | 0    | 617        | 43                 | 580  | 140  | 0    | 763        | 2357       |
| *** BREAK ***          | -                       | -    | -    | -    | -          | -                         | -    | -    | -    | -          | -                       | -    | -    | -    | -          | -                  | -    | -    | -    | -          | -          |
| 4:00 PM                | 54                      | 52   | 39   | 0    | 145        | 31                        | 26   | 16   | 0    | 73         | 54                      | 188  | 95   | 0    | 337        | 17                 | 223  | 53   | 1    | 293        | 848        |
| 4:15 PM                | 77                      | 68   | 43   | 0    | 188        | 63                        | 24   | 26   | 1    | 113        | 64                      | 164  | 85   | 0    | 313        | 21                 | 160  | 52   | 0    | 233        | 847        |
| 4:30 PM                | 79                      | 46   | 33   | 0    | 158        | 50                        | 37   | 18   | 0    | 105        | 52                      | 244  | 121  | 0    | 417        | 34                 | 216  | 61   | 1    | 311        | 991        |
| 4:45 PM                | 101                     | 64   | 38   | 0    | 203        | 49                        | 36   | 15   | 1    | 100        | 55                      | 166  | 95   | 0    | 316        | 23                 | 163  | 69   | 0    | 255        | 874        |
| Hourly Total           | 311                     | 230  | 153  | 0    | 694        | 193                       | 123  | 75   | 2    | 391        | 225                     | 762  | 396  | 0    | 1383       | 95                 | 762  | 235  | 2    | 1092       | 3560       |
| 5:00 PM                | 69                      | 79   | 44   | 0    | 192        | 54                        | 43   | 18   | 0    | 115        | 63                      | 217  | 105  | 1    | 385        | 22                 | 184  | 53   | 0    | 259        | 951        |
| 5:15 PM                | 76                      | 85   | 38   | 0    | 199        | 74                        | 39   | 20   | 0    | 133        | 80                      | 247  | 165  | 0    | 492        | 24                 | 143  | 59   | 0    | 226        | 1050       |
| 5:30 PM                | 84                      | 74   | 40   | 0    | 198        | 58                        | 34   | 18   | 0    | 110        | 60                      | 217  | 94   | 1    | 371        | 13                 | 166  | 53   | 0    | 232        | 911        |
| 5:45 PM                | 82                      | 60   | 27   | 0    | 169        | 48                        | 38   | 16   | 0    | 102        | 48                      | 216  | 133  | 0    | 397        | 25                 | 149  | 52   | 0    | 226        | 894        |
| Hourly Total           | 311                     | 298  | 149  | 0    | 758        | 234                       | 154  | 72   | 0    | 460        | 251                     | 897  | 497  | 2    | 1645       | 84                 | 642  | 217  | 0    | 943        | 3806       |
| Grand Total            | 865                     | 696  | 615  | 0    | 2176       | 1201                      | 646  | 240  | 2    | 2087       | 733                     | 2377 | 1091 | 2    | 4201       | 270                | 2734 | 766  | 2    | 3770       | 12234      |
| Approach %             | 39.8                    | 32.0 | 28.3 | -    | -          | 57.5                      | 31.0 | 11.5 | -    | -          | 17.4                    | 56.6 | 26.0 | -    | -          | 7.2                | 72.5 | 20.3 | -    | -          | -          |
| Total %                | 7.1                     | 5.7  | 5.0  | -    | 17.8       | 9.8                       | 5.3  | 2.0  | -    | 17.1       | 6.0                     | 19.4 | 8.9  | -    | 34.3       | 2.2                | 22.3 | 6.3  | -    | 30.8       | -          |
| Motorcycles            | 3                       | 9    | 11   | -    | 23         | 8                         | 6    | 2    | -    | 16         | 10                      | 30   | 12   | -    | 52         | 3                  | 41   | 7    | -    | 51         | 142        |
| % Motorcycles          | 0.3                     | 1.3  | 1.8  | -    | 1.1        | 0.7                       | 0.9  | 0.8  | -    | 0.8        | 1.4                     | 1.3  | 1.1  | -    | 1.2        | 1.1                | 1.5  | 0.9  | -    | 1.4        | 1.2        |
| Cars                   | 694                     | 471  | 399  | -    | 1564       | 1068                      | 490  | 165  | -    | 1723       | 461                     | 1681 | 791  | -    | 2933       | 177                | 1877 | 533  | -    | 2587       | 8807       |
| % Cars                 | 80.2                    | 67.7 | 64.9 | -    | 71.9       | 88.9                      | 75.9 | 68.8 | -    | 82.6       | 62.9                    | 70.7 | 72.5 | -    | 69.8       | 65.6               | 68.7 | 69.6 | -    | 68.6       | 72.0       |
| Light Goods Vehicles   | 147                     | 200  | 195  | -    | 542        | 116                       | 135  | 64   | -    | 315        | 240                     | 550  | 276  | -    | 1066       | 81                 | 680  | 196  | -    | 957        | 2880       |
| % Light Goods Vehicles | 17.0                    | 28.7 | 31.7 | -    | 24.9       | 9.7                       | 20.9 | 26.7 | -    | 15.1       | 32.7                    | 23.1 | 25.3 | -    | 25.4       | 30.0               | 24.9 | 25.6 | -    | 25.4       | 23.5       |
| Buses                  | 1                       | 5    | 1    | -    | 7          | 1                         | 5    | 2    | -    | 8          | 1                       | 4    | 1    | -    | 6          | 0                  | 4    | 0    | -    | 4          | 25         |
| % Buses                | 0.1                     | 0.7  | 0.2  | -    | 0.3        | 0.1                       | 0.8  | 0.8  | -    | 0.4        | 0.1                     | 0.2  | 0.1  | -    | 0.1        | 0.0                | 0.1  | 0.0  | -    | 0.1        | 0.2        |
| Single-Unit Trucks     | 16                      | 10   | 5    | -    | 31         | 8                         | 9    | 6    | -    | 23         | 17                      | 59   | 11   | -    | 87         | 8                  | 65   | 19   | -    | 92         | 233        |
| % Single-Unit Trucks   | 1.8                     | 1.4  | 0.8  | -    | 1.4        | 0.7                       | 1.4  | 2.5  | -    | 1.1        | 2.3                     | 2.5  | 1.0  | -    | 2.1        | 3.0                | 2.4  | 2.5  | -    | 2.4        | 1.9        |
| Articulated Trucks     | 4                       | 1    | 4    | -    | 9          | 0                         | 0    | 1    | -    | 1          | 4                       | 53   | 0    | -    | 57         | 0                  | 67   | 11   | -    | 78         | 145        |
| % Articulated Trucks   | 0.5                     | 0.1  | 0.7  | -    | 0.4        | 0.0                       | 0.0  | 0.4  | -    | 0.0        | 0.5                     | 2.2  | 0.0  | -    | 1.4        | 0.0                | 2.5  | 1.4  | -    | 2.1        | 1.2        |
| Bicycles on Road       | 0                       | 0    | 0    | -    | 0          | 0                         | 1    | 0    | -    | 1          | 0                       | 0    | 0    | -    | 0          | 1                  | 0    | 0    | -    | 1          | 2          |



|                    |     |     |     |   |     |     |     |     |       |     |     |     |     |       |     |     |     |     |       |     |     |
|--------------------|-----|-----|-----|---|-----|-----|-----|-----|-------|-----|-----|-----|-----|-------|-----|-----|-----|-----|-------|-----|-----|
| % Bicycles on Road | 0.0 | 0.0 | 0.0 | - | 0.0 | 0.0 | 0.2 | 0.0 | -     | 0.0 | 0.0 | 0.0 | 0.0 | -     | 0.0 | 0.4 | 0.0 | 0.0 | -     | 0.0 | 0.0 |
| Pedestrians        | -   | -   | -   | 0 | -   | -   | -   | -   | 2     | -   | -   | -   | -   | 2     | -   | -   | -   | -   | 2     | -   | -   |
| % Pedestrians      | -   | -   | -   | - | -   | -   | -   | -   | 100.0 | -   | -   | -   | -   | 100.0 | -   | -   | -   | -   | 100.0 | -   | -   |



Count Name: 07-FoxFarm\_I315 TMC  
Site Code: TMC-07  
Start Date: 07/16/2014  
Page No: 3



Robert Peccia & Associates  
825 Custer Ave

Helena, Montana, United States 59604  
406-447-5000 scottr@rpa-hln.com

Count Name: 07-FoxFarm\_I315 TMC  
Site Code: TMC-07  
Start Date: 07/16/2014  
Page No: 4

### Turning Movement Peak Hour Data (7:30 AM)

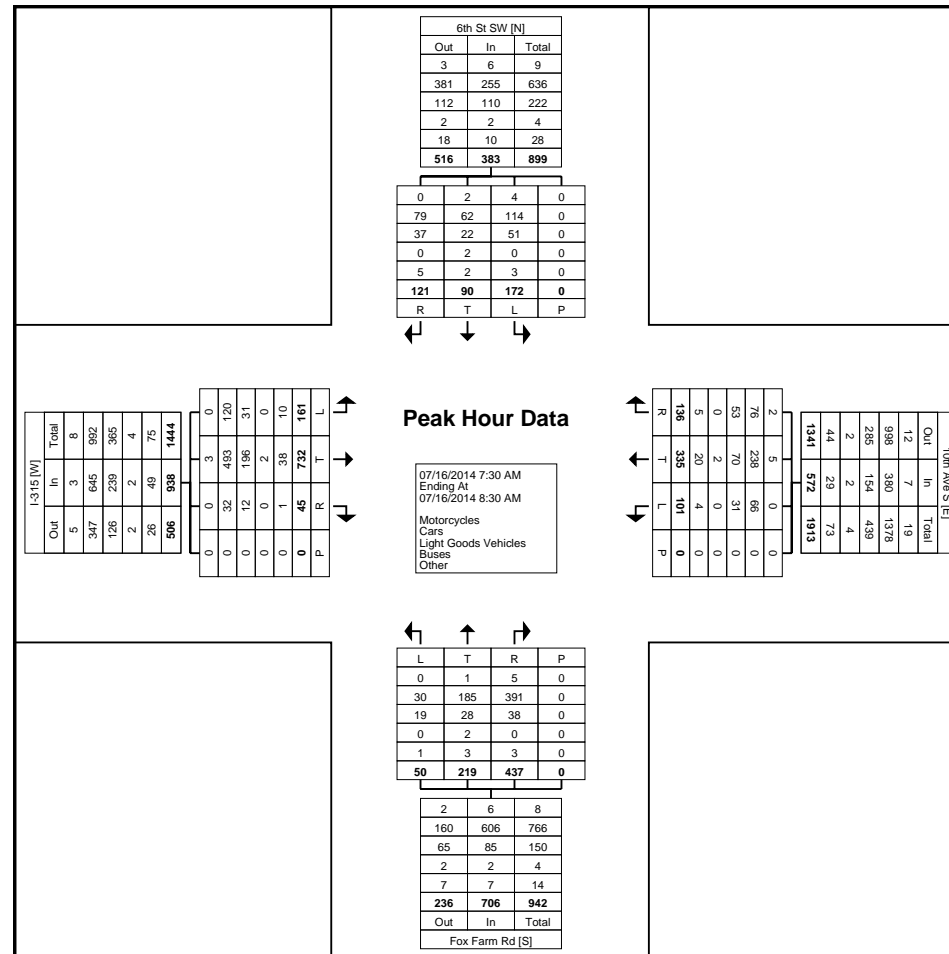
[illegible]



Robert Peccia & Associates  
825 Custer Ave

Helena, Montana, United States 59604  
406-447-5000 scottr@rpa-hln.com

Count Name: 07-FoxFarm\_I315 TMC  
Site Code: TMC-07  
Start Date: 07/16/2014  
Page No: 5





Robert Peccia & Associates  
825 Custer Ave

Helena, Montana, United States 59604  
406-447-5000 scottr@rpa-hln.com

Count Name: 07-FoxFarm\_I315 TMC  
Site Code: TMC-07  
Start Date: 07/16/2014  
Page No: 6

### Turning Movement Peak Hour Data (4:30 PM)

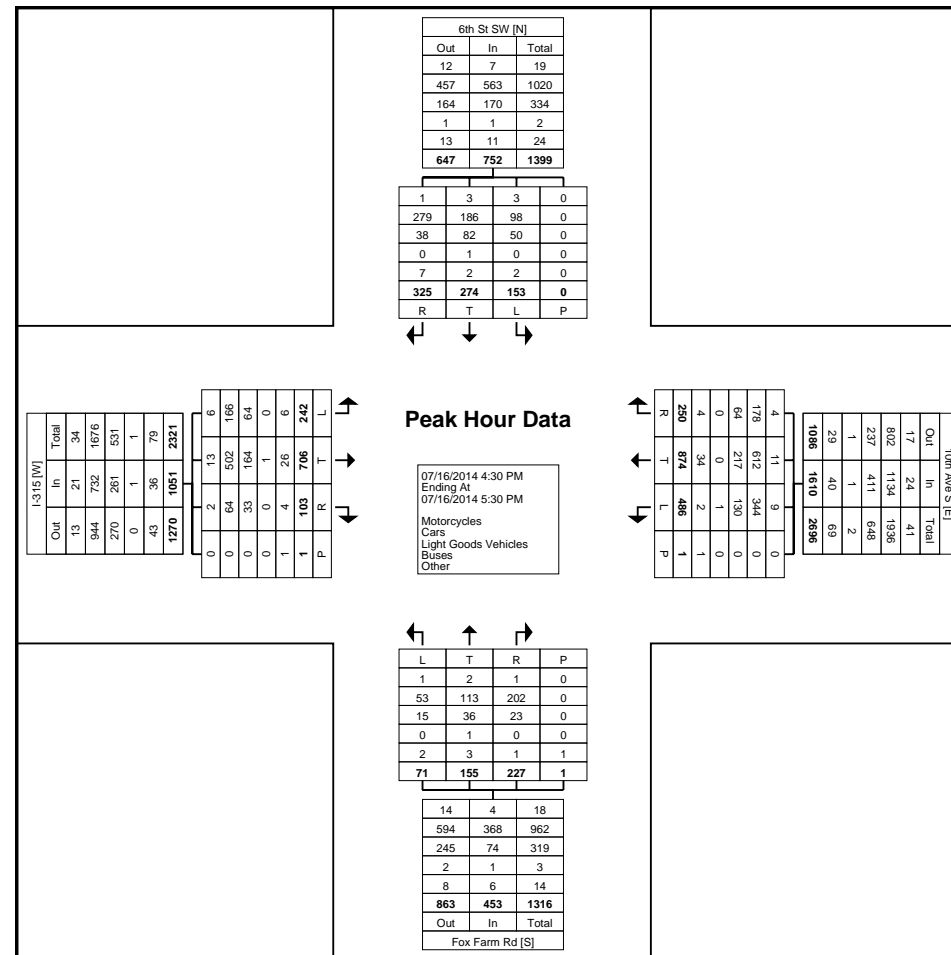
| Start Time             | 6th St SW<br>Southbound |       |       |      |            | Fox Farm Rd<br>Northbound |       |       |       |            | 10th Ave S<br>Westbound |       |       |       |            | I-315<br>Eastbound |       |       |       |            | Int. Total |
|------------------------|-------------------------|-------|-------|------|------------|---------------------------|-------|-------|-------|------------|-------------------------|-------|-------|-------|------------|--------------------|-------|-------|-------|------------|------------|
|                        | Right                   | Thru  | Left  | Peds | App. Total | Right                     | Thru  | Left  | Peds  | App. Total | Right                   | Thru  | Left  | Peds  | App. Total | Right              | Thru  | Left  | Peds  | App. Total |            |
| 4:30 PM                | 79                      | 46    | 33    | 0    | 158        | 50                        | 37    | 18    | 0     | 105        | 52                      | 244   | 121   | 0     | 417        | 34                 | 216   | 61    | 1     | 311        | 991        |
| 4:45 PM                | 101                     | 64    | 38    | 0    | 203        | 49                        | 36    | 15    | 1     | 100        | 55                      | 166   | 95    | 0     | 316        | 23                 | 163   | 69    | 0     | 255        | 874        |
| 5:00 PM                | 69                      | 79    | 44    | 0    | 192        | 54                        | 43    | 18    | 0     | 115        | 63                      | 217   | 105   | 1     | 385        | 22                 | 184   | 53    | 0     | 259        | 951        |
| 5:15 PM                | 76                      | 85    | 38    | 0    | 199        | 74                        | 39    | 20    | 0     | 133        | 80                      | 247   | 165   | 0     | 492        | 24                 | 143   | 59    | 0     | 226        | 1050       |
| Total                  | 325                     | 274   | 153   | 0    | 752        | 227                       | 155   | 71    | 1     | 453        | 250                     | 874   | 486   | 1     | 1610       | 103                | 706   | 242   | 1     | 1051       | 3866       |
| Approach %             | 43.2                    | 36.4  | 20.3  | -    | -          | 50.1                      | 34.2  | 15.7  | -     | -          | 15.5                    | 54.3  | 30.2  | -     | -          | 9.8                | 67.2  | 23.0  | -     | -          | -          |
| Total %                | 8.4                     | 7.1   | 4.0   | -    | 19.5       | 5.9                       | 4.0   | 1.8   | -     | 11.7       | 6.5                     | 22.6  | 12.6  | -     | 41.6       | 2.7                | 18.3  | 6.3   | -     | 27.2       | -          |
| PHF                    | 0.804                   | 0.806 | 0.869 | -    | 0.926      | 0.767                     | 0.901 | 0.888 | -     | 0.852      | 0.781                   | 0.885 | 0.736 | -     | 0.818      | 0.757              | 0.817 | 0.877 | -     | 0.845      | 0.920      |
| Motorcycles            | 1                       | 3     | 3     | -    | 7          | 1                         | 2     | 1     | -     | 4          | 4                       | 11    | 9     | -     | 24         | 2                  | 13    | 6     | -     | 21         | 56         |
| % Motorcycles          | 0.3                     | 1.1   | 2.0   | -    | 0.9        | 0.4                       | 1.3   | 1.4   | -     | 0.9        | 1.6                     | 1.3   | 1.9   | -     | 1.5        | 1.9                | 1.8   | 2.5   | -     | 2.0        | 1.4        |
| Cars                   | 279                     | 186   | 98    | -    | 563        | 202                       | 113   | 53    | -     | 368        | 178                     | 612   | 344   | -     | 1134       | 64                 | 502   | 166   | -     | 732        | 2797       |
| % Cars                 | 85.8                    | 67.9  | 64.1  | -    | 74.9       | 89.0                      | 72.9  | 74.6  | -     | 81.2       | 71.2                    | 70.0  | 70.8  | -     | 70.4       | 62.1               | 71.1  | 68.6  | -     | 69.6       | 72.3       |
| Light Goods Vehicles   | 38                      | 82    | 50    | -    | 170        | 23                        | 36    | 15    | -     | 74         | 64                      | 217   | 130   | -     | 411        | 33                 | 164   | 64    | -     | 261        | 916        |
| % Light Goods Vehicles | 11.7                    | 29.9  | 32.7  | -    | 22.6       | 10.1                      | 23.2  | 21.1  | -     | 16.3       | 25.6                    | 24.8  | 26.7  | -     | 25.5       | 32.0               | 23.2  | 26.4  | -     | 24.8       | 23.7       |
| Buses                  | 0                       | 1     | 0     | -    | 1          | 0                         | 1     | 0     | -     | 1          | 0                       | 0     | 1     | -     | 1          | 0                  | 1     | 0     | -     | 1          | 4          |
| % Buses                | 0.0                     | 0.4   | 0.0   | -    | 0.1        | 0.0                       | 0.6   | 0.0   | -     | 0.2        | 0.0                     | 0.0   | 0.2   | -     | 0.1        | 0.0                | 0.1   | 0.0   | -     | 0.1        | 0.1        |
| Single-Unit Trucks     | 4                       | 2     | 0     | -    | 6          | 1                         | 3     | 2     | -     | 6          | 3                       | 19    | 2     | -     | 24         | 3                  | 13    | 4     | -     | 20         | 56         |
| % Single-Unit Trucks   | 1.2                     | 0.7   | 0.0   | -    | 0.8        | 0.4                       | 1.9   | 2.8   | -     | 1.3        | 1.2                     | 2.2   | 0.4   | -     | 1.5        | 2.9                | 1.8   | 1.7   | -     | 1.9        | 1.4        |
| Articulated Trucks     | 3                       | 0     | 2     | -    | 5          | 0                         | 0     | 0     | -     | 0          | 1                       | 15    | 0     | -     | 16         | 0                  | 13    | 2     | -     | 15         | 36         |
| % Articulated Trucks   | 0.9                     | 0.0   | 1.3   | -    | 0.7        | 0.0                       | 0.0   | 0.0   | -     | 0.0        | 0.4                     | 1.7   | 0.0   | -     | 1.0        | 0.0                | 1.8   | 0.8   | -     | 1.4        | 0.9        |
| Bicycles on Road       | 0                       | 0     | 0     | -    | 0          | 0                         | 0     | 0     | -     | 0          | 0                       | 0     | 0     | -     | 0          | 1                  | 0     | 0     | -     | 1          | 1          |
| % Bicycles on Road     | 0.0                     | 0.0   | 0.0   | -    | 0.0        | 0.0                       | 0.0   | 0.0   | -     | 0.0        | 0.0                     | 0.0   | 0.0   | -     | 0.0        | 1.0                | 0.0   | 0.0   | -     | 0.1        | 0.0        |
| Pedestrians            | -                       | -     | -     | 0    | -          | -                         | -     | -     | 1     | -          | -                       | -     | -     | 1     | -          | -                  | -     | -     | 1     | -          | -          |
| % Pedestrians          | -                       | -     | -     | -    | -          | -                         | -     | -     | 100.0 | -          | -                       | -     | -     | 100.0 | -          | -                  | -     | -     | 100.0 | -          | -          |



Robert Peccia & Associates  
825 Custer Ave

Helena, Montana, United States 59604  
406-447-5000 scottr@rpa-hln.com

Count Name: 07-FoxFarm\_I315 TMC  
Site Code: TMC-07  
Start Date: 07/16/2014  
Page No: 7



Turning Movement Peak Hour Data Plot (4:30 PM)



Robert Peccia & Associates  
825 Custer Ave

Helena, Montana, United States 59604  
406-447-5000 scottr@rpa-hln.com

Count Name: 07-FoxFarm\_I315 TMC  
Site Code: TMC-07  
Start Date: 07/16/2014  
Page No: 8



Robert Peccia & Associates  
825 Custer Ave

Helena, Montana, United States 59604  
406-447-5000 scottr@rpa-hln.com

Count Name: 08-CentralAve\_I15SB TMC  
Site Code: TMC-08  
Start Date: 07/16/2014  
Page No: 1

## Turning Movement Data

| Start Time             | I-15 SB Off<br>Southbound |       |      |      |            | I-15 SB On<br>Northbound |            | Central Ave W<br>Westbound |      |      |            | Central Ave W<br>Eastbound |      |      |            | Int. Total |
|------------------------|---------------------------|-------|------|------|------------|--------------------------|------------|----------------------------|------|------|------------|----------------------------|------|------|------------|------------|
|                        | Right                     | Thru  | Left | Peds | App. Total | Peds                     | App. Total | Thru                       | Left | Peds | App. Total | Right                      | Thru | Peds | App. Total |            |
| 7:00 AM                | 3                         | 0     | 31   | 0    | 34         | 0                        | 0          | 9                          | 30   | 0    | 39         | 9                          | 35   | 0    | 44         | 117        |
| 7:15 AM                | 1                         | 0     | 37   | 0    | 38         | 0                        | 0          | 19                         | 28   | 0    | 47         | 13                         | 33   | 0    | 46         | 131        |
| 7:30 AM                | 2                         | 0     | 38   | 0    | 40         | 0                        | 0          | 27                         | 24   | 0    | 51         | 8                          | 69   | 0    | 77         | 168        |
| 7:45 AM                | 1                         | 0     | 35   | 0    | 36         | 0                        | 0          | 22                         | 40   | 0    | 62         | 12                         | 47   | 0    | 59         | 157        |
| Hourly Total           | 7                         | 0     | 141  | 0    | 148        | 0                        | 0          | 77                         | 122  | 0    | 199        | 42                         | 184  | 0    | 226        | 573        |
| 8:00 AM                | 2                         | 0     | 20   | 0    | 22         | 0                        | 0          | 20                         | 31   | 0    | 51         | 6                          | 42   | 0    | 48         | 121        |
| 8:15 AM                | 0                         | 0     | 19   | 0    | 19         | 0                        | 0          | 20                         | 33   | 0    | 53         | 7                          | 42   | 0    | 49         | 121        |
| 8:30 AM                | 0                         | 0     | 20   | 0    | 20         | 0                        | 0          | 23                         | 28   | 0    | 51         | 6                          | 29   | 0    | 35         | 106        |
| 8:45 AM                | 0                         | 0     | 20   | 0    | 20         | 2                        | 0          | 21                         | 35   | 0    | 56         | 7                          | 33   | 0    | 40         | 116        |
| Hourly Total           | 2                         | 0     | 79   | 0    | 81         | 2                        | 0          | 84                         | 127  | 0    | 211        | 26                         | 146  | 0    | 172        | 464        |
| *** BREAK ***          | -                         | -     | -    | -    | -          | -                        | -          | -                          | -    | -    | -          | -                          | -    | -    | -          | -          |
| 4:00 PM                | 1                         | 1     | 26   | 0    | 28         | 0                        | 0          | 59                         | 46   | 0    | 105        | 10                         | 44   | 0    | 54         | 187        |
| 4:15 PM                | 2                         | 0     | 13   | 0    | 15         | 0                        | 0          | 73                         | 44   | 0    | 117        | 5                          | 37   | 0    | 42         | 174        |
| 4:30 PM                | 0                         | 0     | 23   | 0    | 23         | 0                        | 0          | 68                         | 53   | 0    | 121        | 7                          | 49   | 0    | 56         | 200        |
| 4:45 PM                | 0                         | 0     | 14   | 3    | 14         | 0                        | 0          | 61                         | 65   | 0    | 126        | 2                          | 40   | 0    | 42         | 182        |
| Hourly Total           | 3                         | 1     | 76   | 3    | 80         | 0                        | 0          | 261                        | 208  | 0    | 469        | 24                         | 170  | 0    | 194        | 743        |
| 5:00 PM                | 2                         | 0     | 16   | 0    | 18         | 0                        | 0          | 75                         | 52   | 0    | 127        | 7                          | 40   | 0    | 47         | 192        |
| 5:15 PM                | 1                         | 0     | 17   | 1    | 18         | 1                        | 0          | 86                         | 64   | 0    | 150        | 5                          | 49   | 0    | 54         | 222        |
| 5:30 PM                | 1                         | 0     | 15   | 0    | 16         | 0                        | 0          | 66                         | 64   | 0    | 130        | 9                          | 43   | 0    | 52         | 198        |
| 5:45 PM                | 2                         | 0     | 18   | 1    | 20         | 0                        | 0          | 72                         | 50   | 0    | 122        | 9                          | 34   | 0    | 43         | 185        |
| Hourly Total           | 6                         | 0     | 66   | 2    | 72         | 1                        | 0          | 299                        | 230  | 0    | 529        | 30                         | 166  | 0    | 196        | 797        |
| Grand Total            | 18                        | 1     | 362  | 5    | 381        | 3                        | 0          | 721                        | 687  | 0    | 1408       | 122                        | 666  | 0    | 788        | 2577       |
| Approach %             | 4.7                       | 0.3   | 95.0 | -    | -          | -                        | -          | 51.2                       | 48.8 | -    | -          | 15.5                       | 84.5 | -    | -          | -          |
| Total %                | 0.7                       | 0.0   | 14.0 | -    | 14.8       | -                        | 0.0        | 28.0                       | 26.7 | -    | 54.6       | 4.7                        | 25.8 | -    | 30.6       | -          |
| Motorcycles            | 0                         | 0     | 3    | -    | 3          | -                        | 0          | 18                         | 9    | -    | 27         | 1                          | 17   | -    | 18         | 48         |
| % Motorcycles          | 0.0                       | 0.0   | 0.8  | -    | 0.8        | -                        | -          | 2.5                        | 1.3  | -    | 1.9        | 0.8                        | 2.6  | -    | 2.3        | 1.9        |
| Cars                   | 8                         | 1     | 247  | -    | 256        | -                        | 0          | 476                        | 391  | -    | 867        | 81                         | 386  | -    | 467        | 1590       |
| % Cars                 | 44.4                      | 100.0 | 68.2 | -    | 67.2       | -                        | -          | 66.0                       | 56.9 | -    | 61.6       | 66.4                       | 58.0 | -    | 59.3       | 61.7       |
| Light Goods Vehicles   | 10                        | 0     | 95   | -    | 105        | -                        | 0          | 200                        | 225  | -    | 425        | 36                         | 240  | -    | 276        | 806        |
| % Light Goods Vehicles | 55.6                      | 0.0   | 26.2 | -    | 27.6       | -                        | -          | 27.7                       | 32.8 | -    | 30.2       | 29.5                       | 36.0 | -    | 35.0       | 31.3       |
| Buses                  | 0                         | 0     | 0    | -    | 0          | -                        | 0          | 1                          | 1    | -    | 2          | 0                          | 1    | -    | 1          | 3          |
| % Buses                | 0.0                       | 0.0   | 0.0  | -    | 0.0        | -                        | -          | 0.1                        | 0.1  | -    | 0.1        | 0.0                        | 0.2  | -    | 0.1        | 0.1        |
| Single-Unit Trucks     | 0                         | 0     | 7    | -    | 7          | -                        | 0          | 13                         | 28   | -    | 41         | 4                          | 10   | -    | 14         | 62         |
| % Single-Unit Trucks   | 0.0                       | 0.0   | 1.9  | -    | 1.8        | -                        | -          | 1.8                        | 4.1  | -    | 2.9        | 3.3                        | 1.5  | -    | 1.8        | 2.4        |
| Articulated Trucks     | 0                         | 0     | 10   | -    | 10         | -                        | 0          | 13                         | 33   | -    | 46         | 0                          | 12   | -    | 12         | 68         |
| % Articulated Trucks   | 0.0                       | 0.0   | 2.8  | -    | 2.6        | -                        | -          | 1.8                        | 4.8  | -    | 3.3        | 0.0                        | 1.8  | -    | 1.5        | 2.6        |
| Bicycles on Road       | 0                         | 0     | 0    | -    | 0          | -                        | 0          | 0                          | 0    | -    | 0          | 0                          | 0    | -    | 0          | 0          |
| % Bicycles on Road     | 0.0                       | 0.0   | 0.0  | -    | 0.0        | -                        | -          | 0.0                        | 0.0  | -    | 0.0        | 0.0                        | 0.0  | -    | 0.0        | 0.0        |



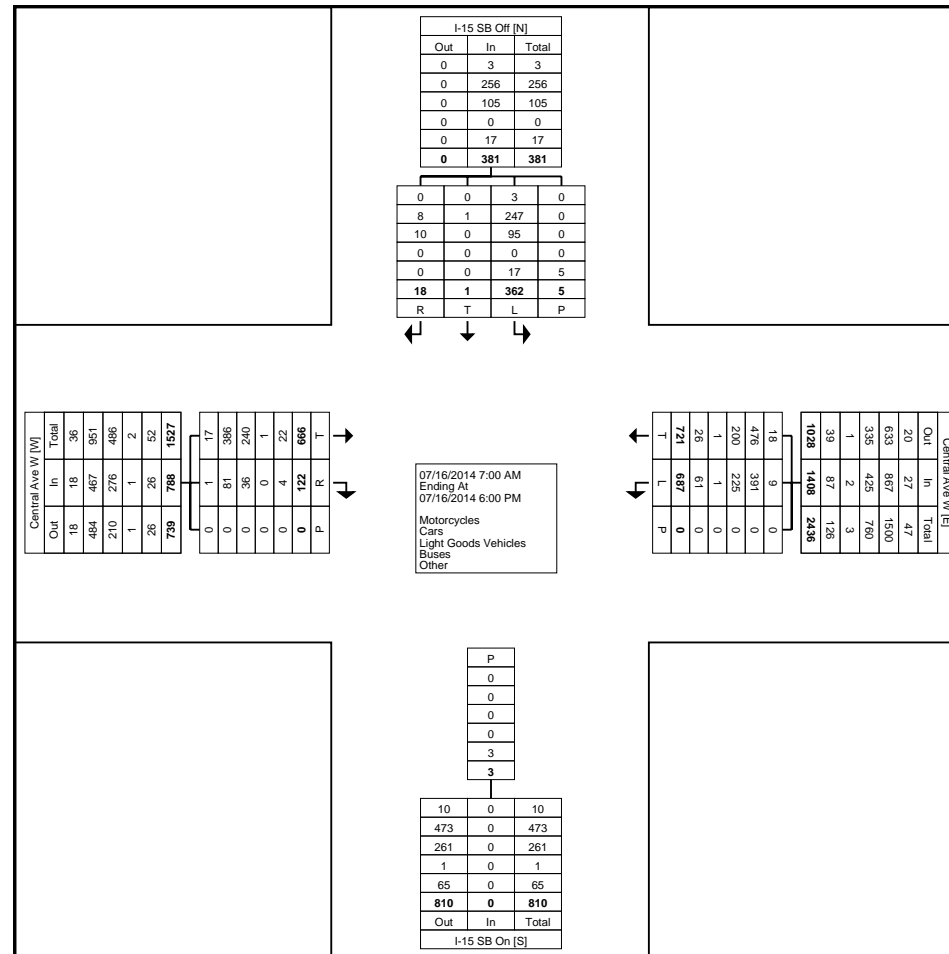




Robert Peccia & Associates  
825 Custer Ave

Helena, Montana, United States 59604  
406-447-5000 scottr@rpa-hln.com

Count Name: 08-CentralAve\_I15SB TMC  
Site Code: TMC-08  
Start Date: 07/16/2014  
Page No: 3



Turning Movement Data Plot

Robert Peccia & Associates  
825 Custer Ave

Helena, Montana, United States 59604  
406-447-5000 scottr@rpa-hln.com

Count Name: 08-CentralAve\_I15SB TMC  
Site Code: TMC-08  
Start Date: 07/16/2014  
Page No: 4

### Turning Movement Peak Hour Data (7:15 AM)

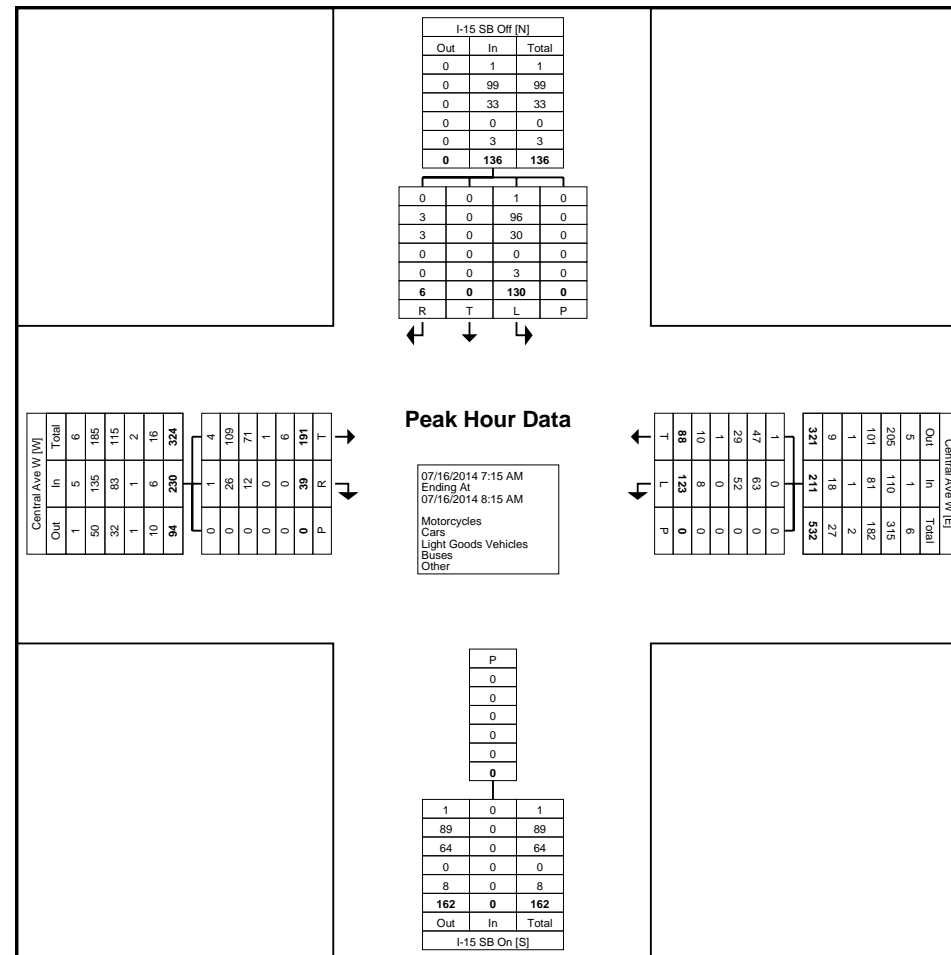
[illegible]



Robert Peccia & Associates  
825 Custer Ave

Helena, Montana, United States 59604  
406-447-5000 scottr@rpa-hln.com

Count Name: 08-CentralAve\_I15SB TMC  
Site Code: TMC-08  
Start Date: 07/16/2014  
Page No: 5



Turning Movement Peak Hour Data Plot (7:15 AM)

Robert Peccia & Associates  
825 Custer Ave

Helena, Montana, United States 59604  
406-447-5000 [scottr@rpa-hln.com](mailto:scottr@rpa-hln.com)

Count Name: 08-CentralAve\_I15SB TMC  
Site Code: TMC-08  
Start Date: 07/16/2014  
Page No: 6

### Turning Movement Peak Hour Data (5:00 PM)

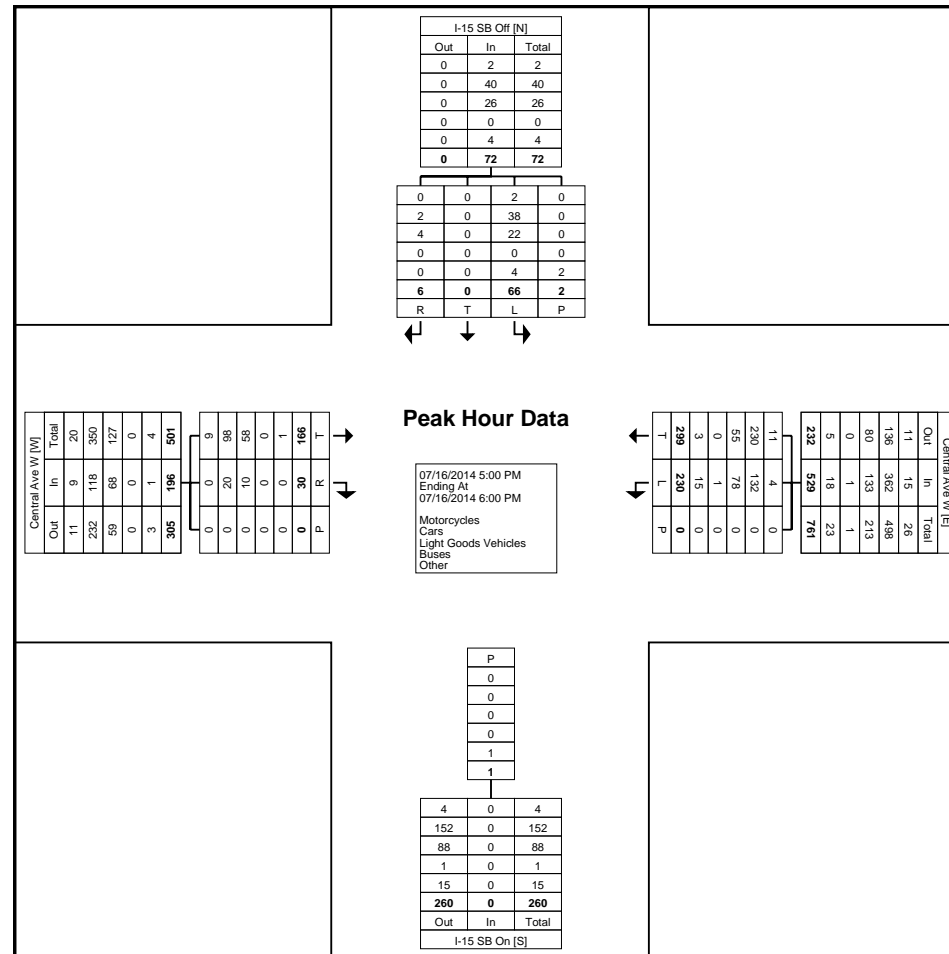
[illegible]



Robert Peccia & Associates  
825 Custer Ave

Helena, Montana, United States 59604  
406-447-5000 scottr@rpa-hln.com

Count Name: 08-CentralAve\_I15SB TMC  
Site Code: TMC-08  
Start Date: 07/16/2014  
Page No: 7



Turning Movement Peak Hour Data Plot (5:00 PM)



Robert Peccia & Associates  
825 Custer Ave

Helena, Montana, United States 59604  
406-447-5000 scottr@rpa-hln.com

Count Name: 08-CentralAve\_I15SB TMC  
Site Code: TMC-08  
Start Date: 07/16/2014  
Page No: 8



Robert Peccia & Associates  
825 Custer Ave

Helena, Montana, United States 59604  
406-447-5000 scottr@rpa-hln.com

Count Name: 09-CentralAve\_I15NB TMC  
Site Code: TMC-09  
Start Date: 07/16/2014  
Page No: 1

## Turning Movement Data

| Start Time             | I-15 NB On<br>Southbound |            | I-15 NB Off<br>Northbound |       |      |      |            | Central Ave W<br>Westbound |      |      |            | Central Ave W<br>Eastbound |      |      |            | Int. Total |
|------------------------|--------------------------|------------|---------------------------|-------|------|------|------------|----------------------------|------|------|------------|----------------------------|------|------|------------|------------|
|                        | Peds                     | App. Total | Right                     | Thru  | Left | Peds | App. Total | Right                      | Thru | Peds | App. Total | Thru                       | Left | Peds | App. Total |            |
| 7:00 AM                | 0                        | 0          | 31                        | 1     | 0    | 0    | 32         | 8                          | 39   | 0    | 47         | 64                         | 3    | 0    | 67         | 146        |
| 7:15 AM                | 0                        | 0          | 27                        | 0     | 7    | 0    | 34         | 6                          | 41   | 0    | 47         | 70                         | 0    | 0    | 70         | 151        |
| 7:30 AM                | 0                        | 0          | 52                        | 0     | 7    | 0    | 59         | 7                          | 42   | 0    | 49         | 106                        | 2    | 0    | 108        | 216        |
| 7:45 AM                | 0                        | 0          | 42                        | 0     | 1    | 0    | 43         | 11                         | 60   | 0    | 71         | 79                         | 1    | 0    | 80         | 194        |
| Hourly Total           | 0                        | 0          | 152                       | 1     | 15   | 0    | 168        | 32                         | 182  | 0    | 214        | 319                        | 6    | 0    | 325        | 707        |
| 8:00 AM                | 0                        | 0          | 39                        | 0     | 3    | 0    | 42         | 11                         | 52   | 0    | 63         | 61                         | 1    | 0    | 62         | 167        |
| 8:15 AM                | 0                        | 0          | 44                        | 0     | 4    | 0    | 48         | 15                         | 48   | 0    | 63         | 59                         | 2    | 0    | 61         | 172        |
| 8:30 AM                | 0                        | 0          | 32                        | 0     | 3    | 0    | 35         | 11                         | 45   | 0    | 56         | 54                         | 0    | 0    | 54         | 145        |
| 8:45 AM                | 0                        | 0          | 34                        | 0     | 9    | 0    | 43         | 4                          | 49   | 0    | 53         | 50                         | 0    | 0    | 50         | 146        |
| Hourly Total           | 0                        | 0          | 149                       | 0     | 19   | 0    | 168        | 41                         | 194  | 0    | 235        | 224                        | 3    | 0    | 227        | 630        |
| *** BREAK ***          | -                        | -          | -                         | -     | -    | -    | -          | -                          | -    | -    | -          | -                          | -    | -    | -          | -          |
| 4:00 PM                | 0                        | 0          | 61                        | 0     | 7    | 0    | 68         | 19                         | 96   | 0    | 115        | 70                         | 1    | 0    | 71         | 254        |
| 4:15 PM                | 0                        | 0          | 44                        | 0     | 16   | 0    | 60         | 18                         | 99   | 0    | 117        | 48                         | 1    | 0    | 49         | 226        |
| 4:30 PM                | 0                        | 0          | 56                        | 0     | 12   | 0    | 68         | 20                         | 117  | 0    | 137        | 72                         | 1    | 0    | 73         | 278        |
| 4:45 PM                | 0                        | 0          | 36                        | 0     | 10   | 0    | 46         | 28                         | 110  | 0    | 138        | 55                         | 0    | 0    | 55         | 239        |
| Hourly Total           | 0                        | 0          | 197                       | 0     | 45   | 0    | 242        | 85                         | 422  | 0    | 507        | 245                        | 3    | 0    | 248        | 997        |
| 5:00 PM                | 0                        | 0          | 35                        | 0     | 15   | 0    | 50         | 34                         | 118  | 0    | 152        | 58                         | 1    | 0    | 59         | 261        |
| 5:15 PM                | 1                        | 0          | 43                        | 0     | 20   | 0    | 63         | 31                         | 126  | 0    | 157        | 64                         | 3    | 0    | 67         | 287        |
| 5:30 PM                | 0                        | 0          | 47                        | 0     | 8    | 0    | 55         | 30                         | 124  | 0    | 154        | 60                         | 1    | 0    | 61         | 270        |
| 5:45 PM                | 1                        | 0          | 34                        | 0     | 10   | 0    | 44         | 26                         | 110  | 0    | 136        | 48                         | 6    | 0    | 54         | 234        |
| Hourly Total           | 2                        | 0          | 159                       | 0     | 53   | 0    | 212        | 121                        | 478  | 0    | 599        | 230                        | 11   | 0    | 241        | 1052       |
| Grand Total            | 2                        | 0          | 657                       | 1     | 132  | 0    | 790        | 279                        | 1276 | 0    | 1555       | 1018                       | 23   | 0    | 1041       | 3386       |
| Approach %             | -                        | -          | 83.2                      | 0.1   | 16.7 | -    | -          | 17.9                       | 82.1 | -    | -          | 97.8                       | 2.2  | -    | -          | -          |
| Total %                | -                        | 0.0        | 19.4                      | 0.0   | 3.9  | -    | 23.3       | 8.2                        | 37.7 | -    | 45.9       | 30.1                       | 0.7  | -    | 30.7       | -          |
| Motorcycles            | -                        | 0          | 8                         | 0     | 1    | -    | 9          | 6                          | 24   | -    | 30         | 17                         | 0    | -    | 17         | 56         |
| % Motorcycles          | -                        | -          | 1.2                       | 0.0   | 0.8  | -    | 1.1        | 2.2                        | 1.9  | -    | 1.9        | 1.7                        | 0.0  | -    | 1.6        | 1.7        |
| Cars                   | -                        | 0          | 382                       | 1     | 92   | -    | 475        | 201                        | 822  | -    | 1023       | 637                        | 15   | -    | 652        | 2150       |
| % Cars                 | -                        | -          | 58.1                      | 100.0 | 69.7 | -    | 60.1       | 72.0                       | 64.4 | -    | 65.8       | 62.6                       | 65.2 | -    | 62.6       | 63.5       |
| Light Goods Vehicles   | -                        | 0          | 205                       | 0     | 34   | -    | 239        | 60                         | 337  | -    | 397        | 325                        | 6    | -    | 331        | 967        |
| % Light Goods Vehicles | -                        | -          | 31.2                      | 0.0   | 25.8 | -    | 30.3       | 21.5                       | 26.4 | -    | 25.5       | 31.9                       | 26.1 | -    | 31.8       | 28.6       |
| Buses                  | -                        | 0          | 1                         | 0     | 0    | -    | 1          | 0                          | 2    | -    | 2          | 1                          | 0    | -    | 1          | 4          |
| % Buses                | -                        | -          | 0.2                       | 0.0   | 0.0  | -    | 0.1        | 0.0                        | 0.2  | -    | 0.1        | 0.1                        | 0.0  | -    | 0.1        | 0.1        |
| Single-Unit Trucks     | -                        | 0          | 25                        | 0     | 5    | -    | 30         | 8                          | 43   | -    | 51         | 16                         | 2    | -    | 18         | 99         |
| % Single-Unit Trucks   | -                        | -          | 3.8                       | 0.0   | 3.8  | -    | 3.8        | 2.9                        | 3.4  | -    | 3.3        | 1.6                        | 8.7  | -    | 1.7        | 2.9        |
| Articulated Trucks     | -                        | 0          | 36                        | 0     | 0    | -    | 36         | 4                          | 47   | -    | 51         | 19                         | 0    | -    | 19         | 106        |
| % Articulated Trucks   | -                        | -          | 5.5                       | 0.0   | 0.0  | -    | 4.6        | 1.4                        | 3.7  | -    | 3.3        | 1.9                        | 0.0  | -    | 1.8        | 3.1        |
| Bicycles on Road       | -                        | 0          | 0                         | 0     | 0    | -    | 0          | 0                          | 1    | -    | 1          | 3                          | 0    | -    | 3          | 4          |
| % Bicycles on Road     | -                        | -          | 0.0                       | 0.0   | 0.0  | -    | 0.0        | 0.0                        | 0.1  | -    | 0.1        | 0.3                        | 0.0  | -    | 0.3        | 0.1        |



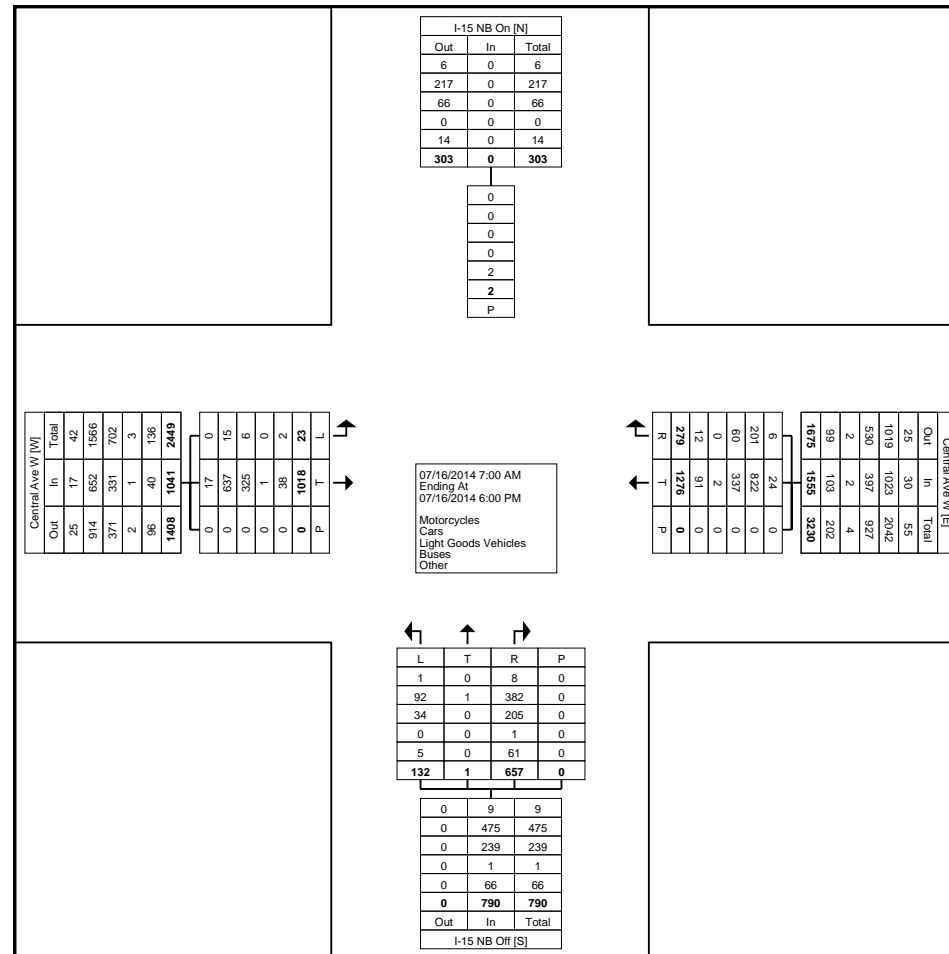
[illegible]



Robert Peccia & Associates  
825 Custer Ave

Helena, Montana, United States 59604  
406-447-5000 scottr@rpa-hln.com

Count Name: 09-CentralAve\_I15NB TMC  
Site Code: TMC-09  
Start Date: 07/16/2014  
Page No: 3



Turning Movement Data Plot



Robert Peccia & Associates  
825 Custer Ave

Helena, Montana, United States 59604  
406-447-5000 [scottr@rpa-hln.com](mailto:scottr@rpa-hln.com)

Count Name: 09-CentralAve\_I15NB TMC  
Site Code: TMC-09  
Start Date: 07/16/2014  
Page No: 4

## Turning Movement Peak Hour Data (7:30 AM)

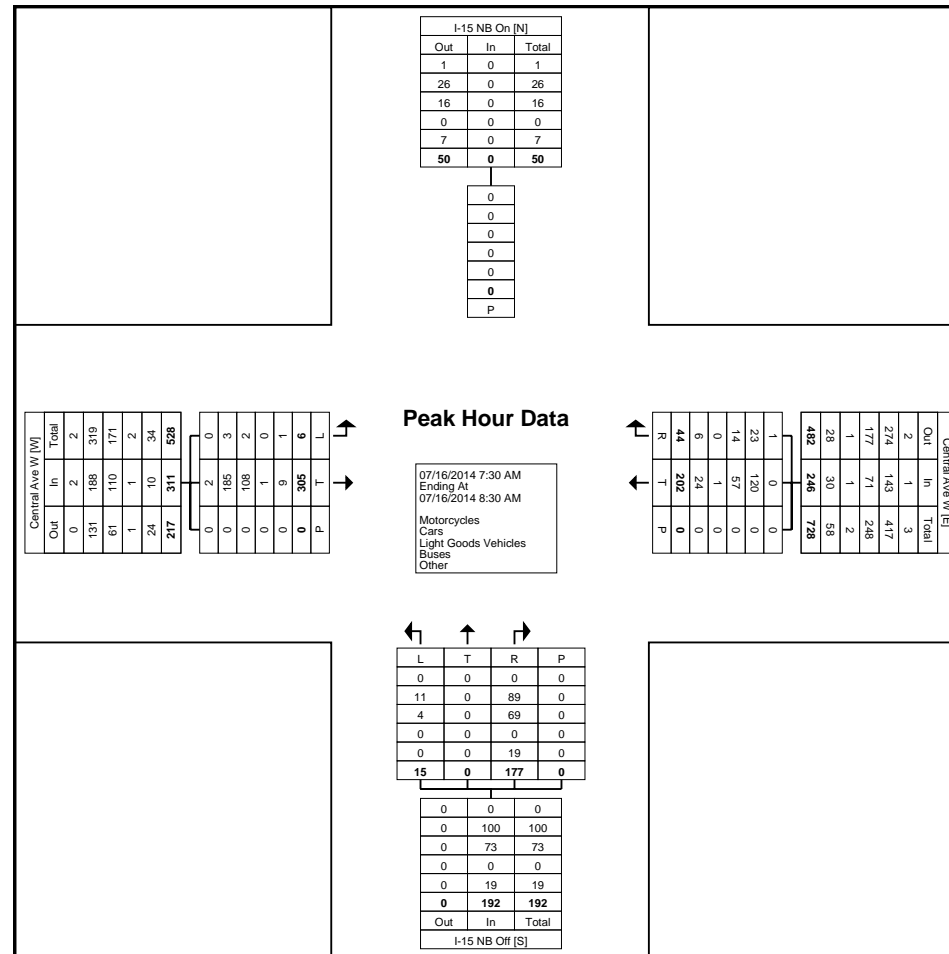
[illegible]



Robert Peccia & Associates  
825 Custer Ave

Helena, Montana, United States 59604  
406-447-5000 scott@rpa-hln.com

Count Name: 09-CentralAve\_I15NB TMC  
Site Code: TMC-09  
Start Date: 07/16/2014  
Page No: 5



Turning Movement Peak Hour Data Plot (7:30 AM)



Robert Peccia & Associates  
825 Custer Ave

Helena, Montana, United States 59604  
406-447-5000 [scottr@rpa-hln.com](mailto:scottr@rpa-hln.com)

Count Name: 09-CentralAve\_I15NB TMC  
Site Code: TMC-09  
Start Date: 07/16/2014  
Page No: 6

## Turning Movement Peak Hour Data (4:30 PM)

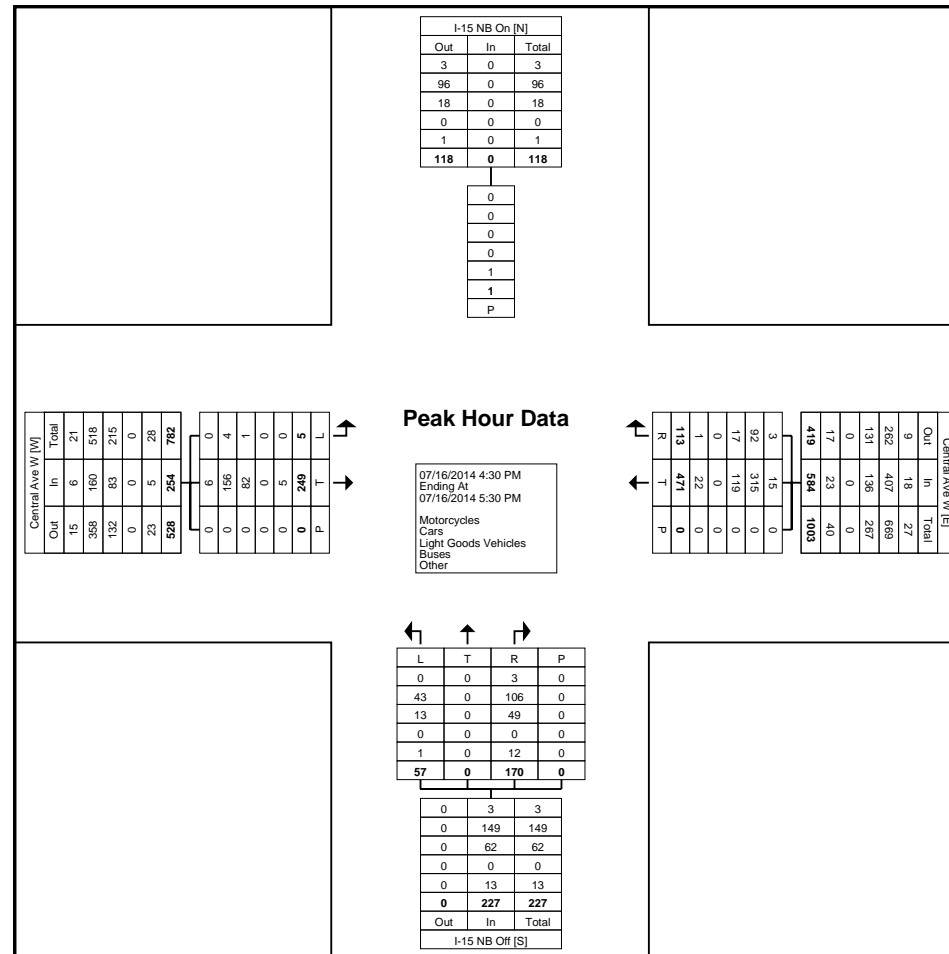
[illegible]



Robert Peccia & Associates  
825 Custer Ave

Helena, Montana, United States 59604  
406-447-5000 scott@rpa-hln.com

Count Name: 09-CentralAve\_I15NB TMC  
Site Code: TMC-09  
Start Date: 07/16/2014  
Page No: 7



Turning Movement Peak Hour Data Plot (4:30 PM)



Robert Peccia & Associates  
825 Custer Ave

Helena, Montana, United States 59604  
406-447-5000 [scottr@rpa-hln.com](mailto:scottr@rpa-hln.com)

Count Name: 09-CentralAve\_I15NB TMC  
Site Code: TMC-09  
Start Date: 07/16/2014  
Page No: 8



Robert Peccia & Associates  
825 Custer Ave

Helena, Montana, United States 59604  
406-447-5000 scottr@rpa-hln.com

Count Name: 10-CentralAve\_VaughnRd TMC  
Site Code: TMC-10  
Start Date: 07/16/2014  
Page No: 1

## Turning Movement Data

| Start Time             | Vaughn Rd<br>Southbound |      |      |            | Central Ave W<br>Westbound |      |      |            | Central Ave W<br>Eastbound |      |      |            | Int. Total |
|------------------------|-------------------------|------|------|------------|----------------------------|------|------|------------|----------------------------|------|------|------------|------------|
|                        | Right                   | Left | Peds | App. Total | Right                      | Thru | Peds | App. Total | Thru                       | Left | Peds | App. Total |            |
| 7:00 AM                | 10                      | 17   | 0    | 27         | 9                          | 39   | 0    | 48         | 73                         | 13   | 0    | 86         | 161        |
| 7:15 AM                | 13                      | 13   | 0    | 26         | 10                         | 33   | 0    | 43         | 95                         | 12   | 0    | 107        | 176        |
| 7:30 AM                | 14                      | 19   | 0    | 33         | 17                         | 35   | 0    | 52         | 128                        | 20   | 0    | 148        | 233        |
| 7:45 AM                | 16                      | 25   | 0    | 41         | 21                         | 54   | 0    | 75         | 110                        | 21   | 0    | 131        | 247        |
| Hourly Total           | 53                      | 74   | 0    | 127        | 57                         | 161  | 0    | 218        | 406                        | 66   | 0    | 472        | 817        |
| 8:00 AM                | 19                      | 21   | 0    | 40         | 14                         | 44   | 0    | 58         | 85                         | 12   | 0    | 97         | 195        |
| 8:15 AM                | 11                      | 12   | 0    | 23         | 13                         | 51   | 0    | 64         | 87                         | 18   | 0    | 105        | 192        |
| 8:30 AM                | 15                      | 8    | 0    | 23         | 16                         | 43   | 0    | 59         | 71                         | 12   | 0    | 83         | 165        |
| 8:45 AM                | 10                      | 13   | 0    | 23         | 18                         | 41   | 0    | 59         | 70                         | 15   | 0    | 85         | 167        |
| Hourly Total           | 55                      | 54   | 0    | 109        | 61                         | 179  | 0    | 240        | 313                        | 57   | 0    | 370        | 719        |
| *** BREAK ***          | -                       | -    | -    | -          | -                          | -    | -    | -          | -                          | -    | -    | -          | -          |
| 4:00 PM                | 27                      | 19   | 0    | 46         | 19                         | 90   | 0    | 109        | 99                         | 30   | 0    | 129        | 284        |
| 4:15 PM                | 24                      | 18   | 0    | 42         | 25                         | 96   | 0    | 121        | 77                         | 15   | 0    | 92         | 255        |
| 4:30 PM                | 32                      | 26   | 0    | 58         | 12                         | 104  | 0    | 116        | 111                        | 17   | 0    | 128        | 302        |
| 4:45 PM                | 30                      | 13   | 1    | 43         | 17                         | 106  | 0    | 123        | 74                         | 22   | 0    | 96         | 262        |
| Hourly Total           | 113                     | 76   | 1    | 189        | 73                         | 396  | 0    | 469        | 361                        | 84   | 0    | 445        | 1103       |
| 5:00 PM                | 31                      | 18   | 0    | 49         | 26                         | 119  | 0    | 145        | 71                         | 16   | 0    | 87         | 281        |
| 5:15 PM                | 28                      | 11   | 0    | 39         | 21                         | 133  | 0    | 154        | 95                         | 11   | 0    | 106        | 299        |
| 5:30 PM                | 34                      | 20   | 1    | 54         | 18                         | 116  | 0    | 134        | 87                         | 19   | 0    | 106        | 294        |
| 5:45 PM                | 33                      | 11   | 0    | 44         | 15                         | 101  | 0    | 116        | 62                         | 14   | 0    | 76         | 236        |
| Hourly Total           | 126                     | 60   | 1    | 186        | 80                         | 469  | 0    | 549        | 315                        | 60   | 0    | 375        | 1110       |
| Grand Total            | 347                     | 264  | 2    | 611        | 271                        | 1205 | 0    | 1476       | 1395                       | 267  | 0    | 1662       | 3749       |
| Approach %             | 56.8                    | 43.2 | -    | -          | 18.4                       | 81.6 | -    | -          | 83.9                       | 16.1 | -    | -          | -          |
| Total %                | 9.3                     | 7.0  | -    | 16.3       | 7.2                        | 32.1 | -    | 39.4       | 37.2                       | 7.1  | -    | 44.3       | -          |
| Motorcycles            | 2                       | 2    | -    | 4          | 2                          | 24   | -    | 26         | 22                         | 2    | -    | 24         | 54         |
| % Motorcycles          | 0.6                     | 0.8  | -    | 0.7        | 0.7                        | 2.0  | -    | 1.8        | 1.6                        | 0.7  | -    | 1.4        | 1.4        |
| Cars                   | 190                     | 179  | -    | 369        | 169                        | 765  | -    | 934        | 890                        | 146  | -    | 1036       | 2339       |
| % Cars                 | 54.8                    | 67.8 | -    | 60.4       | 62.4                       | 63.5 | -    | 63.3       | 63.8                       | 54.7 | -    | 62.3       | 62.4       |
| Light Goods Vehicles   | 139                     | 70   | -    | 209        | 82                         | 338  | -    | 420        | 402                        | 99   | -    | 501        | 1130       |
| % Light Goods Vehicles | 40.1                    | 26.5 | -    | 34.2       | 30.3                       | 28.0 | -    | 28.5       | 28.8                       | 37.1 | -    | 30.1       | 30.1       |
| Buses                  | 0                       | 1    | -    | 1          | 2                          | 3    | -    | 5          | 2                          | 0    | -    | 2          | 8          |
| % Buses                | 0.0                     | 0.4  | -    | 0.2        | 0.7                        | 0.2  | -    | 0.3        | 0.1                        | 0.0  | -    | 0.1        | 0.2        |
| Single-Unit Trucks     | 10                      | 11   | -    | 21         | 10                         | 26   | -    | 36         | 40                         | 10   | -    | 50         | 107        |
| % Single-Unit Trucks   | 2.9                     | 4.2  | -    | 3.4        | 3.7                        | 2.2  | -    | 2.4        | 2.9                        | 3.7  | -    | 3.0        | 2.9        |
| Articulated Trucks     | 6                       | 1    | -    | 7          | 6                          | 48   | -    | 54         | 37                         | 10   | -    | 47         | 108        |
| % Articulated Trucks   | 1.7                     | 0.4  | -    | 1.1        | 2.2                        | 4.0  | -    | 3.7        | 2.7                        | 3.7  | -    | 2.8        | 2.9        |
| Bicycles on Road       | 0                       | 0    | -    | 0          | 0                          | 1    | -    | 1          | 2                          | 0    | -    | 2          | 3          |
| % Bicycles on Road     | 0.0                     | 0.0  | -    | 0.0        | 0.0                        | 0.1  | -    | 0.1        | 0.1                        | 0.0  | -    | 0.1        | 0.1        |



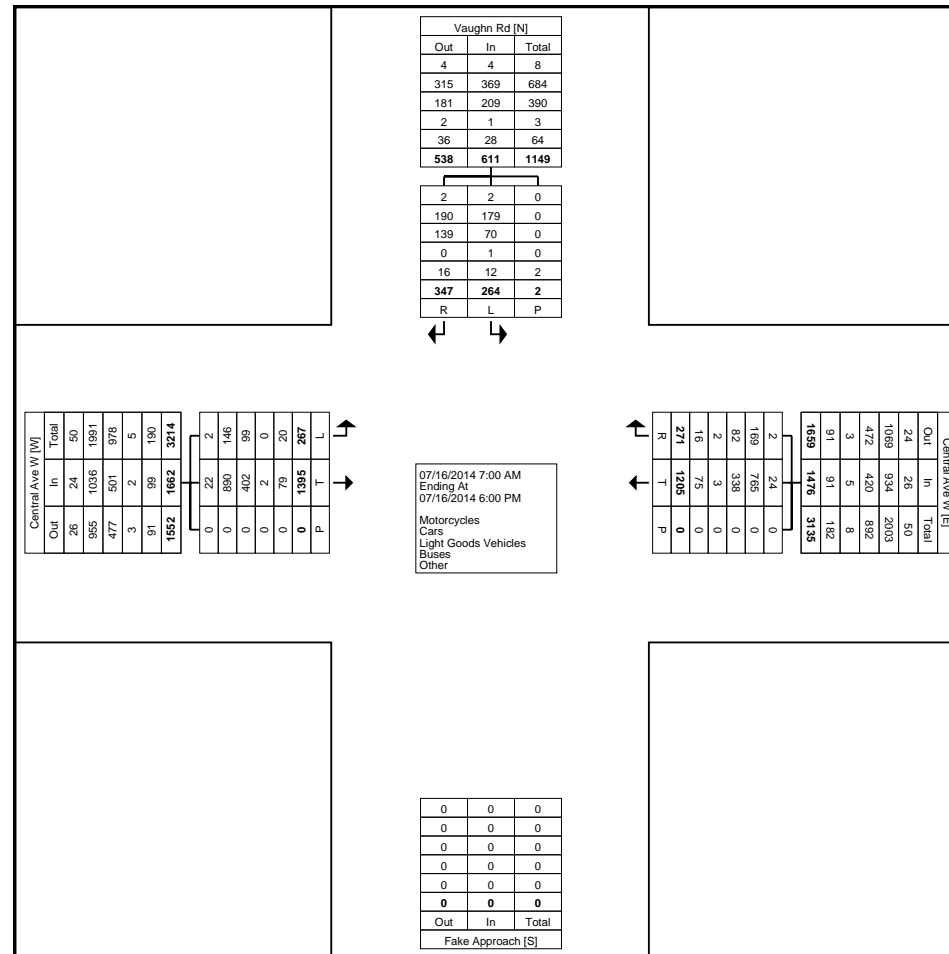
[illegible]



Robert Peccia & Associates  
825 Custer Ave

Helena, Montana, United States 59604  
406-447-5000 scottr@rpa-hln.com

Count Name: 10-CentralAve\_VaughnRd TMC  
Site Code: TMC-10  
Start Date: 07/16/2014  
Page No: 3



Turning Movement Data Plot



Robert Peccia & Associates  
825 Custer Ave

Helena, Montana, United States 59604  
406-447-5000 [scottr@rpa-hln.com](mailto:scottr@rpa-hln.com)

Count Name: 10-CentralAve\_VaughnRd TMC  
Site Code: TMC-10  
Start Date: 07/16/2014  
Page No: 4

## Turning Movement Peak Hour Data (7:30 AM)

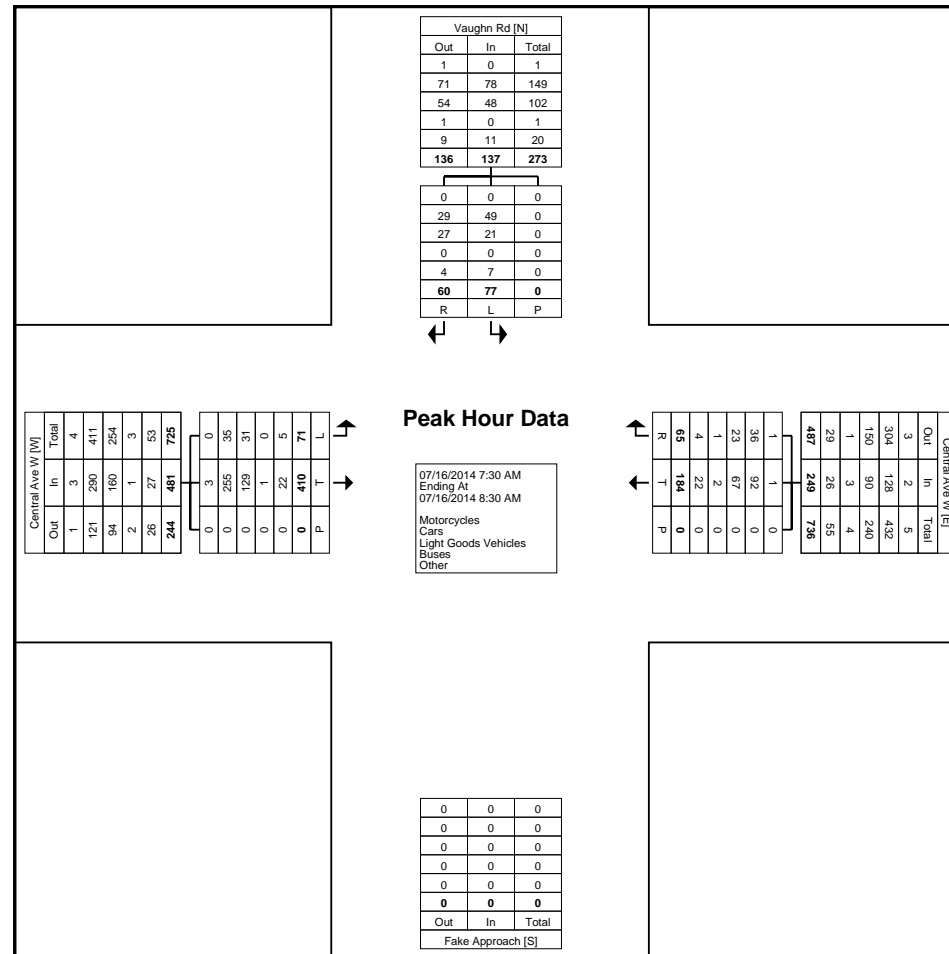
[illegible]



Robert Peccia & Associates  
825 Custer Ave

Helena, Montana, United States 59604  
406-447-5000 scott@rpa-hln.com

Count Name: 10-CentralAve\_VaughnRd TMC  
Site Code: TMC-10  
Start Date: 07/16/2014  
Page No: 5



Turning Movement Peak Hour Data Plot (7:30 AM)



Robert Peccia & Associates  
825 Custer Ave

Helena, Montana, United States 59604  
406-447-5000 [scottr@rpa-hln.com](mailto:scottr@rpa-hln.com)

Count Name: 10-CentralAve\_VaughnRd TMC  
Site Code: TMC-10  
Start Date: 07/16/2014  
Page No: 6

## Turning Movement Peak Hour Data (4:30 PM)

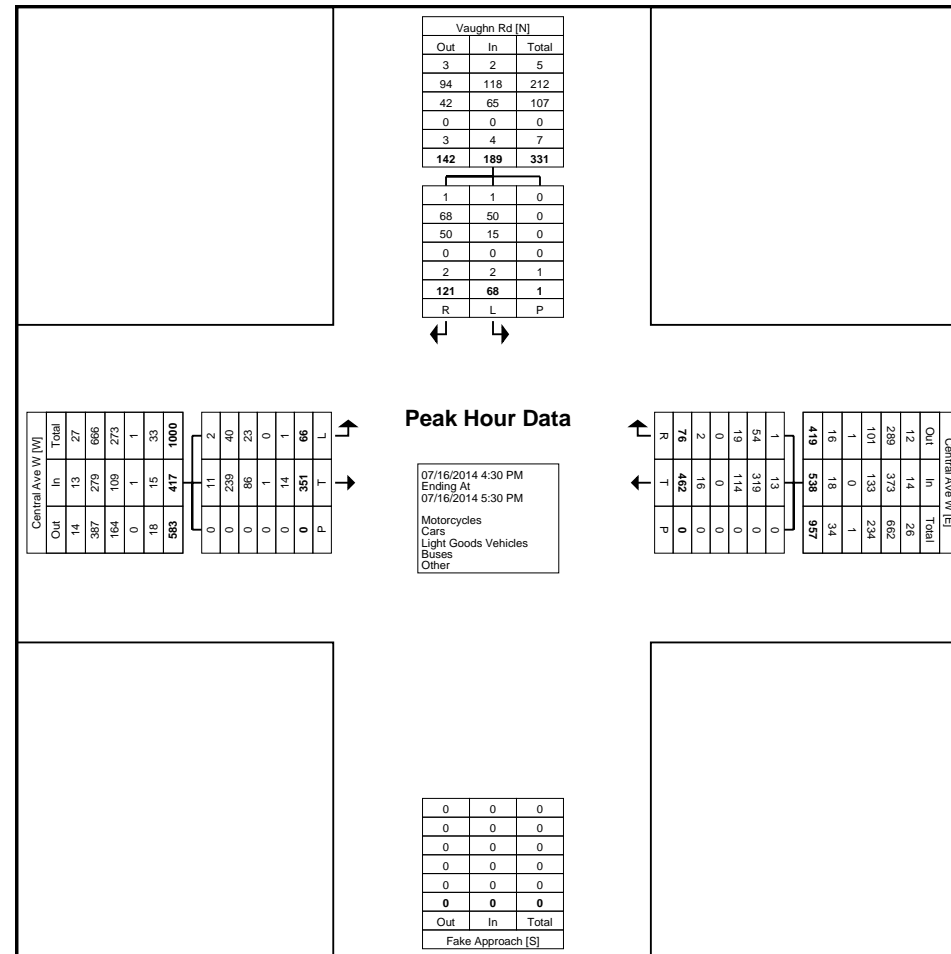
[illegible]



Robert Peccia & Associates  
825 Custer Ave

Helena, Montana, United States 59604  
406-447-5000 scott@rpa-hln.com

Count Name: 10-CentralAve\_VaughnRd TMC  
Site Code: TMC-10  
Start Date: 07/16/2014  
Page No: 7



Turning Movement Peak Hour Data Plot (4:30 PM)



Robert Peccia & Associates  
825 Custer Ave

Helena, Montana, United States 59604  
406-447-5000 scottr@rpa-hln.com

Count Name: 10-CentralAve\_VaughnRd TMC  
Site Code: TMC-10  
Start Date: 07/16/2014  
Page No: 8



Robert Peccia & Associates  
825 Custer Ave

Helena, Montana, United States 59604  
406-447-5000 scottr@rpa-hln.com

Count Name: 11-VaughnRd\_I15SB TMC  
Site Code: TMC-11  
Start Date: 07/16/2014  
Page No: 1

## Turning Movement Data

| Start Time             | I-15 SB Off<br>Southbound |      |      |            | Vaughn Rd<br>Westbound |      |      |            | Frontage Rd<br>Eastbound |       |      |            | Int. Total |
|------------------------|---------------------------|------|------|------------|------------------------|------|------|------------|--------------------------|-------|------|------------|------------|
|                        | Right                     | Left | Peds | App. Total | Thru                   | Left | Peds | App. Total | Thru                     | Left  | Peds | App. Total |            |
| 7:00 AM                | 0                         | 50   | 0    | 50         | 1                      | 0    | 0    | 1          | 8                        | 0     | 0    | 8          | 59         |
| 7:15 AM                | 0                         | 50   | 0    | 50         | 4                      | 0    | 0    | 4          | 6                        | 0     | 0    | 6          | 60         |
| 7:30 AM                | 0                         | 62   | 0    | 62         | 3                      | 1    | 0    | 4          | 5                        | 0     | 0    | 5          | 71         |
| 7:45 AM                | 1                         | 57   | 0    | 58         | 4                      | 0    | 0    | 4          | 8                        | 0     | 0    | 8          | 70         |
| Hourly Total           | 1                         | 219  | 0    | 220        | 12                     | 1    | 0    | 13         | 27                       | 0     | 0    | 27         | 260        |
| 8:00 AM                | 0                         | 37   | 0    | 37         | 7                      | 0    | 0    | 7          | 7                        | 0     | 0    | 7          | 51         |
| 8:15 AM                | 0                         | 38   | 0    | 38         | 8                      | 0    | 0    | 8          | 6                        | 0     | 0    | 6          | 52         |
| 8:30 AM                | 0                         | 37   | 0    | 37         | 13                     | 0    | 0    | 13         | 7                        | 0     | 0    | 7          | 57         |
| 8:45 AM                | 1                         | 35   | 0    | 36         | 4                      | 0    | 0    | 4          | 9                        | 0     | 0    | 9          | 49         |
| Hourly Total           | 1                         | 147  | 0    | 148        | 32                     | 0    | 0    | 32         | 29                       | 0     | 0    | 29         | 209        |
| *** BREAK ***          | -                         | -    | -    | -          | -                      | -    | -    | -          | -                        | -     | -    | -          | -          |
| 4:00 PM                | 0                         | 32   | 0    | 32         | 9                      | 1    | 0    | 10         | 12                       | 0     | 0    | 12         | 54         |
| 4:15 PM                | 0                         | 38   | 0    | 38         | 14                     | 0    | 0    | 14         | 12                       | 0     | 0    | 12         | 64         |
| 4:30 PM                | 0                         | 35   | 0    | 35         | 13                     | 0    | 0    | 13         | 12                       | 0     | 0    | 12         | 60         |
| 4:45 PM                | 1                         | 38   | 0    | 39         | 14                     | 0    | 0    | 14         | 17                       | 0     | 0    | 17         | 70         |
| Hourly Total           | 1                         | 143  | 0    | 144        | 50                     | 1    | 0    | 51         | 53                       | 0     | 0    | 53         | 248        |
| 5:00 PM                | 0                         | 23   | 0    | 23         | 14                     | 0    | 0    | 14         | 8                        | 1     | 0    | 9          | 46         |
| 5:15 PM                | 0                         | 29   | 0    | 29         | 16                     | 0    | 0    | 16         | 7                        | 0     | 0    | 7          | 52         |
| 5:30 PM                | 0                         | 35   | 0    | 35         | 11                     | 0    | 0    | 11         | 6                        | 0     | 0    | 6          | 52         |
| 5:45 PM                | 0                         | 33   | 0    | 33         | 12                     | 0    | 0    | 12         | 12                       | 0     | 0    | 12         | 57         |
| Hourly Total           | 0                         | 120  | 0    | 120        | 53                     | 0    | 0    | 53         | 33                       | 1     | 0    | 34         | 207        |
| Grand Total            | 3                         | 629  | 0    | 632        | 147                    | 2    | 0    | 149        | 142                      | 1     | 0    | 143        | 924        |
| Approach %             | 0.5                       | 99.5 | -    | -          | 98.7                   | 1.3  | -    | -          | 99.3                     | 0.7   | -    | -          | -          |
| Total %                | 0.3                       | 68.1 | -    | 68.4       | 15.9                   | 0.2  | -    | 16.1       | 15.4                     | 0.1   | -    | 15.5       | -          |
| Motorcycles            | 0                         | 4    | -    | 4          | 3                      | 0    | -    | 3          | 1                        | 0     | -    | 1          | 8          |
| % Motorcycles          | 0.0                       | 0.6  | -    | 0.6        | 2.0                    | 0.0  | -    | 2.0        | 0.7                      | 0.0   | -    | 0.7        | 0.9        |
| Cars                   | 2                         | 324  | -    | 326        | 70                     | 1    | -    | 71         | 65                       | 0     | -    | 65         | 462        |
| % Cars                 | 66.7                      | 51.5 | -    | 51.6       | 47.6                   | 50.0 | -    | 47.7       | 45.8                     | 0.0   | -    | 45.5       | 50.0       |
| Light Goods Vehicles   | 1                         | 257  | -    | 258        | 66                     | 1    | -    | 67         | 65                       | 1     | -    | 66         | 391        |
| % Light Goods Vehicles | 33.3                      | 40.9 | -    | 40.8       | 44.9                   | 50.0 | -    | 45.0       | 45.8                     | 100.0 | -    | 46.2       | 42.3       |
| Buses                  | 0                         | 1    | -    | 1          | 0                      | 0    | -    | 0          | 0                        | 0     | -    | 0          | 1          |
| % Buses                | 0.0                       | 0.2  | -    | 0.2        | 0.0                    | 0.0  | -    | 0.0        | 0.0                      | 0.0   | -    | 0.0        | 0.1        |
| Single-Unit Trucks     | 0                         | 27   | -    | 27         | 6                      | 0    | -    | 6          | 7                        | 0     | -    | 7          | 40         |
| % Single-Unit Trucks   | 0.0                       | 4.3  | -    | 4.3        | 4.1                    | 0.0  | -    | 4.0        | 4.9                      | 0.0   | -    | 4.9        | 4.3        |
| Articulated Trucks     | 0                         | 16   | -    | 16         | 2                      | 0    | -    | 2          | 4                        | 0     | -    | 4          | 22         |
| % Articulated Trucks   | 0.0                       | 2.5  | -    | 2.5        | 1.4                    | 0.0  | -    | 1.3        | 2.8                      | 0.0   | -    | 2.8        | 2.4        |
| Bicycles on Road       | 0                         | 0    | -    | 0          | 0                      | 0    | -    | 0          | 0                        | 0     | -    | 0          | 0          |
| % Bicycles on Road     | 0.0                       | 0.0  | -    | 0.0        | 0.0                    | 0.0  | -    | 0.0        | 0.0                      | 0.0   | -    | 0.0        | 0.0        |



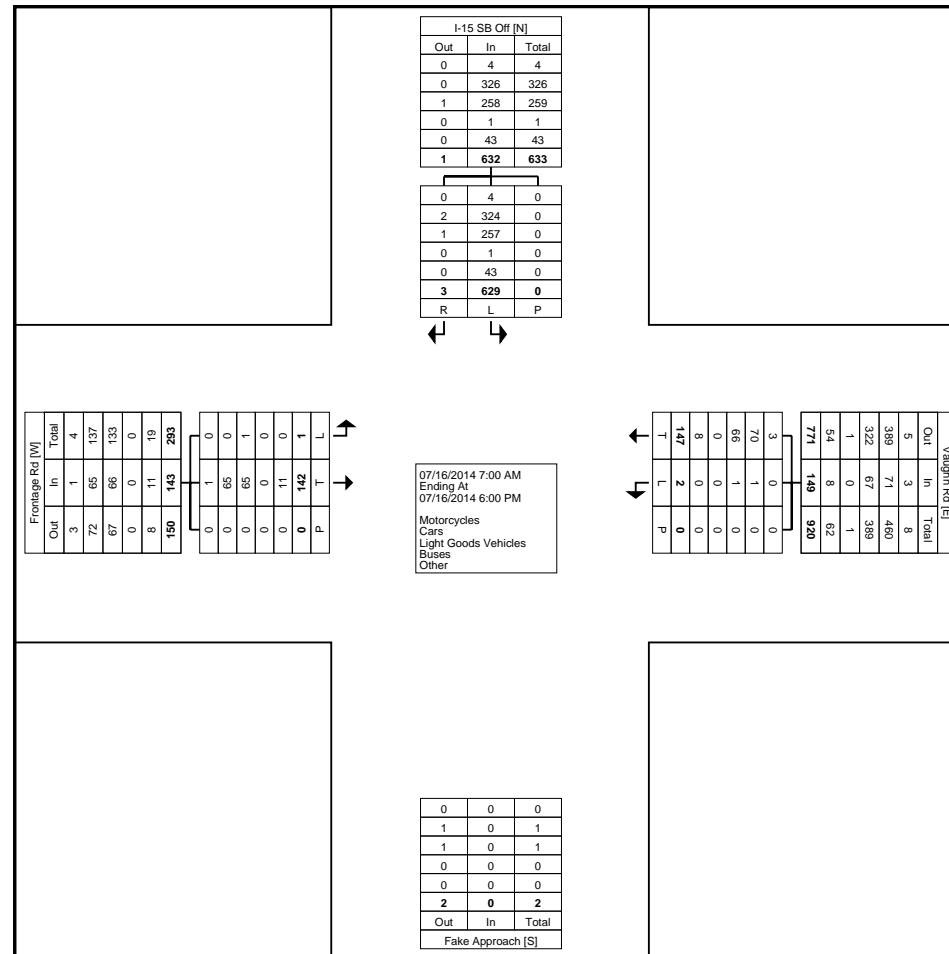
[illegible]



Robert Peccia & Associates  
825 Custer Ave

Helena, Montana, United States 59604  
406-447-5000 scottr@rpa-hln.com

Count Name: 11-VaughnRd\_I15SB TMC  
Site Code: TMC-11  
Start Date: 07/16/2014  
Page No: 3



Turning Movement Data Plot



Robert Peccia & Associates  
825 Custer Ave

Helena, Montana, United States 59604  
406-447-5000 [scottr@rpa-hln.com](mailto:scottr@rpa-hln.com)

Count Name: 11-VaughnRd\_I15SB TMC  
Site Code: TMC-11  
Start Date: 07/16/2014  
Page No: 4

## Turning Movement Peak Hour Data (7:00 AM)

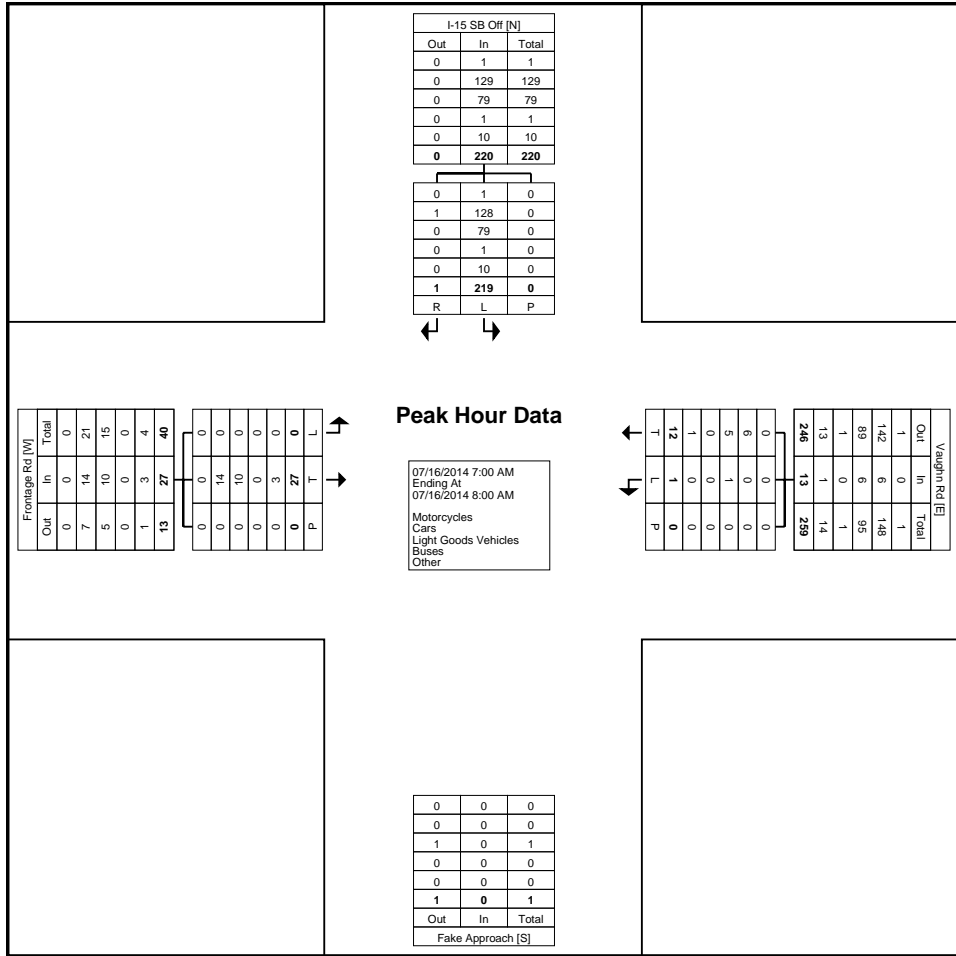
[illegible]



Robert Peccia & Associates  
825 Custer Ave

Helena, Montana, United States 59604  
406-447-5000 scottr@rpa-hln.com

Count Name: 11-VaughnRd\_I15SB TMC  
Site Code: TMC-11  
Start Date: 07/16/2014  
Page No: 5



### Turning Movement Peak Hour Data Plot (7:00 AM)



Robert Peccia & Associates  
825 Custer Ave

Helena, Montana, United States 59604  
406-447-5000 scottr@rpa-hln.com

Count Name: 11-VaughnRd\_I15SB TMC  
Site Code: TMC-11  
Start Date: 07/16/2014  
Page No: 6

## Turning Movement Peak Hour Data (4:00 PM)

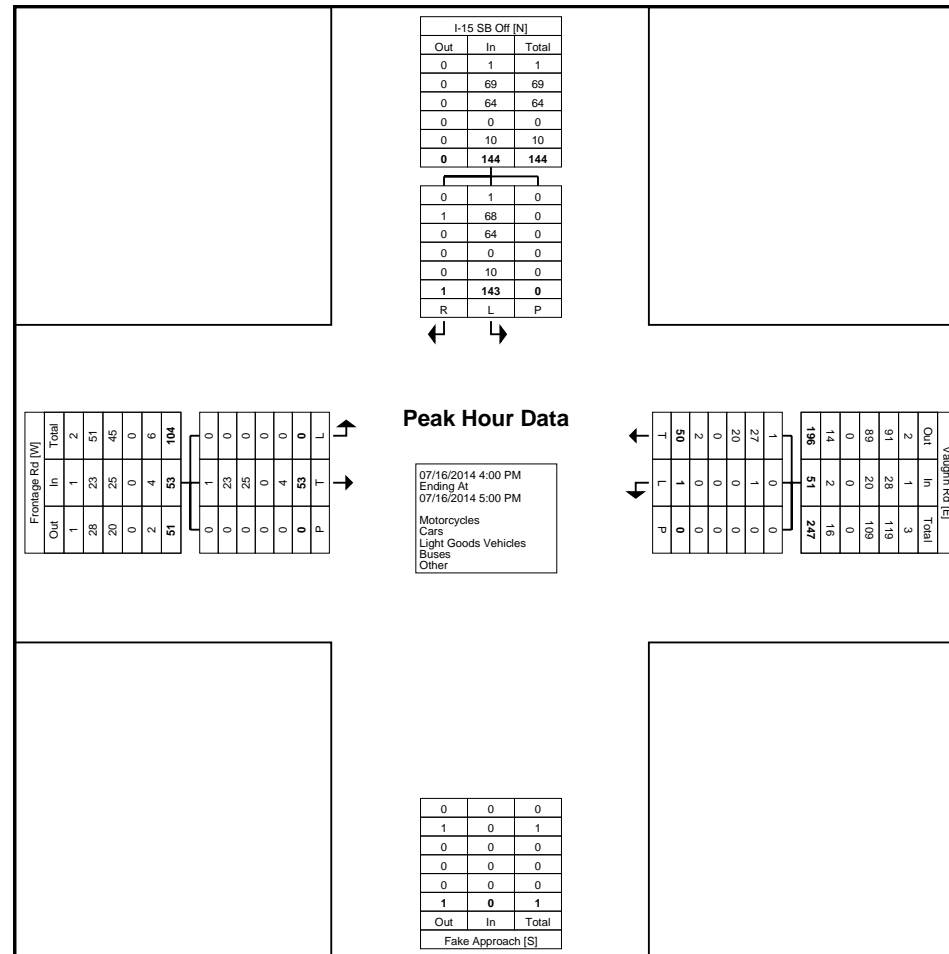
[illegible]



Robert Peccia & Associates  
825 Custer Ave

Helena, Montana, United States 59604  
406-447-5000 scott@rpa-hln.com

Count Name: 11-VaughnRd\_I15SB TMC  
Site Code: TMC-11  
Start Date: 07/16/2014  
Page No: 7



Turning Movement Peak Hour Data Plot (4:00 PM)



Robert Peccia & Associates  
825 Custer Ave

Helena, Montana, United States 59604  
406-447-5000 scottr@rpa-hln.com

Count Name: 11-VaughnRd\_I15SB TMC  
Site Code: TMC-11  
Start Date: 07/16/2014  
Page No: 8



Robert Peccia & Associates  
825 Custer Ave

Helena, Montana, United States 59604  
406-447-5000 scottr@rpa-hln.com

Count Name: 12-VaughnRd\_I15NB TMC  
Site Code: TMC-12  
Start Date: 07/16/2014  
Page No: 1

## Turning Movement Data

| Start Time             | I-15 NB On<br>Southbound |            | Vaughn Rd<br>Westbound |      |      |            | Vaughn Rd<br>Eastbound |       |      |            | Int. Total |
|------------------------|--------------------------|------------|------------------------|------|------|------------|------------------------|-------|------|------------|------------|
|                        | Peds                     | App. Total | Right                  | Thru | Peds | App. Total | Thru                   | Left  | Peds | App. Total |            |
| 7:00 AM                | 1                        | 0          | 16                     | 1    | 0    | 17         | 53                     | 0     | 0    | 53         | 70         |
| 7:15 AM                | 0                        | 0          | 23                     | 4    | 0    | 27         | 58                     | 0     | 0    | 58         | 85         |
| 7:30 AM                | 0                        | 0          | 14                     | 4    | 0    | 18         | 67                     | 0     | 0    | 67         | 85         |
| 7:45 AM                | 0                        | 0          | 18                     | 3    | 0    | 21         | 69                     | 0     | 0    | 69         | 90         |
| Hourly Total           | 1                        | 0          | 71                     | 12   | 0    | 83         | 247                    | 0     | 0    | 247        | 330        |
| 8:00 AM                | 0                        | 0          | 21                     | 8    | 0    | 29         | 43                     | 0     | 0    | 43         | 72         |
| 8:15 AM                | 0                        | 0          | 19                     | 8    | 0    | 27         | 43                     | 0     | 0    | 43         | 70         |
| 8:30 AM                | 0                        | 0          | 23                     | 12   | 0    | 35         | 40                     | 1     | 0    | 41         | 76         |
| 8:45 AM                | 0                        | 0          | 31                     | 5    | 0    | 36         | 47                     | 0     | 0    | 47         | 83         |
| Hourly Total           | 0                        | 0          | 94                     | 33   | 0    | 127        | 173                    | 1     | 0    | 174        | 301        |
| *** BREAK ***          | -                        | -          | -                      | -    | -    | -          | -                      | -     | -    | -          | -          |
| 4:00 PM                | 0                        | 0          | 61                     | 10   | 0    | 71         | 47                     | 0     | 0    | 47         | 118        |
| 4:15 PM                | 0                        | 0          | 51                     | 14   | 0    | 65         | 47                     | 0     | 0    | 47         | 112        |
| 4:30 PM                | 0                        | 0          | 72                     | 14   | 0    | 86         | 48                     | 0     | 0    | 48         | 134        |
| 4:45 PM                | 0                        | 0          | 73                     | 14   | 0    | 87         | 55                     | 0     | 0    | 55         | 142        |
| Hourly Total           | 0                        | 0          | 257                    | 52   | 0    | 309        | 197                    | 0     | 0    | 197        | 506        |
| 5:00 PM                | 0                        | 0          | 84                     | 13   | 0    | 97         | 35                     | 0     | 0    | 35         | 132        |
| 5:15 PM                | 0                        | 0          | 91                     | 17   | 0    | 108        | 34                     | 0     | 0    | 34         | 142        |
| 5:30 PM                | 0                        | 0          | 86                     | 11   | 0    | 97         | 41                     | 0     | 0    | 41         | 138        |
| 5:45 PM                | 0                        | 0          | 81                     | 11   | 0    | 92         | 41                     | 0     | 0    | 41         | 133        |
| Hourly Total           | 0                        | 0          | 342                    | 52   | 0    | 394        | 151                    | 0     | 0    | 151        | 545        |
| Grand Total            | 1                        | 0          | 764                    | 149  | 0    | 913        | 768                    | 1     | 0    | 769        | 1682       |
| Approach %             | -                        | -          | 83.7                   | 16.3 | -    | -          | 99.9                   | 0.1   | -    | -          | -          |
| Total %                | -                        | 0.0        | 45.4                   | 8.9  | -    | 54.3       | 45.7                   | 0.1   | -    | 45.7       | -          |
| Motorcycles            | -                        | 0          | 5                      | 2    | -    | 7          | 4                      | 0     | -    | 4          | 11         |
| % Motorcycles          | -                        | -          | 0.7                    | 1.3  | -    | 0.8        | 0.5                    | 0.0   | -    | 0.5        | 0.7        |
| Cars                   | -                        | 0          | 473                    | 72   | -    | 545        | 428                    | 0     | -    | 428        | 973        |
| % Cars                 | -                        | -          | 61.9                   | 48.3 | -    | 59.7       | 55.7                   | 0.0   | -    | 55.7       | 57.8       |
| Light Goods Vehicles   | -                        | 0          | 237                    | 68   | -    | 305        | 282                    | 0     | -    | 282        | 587        |
| % Light Goods Vehicles | -                        | -          | 31.0                   | 45.6 | -    | 33.4       | 36.7                   | 0.0   | -    | 36.7       | 34.9       |
| Buses                  | -                        | 0          | 2                      | 0    | -    | 2          | 3                      | 0     | -    | 3          | 5          |
| % Buses                | -                        | -          | 0.3                    | 0.0  | -    | 0.2        | 0.4                    | 0.0   | -    | 0.4        | 0.3        |
| Single-Unit Trucks     | -                        | 0          | 17                     | 5    | -    | 22         | 31                     | 1     | -    | 32         | 54         |
| % Single-Unit Trucks   | -                        | -          | 2.2                    | 3.4  | -    | 2.4        | 4.0                    | 100.0 | -    | 4.2        | 3.2        |
| Articulated Trucks     | -                        | 0          | 30                     | 2    | -    | 32         | 20                     | 0     | -    | 20         | 52         |
| % Articulated Trucks   | -                        | -          | 3.9                    | 1.3  | -    | 3.5        | 2.6                    | 0.0   | -    | 2.6        | 3.1        |
| Bicycles on Road       | -                        | 0          | 0                      | 0    | -    | 0          | 0                      | 0     | -    | 0          | 0          |
| % Bicycles on Road     | -                        | -          | 0.0                    | 0.0  | -    | 0.0        | 0.0                    | 0.0   | -    | 0.0        | 0.0        |



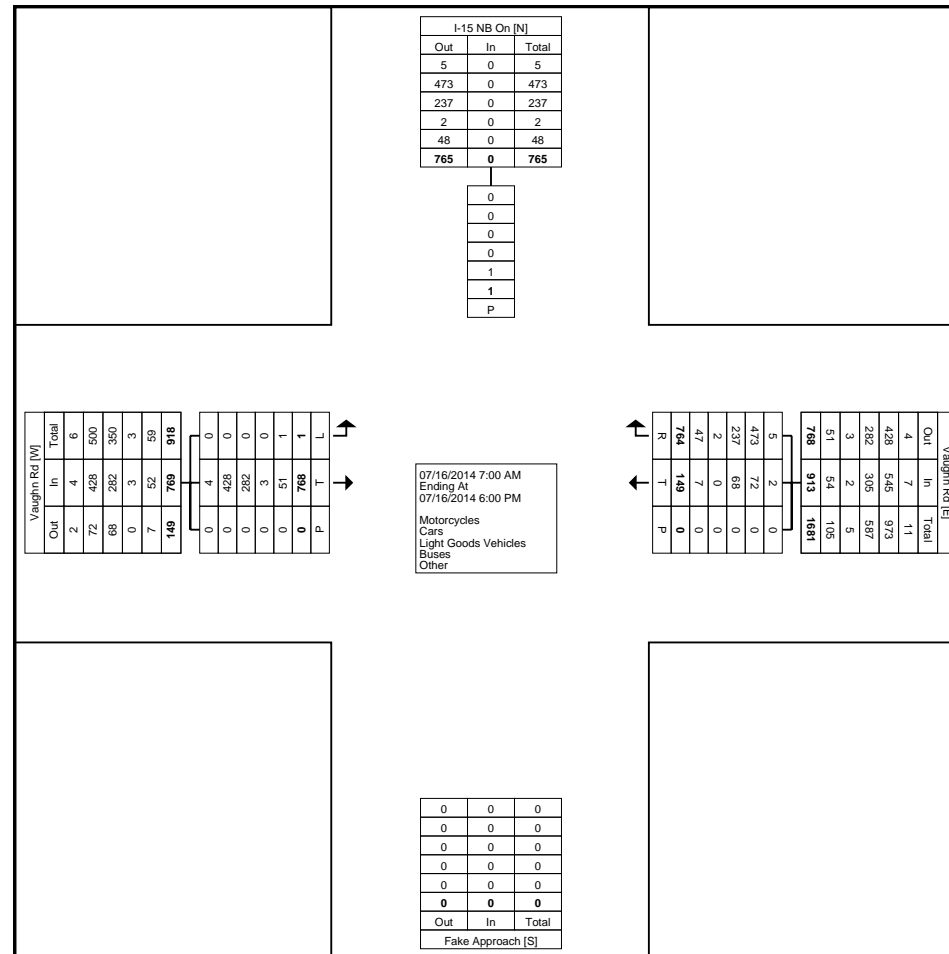




Robert Peccia & Associates  
825 Custer Ave

Helena, Montana, United States 59604  
406-447-5000 scottr@rpa-hln.com

Count Name: 12-VaughnRd\_I15NB TMC  
Site Code: TMC-12  
Start Date: 07/16/2014  
Page No: 3



Turning Movement Data Plot



Robert Peccia & Associates  
825 Custer Ave

Helena, Montana, United States 59604  
406-447-5000 scottr@rpa-hln.com

Count Name: 12-VaughnRd\_I15NB TMC  
Site Code: TMC-12  
Start Date: 07/16/2014  
Page No: 4

### Turning Movement Peak Hour Data (7:15 AM)

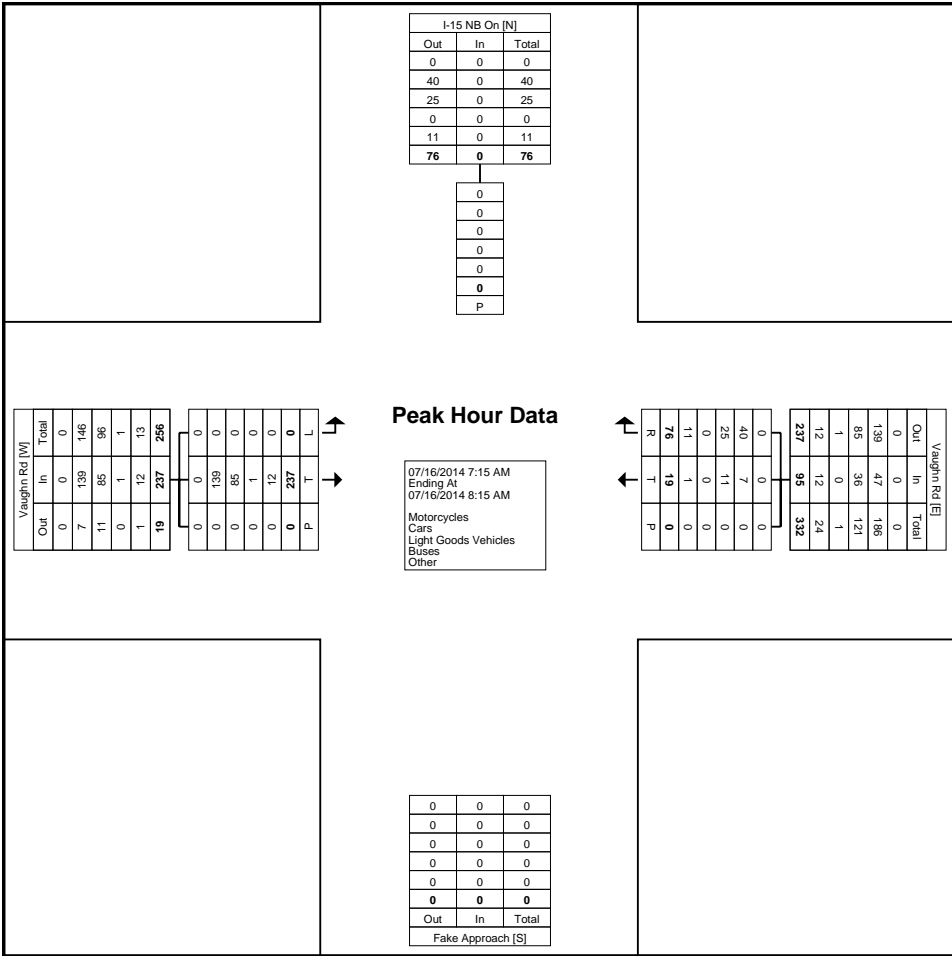
[illegible]



Robert Peccia & Associates  
825 Custer Ave

Helena, Montana, United States 59604  
406-447-5000 [scottr@rpa-hln.com](mailto:scottr@rpa-hln.com)

Count Name: 12-VaughnRd\_I15NB TMC  
Site Code: TMC-12  
Start Date: 07/16/2014  
Page No: 5



### Turning Movement Peak Hour Data Plot (7:15 AM)



Robert Peccia & Associates  
825 Custer Ave

Helena, Montana, United States 59604  
406-447-5000 [scottr@rpa-hln.com](mailto:scottr@rpa-hln.com)

Count Name: 12-VaughnRd\_I15NB TMC  
Site Code: TMC-12  
Start Date: 07/16/2014  
Page No: 6

### Turning Movement Peak Hour Data (4:45 PM)

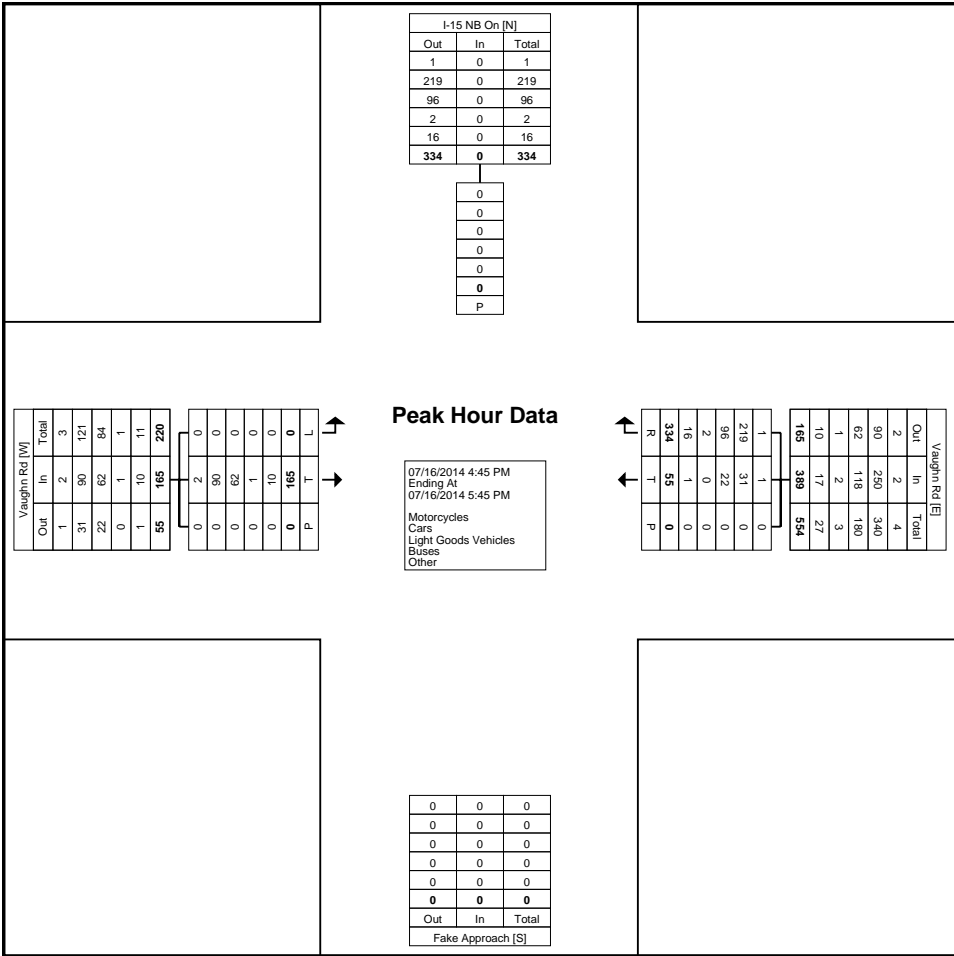
[illegible]



Robert Peccia & Associates  
825 Custer Ave

Helena, Montana, United States 59604  
406-447-5000 scottr@rpa-hln.com

Count Name: 12-VaughnRd\_I15NB TMC  
Site Code: TMC-12  
Start Date: 07/16/2014  
Page No: 7



### Turning Movement Peak Hour Data Plot (4:45 PM)



Robert Peccia & Associates  
825 Custer Ave

Helena, Montana, United States 59604  
406-447-5000 [scottr@rpa-hln.com](mailto:scottr@rpa-hln.com)

Count Name: 12-VaughnRd\_I15NB TMC  
Site Code: TMC-12  
Start Date: 07/16/2014  
Page No: 8

# APPENDIX C

---

## *Existing Conditions Traffic Data Analysis*





| BASIC FREEWAY SEGMENTS WORKSHEET                            |                             |                                  |   |  |     |
|---|-----------------------------|----------------------------------|---|--|-----|
| <b>General Information</b>                                  |                             |                                  | <b>Site Information</b>   |  |     |
| Analyst   | Shane Forsythe              |                                  | Highway/Direction of Travel I-315 Eastbound   |  |     |
| Agency or Company   |                             |                                  | From/To I-15 to 14th Ave  |  |     |
| Date Performed  | 9/15/2014                   |                                  | Jurisdiction  |  |     |
| Analysis Time Period  | AM Peak                     |                                  | Analysis Year 2014  |  |     |
| Project Description I-15 Corridor Study                     |                             |                                  |   |  |     |
| <input checked="" type="checkbox"/> Oper.(LOS)              |                             | <input type="checkbox"/> Des.(N) |   | <input type="checkbox"/> Planning Data |     |
| <b>Flow Inputs</b>  |                             |                                  |   |  |     |
| Volume, V   | 530                         | veh/h                            | Peak-Hour Factor, PHF   | 0.87                                   |     |
| AADT  |                             | veh/day                          | %Trucks and Buses, P <sub>T</sub>   | 6                                      |     |
| Peak-Hr Prop. of AADT, K                                    |                             |                                  | %RVs, P <sub>R</sub>  | 0                                      |     |
| Peak-Hr Direction Prop, D                                   |                             |                                  | General Terrain:  | Level                                  |     |
| DDHV = AADT x K x D   |                             | veh/h                            | Grade % Length  | mi                                     |     |
|   |                             |                                  | Up/Down %   |  |     |
| <b>Calculate Flow Adjustments</b>                           |                             |                                  |   |  |     |
| f <sub>p</sub>  | 1.00                        |                                  | E <sub>R</sub>  | 1.2                                    |     |
| E <sub>T</sub>  | 1.5                         |                                  | f <sub>HV</sub> = 1/[1+P <sub>T</sub> (E <sub>T</sub> - 1) + P <sub>R</sub> (E <sub>R</sub> - 1)] | 0.971                                  |     |
| <b>Speed Inputs</b>   |                             |                                  | <b>Calc Speed Adj and FFS</b>   |  |     |
| Lane Width  |                             | ft                               |   |  |     |
| Rt-Side Lat. Clearance                                      |                             | ft                               | f <sub>LW</sub>   | mph                                    |     |
| Number of Lanes, N  | 2                           |                                  | f <sub>LC</sub>   | mph                                    |     |
| Total Ramp Density, TRD                                     |                             | ramps/mi                         | TRD Adjustment  | mph                                    |     |
| FFS (measured)  | 55.0                        | mph                              | FFS   | 55.0                                   | mph |
| Base free-flow Speed, BFFS                                  |                             | mph                              |   |  |     |
| <b>LOS and Performance Measures</b>                         |                             |                                  | <b>Design (N)</b>   |  |     |
| <u>Operational (LOS)</u>                                    |                             |                                  | <u>Design (N)</u>   |  |     |
| v <sub>p</sub> = (V or DDHV) / (PHF x N x f <sub>HV</sub> ) |                             |                                  | Design LOS  |  |     |
|   | 314                         | pc/h/ln                          | v <sub>p</sub> = (V or DDHV) / (PHF x N x f <sub>HV</sub> )                                       |  |     |
| x f <sub>p</sub> )  |                             |                                  | x f <sub>p</sub> )  |  |     |
| S   | 55.0                        | mph                              | S   |  |     |
| D = v <sub>p</sub> / S                                      | 5.7                         | pc/mi/ln                         | D = v <sub>p</sub> / S  |  |     |
| LOS   | A                           |                                  | Required Number of Lanes, N   |  |     |
| <b>Glossary</b>   |                             |                                  | <b>Factor Location</b>  |  |     |
| N - Number of lanes   | S - Speed                   |                                  | E <sub>R</sub> - Exhibits 11-10, 11-12  | f <sub>LW</sub> - Exhibit 11-8         |     |
| V - Hourly volume   | D - Density                 |                                  | E <sub>T</sub> - Exhibits 11-10, 11-11, 11-13   | f <sub>LC</sub> - Exhibit 11-9         |     |
| v <sub>p</sub> - Flow rate                                  | FFS - Free-flow speed       |                                  | f <sub>p</sub> - Page 11-18   | TRD - Page 11-11                       |     |
| LOS - Level of service                                      | BFFS - Base free-flow speed |                                  | LOS, S, FFS, v <sub>p</sub> - Exhibits 11-2, 11-3   |  |     |
| DDHV - Directional design hour volume                       |                             |                                  |   |  |     |

| BASIC FREEWAY SEGMENTS WORKSHEET                            |                             |                                  |   |  |     |
|---|-----------------------------|----------------------------------|---|--|-----|
| <b>General Information</b>                                  |                             |                                  | <b>Site Information</b>   |  |     |
| Analyst   | Shane Forsythe              |                                  | Highway/Direction of Travel I-315 Westbound   |  |     |
| Agency or Company   |                             |                                  | From/To I-15 to 14th Ave  |  |     |
| Date Performed  | 9/15/2014                   |                                  | Jurisdiction  |  |     |
| Analysis Time Period  | AM Peak                     |                                  | Analysis Year 2014  |  |     |
| Project Description I-15 Corridor Study                     |                             |                                  |   |  |     |
| <input checked="" type="checkbox"/> Oper.(LOS)              |                             | <input type="checkbox"/> Des.(N) |   | <input type="checkbox"/> Planning Data |     |
| <b>Flow Inputs</b>  |                             |                                  |   |  |     |
| Volume, V   | 454                         | veh/h                            | Peak-Hour Factor, PHF   | 0.76                                   |     |
| AADT  |                             | veh/day                          | %Trucks and Buses, P <sub>T</sub>   | 6                                      |     |
| Peak-Hr Prop. of AADT, K                                    |                             |                                  | %RVs, P <sub>R</sub>  | 0                                      |     |
| Peak-Hr Direction Prop, D                                   |                             |                                  | General Terrain:  | Level                                  |     |
| DDHV = AADT x K x D   |                             | veh/h                            | Grade % Length  | mi                                     |     |
|   |                             |                                  | Up/Down %   |  |     |
| <b>Calculate Flow Adjustments</b>                           |                             |                                  |   |  |     |
| f <sub>p</sub>  | 1.00                        |                                  | E <sub>R</sub>  | 1.2                                    |     |
| E <sub>T</sub>  | 1.5                         |                                  | f <sub>HV</sub> = 1/[1+P <sub>T</sub> (E <sub>T</sub> - 1) + P <sub>R</sub> (E <sub>R</sub> - 1)] | 0.971                                  |     |
| <b>Speed Inputs</b>   |                             |                                  | <b>Calc Speed Adj and FFS</b>   |  |     |
| Lane Width  |                             | ft                               |   |  |     |
| Rt-Side Lat. Clearance                                      |                             | ft                               | f <sub>LW</sub>   | mph                                    |     |
| Number of Lanes, N  | 2                           |                                  | f <sub>LC</sub>   | mph                                    |     |
| Total Ramp Density, TRD                                     |                             | ramps/mi                         | TRD Adjustment  | mph                                    |     |
| FFS (measured)  | 55.0                        | mph                              | FFS   | 55.0                                   | mph |
| Base free-flow Speed, BFFS                                  |                             | mph                              |   |  |     |
| <b>LOS and Performance Measures</b>                         |                             |                                  | <b>Design (N)</b>   |  |     |
| <u>Operational (LOS)</u>                                    |                             |                                  | <u>Design (N)</u>   |  |     |
| v <sub>p</sub> = (V or DDHV) / (PHF x N x f <sub>HV</sub> ) |                             |                                  | Design LOS  |  |     |
|   | 308                         | pc/h/ln                          | v <sub>p</sub> = (V or DDHV) / (PHF x N x f <sub>HV</sub> )                                       |  |     |
| x f <sub>p</sub> )  |                             |                                  | x f <sub>p</sub> )  |  |     |
| S   | 55.0                        | mph                              | S   |  |     |
| D = v <sub>p</sub> / S                                      | 5.6                         | pc/mi/ln                         | D = v <sub>p</sub> / S  |  |     |
| LOS   | A                           |                                  | Required Number of Lanes, N   |  |     |
| <b>Glossary</b>   |                             |                                  | <b>Factor Location</b>  |  |     |
| N - Number of lanes   | S - Speed                   |                                  | E <sub>R</sub> - Exhibits 11-10, 11-12  | f <sub>LW</sub> - Exhibit 11-8         |     |
| V - Hourly volume   | D - Density                 |                                  | E <sub>T</sub> - Exhibits 11-10, 11-11, 11-13   | f <sub>LC</sub> - Exhibit 11-9         |     |
| v <sub>p</sub> - Flow rate                                  | FFS - Free-flow speed       |                                  | f <sub>p</sub> - Page 11-18   | TRD - Page 11-11                       |     |
| LOS - Level of service                                      | BFFS - Base free-flow speed |                                  | LOS, S, FFS, v <sub>p</sub> - Exhibits 11-2, 11-3   |  |     |
| DDHV - Directional design hour volume                       |                             |                                  |   |  |     |

| BASIC FREEWAY SEGMENTS WORKSHEET                            |                             |                                  |   |  |     |
|---|-----------------------------|----------------------------------|---|--|-----|
| <b>General Information</b>                                  |                             |                                  | <b>Site Information</b>   |  |     |
| Analyst   | Shane Forsythe              |                                  | Highway/Direction of Travel I-315 Eastbound   |  |     |
| Agency or Company   |                             |                                  | From/To I-15 to 14th Ave  |  |     |
| Date Performed  | 9/15/2014                   |                                  | Jurisdiction  |  |     |
| Analysis Time Period  | PM Peak                     |                                  | Analysis Year 2014  |  |     |
| Project Description I-15 Corridor Study                     |                             |                                  |   |  |     |
| <input checked="" type="checkbox"/> Oper.(LOS)              |                             | <input type="checkbox"/> Des.(N) |   | <input type="checkbox"/> Planning Data |     |
| <b>Flow Inputs</b>  |                             |                                  |   |  |     |
| Volume, V   | 675                         | veh/h                            | Peak-Hour Factor, PHF   | 0.83                                   |     |
| AADT  |                             | veh/day                          | %Trucks and Buses, P <sub>T</sub>   | 4                                      |     |
| Peak-Hr Prop. of AADT, K                                    |                             |                                  | %RVs, P <sub>R</sub>  | 0                                      |     |
| Peak-Hr Direction Prop, D                                   |                             |                                  | General Terrain:  | Level                                  |     |
| DDHV = AADT x K x D   |                             | veh/h                            | Grade % Length  | mi                                     |     |
|   |                             |                                  | Up/Down %   |  |     |
| <b>Calculate Flow Adjustments</b>                           |                             |                                  |   |  |     |
| f <sub>p</sub>  | 1.00                        |                                  | E <sub>R</sub>  | 1.2                                    |     |
| E <sub>T</sub>  | 1.5                         |                                  | f <sub>HV</sub> = 1/[1+P <sub>T</sub> (E <sub>T</sub> - 1) + P <sub>R</sub> (E <sub>R</sub> - 1)] | 0.980                                  |     |
| <b>Speed Inputs</b>   |                             |                                  | <b>Calc Speed Adj and FFS</b>   |  |     |
| Lane Width  |                             | ft                               |   |  |     |
| Rt-Side Lat. Clearance                                      |                             | ft                               | f <sub>LW</sub>   | mph                                    |     |
| Number of Lanes, N  | 2                           |                                  | f <sub>LC</sub>   | mph                                    |     |
| Total Ramp Density, TRD                                     |                             | ramps/mi                         | TRD Adjustment  | mph                                    |     |
| FFS (measured)  | 55.0                        | mph                              | FFS   | 55.0                                   | mph |
| Base free-flow Speed, BFFS                                  |                             | mph                              |   |  |     |
| <b>LOS and Performance Measures</b>                         |                             |                                  | <b>Design (N)</b>   |  |     |
| <u>Operational (LOS)</u>                                    |                             |                                  | <u>Design (N)</u>   |  |     |
| v <sub>p</sub> = (V or DDHV) / (PHF x N x f <sub>HV</sub> ) |                             |                                  | Design LOS  |  |     |
|   | 415                         | pc/h/ln                          | v <sub>p</sub> = (V or DDHV) / (PHF x N x f <sub>HV</sub> )                                       |  |     |
| x f <sub>p</sub> )  |                             |                                  | x f <sub>p</sub> )  |  |     |
| S   | 55.0                        | mph                              | S   |  |     |
| D = v <sub>p</sub> / S                                      | 7.5                         | pc/mi/ln                         | D = v <sub>p</sub> / S  |  |     |
| LOS   | A                           |                                  | Required Number of Lanes, N   |  |     |
| <b>Glossary</b>   |                             |                                  | <b>Factor Location</b>  |  |     |
| N - Number of lanes   | S - Speed                   |                                  | E <sub>R</sub> - Exhibits 11-10, 11-12  | f <sub>LW</sub> - Exhibit 11-8         |     |
| V - Hourly volume   | D - Density                 |                                  | E <sub>T</sub> - Exhibits 11-10, 11-11, 11-13   | f <sub>LC</sub> - Exhibit 11-9         |     |
| v <sub>p</sub> - Flow rate                                  | FFS - Free-flow speed       |                                  | f <sub>p</sub> - Page 11-18   | TRD - Page 11-11                       |     |
| LOS - Level of service                                      | BFFS - Base free-flow speed |                                  | LOS, S, FFS, v <sub>p</sub> - Exhibits 11-2, 11-3   |  |     |
| DDHV - Directional design hour volume                       |                             |                                  |   |  |     |

| BASIC FREEWAY SEGMENTS WORKSHEET                            |                             |                                  |   |  |     |
|---|-----------------------------|----------------------------------|---|--|-----|
| <b>General Information</b>                                  |                             |                                  | <b>Site Information</b>   |  |     |
| Analyst   | Shane Forsythe              |                                  | Highway/Direction of Travel I-315 Westbound   |  |     |
| Agency or Company   |                             |                                  | From/To I-15 to 14th Ave  |  |     |
| Date Performed  | 9/15/2014                   |                                  | Jurisdiction  |  |     |
| Analysis Time Period  | PM Peak                     |                                  | Analysis Year 2014  |  |     |
| Project Description I-15 Corridor Study                     |                             |                                  |   |  |     |
| <input checked="" type="checkbox"/> Oper.(LOS)              |                             | <input type="checkbox"/> Des.(N) |   | <input type="checkbox"/> Planning Data |     |
| <b>Flow Inputs</b>  |                             |                                  |   |  |     |
| Volume, V   | 646                         | veh/h                            | Peak-Hour Factor, PHF   | 0.93                                   |     |
| AADT  |                             | veh/day                          | %Trucks and Buses, P <sub>T</sub>   | 5                                      |     |
| Peak-Hr Prop. of AADT, K                                    |                             |                                  | %RVs, P <sub>R</sub>  | 0                                      |     |
| Peak-Hr Direction Prop, D                                   |                             |                                  | General Terrain:  | Level                                  |     |
| DDHV = AADT x K x D   |                             | veh/h                            | Grade % Length  | mi                                     |     |
|   |                             |                                  | Up/Down %   |  |     |
| <b>Calculate Flow Adjustments</b>                           |                             |                                  |   |  |     |
| f <sub>p</sub>  | 1.00                        |                                  | E <sub>R</sub>  | 1.2                                    |     |
| E <sub>T</sub>  | 1.5                         |                                  | f <sub>HV</sub> = 1/[1+P <sub>T</sub> (E <sub>T</sub> - 1) + P <sub>R</sub> (E <sub>R</sub> - 1)] | 0.976                                  |     |
| <b>Speed Inputs</b>   |                             |                                  | <b>Calc Speed Adj and FFS</b>   |  |     |
| Lane Width  |                             | ft                               |   |  |     |
| Rt-Side Lat. Clearance                                      |                             | ft                               | f <sub>LW</sub>   | mph                                    |     |
| Number of Lanes, N  | 2                           |                                  | f <sub>LC</sub>   | mph                                    |     |
| Total Ramp Density, TRD                                     |                             | ramps/mi                         | TRD Adjustment  | mph                                    |     |
| FFS (measured)  | 55.0                        | mph                              | FFS   | 55.0                                   | mph |
| Base free-flow Speed, BFFS                                  |                             | mph                              |   |  |     |
| <b>LOS and Performance Measures</b>                         |                             |                                  | <b>Design (N)</b>   |  |     |
| <u>Operational (LOS)</u>                                    |                             |                                  | <u>Design (N)</u>   |  |     |
| v <sub>p</sub> = (V or DDHV) / (PHF x N x f <sub>HV</sub> ) |                             |                                  | Design LOS  |  |     |
|   | 356                         | pc/h/ln                          | v <sub>p</sub> = (V or DDHV) / (PHF x N x f <sub>HV</sub> )                                       |  |     |
| x f <sub>p</sub> )  |                             |                                  | x f <sub>p</sub> )  |  |     |
| S   | 55.0                        | mph                              | S   |  |     |
| D = v <sub>p</sub> / S                                      | 6.5                         | pc/mi/ln                         | D = v <sub>p</sub> / S  |  |     |
| LOS   | A                           |                                  | Required Number of Lanes, N   |  |     |
| <b>Glossary</b>   |                             |                                  | <b>Factor Location</b>  |  |     |
| N - Number of lanes   | S - Speed                   |                                  | E <sub>R</sub> - Exhibits 11-10, 11-12  | f <sub>LW</sub> - Exhibit 11-8         |     |
| V - Hourly volume   | D - Density                 |                                  | E <sub>T</sub> - Exhibits 11-10, 11-11, 11-13   | f <sub>LC</sub> - Exhibit 11-9         |     |
| v <sub>p</sub> - Flow rate                                  | FFS - Free-flow speed       |                                  | f <sub>p</sub> - Page 11-18   | TRD - Page 11-11                       |     |
| LOS - Level of service                                      | BFFS - Base free-flow speed |                                  | LOS, S, FFS, v <sub>p</sub> - Exhibits 11-2, 11-3   |  |     |
| DDHV - Directional design hour volume                       |                             |                                  |   |  |     |

| BASIC FREEWAY SEGMENTS WORKSHEET                            |                             |                                  |   |  |     |
|---|-----------------------------|----------------------------------|---|--|-----|
| <b>General Information</b>                                  |                             |                                  | <b>Site Information</b>   |  |     |
| Analyst   | Shane Forsythe              |                                  | Highway/Direction of Travel I-315 Eastbound   |  |     |
| Agency or Company   |                             |                                  | From/To 14th Ave to Fox Farm  |  |     |
| Date Performed  | 9/15/2014                   |                                  | Jurisdiction  |  |     |
| Analysis Time Period  | AM Peak                     |                                  | Analysis Year 2014  |  |     |
| Project Description I-15 Corridor Study                     |                             |                                  |   |  |     |
| <input checked="" type="checkbox"/> Oper.(LOS)              |                             | <input type="checkbox"/> Des.(N) |   | <input type="checkbox"/> Planning Data |     |
| <b>Flow Inputs</b>  |                             |                                  |   |  |     |
| Volume, V   | 979                         | veh/h                            | Peak-Hour Factor, PHF   | 0.83                                   |     |
| AADT  |                             | veh/day                          | %Trucks and Buses, P <sub>T</sub>   | 4                                      |     |
| Peak-Hr Prop. of AADT, K                                    |                             |                                  | %RVs, P <sub>R</sub>  | 0                                      |     |
| Peak-Hr Direction Prop, D                                   |                             |                                  | General Terrain:  | Level                                  |     |
| DDHV = AADT x K x D   |                             | veh/h                            | Grade % Length  | mi                                     |     |
|   |                             |                                  | Up/Down %   |  |     |
| <b>Calculate Flow Adjustments</b>                           |                             |                                  |   |  |     |
| f <sub>p</sub>  | 1.00                        |                                  | E <sub>R</sub>  | 1.2                                    |     |
| E <sub>T</sub>  | 1.5                         |                                  | f <sub>HV</sub> = 1/[1+P <sub>T</sub> (E <sub>T</sub> - 1) + P <sub>R</sub> (E <sub>R</sub> - 1)] | 0.980                                  |     |
| <b>Speed Inputs</b>   |                             |                                  | <b>Calc Speed Adj and FFS</b>   |  |     |
| Lane Width  |                             | ft                               |   |  |     |
| Rt-Side Lat. Clearance                                      |                             | ft                               | f <sub>LW</sub>   | mph                                    |     |
| Number of Lanes, N  | 2                           |                                  | f <sub>LC</sub>   | mph                                    |     |
| Total Ramp Density, TRD                                     |                             | ramps/mi                         | TRD Adjustment  | mph                                    |     |
| FFS (measured)  | 55.0                        | mph                              | FFS   | 55.0                                   | mph |
| Base free-flow Speed, BFFS                                  |                             | mph                              |   |  |     |
| <b>LOS and Performance Measures</b>                         |                             |                                  | <b>Design (N)</b>   |  |     |
| <u>Operational (LOS)</u>                                    |                             |                                  | <u>Design (N)</u>   |  |     |
| v <sub>p</sub> = (V or DDHV) / (PHF x N x f <sub>HV</sub> ) |                             |                                  | Design LOS  |  |     |
|   | 602                         | pc/h/ln                          | v <sub>p</sub> = (V or DDHV) / (PHF x N x f <sub>HV</sub> )                                       |  |     |
| x f <sub>p</sub> )  |                             |                                  | x f <sub>p</sub> )  |  |     |
| S   | 55.0                        | mph                              | S   |  |     |
| D = v <sub>p</sub> / S                                      | 10.9                        | pc/mi/ln                         | D = v <sub>p</sub> / S  |  |     |
| LOS   | A                           |                                  | Required Number of Lanes, N   |  |     |
| <b>Glossary</b>   |                             |                                  | <b>Factor Location</b>  |  |     |
| N - Number of lanes   | S - Speed                   |                                  | E <sub>R</sub> - Exhibits 11-10, 11-12  | f <sub>LW</sub> - Exhibit 11-8         |     |
| V - Hourly volume   | D - Density                 |                                  | E <sub>T</sub> - Exhibits 11-10, 11-11, 11-13   | f <sub>LC</sub> - Exhibit 11-9         |     |
| v <sub>p</sub> - Flow rate                                  | FFS - Free-flow speed       |                                  | f <sub>p</sub> - Page 11-18   | TRD - Page 11-11                       |     |
| LOS - Level of service                                      | BFFS - Base free-flow speed |                                  | LOS, S, FFS, v <sub>p</sub> - Exhibits 11-2, 11-3   |  |     |
| DDHV - Directional design hour volume                       |                             |                                  |   |  |     |

| BASIC FREEWAY SEGMENTS WORKSHEET                            |                             |                                  |   |  |     |
|---|-----------------------------|----------------------------------|---|--|-----|
| <b>General Information</b>                                  |                             |                                  | <b>Site Information</b>   |  |     |
| Analyst   | Shane Forsythe              |                                  | Highway/Direction of Travel I-315 Westbound   |  |     |
| Agency or Company   |                             |                                  | From/To 14th Ave to Fox Farm  |  |     |
| Date Performed  | 9/15/2014                   |                                  | Jurisdiction  |  |     |
| Analysis Time Period  | AM Peak                     |                                  | Analysis Year 2014  |  |     |
| Project Description I-15 Corridor Study                     |                             |                                  |   |  |     |
| <input checked="" type="checkbox"/> Oper.(LOS)              |                             | <input type="checkbox"/> Des.(N) |   | <input type="checkbox"/> Planning Data |     |
| <b>Flow Inputs</b>  |                             |                                  |   |  |     |
| Volume, V   | 528                         | veh/h                            | Peak-Hour Factor, PHF   | 0.82                                   |     |
| AADT  |                             | veh/day                          | %Trucks and Buses, P <sub>T</sub>   | 5                                      |     |
| Peak-Hr Prop. of AADT, K                                    |                             |                                  | %RVs, P <sub>R</sub>  | 0                                      |     |
| Peak-Hr Direction Prop, D                                   |                             |                                  | General Terrain:  | Level                                  |     |
| DDHV = AADT x K x D   |                             | veh/h                            | Grade % Length  | mi                                     |     |
|   |                             |                                  | Up/Down %   |  |     |
| <b>Calculate Flow Adjustments</b>                           |                             |                                  |   |  |     |
| f <sub>p</sub>  | 1.00                        |                                  | E <sub>R</sub>  | 1.2                                    |     |
| E <sub>T</sub>  | 1.5                         |                                  | f <sub>HV</sub> = 1/[1+P <sub>T</sub> (E <sub>T</sub> - 1) + P <sub>R</sub> (E <sub>R</sub> - 1)] | 0.976                                  |     |
| <b>Speed Inputs</b>   |                             |                                  | <b>Calc Speed Adj and FFS</b>   |  |     |
| Lane Width  |                             | ft                               |   |  |     |
| Rt-Side Lat. Clearance                                      |                             | ft                               | f <sub>LW</sub>   | mph                                    |     |
| Number of Lanes, N  | 2                           |                                  | f <sub>LC</sub>   | mph                                    |     |
| Total Ramp Density, TRD                                     |                             | ramps/mi                         | TRD Adjustment  | mph                                    |     |
| FFS (measured)  | 55.0                        | mph                              | FFS   | 55.0                                   | mph |
| Base free-flow Speed, BFFS                                  |                             | mph                              |   |  |     |
| <b>LOS and Performance Measures</b>                         |                             |                                  | <b>Design (N)</b>   |  |     |
| <u>Operational (LOS)</u>                                    |                             |                                  | <u>Design (N)</u>   |  |     |
| v <sub>p</sub> = (V or DDHV) / (PHF x N x f <sub>HV</sub> ) |                             |                                  | Design LOS  |  |     |
|   | 330                         | pc/h/ln                          | v <sub>p</sub> = (V or DDHV) / (PHF x N x f <sub>HV</sub> )                                       |  |     |
| x f <sub>p</sub> )  |                             |                                  | x f <sub>p</sub> )  |  |     |
| S   | 55.0                        | mph                              | S   |  |     |
| D = v <sub>p</sub> / S                                      | 6.0                         | pc/mi/ln                         | D = v <sub>p</sub> / S  |  |     |
| LOS   | A                           |                                  | Required Number of Lanes, N   |  |     |
| <b>Glossary</b>   |                             |                                  | <b>Factor Location</b>  |  |     |
| N - Number of lanes   | S - Speed                   |                                  | E <sub>R</sub> - Exhibits 11-10, 11-12  | f <sub>LW</sub> - Exhibit 11-8         |     |
| V - Hourly volume   | D - Density                 |                                  | E <sub>T</sub> - Exhibits 11-10, 11-11, 11-13   | f <sub>LC</sub> - Exhibit 11-9         |     |
| v <sub>p</sub> - Flow rate                                  | FFS - Free-flow speed       |                                  | f <sub>p</sub> - Page 11-18   | TRD - Page 11-11                       |     |
| LOS - Level of service                                      | BFFS - Base free-flow speed |                                  | LOS, S, FFS, v <sub>p</sub> - Exhibits 11-2, 11-3   |  |     |
| DDHV - Directional design hour volume                       |                             |                                  |   |  |     |

| BASIC FREEWAY SEGMENTS WORKSHEET                            |                             |                                  |   |  |     |
|---|-----------------------------|----------------------------------|---|--|-----|
| <b>General Information</b>                                  |                             |                                  | <b>Site Information</b>   |  |     |
| Analyst   | Shane Forsythe              |                                  | Highway/Direction of Travel I-315 Eastbound   |  |     |
| Agency or Company   |                             |                                  | From/To 14th Ave to Fox Farm  |  |     |
| Date Performed  | 9/15/2014                   |                                  | Jurisdiction  |  |     |
| Analysis Time Period  | PM Peak                     |                                  | Analysis Year 2014  |  |     |
| Project Description I-15 Corridor Study                     |                             |                                  |   |  |     |
| <input checked="" type="checkbox"/> Oper.(LOS)              |                             | <input type="checkbox"/> Des.(N) |   | <input type="checkbox"/> Planning Data |     |
| <b>Flow Inputs</b>  |                             |                                  |   |  |     |
| Volume, V   | 1044                        | veh/h                            | Peak-Hour Factor, PHF   | 0.90                                   |     |
| AADT  |                             | veh/day                          | %Trucks and Buses, P <sub>T</sub>   | 3                                      |     |
| Peak-Hr Prop. of AADT, K                                    |                             |                                  | %RVs, P <sub>R</sub>  | 0                                      |     |
| Peak-Hr Direction Prop, D                                   |                             |                                  | General Terrain:  | Level                                  |     |
| DDHV = AADT x K x D   |                             | veh/h                            | Grade % Length  | mi                                     |     |
|   |                             |                                  | Up/Down %   |  |     |
| <b>Calculate Flow Adjustments</b>                           |                             |                                  |   |  |     |
| f <sub>p</sub>  | 1.00                        |                                  | E <sub>R</sub>  | 1.2                                    |     |
| E <sub>T</sub>  | 1.5                         |                                  | f <sub>HV</sub> = 1/[1+P <sub>T</sub> (E <sub>T</sub> - 1) + P <sub>R</sub> (E <sub>R</sub> - 1)] | 0.985                                  |     |
| <b>Speed Inputs</b>   |                             |                                  | <b>Calc Speed Adj and FFS</b>   |  |     |
| Lane Width  |                             | ft                               |   |  |     |
| Rt-Side Lat. Clearance                                      |                             | ft                               | f <sub>LW</sub>   | mph                                    |     |
| Number of Lanes, N  | 2                           |                                  | f <sub>LC</sub>   | mph                                    |     |
| Total Ramp Density, TRD                                     |                             | ramps/mi                         | TRD Adjustment  | mph                                    |     |
| FFS (measured)  | 55.0                        | mph                              | FFS   | 55.0                                   | mph |
| Base free-flow Speed, BFFS                                  |                             | mph                              |   |  |     |
| <b>LOS and Performance Measures</b>                         |                             |                                  | <b>Design (N)</b>   |  |     |
| <u>Operational (LOS)</u>                                    |                             |                                  | <u>Design (N)</u>   |  |     |
| v <sub>p</sub> = (V or DDHV) / (PHF x N x f <sub>HV</sub> ) |                             |                                  | Design LOS  |  |     |
|   | 589                         | pc/h/ln                          | v <sub>p</sub> = (V or DDHV) / (PHF x N x f <sub>HV</sub> )                                       |  |     |
| x f <sub>p</sub> )  |                             |                                  | x f <sub>p</sub> )  |  |     |
| S   | 55.0                        | mph                              | S   |  |     |
| D = v <sub>p</sub> / S                                      | 10.7                        | pc/mi/ln                         | D = v <sub>p</sub> / S  |  |     |
| LOS   | A                           |                                  | Required Number of Lanes, N   |  |     |
| <b>Glossary</b>   |                             |                                  | <b>Factor Location</b>  |  |     |
| N - Number of lanes   | S - Speed                   |                                  | E <sub>R</sub> - Exhibits 11-10, 11-12  | f <sub>LW</sub> - Exhibit 11-8         |     |
| V - Hourly volume   | D - Density                 |                                  | E <sub>T</sub> - Exhibits 11-10, 11-11, 11-13   | f <sub>LC</sub> - Exhibit 11-9         |     |
| v <sub>p</sub> - Flow rate                                  | FFS - Free-flow speed       |                                  | f <sub>p</sub> - Page 11-18   | TRD - Page 11-11                       |     |
| LOS - Level of service                                      | BFFS - Base free-flow speed |                                  | LOS, S, FFS, v <sub>p</sub> - Exhibits 11-2, 11-3   |  |     |
| DDHV - Directional design hour volume                       |                             |                                  |   |  |     |

| BASIC FREEWAY SEGMENTS WORKSHEET                            |                             |                                  |   |  |     |
|---|-----------------------------|----------------------------------|---|--|-----|
| <b>General Information</b>                                  |                             |                                  | <b>Site Information</b>   |  |     |
| Analyst   | Shane Forsythe              |                                  | Highway/Direction of Travel I-315 Westbound   |  |     |
| Agency or Company   |                             |                                  | From/To 14th Ave to Fox Farm  |  |     |
| Date Performed  | 9/15/2014                   |                                  | Jurisdiction  |  |     |
| Analysis Time Period  | PM Peak                     |                                  | Analysis Year 2014  |  |     |
| Project Description I-15 Corridor Study                     |                             |                                  |   |  |     |
| <input checked="" type="checkbox"/> Oper.(LOS)              |                             | <input type="checkbox"/> Des.(N) |   | <input type="checkbox"/> Planning Data |     |
| <b>Flow Inputs</b>  |                             |                                  |   |  |     |
| Volume, V   | 1279                        | veh/h                            | Peak-Hour Factor, PHF   | 0.95                                   |     |
| AADT  |                             | veh/day                          | %Trucks and Buses, P <sub>T</sub>   | 3                                      |     |
| Peak-Hr Prop. of AADT, K                                    |                             |                                  | %RVs, P <sub>R</sub>  | 0                                      |     |
| Peak-Hr Direction Prop, D                                   |                             |                                  | General Terrain:  | Level                                  |     |
| DDHV = AADT x K x D   |                             | veh/h                            | Grade % Length  | mi                                     |     |
|   |                             |                                  | Up/Down %   |  |     |
| <b>Calculate Flow Adjustments</b>                           |                             |                                  |   |  |     |
| f <sub>p</sub>  | 1.00                        |                                  | E <sub>R</sub>  | 1.2                                    |     |
| E <sub>T</sub>  | 1.5                         |                                  | f <sub>HV</sub> = 1/[1+P <sub>T</sub> (E <sub>T</sub> - 1) + P <sub>R</sub> (E <sub>R</sub> - 1)] | 0.985                                  |     |
| <b>Speed Inputs</b>   |                             |                                  | <b>Calc Speed Adj and FFS</b>   |  |     |
| Lane Width  |                             | ft                               |   |  |     |
| Rt-Side Lat. Clearance                                      |                             | ft                               | f <sub>LW</sub>   | mph                                    |     |
| Number of Lanes, N  | 2                           |                                  | f <sub>LC</sub>   | mph                                    |     |
| Total Ramp Density, TRD                                     |                             | ramps/mi                         | TRD Adjustment  | mph                                    |     |
| FFS (measured)  | 55.0                        | mph                              | FFS   | 55.0                                   | mph |
| Base free-flow Speed, BFFS                                  |                             | mph                              |   |  |     |
| <b>LOS and Performance Measures</b>                         |                             |                                  | <b>Design (N)</b>   |  |     |
| <u>Operational (LOS)</u>                                    |                             |                                  | <u>Design (N)</u>   |  |     |
| v <sub>p</sub> = (V or DDHV) / (PHF x N x f <sub>HV</sub> ) |                             |                                  | Design LOS  |  |     |
|   | 683                         | pc/h/ln                          | v <sub>p</sub> = (V or DDHV) / (PHF x N x f <sub>HV</sub> )                                       |  |     |
| x f <sub>p</sub> )  |                             |                                  | x f <sub>p</sub> )  |  |     |
| S   | 55.0                        | mph                              | S   |  |     |
| D = v <sub>p</sub> / S                                      | 12.4                        | pc/mi/ln                         | D = v <sub>p</sub> / S  |  |     |
| LOS   | B                           |                                  | Required Number of Lanes, N   |  |     |
| <b>Glossary</b>   |                             |                                  | <b>Factor Location</b>  |  |     |
| N - Number of lanes   | S - Speed                   |                                  | E <sub>R</sub> - Exhibits 11-10, 11-12  | f <sub>LW</sub> - Exhibit 11-8         |     |
| V - Hourly volume   | D - Density                 |                                  | E <sub>T</sub> - Exhibits 11-10, 11-11, 11-13   | f <sub>LC</sub> - Exhibit 11-9         |     |
| v <sub>p</sub> - Flow rate                                  | FFS - Free-flow speed       |                                  | f <sub>p</sub> - Page 11-18   | TRD - Page 11-11                       |     |
| LOS - Level of service                                      | BFFS - Base free-flow speed |                                  | LOS, S, FFS, v <sub>p</sub> - Exhibits 11-2, 11-3   |  |     |
| DDHV - Directional design hour volume                       |                             |                                  |   |  |     |



| BASIC FREEWAY SEGMENTS WORKSHEET                            |                             |                                  |   |  |     |
|---|-----------------------------|----------------------------------|---|--|-----|
| <b>General Information</b>                                  |                             |                                  | <b>Site Information</b>   |  |     |
| Analyst   | Shane Forsythe              |                                  | Highway/Direction of Travel I-15 NB   |  |     |
| Agency or Company   |                             |                                  | From/To North of Central  |  |     |
| Date Performed  | 8/7/2014                    |                                  | Jurisdiction  |  |     |
| Analysis Time Period  | AM Peak                     |                                  | Analysis Year 2014  |  |     |
| Project Description I-15 Corridor Study                     |                             |                                  |   |  |     |
| <input checked="" type="checkbox"/> Oper.(LOS)              |                             | <input type="checkbox"/> Des.(N) |   | <input type="checkbox"/> Planning Data |     |
| <b>Flow Inputs</b>  |                             |                                  |   |  |     |
| Volume, V   | 334                         | veh/h                            | Peak-Hour Factor, PHF   | 0.83                                   |     |
| AADT  |                             | veh/day                          | %Trucks and Buses, P <sub>T</sub>   | 7                                      |     |
| Peak-Hr Prop. of AADT, K                                    |                             |                                  | %RVs, P <sub>R</sub>  | 0                                      |     |
| Peak-Hr Direction Prop, D                                   |                             |                                  | General Terrain:  | Level                                  |     |
| DDHV = AADT x K x D   |                             | veh/h                            | Grade % Length  | mi                                     |     |
|   |                             |                                  | Up/Down %   |  |     |
| <b>Calculate Flow Adjustments</b>                           |                             |                                  |   |  |     |
| f <sub>p</sub>  | 1.00                        |                                  | E <sub>R</sub>  | 1.2                                    |     |
| E <sub>T</sub>  | 1.5                         |                                  | f <sub>HV</sub> = 1/[1+P <sub>T</sub> (E <sub>T</sub> - 1) + P <sub>R</sub> (E <sub>R</sub> - 1)] | 0.966                                  |     |
| <b>Speed Inputs</b>   |                             |                                  | <b>Calc Speed Adj and FFS</b>   |  |     |
| Lane Width  |                             | ft                               |   |  |     |
| Rt-Side Lat. Clearance                                      |                             | ft                               | f <sub>LW</sub>   | mph                                    |     |
| Number of Lanes, N  | 2                           |                                  | f <sub>LC</sub>   | mph                                    |     |
| Total Ramp Density, TRD                                     |                             | ramps/mi                         | TRD Adjustment  | mph                                    |     |
| FFS (measured)  | 65.0                        | mph                              | FFS   | 65.0                                   | mph |
| Base free-flow Speed, BFFS                                  |                             | mph                              |   |  |     |
| <b>LOS and Performance Measures</b>                         |                             |                                  | <b>Design (N)</b>   |  |     |
| <u>Operational (LOS)</u>                                    |                             |                                  | <u>Design (N)</u>   |  |     |
| v <sub>p</sub> = (V or DDHV) / (PHF x N x f <sub>HV</sub> ) |                             |                                  | Design LOS  |  |     |
|   | 209                         | pc/h/ln                          | v <sub>p</sub> = (V or DDHV) / (PHF x N x f <sub>HV</sub> )                                       |  |     |
| x f <sub>p</sub> )  |                             |                                  | x f <sub>p</sub> )  |  |     |
| S   | 65.0                        | mph                              | S   |  |     |
| D = v <sub>p</sub> / S                                      | 3.2                         | pc/mi/ln                         | D = v <sub>p</sub> / S  |  |     |
| LOS   | A                           |                                  | Required Number of Lanes, N   |  |     |
| <b>Glossary</b>   |                             |                                  | <b>Factor Location</b>  |  |     |
| N - Number of lanes   | S - Speed                   |                                  | E <sub>R</sub> - Exhibits 11-10, 11-12  | f <sub>LW</sub> - Exhibit 11-8         |     |
| V - Hourly volume   | D - Density                 |                                  | E <sub>T</sub> - Exhibits 11-10, 11-11, 11-13   | f <sub>LC</sub> - Exhibit 11-9         |     |
| v <sub>p</sub> - Flow rate                                  | FFS - Free-flow speed       |                                  | f <sub>p</sub> - Page 11-18   | TRD - Page 11-11                       |     |
| LOS - Level of service                                      | BFFS - Base free-flow speed |                                  | LOS, S, FFS, v <sub>p</sub> - Exhibits 11-2, 11-3   |  |     |
| DDHV - Directional design hour volume                       |                             |                                  |   |  |     |

| BASIC FREEWAY SEGMENTS WORKSHEET                                       |  |   |   |   |  |
|--|--|---|---|---|--|
| <b>General Information</b>   |  |   | <b>Site Information</b>                                     |   |  |
| Analyst <i>Shane Forsythe</i>  |  | Highway/Direction of Travel <i>I-15 SB</i>  |   |   |  |
| Agency or Company  |  | From/To <i>North of Central</i>   |   |   |  |
| Date Performed <i>8/7/2014</i>   |  | Jurisdiction  |   |   |  |
| Analysis Time Period <i>AM Peak</i>                                    |  | Analysis Year <i>2014</i>   |   |   |  |
| Project Description <i>I-15 Corridor Study</i>                         |  |   |   |   |  |
| <input checked="" type="checkbox"/> Oper.(LOS)                         |  | <input type="checkbox"/> Des.(N)  |   | <input type="checkbox"/> Planning Data      |  |
| <b>Flow Inputs</b>   |  |   |   |   |  |
| Volume, V <i>200</i>   |  | veh/h   |   | Peak-Hour Factor, PHF <i>0.83</i>           |  |
| AADT   |  | veh/day   |   | %Trucks and Buses, P <sub>T</sub> <i>21</i> |  |
| Peak-Hr Prop. of AADT, K   |  |   |   | %RVs, P <sub>R</sub> <i>0</i>               |  |
| Peak-Hr Direction Prop, D  |  |   |   | General Terrain: <i>Level</i>               |  |
| DDHV = AADT x K x D  |  | veh/h   |   | Grade % Length <i>mi</i>                    |  |
|  |  |   |   | Up/Down %                                   |  |
| <b>Calculate Flow Adjustments</b>                                      |  |   |   |   |  |
| f <sub>p</sub> <i>1.00</i>   |  | E <sub>R</sub>  |   | <i>1.2</i>                                  |  |
| E <sub>T</sub> <i>1.5</i>  |  | f <sub>HV</sub> = 1/[1+P <sub>T</sub> (E <sub>T</sub> - 1) + P <sub>R</sub> (E <sub>R</sub> - 1)] |   | <i>0.905</i>                                |  |
| <b>Speed Inputs</b>  |  |   | <b>Calc Speed Adj and FFS</b>                               |   |  |
| Lane Width   |  |   | ft  |   |  |
| Rt-Side Lat. Clearance   |  |   | ft  |   |  |
| Number of Lanes, N <i>2</i>  |  |   | f <sub>LW</sub> mph   |   |  |
| Total Ramp Density, TRD  |  |   | ramps/mi  |   |  |
| FFS (measured) <i>65.0</i>   |  |   | f <sub>LC</sub> mph   |   |  |
| Base free-flow Speed, BFFS   |  |   | mph   |   |  |
|  |  |   | TRD Adjustment mph  |   |  |
|  |  |   | FFS <i>65.0</i> mph   |   |  |
| <b>LOS and Performance Measures</b>                                    |  |   | <b>Design (N)</b>   |   |  |
| <u>Operational (LOS)</u>   |  |   | <u>Design (N)</u>   |   |  |
| v <sub>p</sub> = (V or DDHV) / (PHF x N x f <sub>HV</sub> ) <i>133</i> |  |   | Design LOS  |   |  |
| x f <sub>p</sub> )   |  |   | v <sub>p</sub> = (V or DDHV) / (PHF x N x f <sub>HV</sub> ) |   |  |
| S <i>65.0</i> mph  |  |   | x f <sub>p</sub> )  |   |  |
| D = v <sub>p</sub> / S <i>2.0</i> pc/mi/ln                             |  |   | S mph   |   |  |
| LOS <i>A</i>   |  |   | D = v <sub>p</sub> / S                                      |   |  |
|  |  |   | pc/mi/ln  |   |  |
|  |  |   | Required Number of Lanes, N                                 |   |  |
| <b>Glossary</b>  |  |   | <b>Factor Location</b>                                      |   |  |
| N - Number of lanes  |  |   | S - Speed   |   |  |
| V - Hourly volume  |  |   | D - Density   |   |  |
| v <sub>p</sub> - Flow rate   |  |   | FFS - Free-flow speed                                       |   |  |
| LOS - Level of service   |  |   | BFFS - Base free-flow speed                                 |   |  |
| DDHV - Directional design hour volume                                  |  |   |   |   |  |
|  |  |   | E <sub>R</sub> - Exhibits 11-10, 11-12                      |   |  |
|  |  |   | f <sub>LW</sub> - Exhibit 11-8                              |   |  |
|  |  |   | E <sub>T</sub> - Exhibits 11-10, 11-11, 11-13               |   |  |
|  |  |   | f <sub>LC</sub> - Exhibit 11-9                              |   |  |
|  |  |   | f <sub>p</sub> - Page 11-18                                 |   |  |
|  |  |   | TRD - Page 11-11  |   |  |
|  |  |   | LOS, S, FFS, v <sub>p</sub> - Exhibits 11-2, 11-3           |   |  |

| BASIC FREEWAY SEGMENTS WORKSHEET                            |                             |                                  |   |  |     |
|---|-----------------------------|----------------------------------|---|--|-----|
| <b>General Information</b>                                  |                             |                                  | <b>Site Information</b>   |  |     |
| Analyst   | Shane Forsythe              |                                  | Highway/Direction of Travel I-15 NB   |  |     |
| Agency or Company   |                             |                                  | From/To North of Central Ave  |  |     |
| Date Performed  | 8/7/2014                    |                                  | Jurisdiction  |  |     |
| Analysis Time Period  | PM Peak                     |                                  | Analysis Year 2014  |  |     |
| Project Description I-15 Corridor Study                     |                             |                                  |   |  |     |
| <input checked="" type="checkbox"/> Oper.(LOS)              |                             | <input type="checkbox"/> Des.(N) |   | <input type="checkbox"/> Planning Data |     |
| <b>Flow Inputs</b>  |                             |                                  |   |  |     |
| Volume, V   | 359                         | veh/h                            | Peak-Hour Factor, PHF   | 0.97                                   |     |
| AADT  |                             | veh/day                          | %Trucks and Buses, P <sub>T</sub>   | 8                                      |     |
| Peak-Hr Prop. of AADT, K                                    |                             |                                  | %RVs, P <sub>R</sub>  | 0                                      |     |
| Peak-Hr Direction Prop, D                                   |                             |                                  | General Terrain:  | Level                                  |     |
| DDHV = AADT x K x D   |                             | veh/h                            | Grade % Length  | mi                                     |     |
|   |                             |                                  | Up/Down %   |  |     |
| <b>Calculate Flow Adjustments</b>                           |                             |                                  |   |  |     |
| f <sub>p</sub>  | 1.00                        |                                  | E <sub>R</sub>  | 1.2                                    |     |
| E <sub>T</sub>  | 1.5                         |                                  | f <sub>HV</sub> = 1/[1+P <sub>T</sub> (E <sub>T</sub> - 1) + P <sub>R</sub> (E <sub>R</sub> - 1)] | 0.962                                  |     |
| <b>Speed Inputs</b>   |                             |                                  | <b>Calc Speed Adj and FFS</b>   |  |     |
| Lane Width  |                             | ft                               |   |  |     |
| Rt-Side Lat. Clearance                                      |                             | ft                               | f <sub>LW</sub>   | mph                                    |     |
| Number of Lanes, N  | 2                           |                                  | f <sub>LC</sub>   | mph                                    |     |
| Total Ramp Density, TRD                                     |                             | ramps/mi                         | TRD Adjustment  | mph                                    |     |
| FFS (measured)  | 65.0                        | mph                              | FFS   | 65.0                                   | mph |
| Base free-flow Speed, BFFS                                  |                             | mph                              |   |  |     |
| <b>LOS and Performance Measures</b>                         |                             |                                  | <b>Design (N)</b>   |  |     |
| <u>Operational (LOS)</u>                                    |                             |                                  | <u>Design (N)</u>   |  |     |
| v <sub>p</sub> = (V or DDHV) / (PHF x N x f <sub>HV</sub> ) |                             |                                  | Design LOS  |  |     |
|   | 193                         | pc/h/ln                          | v <sub>p</sub> = (V or DDHV) / (PHF x N x f <sub>HV</sub> )                                       |  |     |
| x f <sub>p</sub> )  |                             |                                  | x f <sub>p</sub> )  |  |     |
| S   | 65.0                        | mph                              | S   |  |     |
| D = v <sub>p</sub> / S                                      | 3.0                         | pc/mi/ln                         | D = v <sub>p</sub> / S  |  |     |
| LOS   | A                           |                                  | Required Number of Lanes, N   |  |     |
| <b>Glossary</b>   |                             |                                  | <b>Factor Location</b>  |  |     |
| N - Number of lanes   | S - Speed                   |                                  | E <sub>R</sub> - Exhibits 11-10, 11-12  | f <sub>LW</sub> - Exhibit 11-8         |     |
| V - Hourly volume   | D - Density                 |                                  | E <sub>T</sub> - Exhibits 11-10, 11-11, 11-13   | f <sub>LC</sub> - Exhibit 11-9         |     |
| v <sub>p</sub> - Flow rate                                  | FFS - Free-flow speed       |                                  | f <sub>p</sub> - Page 11-18   | TRD - Page 11-11                       |     |
| LOS - Level of service                                      | BFFS - Base free-flow speed |                                  | LOS, S, FFS, v <sub>p</sub> - Exhibits 11-2, 11-3   |  |     |
| DDHV - Directional design hour volume                       |                             |                                  |   |  |     |

| BASIC FREEWAY SEGMENTS WORKSHEET                            |                             |                                  |   |  |     |
|---|-----------------------------|----------------------------------|---|--|-----|
| <b>General Information</b>                                  |                             |                                  | <b>Site Information</b>   |  |     |
| Analyst   | Shane Forsythe              |                                  | Highway/Direction of Travel I-15 SB   |  |     |
| Agency or Company   |                             |                                  | From/To North of Central Ave  |  |     |
| Date Performed  | 8/7/2014                    |                                  | Jurisdiction  |  |     |
| Analysis Time Period  | PM Peak                     |                                  | Analysis Year 2014  |  |     |
| Project Description I-15 Corridor Study                     |                             |                                  |   |  |     |
| <input checked="" type="checkbox"/> Oper.(LOS)              |                             | <input type="checkbox"/> Des.(N) |   | <input type="checkbox"/> Planning Data |     |
| <b>Flow Inputs</b>  |                             |                                  |   |  |     |
| Volume, V   | 309                         | veh/h                            | Peak-Hour Factor, PHF   | 0.79                                   |     |
| AADT  |                             | veh/day                          | %Trucks and Buses, P <sub>T</sub>   | 14                                     |     |
| Peak-Hr Prop. of AADT, K                                    |                             |                                  | %RVs, P <sub>R</sub>  | 0                                      |     |
| Peak-Hr Direction Prop, D                                   |                             |                                  | General Terrain:  | Level                                  |     |
| DDHV = AADT x K x D   |                             | veh/h                            | Grade % Length  | mi                                     |     |
|   |                             |                                  | Up/Down %   |  |     |
| <b>Calculate Flow Adjustments</b>                           |                             |                                  |   |  |     |
| f <sub>p</sub>  | 1.00                        |                                  | E <sub>R</sub>  | 1.2                                    |     |
| E <sub>T</sub>  | 1.5                         |                                  | f <sub>HV</sub> = 1/[1+P <sub>T</sub> (E <sub>T</sub> - 1) + P <sub>R</sub> (E <sub>R</sub> - 1)] | 0.935                                  |     |
| <b>Speed Inputs</b>   |                             |                                  | <b>Calc Speed Adj and FFS</b>   |  |     |
| Lane Width  |                             | ft                               |   |  |     |
| Rt-Side Lat. Clearance                                      |                             | ft                               | f <sub>LW</sub>   | mph                                    |     |
| Number of Lanes, N  | 2                           |                                  | f <sub>LC</sub>   | mph                                    |     |
| Total Ramp Density, TRD                                     |                             | ramps/mi                         | TRD Adjustment  | mph                                    |     |
| FFS (measured)  | 65.0                        | mph                              | FFS   | 65.0                                   | mph |
| Base free-flow Speed, BFFS                                  |                             | mph                              |   |  |     |
| <b>LOS and Performance Measures</b>                         |                             |                                  | <b>Design (N)</b>   |  |     |
| <u>Operational (LOS)</u>                                    |                             |                                  | <u>Design (N)</u>   |  |     |
| v <sub>p</sub> = (V or DDHV) / (PHF x N x f <sub>HV</sub> ) |                             |                                  | Design LOS  |  |     |
|   | 210                         | pc/h/ln                          | v <sub>p</sub> = (V or DDHV) / (PHF x N x f <sub>HV</sub> )                                       |  |     |
| x f <sub>p</sub> )  |                             |                                  | x f <sub>p</sub> )  |  |     |
| S   | 65.0                        | mph                              | S   |  |     |
| D = v <sub>p</sub> / S                                      | 3.2                         | pc/mi/ln                         | D = v <sub>p</sub> / S  |  |     |
| LOS   | A                           |                                  | Required Number of Lanes, N   |  |     |
| <b>Glossary</b>   |                             |                                  | <b>Factor Location</b>  |  |     |
| N - Number of lanes   | S - Speed                   |                                  | E <sub>R</sub> - Exhibits 11-10, 11-12  | f <sub>LW</sub> - Exhibit 11-8         |     |
| V - Hourly volume   | D - Density                 |                                  | E <sub>T</sub> - Exhibits 11-10, 11-11, 11-13   | f <sub>LC</sub> - Exhibit 11-9         |     |
| v <sub>p</sub> - Flow rate                                  | FFS - Free-flow speed       |                                  | f <sub>p</sub> - Page 11-18   | TRD - Page 11-11                       |     |
| LOS - Level of service                                      | BFFS - Base free-flow speed |                                  | LOS, S, FFS, v <sub>p</sub> - Exhibits 11-2, 11-3   |  |     |
| DDHV - Directional design hour volume                       |                             |                                  |   |  |     |

| BASIC FREEWAY SEGMENTS WORKSHEET                            |                             |                                  |   |  |     |
|---|-----------------------------|----------------------------------|---|--|-----|
| <b>General Information</b>                                  |                             |                                  | <b>Site Information</b>   |  |     |
| Analyst   | Shane Forsythe              |                                  | Highway/Direction of Travel I-15 NB   |  |     |
| Agency or Company   |                             |                                  | From/To North of Emerson Junction   |  |     |
| Date Performed  | 8/7/2014                    |                                  | Jurisdiction  |  |     |
| Analysis Time Period  | AM Peak                     |                                  | Analysis Year 2014  |  |     |
| Project Description I-15 Corridor Study                     |                             |                                  |   |  |     |
| <input checked="" type="checkbox"/> Oper.(LOS)              |                             | <input type="checkbox"/> Des.(N) |   | <input type="checkbox"/> Planning Data |     |
| <b>Flow Inputs</b>  |                             |                                  |   |  |     |
| Volume, V   | 288                         | veh/h                            | Peak-Hour Factor, PHF   | 0.89                                   |     |
| AADT  |                             | veh/day                          | %Trucks and Buses, P <sub>T</sub>   | 21                                     |     |
| Peak-Hr Prop. of AADT, K                                    |                             |                                  | %RVs, P <sub>R</sub>  | 0                                      |     |
| Peak-Hr Direction Prop, D                                   |                             |                                  | General Terrain:  | Level                                  |     |
| DDHV = AADT x K x D   |                             | veh/h                            | Grade % Length  | mi                                     |     |
|   |                             |                                  | Up/Down %   |  |     |
| <b>Calculate Flow Adjustments</b>                           |                             |                                  |   |  |     |
| f <sub>p</sub>  | 1.00                        |                                  | E <sub>R</sub>  | 1.2                                    |     |
| E <sub>T</sub>  | 1.5                         |                                  | f <sub>HV</sub> = 1/[1+P <sub>T</sub> (E <sub>T</sub> - 1) + P <sub>R</sub> (E <sub>R</sub> - 1)] | 0.905                                  |     |
| <b>Speed Inputs</b>   |                             |                                  | <b>Calc Speed Adj and FFS</b>   |  |     |
| Lane Width  |                             | ft                               |   |  |     |
| Rt-Side Lat. Clearance                                      |                             | ft                               | f <sub>LW</sub>   | mph                                    |     |
| Number of Lanes, N  | 2                           |                                  | f <sub>LC</sub>   | mph                                    |     |
| Total Ramp Density, TRD                                     |                             | ramps/mi                         | TRD Adjustment  | mph                                    |     |
| FFS (measured)  | 65.0                        | mph                              | FFS   | 65.0                                   | mph |
| Base free-flow Speed, BFFS                                  |                             | mph                              |   |  |     |
| <b>LOS and Performance Measures</b>                         |                             |                                  | <b>Design (N)</b>   |  |     |
| <u>Operational (LOS)</u>                                    |                             |                                  | <u>Design (N)</u>   |  |     |
| v <sub>p</sub> = (V or DDHV) / (PHF x N x f <sub>HV</sub> ) |                             |                                  | Design LOS  |  |     |
|   | 179                         | pc/h/ln                          | v <sub>p</sub> = (V or DDHV) / (PHF x N x f <sub>HV</sub> )                                       |  |     |
| x f <sub>p</sub> )  |                             |                                  | x f <sub>p</sub> )  |  |     |
| S   | 65.0                        | mph                              | S   |  |     |
| D = v <sub>p</sub> / S                                      | 2.8                         | pc/mi/ln                         | D = v <sub>p</sub> / S  |  |     |
| LOS   | A                           |                                  | Required Number of Lanes, N   |  |     |
| <b>Glossary</b>   |                             |                                  | <b>Factor Location</b>  |  |     |
| N - Number of lanes   | S - Speed                   |                                  | E <sub>R</sub> - Exhibits 11-10, 11-12  | f <sub>LW</sub> - Exhibit 11-8         |     |
| V - Hourly volume   | D - Density                 |                                  | E <sub>T</sub> - Exhibits 11-10, 11-11, 11-13   | f <sub>LC</sub> - Exhibit 11-9         |     |
| v <sub>p</sub> - Flow rate                                  | FFS - Free-flow speed       |                                  | f <sub>p</sub> - Page 11-18   | TRD - Page 11-11                       |     |
| LOS - Level of service                                      | BFFS - Base free-flow speed |                                  | LOS, S, FFS, v <sub>p</sub> - Exhibits 11-2, 11-3   |  |     |
| DDHV - Directional design hour volume                       |                             |                                  |   |  |     |

| BASIC FREEWAY SEGMENTS WORKSHEET                            |                             |                                  |   |  |     |
|---|-----------------------------|----------------------------------|---|--|-----|
| <b>General Information</b>                                  |                             |                                  | <b>Site Information</b>   |  |     |
| Analyst   | Shane Forsythe              |                                  | Highway/Direction of Travel I-15 SB   |  |     |
| Agency or Company   |                             |                                  | From/To North of Emerson Junction   |  |     |
| Date Performed  | 8/7/2014                    |                                  | Jurisdiction  |  |     |
| Analysis Time Period  | AM Peak                     |                                  | Analysis Year 2014  |  |     |
| Project Description I-15 Corridor Study                     |                             |                                  |   |  |     |
| <input checked="" type="checkbox"/> Oper.(LOS)              |                             | <input type="checkbox"/> Des.(N) |   | <input type="checkbox"/> Planning Data |     |
| <b>Flow Inputs</b>  |                             |                                  |   |  |     |
| Volume, V   | 548                         | veh/h                            | Peak-Hour Factor, PHF   | 0.87                                   |     |
| AADT  |                             | veh/day                          | %Trucks and Buses, P <sub>T</sub>   | 6                                      |     |
| Peak-Hr Prop. of AADT, K                                    |                             |                                  | %RVs, P <sub>R</sub>  | 0                                      |     |
| Peak-Hr Direction Prop, D                                   |                             |                                  | General Terrain:  | Level                                  |     |
| DDHV = AADT x K x D   |                             | veh/h                            | Grade % Length  | mi                                     |     |
|   |                             |                                  | Up/Down %   |  |     |
| <b>Calculate Flow Adjustments</b>                           |                             |                                  |   |  |     |
| f <sub>p</sub>  | 1.00                        |                                  | E <sub>R</sub>  | 1.2                                    |     |
| E <sub>T</sub>  | 1.5                         |                                  | f <sub>HV</sub> = 1/[1+P <sub>T</sub> (E <sub>T</sub> - 1) + P <sub>R</sub> (E <sub>R</sub> - 1)] | 0.971                                  |     |
| <b>Speed Inputs</b>   |                             |                                  | <b>Calc Speed Adj and FFS</b>   |  |     |
| Lane Width  |                             | ft                               |   |  |     |
| Rt-Side Lat. Clearance                                      |                             | ft                               | f <sub>LW</sub>   | mph                                    |     |
| Number of Lanes, N  | 2                           |                                  | f <sub>LC</sub>   | mph                                    |     |
| Total Ramp Density, TRD                                     |                             | ramps/mi                         | TRD Adjustment  | mph                                    |     |
| FFS (measured)  | 65.0                        | mph                              | FFS   | 65.0                                   | mph |
| Base free-flow Speed, BFFS                                  |                             | mph                              |   |  |     |
| <b>LOS and Performance Measures</b>                         |                             |                                  | <b>Design (N)</b>   |  |     |
| <u>Operational (LOS)</u>                                    |                             |                                  | <u>Design (N)</u>   |  |     |
| v <sub>p</sub> = (V or DDHV) / (PHF x N x f <sub>HV</sub> ) |                             |                                  | Design LOS  |  |     |
|   | 323                         | pc/h/ln                          | v <sub>p</sub> = (V or DDHV) / (PHF x N x f <sub>HV</sub> )                                       |  |     |
| x f <sub>p</sub> )  |                             |                                  | x f <sub>p</sub> )  |  |     |
| S   | 65.0                        | mph                              | S   |  |     |
| D = v <sub>p</sub> / S                                      | 5.0                         | pc/mi/ln                         | D = v <sub>p</sub> / S  |  |     |
| LOS   | A                           |                                  | Required Number of Lanes, N   |  |     |
| <b>Glossary</b>   |                             |                                  | <b>Factor Location</b>  |  |     |
| N - Number of lanes   | S - Speed                   |                                  | E <sub>R</sub> - Exhibits 11-10, 11-12  | f <sub>LW</sub> - Exhibit 11-8         |     |
| V - Hourly volume   | D - Density                 |                                  | E <sub>T</sub> - Exhibits 11-10, 11-11, 11-13   | f <sub>LC</sub> - Exhibit 11-9         |     |
| v <sub>p</sub> - Flow rate                                  | FFS - Free-flow speed       |                                  | f <sub>p</sub> - Page 11-18   | TRD - Page 11-11                       |     |
| LOS - Level of service                                      | BFFS - Base free-flow speed |                                  | LOS, S, FFS, v <sub>p</sub> - Exhibits 11-2, 11-3   |  |     |
| DDHV - Directional design hour volume                       |                             |                                  |   |  |     |

| BASIC FREEWAY SEGMENTS WORKSHEET                            |                             |                                  |   |  |     |
|---|-----------------------------|----------------------------------|---|--|-----|
| <b>General Information</b>                                  |                             |                                  | <b>Site Information</b>   |  |     |
| Analyst   | Shane Forsythe              |                                  | Highway/Direction of Travel I-15 NB   |  |     |
| Agency or Company   |                             |                                  | From/To North of Emerson Junction   |  |     |
| Date Performed  | 8/7/2014                    |                                  | Jurisdiction  |  |     |
| Analysis Time Period  | PM Peak                     |                                  | Analysis Year 2014  |  |     |
| Project Description I-15 Corridor Study                     |                             |                                  |   |  |     |
| <input checked="" type="checkbox"/> Oper.(LOS)              |                             | <input type="checkbox"/> Des.(N) |   | <input type="checkbox"/> Planning Data |     |
| <b>Flow Inputs</b>  |                             |                                  |   |  |     |
| Volume, V   | 696                         | veh/h                            | Peak-Hour Factor, PHF   | 0.94                                   |     |
| AADT  |                             | veh/day                          | %Trucks and Buses, P <sub>T</sub>   | 6                                      |     |
| Peak-Hr Prop. of AADT, K                                    |                             |                                  | %RVs, P <sub>R</sub>  | 0                                      |     |
| Peak-Hr Direction Prop, D                                   |                             |                                  | General Terrain:  | Level                                  |     |
| DDHV = AADT x K x D   |                             | veh/h                            | Grade % Length  | mi                                     |     |
|   |                             |                                  | Up/Down %   |  |     |
| <b>Calculate Flow Adjustments</b>                           |                             |                                  |   |  |     |
| f <sub>p</sub>  | 1.00                        |                                  | E <sub>R</sub>  | 1.2                                    |     |
| E <sub>T</sub>  | 1.5                         |                                  | f <sub>HV</sub> = 1/[1+P <sub>T</sub> (E <sub>T</sub> - 1) + P <sub>R</sub> (E <sub>R</sub> - 1)] | 0.971                                  |     |
| <b>Speed Inputs</b>   |                             |                                  | <b>Calc Speed Adj and FFS</b>   |  |     |
| Lane Width  |                             | ft                               |   |  |     |
| Rt-Side Lat. Clearance                                      |                             | ft                               | f <sub>LW</sub>   | mph                                    |     |
| Number of Lanes, N  | 2                           |                                  | f <sub>LC</sub>   | mph                                    |     |
| Total Ramp Density, TRD                                     |                             | ramps/mi                         | TRD Adjustment  | mph                                    |     |
| FFS (measured)  | 65.0                        | mph                              | FFS   | 65.0                                   | mph |
| Base free-flow Speed, BFFS                                  |                             | mph                              |   |  |     |
| <b>LOS and Performance Measures</b>                         |                             |                                  | <b>Design (N)</b>   |  |     |
| <u>Operational (LOS)</u>                                    |                             |                                  | <u>Design (N)</u>   |  |     |
| v <sub>p</sub> = (V or DDHV) / (PHF x N x f <sub>HV</sub> ) |                             |                                  | Design LOS  |  |     |
|   | 383                         | pc/h/ln                          | v <sub>p</sub> = (V or DDHV) / (PHF x N x f <sub>HV</sub> )                                       |  |     |
| x f <sub>p</sub> )  |                             |                                  | x f <sub>p</sub> )  |  |     |
| S   | 65.0                        | mph                              | S   |  |     |
| D = v <sub>p</sub> / S                                      | 5.9                         | pc/mi/ln                         | D = v <sub>p</sub> / S  |  |     |
| LOS   | A                           |                                  | Required Number of Lanes, N   |  |     |
| <b>Glossary</b>   |                             |                                  | <b>Factor Location</b>  |  |     |
| N - Number of lanes   | S - Speed                   |                                  | E <sub>R</sub> - Exhibits 11-10, 11-12  | f <sub>LW</sub> - Exhibit 11-8         |     |
| V - Hourly volume   | D - Density                 |                                  | E <sub>T</sub> - Exhibits 11-10, 11-11, 11-13   | f <sub>LC</sub> - Exhibit 11-9         |     |
| v <sub>p</sub> - Flow rate                                  | FFS - Free-flow speed       |                                  | f <sub>p</sub> - Page 11-18   | TRD - Page 11-11                       |     |
| LOS - Level of service                                      | BFFS - Base free-flow speed |                                  | LOS, S, FFS, v <sub>p</sub> - Exhibits 11-2, 11-3   |  |     |
| DDHV - Directional design hour volume                       |                             |                                  |   |  |     |

| BASIC FREEWAY SEGMENTS WORKSHEET                            |                             |                                  |   |  |     |
|---|-----------------------------|----------------------------------|---|--|-----|
| <b>General Information</b>                                  |                             |                                  | <b>Site Information</b>   |  |     |
| Analyst   | Shane Forsythe              |                                  | Highway/Direction of Travel I-15 SB   |  |     |
| Agency or Company   |                             |                                  | From/To North of Emerson Junction   |  |     |
| Date Performed  | 8/7/2014                    |                                  | Jurisdiction  |  |     |
| Analysis Time Period  | PM Peak                     |                                  | Analysis Year 2014  |  |     |
| Project Description I-15 Corridor Study                     |                             |                                  |   |  |     |
| <input checked="" type="checkbox"/> Oper.(LOS)              |                             | <input type="checkbox"/> Des.(N) |   | <input type="checkbox"/> Planning Data |     |
| <b>Flow Inputs</b>  |                             |                                  |   |  |     |
| Volume, V   | 456                         | veh/h                            | Peak-Hour Factor, PHF   | 0.88                                   |     |
| AADT  |                             | veh/day                          | %Trucks and Buses, P <sub>T</sub>   | 13                                     |     |
| Peak-Hr Prop. of AADT, K                                    |                             |                                  | %RVs, P <sub>R</sub>  | 0                                      |     |
| Peak-Hr Direction Prop, D                                   |                             |                                  | General Terrain:  | Level                                  |     |
| DDHV = AADT x K x D   |                             | veh/h                            | Grade % Length  | mi                                     |     |
|   |                             |                                  | Up/Down %   |  |     |
| <b>Calculate Flow Adjustments</b>                           |                             |                                  |   |  |     |
| f <sub>p</sub>  | 1.00                        |                                  | E <sub>R</sub>  | 1.2                                    |     |
| E <sub>T</sub>  | 1.5                         |                                  | f <sub>HV</sub> = 1/[1+P <sub>T</sub> (E <sub>T</sub> - 1) + P <sub>R</sub> (E <sub>R</sub> - 1)] | 0.939                                  |     |
| <b>Speed Inputs</b>   |                             |                                  | <b>Calc Speed Adj and FFS</b>   |  |     |
| Lane Width  |                             | ft                               |   |  |     |
| Rt-Side Lat. Clearance                                      |                             | ft                               | f <sub>LW</sub>   | mph                                    |     |
| Number of Lanes, N  | 2                           |                                  | f <sub>LC</sub>   | mph                                    |     |
| Total Ramp Density, TRD                                     |                             | ramps/mi                         | TRD Adjustment  | mph                                    |     |
| FFS (measured)  | 65.0                        | mph                              | FFS   | 65.0                                   | mph |
| Base free-flow Speed, BFFS                                  |                             | mph                              |   |  |     |
| <b>LOS and Performance Measures</b>                         |                             |                                  | <b>Design (N)</b>   |  |     |
| <u>Operational (LOS)</u>                                    |                             |                                  | <u>Design (N)</u>   |  |     |
| v <sub>p</sub> = (V or DDHV) / (PHF x N x f <sub>HV</sub> ) |                             |                                  | Design LOS  |  |     |
|   | 277                         | pc/h/ln                          | v <sub>p</sub> = (V or DDHV) / (PHF x N x f <sub>HV</sub> )                                       |  |     |
| x f <sub>p</sub> )  |                             |                                  | x f <sub>p</sub> )  |  |     |
| S   | 65.0                        | mph                              | S   |  |     |
| D = v <sub>p</sub> / S                                      | 4.3                         | pc/mi/ln                         | D = v <sub>p</sub> / S  |  |     |
| LOS   | A                           |                                  | Required Number of Lanes, N   |  |     |
| <b>Glossary</b>   |                             |                                  | <b>Factor Location</b>  |  |     |
| N - Number of lanes   | S - Speed                   |                                  | E <sub>R</sub> - Exhibits 11-10, 11-12  | f <sub>LW</sub> - Exhibit 11-8         |     |
| V - Hourly volume   | D - Density                 |                                  | E <sub>T</sub> - Exhibits 11-10, 11-11, 11-13   | f <sub>LC</sub> - Exhibit 11-9         |     |
| v <sub>p</sub> - Flow rate                                  | FFS - Free-flow speed       |                                  | f <sub>p</sub> - Page 11-18   | TRD - Page 11-11                       |     |
| LOS - Level of service                                      | BFFS - Base free-flow speed |                                  | LOS, S, FFS, v <sub>p</sub> - Exhibits 11-2, 11-3   |  |     |
| DDHV - Directional design hour volume                       |                             |                                  |   |  |     |



| BASIC FREEWAY SEGMENTS WORKSHEET  |                |                                  |  |  |  |
|---|----------------|----------------------------------|--|--|--|
| <b>General Information</b>  |                |                                  | <b>Site Information</b>  |  |  |
| Analyst   | Shane Forsythe |                                  | Highway/Direction of Travel <i>I-15 NB</i>   |  |  |
| Agency or Company   |                |                                  | From/To <i>North of Gore Hill</i>  |  |  |
| Date Performed  | 8/7/2014       |                                  | Jurisdiction   |  |  |
| Analysis Time Period  | AM Peak        |                                  | Analysis Year <i>2014</i>  |  |  |
| Project Description <i>I-15 Corridor Study</i>                          |                |                                  |  |  |  |
| <input checked="" type="checkbox"/> Oper.(LOS)                          |                | <input type="checkbox"/> Des.(N) |  | <input type="checkbox"/> Planning Data |  |
| <b>Flow Inputs</b>  |                |                                  |  |  |  |
| Volume, V   | 517            | veh/h                            | Peak-Hour Factor, PHF  | 0.90                                   |  |
| AADT  |                | veh/day                          | %Trucks and Buses, P <sub>T</sub>  | 16                                     |  |
| Peak-Hr Prop. of AADT, K  |                |                                  | %RVs, P <sub>R</sub>   | 0                                      |  |
| Peak-Hr Direction Prop, D   |                |                                  | General Terrain:   | Grade                                  |  |
| DDHV = AADT x K x D   |                | veh/h                            | Grade -5.00%   | 0.69mi                                 |  |
|   |                |                                  | Length   | Up/Down % -5.00                        |  |
| <b>Calculate Flow Adjustments</b>                                       |                |                                  |  |  |  |
| f <sub>p</sub>  | 1.00           |                                  | E <sub>R</sub>   | 1.2                                    |  |
| E <sub>T</sub>  | 1.5            |                                  | f <sub>HV</sub> = 1/[1+P <sub>T</sub> (E <sub>T</sub> - 1) + P <sub>R</sub> (E <sub>R</sub> - 1)] 0.926  |  |  |
| <b>Speed Inputs</b>   |                |                                  | <b>Calc Speed Adj and FFS</b>  |  |  |
| Lane Width  | ft             |                                  | <div style="display: flex; justify-content: space-between;"> <div>f<sub>LW</sub></div> <div>mph</div> </div> <div style="display: flex; justify-content: space-between;"> <div>f<sub>LC</sub></div> <div>mph</div> </div> <div style="display: flex; justify-content: space-between;"> <div>TRD Adjustment</div> <div>mph</div> </div> <div style="display: flex; justify-content: space-between;"> <div>FFS</div> <div>65.0</div> <div>mph</div> </div> |  |  |
| Rt-Side Lat. Clearance  | ft             |                                  |  |  |  |
| Number of Lanes, N  | 2              |                                  |  |  |  |
| Total Ramp Density, TRD   | ramps/mi       |                                  |  |  |  |
| FFS (measured)  | 65.0 mph       |                                  |  |  |  |
| Base free-flow Speed, BFFS  | mph            |                                  |  |  |  |
| <b>LOS and Performance Measures</b>                                     |                |                                  | <b>Design (N)</b>  |  |  |
| Operational (LOS)   |                |                                  | Design (N)   |  |  |
| v <sub>p</sub> = (V or DDHV) / (PHF x N x f <sub>HV</sub> ) 311 pc/h/ln |                |                                  | Design LOS   |  |  |
| x f <sub>p</sub> )  |                |                                  | v <sub>p</sub> = (V or DDHV) / (PHF x N x f <sub>HV</sub> ) pc/h/ln  |  |  |
| S 65.0 mph  |                |                                  | x f <sub>p</sub> )   |  |  |
| D = v <sub>p</sub> / S 4.8 pc/mi/ln                                     |                |                                  | S mph  |  |  |
| LOS A   |                |                                  | D = v <sub>p</sub> / S pc/mi/ln  |  |  |
|   |                |                                  | Required Number of Lanes, N  |  |  |
| <b>Glossary</b>   |                |                                  | <b>Factor Location</b>   |  |  |
| N - Number of lanes   |                |                                  | E <sub>R</sub> - Exhibits 11-10, 11-12   |  |  |
| S - Speed   |                |                                  | f <sub>LW</sub> - Exhibit 11-8   |  |  |
| V - Hourly volume   |                |                                  | E <sub>T</sub> - Exhibits 11-10, 11-11, 11-13  |  |  |
| D - Density   |                |                                  | f <sub>LC</sub> - Exhibit 11-9   |  |  |
| v <sub>p</sub> - Flow rate  |                |                                  | f <sub>p</sub> - Page 11-18  |  |  |
| FFS - Free-flow speed   |                |                                  | TRD - Page 11-11   |  |  |
| LOS - Level of service  |                |                                  | LOS, S, FFS, v <sub>p</sub> - Exhibits 11-2, 11-3  |  |  |
| BFFS - Base free-flow speed   |                |                                  |  |  |  |
| DDHV - Directional design hour volume                                   |                |                                  |  |  |  |

| BASIC FREEWAY SEGMENTS WORKSHEET                            |                             |                                  |   |  |        |
|---|-----------------------------|----------------------------------|---|--|--------|
| <b>General Information</b>                                  |                             |                                  | <b>Site Information</b>   |  |        |
| Analyst   | Shane Forsythe              |                                  | Highway/Direction of Travel I-15 SB   |  |        |
| Agency or Company   |                             |                                  | From/To North of Gore Hill  |  |        |
| Date Performed  | 8/7/2014                    |                                  | Jurisdiction  |  |        |
| Analysis Time Period  | AM Peak                     |                                  | Analysis Year 2014  |  |        |
| Project Description I-15 Corridor Study                     |                             |                                  |   |  |        |
| <input checked="" type="checkbox"/> Oper.(LOS)              |                             | <input type="checkbox"/> Des.(N) |   | <input type="checkbox"/> Planning Data |        |
| <b>Flow Inputs</b>  |                             |                                  |   |  |        |
| Volume, V   | 458                         | veh/h                            | Peak-Hour Factor, PHF   | 0.85                                   |        |
| AADT  |                             | veh/day                          | %Trucks and Buses, P <sub>T</sub>   | 7                                      |        |
| Peak-Hr Prop. of AADT, K                                    |                             |                                  | %RVs, P <sub>R</sub>  | 0                                      |        |
| Peak-Hr Direction Prop, D                                   |                             |                                  | General Terrain:  | Grade                                  |        |
| DDHV = AADT x K x D   |                             | veh/h                            | Grade 5.00%   | Length                                 | 0.69mi |
|   |                             |                                  | Up/Down %   | 5.00                                   |        |
| <b>Calculate Flow Adjustments</b>                           |                             |                                  |   |  |        |
| f <sub>p</sub>  | 1.00                        |                                  | E <sub>R</sub>  | 4.5                                    |        |
| E <sub>T</sub>  | 2.8                         |                                  | f <sub>HV</sub> = 1/[1+P <sub>T</sub> (E <sub>T</sub> - 1) + P <sub>R</sub> (E <sub>R</sub> - 1)] | 0.891                                  |        |
| <b>Speed Inputs</b>   |                             |                                  | <b>Calc Speed Adj and FFS</b>   |  |        |
| Lane Width  |                             | ft                               |   |  |        |
| Rt-Side Lat. Clearance                                      |                             | ft                               | f <sub>LW</sub>   | mph                                    |        |
| Number of Lanes, N  | 2                           |                                  | f <sub>LC</sub>   | mph                                    |        |
| Total Ramp Density, TRD                                     |                             | ramps/mi                         | TRD Adjustment  | mph                                    |        |
| FFS (measured)  | 65.0                        | mph                              | FFS   | 65.0                                   | mph    |
| Base free-flow Speed, BFFS                                  |                             | mph                              |   |  |        |
| <b>LOS and Performance Measures</b>                         |                             |                                  | <b>Design (N)</b>   |  |        |
| <u>Operational (LOS)</u>                                    |                             |                                  | <u>Design (N)</u>   |  |        |
| v <sub>p</sub> = (V or DDHV) / (PHF x N x f <sub>HV</sub> ) |                             |                                  | Design LOS  |  |        |
|   | 303                         | pc/h/ln                          | v <sub>p</sub> = (V or DDHV) / (PHF x N x f <sub>HV</sub> )                                       |  |        |
| x f <sub>p</sub> )  |                             |                                  | x f <sub>p</sub> )  |  |        |
| S   | 65.0                        | mph                              | S   |  |        |
| D = v <sub>p</sub> / S                                      | 4.7                         | pc/mi/ln                         | D = v <sub>p</sub> / S  |  |        |
| LOS   | A                           |                                  | Required Number of Lanes, N   |  |        |
| <b>Glossary</b>   |                             |                                  | <b>Factor Location</b>  |  |        |
| N - Number of lanes   | S - Speed                   |                                  | E <sub>R</sub> - Exhibits 11-10, 11-12  | f <sub>LW</sub> - Exhibit 11-8         |        |
| V - Hourly volume   | D - Density                 |                                  | E <sub>T</sub> - Exhibits 11-10, 11-11, 11-13   | f <sub>LC</sub> - Exhibit 11-9         |        |
| v <sub>p</sub> - Flow rate                                  | FFS - Free-flow speed       |                                  | f <sub>p</sub> - Page 11-18   | TRD - Page 11-11                       |        |
| LOS - Level of service                                      | BFFS - Base free-flow speed |                                  | LOS, S, FFS, v <sub>p</sub> - Exhibits 11-2, 11-3   |  |        |
| DDHV - Directional design hour volume                       |                             |                                  |   |  |        |

| BASIC FREEWAY SEGMENTS WORKSHEET                            |                             |                                  |   |  |        |
|---|-----------------------------|----------------------------------|---|--|--------|
| <b>General Information</b>                                  |                             |                                  | <b>Site Information</b>   |  |        |
| Analyst   | Shane Forsythe              |                                  | Highway/Direction of Travel   | I-15 NB                                |        |
| Agency or Company   |                             |                                  | From/To   | North of Gore Hill                     |        |
| Date Performed  | 8/7/2014                    |                                  | Jurisdiction  |  |        |
| Analysis Time Period  | PM Peak                     |                                  | Analysis Year   | 2014                                   |        |
| Project Description I-15 Corridor Study                     |                             |                                  |   |  |        |
| <input checked="" type="checkbox"/> Oper.(LOS)              |                             | <input type="checkbox"/> Des.(N) |   | <input type="checkbox"/> Planning Data |        |
| <b>Flow Inputs</b>  |                             |                                  |   |  |        |
| Volume, V   | 722                         | veh/h                            | Peak-Hour Factor, PHF   | 0.80                                   |        |
| AADT  |                             | veh/day                          | %Trucks and Buses, P <sub>T</sub>   | 10                                     |        |
| Peak-Hr Prop. of AADT, K                                    |                             |                                  | %RVs, P <sub>R</sub>  | 0                                      |        |
| Peak-Hr Direction Prop, D                                   |                             |                                  | General Terrain:  | Grade                                  |        |
| DDHV = AADT x K x D   |                             | veh/h                            | Grade   | -5.00%                                 | 0.69mi |
|   |                             |                                  | Length  |  |        |
|   |                             |                                  | Up/Down %   | -5.00                                  |        |
| <b>Calculate Flow Adjustments</b>                           |                             |                                  |   |  |        |
| f <sub>p</sub>  | 1.00                        |                                  | E <sub>R</sub>  | 1.2                                    |        |
| E <sub>T</sub>  | 1.5                         |                                  | f <sub>HV</sub> = 1/[1+P <sub>T</sub> (E <sub>T</sub> - 1) + P <sub>R</sub> (E <sub>R</sub> - 1)] | 0.952                                  |        |
| <b>Speed Inputs</b>   |                             |                                  | <b>Calc Speed Adj and FFS</b>   |  |        |
| Lane Width  |                             | ft                               |   |  |        |
| Rt-Side Lat. Clearance                                      |                             | ft                               | f <sub>LW</sub>   | mph                                    |        |
| Number of Lanes, N  | 2                           |                                  | f <sub>LC</sub>   | mph                                    |        |
| Total Ramp Density, TRD                                     |                             | ramps/mi                         | TRD Adjustment  | mph                                    |        |
| FFS (measured)  | 65.0                        | mph                              | FFS   | 65.0                                   | mph    |
| Base free-flow Speed, BFFS                                  |                             | mph                              |   |  |        |
| <b>LOS and Performance Measures</b>                         |                             |                                  | <b>Design (N)</b>   |  |        |
| <u>Operational (LOS)</u>                                    |                             |                                  | <u>Design (N)</u>   |  |        |
| v <sub>p</sub> = (V or DDHV) / (PHF x N x f <sub>HV</sub> ) | 473                         | pc/h/ln                          | Design LOS  |  |        |
| x f <sub>p</sub> )  |                             |                                  | v <sub>p</sub> = (V or DDHV) / (PHF x N x f <sub>HV</sub> )                                       |  |        |
| S   | 65.0                        | mph                              | x f <sub>p</sub> )  |  |        |
| D = v <sub>p</sub> / S                                      | 7.3                         | pc/mi/ln                         | S   |  |        |
| LOS   | A                           |                                  | D = v <sub>p</sub> / S  |  |        |
|   |                             |                                  | Required Number of Lanes, N   |  |        |
| <b>Glossary</b>   |                             |                                  | <b>Factor Location</b>  |  |        |
| N - Number of lanes   | S - Speed                   |                                  | E <sub>R</sub> - Exhibits 11-10, 11-12  | f <sub>LW</sub> - Exhibit 11-8         |        |
| V - Hourly volume   | D - Density                 |                                  | E <sub>T</sub> - Exhibits 11-10, 11-11, 11-13   | f <sub>LC</sub> - Exhibit 11-9         |        |
| v <sub>p</sub> - Flow rate                                  | FFS - Free-flow speed       |                                  | f <sub>p</sub> - Page 11-18   | TRD - Page 11-11                       |        |
| LOS - Level of service                                      | BFFS - Base free-flow speed |                                  | LOS, S, FFS, v <sub>p</sub> - Exhibits 11-2, 11-3   |  |        |
| DDHV - Directional design hour volume                       |                             |                                  |   |  |        |

| BASIC FREEWAY SEGMENTS WORKSHEET                            |                             |                                  |   |  |        |
|---|-----------------------------|----------------------------------|---|--|--------|
| <b>General Information</b>                                  |                             |                                  | <b>Site Information</b>   |  |        |
| Analyst   | Shane Forsythe              |                                  | Highway/Direction of Travel I-15 SB   |  |        |
| Agency or Company   |                             |                                  | From/To North of Gore Hill  |  |        |
| Date Performed  | 8/7/2014                    |                                  | Jurisdiction  |  |        |
| Analysis Time Period  | PM Peak                     |                                  | Analysis Year 2014  |  |        |
| Project Description I-15 Corridor Study                     |                             |                                  |   |  |        |
| <input checked="" type="checkbox"/> Oper.(LOS)              |                             | <input type="checkbox"/> Des.(N) |   | <input type="checkbox"/> Planning Data |        |
| <b>Flow Inputs</b>  |                             |                                  |   |  |        |
| Volume, V   | 630                         | veh/h                            | Peak-Hour Factor, PHF   | 0.93                                   |        |
| AADT  |                             | veh/day                          | %Trucks and Buses, P <sub>T</sub>   | 10                                     |        |
| Peak-Hr Prop. of AADT, K                                    |                             |                                  | %RVs, P <sub>R</sub>  | 0                                      |        |
| Peak-Hr Direction Prop, D                                   |                             |                                  | General Terrain:  | Grade                                  |        |
| DDHV = AADT x K x D   |                             | veh/h                            | Grade 5.00%   | Length                                 | 0.69mi |
|   |                             |                                  | Up/Down %   | 5.00                                   |        |
| <b>Calculate Flow Adjustments</b>                           |                             |                                  |   |  |        |
| f <sub>p</sub>  | 1.00                        |                                  | E <sub>R</sub>  | 4.5                                    |        |
| E <sub>T</sub>  | 2.5                         |                                  | f <sub>HV</sub> = 1/[1+P <sub>T</sub> (E <sub>T</sub> - 1) + P <sub>R</sub> (E <sub>R</sub> - 1)] | 0.870                                  |        |
| <b>Speed Inputs</b>   |                             |                                  | <b>Calc Speed Adj and FFS</b>   |  |        |
| Lane Width  |                             | ft                               |   |  |        |
| Rt-Side Lat. Clearance                                      |                             | ft                               | f <sub>LW</sub>   | mph                                    |        |
| Number of Lanes, N  | 2                           |                                  | f <sub>LC</sub>   | mph                                    |        |
| Total Ramp Density, TRD                                     |                             | ramps/mi                         | TRD Adjustment  | mph                                    |        |
| FFS (measured)  | 65.0                        | mph                              | FFS   | 65.0                                   | mph    |
| Base free-flow Speed, BFFS                                  |                             | mph                              |   |  |        |
| <b>LOS and Performance Measures</b>                         |                             |                                  | <b>Design (N)</b>   |  |        |
| <u>Operational (LOS)</u>                                    |                             |                                  | <u>Design (N)</u>   |  |        |
| v <sub>p</sub> = (V or DDHV) / (PHF x N x f <sub>HV</sub> ) |                             |                                  | Design LOS  |  |        |
|   | 391                         | pc/h/ln                          | v <sub>p</sub> = (V or DDHV) / (PHF x N x f <sub>HV</sub> )                                       |  |        |
| x f <sub>p</sub> )  |                             |                                  | x f <sub>p</sub> )  |  |        |
| S   | 65.0                        | mph                              | S   |  |        |
| D = v <sub>p</sub> / S                                      | 6.0                         | pc/mi/ln                         | D = v <sub>p</sub> / S  |  |        |
| LOS   | A                           |                                  | Required Number of Lanes, N   |  |        |
| <b>Glossary</b>   |                             |                                  | <b>Factor Location</b>  |  |        |
| N - Number of lanes   | S - Speed                   |                                  | E <sub>R</sub> - Exhibits 11-10, 11-12  | f <sub>LW</sub> - Exhibit 11-8         |        |
| V - Hourly volume   | D - Density                 |                                  | E <sub>T</sub> - Exhibits 11-10, 11-11, 11-13   | f <sub>LC</sub> - Exhibit 11-9         |        |
| v <sub>p</sub> - Flow rate                                  | FFS - Free-flow speed       |                                  | f <sub>p</sub> - Page 11-18   | TRD - Page 11-11                       |        |
| LOS - Level of service                                      | BFFS - Base free-flow speed |                                  | LOS, S, FFS, v <sub>p</sub> - Exhibits 11-2, 11-3   |  |        |
| DDHV - Directional design hour volume                       |                             |                                  |   |  |        |

| BASIC FREEWAY SEGMENTS WORKSHEET                            |                             |                                  |   |  |     |
|---|-----------------------------|----------------------------------|---|--|-----|
| <b>General Information</b>                                  |                             |                                  | <b>Site Information</b>   |  |     |
| Analyst   | Shane Forsythe              |                                  | Highway/Direction of Travel I-15 NB   |  |     |
| Agency or Company   |                             |                                  | From/To South of Central  |  |     |
| Date Performed  | 8/7/2014                    |                                  | Jurisdiction  |  |     |
| Analysis Time Period  | AM Peak                     |                                  | Analysis Year 2014  |  |     |
| Project Description I-15 Corridor Study                     |                             |                                  |   |  |     |
| <input checked="" type="checkbox"/> Oper.(LOS)              |                             | <input type="checkbox"/> Des.(N) |   | <input type="checkbox"/> Planning Data |     |
| <b>Flow Inputs</b>  |                             |                                  |   |  |     |
| Volume, V   | 321                         | veh/h                            | Peak-Hour Factor, PHF   | 0.89                                   |     |
| AADT  |                             | veh/day                          | %Trucks and Buses, P <sub>T</sub>   | 14                                     |     |
| Peak-Hr Prop. of AADT, K                                    |                             |                                  | %RVs, P <sub>R</sub>  | 0                                      |     |
| Peak-Hr Direction Prop, D                                   |                             |                                  | General Terrain:  | Level                                  |     |
| DDHV = AADT x K x D   |                             | veh/h                            | Grade % Length  | mi                                     |     |
|   |                             |                                  | Up/Down %   |  |     |
| <b>Calculate Flow Adjustments</b>                           |                             |                                  |   |  |     |
| f <sub>p</sub>  | 1.00                        |                                  | E <sub>R</sub>  | 1.2                                    |     |
| E <sub>T</sub>  | 1.5                         |                                  | f <sub>HV</sub> = 1/[1+P <sub>T</sub> (E <sub>T</sub> - 1) + P <sub>R</sub> (E <sub>R</sub> - 1)] | 0.935                                  |     |
| <b>Speed Inputs</b>   |                             |                                  | <b>Calc Speed Adj and FFS</b>   |  |     |
| Lane Width  |                             | ft                               |   |  |     |
| Rt-Side Lat. Clearance                                      |                             | ft                               | f <sub>LW</sub>   | mph                                    |     |
| Number of Lanes, N  | 2                           |                                  | f <sub>LC</sub>   | mph                                    |     |
| Total Ramp Density, TRD                                     |                             | ramps/mi                         | TRD Adjustment  | mph                                    |     |
| FFS (measured)  | 65.0                        | mph                              | FFS   | 65.0                                   | mph |
| Base free-flow Speed, BFFS                                  |                             | mph                              |   |  |     |
| <b>LOS and Performance Measures</b>                         |                             |                                  | <b>Design (N)</b>   |  |     |
| <u>Operational (LOS)</u>                                    |                             |                                  | <u>Design (N)</u>   |  |     |
| v <sub>p</sub> = (V or DDHV) / (PHF x N x f <sub>HV</sub> ) |                             |                                  | Design LOS  |  |     |
|   | 193                         | pc/h/ln                          | v <sub>p</sub> = (V or DDHV) / (PHF x N x f <sub>HV</sub> )                                       |  |     |
| x f <sub>p</sub> )  |                             |                                  | x f <sub>p</sub> )  |  |     |
| S   | 65.0                        | mph                              | S   |  |     |
| D = v <sub>p</sub> / S                                      | 3.0                         | pc/mi/ln                         | D = v <sub>p</sub> / S  |  |     |
| LOS   | A                           |                                  | Required Number of Lanes, N   |  |     |
| <b>Glossary</b>   |                             |                                  | <b>Factor Location</b>  |  |     |
| N - Number of lanes   | S - Speed                   |                                  | E <sub>R</sub> - Exhibits 11-10, 11-12  | f <sub>LW</sub> - Exhibit 11-8         |     |
| V - Hourly volume   | D - Density                 |                                  | E <sub>T</sub> - Exhibits 11-10, 11-11, 11-13   | f <sub>LC</sub> - Exhibit 11-9         |     |
| v <sub>p</sub> - Flow rate                                  | FFS - Free-flow speed       |                                  | f <sub>p</sub> - Page 11-18   | TRD - Page 11-11                       |     |
| LOS - Level of service                                      | BFFS - Base free-flow speed |                                  | LOS, S, FFS, v <sub>p</sub> - Exhibits 11-2, 11-3   |  |     |
| DDHV - Directional design hour volume                       |                             |                                  |   |  |     |

| BASIC FREEWAY SEGMENTS WORKSHEET                            |                             |                                  |   |  |     |
|---|-----------------------------|----------------------------------|---|--|-----|
| <b>General Information</b>                                  |                             |                                  | <b>Site Information</b>   |  |     |
| Analyst   | Shane Forsythe              |                                  | Highway/Direction of Travel I-15 SB   |  |     |
| Agency or Company   |                             |                                  | From/To South of Central  |  |     |
| Date Performed  | 8/7/2014                    |                                  | Jurisdiction  |  |     |
| Analysis Time Period  | AM Peak                     |                                  | Analysis Year 2014  |  |     |
| Project Description I-15 Corridor Study                     |                             |                                  |   |  |     |
| <input checked="" type="checkbox"/> Oper.(LOS)              |                             | <input type="checkbox"/> Des.(N) |   | <input type="checkbox"/> Planning Data |     |
| <b>Flow Inputs</b>  |                             |                                  |   |  |     |
| Volume, V   | 352                         | veh/h                            | Peak-Hour Factor, PHF   | 0.94                                   |     |
| AADT  |                             | veh/day                          | %Trucks and Buses, P <sub>T</sub>   | 8                                      |     |
| Peak-Hr Prop. of AADT, K                                    |                             |                                  | %RVs, P <sub>R</sub>  | 0                                      |     |
| Peak-Hr Direction Prop, D                                   |                             |                                  | General Terrain:  | Level                                  |     |
| DDHV = AADT x K x D   |                             | veh/h                            | Grade % Length  | mi                                     |     |
|   |                             |                                  | Up/Down %   |  |     |
| <b>Calculate Flow Adjustments</b>                           |                             |                                  |   |  |     |
| f <sub>p</sub>  | 1.00                        |                                  | E <sub>R</sub>  | 1.2                                    |     |
| E <sub>T</sub>  | 1.5                         |                                  | f <sub>HV</sub> = 1/[1+P <sub>T</sub> (E <sub>T</sub> - 1) + P <sub>R</sub> (E <sub>R</sub> - 1)] | 0.962                                  |     |
| <b>Speed Inputs</b>   |                             |                                  | <b>Calc Speed Adj and FFS</b>   |  |     |
| Lane Width  |                             | ft                               |   |  |     |
| Rt-Side Lat. Clearance                                      |                             | ft                               | f <sub>LW</sub>   | mph                                    |     |
| Number of Lanes, N  | 2                           |                                  | f <sub>LC</sub>   | mph                                    |     |
| Total Ramp Density, TRD                                     |                             | ramps/mi                         | TRD Adjustment  | mph                                    |     |
| FFS (measured)  | 65.0                        | mph                              | FFS   | 65.0                                   | mph |
| Base free-flow Speed, BFFS                                  |                             | mph                              |   |  |     |
| <b>LOS and Performance Measures</b>                         |                             |                                  | <b>Design (N)</b>   |  |     |
| <u>Operational (LOS)</u>                                    |                             |                                  | <u>Design (N)</u>   |  |     |
| v <sub>p</sub> = (V or DDHV) / (PHF x N x f <sub>HV</sub> ) |                             |                                  | Design LOS  |  |     |
|   | 196                         | pc/h/ln                          | v <sub>p</sub> = (V or DDHV) / (PHF x N x f <sub>HV</sub> )                                       |  |     |
| x f <sub>p</sub> )  |                             |                                  | x f <sub>p</sub> )  |  |     |
| S   | 65.0                        | mph                              | S   |  |     |
| D = v <sub>p</sub> / S                                      | 3.0                         | pc/mi/ln                         | D = v <sub>p</sub> / S  |  |     |
| LOS   | A                           |                                  | Required Number of Lanes, N   |  |     |
| <b>Glossary</b>   |                             |                                  | <b>Factor Location</b>  |  |     |
| N - Number of lanes   | S - Speed                   |                                  | E <sub>R</sub> - Exhibits 11-10, 11-12  | f <sub>LW</sub> - Exhibit 11-8         |     |
| V - Hourly volume   | D - Density                 |                                  | E <sub>T</sub> - Exhibits 11-10, 11-11, 11-13   | f <sub>LC</sub> - Exhibit 11-9         |     |
| v <sub>p</sub> - Flow rate                                  | FFS - Free-flow speed       |                                  | f <sub>p</sub> - Page 11-18   | TRD - Page 11-11                       |     |
| LOS - Level of service                                      | BFFS - Base free-flow speed |                                  | LOS, S, FFS, v <sub>p</sub> - Exhibits 11-2, 11-3   |  |     |
| DDHV - Directional design hour volume                       |                             |                                  |   |  |     |

| BASIC FREEWAY SEGMENTS WORKSHEET                            |                             |                                  |   |  |     |
|---|-----------------------------|----------------------------------|---|--|-----|
| <b>General Information</b>                                  |                             |                                  | <b>Site Information</b>   |  |     |
| Analyst   | Shane Forsythe              |                                  | Highway/Direction of Travel I-15 NB   |  |     |
| Agency or Company   |                             |                                  | From/To South of Central Ave  |  |     |
| Date Performed  | 8/7/2014                    |                                  | Jurisdiction  |  |     |
| Analysis Time Period  | PM Peak                     |                                  | Analysis Year 2014  |  |     |
| Project Description I-15 Corridor Study                     |                             |                                  |   |  |     |
| <input checked="" type="checkbox"/> Oper.(LOS)              |                             | <input type="checkbox"/> Des.(N) |   | <input type="checkbox"/> Planning Data |     |
| <b>Flow Inputs</b>  |                             |                                  |   |  |     |
| Volume, V   | 490                         | veh/h                            | Peak-Hour Factor, PHF   | 0.87                                   |     |
| AADT  |                             | veh/day                          | %Trucks and Buses, P <sub>T</sub>   | 11                                     |     |
| Peak-Hr Prop. of AADT, K                                    |                             |                                  | %RVs, P <sub>R</sub>  | 0                                      |     |
| Peak-Hr Direction Prop, D                                   |                             |                                  | General Terrain:  | Level                                  |     |
| DDHV = AADT x K x D   |                             | veh/h                            | Grade % Length  | mi                                     |     |
|   |                             |                                  | Up/Down %   |  |     |
| <b>Calculate Flow Adjustments</b>                           |                             |                                  |   |  |     |
| f <sub>p</sub>  | 1.00                        |                                  | E <sub>R</sub>  | 1.2                                    |     |
| E <sub>T</sub>  | 1.5                         |                                  | f <sub>HV</sub> = 1/[1+P <sub>T</sub> (E <sub>T</sub> - 1) + P <sub>R</sub> (E <sub>R</sub> - 1)] | 0.948                                  |     |
| <b>Speed Inputs</b>   |                             |                                  | <b>Calc Speed Adj and FFS</b>   |  |     |
| Lane Width  |                             | ft                               |   |  |     |
| Rt-Side Lat. Clearance                                      |                             | ft                               | f <sub>LW</sub>   | mph                                    |     |
| Number of Lanes, N  | 2                           |                                  | f <sub>LC</sub>   | mph                                    |     |
| Total Ramp Density, TRD                                     |                             | ramps/mi                         | TRD Adjustment  | mph                                    |     |
| FFS (measured)  | 65.0                        | mph                              | FFS   | 65.0                                   | mph |
| Base free-flow Speed, BFFS                                  |                             | mph                              |   |  |     |
| <b>LOS and Performance Measures</b>                         |                             |                                  | <b>Design (N)</b>   |  |     |
| <u>Operational (LOS)</u>                                    |                             |                                  | <u>Design (N)</u>   |  |     |
| v <sub>p</sub> = (V or DDHV) / (PHF x N x f <sub>HV</sub> ) |                             |                                  | Design LOS  |  |     |
|   | 298                         | pc/h/ln                          | v <sub>p</sub> = (V or DDHV) / (PHF x N x f <sub>HV</sub> )                                       |  |     |
| x f <sub>p</sub> )  |                             |                                  | x f <sub>p</sub> )  |  |     |
| S   | 65.0                        | mph                              | S   |  |     |
| D = v <sub>p</sub> / S                                      | 4.6                         | pc/mi/ln                         | D = v <sub>p</sub> / S  |  |     |
| LOS   | A                           |                                  | Required Number of Lanes, N   |  |     |
| <b>Glossary</b>   |                             |                                  | <b>Factor Location</b>  |  |     |
| N - Number of lanes   | S - Speed                   |                                  | E <sub>R</sub> - Exhibits 11-10, 11-12  | f <sub>LW</sub> - Exhibit 11-8         |     |
| V - Hourly volume   | D - Density                 |                                  | E <sub>T</sub> - Exhibits 11-10, 11-11, 11-13   | f <sub>LC</sub> - Exhibit 11-9         |     |
| v <sub>p</sub> - Flow rate                                  | FFS - Free-flow speed       |                                  | f <sub>p</sub> - Page 11-18   | TRD - Page 11-11                       |     |
| LOS - Level of service                                      | BFFS - Base free-flow speed |                                  | LOS, S, FFS, v <sub>p</sub> - Exhibits 11-2, 11-3   |  |     |
| DDHV - Directional design hour volume                       |                             |                                  |   |  |     |

| BASIC FREEWAY SEGMENTS WORKSHEET                            |                             |                                  |   |  |     |
|---|-----------------------------|----------------------------------|---|--|-----|
| <b>General Information</b>                                  |                             |                                  | <b>Site Information</b>   |  |     |
| Analyst   | Shane Forsythe              |                                  | Highway/Direction of Travel I-15 SB   |  |     |
| Agency or Company   |                             |                                  | From/To South of Central Ave  |  |     |
| Date Performed  | 8/7/2014                    |                                  | Jurisdiction  |  |     |
| Analysis Time Period  | PM Peak                     |                                  | Analysis Year 2014  |  |     |
| Project Description I-15 Corridor Study                     |                             |                                  |   |  |     |
| <input checked="" type="checkbox"/> Oper.(LOS)              |                             | <input type="checkbox"/> Des.(N) |   | <input type="checkbox"/> Planning Data |     |
| <b>Flow Inputs</b>  |                             |                                  |   |  |     |
| Volume, V   | 491                         | veh/h                            | Peak-Hour Factor, PHF   | 0.90                                   |     |
| AADT  |                             | veh/day                          | %Trucks and Buses, P <sub>T</sub>   | 14                                     |     |
| Peak-Hr Prop. of AADT, K                                    |                             |                                  | %RVs, P <sub>R</sub>  | 0                                      |     |
| Peak-Hr Direction Prop, D                                   |                             |                                  | General Terrain:  | Level                                  |     |
| DDHV = AADT x K x D   |                             | veh/h                            | Grade % Length  | mi                                     |     |
|   |                             |                                  | Up/Down %   |  |     |
| <b>Calculate Flow Adjustments</b>                           |                             |                                  |   |  |     |
| f <sub>p</sub>  | 1.00                        |                                  | E <sub>R</sub>  | 1.2                                    |     |
| E <sub>T</sub>  | 1.5                         |                                  | f <sub>HV</sub> = 1/[1+P <sub>T</sub> (E <sub>T</sub> - 1) + P <sub>R</sub> (E <sub>R</sub> - 1)] | 0.935                                  |     |
| <b>Speed Inputs</b>   |                             |                                  | <b>Calc Speed Adj and FFS</b>   |  |     |
| Lane Width  |                             | ft                               |   |  |     |
| Rt-Side Lat. Clearance                                      |                             | ft                               | f <sub>LW</sub>   | mph                                    |     |
| Number of Lanes, N  | 2                           |                                  | f <sub>LC</sub>   | mph                                    |     |
| Total Ramp Density, TRD                                     |                             | ramps/mi                         | TRD Adjustment  | mph                                    |     |
| FFS (measured)  | 65.0                        | mph                              | FFS   | 65.0                                   | mph |
| Base free-flow Speed, BFFS                                  |                             | mph                              |   |  |     |
| <b>LOS and Performance Measures</b>                         |                             |                                  | <b>Design (N)</b>   |  |     |
| <u>Operational (LOS)</u>                                    |                             |                                  | <u>Design (N)</u>   |  |     |
| v <sub>p</sub> = (V or DDHV) / (PHF x N x f <sub>HV</sub> ) |                             |                                  | Design LOS  |  |     |
|   | 293                         | pc/h/ln                          | v <sub>p</sub> = (V or DDHV) / (PHF x N x f <sub>HV</sub> )                                       |  |     |
| x f <sub>p</sub> )  |                             |                                  | x f <sub>p</sub> )  |  |     |
| S   | 65.0                        | mph                              | S   |  |     |
| D = v <sub>p</sub> / S                                      | 4.5                         | pc/mi/ln                         | D = v <sub>p</sub> / S  |  |     |
| LOS   | A                           |                                  | Required Number of Lanes, N   |  |     |
| <b>Glossary</b>   |                             |                                  | <b>Factor Location</b>  |  |     |
| N - Number of lanes   | S - Speed                   |                                  | E <sub>R</sub> - Exhibits 11-10, 11-12  | f <sub>LW</sub> - Exhibit 11-8         |     |
| V - Hourly volume   | D - Density                 |                                  | E <sub>T</sub> - Exhibits 11-10, 11-11, 11-13   | f <sub>LC</sub> - Exhibit 11-9         |     |
| v <sub>p</sub> - Flow rate                                  | FFS - Free-flow speed       |                                  | f <sub>p</sub> - Page 11-18   | TRD - Page 11-11                       |     |
| LOS - Level of service                                      | BFFS - Base free-flow speed |                                  | LOS, S, FFS, v <sub>p</sub> - Exhibits 11-2, 11-3   |  |     |
| DDHV - Directional design hour volume                       |                             |                                  |   |  |     |



| BASIC FREEWAY SEGMENTS WORKSHEET   |                             |         |   |        |    |
|--|-----------------------------|---------|---|--------|----|
| <b>General Information</b>   |                             |         | <b>Site Information</b>   |        |    |
| Analyst  | Shane Forsythe              |         | Highway/Direction of Travel <i>I-15 NB</i>  |        |    |
| Agency or Company  |                             |         | From/To <i>South of Gore Hill</i>   |        |    |
| Date Performed   | 8/7/2014                    |         | Jurisdiction  |        |    |
| Analysis Time Period   | AM Peak                     |         | Analysis Year <i>2014</i>   |        |    |
| Project Description <i>I-15 Corridor Study</i>   |                             |         |   |        |    |
| <input checked="" type="checkbox"/> Oper.(LOS) <input type="checkbox"/> Des.(N) <input type="checkbox"/> Planning Data |                             |         |   |        |    |
| <b>Flow Inputs</b>   |                             |         |   |        |    |
| Volume, V  | 244                         | veh/h   | Peak-Hour Factor, PHF   | 0.92   |    |
| AADT   |                             | veh/day | %Trucks and Buses, P <sub>T</sub>   | 10     |    |
| Peak-Hr Prop. of AADT, K   |                             |         | %RVs, P <sub>R</sub>  | 0      |    |
| Peak-Hr Direction Prop, D  |                             |         | General Terrain:  | Level  |    |
| DDHV = AADT x K x D  |                             | veh/h   | Grade %   | Length | mi |
|  |                             |         | Up/Down %   |        |    |
| <b>Calculate Flow Adjustments</b>  |                             |         |   |        |    |
| f <sub>p</sub>   | 1.00                        |         | E <sub>R</sub>  | 1.2    |    |
| E <sub>T</sub>   | 1.5                         |         | f <sub>HV</sub> = 1/[1+P <sub>T</sub> (E <sub>T</sub> - 1) + P <sub>R</sub> (E <sub>R</sub> - 1)] 0.952 |        |    |
| <b>Speed Inputs</b>  |                             |         | <b>Calc Speed Adj and FFS</b>   |        |    |
| Lane Width   | ft                          |         |   |        |    |
| Rt-Side Lat. Clearance   | ft                          |         |   |        |    |
| Number of Lanes, N   | 2                           |         |   |        |    |
| Total Ramp Density, TRD  | ramps/mi                    |         |   |        |    |
| FFS (measured)   | 65.0 mph                    |         |   |        |    |
| Base free-flow Speed, BFFS   | mph                         |         |   |        |    |
| f <sub>LW</sub>  |                             |         | mph   |        |    |
| f <sub>LC</sub>  |                             |         | mph   |        |    |
| TRD Adjustment   |                             |         | mph   |        |    |
| FFS  |                             |         | 65.0 mph  |        |    |
|  |                             |         |   |        |    |
| <b>LOS and Performance Measures</b>  |                             |         | <b>Design (N)</b>   |        |    |
| <u>Operational (LOS)</u>   |                             |         | <u>Design (N)</u>   |        |    |
| v <sub>p</sub> = (V or DDHV) / (PHF x N x f <sub>HV</sub> )  |                             |         | Design LOS  |        |    |
| 139  | pc/h/ln                     |         | v <sub>p</sub> = (V or DDHV) / (PHF x N x f <sub>HV</sub> )   |        |    |
| x f <sub>p</sub> )   |                             |         | pc/h/ln   |        |    |
| S  | 65.0 mph                    |         | S   |        |    |
| D = v <sub>p</sub> / S   | 2.1 pc/mi/ln                |         | D = v <sub>p</sub> / S  |        |    |
| LOS  | A                           |         | pc/mi/ln  |        |    |
|  |                             |         | Required Number of Lanes, N   |        |    |
| <b>Glossary</b>  |                             |         | <b>Factor Location</b>  |        |    |
| N - Number of lanes  | S - Speed                   |         | E <sub>R</sub> - Exhibits 11-10, 11-12  |        |    |
| V - Hourly volume  | D - Density                 |         | f <sub>LW</sub> - Exhibit 11-8  |        |    |
| v <sub>p</sub> - Flow rate   | FFS - Free-flow speed       |         | E <sub>T</sub> - Exhibits 11-10, 11-11, 11-13   |        |    |
| LOS - Level of service   | BFFS - Base free-flow speed |         | f <sub>LC</sub> - Exhibit 11-9  |        |    |
| DDHV - Directional design hour volume  |                             |         | f <sub>p</sub> - Page 11-18   |        |    |
|  |                             |         | TRD - Page 11-11  |        |    |
|  |                             |         | LOS, S, FFS, v <sub>p</sub> - Exhibits 11-2, 11-3   |        |    |

| BASIC FREEWAY SEGMENTS WORKSHEET                            |                             |                                  |   |  |     |
|---|-----------------------------|----------------------------------|---|--|-----|
| <b>General Information</b>                                  |                             |                                  | <b>Site Information</b>   |  |     |
| Analyst   | Shane Forsythe              |                                  | Highway/Direction of Travel I-15 SB   |  |     |
| Agency or Company   |                             |                                  | From/To South of Gore Hill  |  |     |
| Date Performed  | 8/7/2014                    |                                  | Jurisdiction  |  |     |
| Analysis Time Period  | AM Peak                     |                                  | Analysis Year 2014  |  |     |
| Project Description I-15 Corridor Study                     |                             |                                  |   |  |     |
| <input checked="" type="checkbox"/> Oper.(LOS)              |                             | <input type="checkbox"/> Des.(N) |   | <input type="checkbox"/> Planning Data |     |
| <b>Flow Inputs</b>  |                             |                                  |   |  |     |
| Volume, V   | 235                         | veh/h                            | Peak-Hour Factor, PHF   | 0.79                                   |     |
| AADT  |                             | veh/day                          | %Trucks and Buses, P <sub>T</sub>   | 20                                     |     |
| Peak-Hr Prop. of AADT, K                                    |                             |                                  | %RVs, P <sub>R</sub>  | 0                                      |     |
| Peak-Hr Direction Prop, D                                   |                             |                                  | General Terrain:  | Level                                  |     |
| DDHV = AADT x K x D   |                             | veh/h                            | Grade % Length  | mi                                     |     |
|   |                             |                                  | Up/Down %   |  |     |
| <b>Calculate Flow Adjustments</b>                           |                             |                                  |   |  |     |
| f <sub>p</sub>  | 1.00                        |                                  | E <sub>R</sub>  | 1.2                                    |     |
| E <sub>T</sub>  | 1.5                         |                                  | f <sub>HV</sub> = 1/[1+P <sub>T</sub> (E <sub>T</sub> - 1) + P <sub>R</sub> (E <sub>R</sub> - 1)] | 0.909                                  |     |
| <b>Speed Inputs</b>   |                             |                                  | <b>Calc Speed Adj and FFS</b>   |  |     |
| Lane Width  |                             | ft                               |   |  |     |
| Rt-Side Lat. Clearance                                      |                             | ft                               | f <sub>LW</sub>   | mph                                    |     |
| Number of Lanes, N  | 2                           |                                  | f <sub>LC</sub>   | mph                                    |     |
| Total Ramp Density, TRD                                     |                             | ramps/mi                         | TRD Adjustment  | mph                                    |     |
| FFS (measured)  | 70.0                        | mph                              | FFS   | 70.0                                   | mph |
| Base free-flow Speed, BFFS                                  |                             | mph                              |   |  |     |
| <b>LOS and Performance Measures</b>                         |                             |                                  | <b>Design (N)</b>   |  |     |
| <u>Operational (LOS)</u>                                    |                             |                                  | <u>Design (N)</u>   |  |     |
| v <sub>p</sub> = (V or DDHV) / (PHF x N x f <sub>HV</sub> ) |                             |                                  | Design LOS  |  |     |
|   | 163                         | pc/h/ln                          | v <sub>p</sub> = (V or DDHV) / (PHF x N x f <sub>HV</sub> )                                       |  |     |
| x f <sub>p</sub> )  |                             |                                  | x f <sub>p</sub> )  |  |     |
| S   | 70.0                        | mph                              | S   |  |     |
| D = v <sub>p</sub> / S                                      | 2.3                         | pc/mi/ln                         | D = v <sub>p</sub> / S  |  |     |
| LOS   | A                           |                                  | Required Number of Lanes, N   |  |     |
| <b>Glossary</b>   |                             |                                  | <b>Factor Location</b>  |  |     |
| N - Number of lanes   | S - Speed                   |                                  | E <sub>R</sub> - Exhibits 11-10, 11-12  | f <sub>LW</sub> - Exhibit 11-8         |     |
| V - Hourly volume   | D - Density                 |                                  | E <sub>T</sub> - Exhibits 11-10, 11-11, 11-13   | f <sub>LC</sub> - Exhibit 11-9         |     |
| v <sub>p</sub> - Flow rate                                  | FFS - Free-flow speed       |                                  | f <sub>p</sub> - Page 11-18   | TRD - Page 11-11                       |     |
| LOS - Level of service                                      | BFFS - Base free-flow speed |                                  | LOS, S, FFS, v <sub>p</sub> - Exhibits 11-2, 11-3   |  |     |
| DDHV - Directional design hour volume                       |                             |                                  |   |  |     |

| BASIC FREEWAY SEGMENTS WORKSHEET                            |                             |                                  |   |  |     |
|---|-----------------------------|----------------------------------|---|--|-----|
| <b>General Information</b>                                  |                             |                                  | <b>Site Information</b>   |  |     |
| Analyst   | Shane Forsythe              |                                  | Highway/Direction of Travel I-15 NB   |  |     |
| Agency or Company   |                             |                                  | From/To South of Gore Hill  |  |     |
| Date Performed  | 8/7/2014                    |                                  | Jurisdiction  |  |     |
| Analysis Time Period  | PM Peak                     |                                  | Analysis Year 2014  |  |     |
| Project Description I-15 Corridor Study                     |                             |                                  |   |  |     |
| <input checked="" type="checkbox"/> Oper.(LOS)              |                             | <input type="checkbox"/> Des.(N) |   | <input type="checkbox"/> Planning Data |     |
| <b>Flow Inputs</b>  |                             |                                  |   |  |     |
| Volume, V   | 249                         | veh/h                            | Peak-Hour Factor, PHF   | 0.96                                   |     |
| AADT  |                             | veh/day                          | %Trucks and Buses, P <sub>T</sub>   | 12                                     |     |
| Peak-Hr Prop. of AADT, K                                    |                             |                                  | %RVs, P <sub>R</sub>  | 0                                      |     |
| Peak-Hr Direction Prop, D                                   |                             |                                  | General Terrain:  | Level                                  |     |
| DDHV = AADT x K x D   |                             | veh/h                            | Grade % Length  | mi                                     |     |
|   |                             |                                  | Up/Down %   |  |     |
| <b>Calculate Flow Adjustments</b>                           |                             |                                  |   |  |     |
| f <sub>p</sub>  | 1.00                        |                                  | E <sub>R</sub>  | 1.2                                    |     |
| E <sub>T</sub>  | 1.5                         |                                  | f <sub>HV</sub> = 1/[1+P <sub>T</sub> (E <sub>T</sub> - 1) + P <sub>R</sub> (E <sub>R</sub> - 1)] | 0.943                                  |     |
| <b>Speed Inputs</b>   |                             |                                  | <b>Calc Speed Adj and FFS</b>   |  |     |
| Lane Width  |                             | ft                               |   |  |     |
| Rt-Side Lat. Clearance                                      |                             | ft                               | f <sub>LW</sub>   | mph                                    |     |
| Number of Lanes, N  | 2                           |                                  | f <sub>LC</sub>   | mph                                    |     |
| Total Ramp Density, TRD                                     |                             | ramps/mi                         | TRD Adjustment  | mph                                    |     |
| FFS (measured)  | 65.0                        | mph                              | FFS   | 65.0                                   | mph |
| Base free-flow Speed, BFFS                                  |                             | mph                              |   |  |     |
| <b>LOS and Performance Measures</b>                         |                             |                                  | <b>Design (N)</b>   |  |     |
| <u>Operational (LOS)</u>                                    |                             |                                  | <u>Design (N)</u>   |  |     |
| v <sub>p</sub> = (V or DDHV) / (PHF x N x f <sub>HV</sub> ) |                             |                                  | Design LOS  |  |     |
|   | 138                         | pc/h/ln                          | v <sub>p</sub> = (V or DDHV) / (PHF x N x f <sub>HV</sub> )                                       |  |     |
| x f <sub>p</sub> )  |                             |                                  | x f <sub>p</sub> )  |  |     |
| S   | 65.0                        | mph                              | S   |  |     |
| D = v <sub>p</sub> / S                                      | 2.1                         | pc/mi/ln                         | D = v <sub>p</sub> / S  |  |     |
| LOS   | A                           |                                  | Required Number of Lanes, N   |  |     |
| <b>Glossary</b>   |                             |                                  | <b>Factor Location</b>  |  |     |
| N - Number of lanes   | S - Speed                   |                                  | E <sub>R</sub> - Exhibits 11-10, 11-12  | f <sub>LW</sub> - Exhibit 11-8         |     |
| V - Hourly volume   | D - Density                 |                                  | E <sub>T</sub> - Exhibits 11-10, 11-11, 11-13   | f <sub>LC</sub> - Exhibit 11-9         |     |
| v <sub>p</sub> - Flow rate                                  | FFS - Free-flow speed       |                                  | f <sub>p</sub> - Page 11-18   | TRD - Page 11-11                       |     |
| LOS - Level of service                                      | BFFS - Base free-flow speed |                                  | LOS, S, FFS, v <sub>p</sub> - Exhibits 11-2, 11-3   |  |     |
| DDHV - Directional design hour volume                       |                             |                                  |   |  |     |

| <b>BASIC FREEWAY SEGMENTS WORKSHEET</b>  |                             |          |  |        |    |
|--|-----------------------------|----------|--|--------|----|
| <b>General Information</b>   |                             |          | <b>Site Information</b>  |        |    |
| Analyst  | Shane Forsythe              |          | Highway/Direction of Travel <i>I-15 SB</i>   |        |    |
| Agency or Company  |                             |          | From/To <i>South of Gore Hill</i>  |        |    |
| Date Performed   | 8/7/2014                    |          | Jurisdiction   |        |    |
| Analysis Time Period   | PM Peak                     |          | Analysis Year <i>2014</i>  |        |    |
| Project Description <i>I-15 Corridor Study</i>   |                             |          |  |        |    |
| <input checked="" type="checkbox"/> Oper.(LOS) <input type="checkbox"/> Des.(N) <input type="checkbox"/> Planning Data |                             |          |  |        |    |
| <b>Flow Inputs</b>   |                             |          |  |        |    |
| Volume, V  | 365                         | veh/h    | Peak-Hour Factor, PHF  | 0.89   |    |
| AADT   |                             | veh/day  | %Trucks and Buses, P <sub>T</sub>  | 6      |    |
| Peak-Hr Prop. of AADT, K   |                             |          | %RVs, P <sub>R</sub>   | 0      |    |
| Peak-Hr Direction Prop, D  |                             |          | General Terrain:   | Level  |    |
| DDHV = AADT x K x D  |                             | veh/h    | Grade %  | Length | mi |
|  |                             |          | Up/Down %  |        |    |
| <b>Calculate Flow Adjustments</b>  |                             |          |  |        |    |
| f <sub>p</sub>   | 1.00                        |          | E <sub>R</sub>   | 1.2    |    |
| E <sub>T</sub>   | 1.5                         |          | f <sub>HV</sub> = 1/[1+P <sub>T</sub> (E <sub>T</sub> - 1) + P <sub>R</sub> (E <sub>R</sub> - 1)] 0.971  |        |    |
| <b>Speed Inputs</b>  |                             |          | <b>Calc Speed Adj and FFS</b>  |        |    |
| Lane Width   | ft                          |          | <div style="display: flex; justify-content: space-between;"> <div>f<sub>LW</sub></div> <div>mph</div> </div> <div style="display: flex; justify-content: space-between;"> <div>f<sub>LC</sub></div> <div>mph</div> </div> <div style="display: flex; justify-content: space-between;"> <div>TRD Adjustment</div> <div>mph</div> </div> <div style="display: flex; justify-content: space-between;"> <div>FFS</div> <div>65.0</div> <div>mph</div> </div> |        |    |
| Rt-Side Lat. Clearance   | ft                          |          |  |        |    |
| Number of Lanes, N   | 2                           |          |  |        |    |
| Total Ramp Density, TRD  | ramps/mi                    |          |  |        |    |
| FFS (measured)   | 65.0 mph                    |          |  |        |    |
| Base free-flow Speed, BFFS   | mph                         |          |  |        |    |
| <b>LOS and Performance Measures</b>  |                             |          | <b>Design (N)</b>  |        |    |
| <u>Operational (LOS)</u>   |                             |          | <u>Design (N)</u>  |        |    |
| v <sub>p</sub> = (V or DDHV) / (PHF x N x f <sub>HV</sub> )  |                             |          | Design LOS   |        |    |
| x f <sub>p</sub> )   | 212                         | pc/h/ln  | v <sub>p</sub> = (V or DDHV) / (PHF x N x f <sub>HV</sub> )  |        |    |
| S  | 65.0                        | mph      | x f <sub>p</sub> )   |        |    |
| D = v <sub>p</sub> / S   | 3.3                         | pc/mi/ln | S  |        |    |
| LOS  | A                           |          | D = v <sub>p</sub> / S   |        |    |
|  |                             |          | Required Number of Lanes, N  |        |    |
| <b>Glossary</b>  |                             |          | <b>Factor Location</b>   |        |    |
| N - Number of lanes  | S - Speed                   |          | E <sub>R</sub> - Exhibits 11-10, 11-12   |        |    |
| V - Hourly volume  | D - Density                 |          | f <sub>LW</sub> - Exhibit 11-8   |        |    |
| v <sub>p</sub> - Flow rate   | FFS - Free-flow speed       |          | E <sub>T</sub> - Exhibits 11-10, 11-11, 11-13  |        |    |
| LOS - Level of service   | BFFS - Base free-flow speed |          | f <sub>LC</sub> - Exhibit 11-9   |        |    |
| DDHV - Directional design hour volume  |                             |          | f <sub>p</sub> - Page 11-18  |        |    |
|  |                             |          | TRD - Page 11-11   |        |    |
|  |                             |          | LOS, S, FFS, v <sub>p</sub> - Exhibits 11-2, 11-3  |        |    |

| RAMPS AND RAMP JUNCTIONS WORKSHEET  |                 |  |         |                       |  |  |               |                                      |            |    |
|---|-----------------|--|---------|-----------------------|--|--|---------------|--------------------------------------|------------|----|
| <b>General Information</b>  |                 |  |         |                       | <b>Site Information</b>  |  |               |                                      |            |    |
| Analyst   |                 | Shane Forsythe   |         | Freeway/Dir of Travel |  | 10th Ave NB Off-ramp   |               |                                      |            |    |
| Agency or Company   |                 |  |         | Junction              |  | I-15 and I-315   |               |                                      |            |    |
| Date Performed  |                 | 9/15/2014  |         | Jurisdiction          |  |  |               |                                      |            |    |
| Analysis Time Period  |                 | AM Peak  |         | Analysis Year         |  | 2014   |               |                                      |            |    |
| Project Description   |                 |  |         |                       |  |  |               |                                      |            |    |
| <b>Inputs</b>   |                 |  |         |                       |  |  |               |                                      |            |    |
| Upstream Adj Ramp<br><input type="checkbox"/> Yes <input type="checkbox"/> On<br><input checked="" type="checkbox"/> No <input type="checkbox"/> Off<br><br>$L_{up} =$ ft<br><br>$V_u =$ veh/h  |                 | Freeway Number of Lanes, $N$ 2<br>Ramp Number of Lanes, $N$ 1<br>Acceleration Lane Length, $L_A$<br>Deceleration Lane Length $L_D$ 740<br>Freeway Volume, $V_F$ 517<br>Ramp Volume, $V_R$ 192<br>Freeway Free-Flow Speed, $S_{FF}$ 65.0<br>Ramp Free-Flow Speed, $S_{FR}$ 55.0 |         |                       |  | Downstream Adj Ramp<br><input type="checkbox"/> Yes <input type="checkbox"/> On<br><input checked="" type="checkbox"/> No <input type="checkbox"/> Off<br><br>$L_{down} =$ ft<br><br>$V_D =$ veh/h |               |                                      |            |    |
| <b>Conversion to pc/h Under Base Conditions</b>   |                 |  |         |                       |  |  |               |                                      |            |    |
| (pc/h)  | $V$<br>(Veh/hr) | PHF  | Terrain | %Truck                | %Rv  | $f_{HV}$   | $f_p$         | $v = V/PHF \times f_{HV} \times f_p$ |            |    |
| Freeway   | 517             | 0.90   | Level   | 16                    | 0  | 0.926  | 1.00          | 622                                  |            |    |
| Ramp  | 192             | 0.83   | Level   | 3                     | 0  | 0.985  | 1.00          | 236                                  |            |    |
| UpStream  |                 |  |         |                       |  |  |               |                                      |            |    |
| DownStream  |                 |  |         |                       |  |  |               |                                      |            |    |
| <b>Merge Areas</b>  |                 |  |         |                       | <b>Diverge Areas</b>   |  |               |                                      |            |    |
| <b>Estimation of <math>v_{12}</math></b>  |                 |  |         |                       | <b>Estimation of <math>v_{12}</math></b>   |  |               |                                      |            |    |
| $V_{12} = V_F (P_{FM})$<br>$L_{EQ} =$ (Equation 13-6 or 13-7)<br>$P_{FM} =$ using Equation (Exhibit 13-6)<br>$V_{12} =$ pc/h<br>$V_3$ or $V_{av34}$ pc/h (Equation 13-14 or 13-17)<br>Is $V_3$ or $V_{av34} > 2,700$ pc/h? <input type="checkbox"/> Yes <input type="checkbox"/> No<br>Is $V_3$ or $V_{av34} > 1.5 * V_{12}/2$ <input type="checkbox"/> Yes <input type="checkbox"/> No<br>If Yes, $V_{12a} =$ pc/h (Equation 13-16, 13-18, or 13-19) |                 |  |         |                       | $V_{12} = V_R + (V_F - V_R)P_{FD}$<br>$L_{EQ} =$ (Equation 13-12 or 13-13)<br>$P_{FD} =$ 1.000 using Equation (Exhibit 13-7)<br>$V_{12} =$ 622 pc/h<br>$V_3$ or $V_{av34}$ 0 pc/h (Equation 13-14 or 13-17)<br>Is $V_3$ or $V_{av34} > 2,700$ pc/h? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No<br>Is $V_3$ or $V_{av34} > 1.5 * V_{12}/2$ <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No<br>If Yes, $V_{12a} =$ pc/h (Equation 13-16, 13-18, or 13-19) |  |               |                                      |            |    |
| <b>Capacity Checks</b>  |                 |  |         |                       | <b>Capacity Checks</b>   |  |               |                                      |            |    |
|   | Actual          | Capacity   |         | LOS F?                |  | Actual   | Capacity      |                                      | LOS F?     |    |
| $V_{FO}$  |                 |  |         |                       |  | $V_F$  | 622           | Exhibit 13-8                         | 4700       | No |
|   |                 | Exhibit 13-8   |         |                       |  | $V_{FO} = V_F - V_R$   | 386           | Exhibit 13-8                         | 4700       | No |
|   |                 |  |         |                       |  | $V_R$  | 236           | Exhibit 13-10                        | 2200       | No |
| <b>Flow Entering Merge Influence Area</b>   |                 |  |         |                       | <b>Flow Entering Diverge Influence Area</b>  |  |               |                                      |            |    |
|   | Actual          | Max Desirable  |         | Violation?            |  | Actual   | Max Desirable |                                      | Violation? |    |
| $V_{R12}$   |                 | Exhibit 13-8   |         |                       | $V_{12}$   | 622  | Exhibit 13-8  |                                      | 4400:All   | No |
| <b>Level of Service Determination (if not F)</b>  |                 |  |         |                       | <b>Level of Service Determination (if not F)</b>   |  |               |                                      |            |    |
| $D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$<br>$D_R =$ (pc/mi/ln)<br>$LOS =$ (Exhibit 13-2)   |                 |  |         |                       | $D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$<br>$D_R =$ 2.9 (pc/mi/ln)<br>$LOS =$ A (Exhibit 13-2)  |  |               |                                      |            |    |
| <b>Speed Determination</b>  |                 |  |         |                       | <b>Speed Determination</b>   |  |               |                                      |            |    |
| $M_S =$ (Exhibit 13-11)<br>$S_R =$ mph (Exhibit 13-11)<br>$S_0 =$ mph (Exhibit 13-11)<br>$S =$ mph (Exhibit 13-13)  |                 |  |         |                       | $D_s =$ 0.189 (Exhibit 13-12)<br>$S_R =$ 60.6 mph (Exhibit 13-12)<br>$S_0 =$ N/A mph (Exhibit 13-12)<br>$S =$ 60.6 mph (Exhibit 13-13)   |  |               |                                      |            |    |

| RAMPS AND RAMP JUNCTIONS WORKSHEET   |               |  |          |                       |  |  |                |  |            |
|--|---------------|--|----------|-----------------------|--|--|----------------|--|------------|
| <b>General Information</b>   |               |  |          |                       | <b>Site Information</b>  |  |                |  |            |
| Analyst  |               | Shane Forsythe                               |          | Freeway/Dir of Travel |  | 10th Ave NB On-ramp  |                |  |            |
| Agency or Company  |               |  |          | Junction              |  | I-15 and I-315   |                |  |            |
| Date Performed   |               | 9/15/2014                                    |          | Jurisdiction          |  |  |                |  |            |
| Analysis Time Period   |               | AM Peak                                      |          | Analysis Year         |  | 2014   |                |  |            |
| Project Description  |               |  |          |                       |  |  |                |  |            |
| <b>Inputs</b>  |               |  |          |                       |  |  |                |  |            |
| Upstream Adj Ramp<br><input type="checkbox"/> Yes <input type="checkbox"/> On<br><input checked="" type="checkbox"/> No <input type="checkbox"/> Off<br>L <sub>up</sub> =        ft<br>V <sub>u</sub> =        veh/h   |               | Freeway Number of Lanes, N        2          |          |                       |  | Downstream Adj Ramp<br><input type="checkbox"/> Yes <input type="checkbox"/> On<br><input checked="" type="checkbox"/> No <input type="checkbox"/> Off<br>L <sub>down</sub> =        ft<br>V <sub>D</sub> =        veh/h |                |  |            |
|  |               | Ramp Number of Lanes, N        1             |          |                       |  |  |                |  |            |
|  |               | Acceleration Lane Length, L <sub>A</sub> 590 |          |                       |  |  |                |  |            |
|  |               | Deceleration Lane Length L <sub>D</sub>      |          |                       |  |  |                |  |            |
|  |               | Freeway Volume, V <sub>F</sub> 321           |          |                       |  |  |                |  |            |
|  |               | Ramp Volume, V <sub>R</sub> 167              |          |                       |  |  |                |  |            |
| Freeway Free-Flow Speed, S <sub>FF</sub> 65.0  |               |  |          |                       |  |  |                |  |            |
| Ramp Free-Flow Speed, S <sub>FR</sub> 35.0   |               |  |          |                       |  |  |                |  |            |
| <b>Conversion to pc/h Under Base Conditions</b>  |               |  |          |                       |  |  |                |  |            |
| (pc/h)   | V<br>(Veh/hr) | PHF  | Terrain  | %Truck                | %Rv  | f <sub>HV</sub>  | f <sub>p</sub> | v = V/PHF x f <sub>HV</sub> x f <sub>p</sub> |            |
| Freeway  | 321           | 0.89   | Level    | 14                    | 0  | 0.935  | 1.00           | 385  |            |
| Ramp   | 167           | 0.75   | Level    | 7                     | 0  | 0.966  | 1.00           | 232  |            |
| UpStream   |               |  |          |                       |  |  |                |  |            |
| DownStream   |               |  |          |                       |  |  |                |  |            |
| <b>Merge Areas</b>   |               |  |          |                       | <b>Diverge Areas</b>   |  |                |  |            |
| <b>Estimation of v<sub>12</sub></b>  |               |  |          |                       | <b>Estimation of v<sub>12</sub></b>  |  |                |  |            |
| $V_{12} = V_F (P_{FM})$<br>(Equation 13-6 or 13-7)<br>P <sub>FM</sub> = 1.000 using Equation (Exhibit 13-6)<br>V <sub>12</sub> = 385 pc/h<br>V <sub>3</sub> or V <sub>av34</sub> = 0 pc/h (Equation 13-14 or 13-17)<br>Is V <sub>3</sub> or V <sub>av34</sub> > 2,700 pc/h? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No<br>Is V <sub>3</sub> or V <sub>av34</sub> > 1.5 * V <sub>12</sub> /2 <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No<br>If Yes, V <sub>12a</sub> =        pc/h (Equation 13-16, 13-18, or 13-19) |               |  |          |                       | $V_{12} = V_R + (V_F - V_R)P_{FD}$<br>(Equation 13-12 or 13-13)<br>P <sub>FD</sub> =        using Equation (Exhibit 13-7)<br>V <sub>12</sub> =        pc/h<br>V <sub>3</sub> or V <sub>av34</sub> =        pc/h (Equation 13-14 or 13-17)<br>Is V <sub>3</sub> or V <sub>av34</sub> > 2,700 pc/h? <input type="checkbox"/> Yes <input type="checkbox"/> No<br>Is V <sub>3</sub> or V <sub>av34</sub> > 1.5 * V <sub>12</sub> /2 <input type="checkbox"/> Yes <input type="checkbox"/> No<br>If Yes, V <sub>12a</sub> =        pc/h (Equation 13-16, 13-18, or 13-19) |  |                |  |            |
| <b>Capacity Checks</b>   |               |  |          |                       | <b>Capacity Checks</b>   |  |                |  |            |
|  | Actual        | Capacity                                     |          | LOS F?                |  | Actual   | Capacity       |  | LOS F?     |
| V <sub>FO</sub>  | 617           | Exhibit 13-8                                 |          | No                    | V <sub>F</sub>   |  | Exhibit 13-8   |  |            |
|  |               |  |          |                       | V <sub>FO</sub> = V <sub>F</sub> - V <sub>R</sub>  |  | Exhibit 13-8   |  |            |
|  |               |  |          |                       | V <sub>R</sub>   |  | Exhibit 13-10  |  |            |
| <b>Flow Entering Merge Influence Area</b>  |               |  |          |                       | <b>Flow Entering Diverge Influence Area</b>  |  |                |  |            |
|  | Actual        | Max Desirable                                |          | Violation?            |  | Actual   | Max Desirable  |  | Violation? |
| V <sub>R12</sub>   | 617           | Exhibit 13-8                                 | 4600:All | No                    | V <sub>12</sub>  |  | Exhibit 13-8   |  |            |
| <b>Level of Service Determination (if not F)</b>   |               |  |          |                       | <b>Level of Service Determination (if not F)</b>   |  |                |  |            |
| $D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$<br>D <sub>R</sub> = 6.5 (pc/mi/ln)<br>LOS = A (Exhibit 13-2)   |               |  |          |                       | $D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$<br>D <sub>R</sub> =        (pc/mi/ln)<br>LOS =        (Exhibit 13-2)   |  |                |  |            |
| <b>Speed Determination</b>   |               |  |          |                       | <b>Speed Determination</b>   |  |                |  |            |
| M <sub>S</sub> = 0.287 (Exhibit 13-11)<br>S <sub>R</sub> = 58.4 mph (Exhibit 13-11)<br>S <sub>0</sub> = N/A mph (Exhibit 13-11)<br>S = 58.4 mph (Exhibit 13-13)  |               |  |          |                       | D <sub>S</sub> =        (Exhibit 13-12)<br>S <sub>R</sub> =        mph (Exhibit 13-12)<br>S <sub>0</sub> =        mph (Exhibit 13-12)<br>S =        mph (Exhibit 13-13)  |  |                |  |            |

| RAMPS AND RAMP JUNCTIONS WORKSHEET  |                 |  |         |                       |  |  |               |                                      |            |
|---|-----------------|--|---------|-----------------------|--|--|---------------|--------------------------------------|------------|
| <b>General Information</b>  |                 |  |         |                       | <b>Site Information</b>  |  |               |                                      |            |
| Analyst   |                 | Shane Forsythe   |         | Freeway/Dir of Travel |  | 10th Ave SB Off-ramp   |               |                                      |            |
| Agency or Company   |                 |  |         | Junction              |  | I-15 and I-315   |               |                                      |            |
| Date Performed  |                 | 9/15/2014  |         | Jurisdiction          |  |  |               |                                      |            |
| Analysis Time Period  |                 | AM Peak  |         | Analysis Year         |  | 2014   |               |                                      |            |
| Project Description   |                 |  |         |                       |  |  |               |                                      |            |
| <b>Inputs</b>   |                 |  |         |                       |  |  |               |                                      |            |
| Upstream Adj Ramp<br><input type="checkbox"/> Yes <input type="checkbox"/> On<br><input checked="" type="checkbox"/> No <input type="checkbox"/> Off<br><br>$L_{up} =$ ft<br><br>$V_u =$ veh/h  |                 | Freeway Number of Lanes, $N$ 2<br>Ramp Number of Lanes, $N$ 1<br>Acceleration Lane Length, $L_A$<br>Deceleration Lane Length $L_D$ 463<br>Freeway Volume, $V_F$ 352<br>Ramp Volume, $V_R$ 192<br>Freeway Free-Flow Speed, $S_{FF}$ 65.0<br>Ramp Free-Flow Speed, $S_{FR}$ 55.0 |         |                       |  | Downstream Adj Ramp<br><input type="checkbox"/> Yes <input type="checkbox"/> On<br><input checked="" type="checkbox"/> No <input type="checkbox"/> Off<br><br>$L_{down} =$ ft<br><br>$V_D =$ veh/h |               |                                      |            |
| <b>Conversion to pc/h Under Base Conditions</b>   |                 |  |         |                       |  |  |               |                                      |            |
| (pc/h)  | $V$<br>(Veh/hr) | PHF  | Terrain | %Truck                | %Rv  | $f_{HV}$   | $f_p$         | $v = V/PHF \times f_{HV} \times f_p$ |            |
| Freeway   | 352             | 0.94   | Level   | 8                     | 0  | 0.962  | 1.00          | 391                                  |            |
| Ramp  | 192             | 0.83   | Level   | 3                     | 0  | 0.985  | 1.00          | 236                                  |            |
| UpStream  |                 |  |         |                       |  |  |               |                                      |            |
| DownStream  |                 |  |         |                       |  |  |               |                                      |            |
| <b>Merge Areas</b>  |                 |  |         |                       | <b>Diverge Areas</b>   |  |               |                                      |            |
| <b>Estimation of <math>v_{12}</math></b>  |                 |  |         |                       | <b>Estimation of <math>v_{12}</math></b>   |  |               |                                      |            |
| $V_{12} = V_F (P_{FM})$<br>$L_{EQ} =$ (Equation 13-6 or 13-7)<br>$P_{FM} =$ using Equation (Exhibit 13-6)<br>$V_{12} =$ pc/h<br>$V_3$ or $V_{av34}$ pc/h (Equation 13-14 or 13-17)<br>Is $V_3$ or $V_{av34} > 2,700$ pc/h? <input type="checkbox"/> Yes <input type="checkbox"/> No<br>Is $V_3$ or $V_{av34} > 1.5 * V_{12}/2$ <input type="checkbox"/> Yes <input type="checkbox"/> No<br>If Yes, $V_{12a} =$ pc/h (Equation 13-16, 13-18, or 13-19) |                 |  |         |                       | $V_{12} = V_R + (V_F - V_R)P_{FD}$<br>$L_{EQ} =$ (Equation 13-12 or 13-13)<br>$P_{FD} =$ 1.000 using Equation (Exhibit 13-7)<br>$V_{12} =$ 391 pc/h<br>$V_3$ or $V_{av34}$ 0 pc/h (Equation 13-14 or 13-17)<br>Is $V_3$ or $V_{av34} > 2,700$ pc/h? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No<br>Is $V_3$ or $V_{av34} > 1.5 * V_{12}/2$ <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No<br>If Yes, $V_{12a} =$ pc/h (Equation 13-16, 13-18, or 13-19) |  |               |                                      |            |
| <b>Capacity Checks</b>  |                 |  |         |                       | <b>Capacity Checks</b>   |  |               |                                      |            |
|   | Actual          | Capacity   |         | LOS F?                |  | Actual   | Capacity      |                                      | LOS F?     |
| $V_{FO}$  |                 | Exhibit 13-8   |         |                       | $V_F$  | 391  | Exhibit 13-8  | 4700                                 | No         |
|   |                 |  |         | $V_{FO} = V_F - V_R$  | 155  | Exhibit 13-8   | 4700          | No                                   |            |
|   |                 |  |         | $V_R$                 | 236  | Exhibit 13-10  | 2200          | No                                   |            |
| <b>Flow Entering Merge Influence Area</b>   |                 |  |         |                       | <b>Flow Entering Diverge Influence Area</b>  |  |               |                                      |            |
|   | Actual          | Max Desirable  |         | Violation?            |  | Actual   | Max Desirable |                                      | Violation? |
| $V_{R12}$   |                 | Exhibit 13-8   |         |                       | $V_{12}$   | 391  | Exhibit 13-8  | 4400:All                             | No         |
| <b>Level of Service Determination (if not F)</b>  |                 |  |         |                       | <b>Level of Service Determination (if not F)</b>   |  |               |                                      |            |
| $D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$<br>$D_R =$ (pc/mi/ln)<br>$LOS =$ (Exhibit 13-2)   |                 |  |         |                       | $D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$<br>$D_R =$ 3.4 (pc/mi/ln)<br>$LOS =$ A (Exhibit 13-2)  |  |               |                                      |            |
| <b>Speed Determination</b>  |                 |  |         |                       | <b>Speed Determination</b>   |  |               |                                      |            |
| $M_S =$ (Exhibit 13-11)<br>$S_R =$ mph (Exhibit 13-11)<br>$S_0 =$ mph (Exhibit 13-11)<br>$S =$ mph (Exhibit 13-13)  |                 |  |         |                       | $D_s =$ 0.189 (Exhibit 13-12)<br>$S_R =$ 60.6 mph (Exhibit 13-12)<br>$S_0 =$ N/A mph (Exhibit 13-12)<br>$S =$ 60.6 mph (Exhibit 13-13)   |  |               |                                      |            |

| RAMPS AND RAMP JUNCTIONS WORKSHEET   |                 |                                 |          |                       |   |                     |               |  |            |
|--|-----------------|---------------------------------|----------|-----------------------|---|---------------------|---------------|--|------------|
| <b>General Information</b>   |                 |                                 |          |                       | <b>Site Information</b>   |                     |               |  |            |
| Analyst  |                 | Shane Forsythe                  |          | Freeway/Dir of Travel |   | 10th Ave SB On-ramp |               |  |            |
| Agency or Company  |                 |                                 |          | Junction              |   | I-15 and I-315      |               |  |            |
| Date Performed   |                 | 9/15/2014                       |          | Jurisdiction          |   |                     |               |  |            |
| Analysis Time Period   |                 | AM Peak                         |          | Analysis Year         |   | 2014                |               |  |            |
| Project Description  |                 |                                 |          |                       |   |                     |               |  |            |
| <b>Inputs</b>  |                 |                                 |          |                       |   |                     |               |  |            |
| Upstream Adj Ramp<br><br><input type="checkbox"/> Yes <input type="checkbox"/> On<br><br><input checked="" type="checkbox"/> No <input type="checkbox"/> Off<br><br>$L_{up} =$ ft<br><br>$V_u =$ veh/h   |                 | Freeway Number of Lanes, $N$    |          |                       |   | 2                   |               | Downstream Adj Ramp<br><br><input type="checkbox"/> Yes <input type="checkbox"/> On<br><br><input checked="" type="checkbox"/> No <input type="checkbox"/> Off<br><br>$L_{down} =$ ft<br><br>$V_D =$ veh/h |            |
|  |                 | Ramp Number of Lanes, $N$       |          |                       |   | 1                   |               |  |            |
|  |                 | Acceleration Lane Length, $L_A$ |          |                       |   | 1500                |               |  |            |
|  |                 | Deceleration Lane Length $L_D$  |          |                       |   |                     |               |  |            |
|  |                 | Freeway Volume, $V_F$           |          |                       |   | 458                 |               |  |            |
|  |                 | Ramp Volume, $V_R$              |          |                       |   | 287                 |               |  |            |
| Freeway Free-Flow Speed, $S_{FF}$  |                 |                                 |          | 65.0                  |   |                     |               |  |            |
| Ramp Free-Flow Speed, $S_{FR}$   |                 |                                 |          | 35.0                  |   |                     |               |  |            |
| <b>Conversion to pc/h Under Base Conditions</b>  |                 |                                 |          |                       |   |                     |               |  |            |
| (pc/h)   | $V$<br>(Veh/hr) | PHF                             | Terrain  | %Truck                | %Rv   | $f_{HV}$            | $f_p$         | $v = V/PHF \times f_{HV} \times f_p$   |            |
| Freeway  | 458             | 0.85                            | Level    | 7                     | 0   | 0.966               | 1.00          | 559  |            |
| Ramp   | 287             | 0.77                            | Level    | 5                     | 0   | 0.976               | 1.00          | 382  |            |
| UpStream   |                 |                                 |          |                       |   |                     |               |  |            |
| DownStream   |                 |                                 |          |                       |   |                     |               |  |            |
| <b>Merge Areas</b>   |                 |                                 |          |                       | <b>Diverge Areas</b>  |                     |               |  |            |
| <b>Estimation of <math>v_{12}</math></b>   |                 |                                 |          |                       | <b>Estimation of <math>v_{12}</math></b>  |                     |               |  |            |
| $V_{12} = V_F (P_{FM})$<br>(Equation 13-6 or 13-7)<br>$P_{FM} =$ 1.000 using Equation (Exhibit 13-6)<br>$V_{12} =$ 559 pc/h<br>$V_3$ or $V_{av34}$ 0 pc/h (Equation 13-14 or 13-17)<br>Is $V_3$ or $V_{av34} > 2,700$ pc/h? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No<br>Is $V_3$ or $V_{av34} > 1.5 * V_{12}/2$ <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No<br>If Yes, $V_{12a} =$ pc/h (Equation 13-16, 13-18, or 13-19) |                 |                                 |          |                       | $V_{12} = V_R + (V_F - V_R)P_{FD}$<br>(Equation 13-12 or 13-13)<br>$P_{FD} =$ using Equation (Exhibit 13-7)<br>$V_{12} =$ pc/h<br>$V_3$ or $V_{av34}$ pc/h (Equation 13-14 or 13-17)<br>Is $V_3$ or $V_{av34} > 2,700$ pc/h? <input type="checkbox"/> Yes <input type="checkbox"/> No<br>Is $V_3$ or $V_{av34} > 1.5 * V_{12}/2$ <input type="checkbox"/> Yes <input type="checkbox"/> No<br>If Yes, $V_{12a} =$ pc/h (Equation 13-16, 13-18, or 13-19) |                     |               |  |            |
| <b>Capacity Checks</b>   |                 |                                 |          |                       | <b>Capacity Checks</b>  |                     |               |  |            |
|  | Actual          | Capacity                        |          | LOS F?                |   | Actual              | Capacity      |  | LOS F?     |
| $V_{FO}$   | 941             | Exhibit 13-8                    |          | No                    | $V_F$   |                     | Exhibit 13-8  |  |            |
|  |                 |                                 |          |                       | $V_{FO} = V_F - V_R$  |                     | Exhibit 13-8  |  |            |
|  |                 |                                 |          |                       | $V_R$   |                     | Exhibit 13-10 |  |            |
| <b>Flow Entering Merge Influence Area</b>  |                 |                                 |          |                       | <b>Flow Entering Diverge Influence Area</b>   |                     |               |  |            |
|  | Actual          | Max Desirable                   |          | Violation?            |   | Actual              | Max Desirable |  | Violation? |
| $V_{R12}$  | 941             | Exhibit 13-8                    | 4600:All | No                    | $V_{12}$  |                     | Exhibit 13-8  |  |            |
| <b>Level of Service Determination (if not F)</b>   |                 |                                 |          |                       | <b>Level of Service Determination (if not F)</b>  |                     |               |  |            |
| $D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$<br>$D_R =$ 3.2 (pc/mi/ln)<br>LOS = A (Exhibit 13-2)  |                 |                                 |          |                       | $D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$<br>$D_R =$ (pc/mi/ln)<br>LOS = (Exhibit 13-2)   |                     |               |  |            |
| <b>Speed Determination</b>   |                 |                                 |          |                       | <b>Speed Determination</b>  |                     |               |  |            |
| $M_S =$ 0.226 (Exhibit 13-11)<br>$S_R =$ 59.8 mph (Exhibit 13-11)<br>$S_0 =$ N/A mph (Exhibit 13-11)<br>$S =$ 59.8 mph (Exhibit 13-13)   |                 |                                 |          |                       | $D_S =$ (Exhibit 13-12)<br>$S_R =$ mph (Exhibit 13-12)<br>$S_0 =$ mph (Exhibit 13-12)<br>$S =$ mph (Exhibit 13-13)  |                     |               |  |            |



| RAMPS AND RAMP JUNCTIONS WORKSHEET  |                 |  |         |                       |  |  |               |                                      |            |
|---|-----------------|--|---------|-----------------------|--|--|---------------|--------------------------------------|------------|
| <b>General Information</b>  |                 |  |         |                       | <b>Site Information</b>  |  |               |                                      |            |
| Analyst   |                 | Shane Forsythe   |         | Freeway/Dir of Travel |  | 10th Ave NB Off-ramp   |               |                                      |            |
| Agency or Company   |                 |  |         | Junction              |  | I-15 and I-315   |               |                                      |            |
| Date Performed  |                 | 9/15/2014  |         | Jurisdiction          |  |  |               |                                      |            |
| Analysis Time Period  |                 | PM Peak  |         | Analysis Year         |  | 2014   |               |                                      |            |
| Project Description   |                 |  |         |                       |  |  |               |                                      |            |
| <b>Inputs</b>   |                 |  |         |                       |  |  |               |                                      |            |
| Upstream Adj Ramp<br><input type="checkbox"/> Yes <input type="checkbox"/> On<br><input checked="" type="checkbox"/> No <input type="checkbox"/> Off<br><br>$L_{up} =$ ft<br><br>$V_u =$ veh/h  |                 | Freeway Number of Lanes, $N$ 2<br>Ramp Number of Lanes, $N$ 1<br>Acceleration Lane Length, $L_A$<br>Deceleration Lane Length $L_D$ 740<br>Freeway Volume, $V_F$ 722<br>Ramp Volume, $V_R$ 436<br>Freeway Free-Flow Speed, $S_{FF}$ 65.0<br>Ramp Free-Flow Speed, $S_{FR}$ 55.0 |         |                       |  | Downstream Adj Ramp<br><input type="checkbox"/> Yes <input type="checkbox"/> On<br><input checked="" type="checkbox"/> No <input type="checkbox"/> Off<br><br>$L_{down} =$ ft<br><br>$V_D =$ veh/h |               |                                      |            |
| <b>Conversion to pc/h Under Base Conditions</b>   |                 |  |         |                       |  |  |               |                                      |            |
| (pc/h)  | $V$<br>(Veh/hr) | PHF  | Terrain | %Truck                | %Rv  | $f_{HV}$   | $f_p$         | $v = V/PHF \times f_{HV} \times f_p$ |            |
| Freeway   | 722             | 0.80   | Level   | 10                    | 0  | 0.952  | 1.00          | 948                                  |            |
| Ramp  | 436             | 0.83   | Level   | 3                     | 0  | 0.985  | 1.00          | 533                                  |            |
| UpStream  |                 |  |         |                       |  |  |               |                                      |            |
| DownStream  |                 |  |         |                       |  |  |               |                                      |            |
| <b>Merge Areas</b>  |                 |  |         |                       | <b>Diverge Areas</b>   |  |               |                                      |            |
| <b>Estimation of <math>v_{12}</math></b>  |                 |  |         |                       | <b>Estimation of <math>v_{12}</math></b>   |  |               |                                      |            |
| $V_{12} = V_F (P_{FM})$<br>$L_{EQ} =$ (Equation 13-6 or 13-7)<br>$P_{FM} =$ using Equation (Exhibit 13-6)<br>$V_{12} =$ pc/h<br>$V_3$ or $V_{av34}$ pc/h (Equation 13-14 or 13-17)<br>Is $V_3$ or $V_{av34} > 2,700$ pc/h? <input type="checkbox"/> Yes <input type="checkbox"/> No<br>Is $V_3$ or $V_{av34} > 1.5 * V_{12}/2$ <input type="checkbox"/> Yes <input type="checkbox"/> No<br>If Yes, $V_{12a} =$ pc/h (Equation 13-16, 13-18, or 13-19) |                 |  |         |                       | $V_{12} = V_R + (V_F - V_R)P_{FD}$<br>$L_{EQ} =$ (Equation 13-12 or 13-13)<br>$P_{FD} =$ 1.000 using Equation (Exhibit 13-7)<br>$V_{12} =$ 948 pc/h<br>$V_3$ or $V_{av34}$ 0 pc/h (Equation 13-14 or 13-17)<br>Is $V_3$ or $V_{av34} > 2,700$ pc/h? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No<br>Is $V_3$ or $V_{av34} > 1.5 * V_{12}/2$ <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No<br>If Yes, $V_{12a} =$ pc/h (Equation 13-16, 13-18, or 13-19) |  |               |                                      |            |
| <b>Capacity Checks</b>  |                 |  |         |                       | <b>Capacity Checks</b>   |  |               |                                      |            |
|   | Actual          | Capacity   |         | LOS F?                |  | Actual   | Capacity      |                                      | LOS F?     |
| $V_{FO}$  |                 | Exhibit 13-8   |         |                       | $V_F$  | 948  | Exhibit 13-8  | 4700                                 | No         |
|   |                 |  |         | $V_{FO} = V_F - V_R$  | 415  | Exhibit 13-8   | 4700          | No                                   |            |
|   |                 |  |         | $V_R$                 | 533  | Exhibit 13-10  | 2200          | No                                   |            |
| <b>Flow Entering Merge Influence Area</b>   |                 |  |         |                       | <b>Flow Entering Diverge Influence Area</b>  |  |               |                                      |            |
|   | Actual          | Max Desirable  |         | Violation?            |  | Actual   | Max Desirable |                                      | Violation? |
| $V_{R12}$   |                 | Exhibit 13-8   |         |                       | $V_{12}$   | 948  | Exhibit 13-8  | 4400:All                             | No         |
| <b>Level of Service Determination (if not F)</b>  |                 |  |         |                       | <b>Level of Service Determination (if not F)</b>   |  |               |                                      |            |
| $D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$<br>$D_R =$ (pc/mi/ln)<br>$LOS =$ (Exhibit 13-2)   |                 |  |         |                       | $D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$<br>$D_R =$ 5.7 (pc/mi/ln)<br>$LOS =$ A (Exhibit 13-2)  |  |               |                                      |            |
| <b>Speed Determination</b>  |                 |  |         |                       | <b>Speed Determination</b>   |  |               |                                      |            |
| $M_S =$ (Exhibit 13-11)<br>$S_R =$ mph (Exhibit 13-11)<br>$S_0 =$ mph (Exhibit 13-11)<br>$S =$ mph (Exhibit 13-13)  |                 |  |         |                       | $D_s =$ 0.216 (Exhibit 13-12)<br>$S_R =$ 60.0 mph (Exhibit 13-12)<br>$S_0 =$ N/A mph (Exhibit 13-12)<br>$S =$ 60.0 mph (Exhibit 13-13)   |  |               |                                      |            |

| RAMPS AND RAMP JUNCTIONS WORKSHEET   |               |  |          |  |  |  |                |  |            |
|--|---------------|--|----------|--|--|--|----------------|--|------------|
| <b>General Information</b>   |               |  |          |  | <b>Site Information</b>  |  |                |  |            |
| Analyst  |               | Shane Forsythe                               |          | Freeway/Dir of Travel                      |  | 10th Ave NB On-ramp  |                |  |            |
| Agency or Company  |               |  |          | Junction                                   |  | I-15 and I-315   |                |  |            |
| Date Performed   |               | 9/15/2014                                    |          | Jurisdiction                               |  |  |                |  |            |
| Analysis Time Period   |               | PM Peak                                      |          | Analysis Year                              |  | 2014   |                |  |            |
| Project Description  |               |  |          |  |  |  |                |  |            |
| <b>Inputs</b>  |               |  |          |  |  |  |                |  |            |
| Upstream Adj Ramp<br><input type="checkbox"/> Yes <input type="checkbox"/> On<br><input checked="" type="checkbox"/> No <input type="checkbox"/> Off<br>L <sub>up</sub> =      ft<br>V <sub>u</sub> =      veh/h   |               | Freeway Number of Lanes, N      2            |          |  |  | Downstream Adj Ramp<br><input type="checkbox"/> Yes <input type="checkbox"/> On<br><input checked="" type="checkbox"/> No <input type="checkbox"/> Off<br>L <sub>down</sub> =      ft<br>V <sub>D</sub> =      veh/h |                |  |            |
|  |               | Ramp Number of Lanes, N      1               |          |  |  |  |                |  |            |
|  |               | Acceleration Lane Length, L <sub>A</sub> 590 |          |  |  |  |                |  |            |
|  |               | Deceleration Lane Length L <sub>D</sub>      |          |  |  |  |                |  |            |
|  |               | Freeway Volume, V <sub>F</sub> 490           |          |  |  |  |                |  |            |
|  |               | Ramp Volume, V <sub>R</sub> 262              |          |  |  |  |                |  |            |
| Freeway Free-Flow Speed, S <sub>FF</sub> 65.0  |               |  |          | Ramp Free-Flow Speed, S <sub>FR</sub> 35.0 |  |  |                |  |            |
| <b>Conversion to pc/h Under Base Conditions</b>  |               |  |          |  |  |  |                |  |            |
| (pc/h)   | V<br>(Veh/hr) | PHF  | Terrain  | %Truck                                     | %Rv  | f <sub>HV</sub>  | f <sub>p</sub> | v = V/PHF x f <sub>HV</sub> x f <sub>p</sub> |            |
| Freeway  | 490           | 0.87   | Level    | 11   | 0  | 0.948  | 1.00           | 596  |            |
| Ramp   | 262           | 0.92   | Level    | 4  | 0  | 0.980  | 1.00           | 290  |            |
| UpStream   |               |  |          |  |  |  |                |  |            |
| DownStream   |               |  |          |  |  |  |                |  |            |
| Merge Areas  |               |  |          |  | Diverge Areas  |  |                |  |            |
| <b>Estimation of v<sub>12</sub></b>  |               |  |          |  | <b>Estimation of v<sub>12</sub></b>  |  |                |  |            |
| $V_{12} = V_F (P_{FM})$<br>(Equation 13-6 or 13-7)<br>P <sub>FM</sub> = 1.000 using Equation (Exhibit 13-6)<br>V <sub>12</sub> = 596 pc/h<br>V <sub>3</sub> or V <sub>av34</sub> = 0 pc/h (Equation 13-14 or 13-17)<br>Is V <sub>3</sub> or V <sub>av34</sub> > 2,700 pc/h? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No<br>Is V <sub>3</sub> or V <sub>av34</sub> > 1.5 * V <sub>12</sub> /2 <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No<br>If Yes, V <sub>12a</sub> =      pc/h (Equation 13-16, 13-18, or 13-19) |               |  |          |  | $V_{12} = V_R + (V_F - V_R)P_{FD}$<br>(Equation 13-12 or 13-13)<br>P <sub>FD</sub> =      using Equation (Exhibit 13-7)<br>V <sub>12</sub> =      pc/h<br>V <sub>3</sub> or V <sub>av34</sub> =      pc/h (Equation 13-14 or 13-17)<br>Is V <sub>3</sub> or V <sub>av34</sub> > 2,700 pc/h? <input type="checkbox"/> Yes <input type="checkbox"/> No<br>Is V <sub>3</sub> or V <sub>av34</sub> > 1.5 * V <sub>12</sub> /2 <input type="checkbox"/> Yes <input type="checkbox"/> No<br>If Yes, V <sub>12a</sub> =      pc/h (Equation 13-16, 13-18, or 13-19) |  |                |  |            |
| <b>Capacity Checks</b>   |               |  |          |  | <b>Capacity Checks</b>   |  |                |  |            |
|  | Actual        | Capacity                                     |          | LOS F?                                     |  | Actual   | Capacity       |  | LOS F?     |
| V <sub>FO</sub>  | 886           | Exhibit 13-8                                 |          | No   | V <sub>F</sub>   |  | Exhibit 13-8   |  |            |
|  |               |  |          |  | V <sub>FO</sub> = V <sub>F</sub> - V <sub>R</sub>  |  | Exhibit 13-8   |  |            |
|  |               |  |          |  | V <sub>R</sub>   |  | Exhibit 13-10  |  |            |
| <b>Flow Entering Merge Influence Area</b>  |               |  |          |  | <b>Flow Entering Diverge Influence Area</b>  |  |                |  |            |
|  | Actual        | Max Desirable                                |          | Violation?                                 |  | Actual   | Max Desirable  |  | Violation? |
| V <sub>R12</sub>   | 886           | Exhibit 13-8                                 | 4600:All | No   | V <sub>12</sub>  |  | Exhibit 13-8   |  |            |
| <b>Level of Service Determination (if not F)</b>   |               |  |          |  | <b>Level of Service Determination (if not F)</b>   |  |                |  |            |
| $D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$<br>D <sub>R</sub> = 8.6 (pc/mi/ln)<br>LOS = A (Exhibit 13-2)   |               |  |          |  | $D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$<br>D <sub>R</sub> =      (pc/mi/ln)<br>LOS =      (Exhibit 13-2)   |  |                |  |            |
| <b>Speed Determination</b>   |               |  |          |  | <b>Speed Determination</b>   |  |                |  |            |
| M <sub>S</sub> = 0.289 (Exhibit 13-11)<br>S <sub>R</sub> = 58.3 mph (Exhibit 13-11)<br>S <sub>0</sub> = N/A mph (Exhibit 13-11)<br>S = 58.3 mph (Exhibit 13-13)  |               |  |          |  | D <sub>S</sub> =      (Exhibit 13-12)<br>S <sub>R</sub> =      mph (Exhibit 13-12)<br>S <sub>0</sub> =      mph (Exhibit 13-12)<br>S =      mph (Exhibit 13-13)  |  |                |  |            |

| RAMPS AND RAMP JUNCTIONS WORKSHEET  |                 |  |         |                       |  |  |               |                                      |            |
|---|-----------------|--|---------|-----------------------|--|--|---------------|--------------------------------------|------------|
| <b>General Information</b>  |                 |  |         |                       | <b>Site Information</b>  |  |               |                                      |            |
| Analyst   |                 | Shane Forsythe   |         | Freeway/Dir of Travel |  | 10th Ave SB Off-ramp   |               |                                      |            |
| Agency or Company   |                 |  |         | Junction              |  | I-15 and I-315   |               |                                      |            |
| Date Performed  |                 | 9/15/2014  |         | Jurisdiction          |  |  |               |                                      |            |
| Analysis Time Period  |                 | PM Peak  |         | Analysis Year         |  | 2014   |               |                                      |            |
| Project Description   |                 |  |         |                       |  |  |               |                                      |            |
| <b>Inputs</b>   |                 |  |         |                       |  |  |               |                                      |            |
| Upstream Adj Ramp<br><input type="checkbox"/> Yes <input type="checkbox"/> On<br><input checked="" type="checkbox"/> No <input type="checkbox"/> Off<br><br>$L_{up} =$ ft<br><br>$V_u =$ veh/h  |                 | Freeway Number of Lanes, $N$ 2<br>Ramp Number of Lanes, $N$ 1<br>Acceleration Lane Length, $L_A$<br>Deceleration Lane Length $L_D$ 463<br>Freeway Volume, $V_F$ 491<br>Ramp Volume, $V_R$ 239<br>Freeway Free-Flow Speed, $S_{FF}$ 65.0<br>Ramp Free-Flow Speed, $S_{FR}$ 55.0 |         |                       |  | Downstream Adj Ramp<br><input type="checkbox"/> Yes <input type="checkbox"/> On<br><input checked="" type="checkbox"/> No <input type="checkbox"/> Off<br><br>$L_{down} =$ ft<br><br>$V_D =$ veh/h |               |                                      |            |
| <b>Conversion to pc/h Under Base Conditions</b>   |                 |  |         |                       |  |  |               |                                      |            |
| (pc/h)  | $V$<br>(Veh/hr) | PHF  | Terrain | %Truck                | %Rv  | $f_{HV}$   | $f_p$         | $v = V/PHF \times f_{HV} \times f_p$ |            |
| Freeway   | 491             | 0.90   | Level   | 14                    | 0  | 0.935  | 1.00          | 586                                  |            |
| Ramp  | 239             | 0.83   | Level   | 7                     | 0  | 0.966  | 1.00          | 299                                  |            |
| UpStream  |                 |  |         |                       |  |  |               |                                      |            |
| DownStream  |                 |  |         |                       |  |  |               |                                      |            |
| <b>Merge Areas</b>  |                 |  |         |                       | <b>Diverge Areas</b>   |  |               |                                      |            |
| <b>Estimation of <math>v_{12}</math></b>  |                 |  |         |                       | <b>Estimation of <math>v_{12}</math></b>   |  |               |                                      |            |
| $V_{12} = V_F (P_{FM})$<br>$L_{EQ} =$ (Equation 13-6 or 13-7)<br>$P_{FM} =$ using Equation (Exhibit 13-6)<br>$V_{12} =$ pc/h<br>$V_3$ or $V_{av34}$ pc/h (Equation 13-14 or 13-17)<br>Is $V_3$ or $V_{av34} > 2,700$ pc/h? <input type="checkbox"/> Yes <input type="checkbox"/> No<br>Is $V_3$ or $V_{av34} > 1.5 * V_{12}/2$ <input type="checkbox"/> Yes <input type="checkbox"/> No<br>If Yes, $V_{12a} =$ pc/h (Equation 13-16, 13-18, or 13-19) |                 |  |         |                       | $V_{12} = V_R + (V_F - V_R)P_{FD}$<br>$L_{EQ} =$ (Equation 13-12 or 13-13)<br>$P_{FD} =$ 1.000 using Equation (Exhibit 13-7)<br>$V_{12} =$ 586 pc/h<br>$V_3$ or $V_{av34}$ 0 pc/h (Equation 13-14 or 13-17)<br>Is $V_3$ or $V_{av34} > 2,700$ pc/h? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No<br>Is $V_3$ or $V_{av34} > 1.5 * V_{12}/2$ <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No<br>If Yes, $V_{12a} =$ pc/h (Equation 13-16, 13-18, or 13-19) |  |               |                                      |            |
| <b>Capacity Checks</b>  |                 |  |         |                       | <b>Capacity Checks</b>   |  |               |                                      |            |
|   | Actual          | Capacity   |         | LOS F?                |  | Actual   | Capacity      |                                      | LOS F?     |
| $V_{FO}$  |                 |  |         |                       | $V_F$  | 586  | Exhibit 13-8  | 4700                                 | No         |
|   |                 | Exhibit 13-8   |         |                       | $V_{FO} = V_F - V_R$   | 287  | Exhibit 13-8  | 4700                                 | No         |
|   |                 |  |         |                       | $V_R$  | 299  | Exhibit 13-10 | 2200                                 | No         |
| <b>Flow Entering Merge Influence Area</b>   |                 |  |         |                       | <b>Flow Entering Diverge Influence Area</b>  |  |               |                                      |            |
|   | Actual          | Max Desirable  |         | Violation?            |  | Actual   | Max Desirable |                                      | Violation? |
| $V_{R12}$   |                 | Exhibit 13-8   |         |                       | $V_{12}$   | 586  | Exhibit 13-8  | 4400:All                             | No         |
| <b>Level of Service Determination (if not F)</b>  |                 |  |         |                       | <b>Level of Service Determination (if not F)</b>   |  |               |                                      |            |
| $D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$<br>$D_R =$ (pc/mi/ln)<br>$LOS =$ (Exhibit 13-2)   |                 |  |         |                       | $D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$<br>$D_R =$ 5.1 (pc/mi/ln)<br>$LOS =$ A (Exhibit 13-2)  |  |               |                                      |            |
| <b>Speed Determination</b>  |                 |  |         |                       | <b>Speed Determination</b>   |  |               |                                      |            |
| $M_S =$ (Exhibit 13-11)<br>$S_R =$ mph (Exhibit 13-11)<br>$S_0 =$ mph (Exhibit 13-11)<br>$S =$ mph (Exhibit 13-13)  |                 |  |         |                       | $D_s =$ 0.195 (Exhibit 13-12)<br>$S_R =$ 60.5 mph (Exhibit 13-12)<br>$S_0 =$ N/A mph (Exhibit 13-12)<br>$S =$ 60.5 mph (Exhibit 13-13)   |  |               |                                      |            |

| RAMPS AND RAMP JUNCTIONS WORKSHEET   |                 |                                 |          |                       |   |                     |               |  |            |
|--|-----------------|---------------------------------|----------|-----------------------|---|---------------------|---------------|--|------------|
| <b>General Information</b>   |                 |                                 |          |                       | <b>Site Information</b>   |                     |               |  |            |
| Analyst  |                 | Shane Forsythe                  |          | Freeway/Dir of Travel |   | 10th Ave SB On-ramp |               |  |            |
| Agency or Company  |                 |                                 |          | Junction              |   | I-15 and I-315      |               |  |            |
| Date Performed   |                 | 9/15/2014                       |          | Jurisdiction          |   |                     |               |  |            |
| Analysis Time Period   |                 | PM Peak                         |          | Analysis Year         |   | 2014                |               |  |            |
| Project Description  |                 |                                 |          |                       |   |                     |               |  |            |
| <b>Inputs</b>  |                 |                                 |          |                       |   |                     |               |  |            |
| Upstream Adj Ramp<br><br><input type="checkbox"/> Yes <input type="checkbox"/> On<br><br><input checked="" type="checkbox"/> No <input type="checkbox"/> Off<br><br>$L_{up} =$ ft<br><br>$V_u =$ veh/h   |                 | Freeway Number of Lanes, $N$    |          |                       |   | 2                   |               | Downstream Adj Ramp<br><br><input type="checkbox"/> Yes <input type="checkbox"/> On<br><br><input checked="" type="checkbox"/> No <input type="checkbox"/> Off<br><br>$L_{down} =$ ft<br><br>$V_D =$ veh/h |            |
|  |                 | Ramp Number of Lanes, $N$       |          |                       |   | 1                   |               |  |            |
|  |                 | Acceleration Lane Length, $L_A$ |          |                       |   | 1500                |               |  |            |
|  |                 | Deceleration Lane Length $L_D$  |          |                       |   |                     |               |  |            |
|  |                 | Freeway Volume, $V_F$           |          |                       |   | 630                 |               |  |            |
|  |                 | Ramp Volume, $V_R$              |          |                       |   | 384                 |               |  |            |
| Freeway Free-Flow Speed, $S_{FF}$  |                 |                                 |          | 65.0                  |   |                     |               |  |            |
| Ramp Free-Flow Speed, $S_{FR}$   |                 |                                 |          | 35.0                  |   |                     |               |  |            |
| <b>Conversion to pc/h Under Base Conditions</b>  |                 |                                 |          |                       |   |                     |               |  |            |
| (pc/h)   | $V$<br>(Veh/hr) | PHF                             | Terrain  | %Truck                | %Rv   | $f_{HV}$            | $f_p$         | $v = V/PHF \times f_{HV} \times f_p$   |            |
| Freeway  | 630             | 0.93                            | Level    | 10                    | 0   | 0.952               | 1.00          | 711  |            |
| Ramp   | 384             | 0.94                            | Level    | 5                     | 0   | 0.976               | 1.00          | 419  |            |
| UpStream   |                 |                                 |          |                       |   |                     |               |  |            |
| DownStream   |                 |                                 |          |                       |   |                     |               |  |            |
| <b>Merge Areas</b>   |                 |                                 |          |                       | <b>Diverge Areas</b>  |                     |               |  |            |
| <b>Estimation of <math>v_{12}</math></b>   |                 |                                 |          |                       | <b>Estimation of <math>v_{12}</math></b>  |                     |               |  |            |
| $V_{12} = V_F (P_{FM})$<br>(Equation 13-6 or 13-7)<br>$P_{FM} =$ 1.000 using Equation (Exhibit 13-6)<br>$V_{12} =$ 711 pc/h<br>$V_3$ or $V_{av34}$ 0 pc/h (Equation 13-14 or 13-17)<br>Is $V_3$ or $V_{av34} > 2,700$ pc/h? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No<br>Is $V_3$ or $V_{av34} > 1.5 * V_{12}/2$ <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No<br>If Yes, $V_{12a} =$ pc/h (Equation 13-16, 13-18, or 13-19) |                 |                                 |          |                       | $V_{12} = V_R + (V_F - V_R)P_{FD}$<br>(Equation 13-12 or 13-13)<br>$P_{FD} =$ using Equation (Exhibit 13-7)<br>$V_{12} =$ pc/h<br>$V_3$ or $V_{av34}$ pc/h (Equation 13-14 or 13-17)<br>Is $V_3$ or $V_{av34} > 2,700$ pc/h? <input type="checkbox"/> Yes <input type="checkbox"/> No<br>Is $V_3$ or $V_{av34} > 1.5 * V_{12}/2$ <input type="checkbox"/> Yes <input type="checkbox"/> No<br>If Yes, $V_{12a} =$ pc/h (Equation 13-16, 13-18, or 13-19) |                     |               |  |            |
| <b>Capacity Checks</b>   |                 |                                 |          |                       | <b>Capacity Checks</b>  |                     |               |  |            |
|  | Actual          | Capacity                        |          | LOS F?                |   | Actual              | Capacity      |  | LOS F?     |
| $V_{FO}$   | 1130            | Exhibit 13-8                    |          | No                    | $V_F$   |                     | Exhibit 13-8  |  |            |
|  |                 |                                 |          |                       | $V_{FO} = V_F - V_R$  |                     | Exhibit 13-8  |  |            |
|  |                 |                                 |          |                       | $V_R$   |                     | Exhibit 13-10 |  |            |
| <b>Flow Entering Merge Influence Area</b>  |                 |                                 |          |                       | <b>Flow Entering Diverge Influence Area</b>   |                     |               |  |            |
|  | Actual          | Max Desirable                   |          | Violation?            |   | Actual              | Max Desirable |  | Violation? |
| $V_{R12}$  | 1130            | Exhibit 13-8                    | 4600:All | No                    | $V_{12}$  |                     | Exhibit 13-8  |  |            |
| <b>Level of Service Determination (if not F)</b>   |                 |                                 |          |                       | <b>Level of Service Determination (if not F)</b>  |                     |               |  |            |
| $D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$<br>$D_R =$ 4.7 (pc/mi/ln)<br>LOS = A (Exhibit 13-2)  |                 |                                 |          |                       | $D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$<br>$D_R =$ (pc/mi/ln)<br>LOS = (Exhibit 13-2)   |                     |               |  |            |
| <b>Speed Determination</b>   |                 |                                 |          |                       | <b>Speed Determination</b>  |                     |               |  |            |
| $M_S =$ 0.228 (Exhibit 13-11)<br>$S_R =$ 59.8 mph (Exhibit 13-11)<br>$S_0 =$ N/A mph (Exhibit 13-11)<br>$S =$ 59.8 mph (Exhibit 13-13)   |                 |                                 |          |                       | $D_S =$ (Exhibit 13-12)<br>$S_R =$ mph (Exhibit 13-12)<br>$S_0 =$ mph (Exhibit 13-12)<br>$S =$ mph (Exhibit 13-13)  |                     |               |  |            |

| RAMPS AND RAMP JUNCTIONS WORKSHEET  |                 |   |         |                       |  |  |               |                                      |            |
|---|-----------------|---|---------|-----------------------|--|--|---------------|--------------------------------------|------------|
| <b>General Information</b>  |                 |   |         |                       | <b>Site Information</b>  |  |               |                                      |            |
| Analyst   |                 | Shane Forsythe  |         | Freeway/Dir of Travel |  | 14th EB Off-ramp   |               |                                      |            |
| Agency or Company   |                 |   |         | Junction              |  | I-315  |               |                                      |            |
| Date Performed  |                 | 9/15/2014   |         | Jurisdiction          |  |  |               |                                      |            |
| Analysis Time Period  |                 | AM Peak   |         | Analysis Year         |  | 2014   |               |                                      |            |
| Project Description I-15 Corridor Study   |                 |   |         |                       |  |  |               |                                      |            |
| <b>Inputs</b>   |                 |   |         |                       |  |  |               |                                      |            |
| Upstream Adj Ramp<br><input type="checkbox"/> Yes <input type="checkbox"/> On<br><input checked="" type="checkbox"/> No <input type="checkbox"/> Off<br><br>$L_{up} =$ ft<br><br>$V_u =$ veh/h  |                 | Freeway Number of Lanes, $N$ 2<br>Ramp Number of Lanes, $N$ 1<br>Acceleration Lane Length, $L_A$<br>Deceleration Lane Length $L_D$ 503<br>Freeway Volume, $V_F$ 530<br>Ramp Volume, $V_R$ 55<br>Freeway Free-Flow Speed, $S_{FF}$ 55.0<br>Ramp Free-Flow Speed, $S_{FR}$ 35.0 |         |                       |  | Downstream Adj Ramp<br><input type="checkbox"/> Yes <input type="checkbox"/> On<br><input checked="" type="checkbox"/> No <input type="checkbox"/> Off<br><br>$L_{down} =$ ft<br><br>$V_D =$ veh/h |               |                                      |            |
| <b>Conversion to pc/h Under Base Conditions</b>   |                 |   |         |                       |  |  |               |                                      |            |
| (pc/h)  | $V$<br>(Veh/hr) | PHF   | Terrain | %Truck                | %Rv  | $f_{HV}$   | $f_p$         | $v = V/PHF \times f_{HV} \times f_p$ |            |
| Freeway   | 530             | 0.87  | Level   | 6                     | 0  | 0.971  | 1.00          | 627                                  |            |
| Ramp  | 55              | 0.83  | Level   | 5                     | 0  | 0.976  | 1.00          | 68                                   |            |
| UpStream  |                 |   |         |                       |  |  |               |                                      |            |
| DownStream  |                 |   |         |                       |  |  |               |                                      |            |
| <b>Merge Areas</b>  |                 |   |         |                       | <b>Diverge Areas</b>   |  |               |                                      |            |
| <b>Estimation of <math>v_{12}</math></b>  |                 |   |         |                       | <b>Estimation of <math>v_{12}</math></b>   |  |               |                                      |            |
| $V_{12} = V_F (P_{FM})$<br>$L_{EQ} =$ (Equation 13-6 or 13-7)<br>$P_{FM} =$ using Equation (Exhibit 13-6)<br>$V_{12} =$ pc/h<br>$V_3$ or $V_{av34}$ pc/h (Equation 13-14 or 13-17)<br>Is $V_3$ or $V_{av34} > 2,700$ pc/h? <input type="checkbox"/> Yes <input type="checkbox"/> No<br>Is $V_3$ or $V_{av34} > 1.5 * V_{12}/2$ <input type="checkbox"/> Yes <input type="checkbox"/> No<br>If Yes, $V_{12a} =$ pc/h (Equation 13-16, 13-18, or 13-19) |                 |   |         |                       | $V_{12} = V_R + (V_F - V_R)P_{FD}$<br>$L_{EQ} =$ (Equation 13-12 or 13-13)<br>$P_{FD} =$ 1.000 using Equation (Exhibit 13-7)<br>$V_{12} =$ 627 pc/h<br>$V_3$ or $V_{av34}$ 0 pc/h (Equation 13-14 or 13-17)<br>Is $V_3$ or $V_{av34} > 2,700$ pc/h? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No<br>Is $V_3$ or $V_{av34} > 1.5 * V_{12}/2$ <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No<br>If Yes, $V_{12a} =$ pc/h (Equation 13-16, 13-18, or 13-19) |  |               |                                      |            |
| <b>Capacity Checks</b>  |                 |   |         |                       | <b>Capacity Checks</b>   |  |               |                                      |            |
|   | Actual          | Capacity  |         | LOS F?                |  | Actual   | Capacity      |                                      | LOS F?     |
| $V_{FO}$  |                 |   |         |                       | $V_F$  | 627  | Exhibit 13-8  | 4500                                 | No         |
|   |                 | Exhibit 13-8  |         |                       | $V_{FO} = V_F - V_R$   | 559  | Exhibit 13-8  | 4500                                 | No         |
|   |                 |   |         |                       | $V_R$  | 68   | Exhibit 13-10 | 2000                                 | No         |
| <b>Flow Entering Merge Influence Area</b>   |                 |   |         |                       | <b>Flow Entering Diverge Influence Area</b>  |  |               |                                      |            |
|   | Actual          | Max Desirable   |         | Violation?            |  | Actual   | Max Desirable |                                      | Violation? |
| $V_{R12}$   |                 | Exhibit 13-8  |         |                       | $V_{12}$   | 627  | Exhibit 13-8  | 4400:All                             | No         |
| <b>Level of Service Determination (if not F)</b>  |                 |   |         |                       | <b>Level of Service Determination (if not F)</b>   |  |               |                                      |            |
| $D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$<br>$D_R =$ (pc/mi/ln)<br>$LOS =$ (Exhibit 13-2)   |                 |   |         |                       | $D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$<br>$D_R =$ 5.1 (pc/mi/ln)<br>$LOS =$ A (Exhibit 13-2)  |  |               |                                      |            |
| <b>Speed Determination</b>  |                 |   |         |                       | <b>Speed Determination</b>   |  |               |                                      |            |
| $M_S =$ (Exhibit 13-11)<br>$S_R =$ mph (Exhibit 13-11)<br>$S_0 =$ mph (Exhibit 13-11)<br>$S =$ mph (Exhibit 13-13)  |                 |   |         |                       | $D_s =$ 0.434 (Exhibit 13-12)<br>$S_R =$ 49.4 mph (Exhibit 13-12)<br>$S_0 =$ N/A mph (Exhibit 13-12)<br>$S =$ 49.4 mph (Exhibit 13-13)   |  |               |                                      |            |

| RAMPS AND RAMP JUNCTIONS WORKSHEET  |                 |                                 |          |                       |   |                    |               |  |            |
|---|-----------------|---------------------------------|----------|-----------------------|---|--------------------|---------------|--|------------|
| <b>General Information</b>  |                 |                                 |          |                       | <b>Site Information</b>   |                    |               |  |            |
| Analyst   |                 | Shane Forsythe                  |          | Freeway/Dir of Travel |   | 14th St EB On-ramp |               |  |            |
| Agency or Company   |                 |                                 |          | Junction              |   | I-315              |               |  |            |
| Date Performed  |                 | 9/15/2014                       |          | Jurisdiction          |   |                    |               |  |            |
| Analysis Time Period  |                 | AM Peak                         |          | Analysis Year         |   | 2014               |               |  |            |
| Project Description I-15 Corridor Study   |                 |                                 |          |                       |   |                    |               |  |            |
| <b>Inputs</b>   |                 |                                 |          |                       |   |                    |               |  |            |
| Upstream Adj Ramp<br><br><input type="checkbox"/> Yes <input type="checkbox"/> On<br><br><input checked="" type="checkbox"/> No <input type="checkbox"/> Off<br><br>$L_{up} =$ ft<br><br>$V_u =$ veh/h  |                 | Freeway Number of Lanes, $N$    |          |                       |   | 2                  |               | Downstream Adj Ramp<br><br><input type="checkbox"/> Yes <input type="checkbox"/> On<br><br><input checked="" type="checkbox"/> No <input type="checkbox"/> Off<br><br>$L_{down} =$ ft<br><br>$V_D =$ veh/h |            |
|   |                 | Ramp Number of Lanes, $N$       |          |                       |   | 1                  |               |  |            |
|   |                 | Acceleration Lane Length, $L_A$ |          |                       |   | 930                |               |  |            |
|   |                 | Deceleration Lane Length $L_D$  |          |                       |   |                    |               |  |            |
|   |                 | Freeway Volume, $V_F$           |          |                       |   | 979                |               |  |            |
|   |                 | Ramp Volume, $V_R$              |          |                       |   | 497                |               |  |            |
| Freeway Free-Flow Speed, $S_{FF}$   |                 |                                 |          | 55.0                  |   |                    |               |  |            |
| Ramp Free-Flow Speed, $S_{FR}$  |                 |                                 |          | 35.0                  |   |                    |               |  |            |
| <b>Conversion to pc/h Under Base Conditions</b>   |                 |                                 |          |                       |   |                    |               |  |            |
| (pc/h)  | $V$<br>(Veh/hr) | PHF                             | Terrain  | %Truck                | %Rv   | $f_{HV}$           | $f_p$         | $v = V/PHF \times f_{HV} \times f_p$   |            |
| Freeway   | 979             | 0.83                            | Level    | 4                     | 0   | 0.980              | 1.00          | 1205   |            |
| Ramp  | 497             | 0.83                            | Level    | 3                     | 0   | 0.985              | 1.00          | 608  |            |
| UpStream  |                 |                                 |          |                       |   |                    |               |  |            |
| DownStream  |                 |                                 |          |                       |   |                    |               |  |            |
| <b>Merge Areas</b>  |                 |                                 |          |                       | <b>Diverge Areas</b>  |                    |               |  |            |
| <b>Estimation of <math>v_{12}</math></b>  |                 |                                 |          |                       | <b>Estimation of <math>v_{12}</math></b>  |                    |               |  |            |
| $V_{12} = V_F (P_{FM})$<br>(Equation 13-6 or 13-7)<br>$P_{FM} =$ 1.000 using Equation (Exhibit 13-6)<br>$V_{12} =$ 1205 pc/h<br>$V_3$ or $V_{av34}$ 0 pc/h (Equation 13-14 or 13-17)<br>Is $V_3$ or $V_{av34} > 2,700$ pc/h? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No<br>Is $V_3$ or $V_{av34} > 1.5 * V_{12}/2$ <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No<br>If Yes, $V_{12a} =$ pc/h (Equation 13-16, 13-18, or 13-19) |                 |                                 |          |                       | $V_{12} = V_R + (V_F - V_R)P_{FD}$<br>(Equation 13-12 or 13-13)<br>$P_{FD} =$ using Equation (Exhibit 13-7)<br>$V_{12} =$ pc/h<br>$V_3$ or $V_{av34}$ pc/h (Equation 13-14 or 13-17)<br>Is $V_3$ or $V_{av34} > 2,700$ pc/h? <input type="checkbox"/> Yes <input type="checkbox"/> No<br>Is $V_3$ or $V_{av34} > 1.5 * V_{12}/2$ <input type="checkbox"/> Yes <input type="checkbox"/> No<br>If Yes, $V_{12a} =$ pc/h (Equation 13-16, 13-18, or 13-19) |                    |               |  |            |
| <b>Capacity Checks</b>  |                 |                                 |          |                       | <b>Capacity Checks</b>  |                    |               |  |            |
|   | Actual          | Capacity                        |          | LOS F?                |   | Actual             | Capacity      |  | LOS F?     |
| $V_{FO}$  | 1813            | Exhibit 13-8                    |          | No                    | $V_F$   |                    | Exhibit 13-8  |  |            |
|   |                 |                                 |          |                       | $V_{FO} = V_F - V_R$  |                    | Exhibit 13-8  |  |            |
|   |                 |                                 |          |                       | $V_R$   |                    | Exhibit 13-10 |  |            |
| <b>Flow Entering Merge Influence Area</b>   |                 |                                 |          |                       | <b>Flow Entering Diverge Influence Area</b>   |                    |               |  |            |
|   | Actual          | Max Desirable                   |          | Violation?            |   | Actual             | Max Desirable |  | Violation? |
| $V_{R12}$   | 1813            | Exhibit 13-8                    | 4600:All | No                    | $V_{12}$  |                    | Exhibit 13-8  |  |            |
| <b>Level of Service Determination (if not F)</b>  |                 |                                 |          |                       | <b>Level of Service Determination (if not F)</b>  |                    |               |  |            |
| $D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$<br>$D_R =$ 13.5 (pc/mi/ln)<br>LOS = B (Exhibit 13-2)  |                 |                                 |          |                       | $D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$<br>$D_R =$ (pc/mi/ln)<br>LOS = (Exhibit 13-2)   |                    |               |  |            |
| <b>Speed Determination</b>  |                 |                                 |          |                       | <b>Speed Determination</b>  |                    |               |  |            |
| $M_S =$ 0.280 (Exhibit 13-11)<br>$S_R =$ 51.4 mph (Exhibit 13-11)<br>$S_0 =$ N/A mph (Exhibit 13-11)<br>$S =$ 51.4 mph (Exhibit 13-13)  |                 |                                 |          |                       | $D_S =$ (Exhibit 13-12)<br>$S_R =$ mph (Exhibit 13-12)<br>$S_0 =$ mph (Exhibit 13-12)<br>$S =$ mph (Exhibit 13-13)  |                    |               |  |            |

| RAMPS AND RAMP JUNCTIONS WORKSHEET  |               |                                    |         |                       |  |  |               |                                      |            |
|---|---------------|------------------------------------|---------|-----------------------|--|--|---------------|--------------------------------------|------------|
| <b>General Information</b>  |               |                                    |         |                       | <b>Site Information</b>  |  |               |                                      |            |
| Analyst   |               | Shane Forsythe                     |         | Freeway/Dir of Travel |  | 14th WB Off-ramp   |               |                                      |            |
| Agency or Company   |               |                                    |         | Junction              |  | I-315  |               |                                      |            |
| Date Performed  |               | 9/15/2014                          |         | Jurisdiction          |  |  |               |                                      |            |
| Analysis Time Period  |               | AM Peak                            |         | Analysis Year         |  | 2014   |               |                                      |            |
| Project Description I-15 Corridor Study   |               |                                    |         |                       |  |  |               |                                      |            |
| <b>Inputs</b>   |               |                                    |         |                       |  |  |               |                                      |            |
| Upstream Adj Ramp<br><input type="checkbox"/> Yes <input type="checkbox"/> On<br><input checked="" type="checkbox"/> No <input type="checkbox"/> Off<br><br>$L_{up} =$ ft<br><br>$V_u =$ veh/h  |               | Freeway Number of Lanes, N      2  |         |                       |  | Downstream Adj Ramp<br><input type="checkbox"/> Yes <input type="checkbox"/> On<br><input checked="" type="checkbox"/> No <input type="checkbox"/> Off<br><br>$L_{down} =$ ft<br><br>$V_D =$ veh/h |               |                                      |            |
|   |               | Ramp Number of Lanes, N      1     |         |                       |  |  |               |                                      |            |
|   |               | Acceleration Lane Length, $L_A$    |         |                       |  |  |               |                                      |            |
|   |               | Deceleration Lane Length $L_D$ 713 |         |                       |  |  |               |                                      |            |
|   |               | Freeway Volume, $V_F$ 528          |         |                       |  |  |               |                                      |            |
|   |               | Ramp Volume, $V_R$ 216             |         |                       |  |  |               |                                      |            |
| Freeway Free-Flow Speed, $S_{FF}$ 55.0  |               |                                    |         |                       |  |  |               |                                      |            |
| Ramp Free-Flow Speed, $S_{FR}$ 35.0   |               |                                    |         |                       |  |  |               |                                      |            |
| <b>Conversion to pc/h Under Base Conditions</b>   |               |                                    |         |                       |  |  |               |                                      |            |
| (pc/h)  | V<br>(Veh/hr) | PHF                                | Terrain | %Truck                | %Rv  | $f_{HV}$   | $f_p$         | $v = V/PHF \times f_{HV} \times f_p$ |            |
| Freeway   | 528           | 0.82                               | Level   | 1                     | 0  | 0.995  | 1.00          | 645                                  |            |
| Ramp  | 216           | 0.80                               | Level   | 0                     | 0  | 1.000  | 1.00          | 269                                  |            |
| UpStream  |               |                                    |         |                       |  |  |               |                                      |            |
| DownStream  |               |                                    |         |                       |  |  |               |                                      |            |
| <b>Merge Areas</b>  |               |                                    |         |                       | <b>Diverge Areas</b>   |  |               |                                      |            |
| <b>Estimation of <math>v_{12}</math></b>  |               |                                    |         |                       | <b>Estimation of <math>v_{12}</math></b>   |  |               |                                      |            |
| $V_{12} = V_F (P_{FM})$<br>$L_{EQ} =$ (Equation 13-6 or 13-7)<br>$P_{FM} =$ using Equation (Exhibit 13-6)<br>$V_{12} =$ pc/h<br>$V_3$ or $V_{av34}$ pc/h (Equation 13-14 or 13-17)<br>Is $V_3$ or $V_{av34} > 2,700$ pc/h? <input type="checkbox"/> Yes <input type="checkbox"/> No<br>Is $V_3$ or $V_{av34} > 1.5 * V_{12}/2$ <input type="checkbox"/> Yes <input type="checkbox"/> No<br>If Yes, $V_{12a} =$ pc/h (Equation 13-16, 13-18, or 13-19) |               |                                    |         |                       | $V_{12} = V_R + (V_F - V_R)P_{FD}$<br>$L_{EQ} =$ (Equation 13-12 or 13-13)<br>$P_{FD} =$ 1.000 using Equation (Exhibit 13-7)<br>$V_{12} =$ 645 pc/h<br>$V_3$ or $V_{av34}$ 0 pc/h (Equation 13-14 or 13-17)<br>Is $V_3$ or $V_{av34} > 2,700$ pc/h? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No<br>Is $V_3$ or $V_{av34} > 1.5 * V_{12}/2$ <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No<br>If Yes, $V_{12a} =$ pc/h (Equation 13-16, 13-18, or 13-19) |  |               |                                      |            |
| <b>Capacity Checks</b>  |               |                                    |         |                       | <b>Capacity Checks</b>   |  |               |                                      |            |
|   | Actual        | Capacity                           |         | LOS F?                |  | Actual   | Capacity      |                                      | LOS F?     |
| $V_{FO}$  |               |                                    |         |                       | $V_F$  | 645  | Exhibit 13-8  | 4500                                 | No         |
|   |               | Exhibit 13-8                       |         |                       | $V_{FO} = V_F - V_R$   | 376  | Exhibit 13-8  | 4500                                 | No         |
|   |               |                                    |         |                       | $V_R$  | 269  | Exhibit 13-10 | 2000                                 | No         |
| <b>Flow Entering Merge Influence Area</b>   |               |                                    |         |                       | <b>Flow Entering Diverge Influence Area</b>  |  |               |                                      |            |
|   | Actual        | Max Desirable                      |         | Violation?            |  | Actual   | Max Desirable |                                      | Violation? |
| $V_{R12}$   |               | Exhibit 13-8                       |         |                       | $V_{12}$   | 645  | Exhibit 13-8  | 4400:All                             | No         |
| <b>Level of Service Determination (if not F)</b>  |               |                                    |         |                       | <b>Level of Service Determination (if not F)</b>   |  |               |                                      |            |
| $D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$<br>$D_R =$ (pc/mi/ln)<br>LOS =      (Exhibit 13-2)  |               |                                    |         |                       | $D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$<br>$D_R =$ 3.4 (pc/mi/ln)<br>LOS =      A (Exhibit 13-2)   |  |               |                                      |            |
| <b>Speed Determination</b>  |               |                                    |         |                       | <b>Speed Determination</b>   |  |               |                                      |            |
| $M_S =$ (Exhibit 13-11)<br>$S_R =$ mph (Exhibit 13-11)<br>$S_0 =$ mph (Exhibit 13-11)<br>$S =$ mph (Exhibit 13-13)  |               |                                    |         |                       | $D_s =$ 0.452 (Exhibit 13-12)<br>$S_R =$ 49.1 mph (Exhibit 13-12)<br>$S_0 =$ N/A mph (Exhibit 13-12)<br>$S =$ 49.1 mph (Exhibit 13-13)   |  |               |                                      |            |

| RAMPS AND RAMP JUNCTIONS WORKSHEET   |                 |                                 |          |                       |   |                    |               |  |            |
|--|-----------------|---------------------------------|----------|-----------------------|---|--------------------|---------------|--|------------|
| <b>General Information</b>   |                 |                                 |          |                       | <b>Site Information</b>   |                    |               |  |            |
| Analyst  |                 | Shane Forsythe                  |          | Freeway/Dir of Travel |   | 14th St WB On-ramp |               |  |            |
| Agency or Company  |                 |                                 |          | Junction              |   | I-315              |               |  |            |
| Date Performed   |                 | 9/15/2014                       |          | Jurisdiction          |   |                    |               |  |            |
| Analysis Time Period   |                 | AM Peak                         |          | Analysis Year         |   | 2014               |               |  |            |
| Project Description I-15 Corridor Study  |                 |                                 |          |                       |   |                    |               |  |            |
| <b>Inputs</b>  |                 |                                 |          |                       |   |                    |               |  |            |
| Upstream Adj Ramp<br><br><input type="checkbox"/> Yes <input type="checkbox"/> On<br><br><input checked="" type="checkbox"/> No <input type="checkbox"/> Off<br><br>$L_{up} =$ ft<br><br>$V_u =$ veh/h   |                 | Freeway Number of Lanes, $N$    |          |                       |   | 2                  |               | Downstream Adj Ramp<br><br><input type="checkbox"/> Yes <input type="checkbox"/> On<br><br><input checked="" type="checkbox"/> No <input type="checkbox"/> Off<br><br>$L_{down} =$ ft<br><br>$V_D =$ veh/h |            |
|  |                 | Ramp Number of Lanes, $N$       |          |                       |   | 1                  |               |  |            |
|  |                 | Acceleration Lane Length, $L_A$ |          |                       |   | 505                |               |  |            |
|  |                 | Deceleration Lane Length $L_D$  |          |                       |   |                    |               |  |            |
|  |                 | Freeway Volume, $V_F$           |          |                       |   | 454                |               |  |            |
|  |                 | Ramp Volume, $V_R$              |          |                       |   | 123                |               |  |            |
| Freeway Free-Flow Speed, $S_{FF}$  |                 |                                 |          | 55.0                  |   |                    |               |  |            |
| Ramp Free-Flow Speed, $S_{FR}$   |                 |                                 |          | 35.0                  |   |                    |               |  |            |
| <b>Conversion to pc/h Under Base Conditions</b>  |                 |                                 |          |                       |   |                    |               |  |            |
| (pc/h)   | $V$<br>(Veh/hr) | PHF                             | Terrain  | %Truck                | %Rv   | $f_{HV}$           | $f_p$         | $v = V/PHF \times f_{HV} \times f_p$   |            |
| Freeway  | 454             | 0.76                            | Level    | 6                     | 0   | 0.971              | 1.00          | 614  |            |
| Ramp   | 123             | 0.80                            | Level    | 5                     | 0   | 0.976              | 1.00          | 157  |            |
| UpStream   |                 |                                 |          |                       |   |                    |               |  |            |
| DownStream   |                 |                                 |          |                       |   |                    |               |  |            |
| <b>Merge Areas</b>   |                 |                                 |          |                       | <b>Diverge Areas</b>  |                    |               |  |            |
| <b>Estimation of <math>v_{12}</math></b>   |                 |                                 |          |                       | <b>Estimation of <math>v_{12}</math></b>  |                    |               |  |            |
| $V_{12} = V_F (P_{FM})$<br>(Equation 13-6 or 13-7)<br>$P_{FM} =$ 1.000 using Equation (Exhibit 13-6)<br>$V_{12} =$ 614 pc/h<br>$V_3$ or $V_{av34}$ 0 pc/h (Equation 13-14 or 13-17)<br>Is $V_3$ or $V_{av34} > 2,700$ pc/h? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No<br>Is $V_3$ or $V_{av34} > 1.5 * V_{12}/2$ <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No<br>If Yes, $V_{12a} =$ pc/h (Equation 13-16, 13-18, or 13-19) |                 |                                 |          |                       | $V_{12} = V_R + (V_F - V_R)P_{FD}$<br>(Equation 13-12 or 13-13)<br>$P_{FD} =$ using Equation (Exhibit 13-7)<br>$V_{12} =$ pc/h<br>$V_3$ or $V_{av34}$ pc/h (Equation 13-14 or 13-17)<br>Is $V_3$ or $V_{av34} > 2,700$ pc/h? <input type="checkbox"/> Yes <input type="checkbox"/> No<br>Is $V_3$ or $V_{av34} > 1.5 * V_{12}/2$ <input type="checkbox"/> Yes <input type="checkbox"/> No<br>If Yes, $V_{12a} =$ pc/h (Equation 13-16, 13-18, or 13-19) |                    |               |  |            |
| <b>Capacity Checks</b>   |                 |                                 |          |                       | <b>Capacity Checks</b>  |                    |               |  |            |
|  | Actual          | Capacity                        |          | LOS F?                |   | Actual             | Capacity      |  | LOS F?     |
| $V_{FO}$   | 771             | Exhibit 13-8                    |          | No                    | $V_F$   |                    | Exhibit 13-8  |  |            |
|  |                 |                                 |          |                       | $V_{FO} = V_F - V_R$  |                    | Exhibit 13-8  |  |            |
|  |                 |                                 |          |                       | $V_R$   |                    | Exhibit 13-10 |  |            |
| <b>Flow Entering Merge Influence Area</b>  |                 |                                 |          |                       | <b>Flow Entering Diverge Influence Area</b>   |                    |               |  |            |
|  | Actual          | Max Desirable                   |          | Violation?            |   | Actual             | Max Desirable |  | Violation? |
| $V_{R12}$  | 771             | Exhibit 13-8                    | 4600:All | No                    | $V_{12}$  |                    | Exhibit 13-8  |  |            |
| <b>Level of Service Determination (if not F)</b>   |                 |                                 |          |                       | <b>Level of Service Determination (if not F)</b>  |                    |               |  |            |
| $D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$<br>$D_R =$ 8.3 (pc/mi/ln)<br>LOS = A (Exhibit 13-2)  |                 |                                 |          |                       | $D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$<br>$D_R =$ (pc/mi/ln)<br>LOS = (Exhibit 13-2)   |                    |               |  |            |
| <b>Speed Determination</b>   |                 |                                 |          |                       | <b>Speed Determination</b>  |                    |               |  |            |
| $M_S =$ 0.294 (Exhibit 13-11)<br>$S_R =$ 51.2 mph (Exhibit 13-11)<br>$S_0 =$ N/A mph (Exhibit 13-11)<br>$S =$ 51.2 mph (Exhibit 13-13)   |                 |                                 |          |                       | $D_S =$ (Exhibit 13-12)<br>$S_R =$ mph (Exhibit 13-12)<br>$S_0 =$ mph (Exhibit 13-12)<br>$S =$ mph (Exhibit 13-13)  |                    |               |  |            |



| RAMPS AND RAMP JUNCTIONS WORKSHEET  |            |                                 |         |                       |  |                  |               |  |            |
|---|------------|---------------------------------|---------|-----------------------|--|------------------|---------------|--|------------|
| <b>General Information</b>  |            |                                 |         |                       | <b>Site Information</b>  |                  |               |  |            |
| Analyst   |            | Shane Forsythe                  |         | Freeway/Dir of Travel |  | 14th EB Off-ramp |               |  |            |
| Agency or Company   |            |                                 |         | Junction              |  | I-315            |               |  |            |
| Date Performed  |            | 9/15/2014                       |         | Jurisdiction          |  |                  |               |  |            |
| Analysis Time Period  |            | PM Peak                         |         | Analysis Year         |  | 2014             |               |  |            |
| Project Description I-15 Corridor Study   |            |                                 |         |                       |  |                  |               |  |            |
| <b>Inputs</b>   |            |                                 |         |                       |  |                  |               |  |            |
| Upstream Adj Ramp<br><input type="checkbox"/> Yes <input type="checkbox"/> On<br><input checked="" type="checkbox"/> No <input type="checkbox"/> Off<br><br>$L_{up} =$ ft<br><br>$V_u =$ veh/h  |            | Freeway Number of Lanes, N      |         |                       |  | 2                |               | Downstream Adj Ramp<br><input type="checkbox"/> Yes <input type="checkbox"/> On<br><input checked="" type="checkbox"/> No <input type="checkbox"/> Off<br><br>$L_{down} =$ ft<br><br>$V_D =$ veh/h |            |
|   |            | Ramp Number of Lanes, N         |         |                       |  | 1                |               |  |            |
|   |            | Acceleration Lane Length, $L_A$ |         |                       |  |                  |               |  |            |
|   |            | Deceleration Lane Length $L_D$  |         |                       |  | 503              |               |  |            |
|   |            | Freeway Volume, $V_F$           |         |                       |  | 675              |               |  |            |
|   |            | Ramp Volume, $V_R$              |         |                       |  | 183              |               |  |            |
| Freeway Free-Flow Speed, $S_{FF}$   |            |                                 |         | 55.0                  |  |                  |               |  |            |
| Ramp Free-Flow Speed, $S_{FR}$  |            |                                 |         | 35.0                  |  |                  |               |  |            |
| <b>Conversion to pc/h Under Base Conditions</b>   |            |                                 |         |                       |  |                  |               |  |            |
| (pc/h)  | V (Veh/hr) | PHF                             | Terrain | %Truck                | %Rv  | $f_{HV}$         | $f_p$         | $v = V/PHF \times f_{HV} \times f_p$   |            |
| Freeway   | 675        | 0.83                            | Level   | 4                     | 0  | 0.980            | 1.00          | 830  |            |
| Ramp  | 183        | 0.94                            | Level   | 3                     | 0  | 0.985            | 1.00          | 198  |            |
| UpStream  |            |                                 |         |                       |  |                  |               |  |            |
| DownStream  |            |                                 |         |                       |  |                  |               |  |            |
| <b>Merge Areas</b>  |            |                                 |         |                       | <b>Diverge Areas</b>   |                  |               |  |            |
| <b>Estimation of <math>v_{12}</math></b>  |            |                                 |         |                       | <b>Estimation of <math>v_{12}</math></b>   |                  |               |  |            |
| $V_{12} = V_F (P_{FM})$<br>$L_{EQ} =$ (Equation 13-6 or 13-7)<br>$P_{FM} =$ using Equation (Exhibit 13-6)<br>$V_{12} =$ pc/h<br>$V_3$ or $V_{av34}$ pc/h (Equation 13-14 or 13-17)<br>Is $V_3$ or $V_{av34} > 2,700$ pc/h? <input type="checkbox"/> Yes <input type="checkbox"/> No<br>Is $V_3$ or $V_{av34} > 1.5 * V_{12}/2$ <input type="checkbox"/> Yes <input type="checkbox"/> No<br>If Yes, $V_{12a} =$ pc/h (Equation 13-16, 13-18, or 13-19) |            |                                 |         |                       | $V_{12} = V_R + (V_F - V_R)P_{FD}$<br>$L_{EQ} =$ (Equation 13-12 or 13-13)<br>$P_{FD} =$ 1.000 using Equation (Exhibit 13-7)<br>$V_{12} =$ 830 pc/h<br>$V_3$ or $V_{av34}$ 0 pc/h (Equation 13-14 or 13-17)<br>Is $V_3$ or $V_{av34} > 2,700$ pc/h? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No<br>Is $V_3$ or $V_{av34} > 1.5 * V_{12}/2$ <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No<br>If Yes, $V_{12a} =$ pc/h (Equation 13-16, 13-18, or 13-19) |                  |               |  |            |
| <b>Capacity Checks</b>  |            |                                 |         |                       | <b>Capacity Checks</b>   |                  |               |  |            |
|   | Actual     | Capacity                        |         | LOS F?                |  | Actual           | Capacity      |  | LOS F?     |
| $V_{FO}$  |            |                                 |         |                       | $V_F$  | 830              | Exhibit 13-8  | 4500   | No         |
|   |            | Exhibit 13-8                    |         |                       | $V_{FO} = V_F - V_R$   | 632              | Exhibit 13-8  | 4500   | No         |
|   |            |                                 |         |                       | $V_R$  | 198              | Exhibit 13-10 | 2000   | No         |
| <b>Flow Entering Merge Influence Area</b>   |            |                                 |         |                       | <b>Flow Entering Diverge Influence Area</b>  |                  |               |  |            |
|   | Actual     | Max Desirable                   |         | Violation?            |  | Actual           | Max Desirable |  | Violation? |
| $V_{R12}$   |            | Exhibit 13-8                    |         |                       | $V_{12}$   | 830              | Exhibit 13-8  | 4400:All   | No         |
| <b>Level of Service Determination (if not F)</b>  |            |                                 |         |                       | <b>Level of Service Determination (if not F)</b>   |                  |               |  |            |
| $D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$<br>$D_R =$ (pc/mi/ln)<br>LOS =      (Exhibit 13-2)  |            |                                 |         |                       | $D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$<br>$D_R =$ 6.9 (pc/mi/ln)<br>LOS =      A (Exhibit 13-2)   |                  |               |  |            |
| <b>Speed Determination</b>  |            |                                 |         |                       | <b>Speed Determination</b>   |                  |               |  |            |
| $M_S =$ (Exhibit 13-11)<br>$S_R =$ mph (Exhibit 13-11)<br>$S_0 =$ mph (Exhibit 13-11)<br>$S =$ mph (Exhibit 13-13)  |            |                                 |         |                       | $D_s =$ 0.446 (Exhibit 13-12)<br>$S_R =$ 49.2 mph (Exhibit 13-12)<br>$S_0 =$ N/A mph (Exhibit 13-12)<br>$S =$ 49.2 mph (Exhibit 13-13)   |                  |               |  |            |

| RAMPS AND RAMP JUNCTIONS WORKSHEET  |            |  |          |  |  |  |                    |  |            |
|---|------------|--|----------|--|--|--|--------------------|--|------------|
| <b>General Information</b>  |            |  |          |  | <b>Site Information</b>  |  |                    |  |            |
| Analyst   |            | Shane Forsythe                               |          |  | Freeway/Dir of Travel  |  | 14th St EB On-ramp |  |            |
| Agency or Company   |            |  |          |  | Junction   |  | I-315              |  |            |
| Date Performed  |            | 9/15/2014                                    |          |  | Jurisdiction   |  |                    |  |            |
| Analysis Time Period  |            | PM Peak                                      |          |  | Analysis Year  |  | 2014               |  |            |
| Project Description I-15 Corridor Study   |            |  |          |  |  |  |                    |  |            |
| <b>Inputs</b>   |            |  |          |  |  |  |                    |  |            |
| Upstream Adj Ramp<br><input type="checkbox"/> Yes <input type="checkbox"/> On<br><input checked="" type="checkbox"/> No <input type="checkbox"/> Off<br>L <sub>up</sub> =      ft<br>V <sub>u</sub> =      veh/h  |            | Freeway Number of Lanes, N      2            |          |  |  | Downstream Adj Ramp<br><input type="checkbox"/> Yes <input type="checkbox"/> On<br><input checked="" type="checkbox"/> No <input type="checkbox"/> Off<br>L <sub>down</sub> =      ft<br>V <sub>D</sub> =      veh/h |                    |  |            |
|   |            | Ramp Number of Lanes, N      1               |          |  |  |  |                    |  |            |
|   |            | Acceleration Lane Length, L <sub>A</sub> 930 |          |  |  |  |                    |  |            |
|   |            | Deceleration Lane Length L <sub>D</sub>      |          |  |  |  |                    |  |            |
|   |            | Freeway Volume, V <sub>F</sub> 1044          |          |  |  |  |                    |  |            |
|   |            | Ramp Volume, V <sub>R</sub> 523              |          |  |  |  |                    |  |            |
| Freeway Free-Flow Speed, S <sub>FF</sub> 55.0   |            |  |          | Ramp Free-Flow Speed, S <sub>FR</sub> 35.0 |  |  |                    |  |            |
| <b>Conversion to pc/h Under Base Conditions</b>   |            |  |          |  |  |  |                    |  |            |
| (pc/h)  | V (Veh/hr) | PHF  | Terrain  | %Truck                                     | %Rv  | f <sub>HV</sub>  | f <sub>p</sub>     | v = V/PHF x f <sub>HV</sub> x f <sub>p</sub> |            |
| Freeway   | 1044       | 0.90   | Level    | 3  | 0  | 0.985  | 1.00               | 1177   |            |
| Ramp  | 523        | 0.94   | Level    | 1  | 0  | 0.995  | 1.00               | 559  |            |
| UpStream  |            |  |          |  |  |  |                    |  |            |
| DownStream  |            |  |          |  |  |  |                    |  |            |
| <b>Merge Areas</b>  |            |  |          |  | <b>Diverge Areas</b>   |  |                    |  |            |
| <b>Estimation of v<sub>12</sub></b>   |            |  |          |  | <b>Estimation of v<sub>12</sub></b>  |  |                    |  |            |
| $V_{12} = V_F (P_{FM})$<br>(Equation 13-6 or 13-7)<br>P <sub>FM</sub> = 1.000 using Equation (Exhibit 13-6)<br>V <sub>12</sub> = 1177 pc/h<br>V <sub>3</sub> or V <sub>av34</sub> = 0 pc/h (Equation 13-14 or 13-17)<br>Is V <sub>3</sub> or V <sub>av34</sub> > 2,700 pc/h? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No<br>Is V <sub>3</sub> or V <sub>av34</sub> > 1.5 * V <sub>12</sub> /2 <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No<br>If Yes, V <sub>12a</sub> =      pc/h (Equation 13-16, 13-18, or 13-19) |            |  |          |  | $V_{12} = V_R + (V_F - V_R)P_{FD}$<br>(Equation 13-12 or 13-13)<br>P <sub>FD</sub> =      using Equation (Exhibit 13-7)<br>V <sub>12</sub> =      pc/h<br>V <sub>3</sub> or V <sub>av34</sub> =      pc/h (Equation 13-14 or 13-17)<br>Is V <sub>3</sub> or V <sub>av34</sub> > 2,700 pc/h? <input type="checkbox"/> Yes <input type="checkbox"/> No<br>Is V <sub>3</sub> or V <sub>av34</sub> > 1.5 * V <sub>12</sub> /2 <input type="checkbox"/> Yes <input type="checkbox"/> No<br>If Yes, V <sub>12a</sub> =      pc/h (Equation 13-16, 13-18, or 13-19) |  |                    |  |            |
| <b>Capacity Checks</b>  |            |  |          |  | <b>Capacity Checks</b>   |  |                    |  |            |
|   | Actual     | Capacity                                     |          | LOS F?                                     |  | Actual   | Capacity           |  | LOS F?     |
| V <sub>FO</sub>   | 1736       | Exhibit 13-8                                 |          | No   | V <sub>F</sub>   |  | Exhibit 13-8       |  |            |
|   |            |  |          |  | V <sub>FO</sub> = V <sub>F</sub> - V <sub>R</sub>  |  | Exhibit 13-8       |  |            |
|   |            |  |          |  | V <sub>R</sub>   |  | Exhibit 13-10      |  |            |
| <b>Flow Entering Merge Influence Area</b>   |            |  |          |  | <b>Flow Entering Diverge Influence Area</b>  |  |                    |  |            |
|   | Actual     | Max Desirable                                |          | Violation?                                 |  | Actual   | Max Desirable      |  | Violation? |
| V <sub>R12</sub>  | 1736       | Exhibit 13-8                                 | 4600:All | No   | V <sub>12</sub>  |  | Exhibit 13-8       |  |            |
| <b>Level of Service Determination (if not F)</b>  |            |  |          |  | <b>Level of Service Determination (if not F)</b>   |  |                    |  |            |
| $D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$<br>D <sub>R</sub> = 12.9 (pc/mi/ln)<br>LOS = B (Exhibit 13-2)   |            |  |          |  | $D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$<br>D <sub>R</sub> =      (pc/mi/ln)<br>LOS =      (Exhibit 13-2)   |  |                    |  |            |
| <b>Speed Determination</b>  |            |  |          |  | <b>Speed Determination</b>   |  |                    |  |            |
| M <sub>S</sub> = 0.278 (Exhibit 13-11)<br>S <sub>R</sub> = 51.4 mph (Exhibit 13-11)<br>S <sub>0</sub> = N/A mph (Exhibit 13-11)<br>S = 51.4 mph (Exhibit 13-13)   |            |  |          |  | D <sub>S</sub> =      (Exhibit 13-12)<br>S <sub>R</sub> =      mph (Exhibit 13-12)<br>S <sub>0</sub> =      mph (Exhibit 13-12)<br>S =      mph (Exhibit 13-13)  |  |                    |  |            |

| RAMPS AND RAMP JUNCTIONS WORKSHEET  |                 |   |         |                       |   |  |               |                                      |            |
|---|-----------------|---|---------|-----------------------|---|--|---------------|--------------------------------------|------------|
| <b>General Information</b>  |                 |   |         |                       | <b>Site Information</b>   |  |               |                                      |            |
| Analyst   |                 | Shane Forsythe  |         | Freeway/Dir of Travel |   | 14th WB Off-ramp   |               |                                      |            |
| Agency or Company   |                 |   |         | Junction              |   | I-315  |               |                                      |            |
| Date Performed  |                 | 9/15/2014   |         | Jurisdiction          |   |  |               |                                      |            |
| Analysis Time Period  |                 | PM Peak   |         | Analysis Year         |   | 2014   |               |                                      |            |
| Project Description I-15 Corridor Study   |                 |   |         |                       |   |  |               |                                      |            |
| <b>Inputs</b>   |                 |   |         |                       |   |  |               |                                      |            |
| Upstream Adj Ramp<br><input type="checkbox"/> Yes <input type="checkbox"/> On<br><input checked="" type="checkbox"/> No <input type="checkbox"/> Off<br><br>$L_{up} =$ ft<br><br>$V_u =$ veh/h  |                 | Freeway Number of Lanes, $N$ 2<br>Ramp Number of Lanes, $N$ 1<br>Acceleration Lane Length, $L_A$<br>Deceleration Lane Length $L_D$ 713<br>Freeway Volume, $V_F$ 1279<br>Ramp Volume, $V_R$ 792<br>Freeway Free-Flow Speed, $S_{FF}$ 55.0<br>Ramp Free-Flow Speed, $S_{FR}$ 35.0 |         |                       |   | Downstream Adj Ramp<br><input type="checkbox"/> Yes <input type="checkbox"/> On<br><input checked="" type="checkbox"/> No <input type="checkbox"/> Off<br><br>$L_{down} =$ ft<br><br>$V_D =$ veh/h |               |                                      |            |
| <b>Conversion to pc/h Under Base Conditions</b>   |                 |   |         |                       |   |  |               |                                      |            |
| (pc/h)  | $V$<br>(Veh/hr) | PHF   | Terrain | %Truck                | %Rv   | $f_{HV}$   | $f_p$         | $v = V/PHF \times f_{HV} \times f_p$ |            |
| Freeway   | 1279            | 0.91  | Level   | 3                     | 0   | 0.985  | 1.00          | 1427                                 |            |
| Ramp  | 792             | 0.99  | Level   | 2                     | 0   | 0.990  | 1.00          | 810                                  |            |
| UpStream  |                 |   |         |                       |   |  |               |                                      |            |
| DownStream  |                 |   |         |                       |   |  |               |                                      |            |
| <b>Merge Areas</b>  |                 |   |         |                       | <b>Diverge Areas</b>  |  |               |                                      |            |
| <b>Estimation of <math>v_{12}</math></b>  |                 |   |         |                       | <b>Estimation of <math>v_{12}</math></b>  |  |               |                                      |            |
| $V_{12} = V_F (P_{FM})$<br>$L_{EQ} =$ (Equation 13-6 or 13-7)<br>$P_{FM} =$ using Equation (Exhibit 13-6)<br>$V_{12} =$ pc/h<br>$V_3$ or $V_{av34}$ pc/h (Equation 13-14 or 13-17)<br>Is $V_3$ or $V_{av34} > 2,700$ pc/h? <input type="checkbox"/> Yes <input type="checkbox"/> No<br>Is $V_3$ or $V_{av34} > 1.5 * V_{12}/2$ <input type="checkbox"/> Yes <input type="checkbox"/> No<br>If Yes, $V_{12a} =$ pc/h (Equation 13-16, 13-18, or 13-19) |                 |   |         |                       | $V_{12} = V_R + (V_F - V_R)P_{FD}$<br>$L_{EQ} =$ (Equation 13-12 or 13-13)<br>$P_{FD} =$ 1.000 using Equation (Exhibit 13-7)<br>$V_{12} =$ 1427 pc/h<br>$V_3$ or $V_{av34}$ 0 pc/h (Equation 13-14 or 13-17)<br>Is $V_3$ or $V_{av34} > 2,700$ pc/h? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No<br>Is $V_3$ or $V_{av34} > 1.5 * V_{12}/2$ <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No<br>If Yes, $V_{12a} =$ pc/h (Equation 13-16, 13-18, or 13-19) |  |               |                                      |            |
| <b>Capacity Checks</b>  |                 |   |         |                       | <b>Capacity Checks</b>  |  |               |                                      |            |
|   | Actual          | Capacity  |         | LOS F?                |   | Actual   | Capacity      |                                      | LOS F?     |
| $V_{FO}$  |                 | Exhibit 13-8  |         |                       | $V_F$   | 1427   | Exhibit 13-8  | 4500                                 | No         |
|   |                 |   |         | $V_{FO} = V_F - V_R$  | 617   | Exhibit 13-8   | 4500          | No                                   |            |
|   |                 |   |         | $V_R$                 | 810   | Exhibit 13-10  | 2000          | No                                   |            |
| <b>Flow Entering Merge Influence Area</b>   |                 |   |         |                       | <b>Flow Entering Diverge Influence Area</b>   |  |               |                                      |            |
|   | Actual          | Max Desirable   |         | Violation?            |   | Actual   | Max Desirable |                                      | Violation? |
| $V_{R12}$   |                 | Exhibit 13-8  |         |                       | $V_{12}$  | 1427   | Exhibit 13-8  | 4400:All                             | No         |
| <b>Level of Service Determination (if not F)</b>  |                 |   |         |                       | <b>Level of Service Determination (if not F)</b>  |  |               |                                      |            |
| $D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$<br>$D_R =$ (pc/mi/ln)<br>$LOS =$ (Exhibit 13-2)   |                 |   |         |                       | $D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$<br>$D_R =$ 10.1 (pc/mi/ln)<br>$LOS =$ B (Exhibit 13-2)  |  |               |                                      |            |
| <b>Speed Determination</b>  |                 |   |         |                       | <b>Speed Determination</b>  |  |               |                                      |            |
| $M_S =$ (Exhibit 13-11)<br>$S_R =$ mph (Exhibit 13-11)<br>$S_0 =$ mph (Exhibit 13-11)<br>$S =$ mph (Exhibit 13-13)  |                 |   |         |                       | $D_s =$ 0.501 (Exhibit 13-12)<br>$S_R =$ 48.5 mph (Exhibit 13-12)<br>$S_0 =$ N/A mph (Exhibit 13-12)<br>$S =$ 48.5 mph (Exhibit 13-13)  |  |               |                                      |            |

| RAMPS AND RAMP JUNCTIONS WORKSHEET  |            |  |          |  |  |  |                    |  |            |
|---|------------|--|----------|--|--|--|--------------------|--|------------|
| <b>General Information</b>  |            |  |          |  | <b>Site Information</b>  |  |                    |  |            |
| Analyst   |            | Shane Forsythe                               |          |  | Freeway/Dir of Travel  |  | 14th St WB On-ramp |  |            |
| Agency or Company   |            |  |          |  | Junction   |  | I-315              |  |            |
| Date Performed  |            | 9/15/2014                                    |          |  | Jurisdiction   |  |                    |  |            |
| Analysis Time Period  |            | PM Peak                                      |          |  | Analysis Year  |  | 2014               |  |            |
| Project Description I-15 Corridor Study   |            |  |          |  |  |  |                    |  |            |
| <b>Inputs</b>   |            |  |          |  |  |  |                    |  |            |
| Upstream Adj Ramp<br><input type="checkbox"/> Yes <input type="checkbox"/> On<br><input checked="" type="checkbox"/> No <input type="checkbox"/> Off<br>L <sub>up</sub> =      ft<br>V <sub>u</sub> =      veh/h  |            | Freeway Number of Lanes, N      2            |          |  |  | Downstream Adj Ramp<br><input type="checkbox"/> Yes <input type="checkbox"/> On<br><input checked="" type="checkbox"/> No <input type="checkbox"/> Off<br>L <sub>down</sub> =      ft<br>V <sub>D</sub> =      veh/h |                    |  |            |
|   |            | Ramp Number of Lanes, N      1               |          |  |  |  |                    |  |            |
|   |            | Acceleration Lane Length, L <sub>A</sub> 505 |          |  |  |  |                    |  |            |
|   |            | Deceleration Lane Length L <sub>D</sub>      |          |  |  |  |                    |  |            |
|   |            | Freeway Volume, V <sub>F</sub> 646           |          |  |  |  |                    |  |            |
|   |            | Ramp Volume, V <sub>R</sub> 173              |          |  |  |  |                    |  |            |
| Freeway Free-Flow Speed, S <sub>FF</sub> 55.0   |            |  |          | Ramp Free-Flow Speed, S <sub>FR</sub> 35.0 |  |  |                    |  |            |
| <b>Conversion to pc/h Under Base Conditions</b>   |            |  |          |  |  |  |                    |  |            |
| (pc/h)  | V (Veh/hr) | PHF  | Terrain  | %Truck                                     | %Rv  | f <sub>HV</sub>  | f <sub>p</sub>     | v = V/PHF x f <sub>HV</sub> x f <sub>p</sub> |            |
| Freeway   | 646        | 0.93   | Level    | 5  | 0  | 0.976  | 1.00               | 712  |            |
| Ramp  | 173        | 0.99   | Level    | 1  | 0  | 0.995  | 1.00               | 176  |            |
| UpStream  |            |  |          |  |  |  |                    |  |            |
| DownStream  |            |  |          |  |  |  |                    |  |            |
| <b>Merge Areas</b>  |            |  |          |  | <b>Diverge Areas</b>   |  |                    |  |            |
| <b>Estimation of v<sub>12</sub></b>   |            |  |          |  | <b>Estimation of v<sub>12</sub></b>  |  |                    |  |            |
| V <sub>12</sub> = V <sub>F</sub> ( P <sub>FM</sub> )<br>(Equation 13-6 or 13-7)<br>P <sub>FM</sub> = 1.000 using Equation (Exhibit 13-6)<br>V <sub>12</sub> = 712 pc/h<br>V <sub>3</sub> or V <sub>av34</sub> = 0 pc/h (Equation 13-14 or 13-17)<br>Is V <sub>3</sub> or V <sub>av34</sub> > 2,700 pc/h? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No<br>Is V <sub>3</sub> or V <sub>av34</sub> > 1.5 * V <sub>12</sub> /2 <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No<br>If Yes, V <sub>12a</sub> =      pc/h (Equation 13-16, 13-18, or 13-19) |            |  |          |  | V <sub>12</sub> = V <sub>R</sub> + (V <sub>F</sub> - V <sub>R</sub> )P <sub>FD</sub><br>(Equation 13-12 or 13-13)<br>P <sub>FD</sub> =      using Equation (Exhibit 13-7)<br>V <sub>12</sub> =      pc/h<br>V <sub>3</sub> or V <sub>av34</sub> =      pc/h (Equation 13-14 or 13-17)<br>Is V <sub>3</sub> or V <sub>av34</sub> > 2,700 pc/h? <input type="checkbox"/> Yes <input type="checkbox"/> No<br>Is V <sub>3</sub> or V <sub>av34</sub> > 1.5 * V <sub>12</sub> /2 <input type="checkbox"/> Yes <input type="checkbox"/> No<br>If Yes, V <sub>12a</sub> =      pc/h (Equation 13-16, 13-18, or 13-19) |  |                    |  |            |
| <b>Capacity Checks</b>  |            |  |          |  | <b>Capacity Checks</b>   |  |                    |  |            |
|   | Actual     | Capacity                                     |          | LOS F?                                     |  | Actual   | Capacity           |  | LOS F?     |
| V <sub>FO</sub>   | 888        | Exhibit 13-8                                 |          | No   | V <sub>F</sub>   |  | Exhibit 13-8       |  |            |
|   |            |  |          |  | V <sub>FO</sub> = V <sub>F</sub> - V <sub>R</sub>  |  | Exhibit 13-8       |  |            |
|   |            |  |          |  | V <sub>R</sub>   |  | Exhibit 13-10      |  |            |
| <b>Flow Entering Merge Influence Area</b>   |            |  |          |  | <b>Flow Entering Diverge Influence Area</b>  |  |                    |  |            |
|   | Actual     | Max Desirable                                |          | Violation?                                 |  | Actual   | Max Desirable      |  | Violation? |
| V <sub>R12</sub>  | 888        | Exhibit 13-8                                 | 4600:All | No   | V <sub>12</sub>  |  | Exhibit 13-8       |  |            |
| <b>Level of Service Determination (if not F)</b>  |            |  |          |  | <b>Level of Service Determination (if not F)</b>   |  |                    |  |            |
| D <sub>R</sub> = 5.475 + 0.00734 v <sub>R</sub> + 0.0078 V <sub>12</sub> - 0.00627 L <sub>A</sub><br>D <sub>R</sub> = 9.2 (pc/mi/ln)<br>LOS = A (Exhibit 13-2)  |            |  |          |  | D <sub>R</sub> = 4.252 + 0.0086 V <sub>12</sub> - 0.009 L <sub>D</sub><br>D <sub>R</sub> =      (pc/mi/ln)<br>LOS =      (Exhibit 13-2)  |  |                    |  |            |
| <b>Speed Determination</b>  |            |  |          |  | <b>Speed Determination</b>   |  |                    |  |            |
| M <sub>S</sub> = 0.295 (Exhibit 13-11)<br>S <sub>R</sub> = 51.2 mph (Exhibit 13-11)<br>S <sub>0</sub> = N/A mph (Exhibit 13-11)<br>S = 51.2 mph (Exhibit 13-13)   |            |  |          |  | D <sub>S</sub> =      (Exhibit 13-12)<br>S <sub>R</sub> =      mph (Exhibit 13-12)<br>S <sub>0</sub> =      mph (Exhibit 13-12)<br>S =      mph (Exhibit 13-13)  |  |                    |  |            |

| RAMPS AND RAMP JUNCTIONS WORKSHEET   |               |   |         |   |   |                 |  |  |            |
|--|---------------|---|---------|---|---|-----------------|--|--|------------|
| <b>General Information</b>   |               |   |         |   | <b>Site Information</b>   |                 |  |  |            |
| Analyst  |               | Shane Forsythe                                |         |   | Freeway/Dir of Travel   |                 | Central Ave NB Off   |  |            |
| Agency or Company  |               |   |         |   | Junction  |                 |  |  |            |
| Date Performed   |               | 9/9/2014                                      |         |   | Jurisdiction  |                 |  |  |            |
| Analysis Time Period   |               | AM Peak                                       |         |   | Analysis Year   |                 | 2014   |  |            |
| Project Description I-15 Corridor Study  |               |   |         |   |   |                 |  |  |            |
| <b>Inputs</b>  |               |   |         |   |   |                 |  |  |            |
| Upstream Adj Ramp<br><br><input type="checkbox"/> Yes <input type="checkbox"/> On<br><br><input checked="" type="checkbox"/> No <input type="checkbox"/> Off<br><br>L <sub>up</sub> =      ft<br><br>V <sub>u</sub> =      veh/h |               | Freeway Number of Lanes, N      2             |         |   |   |                 | Downstream Adj Ramp<br><br><input type="checkbox"/> Yes <input type="checkbox"/> On<br><br><input checked="" type="checkbox"/> No <input type="checkbox"/> Off<br><br>L <sub>down</sub> =      ft<br><br>V <sub>D</sub> =      veh/h |  |            |
|  |               | Ramp Number of Lanes, N      1                |         |   |   |                 |  |  |            |
|  |               | Acceleration Lane Length, L <sub>A</sub>      |         |   |   |                 |  |  |            |
|  |               | Deceleration Lane Length L <sub>D</sub> 1388  |         |   |   |                 |  |  |            |
|  |               | Freeway Volume, V <sub>F</sub> 321            |         |   |   |                 |  |  |            |
|  |               | Ramp Volume, V <sub>R</sub> 192               |         |   |   |                 |  |  |            |
|  |               | Freeway Free-Flow Speed, S <sub>FF</sub> 65.0 |         |   |   |                 |  |  |            |
|  |               | Ramp Free-Flow Speed, S <sub>FR</sub> 45.0    |         |   |   |                 |  |  |            |
| <b>Conversion to pc/h Under Base Conditions</b>  |               |   |         |   |   |                 |  |  |            |
| (pc/h)   | V<br>(Veh/hr) | PHF   | Terrain | %Truck  | %Rv   | f <sub>HV</sub> | f <sub>p</sub>   | v = V/PHF x f <sub>HV</sub> x f <sub>p</sub> |            |
| Freeway  | 321           | 0.89  | Level   | 14  | 0   | 0.935           | 1.00   | 386  |            |
| Ramp   | 192           | 0.83  | Level   | 10  | 0   | 0.952           | 1.00   | 244  |            |
| UpStream   |               |   |         |   |   |                 |  |  |            |
| DownStream   |               |   |         |   |   |                 |  |  |            |
| <b>Merge Areas</b>   |               |   |         |   | <b>Diverge Areas</b>  |                 |  |  |            |
| <b>Estimation of v<sub>12</sub></b>  |               |   |         |   | <b>Estimation of v<sub>12</sub></b>   |                 |  |  |            |
| V <sub>12</sub> = V <sub>F</sub> (P <sub>FM</sub> )<br>(Equation 13-6 or 13-7)   |               |   |         |   | V <sub>12</sub> = V <sub>R</sub> + (V <sub>F</sub> - V <sub>R</sub> )P <sub>FD</sub><br>(Equation 13-12 or 13-13)                     |                 |  |  |            |
| L <sub>EQ</sub> =  |               |   |         |   | L <sub>EQ</sub> =   |                 |  |  |            |
| P <sub>FM</sub> = using Equation (Exhibit 13-6)  |               |   |         |   | P <sub>FD</sub> = 1.000 using Equation (Exhibit 13-7)   |                 |  |  |            |
| V <sub>12</sub> = pc/h   |               |   |         |   | V <sub>12</sub> = 386 pc/h  |                 |  |  |            |
| V <sub>3</sub> or V <sub>av34</sub> pc/h (Equation 13-14 or 13-17)   |               |   |         |   | V <sub>3</sub> or V <sub>av34</sub> 0 pc/h (Equation 13-14 or 13-17)  |                 |  |  |            |
| Is V <sub>3</sub> or V <sub>av34</sub> > 2,700 pc/h? <input type="checkbox"/> Yes <input type="checkbox"/> No  |               |   |         |   | Is V <sub>3</sub> or V <sub>av34</sub> > 2,700 pc/h? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No              |                 |  |  |            |
| Is V <sub>3</sub> or V <sub>av34</sub> > 1.5 * V <sub>12</sub> /2 <input type="checkbox"/> Yes <input type="checkbox"/> No   |               |   |         |   | Is V <sub>3</sub> or V <sub>av34</sub> > 1.5 * V <sub>12</sub> /2 <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No |                 |  |  |            |
| If Yes, V <sub>12a</sub> = pc/h (Equation 13-16, 13-18, or 13-19)  |               |   |         |   | If Yes, V <sub>12a</sub> = pc/h (Equation 13-16, 13-18, or 13-19)   |                 |  |  |            |
| <b>Capacity Checks</b>   |               |   |         |   | <b>Capacity Checks</b>  |                 |  |  |            |
|  | Actual        | Capacity                                      |         | LOS F?  |   | Actual          | Capacity   |  | LOS F?     |
| V <sub>FO</sub>  |               | Exhibit 13-8                                  |         |   | V <sub>F</sub>  | 386             | Exhibit 13-8   | 4700   | No         |
|  |               |   |         | V <sub>FO</sub> = V <sub>F</sub> - V <sub>R</sub> | 142   | Exhibit 13-8    | 4700   | No   |            |
|  |               |   |         | V <sub>R</sub>                                    | 244   | Exhibit 13-10   | 2100   | No   |            |
| <b>Flow Entering Merge Influence Area</b>  |               |   |         |   | <b>Flow Entering Diverge Influence Area</b>   |                 |  |  |            |
|  | Actual        | Max Desirable                                 |         | Violation?  |   | Actual          | Max Desirable  |  | Violation? |
| V <sub>R12</sub>   |               | Exhibit 13-8                                  |         |   | V <sub>12</sub>   | 386             | Exhibit 13-8   | 4400:All                                     | No         |
| <b>Level of Service Determination (if not F)</b>   |               |   |         |   | <b>Level of Service Determination (if not F)</b>  |                 |  |  |            |
| D <sub>R</sub> = 5.475 + 0.00734 v <sub>R</sub> + 0.0078 V <sub>12</sub> - 0.00627 L <sub>A</sub>  |               |   |         |   | D <sub>R</sub> = 4.252 + 0.0086 V <sub>12</sub> - 0.009 L <sub>D</sub>  |                 |  |  |            |
| D <sub>R</sub> = (pc/mi/ln)  |               |   |         |   | D <sub>R</sub> = -4.9 (pc/mi/ln)  |                 |  |  |            |
| LOS = (Exhibit 13-2)   |               |   |         |   | LOS = A (Exhibit 13-2)  |                 |  |  |            |
| <b>Speed Determination</b>   |               |   |         |   | <b>Speed Determination</b>  |                 |  |  |            |
| M <sub>S</sub> = (Exhibit 13-11)   |               |   |         |   | D <sub>S</sub> = 0.320 (Exhibit 13-12)  |                 |  |  |            |
| S <sub>R</sub> = mph (Exhibit 13-11)   |               |   |         |   | S <sub>R</sub> = 57.6 mph (Exhibit 13-12)   |                 |  |  |            |
| S <sub>0</sub> = mph (Exhibit 13-11)   |               |   |         |   | S <sub>0</sub> = N/A mph (Exhibit 13-12)  |                 |  |  |            |
| S = mph (Exhibit 13-13)  |               |   |         |   | S = 57.6 mph (Exhibit 13-13)  |                 |  |  |            |

| RAMPS AND RAMP JUNCTIONS WORKSHEET  |                 |                                 |          |                       |  |                   |               |  |            |
|---|-----------------|---------------------------------|----------|-----------------------|--|-------------------|---------------|--|------------|
| <b>General Information</b>  |                 |                                 |          |                       | <b>Site Information</b>  |                   |               |  |            |
| Analyst   |                 | Shane Forsythe                  |          | Freeway/Dir of Travel |  | Central Ave NB On |               |  |            |
| Agency or Company   |                 |                                 |          | Junction              |  |                   |               |  |            |
| Date Performed  |                 | 9/9/2014                        |          | Jurisdiction          |  |                   |               |  |            |
| Analysis Time Period  |                 | AM Peak                         |          | Analysis Year         |  |                   |               |  |            |
| Project Description I-15 Corridor Study   |                 |                                 |          |                       |  |                   |               |  |            |
| <b>Inputs</b>   |                 |                                 |          |                       |  |                   |               |  |            |
| Upstream Adj Ramp<br><br><input type="checkbox"/> Yes <input type="checkbox"/> On<br><br><input checked="" type="checkbox"/> No <input type="checkbox"/> Off<br><br>$L_{up} =$ ft<br><br>$V_u =$ veh/h  |                 | Freeway Number of Lanes, $N$    |          |                       |  | 2                 |               | Downstream Adj Ramp<br><br><input type="checkbox"/> Yes <input type="checkbox"/> On<br><br><input checked="" type="checkbox"/> No <input type="checkbox"/> Off<br><br>$L_{down} =$ ft<br><br>$V_D =$ veh/h |            |
|   |                 | Ramp Number of Lanes, $N$       |          |                       |  | 1                 |               |  |            |
|   |                 | Acceleration Lane Length, $L_A$ |          |                       |  | 1491              |               |  |            |
|   |                 | Deceleration Lane Length $L_D$  |          |                       |  |                   |               |  |            |
|   |                 | Freeway Volume, $V_F$           |          |                       |  | 200               |               |  |            |
|   |                 | Ramp Volume, $V_R$              |          |                       |  | 50                |               |  |            |
| Freeway Free-Flow Speed, $S_{FF}$   |                 |                                 |          | 65.0                  |  |                   |               |  |            |
| Ramp Free-Flow Speed, $S_{FR}$  |                 |                                 |          | 55.0                  |  |                   |               |  |            |
| <b>Conversion to pc/h Under Base Conditions</b>   |                 |                                 |          |                       |  |                   |               |  |            |
| (pc/h)  | $V$<br>(Veh/hr) | PHF                             | Terrain  | %Truck                | %Rv  | $f_{HV}$          | $f_p$         | $v = V/PHF \times f_{HV} \times f_p$   |            |
| Freeway   | 200             | 0.83                            | Level    | 7                     | 0  | 0.966             | 1.00          | 249  |            |
| Ramp  | 50              | 0.74                            | Level    | 40                    | 0  | 0.833             | 1.00          | 82   |            |
| UpStream  |                 |                                 |          |                       |  |                   |               |  |            |
| DownStream  |                 |                                 |          |                       |  |                   |               |  |            |
| <b>Merge Areas</b>  |                 |                                 |          |                       | <b>Diverge Areas</b>   |                   |               |  |            |
| <b>Estimation of <math>v_{12}</math></b>  |                 |                                 |          |                       | <b>Estimation of <math>v_{12}</math></b>   |                   |               |  |            |
| $V_{12} = V_F (P_{FM})$<br>$L_{EQ} =$ (Equation 13-6 or 13-7)<br>$P_{FM} =$ 1.000 using Equation (Exhibit 13-6)<br>$V_{12} =$ 249 pc/h<br>$V_3$ or $V_{av34}$ 0 pc/h (Equation 13-14 or 13-17)<br>Is $V_3$ or $V_{av34} > 2,700$ pc/h? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No<br>Is $V_3$ or $V_{av34} > 1.5 * V_{12}/2$ <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No<br>If Yes, $V_{12a} =$ pc/h (Equation 13-16, 13-18, or 13-19) |                 |                                 |          |                       | $V_{12} = V_R + (V_F - V_R)P_{FD}$<br>$L_{EQ} =$ (Equation 13-12 or 13-13)<br>$P_{FD} =$ using Equation (Exhibit 13-7)<br>$V_{12} =$ pc/h<br>$V_3$ or $V_{av34}$ pc/h (Equation 13-14 or 13-17)<br>Is $V_3$ or $V_{av34} > 2,700$ pc/h? <input type="checkbox"/> Yes <input type="checkbox"/> No<br>Is $V_3$ or $V_{av34} > 1.5 * V_{12}/2$ <input type="checkbox"/> Yes <input type="checkbox"/> No<br>If Yes, $V_{12a} =$ pc/h (Equation 13-16, 13-18, or 13-19) |                   |               |  |            |
| <b>Capacity Checks</b>  |                 |                                 |          |                       | <b>Capacity Checks</b>   |                   |               |  |            |
|   | Actual          | Capacity                        |          | LOS F?                |  | Actual            | Capacity      |  | LOS F?     |
| $V_{FO}$  | 331             | Exhibit 13-8                    |          | No                    | $V_F$  |                   | Exhibit 13-8  |  |            |
|   |                 |                                 |          |                       | $V_{FO} = V_F - V_R$   |                   | Exhibit 13-8  |  |            |
|   |                 |                                 |          |                       | $V_R$  |                   | Exhibit 13-10 |  |            |
| <b>Flow Entering Merge Influence Area</b>   |                 |                                 |          |                       | <b>Flow Entering Diverge Influence Area</b>  |                   |               |  |            |
|   | Actual          | Max Desirable                   |          | Violation?            |  | Actual            | Max Desirable |  | Violation? |
| $V_{R12}$   | 331             | Exhibit 13-8                    | 4600:All | No                    | $V_{12}$   |                   | Exhibit 13-8  |  |            |
| <b>Level of Service Determination (if not F)</b>  |                 |                                 |          |                       | <b>Level of Service Determination (if not F)</b>   |                   |               |  |            |
| $D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$<br>$D_R =$ -1.3 (pc/mi/ln)<br>LOS =      A (Exhibit 13-2)   |                 |                                 |          |                       | $D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$<br>$D_R =$ (pc/mi/ln)<br>LOS =      (Exhibit 13-2)   |                   |               |  |            |
| <b>Speed Determination</b>  |                 |                                 |          |                       | <b>Speed Determination</b>   |                   |               |  |            |
| $M_S =$ 0.162 (Exhibit 13-11)<br>$S_R =$ 61.3 mph (Exhibit 13-11)<br>$S_0 =$ N/A mph (Exhibit 13-11)<br>$S =$ 61.3 mph (Exhibit 13-13)  |                 |                                 |          |                       | $D_S =$ (Exhibit 13-12)<br>$S_R =$ mph (Exhibit 13-12)<br>$S_0 =$ mph (Exhibit 13-12)<br>$S =$ mph (Exhibit 13-13)   |                   |               |  |            |

| RAMPS AND RAMP JUNCTIONS WORKSHEET  |               |   |         |   |  |  |                |  |            |
|---|---------------|---|---------|---|--|--|----------------|--|------------|
| <b>General Information</b>  |               |   |         |   | <b>Site Information</b>  |  |                |  |            |
| Analyst   |               | Shane Forsythe                                |         | Freeway/Dir of Travel                             |  | Central Ave SB Off   |                |  |            |
| Agency or Company   |               |   |         | Junction  |  |  |                |  |            |
| Date Performed  |               | 9/9/2014                                      |         | Jurisdiction                                      |  |  |                |  |            |
| Analysis Time Period  |               | AM Peak                                       |         | Analysis Year                                     |  | 2014   |                |  |            |
| Project Description I-15 Corridor Study   |               |   |         |   |  |  |                |  |            |
| <b>Inputs</b>   |               |   |         |   |  |  |                |  |            |
| Upstream Adj Ramp<br><br><input type="checkbox"/> Yes <input type="checkbox"/> On<br><br><input checked="" type="checkbox"/> No <input type="checkbox"/> Off<br><br>L <sub>up</sub> =      ft<br><br>V <sub>u</sub> =      veh/h  |               | Freeway Number of Lanes, N      2             |         |   |  | Downstream Adj Ramp<br><br><input type="checkbox"/> Yes <input type="checkbox"/> On<br><br><input checked="" type="checkbox"/> No <input type="checkbox"/> Off<br><br>L <sub>down</sub> =      ft<br><br>V <sub>D</sub> =      veh/h |                |  |            |
|   |               | Ramp Number of Lanes, N      1                |         |   |  |  |                |  |            |
|   |               | Acceleration Lane Length, L <sub>A</sub>      |         |   |  |  |                |  |            |
|   |               | Deceleration Lane Length L <sub>D</sub> 1144  |         |   |  |  |                |  |            |
|   |               | Freeway Volume, V <sub>F</sub> 334            |         |   |  |  |                |  |            |
|   |               | Ramp Volume, V <sub>R</sub> 136               |         |   |  |  |                |  |            |
|   |               | Freeway Free-Flow Speed, S <sub>FF</sub> 65.0 |         |   |  |  |                |  |            |
|   |               | Ramp Free-Flow Speed, S <sub>FR</sub> 45.0    |         |   |  |  |                |  |            |
| <b>Conversion to pc/h Under Base Conditions</b>   |               |   |         |   |  |  |                |  |            |
| (pc/h)  | V<br>(Veh/hr) | PHF   | Terrain | %Truck  | %Rv  | f <sub>HV</sub>  | f <sub>p</sub> | v = V/PHF x f <sub>HV</sub> x f <sub>p</sub> |            |
| Freeway   | 334           | 0.83  | Level   | 21  | 0  | 0.905  | 1.00           | 445  |            |
| Ramp  | 136           | 0.85  | Level   | 2   | 0  | 0.990  | 1.00           | 162  |            |
| UpStream  |               |   |         |   |  |  |                |  |            |
| DownStream  |               |   |         |   |  |  |                |  |            |
| <b>Merge Areas</b>  |               |   |         |   | <b>Diverge Areas</b>   |  |                |  |            |
| <b>Estimation of v<sub>12</sub></b>   |               |   |         |   | <b>Estimation of v<sub>12</sub></b>  |  |                |  |            |
| $V_{12} = V_F (P_{FM})$ (Equation 13-6 or 13-7)<br>P <sub>FM</sub> =      using Equation (Exhibit 13-6)<br>V <sub>12</sub> =      pc/h<br>V <sub>3</sub> or V <sub>av34</sub> pc/h (Equation 13-14 or 13-17)<br>Is V <sub>3</sub> or V <sub>av34</sub> > 2,700 pc/h? <input type="checkbox"/> Yes <input type="checkbox"/> No<br>Is V <sub>3</sub> or V <sub>av34</sub> > 1.5 * V <sub>12</sub> /2 <input type="checkbox"/> Yes <input type="checkbox"/> No<br>If Yes, V <sub>12a</sub> =      pc/h (Equation 13-16, 13-18, or 13-19) |               |   |         |   | $V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 13-12 or 13-13)<br>P <sub>FD</sub> =      1.000 using Equation (Exhibit 13-7)<br>V <sub>12</sub> =      445 pc/h<br>V <sub>3</sub> or V <sub>av34</sub> 0 pc/h (Equation 13-14 or 13-17)<br>Is V <sub>3</sub> or V <sub>av34</sub> > 2,700 pc/h? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No<br>Is V <sub>3</sub> or V <sub>av34</sub> > 1.5 * V <sub>12</sub> /2 <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No<br>If Yes, V <sub>12a</sub> =      pc/h (Equation 13-16, 13-18, or 13-19) |  |                |  |            |
| <b>Capacity Checks</b>  |               |   |         |   | <b>Capacity Checks</b>   |  |                |  |            |
|   | Actual        | Capacity                                      |         | LOS F?  |  | Actual   | Capacity       |  | LOS F?     |
| V <sub>FO</sub>   |               | Exhibit 13-8                                  |         |   | V <sub>F</sub>   | 445  | Exhibit 13-8   | 4700   | No         |
|   |               |   |         | V <sub>FO</sub> = V <sub>F</sub> - V <sub>R</sub> | 283  | Exhibit 13-8   | 4700           | No   |            |
|   |               |   |         | V <sub>R</sub>                                    | 162  | Exhibit 13-10  | 2100           | No   |            |
| <b>Flow Entering Merge Influence Area</b>   |               |   |         |   | <b>Flow Entering Diverge Influence Area</b>  |  |                |  |            |
|   | Actual        | Max Desirable                                 |         | Violation?  |  | Actual   | Max Desirable  |  | Violation? |
| V <sub>R12</sub>  |               | Exhibit 13-8                                  |         |   | V <sub>12</sub>  | 445  | Exhibit 13-8   | 4400:All                                     | No         |
| <b>Level of Service Determination (if not F)</b>  |               |   |         |   | <b>Level of Service Determination (if not F)</b>   |  |                |  |            |
| $D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ D <sub>R</sub> =      (pc/mi/ln)<br>LOS =      (Exhibit 13-2)   |               |   |         |   | $D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$ D <sub>R</sub> =      -2.2 (pc/mi/ln)<br>LOS =      A (Exhibit 13-2)   |  |                |  |            |
| <b>Speed Determination</b>  |               |   |         |   | <b>Speed Determination</b>   |  |                |  |            |
| M <sub>S</sub> =      (Exhibit 13-11)<br>S <sub>R</sub> =      mph (Exhibit 13-11)<br>S <sub>0</sub> =      mph (Exhibit 13-11)<br>S =      mph (Exhibit 13-13)   |               |   |         |   | D <sub>S</sub> =      0.313 (Exhibit 13-12)<br>S <sub>R</sub> =      57.8 mph (Exhibit 13-12)<br>S <sub>0</sub> =      N/A mph (Exhibit 13-12)<br>S =      57.8 mph (Exhibit 13-13)  |  |                |  |            |

| RAMPS AND RAMP JUNCTIONS WORKSHEET   |               |   |          |            |  |  |                   |  |            |
|--|---------------|---|----------|------------|--|--|-------------------|--|------------|
| <b>General Information</b>   |               |   |          |            | <b>Site Information</b>  |  |                   |  |            |
| Analyst  |               | Shane Forsythe                                |          |            | Freeway/Dir of Travel  |  | Central Ave SB On |  |            |
| Agency or Company  |               |   |          |            | Junction   |  |                   |  |            |
| Date Performed   |               | 9/9/2014                                      |          |            | Jurisdiction   |  |                   |  |            |
| Analysis Time Period   |               | AM Peak                                       |          |            | Analysis Year  |  |                   |  |            |
| Project Description I-15 Corridor Study  |               |   |          |            |  |  |                   |  |            |
| <b>Inputs</b>  |               |   |          |            |  |  |                   |  |            |
| Upstream Adj Ramp<br><input type="checkbox"/> Yes <input type="checkbox"/> On<br><input checked="" type="checkbox"/> No <input type="checkbox"/> Off<br>L <sub>up</sub> =        ft<br>V <sub>u</sub> =        veh/h   |               | Freeway Number of Lanes, N        2           |          |            |  | Downstream Adj Ramp<br><input type="checkbox"/> Yes <input type="checkbox"/> On<br><input checked="" type="checkbox"/> No <input type="checkbox"/> Off<br>L <sub>down</sub> =        ft<br>V <sub>D</sub> =        veh/h |                   |  |            |
|  |               | Ramp Number of Lanes, N        1              |          |            |  |  |                   |  |            |
|  |               | Acceleration Lane Length, L <sub>A</sub> 1379 |          |            |  |  |                   |  |            |
|  |               | Deceleration Lane Length L <sub>D</sub>       |          |            |  |  |                   |  |            |
|  |               | Freeway Volume, V <sub>F</sub> 352            |          |            |  |  |                   |  |            |
|  |               | Ramp Volume, V <sub>R</sub> 162               |          |            |  |  |                   |  |            |
| Freeway Free-Flow Speed, S <sub>FF</sub> 65.0  |               |   |          |            |  |  |                   |  |            |
| Ramp Free-Flow Speed, S <sub>FR</sub> 45.0   |               |   |          |            |  |  |                   |  |            |
| <b>Conversion to pc/h Under Base Conditions</b>  |               |   |          |            |  |  |                   |  |            |
| (pc/h)   | V<br>(Veh/hr) | PHF   | Terrain  | %Truck     | %Rv  | f <sub>HV</sub>  | f <sub>p</sub>    | v = V/PHF x f <sub>HV</sub> x f <sub>p</sub> |            |
| Freeway  | 352           | 0.94  | Level    | 8          | 0  | 0.962  | 1.00              | 389  |            |
| Ramp   | 162           | 0.76  | Level    | 5          | 0  | 0.976  | 1.00              | 217  |            |
| UpStream   |               |   |          |            |  |  |                   |  |            |
| DownStream   |               |   |          |            |  |  |                   |  |            |
| <b>Merge Areas</b>   |               |   |          |            | <b>Diverge Areas</b>   |  |                   |  |            |
| <b>Estimation of v<sub>12</sub></b>  |               |   |          |            | <b>Estimation of v<sub>12</sub></b>  |  |                   |  |            |
| V <sub>12</sub> = V <sub>F</sub> ( P <sub>FM</sub> )<br>L <sub>EQ</sub> =        (Equation 13-6 or 13-7)<br>P <sub>FM</sub> =        1.000 using Equation (Exhibit 13-6)<br>V <sub>12</sub> =        389 pc/h<br>V <sub>3</sub> or V <sub>av34</sub> 0 pc/h (Equation 13-14 or 13-17)<br>Is V <sub>3</sub> or V <sub>av34</sub> > 2,700 pc/h? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No<br>Is V <sub>3</sub> or V <sub>av34</sub> > 1.5 * V <sub>12</sub> /2 <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No<br>If Yes, V <sub>12a</sub> =        pc/h (Equation 13-16, 13-18, or 13-19) |               |   |          |            | V <sub>12</sub> = V <sub>R</sub> + (V <sub>F</sub> - V <sub>R</sub> )P <sub>FD</sub><br>L <sub>EQ</sub> =        (Equation 13-12 or 13-13)<br>P <sub>FD</sub> =        using Equation (Exhibit 13-7)<br>V <sub>12</sub> =        pc/h<br>V <sub>3</sub> or V <sub>av34</sub> pc/h (Equation 13-14 or 13-17)<br>Is V <sub>3</sub> or V <sub>av34</sub> > 2,700 pc/h? <input type="checkbox"/> Yes <input type="checkbox"/> No<br>Is V <sub>3</sub> or V <sub>av34</sub> > 1.5 * V <sub>12</sub> /2 <input type="checkbox"/> Yes <input type="checkbox"/> No<br>If Yes, V <sub>12a</sub> =        pc/h (Equation 13-16, 13-18, or 13-19) |  |                   |  |            |
| <b>Capacity Checks</b>   |               |   |          |            | <b>Capacity Checks</b>   |  |                   |  |            |
|  | Actual        | Capacity                                      |          | LOS F?     |  | Actual   | Capacity          |  | LOS F?     |
| V <sub>FO</sub>  | 606           | Exhibit 13-8                                  |          | No         | V <sub>F</sub>   |  | Exhibit 13-8      |  |            |
|  |               |   |          |            | V <sub>FO</sub> = V <sub>F</sub> - V <sub>R</sub>  |  | Exhibit 13-8      |  |            |
|  |               |   |          |            | V <sub>R</sub>   |  | Exhibit 13-10     |  |            |
| <b>Flow Entering Merge Influence Area</b>  |               |   |          |            | <b>Flow Entering Diverge Influence Area</b>  |  |                   |  |            |
|  | Actual        | Max Desirable                                 |          | Violation? |  | Actual   | Max Desirable     |  | Violation? |
| V <sub>R12</sub>   | 606           | Exhibit 13-8                                  | 4600:All | No         | V <sub>12</sub>  |  | Exhibit 13-8      |  |            |
| <b>Level of Service Determination (if not F)</b>   |               |   |          |            | <b>Level of Service Determination (if not F)</b>   |  |                   |  |            |
| D <sub>R</sub> = 5.475 + 0.00734 v <sub>R</sub> + 0.0078 V <sub>12</sub> - 0.00627 L <sub>A</sub><br>D <sub>R</sub> =        1.5 (pc/mi/ln)<br>LOS =        A (Exhibit 13-2)   |               |   |          |            | D <sub>R</sub> = 4.252 + 0.0086 V <sub>12</sub> - 0.009 L <sub>D</sub><br>D <sub>R</sub> =        (pc/mi/ln)<br>LOS =        (Exhibit 13-2)  |  |                   |  |            |
| <b>Speed Determination</b>   |               |   |          |            | <b>Speed Determination</b>   |  |                   |  |            |
| M <sub>S</sub> =        0.204 (Exhibit 13-11)<br>S <sub>R</sub> =        60.3 mph (Exhibit 13-11)<br>S <sub>0</sub> =        N/A mph (Exhibit 13-11)<br>S =        60.3 mph (Exhibit 13-13)  |               |   |          |            | D <sub>S</sub> =        (Exhibit 13-12)<br>S <sub>R</sub> =        mph (Exhibit 13-12)<br>S <sub>0</sub> =        mph (Exhibit 13-12)<br>S =        mph (Exhibit 13-13)  |  |                   |  |            |



| RAMPS AND RAMP JUNCTIONS WORKSHEET  |               |   |         |                       |  |  |                |  |            |
|---|---------------|---|---------|-----------------------|--|--|----------------|--|------------|
| <b>General Information</b>  |               |   |         |                       | <b>Site Information</b>  |  |                |  |            |
| Analyst   |               | Shane Forsythe                                |         | Freeway/Dir of Travel |  | Central Ave NB Off   |                |  |            |
| Agency or Company   |               |   |         | Junction              |  |  |                |  |            |
| Date Performed  |               | 9/9/2014                                      |         | Jurisdiction          |  |  |                |  |            |
| Analysis Time Period  |               | PM Peak                                       |         | Analysis Year         |  | 2014   |                |  |            |
| Project Description I-15 Corridor Study   |               |   |         |                       |  |  |                |  |            |
| <b>Inputs</b>   |               |   |         |                       |  |  |                |  |            |
| Upstream Adj Ramp<br><br><input type="checkbox"/> Yes <input type="checkbox"/> On<br><br><input checked="" type="checkbox"/> No <input type="checkbox"/> Off<br><br>L <sub>up</sub> =      ft<br><br>V <sub>u</sub> =      veh/h  |               | Freeway Number of Lanes, N      2             |         |                       |  | Downstream Adj Ramp<br><br><input type="checkbox"/> Yes <input type="checkbox"/> On<br><br><input checked="" type="checkbox"/> No <input type="checkbox"/> Off<br><br>L <sub>down</sub> =      ft<br><br>V <sub>D</sub> =      veh/h |                |  |            |
|   |               | Ramp Number of Lanes, N      1                |         |                       |  |  |                |  |            |
|   |               | Acceleration Lane Length, L <sub>A</sub>      |         |                       |  |  |                |  |            |
|   |               | Deceleration Lane Length L <sub>D</sub> 1388  |         |                       |  |  |                |  |            |
|   |               | Freeway Volume, V <sub>F</sub> 490            |         |                       |  |  |                |  |            |
|   |               | Ramp Volume, V <sub>R</sub> 227               |         |                       |  |  |                |  |            |
|   |               | Freeway Free-Flow Speed, S <sub>FF</sub> 65.0 |         |                       |  |  |                |  |            |
|   |               | Ramp Free-Flow Speed, S <sub>FR</sub> 45.0    |         |                       |  |  |                |  |            |
| <b>Conversion to pc/h Under Base Conditions</b>   |               |   |         |                       |  |  |                |  |            |
| (pc/h)  | V<br>(Veh/hr) | PHF   | Terrain | %Truck                | %Rv  | f <sub>HV</sub>  | f <sub>p</sub> | v = V/PHF x f <sub>HV</sub> x f <sub>p</sub> |            |
| Freeway   | 490           | 0.87  | Level   | 11                    | 0  | 0.948  | 1.00           | 594  |            |
| Ramp  | 227           | 0.75  | Level   | 6                     | 0  | 0.971  | 1.00           | 313  |            |
| UpStream  |               |   |         |                       |  |  |                |  |            |
| DownStream  |               |   |         |                       |  |  |                |  |            |
| <b>Merge Areas</b>  |               |   |         |                       | <b>Diverge Areas</b>   |  |                |  |            |
| <b>Estimation of v<sub>12</sub></b>   |               |   |         |                       | <b>Estimation of v<sub>12</sub></b>  |  |                |  |            |
| $V_{12} = V_F (P_{FM})$ (Equation 13-6 or 13-7)<br>P <sub>FM</sub> =      using Equation (Exhibit 13-6)<br>V <sub>12</sub> =      pc/h<br>V <sub>3</sub> or V <sub>av34</sub> pc/h (Equation 13-14 or 13-17)<br>Is V <sub>3</sub> or V <sub>av34</sub> > 2,700 pc/h? <input type="checkbox"/> Yes <input type="checkbox"/> No<br>Is V <sub>3</sub> or V <sub>av34</sub> > 1.5 * V <sub>12</sub> /2 <input type="checkbox"/> Yes <input type="checkbox"/> No<br>If Yes, V <sub>12a</sub> =      pc/h (Equation 13-16, 13-18, or 13-19) |               |   |         |                       | $V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 13-12 or 13-13)<br>P <sub>FD</sub> =      1.000 using Equation (Exhibit 13-7)<br>V <sub>12</sub> =      594 pc/h<br>V <sub>3</sub> or V <sub>av34</sub> 0 pc/h (Equation 13-14 or 13-17)<br>Is V <sub>3</sub> or V <sub>av34</sub> > 2,700 pc/h? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No<br>Is V <sub>3</sub> or V <sub>av34</sub> > 1.5 * V <sub>12</sub> /2 <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No<br>If Yes, V <sub>12a</sub> =      pc/h (Equation 13-16, 13-18, or 13-19) |  |                |  |            |
| <b>Capacity Checks</b>  |               |   |         |                       | <b>Capacity Checks</b>   |  |                |  |            |
|   | Actual        | Capacity                                      |         | LOS F?                |  | Actual   | Capacity       |  | LOS F?     |
| V <sub>FO</sub>   |               | Exhibit 13-8                                  |         |                       | V <sub>F</sub>   | 594  | Exhibit 13-8   | 4700   | No         |
|   |               |   |         |                       | V <sub>FO</sub> = V <sub>F</sub> - V <sub>R</sub>  | 281  | Exhibit 13-8   | 4700   | No         |
|   |               |   |         |                       | V <sub>R</sub>   | 313  | Exhibit 13-10  | 2100   | No         |
| <b>Flow Entering Merge Influence Area</b>   |               |   |         |                       | <b>Flow Entering Diverge Influence Area</b>  |  |                |  |            |
|   | Actual        | Max Desirable                                 |         | Violation?            |  | Actual   | Max Desirable  |  | Violation? |
| V <sub>R12</sub>  |               | Exhibit 13-8                                  |         |                       | V <sub>12</sub>  | 594  | Exhibit 13-8   | 4400:All                                     | No         |
| <b>Level of Service Determination (if not F)</b>  |               |   |         |                       | <b>Level of Service Determination (if not F)</b>   |  |                |  |            |
| $D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ D <sub>R</sub> =      (pc/mi/ln)<br>LOS =      (Exhibit 13-2)   |               |   |         |                       | $D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$ D <sub>R</sub> =      -3.1 (pc/mi/ln)<br>LOS =      A (Exhibit 13-2)   |  |                |  |            |
| <b>Speed Determination</b>  |               |   |         |                       | <b>Speed Determination</b>   |  |                |  |            |
| M <sub>S</sub> =      (Exhibit 13-11)<br>S <sub>R</sub> =      mph (Exhibit 13-11)<br>S <sub>0</sub> =      mph (Exhibit 13-11)<br>S =      mph (Exhibit 13-13)   |               |   |         |                       | D <sub>S</sub> =      0.326 (Exhibit 13-12)<br>S <sub>R</sub> =      57.5 mph (Exhibit 13-12)<br>S <sub>0</sub> =      N/A mph (Exhibit 13-12)<br>S =      57.5 mph (Exhibit 13-13)  |  |                |  |            |

| RAMPS AND RAMP JUNCTIONS WORKSHEET   |               |   |          |            |  |  |                |  |            |
|--|---------------|---|----------|------------|--|--|----------------|--|------------|
| <b>General Information</b>   |               |   |          |            | <b>Site Information</b>  |  |                |  |            |
| Analyst  |               | Shane Forsythe                                |          |            | Freeway/Dir of Travel  |  | Centrall NB On |  |            |
| Agency or Company  |               |   |          |            | Junction   |  |                |  |            |
| Date Performed   |               | 9/9/2014                                      |          |            | Jurisdiction   |  |                |  |            |
| Analysis Time Period   |               | PM Peak                                       |          |            | Analysis Year  |  | 2014           |  |            |
| Project Description I-15 Corridor Study  |               |   |          |            |  |  |                |  |            |
| <b>Inputs</b>  |               |   |          |            |  |  |                |  |            |
| Upstream Adj Ramp<br><input type="checkbox"/> Yes <input type="checkbox"/> On<br><input checked="" type="checkbox"/> No <input type="checkbox"/> Off<br>L <sub>up</sub> =        ft<br>V <sub>u</sub> =        veh/h   |               | Freeway Number of Lanes, N        2           |          |            |  | Downstream Adj Ramp<br><input type="checkbox"/> Yes <input type="checkbox"/> On<br><input checked="" type="checkbox"/> No <input type="checkbox"/> Off<br>L <sub>down</sub> =        ft<br>V <sub>D</sub> =        veh/h |                |  |            |
|  |               | Ramp Number of Lanes, N        1              |          |            |  |  |                |  |            |
|  |               | Acceleration Lane Length, L <sub>A</sub> 1491 |          |            |  |  |                |  |            |
|  |               | Deceleration Lane Length L <sub>D</sub>       |          |            |  |  |                |  |            |
|  |               | Freeway Volume, V <sub>F</sub> 359            |          |            |  |  |                |  |            |
|  |               | Ramp Volume, V <sub>R</sub> 118               |          |            |  |  |                |  |            |
| Freeway Free-Flow Speed, S <sub>FF</sub> 65.0  |               |   |          |            |  |  |                |  |            |
| Ramp Free-Flow Speed, S <sub>FR</sub> 55.0   |               |   |          |            |  |  |                |  |            |
| <b>Conversion to pc/h Under Base Conditions</b>  |               |   |          |            |  |  |                |  |            |
| (pc/h)   | V<br>(Veh/hr) | PHF   | Terrain  | %Truck     | %Rv  | f <sub>HV</sub>  | f <sub>p</sub> | v = V/PHF x f <sub>HV</sub> x f <sub>p</sub> |            |
| Freeway  | 359           | 0.97  | Level    | 8          | 0  | 0.962  | 1.00           | 385  |            |
| Ramp   | 118           | 0.81  | Level    | 1          | 0  | 0.995  | 1.00           | 146  |            |
| UpStream   |               |   |          |            |  |  |                |  |            |
| DownStream   |               |   |          |            |  |  |                |  |            |
| <b>Merge Areas</b>   |               |   |          |            | <b>Diverge Areas</b>   |  |                |  |            |
| <b>Estimation of v<sub>12</sub></b>  |               |   |          |            | <b>Estimation of v<sub>12</sub></b>  |  |                |  |            |
| V <sub>12</sub> = V <sub>F</sub> ( P <sub>FM</sub> )<br>L <sub>EQ</sub> =        (Equation 13-6 or 13-7)<br>P <sub>FM</sub> =        1.000 using Equation (Exhibit 13-6)<br>V <sub>12</sub> =        385 pc/h<br>V <sub>3</sub> or V <sub>av34</sub> 0 pc/h (Equation 13-14 or 13-17)<br>Is V <sub>3</sub> or V <sub>av34</sub> > 2,700 pc/h? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No<br>Is V <sub>3</sub> or V <sub>av34</sub> > 1.5 * V <sub>12</sub> /2 <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No<br>If Yes, V <sub>12a</sub> =        pc/h (Equation 13-16, 13-18, or 13-19) |               |   |          |            | V <sub>12</sub> = V <sub>R</sub> + (V <sub>F</sub> - V <sub>R</sub> )P <sub>FD</sub><br>L <sub>EQ</sub> =        (Equation 13-12 or 13-13)<br>P <sub>FD</sub> =        using Equation (Exhibit 13-7)<br>V <sub>12</sub> =        pc/h<br>V <sub>3</sub> or V <sub>av34</sub> pc/h (Equation 13-14 or 13-17)<br>Is V <sub>3</sub> or V <sub>av34</sub> > 2,700 pc/h? <input type="checkbox"/> Yes <input type="checkbox"/> No<br>Is V <sub>3</sub> or V <sub>av34</sub> > 1.5 * V <sub>12</sub> /2 <input type="checkbox"/> Yes <input type="checkbox"/> No<br>If Yes, V <sub>12a</sub> =        pc/h (Equation 13-16, 13-18, or 13-19) |  |                |  |            |
| <b>Capacity Checks</b>   |               |   |          |            | <b>Capacity Checks</b>   |  |                |  |            |
|  | Actual        | Capacity                                      |          | LOS F?     |  | Actual   | Capacity       |  | LOS F?     |
| V <sub>FO</sub>  | 531           | Exhibit 13-8                                  |          | No         | V <sub>F</sub>   |  | Exhibit 13-8   |  |            |
|  |               |   |          |            | V <sub>FO</sub> = V <sub>F</sub> - V <sub>R</sub>  |  | Exhibit 13-8   |  |            |
|  |               |   |          |            | V <sub>R</sub>   |  | Exhibit 13-10  |  |            |
| <b>Flow Entering Merge Influence Area</b>  |               |   |          |            | <b>Flow Entering Diverge Influence Area</b>  |  |                |  |            |
|  | Actual        | Max Desirable                                 |          | Violation? |  | Actual   | Max Desirable  |  | Violation? |
| V <sub>R12</sub>   | 531           | Exhibit 13-8                                  | 4600:All | No         | V <sub>12</sub>  |  | Exhibit 13-8   |  |            |
| <b>Level of Service Determination (if not F)</b>   |               |   |          |            | <b>Level of Service Determination (if not F)</b>   |  |                |  |            |
| D <sub>R</sub> = 5.475 + 0.00734 v <sub>R</sub> + 0.0078 V <sub>12</sub> - 0.00627 L <sub>A</sub><br>D <sub>R</sub> =        0.2 (pc/mi/ln)<br>LOS =        A (Exhibit 13-2)   |               |   |          |            | D <sub>R</sub> = 4.252 + 0.0086 V <sub>12</sub> - 0.009 L <sub>D</sub><br>D <sub>R</sub> =        (pc/mi/ln)<br>LOS =        (Exhibit 13-2)  |  |                |  |            |
| <b>Speed Determination</b>   |               |   |          |            | <b>Speed Determination</b>   |  |                |  |            |
| M <sub>S</sub> =        0.164 (Exhibit 13-11)<br>S <sub>R</sub> =        61.2 mph (Exhibit 13-11)<br>S <sub>0</sub> =        N/A mph (Exhibit 13-11)<br>S =        61.2 mph (Exhibit 13-13)  |               |   |          |            | D <sub>S</sub> =        (Exhibit 13-12)<br>S <sub>R</sub> =        mph (Exhibit 13-12)<br>S <sub>0</sub> =        mph (Exhibit 13-12)<br>S =        mph (Exhibit 13-13)  |  |                |  |            |

| RAMPS AND RAMP JUNCTIONS WORKSHEET   |               |   |         |   |   |                 |  |  |            |
|--|---------------|---|---------|---|---|-----------------|--|--|------------|
| <b>General Information</b>   |               |   |         |   | <b>Site Information</b>   |                 |  |  |            |
| Analyst  |               | Shane Forsythe                                |         |   | Freeway/Dir of Travel   |                 | Central Ave SB Off   |  |            |
| Agency or Company  |               |   |         |   | Junction  |                 |  |  |            |
| Date Performed   |               | 9/9/2014                                      |         |   | Jurisdiction  |                 |  |  |            |
| Analysis Time Period   |               | PM Peak                                       |         |   | Analysis Year   |                 | 2014   |  |            |
| Project Description I-15 Corridor Study  |               |   |         |   |   |                 |  |  |            |
| <b>Inputs</b>  |               |   |         |   |   |                 |  |  |            |
| Upstream Adj Ramp<br><br><input type="checkbox"/> Yes <input type="checkbox"/> On<br><br><input checked="" type="checkbox"/> No <input type="checkbox"/> Off<br><br>L <sub>up</sub> =        ft<br><br>V <sub>u</sub> =        veh/h |               | Freeway Number of Lanes, N        2           |         |   |   |                 | Downstream Adj Ramp<br><br><input type="checkbox"/> Yes <input type="checkbox"/> On<br><br><input checked="" type="checkbox"/> No <input type="checkbox"/> Off<br><br>L <sub>down</sub> =        ft<br><br>V <sub>D</sub> =        veh/h |  |            |
|  |               | Ramp Number of Lanes, N        1              |         |   |   |                 |  |  |            |
|  |               | Acceleration Lane Length, L <sub>A</sub>      |         |   |   |                 |  |  |            |
|  |               | Deceleration Lane Length L <sub>D</sub> 1144  |         |   |   |                 |  |  |            |
|  |               | Freeway Volume, V <sub>F</sub> 309            |         |   |   |                 |  |  |            |
|  |               | Ramp Volume, V <sub>R</sub> 72                |         |   |   |                 |  |  |            |
|  |               | Freeway Free-Flow Speed, S <sub>FF</sub> 65.0 |         |   |   |                 |  |  |            |
|  |               | Ramp Free-Flow Speed, S <sub>FR</sub> 45.0    |         |   |   |                 |  |  |            |
| <b>Conversion to pc/h Under Base Conditions</b>  |               |   |         |   |   |                 |  |  |            |
| (pc/h)   | V<br>(Veh/hr) | PHF   | Terrain | %Truck  | %Rv   | f <sub>HV</sub> | f <sub>p</sub>   | v = V/PHF x f <sub>HV</sub> x f <sub>p</sub> |            |
| Freeway  | 309           | 0.79  | Level   | 14  | 0   | 0.935           | 1.00   | 419  |            |
| Ramp   | 72            | 0.90  | Level   | 6   | 0   | 0.971           | 1.00   | 82   |            |
| UpStream   |               |   |         |   |   |                 |  |  |            |
| DownStream   |               |   |         |   |   |                 |  |  |            |
| <b>Merge Areas</b>   |               |   |         |   | <b>Diverge Areas</b>  |                 |  |  |            |
| <b>Estimation of v<sub>12</sub></b>  |               |   |         |   | <b>Estimation of v<sub>12</sub></b>   |                 |  |  |            |
| V <sub>12</sub> = V <sub>F</sub> (P <sub>FM</sub> )<br>(Equation 13-6 or 13-7)   |               |   |         |   | V <sub>12</sub> = V <sub>R</sub> + (V <sub>F</sub> - V <sub>R</sub> )P <sub>FD</sub><br>(Equation 13-12 or 13-13)                     |                 |  |  |            |
| L <sub>EQ</sub> =  |               |   |         |   | L <sub>EQ</sub> =   |                 |  |  |            |
| P <sub>FM</sub> = using Equation (Exhibit 13-6)  |               |   |         |   | P <sub>FD</sub> = 1.000 using Equation (Exhibit 13-7)   |                 |  |  |            |
| V <sub>12</sub> = pc/h   |               |   |         |   | V <sub>12</sub> = 419 pc/h  |                 |  |  |            |
| V <sub>3</sub> or V <sub>av34</sub> pc/h (Equation 13-14 or 13-17)   |               |   |         |   | V <sub>3</sub> or V <sub>av34</sub> 0 pc/h (Equation 13-14 or 13-17)  |                 |  |  |            |
| Is V <sub>3</sub> or V <sub>av34</sub> > 2,700 pc/h? <input type="checkbox"/> Yes <input type="checkbox"/> No  |               |   |         |   | Is V <sub>3</sub> or V <sub>av34</sub> > 2,700 pc/h? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No              |                 |  |  |            |
| Is V <sub>3</sub> or V <sub>av34</sub> > 1.5 * V <sub>12</sub> /2 <input type="checkbox"/> Yes <input type="checkbox"/> No   |               |   |         |   | Is V <sub>3</sub> or V <sub>av34</sub> > 1.5 * V <sub>12</sub> /2 <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No |                 |  |  |            |
| If Yes, V <sub>12a</sub> = pc/h (Equation 13-16, 13-18, or 13-19)  |               |   |         |   | If Yes, V <sub>12a</sub> = pc/h (Equation 13-16, 13-18, or 13-19)   |                 |  |  |            |
| <b>Capacity Checks</b>   |               |   |         |   | <b>Capacity Checks</b>  |                 |  |  |            |
|  | Actual        | Capacity                                      |         | LOS F?  |   | Actual          | Capacity   |  | LOS F?     |
| V <sub>FO</sub>  |               | Exhibit 13-8                                  |         |   | V <sub>F</sub>  | 419             | Exhibit 13-8   | 4700   | No         |
|  |               |   |         | V <sub>FO</sub> = V <sub>F</sub> - V <sub>R</sub> | 337   | Exhibit 13-8    | 4700   | No   |            |
|  |               |   |         | V <sub>R</sub>                                    | 82  | Exhibit 13-10   | 2100   | No   |            |
| <b>Flow Entering Merge Influence Area</b>  |               |   |         |   | <b>Flow Entering Diverge Influence Area</b>   |                 |  |  |            |
|  | Actual        | Max Desirable                                 |         | Violation?  |   | Actual          | Max Desirable  |  | Violation? |
| V <sub>R12</sub>   |               | Exhibit 13-8                                  |         |   | V <sub>12</sub>   | 419             | Exhibit 13-8   | 4400:All                                     | No         |
| <b>Level of Service Determination (if not F)</b>   |               |   |         |   | <b>Level of Service Determination (if not F)</b>  |                 |  |  |            |
| D <sub>R</sub> = 5.475 + 0.00734 v <sub>R</sub> + 0.0078 V <sub>12</sub> - 0.00627 L <sub>A</sub>  |               |   |         |   | D <sub>R</sub> = 4.252 + 0.0086 V <sub>12</sub> - 0.009 L <sub>D</sub>  |                 |  |  |            |
| D <sub>R</sub> = (pc/mi/ln)  |               |   |         |   | D <sub>R</sub> = -2.4 (pc/mi/ln)  |                 |  |  |            |
| LOS = (Exhibit 13-2)   |               |   |         |   | LOS = A (Exhibit 13-2)  |                 |  |  |            |
| <b>Speed Determination</b>   |               |   |         |   | <b>Speed Determination</b>  |                 |  |  |            |
| M <sub>S</sub> = (Exhibit 13-11)   |               |   |         |   | D <sub>S</sub> = 0.305 (Exhibit 13-12)  |                 |  |  |            |
| S <sub>R</sub> = mph (Exhibit 13-11)   |               |   |         |   | S <sub>R</sub> = 58.0 mph (Exhibit 13-12)   |                 |  |  |            |
| S <sub>0</sub> = mph (Exhibit 13-11)   |               |   |         |   | S <sub>0</sub> = N/A mph (Exhibit 13-12)  |                 |  |  |            |
| S = mph (Exhibit 13-13)  |               |   |         |   | S = 58.0 mph (Exhibit 13-13)  |                 |  |  |            |

| RAMPS AND RAMP JUNCTIONS WORKSHEET  |               |   |          |            |  |  |                |  |            |
|---|---------------|---|----------|------------|--|--|----------------|--|------------|
| <b>General Information</b>  |               |   |          |            | <b>Site Information</b>  |  |                |  |            |
| Analyst   |               | Shane Forsythe                                |          |            | Freeway/Dir of Travel  |  | Centrall SB On |  |            |
| Agency or Company   |               |   |          |            | Junction   |  |                |  |            |
| Date Performed  |               | 9/9/2014                                      |          |            | Jurisdiction   |  |                |  |            |
| Analysis Time Period  |               | PM Peak                                       |          |            | Analysis Year  |  | 2014           |  |            |
| Project Description I-15 Corridor Study   |               |   |          |            |  |  |                |  |            |
| <b>Inputs</b>   |               |   |          |            |  |  |                |  |            |
| Upstream Adj Ramp<br><input type="checkbox"/> Yes <input type="checkbox"/> On<br><input checked="" type="checkbox"/> No <input type="checkbox"/> Off<br>L <sub>up</sub> =      ft<br>V <sub>u</sub> =      veh/h  |               | Freeway Number of Lanes, N      2             |          |            |  | Downstream Adj Ramp<br><input type="checkbox"/> Yes <input type="checkbox"/> On<br><input checked="" type="checkbox"/> No <input type="checkbox"/> Off<br>L <sub>down</sub> =      ft<br>V <sub>D</sub> =      veh/h |                |  |            |
|   |               | Ramp Number of Lanes, N      1                |          |            |  |  |                |  |            |
|   |               | Acceleration Lane Length, L <sub>A</sub> 1379 |          |            |  |  |                |  |            |
|   |               | Deceleration Lane Length L <sub>D</sub>       |          |            |  |  |                |  |            |
|   |               | Freeway Volume, V <sub>F</sub> 491            |          |            |  |  |                |  |            |
|   |               | Ramp Volume, V <sub>R</sub> 260               |          |            |  |  |                |  |            |
| Freeway Free-Flow Speed, S <sub>FF</sub> 65.0   |               |   |          |            |  |  |                |  |            |
| Ramp Free-Flow Speed, S <sub>FR</sub> 45.0  |               |   |          |            |  |  |                |  |            |
| <b>Conversion to pc/h Under Base Conditions</b>   |               |   |          |            |  |  |                |  |            |
| (pc/h)  | V<br>(Veh/hr) | PHF   | Terrain  | %Truck     | %Rv  | f <sub>HV</sub>  | f <sub>p</sub> | v = V/PHF x f <sub>HV</sub> x f <sub>p</sub> |            |
| Freeway   | 491           | 0.90  | Level    | 14         | 0  | 0.935  | 1.00           | 584  |            |
| Ramp  | 260           | 0.89  | Level    | 6          | 0  | 0.971  | 1.00           | 301  |            |
| UpStream  |               |   |          |            |  |  |                |  |            |
| DownStream  |               |   |          |            |  |  |                |  |            |
| <b>Merge Areas</b>  |               |   |          |            | <b>Diverge Areas</b>   |  |                |  |            |
| <b>Estimation of v<sub>12</sub></b>   |               |   |          |            | <b>Estimation of v<sub>12</sub></b>  |  |                |  |            |
| $V_{12} = V_F (P_{FM})$<br>L <sub>EQ</sub> =      (Equation 13-6 or 13-7)<br>P <sub>FM</sub> =      1.000 using Equation (Exhibit 13-6)<br>V <sub>12</sub> =      584 pc/h<br>V <sub>3</sub> or V <sub>av34</sub> 0 pc/h (Equation 13-14 or 13-17)<br>Is V <sub>3</sub> or V <sub>av34</sub> > 2,700 pc/h? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No<br>Is V <sub>3</sub> or V <sub>av34</sub> > 1.5 * V <sub>12</sub> /2 <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No<br>If Yes, V <sub>12a</sub> =      pc/h (Equation 13-16, 13-18, or 13-19) |               |   |          |            | $V_{12} = V_R + (V_F - V_R)P_{FD}$<br>L <sub>EQ</sub> =      (Equation 13-12 or 13-13)<br>P <sub>FD</sub> =      using Equation (Exhibit 13-7)<br>V <sub>12</sub> =      pc/h<br>V <sub>3</sub> or V <sub>av34</sub> pc/h (Equation 13-14 or 13-17)<br>Is V <sub>3</sub> or V <sub>av34</sub> > 2,700 pc/h? <input type="checkbox"/> Yes <input type="checkbox"/> No<br>Is V <sub>3</sub> or V <sub>av34</sub> > 1.5 * V <sub>12</sub> /2 <input type="checkbox"/> Yes <input type="checkbox"/> No<br>If Yes, V <sub>12a</sub> =      pc/h (Equation 13-16, 13-18, or 13-19) |  |                |  |            |
| <b>Capacity Checks</b>  |               |   |          |            | <b>Capacity Checks</b>   |  |                |  |            |
|   | Actual        | Capacity                                      |          | LOS F?     |  | Actual   | Capacity       |  | LOS F?     |
| V <sub>FO</sub>   | 885           | Exhibit 13-8                                  |          | No         | V <sub>F</sub>   |  | Exhibit 13-8   |  |            |
|   |               |   |          |            | V <sub>FO</sub> = V <sub>F</sub> - V <sub>R</sub>  |  | Exhibit 13-8   |  |            |
|   |               |   |          |            | V <sub>R</sub>   |  | Exhibit 13-10  |  |            |
| <b>Flow Entering Merge Influence Area</b>   |               |   |          |            | <b>Flow Entering Diverge Influence Area</b>  |  |                |  |            |
|   | Actual        | Max Desirable                                 |          | Violation? |  | Actual   | Max Desirable  |  | Violation? |
| V <sub>R12</sub>  | 885           | Exhibit 13-8                                  | 4600:All | No         | V <sub>12</sub>  |  | Exhibit 13-8   |  |            |
| <b>Level of Service Determination (if not F)</b>  |               |   |          |            | <b>Level of Service Determination (if not F)</b>   |  |                |  |            |
| $D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$<br>D <sub>R</sub> =      3.6 (pc/mi/ln)<br>LOS =      A (Exhibit 13-2)  |               |   |          |            | $D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$<br>D <sub>R</sub> =      (pc/mi/ln)<br>LOS =      (Exhibit 13-2)   |  |                |  |            |
| <b>Speed Determination</b>  |               |   |          |            | <b>Speed Determination</b>   |  |                |  |            |
| M <sub>S</sub> =      0.206 (Exhibit 13-11)<br>S <sub>R</sub> =      60.3 mph (Exhibit 13-11)<br>S <sub>0</sub> =      N/A mph (Exhibit 13-11)<br>S =      60.3 mph (Exhibit 13-13)   |               |   |          |            | D <sub>S</sub> =      (Exhibit 13-12)<br>S <sub>R</sub> =      mph (Exhibit 13-12)<br>S <sub>0</sub> =      mph (Exhibit 13-12)<br>S =      mph (Exhibit 13-13)  |  |                |  |            |

| RAMPS AND RAMP JUNCTIONS WORKSHEET  |               |  |          |            |  |                 |                        |  |            |
|---|---------------|--|----------|------------|--|-----------------|------------------------|--|------------|
| <b>General Information</b>  |               |  |          |            | <b>Site Information</b>  |                 |                        |  |            |
| Analyst   |               | Shane Forsythe                           |          |            | Freeway/Dir of Travel  |                 | Emerson Junction NB On |  |            |
| Agency or Company   |               |  |          |            | Junction   |                 |                        |  |            |
| Date Performed  |               | 9/9/2014                                 |          |            | Jurisdiction   |                 |                        |  |            |
| Analysis Time Period  |               | AM Peak                                  |          |            | Analysis Year  |                 |                        |  |            |
| Project Description I-15 Corridor Study   |               |  |          |            |  |                 |                        |  |            |
| <b>Inputs</b>   |               |  |          |            |  |                 |                        |  |            |
| Upstream Adj Ramp<br><input type="checkbox"/> Yes <input type="checkbox"/> On<br><input checked="" type="checkbox"/> No <input type="checkbox"/> Off<br>L <sub>up</sub> =        ft<br>V <sub>u</sub> =        veh/h  |               | Freeway Number of Lanes, N               |          |            |  | 2               |                        | Downstream Adj Ramp<br><input type="checkbox"/> Yes <input type="checkbox"/> On<br><input checked="" type="checkbox"/> No <input type="checkbox"/> Off<br>L <sub>down</sub> =        ft<br>V <sub>D</sub> =        veh/h |            |
|   |               | Ramp Number of Lanes, N                  |          |            |  | 1               |                        |  |            |
|   |               | Acceleration Lane Length, L <sub>A</sub> |          |            |  | 980             |                        |  |            |
|   |               | Deceleration Lane Length L <sub>D</sub>  |          |            |  |                 |                        |  |            |
|   |               | Freeway Volume, V <sub>F</sub>           |          |            |  | 288             |                        |  |            |
|   |               | Ramp Volume, V <sub>R</sub>              |          |            |  | 76              |                        |  |            |
| Freeway Free-Flow Speed, S <sub>FF</sub>  |               |  |          | 65.0       |  |                 |                        |  |            |
| Ramp Free-Flow Speed, S <sub>FR</sub>   |               |  |          | 55.0       |  |                 |                        |  |            |
| <b>Conversion to pc/h Under Base Conditions</b>   |               |  |          |            |  |                 |                        |  |            |
| (pc/h)  | V<br>(Veh/hr) | PHF                                      | Terrain  | %Truck     | %Rv  | f <sub>HV</sub> | f <sub>p</sub>         | v = V/PHF x f <sub>HV</sub> x f <sub>p</sub>   |            |
| Freeway   | 288           | 0.89                                     | Level    | 21         | 0  | 0.905           | 1.00                   | 358  |            |
| Ramp  | 76            | 0.83                                     | Level    | 15         | 0  | 0.930           | 1.00                   | 99   |            |
| UpStream  |               |  |          |            |  |                 |                        |  |            |
| DownStream  |               |  |          |            |  |                 |                        |  |            |
| <b>Merge Areas</b>  |               |  |          |            | <b>Diverge Areas</b>   |                 |                        |  |            |
| <b>Estimation of v<sub>12</sub></b>   |               |  |          |            | <b>Estimation of v<sub>12</sub></b>  |                 |                        |  |            |
| $V_{12} = V_F (P_{FM})$<br>L <sub>EQ</sub> =        (Equation 13-6 or 13-7)<br>P <sub>FM</sub> =        1.000 using Equation (Exhibit 13-6)<br>V <sub>12</sub> =        358 pc/h<br>V <sub>3</sub> or V <sub>av34</sub> 0 pc/h (Equation 13-14 or 13-17)<br>Is V <sub>3</sub> or V <sub>av34</sub> > 2,700 pc/h? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No<br>Is V <sub>3</sub> or V <sub>av34</sub> > 1.5 * V <sub>12</sub> /2 <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No<br>If Yes, V <sub>12a</sub> =        pc/h (Equation 13-16, 13-18, or 13-19) |               |  |          |            | $V_{12} = V_R + (V_F - V_R)P_{FD}$<br>L <sub>EQ</sub> =        (Equation 13-12 or 13-13)<br>P <sub>FD</sub> =        using Equation (Exhibit 13-7)<br>V <sub>12</sub> =        pc/h<br>V <sub>3</sub> or V <sub>av34</sub> pc/h (Equation 13-14 or 13-17)<br>Is V <sub>3</sub> or V <sub>av34</sub> > 2,700 pc/h? <input type="checkbox"/> Yes <input type="checkbox"/> No<br>Is V <sub>3</sub> or V <sub>av34</sub> > 1.5 * V <sub>12</sub> /2 <input type="checkbox"/> Yes <input type="checkbox"/> No<br>If Yes, V <sub>12a</sub> =        pc/h (Equation 13-16, 13-18, or 13-19) |                 |                        |  |            |
| <b>Capacity Checks</b>  |               |  |          |            | <b>Capacity Checks</b>   |                 |                        |  |            |
|   | Actual        | Capacity                                 |          | LOS F?     |  | Actual          | Capacity               |  | LOS F?     |
| V <sub>FO</sub>   | 457           | Exhibit 13-8                             |          | No         | V <sub>F</sub>   |                 | Exhibit 13-8           |  |            |
|   |               |  |          |            | V <sub>FO</sub> = V <sub>F</sub> - V <sub>R</sub>  |                 | Exhibit 13-8           |  |            |
|   |               |  |          |            | V <sub>R</sub>   |                 | Exhibit 13-10          |  |            |
| <b>Flow Entering Merge Influence Area</b>   |               |  |          |            | <b>Flow Entering Diverge Influence Area</b>  |                 |                        |  |            |
|   | Actual        | Max Desirable                            |          | Violation? |  | Actual          | Max Desirable          |  | Violation? |
| V <sub>R12</sub>  | 457           | Exhibit 13-8                             | 4600:All | No         | V <sub>12</sub>  |                 | Exhibit 13-8           |  |            |
| <b>Level of Service Determination (if not F)</b>  |               |  |          |            | <b>Level of Service Determination (if not F)</b>   |                 |                        |  |            |
| $D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$<br>D <sub>R</sub> =        2.8 (pc/mi/ln)<br>LOS =        A (Exhibit 13-2)  |               |  |          |            | $D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$<br>D <sub>R</sub> =        (pc/mi/ln)<br>LOS =        (Exhibit 13-2)   |                 |                        |  |            |
| <b>Speed Determination</b>  |               |  |          |            | <b>Speed Determination</b>   |                 |                        |  |            |
| M <sub>S</sub> =        0.219 (Exhibit 13-11)<br>S <sub>R</sub> =        60.0 mph (Exhibit 13-11)<br>S <sub>0</sub> =        N/A mph (Exhibit 13-11)<br>S =        60.0 mph (Exhibit 13-13)   |               |  |          |            | D <sub>S</sub> =        (Exhibit 13-12)<br>S <sub>R</sub> =        mph (Exhibit 13-12)<br>S <sub>0</sub> =        mph (Exhibit 13-12)<br>S =        mph (Exhibit 13-13)  |                 |                        |  |            |

9/9/2014

| RAMPS AND RAMP JUNCTIONS WORKSHEET   |               |  |          |            |  |  |                        |  |            |
|--|---------------|--|----------|------------|--|--|------------------------|--|------------|
| <b>General Information</b>   |               |  |          |            | <b>Site Information</b>  |  |                        |  |            |
| Analyst  |               | Shane Forsythe                               |          |            | Freeway/Dir of Travel  |  | Emerson Junction NB On |  |            |
| Agency or Company  |               |  |          |            | Junction   |  |                        |  |            |
| Date Performed   |               | 9/9/2014                                     |          |            | Jurisdiction   |  |                        |  |            |
| Analysis Time Period   |               | PM Peak                                      |          |            | Analysis Year  |  | 2014                   |  |            |
| Project Description I-15 Corridor Study  |               |  |          |            |  |  |                        |  |            |
| <b>Inputs</b>  |               |  |          |            |  |  |                        |  |            |
| Upstream Adj Ramp<br><input type="checkbox"/> Yes <input type="checkbox"/> On<br><input checked="" type="checkbox"/> No <input type="checkbox"/> Off<br>L <sub>up</sub> =        ft<br>V <sub>u</sub> =        veh/h   |               | Freeway Number of Lanes, N        2          |          |            |  | Downstream Adj Ramp<br><input type="checkbox"/> Yes <input type="checkbox"/> On<br><input checked="" type="checkbox"/> No <input type="checkbox"/> Off<br>L <sub>down</sub> =        ft<br>V <sub>D</sub> =        veh/h |                        |  |            |
|  |               | Ramp Number of Lanes, N        1             |          |            |  |  |                        |  |            |
|  |               | Acceleration Lane Length, L <sub>A</sub> 980 |          |            |  |  |                        |  |            |
|  |               | Deceleration Lane Length L <sub>D</sub>      |          |            |  |  |                        |  |            |
|  |               | Freeway Volume, V <sub>F</sub> 696           |          |            |  |  |                        |  |            |
|  |               | Ramp Volume, V <sub>R</sub> 334              |          |            |  |  |                        |  |            |
| Freeway Free-Flow Speed, S <sub>FF</sub> 65.0  |               |  |          |            |  |  |                        |  |            |
| Ramp Free-Flow Speed, S <sub>FR</sub> 55.0   |               |  |          |            |  |  |                        |  |            |
| <b>Conversion to pc/h Under Base Conditions</b>  |               |  |          |            |  |  |                        |  |            |
| (pc/h)   | V<br>(Veh/hr) | PHF  | Terrain  | %Truck     | %Rv  | f <sub>HV</sub>  | f <sub>p</sub>         | v = V/PHF x f <sub>HV</sub> x f <sub>p</sub> |            |
| Freeway  | 696           | 0.94   | Level    | 6          | 0  | 0.971  | 1.00                   | 763  |            |
| Ramp   | 334           | 0.92   | Level    | 5          | 0  | 0.976  | 1.00                   | 373  |            |
| UpStream   |               |  |          |            |  |  |                        |  |            |
| DownStream   |               |  |          |            |  |  |                        |  |            |
| <b>Merge Areas</b>   |               |  |          |            | <b>Diverge Areas</b>   |  |                        |  |            |
| <b>Estimation of v<sub>12</sub></b>  |               |  |          |            | <b>Estimation of v<sub>12</sub></b>  |  |                        |  |            |
| V <sub>12</sub> = V <sub>F</sub> ( P <sub>FM</sub> )<br>L <sub>EQ</sub> =        (Equation 13-6 or 13-7)<br>P <sub>FM</sub> =        1.000 using Equation (Exhibit 13-6)<br>V <sub>12</sub> =        763 pc/h<br>V <sub>3</sub> or V <sub>av34</sub> 0 pc/h (Equation 13-14 or 13-17)<br>Is V <sub>3</sub> or V <sub>av34</sub> > 2,700 pc/h? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No<br>Is V <sub>3</sub> or V <sub>av34</sub> > 1.5 * V <sub>12</sub> /2 <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No<br>If Yes, V <sub>12a</sub> =        pc/h (Equation 13-16, 13-18, or 13-19) |               |  |          |            | V <sub>12</sub> = V <sub>R</sub> + (V <sub>F</sub> - V <sub>R</sub> )P <sub>FD</sub><br>L <sub>EQ</sub> =        (Equation 13-12 or 13-13)<br>P <sub>FD</sub> =        using Equation (Exhibit 13-7)<br>V <sub>12</sub> =        pc/h<br>V <sub>3</sub> or V <sub>av34</sub> pc/h (Equation 13-14 or 13-17)<br>Is V <sub>3</sub> or V <sub>av34</sub> > 2,700 pc/h? <input type="checkbox"/> Yes <input type="checkbox"/> No<br>Is V <sub>3</sub> or V <sub>av34</sub> > 1.5 * V <sub>12</sub> /2 <input type="checkbox"/> Yes <input type="checkbox"/> No<br>If Yes, V <sub>12a</sub> =        pc/h (Equation 13-16, 13-18, or 13-19) |  |                        |  |            |
| <b>Capacity Checks</b>   |               |  |          |            | <b>Capacity Checks</b>   |  |                        |  |            |
|  | Actual        | Capacity                                     |          | LOS F?     |  | Actual   | Capacity               |  | LOS F?     |
| V <sub>FO</sub>  | 1136          | Exhibit 13-8                                 |          | No         | V <sub>F</sub>   |  | Exhibit 13-8           |  |            |
|  |               |  |          |            | V <sub>FO</sub> = V <sub>F</sub> - V <sub>R</sub>  |  | Exhibit 13-8           |  |            |
|  |               |  |          |            | V <sub>R</sub>   |  | Exhibit 13-10          |  |            |
| <b>Flow Entering Merge Influence Area</b>  |               |  |          |            | <b>Flow Entering Diverge Influence Area</b>  |  |                        |  |            |
|  | Actual        | Max Desirable                                |          | Violation? |  | Actual   | Max Desirable          |  | Violation? |
| V <sub>R12</sub>   | 1136          | Exhibit 13-8                                 | 4600:All | No         | V <sub>12</sub>  |  | Exhibit 13-8           |  |            |
| <b>Level of Service Determination (if not F)</b>   |               |  |          |            | <b>Level of Service Determination (if not F)</b>   |  |                        |  |            |
| D <sub>R</sub> = 5.475 + 0.00734 v <sub>R</sub> + 0.0078 V <sub>12</sub> - 0.00627 L <sub>A</sub><br>D <sub>R</sub> =        8.0 (pc/mi/ln)<br>LOS =        A (Exhibit 13-2)   |               |  |          |            | D <sub>R</sub> = 4.252 + 0.0086 V <sub>12</sub> - 0.009 L <sub>D</sub><br>D <sub>R</sub> =        (pc/mi/ln)<br>LOS =        (Exhibit 13-2)  |  |                        |  |            |
| <b>Speed Determination</b>   |               |  |          |            | <b>Speed Determination</b>   |  |                        |  |            |
| M <sub>S</sub> =        0.225 (Exhibit 13-11)<br>S <sub>R</sub> =        59.8 mph (Exhibit 13-11)<br>S <sub>0</sub> =        N/A mph (Exhibit 13-11)<br>S =        59.8 mph (Exhibit 13-13)  |               |  |          |            | D <sub>S</sub> =        (Exhibit 13-12)<br>S <sub>R</sub> =        mph (Exhibit 13-12)<br>S <sub>0</sub> =        mph (Exhibit 13-12)<br>S =        mph (Exhibit 13-13)  |  |                        |  |            |

| RAMPS AND RAMP JUNCTIONS WORKSHEET  |               |   |         |                       |  |  |                |  |            |
|---|---------------|---|---------|-----------------------|--|--|----------------|--|------------|
| <b>General Information</b>  |               |   |         |                       | <b>Site Information</b>  |  |                |  |            |
| Analyst   |               | Shane Forsythe                                |         | Freeway/Dir of Travel |  | Emerson Junction SB Off  |                |  |            |
| Agency or Company   |               |   |         | Junction              |  |  |                |  |            |
| Date Performed  |               | 9/9/2014                                      |         | Jurisdiction          |  |  |                |  |            |
| Analysis Time Period  |               | PM Peak                                       |         | Analysis Year         |  | 2014   |                |  |            |
| Project Description I-15 Corridor Study   |               |   |         |                       |  |  |                |  |            |
| <b>Inputs</b>   |               |   |         |                       |  |  |                |  |            |
| Upstream Adj Ramp<br><br><input type="checkbox"/> Yes <input type="checkbox"/> On<br><br><input checked="" type="checkbox"/> No <input type="checkbox"/> Off<br><br>L <sub>up</sub> =        ft<br><br>V <sub>u</sub> =        veh/h  |               | Freeway Number of Lanes, N        2           |         |                       |  | Downstream Adj Ramp<br><br><input type="checkbox"/> Yes <input type="checkbox"/> On<br><br><input checked="" type="checkbox"/> No <input type="checkbox"/> Off<br><br>L <sub>down</sub> =        ft<br><br>V <sub>D</sub> =        veh/h |                |  |            |
|   |               | Ramp Number of Lanes, N        1              |         |                       |  |  |                |  |            |
|   |               | Acceleration Lane Length, L <sub>A</sub>      |         |                       |  |  |                |  |            |
|   |               | Deceleration Lane Length L <sub>D</sub> 340   |         |                       |  |  |                |  |            |
|   |               | Freeway Volume, V <sub>F</sub> 456            |         |                       |  |  |                |  |            |
|   |               | Ramp Volume, V <sub>R</sub> 144               |         |                       |  |  |                |  |            |
|   |               | Freeway Free-Flow Speed, S <sub>FF</sub> 65.0 |         |                       |  |  |                |  |            |
|   |               | Ramp Free-Flow Speed, S <sub>FR</sub> 50.0    |         |                       |  |  |                |  |            |
| <b>Conversion to pc/h Under Base Conditions</b>   |               |   |         |                       |  |  |                |  |            |
| (pc/h)  | V<br>(Veh/hr) | PHF   | Terrain | %Truck                | %Rv  | f <sub>HV</sub>  | f <sub>p</sub> | v = V/PHF x f <sub>HV</sub> x f <sub>p</sub> |            |
| Freeway   | 456           | 0.88  | Level   | 13                    | 0  | 0.939  | 1.00           | 552  |            |
| Ramp  | 144           | 0.94  | Level   | 7                     | 0  | 0.966  | 1.00           | 159  |            |
| UpStream  |               |   |         |                       |  |  |                |  |            |
| DownStream  |               |   |         |                       |  |  |                |  |            |
| <b>Merge Areas</b>  |               |   |         |                       | <b>Diverge Areas</b>   |  |                |  |            |
| <b>Estimation of v<sub>12</sub></b>   |               |   |         |                       | <b>Estimation of v<sub>12</sub></b>  |  |                |  |            |
| $V_{12} = V_F (P_{FM})$ (Equation 13-6 or 13-7)<br>P <sub>FM</sub> =        using Equation (Exhibit 13-6)<br>V <sub>12</sub> =        pc/h<br>V <sub>3</sub> or V <sub>av34</sub> pc/h (Equation 13-14 or 13-17)<br>Is V <sub>3</sub> or V <sub>av34</sub> > 2,700 pc/h? <input type="checkbox"/> Yes <input type="checkbox"/> No<br>Is V <sub>3</sub> or V <sub>av34</sub> > 1.5 * V <sub>12</sub> /2 <input type="checkbox"/> Yes <input type="checkbox"/> No<br>If Yes, V <sub>12a</sub> =        pc/h (Equation 13-16, 13-18, or 13-19) |               |   |         |                       | $V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 13-12 or 13-13)<br>P <sub>FD</sub> =        1.000 using Equation (Exhibit 13-7)<br>V <sub>12</sub> =        552 pc/h<br>V <sub>3</sub> or V <sub>av34</sub> 0 pc/h (Equation 13-14 or 13-17)<br>Is V <sub>3</sub> or V <sub>av34</sub> > 2,700 pc/h? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No<br>Is V <sub>3</sub> or V <sub>av34</sub> > 1.5 * V <sub>12</sub> /2 <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No<br>If Yes, V <sub>12a</sub> =        pc/h (Equation 13-16, 13-18, or 13-19) |  |                |  |            |
| <b>Capacity Checks</b>  |               |   |         |                       | <b>Capacity Checks</b>   |  |                |  |            |
|   | Actual        | Capacity                                      |         | LOS F?                |  | Actual   | Capacity       |  | LOS F?     |
| V <sub>FO</sub>   |               | Exhibit 13-8                                  |         |                       | V <sub>F</sub>   | 552  | Exhibit 13-8   | 4700   | No         |
|   |               |   |         |                       | V <sub>FO</sub> = V <sub>F</sub> - V <sub>R</sub>  | 393  | Exhibit 13-8   | 4700   | No         |
|   |               |   |         |                       | V <sub>R</sub>   | 159  | Exhibit 13-10  | 2100   | No         |
| <b>Flow Entering Merge Influence Area</b>   |               |   |         |                       | <b>Flow Entering Diverge Influence Area</b>  |  |                |  |            |
|   | Actual        | Max Desirable                                 |         | Violation?            |  | Actual   | Max Desirable  |  | Violation? |
| V <sub>R12</sub>  |               | Exhibit 13-8                                  |         |                       | V <sub>12</sub>  | 552  | Exhibit 13-8   | 4400:All                                     | No         |
| <b>Level of Service Determination (if not F)</b>  |               |   |         |                       | <b>Level of Service Determination (if not F)</b>   |  |                |  |            |
| $D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ D <sub>R</sub> =        (pc/mi/ln)<br>LOS =        (Exhibit 13-2)   |               |   |         |                       | $D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$ D <sub>R</sub> =        5.9 (pc/mi/ln)<br>LOS =        A (Exhibit 13-2)  |  |                |  |            |
| <b>Speed Determination</b>  |               |   |         |                       | <b>Speed Determination</b>   |  |                |  |            |
| M <sub>S</sub> =        (Exhibit 13-11)<br>S <sub>R</sub> =        mph (Exhibit 13-11)<br>S <sub>0</sub> =        mph (Exhibit 13-11)<br>S =        mph (Exhibit 13-13)   |               |   |         |                       | D <sub>S</sub> =        0.247 (Exhibit 13-12)<br>S <sub>R</sub> =        59.3 mph (Exhibit 13-12)<br>S <sub>0</sub> =        N/A mph (Exhibit 13-12)<br>S =        59.3 mph (Exhibit 13-13)  |  |                |  |            |



| RAMPS AND RAMP JUNCTIONS WORKSHEET   |               |                                 |                      |                       |   |                  |               |  |            |
|--|---------------|---------------------------------|----------------------|-----------------------|---|------------------|---------------|--|------------|
| <b>General Information</b>   |               |                                 |                      |                       | <b>Site Information</b>   |                  |               |  |            |
| Analyst  |               | Shane Forsythe                  |                      | Freeway/Dir of Travel |   | Gore Hill NB Off |               |  |            |
| Agency or Company  |               |                                 |                      | Junction              |   |                  |               |  |            |
| Date Performed   |               | 9/9/2014                        |                      | Jurisdiction          |   |                  |               |  |            |
| Analysis Time Period   |               | AM Peak                         |                      | Analysis Year         |   | 2014             |               |  |            |
| Project Description I-15 Corridor Study  |               |                                 |                      |                       |   |                  |               |  |            |
| <b>Inputs</b>  |               |                                 |                      |                       |   |                  |               |  |            |
| Upstream Adj Ramp<br><input type="checkbox"/> Yes <input type="checkbox"/> On<br><input checked="" type="checkbox"/> No <input type="checkbox"/> Off<br><br>$L_{up} =$ ft<br><br>$V_u =$ veh/h   |               | Freeway Number of Lanes, N      |                      |                       |   | 2                |               | Downstream Adj Ramp<br><input type="checkbox"/> Yes <input type="checkbox"/> On<br><input checked="" type="checkbox"/> No <input type="checkbox"/> Off<br><br>$L_{down} =$ ft<br><br>$V_D =$ veh/h |            |
|  |               | Ramp Number of Lanes, N         |                      |                       |   | 1                |               |  |            |
|  |               | Acceleration Lane Length, $L_A$ |                      |                       |   |                  |               |  |            |
|  |               | Deceleration Lane Length $L_D$  |                      |                       |   | 323              |               |  |            |
|  |               | Freeway Volume, $V_F$           |                      |                       |   | 244              |               |  |            |
|  |               | Ramp Volume, $V_R$              |                      |                       |   | 17               |               |  |            |
| Freeway Free-Flow Speed, $S_{FF}$  |               |                                 |                      | 65.0                  |   |                  |               |  |            |
| Ramp Free-Flow Speed, $S_{FR}$   |               |                                 |                      | 50.0                  |   |                  |               |  |            |
| <b>Conversion to pc/h Under Base Conditions</b>  |               |                                 |                      |                       |   |                  |               |  |            |
| (pc/h)   | V<br>(Veh/hr) | PHF                             | Terrain              | %Truck                | %Rv   | $f_{HV}$         | $f_p$         | $v = V/PHF \times f_{HV} \times f_p$   |            |
| Freeway  | 244           | 0.92                            | Level                | 10                    | 0   | 0.952            | 1.00          | 278  |            |
| Ramp   | 17            | 0.74                            | Level                | 35                    | 0   | 0.851            | 1.00          | 27   |            |
| UpStream   |               |                                 |                      |                       |   |                  |               |  |            |
| DownStream   |               |                                 |                      |                       |   |                  |               |  |            |
| <b>Merge Areas</b>   |               |                                 |                      |                       | <b>Diverge Areas</b>  |                  |               |  |            |
| <b>Estimation of <math>v_{12}</math></b>   |               |                                 |                      |                       | <b>Estimation of <math>v_{12}</math></b>  |                  |               |  |            |
| $V_{12} = V_F (P_{FM})$<br>(Equation 13-6 or 13-7)<br>$P_{FM} =$ using Equation (Exhibit 13-6)<br>$V_{12} =$ pc/h<br>$V_3$ or $V_{av34}$ pc/h (Equation 13-14 or 13-17)<br>Is $V_3$ or $V_{av34} > 2,700$ pc/h? <input type="checkbox"/> Yes <input type="checkbox"/> No<br>Is $V_3$ or $V_{av34} > 1.5 * V_{12}/2$ <input type="checkbox"/> Yes <input type="checkbox"/> No<br>If Yes, $V_{12a} =$ pc/h (Equation 13-16, 13-18, or 13-19) |               |                                 |                      |                       | $V_{12} = V_R + (V_F - V_R)P_{FD}$<br>(Equation 13-12 or 13-13)<br>$P_{FD} =$ 1.000 using Equation (Exhibit 13-7)<br>$V_{12} =$ 278 pc/h<br>$V_3$ or $V_{av34}$ 0 pc/h (Equation 13-14 or 13-17)<br>Is $V_3$ or $V_{av34} > 2,700$ pc/h? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No<br>Is $V_3$ or $V_{av34} > 1.5 * V_{12}/2$ <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No<br>If Yes, $V_{12a} =$ pc/h (Equation 13-16, 13-18, or 13-19) |                  |               |  |            |
| <b>Capacity Checks</b>   |               |                                 |                      |                       | <b>Capacity Checks</b>  |                  |               |  |            |
|  | Actual        | Capacity                        |                      | LOS F?                |   | Actual           | Capacity      |  | LOS F?     |
| $V_{FO}$   |               | Exhibit 13-8                    |                      |                       | $V_F$   | 278              | Exhibit 13-8  | 4700   | No         |
|  |               |                                 | $V_{FO} = V_F - V_R$ | 251                   | Exhibit 13-8  | 4700             | No            |  |            |
|  |               |                                 | $V_R$                | 27                    | Exhibit 13-10   | 2100             | No            |  |            |
| <b>Flow Entering Merge Influence Area</b>  |               |                                 |                      |                       | <b>Flow Entering Diverge Influence Area</b>   |                  |               |  |            |
|  | Actual        | Max Desirable                   |                      | Violation?            |   | Actual           | Max Desirable |  | Violation? |
| $V_{R12}$  |               | Exhibit 13-8                    |                      |                       | $V_{12}$  | 278              | Exhibit 13-8  | 4400:All   | No         |
| <b>Level of Service Determination (if not F)</b>   |               |                                 |                      |                       | <b>Level of Service Determination (if not F)</b>  |                  |               |  |            |
| $D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$<br>$D_R =$ (pc/mi/ln)<br>LOS =      (Exhibit 13-2)   |               |                                 |                      |                       | $D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$<br>$D_R =$ 3.7 (pc/mi/ln)<br>LOS =      A (Exhibit 13-2)  |                  |               |  |            |
| <b>Speed Determination</b>   |               |                                 |                      |                       | <b>Speed Determination</b>  |                  |               |  |            |
| $M_S =$ (Exhibit 13-11)<br>$S_R =$ mph (Exhibit 13-11)<br>$S_0 =$ mph (Exhibit 13-11)<br>$S =$ mph (Exhibit 13-13)   |               |                                 |                      |                       | $D_S =$ 0.235 (Exhibit 13-12)<br>$S_R =$ 59.6 mph (Exhibit 13-12)<br>$S_0 =$ N/A mph (Exhibit 13-12)<br>$S =$ 59.6 mph (Exhibit 13-13)  |                  |               |  |            |

| RAMPS AND RAMP JUNCTIONS WORKSHEET  |               |  |          |                       |  |                 |                |  |            |
|---|---------------|--|----------|-----------------------|--|-----------------|----------------|--|------------|
| <b>General Information</b>  |               |  |          |                       | <b>Site Information</b>  |                 |                |  |            |
| Analyst   |               | Shane Forsythe                           |          | Freeway/Dir of Travel |  | Gore Hill NB On |                |  |            |
| Agency or Company   |               |  |          | Junction              |  |                 |                |  |            |
| Date Performed  |               | 9/9/2014                                 |          | Jurisdiction          |  |                 |                |  |            |
| Analysis Time Period  |               | AM Peak                                  |          | Analysis Year         |  |                 |                |  |            |
| Project Description   |               |  |          |                       |  |                 |                |  |            |
| <b>Inputs</b>   |               |  |          |                       |  |                 |                |  |            |
| Upstream Adj Ramp<br><input type="checkbox"/> Yes <input type="checkbox"/> On<br><input checked="" type="checkbox"/> No <input type="checkbox"/> Off<br>L <sub>up</sub> =        ft<br>V <sub>u</sub> =        veh/h  |               | Freeway Number of Lanes, N               |          |                       |  | 2               |                | Downstream Adj Ramp<br><input type="checkbox"/> Yes <input type="checkbox"/> On<br><input checked="" type="checkbox"/> No <input type="checkbox"/> Off<br>L <sub>down</sub> =        ft<br>V <sub>D</sub> =        veh/h |            |
|   |               | Ramp Number of Lanes, N                  |          |                       |  | 1               |                |  |            |
|   |               | Acceleration Lane Length, L <sub>A</sub> |          |                       |  | 1500            |                |  |            |
|   |               | Deceleration Lane Length L <sub>D</sub>  |          |                       |  |                 |                |  |            |
|   |               | Freeway Volume, V <sub>F</sub>           |          |                       |  | 517             |                |  |            |
|   |               | Ramp Volume, V <sub>R</sub>              |          |                       |  | 301             |                |  |            |
| Freeway Free-Flow Speed, S <sub>FF</sub>  |               |  |          | 65.0                  |  |                 |                |  |            |
| Ramp Free-Flow Speed, S <sub>FR</sub>   |               |  |          | 50.0                  |  |                 |                |  |            |
| <b>Conversion to pc/h Under Base Conditions</b>   |               |  |          |                       |  |                 |                |  |            |
| (pc/h)  | V<br>(Veh/hr) | PHF                                      | Terrain  | %Truck                | %Rv  | f <sub>HV</sub> | f <sub>p</sub> | v = V/PHF x f <sub>HV</sub> x f <sub>p</sub>   |            |
| Freeway   | 517           | 0.90                                     | Grade    | 16                    | 0  | 0.926           | 1.00           | 620  |            |
| Ramp  | 301           | 0.82                                     | Level    | 23                    | 0  | 0.897           | 1.00           | 407  |            |
| UpStream  |               |  |          |                       |  |                 |                |  |            |
| DownStream  |               |  |          |                       |  |                 |                |  |            |
| <b>Merge Areas</b>  |               |  |          |                       | <b>Diverge Areas</b>   |                 |                |  |            |
| <b>Estimation of v<sub>12</sub></b>   |               |  |          |                       | <b>Estimation of v<sub>12</sub></b>  |                 |                |  |            |
| $V_{12} = V_F (P_{FM})$<br>L <sub>EQ</sub> =        (Equation 13-6 or 13-7)<br>P <sub>FM</sub> =        1.000 using Equation (Exhibit 13-6)<br>V <sub>12</sub> =        620 pc/h<br>V <sub>3</sub> or V <sub>av34</sub> 0 pc/h (Equation 13-14 or 13-17)<br>Is V <sub>3</sub> or V <sub>av34</sub> > 2,700 pc/h? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No<br>Is V <sub>3</sub> or V <sub>av34</sub> > 1.5 * V <sub>12</sub> /2 <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No<br>If Yes, V <sub>12a</sub> =        pc/h (Equation 13-16, 13-18, or 13-19) |               |  |          |                       | $V_{12} = V_R + (V_F - V_R)P_{FD}$<br>L <sub>EQ</sub> =        (Equation 13-12 or 13-13)<br>P <sub>FD</sub> =        using Equation (Exhibit 13-7)<br>V <sub>12</sub> =        pc/h<br>V <sub>3</sub> or V <sub>av34</sub> pc/h (Equation 13-14 or 13-17)<br>Is V <sub>3</sub> or V <sub>av34</sub> > 2,700 pc/h? <input type="checkbox"/> Yes <input type="checkbox"/> No<br>Is V <sub>3</sub> or V <sub>av34</sub> > 1.5 * V <sub>12</sub> /2 <input type="checkbox"/> Yes <input type="checkbox"/> No<br>If Yes, V <sub>12a</sub> =        pc/h (Equation 13-16, 13-18, or 13-19) |                 |                |  |            |
| <b>Capacity Checks</b>  |               |  |          |                       | <b>Capacity Checks</b>   |                 |                |  |            |
|   | Actual        | Capacity                                 |          | LOS F?                |  | Actual          | Capacity       |  | LOS F?     |
| V <sub>FO</sub>   | 1027          | Exhibit 13-8                             |          | No                    | V <sub>F</sub>   |                 | Exhibit 13-8   |  |            |
|   |               |  |          |                       | V <sub>FO</sub> = V <sub>F</sub> - V <sub>R</sub>  |                 | Exhibit 13-8   |  |            |
|   |               |  |          |                       | V <sub>R</sub>   |                 | Exhibit 13-10  |  |            |
| <b>Flow Entering Merge Influence Area</b>   |               |  |          |                       | <b>Flow Entering Diverge Influence Area</b>  |                 |                |  |            |
|   | Actual        | Max Desirable                            |          | Violation?            |  | Actual          | Max Desirable  |  | Violation? |
| V <sub>R12</sub>  | 1027          | Exhibit 13-8                             | 4600:All | No                    | V <sub>12</sub>  |                 | Exhibit 13-8   |  |            |
| <b>Level of Service Determination (if not F)</b>  |               |  |          |                       | <b>Level of Service Determination (if not F)</b>   |                 |                |  |            |
| $D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$<br>D <sub>R</sub> =        3.9 (pc/mi/ln)<br>LOS =        A (Exhibit 13-2)  |               |  |          |                       | $D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$<br>D <sub>R</sub> =        (pc/mi/ln)<br>LOS =        (Exhibit 13-2)   |                 |                |  |            |
| <b>Speed Determination</b>  |               |  |          |                       | <b>Speed Determination</b>   |                 |                |  |            |
| M <sub>S</sub> =        0.182 (Exhibit 13-11)<br>S <sub>R</sub> =        60.8 mph (Exhibit 13-11)<br>S <sub>0</sub> =        N/A mph (Exhibit 13-11)<br>S =        60.8 mph (Exhibit 13-13)   |               |  |          |                       | D <sub>S</sub> =        (Exhibit 13-12)<br>S <sub>R</sub> =        mph (Exhibit 13-12)<br>S <sub>0</sub> =        mph (Exhibit 13-12)<br>S =        mph (Exhibit 13-13)  |                 |                |  |            |

| RAMPS AND RAMP JUNCTIONS WORKSHEET  |               |   |         |   |  |  |                |  |            |
|---|---------------|---|---------|---|--|--|----------------|--|------------|
| <b>General Information</b>  |               |   |         |   | <b>Site Information</b>  |  |                |  |            |
| Analyst   |               | Shane Forsythe                                |         | Freeway/Dir of Travel                             |  | Gore Hill SB Off   |                |  |            |
| Agency or Company   |               |   |         | Junction  |  |  |                |  |            |
| Date Performed  |               | 9/9/2014                                      |         | Jurisdiction                                      |  |  |                |  |            |
| Analysis Time Period  |               | AM Peak                                       |         | Analysis Year                                     |  | 2014   |                |  |            |
| Project Description I-15 Corridor Study   |               |   |         |   |  |  |                |  |            |
| <b>Inputs</b>   |               |   |         |   |  |  |                |  |            |
| Upstream Adj Ramp<br><br><input type="checkbox"/> Yes <input type="checkbox"/> On<br><br><input checked="" type="checkbox"/> No <input type="checkbox"/> Off<br><br>L <sub>up</sub> =      ft<br><br>V <sub>u</sub> =      veh/h  |               | Freeway Number of Lanes, N      2             |         |   |  | Downstream Adj Ramp<br><br><input type="checkbox"/> Yes <input type="checkbox"/> On<br><br><input checked="" type="checkbox"/> No <input type="checkbox"/> Off<br><br>L <sub>down</sub> =      ft<br><br>V <sub>D</sub> =      veh/h |                |  |            |
|   |               | Ramp Number of Lanes, N      1                |         |   |  |  |                |  |            |
|   |               | Acceleration Lane Length, L <sub>A</sub>      |         |   |  |  |                |  |            |
|   |               | Deceleration Lane Length L <sub>D</sub> 358   |         |   |  |  |                |  |            |
|   |               | Freeway Volume, V <sub>F</sub> 458            |         |   |  |  |                |  |            |
|   |               | Ramp Volume, V <sub>R</sub> 309               |         |   |  |  |                |  |            |
|   |               | Freeway Free-Flow Speed, S <sub>FF</sub> 65.0 |         |   |  |  |                |  |            |
|   |               | Ramp Free-Flow Speed, S <sub>FR</sub> 50.0    |         |   |  |  |                |  |            |
| <b>Conversion to pc/h Under Base Conditions</b>   |               |   |         |   |  |  |                |  |            |
| (pc/h)  | V<br>(Veh/hr) | PHF   | Terrain | %Truck  | %Rv  | f <sub>HV</sub>  | f <sub>p</sub> | v = V/PHF x f <sub>HV</sub> x f <sub>p</sub> |            |
| Freeway   | 458           | 0.85  | Grade   | 7   | 0  | 0.891  | 1.00           | 605  |            |
| Ramp  | 309           | 0.79  | Level   | 7   | 0  | 0.966  | 1.00           | 403  |            |
| UpStream  |               |   |         |   |  |  |                |  |            |
| DownStream  |               |   |         |   |  |  |                |  |            |
| <b>Merge Areas</b>  |               |   |         |   | <b>Diverge Areas</b>   |  |                |  |            |
| <b>Estimation of v<sub>12</sub></b>   |               |   |         |   | <b>Estimation of v<sub>12</sub></b>  |  |                |  |            |
| $V_{12} = V_F (P_{FM})$ (Equation 13-6 or 13-7)<br>P <sub>FM</sub> =      using Equation (Exhibit 13-6)<br>V <sub>12</sub> =      pc/h<br>V <sub>3</sub> or V <sub>av34</sub> pc/h (Equation 13-14 or 13-17)<br>Is V <sub>3</sub> or V <sub>av34</sub> > 2,700 pc/h? <input type="checkbox"/> Yes <input type="checkbox"/> No<br>Is V <sub>3</sub> or V <sub>av34</sub> > 1.5 * V <sub>12</sub> /2 <input type="checkbox"/> Yes <input type="checkbox"/> No<br>If Yes, V <sub>12a</sub> =      pc/h (Equation 13-16, 13-18, or 13-19) |               |   |         |   | $V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 13-12 or 13-13)<br>P <sub>FD</sub> =      1.000 using Equation (Exhibit 13-7)<br>V <sub>12</sub> =      605 pc/h<br>V <sub>3</sub> or V <sub>av34</sub> 0 pc/h (Equation 13-14 or 13-17)<br>Is V <sub>3</sub> or V <sub>av34</sub> > 2,700 pc/h? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No<br>Is V <sub>3</sub> or V <sub>av34</sub> > 1.5 * V <sub>12</sub> /2 <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No<br>If Yes, V <sub>12a</sub> =      pc/h (Equation 13-16, 13-18, or 13-19) |  |                |  |            |
| <b>Capacity Checks</b>  |               |   |         |   | <b>Capacity Checks</b>   |  |                |  |            |
|   | Actual        | Capacity                                      |         | LOS F?  |  | Actual   | Capacity       |  | LOS F?     |
| V <sub>FO</sub>   |               | Exhibit 13-8                                  |         |   | V <sub>F</sub>   | 605  | Exhibit 13-8   | 4700   | No         |
|   |               |   |         | V <sub>FO</sub> = V <sub>F</sub> - V <sub>R</sub> | 202  | Exhibit 13-8   | 4700           | No   |            |
|   |               |   |         | V <sub>R</sub>                                    | 403  | Exhibit 13-10  | 2100           | No   |            |
| <b>Flow Entering Merge Influence Area</b>   |               |   |         |   | <b>Flow Entering Diverge Influence Area</b>  |  |                |  |            |
|   | Actual        | Max Desirable                                 |         | Violation?  |  | Actual   | Max Desirable  |  | Violation? |
| V <sub>R12</sub>  |               | Exhibit 13-8                                  |         |   | V <sub>12</sub>  | 605  | Exhibit 13-8   | 4400:All                                     | No         |
| <b>Level of Service Determination (if not F)</b>  |               |   |         |   | <b>Level of Service Determination (if not F)</b>   |  |                |  |            |
| $D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ D <sub>R</sub> =      (pc/mi/ln)<br>LOS =      (Exhibit 13-2)   |               |   |         |   | $D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$ D <sub>R</sub> =      6.2 (pc/mi/ln)<br>LOS =      A (Exhibit 13-2)  |  |                |  |            |
| <b>Speed Determination</b>  |               |   |         |   | <b>Speed Determination</b>   |  |                |  |            |
| M <sub>S</sub> =      (Exhibit 13-11)<br>S <sub>R</sub> =      mph (Exhibit 13-11)<br>S <sub>0</sub> =      mph (Exhibit 13-11)<br>S =      mph (Exhibit 13-13)   |               |   |         |   | D <sub>S</sub> =      0.269 (Exhibit 13-12)<br>S <sub>R</sub> =      58.8 mph (Exhibit 13-12)<br>S <sub>0</sub> =      N/A mph (Exhibit 13-12)<br>S =      58.8 mph (Exhibit 13-13)  |  |                |  |            |

| RAMPS AND RAMP JUNCTIONS WORKSHEET   |               |   |          |            |  |  |                 |  |            |
|--|---------------|---|----------|------------|--|--|-----------------|--|------------|
| <b>General Information</b>   |               |   |          |            | <b>Site Information</b>  |  |                 |  |            |
| Analyst  |               | Shane Forsythe                                |          |            | Freeway/Dir of Travel  |  | Gore Hill NB On |  |            |
| Agency or Company  |               |   |          |            | Junction   |  |                 |  |            |
| Date Performed   |               | 9/9/2014                                      |          |            | Jurisdiction   |  |                 |  |            |
| Analysis Time Period   |               | AM Peak                                       |          |            | Analysis Year  |  |                 |  |            |
| Project Description I-15 Corridor Study  |               |   |          |            |  |  |                 |  |            |
| <b>Inputs</b>  |               |   |          |            |  |  |                 |  |            |
| Upstream Adj Ramp<br><input type="checkbox"/> Yes <input type="checkbox"/> On<br><input checked="" type="checkbox"/> No <input type="checkbox"/> Off<br>L <sub>up</sub> =        ft<br>V <sub>u</sub> =        veh/h   |               | Freeway Number of Lanes, N        2           |          |            |  | Downstream Adj Ramp<br><input type="checkbox"/> Yes <input type="checkbox"/> On<br><input checked="" type="checkbox"/> No <input type="checkbox"/> Off<br>L <sub>down</sub> =        ft<br>V <sub>D</sub> =        veh/h |                 |  |            |
|  |               | Ramp Number of Lanes, N        1              |          |            |  |  |                 |  |            |
|  |               | Acceleration Lane Length, L <sub>A</sub> 1500 |          |            |  |  |                 |  |            |
|  |               | Deceleration Lane Length L <sub>D</sub>       |          |            |  |  |                 |  |            |
|  |               | Freeway Volume, V <sub>F</sub> 235            |          |            |  |  |                 |  |            |
|  |               | Ramp Volume, V <sub>R</sub> 38                |          |            |  |  |                 |  |            |
| Freeway Free-Flow Speed, S <sub>FF</sub> 65.0  |               |   |          |            |  |  |                 |  |            |
| Ramp Free-Flow Speed, S <sub>FR</sub> 50.0   |               |   |          |            |  |  |                 |  |            |
| <b>Conversion to pc/h Under Base Conditions</b>  |               |   |          |            |  |  |                 |  |            |
| (pc/h)   | V<br>(Veh/hr) | PHF   | Terrain  | %Truck     | %Rv  | f <sub>HV</sub>  | f <sub>p</sub>  | v = V/PHF x f <sub>HV</sub> x f <sub>p</sub> |            |
| Freeway  | 235           | 0.79  | Level    | 20         | 0  | 0.909  | 1.00            | 327  |            |
| Ramp   | 38            | 0.62  | Level    | 40         | 0  | 0.833  | 1.00            | 73   |            |
| UpStream   |               |   |          |            |  |  |                 |  |            |
| DownStream   |               |   |          |            |  |  |                 |  |            |
| <b>Merge Areas</b>   |               |   |          |            | <b>Diverge Areas</b>   |  |                 |  |            |
| <b>Estimation of v<sub>12</sub></b>  |               |   |          |            | <b>Estimation of v<sub>12</sub></b>  |  |                 |  |            |
| V <sub>12</sub> = V <sub>F</sub> ( P <sub>FM</sub> )<br>L <sub>EQ</sub> =        (Equation 13-6 or 13-7)<br>P <sub>FM</sub> =        1.000 using Equation (Exhibit 13-6)<br>V <sub>12</sub> =        327 pc/h<br>V <sub>3</sub> or V <sub>av34</sub> 0 pc/h (Equation 13-14 or 13-17)<br>Is V <sub>3</sub> or V <sub>av34</sub> > 2,700 pc/h? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No<br>Is V <sub>3</sub> or V <sub>av34</sub> > 1.5 * V <sub>12</sub> /2 <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No<br>If Yes, V <sub>12a</sub> =        pc/h (Equation 13-16, 13-18, or 13-19) |               |   |          |            | V <sub>12</sub> = V <sub>R</sub> + (V <sub>F</sub> - V <sub>R</sub> )P <sub>FD</sub><br>L <sub>EQ</sub> =        (Equation 13-12 or 13-13)<br>P <sub>FD</sub> =        using Equation (Exhibit 13-7)<br>V <sub>12</sub> =        pc/h<br>V <sub>3</sub> or V <sub>av34</sub> pc/h (Equation 13-14 or 13-17)<br>Is V <sub>3</sub> or V <sub>av34</sub> > 2,700 pc/h? <input type="checkbox"/> Yes <input type="checkbox"/> No<br>Is V <sub>3</sub> or V <sub>av34</sub> > 1.5 * V <sub>12</sub> /2 <input type="checkbox"/> Yes <input type="checkbox"/> No<br>If Yes, V <sub>12a</sub> =        pc/h (Equation 13-16, 13-18, or 13-19) |  |                 |  |            |
| <b>Capacity Checks</b>   |               |   |          |            | <b>Capacity Checks</b>   |  |                 |  |            |
|  | Actual        | Capacity                                      |          | LOS F?     |  | Actual   | Capacity        |  | LOS F?     |
| V <sub>FO</sub>  | 400           | Exhibit 13-8                                  |          | No         | V <sub>F</sub>   |  | Exhibit 13-8    |  |            |
|  |               |   |          |            | V <sub>FO</sub> = V <sub>F</sub> - V <sub>R</sub>  |  | Exhibit 13-8    |  |            |
|  |               |   |          |            | V <sub>R</sub>   |  | Exhibit 13-10   |  |            |
| <b>Flow Entering Merge Influence Area</b>  |               |   |          |            | <b>Flow Entering Diverge Influence Area</b>  |  |                 |  |            |
|  | Actual        | Max Desirable                                 |          | Violation? |  | Actual   | Max Desirable   |  | Violation? |
| V <sub>R12</sub>   | 400           | Exhibit 13-8                                  | 4600:All | No         | V <sub>12</sub>  |  | Exhibit 13-8    |  |            |
| <b>Level of Service Determination (if not F)</b>   |               |   |          |            | <b>Level of Service Determination (if not F)</b>   |  |                 |  |            |
| D <sub>R</sub> = 5.475 + 0.00734 v <sub>R</sub> + 0.0078 V <sub>12</sub> - 0.00627 L <sub>A</sub>  |               |   |          |            | D <sub>R</sub> = 4.252 + 0.0086 V <sub>12</sub> - 0.009 L <sub>D</sub>   |  |                 |  |            |
| D <sub>R</sub> =        -0.8 (pc/mi/ln)  |               |   |          |            | D <sub>R</sub> =        (pc/mi/ln)   |  |                 |  |            |
| LOS =        A (Exhibit 13-2)  |               |   |          |            | LOS =        (Exhibit 13-2)  |  |                 |  |            |
| <b>Speed Determination</b>   |               |   |          |            | <b>Speed Determination</b>   |  |                 |  |            |
| M <sub>S</sub> =        0.177 (Exhibit 13-11)  |               |   |          |            | D <sub>S</sub> =        (Exhibit 13-12)  |  |                 |  |            |
| S <sub>R</sub> =        60.9 mph (Exhibit 13-11)   |               |   |          |            | S <sub>R</sub> =        mph (Exhibit 13-12)  |  |                 |  |            |
| S <sub>0</sub> =        N/A mph (Exhibit 13-11)  |               |   |          |            | S <sub>0</sub> =        mph (Exhibit 13-12)  |  |                 |  |            |
| S =        60.9 mph (Exhibit 13-13)  |               |   |          |            | S =        mph (Exhibit 13-13)   |  |                 |  |            |

| RAMPS AND RAMP JUNCTIONS WORKSHEET  |               |   |         |   |  |                 |  |  |            |
|---|---------------|---|---------|---|--|-----------------|--|--|------------|
| <b>General Information</b>  |               |   |         |   | <b>Site Information</b>  |                 |  |  |            |
| Analyst   |               | Shane Forsythe                                |         |   | Freeway/Dir of Travel  |                 | Gore Hill NB Off   |  |            |
| Agency or Company   |               |   |         |   | Junction   |                 |  |  |            |
| Date Performed  |               | 9/9/2014                                      |         |   | Jurisdiction   |                 |  |  |            |
| Analysis Time Period  |               | PM Peak                                       |         |   | Analysis Year  |                 | 2014   |  |            |
| Project Description I-15 Corridor Study   |               |   |         |   |  |                 |  |  |            |
| <b>Inputs</b>   |               |   |         |   |  |                 |  |  |            |
| Upstream Adj Ramp<br><br><input type="checkbox"/> Yes <input type="checkbox"/> On<br><br><input checked="" type="checkbox"/> No <input type="checkbox"/> Off<br><br>L <sub>up</sub> =      ft<br><br>V <sub>u</sub> =      veh/h  |               | Freeway Number of Lanes, N      2             |         |   |  |                 | Downstream Adj Ramp<br><br><input type="checkbox"/> Yes <input type="checkbox"/> On<br><br><input checked="" type="checkbox"/> No <input type="checkbox"/> Off<br><br>L <sub>down</sub> =      ft<br><br>V <sub>D</sub> =      veh/h |  |            |
|   |               | Ramp Number of Lanes, N      1                |         |   |  |                 |  |  |            |
|   |               | Acceleration Lane Length, L <sub>A</sub>      |         |   |  |                 |  |  |            |
|   |               | Deceleration Lane Length L <sub>D</sub> 323   |         |   |  |                 |  |  |            |
|   |               | Freeway Volume, V <sub>F</sub> 249            |         |   |  |                 |  |  |            |
|   |               | Ramp Volume, V <sub>R</sub> 35                |         |   |  |                 |  |  |            |
|   |               | Freeway Free-Flow Speed, S <sub>FF</sub> 65.0 |         |   |  |                 |  |  |            |
|   |               | Ramp Free-Flow Speed, S <sub>FR</sub> 50.0    |         |   |  |                 |  |  |            |
| <b>Conversion to pc/h Under Base Conditions</b>   |               |   |         |   |  |                 |  |  |            |
| (pc/h)  | V<br>(Veh/hr) | PHF   | Terrain | %Truck  | %Rv  | f <sub>HV</sub> | f <sub>p</sub>   | v = V/PHF x f <sub>HV</sub> x f <sub>p</sub> |            |
| Freeway   | 249           | 0.96  | Level   | 12  | 0  | 0.943           | 1.00   | 275  |            |
| Ramp  | 35            | 0.74  | Level   | 42  | 0  | 0.826           | 1.00   | 57   |            |
| UpStream  |               |   |         |   |  |                 |  |  |            |
| DownStream  |               |   |         |   |  |                 |  |  |            |
| <b>Merge Areas</b>  |               |   |         |   | <b>Diverge Areas</b>   |                 |  |  |            |
| <b>Estimation of v<sub>12</sub></b>   |               |   |         |   | <b>Estimation of v<sub>12</sub></b>  |                 |  |  |            |
| $V_{12} = V_F (P_{FM})$ (Equation 13-6 or 13-7)<br>P <sub>FM</sub> =      using Equation (Exhibit 13-6)<br>V <sub>12</sub> =      pc/h<br>V <sub>3</sub> or V <sub>av34</sub> pc/h (Equation 13-14 or 13-17)<br>Is V <sub>3</sub> or V <sub>av34</sub> > 2,700 pc/h? <input type="checkbox"/> Yes <input type="checkbox"/> No<br>Is V <sub>3</sub> or V <sub>av34</sub> > 1.5 * V <sub>12</sub> /2 <input type="checkbox"/> Yes <input type="checkbox"/> No<br>If Yes, V <sub>12a</sub> =      pc/h (Equation 13-16, 13-18, or 13-19) |               |   |         |   | $V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 13-12 or 13-13)<br>P <sub>FD</sub> =      1.000 using Equation (Exhibit 13-7)<br>V <sub>12</sub> =      275 pc/h<br>V <sub>3</sub> or V <sub>av34</sub> 0 pc/h (Equation 13-14 or 13-17)<br>Is V <sub>3</sub> or V <sub>av34</sub> > 2,700 pc/h? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No<br>Is V <sub>3</sub> or V <sub>av34</sub> > 1.5 * V <sub>12</sub> /2 <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No<br>If Yes, V <sub>12a</sub> =      pc/h (Equation 13-16, 13-18, or 13-19) |                 |  |  |            |
| <b>Capacity Checks</b>  |               |   |         |   | <b>Capacity Checks</b>   |                 |  |  |            |
|   | Actual        | Capacity                                      |         | LOS F?  |  | Actual          | Capacity   |  | LOS F?     |
| V <sub>FO</sub>   |               | Exhibit 13-8                                  |         |   | V <sub>F</sub>   | 275             | Exhibit 13-8   | 4700   | No         |
|   |               |   |         | V <sub>FO</sub> = V <sub>F</sub> - V <sub>R</sub> | 218  | Exhibit 13-8    | 4700   | No   |            |
|   |               |   |         | V <sub>R</sub>                                    | 57   | Exhibit 13-10   | 2100   | No   |            |
| <b>Flow Entering Merge Influence Area</b>   |               |   |         |   | <b>Flow Entering Diverge Influence Area</b>  |                 |  |  |            |
|   | Actual        | Max Desirable                                 |         | Violation?  |  | Actual          | Max Desirable  |  | Violation? |
| V <sub>R12</sub>  |               | Exhibit 13-8                                  |         |   | V <sub>12</sub>  | 275             | Exhibit 13-8   | 4400:All                                     | No         |
| <b>Level of Service Determination (if not F)</b>  |               |   |         |   | <b>Level of Service Determination (if not F)</b>   |                 |  |  |            |
| $D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ D <sub>R</sub> =      (pc/mi/ln)<br>LOS =      (Exhibit 13-2)   |               |   |         |   | $D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$ D <sub>R</sub> =      3.7 (pc/mi/ln)<br>LOS =      A (Exhibit 13-2)  |                 |  |  |            |
| <b>Speed Determination</b>  |               |   |         |   | <b>Speed Determination</b>   |                 |  |  |            |
| M <sub>S</sub> =      (Exhibit 13-11)<br>S <sub>R</sub> =      mph (Exhibit 13-11)<br>S <sub>0</sub> =      mph (Exhibit 13-11)<br>S =      mph (Exhibit 13-13)   |               |   |         |   | D <sub>S</sub> =      0.238 (Exhibit 13-12)<br>S <sub>R</sub> =      59.5 mph (Exhibit 13-12)<br>S <sub>0</sub> =      N/A mph (Exhibit 13-12)<br>S =      59.5 mph (Exhibit 13-13)  |                 |  |  |            |

| RAMPS AND RAMP JUNCTIONS WORKSHEET  |               |   |          |            |  |  |                 |  |            |
|---|---------------|---|----------|------------|--|--|-----------------|--|------------|
| <b>General Information</b>  |               |   |          |            | <b>Site Information</b>  |  |                 |  |            |
| Analyst   |               | Shane Forsythe                                |          |            | Freeway/Dir of Travel  |  | Gore Hill NB On |  |            |
| Agency or Company   |               |   |          |            | Junction   |  |                 |  |            |
| Date Performed  |               | 9/9/2014                                      |          |            | Jurisdiction   |  |                 |  |            |
| Analysis Time Period  |               | PM Peak                                       |          |            | Analysis Year  |  | 2014            |  |            |
| Project Description I-15 Corridor Study   |               |   |          |            |  |  |                 |  |            |
| <b>Inputs</b>   |               |   |          |            |  |  |                 |  |            |
| Upstream Adj Ramp<br><input type="checkbox"/> Yes <input type="checkbox"/> On<br><input checked="" type="checkbox"/> No <input type="checkbox"/> Off<br>L <sub>up</sub> =        ft<br>V <sub>u</sub> =        veh/h  |               | Freeway Number of Lanes, N        2           |          |            |  | Downstream Adj Ramp<br><input type="checkbox"/> Yes <input type="checkbox"/> On<br><input checked="" type="checkbox"/> No <input type="checkbox"/> Off<br>L <sub>down</sub> =        ft<br>V <sub>D</sub> =        veh/h |                 |  |            |
|   |               | Ramp Number of Lanes, N        1              |          |            |  |  |                 |  |            |
|   |               | Acceleration Lane Length, L <sub>A</sub> 1500 |          |            |  |  |                 |  |            |
|   |               | Deceleration Lane Length L <sub>D</sub>       |          |            |  |  |                 |  |            |
|   |               | Freeway Volume, V <sub>F</sub> 722            |          |            |  |  |                 |  |            |
|   |               | Ramp Volume, V <sub>R</sub> 506               |          |            |  |  |                 |  |            |
| Freeway Free-Flow Speed, S <sub>FF</sub> 65.0   |               |   |          |            |  |  |                 |  |            |
| Ramp Free-Flow Speed, S <sub>FR</sub> 50.0  |               |   |          |            |  |  |                 |  |            |
| <b>Conversion to pc/h Under Base Conditions</b>   |               |   |          |            |  |  |                 |  |            |
| (pc/h)  | V<br>(Veh/hr) | PHF   | Terrain  | %Truck     | %Rv  | f <sub>HV</sub>  | f <sub>p</sub>  | v = V/PHF x f <sub>HV</sub> x f <sub>p</sub> |            |
| Freeway   | 722           | 0.80  | Grade    | 10         | 0  | 0.952  | 1.00            | 948  |            |
| Ramp  | 506           | 0.74  | Level    | 9          | 0  | 0.957  | 1.00            | 714  |            |
| UpStream  |               |   |          |            |  |  |                 |  |            |
| DownStream  |               |   |          |            |  |  |                 |  |            |
| <b>Merge Areas</b>  |               |   |          |            | <b>Diverge Areas</b>   |  |                 |  |            |
| <b>Estimation of v<sub>12</sub></b>   |               |   |          |            | <b>Estimation of v<sub>12</sub></b>  |  |                 |  |            |
| $V_{12} = V_F (P_{FM})$<br>L <sub>EQ</sub> =        (Equation 13-6 or 13-7)<br>P <sub>FM</sub> =        1.000 using Equation (Exhibit 13-6)<br>V <sub>12</sub> =        948 pc/h<br>V <sub>3</sub> or V <sub>av34</sub> 0 pc/h (Equation 13-14 or 13-17)<br>Is V <sub>3</sub> or V <sub>av34</sub> > 2,700 pc/h? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No<br>Is V <sub>3</sub> or V <sub>av34</sub> > 1.5 * V <sub>12</sub> /2 <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No<br>If Yes, V <sub>12a</sub> =        pc/h (Equation 13-16, 13-18, or 13-19) |               |   |          |            | $V_{12} = V_R + (V_F - V_R)P_{FD}$<br>L <sub>EQ</sub> =        (Equation 13-12 or 13-13)<br>P <sub>FD</sub> =        using Equation (Exhibit 13-7)<br>V <sub>12</sub> =        pc/h<br>V <sub>3</sub> or V <sub>av34</sub> pc/h (Equation 13-14 or 13-17)<br>Is V <sub>3</sub> or V <sub>av34</sub> > 2,700 pc/h? <input type="checkbox"/> Yes <input type="checkbox"/> No<br>Is V <sub>3</sub> or V <sub>av34</sub> > 1.5 * V <sub>12</sub> /2 <input type="checkbox"/> Yes <input type="checkbox"/> No<br>If Yes, V <sub>12a</sub> =        pc/h (Equation 13-16, 13-18, or 13-19) |  |                 |  |            |
| <b>Capacity Checks</b>  |               |   |          |            | <b>Capacity Checks</b>   |  |                 |  |            |
|   | Actual        | Capacity                                      |          | LOS F?     |  | Actual   | Capacity        |  | LOS F?     |
| V <sub>FO</sub>   | 1662          | Exhibit 13-8                                  |          | No         | V <sub>F</sub>   |  | Exhibit 13-8    |  |            |
|   |               |   |          |            | V <sub>FO</sub> = V <sub>F</sub> - V <sub>R</sub>  |  | Exhibit 13-8    |  |            |
|   |               |   |          |            | V <sub>R</sub>   |  | Exhibit 13-10   |  |            |
| <b>Flow Entering Merge Influence Area</b>   |               |   |          |            | <b>Flow Entering Diverge Influence Area</b>  |  |                 |  |            |
|   | Actual        | Max Desirable                                 |          | Violation? |  | Actual   | Max Desirable   |  | Violation? |
| V <sub>R12</sub>  | 1662          | Exhibit 13-8                                  | 4600:All | No         | V <sub>12</sub>  |  | Exhibit 13-8    |  |            |
| <b>Level of Service Determination (if not F)</b>  |               |   |          |            | <b>Level of Service Determination (if not F)</b>   |  |                 |  |            |
| $D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$<br>D <sub>R</sub> =        8.7 (pc/mi/ln)<br>LOS =        A (Exhibit 13-2)  |               |   |          |            | $D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$<br>D <sub>R</sub> =        (pc/mi/ln)<br>LOS =        (Exhibit 13-2)   |  |                 |  |            |
| <b>Speed Determination</b>  |               |   |          |            | <b>Speed Determination</b>   |  |                 |  |            |
| M <sub>S</sub> =        0.192 (Exhibit 13-11)<br>S <sub>R</sub> =        60.6 mph (Exhibit 13-11)<br>S <sub>0</sub> =        N/A mph (Exhibit 13-11)<br>S =        60.6 mph (Exhibit 13-13)   |               |   |          |            | D <sub>S</sub> =        (Exhibit 13-12)<br>S <sub>R</sub> =        mph (Exhibit 13-12)<br>S <sub>0</sub> =        mph (Exhibit 13-12)<br>S =        mph (Exhibit 13-13)  |  |                 |  |            |

| RAMPS AND RAMP JUNCTIONS WORKSHEET  |               |   |         |   |  |  |                |  |            |
|---|---------------|---|---------|---|--|--|----------------|--|------------|
| <b>General Information</b>  |               |   |         |   | <b>Site Information</b>  |  |                |  |            |
| Analyst   |               | Shane Forsythe                                |         | Freeway/Dir of Travel                             |  | Gore Hill SB Off   |                |  |            |
| Agency or Company   |               |   |         | Junction  |  |  |                |  |            |
| Date Performed  |               | 9/9/2014                                      |         | Jurisdiction                                      |  |  |                |  |            |
| Analysis Time Period  |               | PM Peak                                       |         | Analysis Year                                     |  | 2014   |                |  |            |
| Project Description I-15 Corridor Study   |               |   |         |   |  |  |                |  |            |
| <b>Inputs</b>   |               |   |         |   |  |  |                |  |            |
| Upstream Adj Ramp<br><br><input type="checkbox"/> Yes <input type="checkbox"/> On<br><br><input checked="" type="checkbox"/> No <input type="checkbox"/> Off<br><br>L <sub>up</sub> =        ft<br><br>V <sub>u</sub> =        veh/h  |               | Freeway Number of Lanes, N        2           |         |   |  | Downstream Adj Ramp<br><br><input type="checkbox"/> Yes <input type="checkbox"/> On<br><br><input checked="" type="checkbox"/> No <input type="checkbox"/> Off<br><br>L <sub>down</sub> =        ft<br><br>V <sub>D</sub> =        veh/h |                |  |            |
|   |               | Ramp Number of Lanes, N        1              |         |   |  |  |                |  |            |
|   |               | Acceleration Lane Length, L <sub>A</sub>      |         |   |  |  |                |  |            |
|   |               | Deceleration Lane Length L <sub>D</sub> 358   |         |   |  |  |                |  |            |
|   |               | Freeway Volume, V <sub>F</sub> 630            |         |   |  |  |                |  |            |
|   |               | Ramp Volume, V <sub>R</sub> 290               |         |   |  |  |                |  |            |
|   |               | Freeway Free-Flow Speed, S <sub>FF</sub> 65.0 |         |   |  |  |                |  |            |
|   |               | Ramp Free-Flow Speed, S <sub>FR</sub> 50.0    |         |   |  |  |                |  |            |
| <b>Conversion to pc/h Under Base Conditions</b>   |               |   |         |   |  |  |                |  |            |
| (pc/h)  | V<br>(Veh/hr) | PHF   | Terrain | %Truck  | %Rv  | f <sub>HV</sub>  | f <sub>p</sub> | v = V/PHF x f <sub>HV</sub> x f <sub>p</sub> |            |
| Freeway   | 630           | 0.93  | Grade   | 10  | 0  | 0.952  | 1.00           | 711  |            |
| Ramp  | 290           | 0.80  | Level   | 16  | 0  | 0.926  | 1.00           | 391  |            |
| UpStream  |               |   |         |   |  |  |                |  |            |
| DownStream  |               |   |         |   |  |  |                |  |            |
| <b>Merge Areas</b>  |               |   |         |   | <b>Diverge Areas</b>   |  |                |  |            |
| <b>Estimation of v<sub>12</sub></b>   |               |   |         |   | <b>Estimation of v<sub>12</sub></b>  |  |                |  |            |
| $V_{12} = V_F (P_{FM})$ (Equation 13-6 or 13-7)<br>P <sub>FM</sub> =        using Equation (Exhibit 13-6)<br>V <sub>12</sub> =        pc/h<br>V <sub>3</sub> or V <sub>av34</sub> pc/h (Equation 13-14 or 13-17)<br>Is V <sub>3</sub> or V <sub>av34</sub> > 2,700 pc/h? <input type="checkbox"/> Yes <input type="checkbox"/> No<br>Is V <sub>3</sub> or V <sub>av34</sub> > 1.5 * V <sub>12</sub> /2 <input type="checkbox"/> Yes <input type="checkbox"/> No<br>If Yes, V <sub>12a</sub> =        pc/h (Equation 13-16, 13-18, or 13-19) |               |   |         |   | $V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 13-12 or 13-13)<br>P <sub>FD</sub> =        1.000 using Equation (Exhibit 13-7)<br>V <sub>12</sub> =        711 pc/h<br>V <sub>3</sub> or V <sub>av34</sub> 0 pc/h (Equation 13-14 or 13-17)<br>Is V <sub>3</sub> or V <sub>av34</sub> > 2,700 pc/h? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No<br>Is V <sub>3</sub> or V <sub>av34</sub> > 1.5 * V <sub>12</sub> /2 <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No<br>If Yes, V <sub>12a</sub> =        pc/h (Equation 13-16, 13-18, or 13-19) |  |                |  |            |
| <b>Capacity Checks</b>  |               |   |         |   | <b>Capacity Checks</b>   |  |                |  |            |
|   | Actual        | Capacity                                      |         | LOS F?  |  | Actual   | Capacity       |  | LOS F?     |
| V <sub>FO</sub>   |               | Exhibit 13-8                                  |         |   | V <sub>F</sub>   | 711  | Exhibit 13-8   | 4700   | No         |
|   |               |   |         | V <sub>FO</sub> = V <sub>F</sub> - V <sub>R</sub> | 320  | Exhibit 13-8   | 4700           | No   |            |
|   |               |   |         | V <sub>R</sub>                                    | 391  | Exhibit 13-10  | 2100           | No   |            |
| <b>Flow Entering Merge Influence Area</b>   |               |   |         |   | <b>Flow Entering Diverge Influence Area</b>  |  |                |  |            |
|   | Actual        | Max Desirable                                 |         | Violation?  |  | Actual   | Max Desirable  |  | Violation? |
| V <sub>R12</sub>  |               | Exhibit 13-8                                  |         |   | V <sub>12</sub>  | 711  | Exhibit 13-8   | 4400:All                                     | No         |
| <b>Level of Service Determination (if not F)</b>  |               |   |         |   | <b>Level of Service Determination (if not F)</b>   |  |                |  |            |
| $D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ D <sub>R</sub> =        (pc/mi/ln)<br>LOS =        (Exhibit 13-2)   |               |   |         |   | $D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$ D <sub>R</sub> =        7.1 (pc/mi/ln)<br>LOS =        A (Exhibit 13-2)  |  |                |  |            |
| <b>Speed Determination</b>  |               |   |         |   | <b>Speed Determination</b>   |  |                |  |            |
| M <sub>S</sub> =        (Exhibit 13-11)<br>S <sub>R</sub> =        mph (Exhibit 13-11)<br>S <sub>0</sub> =        mph (Exhibit 13-11)<br>S =        mph (Exhibit 13-13)   |               |   |         |   | D <sub>S</sub> =        0.268 (Exhibit 13-12)<br>S <sub>R</sub> =        58.8 mph (Exhibit 13-12)<br>S <sub>0</sub> =        N/A mph (Exhibit 13-12)<br>S =        58.8 mph (Exhibit 13-13)  |  |                |  |            |

| RAMPS AND RAMP JUNCTIONS WORKSHEET   |               |   |          |            |  |  |                 |  |            |
|--|---------------|---|----------|------------|--|--|-----------------|--|------------|
| <b>General Information</b>   |               |   |          |            | <b>Site Information</b>  |  |                 |  |            |
| Analyst  |               | Shane Forsythe                                |          |            | Freeway/Dir of Travel  |  | Gore Hill SB On |  |            |
| Agency or Company  |               |   |          |            | Junction   |  |                 |  |            |
| Date Performed   |               | 9/9/2014                                      |          |            | Jurisdiction   |  |                 |  |            |
| Analysis Time Period   |               | PM Peak                                       |          |            | Analysis Year  |  | 2014            |  |            |
| Project Description I-15 Corridor Study  |               |   |          |            |  |  |                 |  |            |
| <b>Inputs</b>  |               |   |          |            |  |  |                 |  |            |
| Upstream Adj Ramp<br><input type="checkbox"/> Yes <input type="checkbox"/> On<br><input checked="" type="checkbox"/> No <input type="checkbox"/> Off<br>L <sub>up</sub> =      ft<br>V <sub>u</sub> =      veh/h   |               | Freeway Number of Lanes, N      2             |          |            |  | Downstream Adj Ramp<br><input type="checkbox"/> Yes <input type="checkbox"/> On<br><input checked="" type="checkbox"/> No <input type="checkbox"/> Off<br>L <sub>down</sub> =      ft<br>V <sub>D</sub> =      veh/h |                 |  |            |
|  |               | Ramp Number of Lanes, N      1                |          |            |  |  |                 |  |            |
|  |               | Acceleration Lane Length, L <sub>A</sub> 1500 |          |            |  |  |                 |  |            |
|  |               | Deceleration Lane Length L <sub>D</sub>       |          |            |  |  |                 |  |            |
|  |               | Freeway Volume, V <sub>F</sub> 365            |          |            |  |  |                 |  |            |
|  |               | Ramp Volume, V <sub>R</sub> 39                |          |            |  |  |                 |  |            |
| Freeway Free-Flow Speed, S <sub>FF</sub> 65.0  |               |   |          |            |  |  |                 |  |            |
| Ramp Free-Flow Speed, S <sub>FR</sub> 50.0   |               |   |          |            |  |  |                 |  |            |
| <b>Conversion to pc/h Under Base Conditions</b>  |               |   |          |            |  |  |                 |  |            |
| (pc/h)   | V<br>(Veh/hr) | PHF   | Terrain  | %Truck     | %Rv  | f <sub>HV</sub>  | f <sub>p</sub>  | v = V/PHF x f <sub>HV</sub> x f <sub>p</sub> |            |
| Freeway  | 365           | 0.93  | Level    | 6          | 0  | 0.971  | 1.00            | 404  |            |
| Ramp   | 39            | 0.65  | Level    | 41         | 0  | 0.830  | 1.00            | 72   |            |
| UpStream   |               |   |          |            |  |  |                 |  |            |
| DownStream   |               |   |          |            |  |  |                 |  |            |
| <b>Merge Areas</b>   |               |   |          |            | <b>Diverge Areas</b>   |  |                 |  |            |
| <b>Estimation of v<sub>12</sub></b>  |               |   |          |            | <b>Estimation of v<sub>12</sub></b>  |  |                 |  |            |
| V <sub>12</sub> = V <sub>F</sub> ( P <sub>FM</sub> )<br>L <sub>EQ</sub> =      (Equation 13-6 or 13-7)<br>P <sub>FM</sub> =      1.000 using Equation (Exhibit 13-6)<br>V <sub>12</sub> =      404 pc/h<br>V <sub>3</sub> or V <sub>av34</sub> 0 pc/h (Equation 13-14 or 13-17)<br>Is V <sub>3</sub> or V <sub>av34</sub> > 2,700 pc/h? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No<br>Is V <sub>3</sub> or V <sub>av34</sub> > 1.5 * V <sub>12</sub> /2 <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No<br>If Yes, V <sub>12a</sub> =      pc/h (Equation 13-16, 13-18, or 13-19) |               |   |          |            | V <sub>12</sub> = V <sub>R</sub> + (V <sub>F</sub> - V <sub>R</sub> )P <sub>FD</sub><br>L <sub>EQ</sub> =      (Equation 13-12 or 13-13)<br>P <sub>FD</sub> =      using Equation (Exhibit 13-7)<br>V <sub>12</sub> =      pc/h<br>V <sub>3</sub> or V <sub>av34</sub> pc/h (Equation 13-14 or 13-17)<br>Is V <sub>3</sub> or V <sub>av34</sub> > 2,700 pc/h? <input type="checkbox"/> Yes <input type="checkbox"/> No<br>Is V <sub>3</sub> or V <sub>av34</sub> > 1.5 * V <sub>12</sub> /2 <input type="checkbox"/> Yes <input type="checkbox"/> No<br>If Yes, V <sub>12a</sub> =      pc/h (Equation 13-16, 13-18, or 13-19) |  |                 |  |            |
| <b>Capacity Checks</b>   |               |   |          |            | <b>Capacity Checks</b>   |  |                 |  |            |
|  | Actual        | Capacity                                      |          | LOS F?     |  | Actual   | Capacity        |  | LOS F?     |
| V <sub>FO</sub>  | 476           | Exhibit 13-8                                  |          | No         | V <sub>F</sub>   |  | Exhibit 13-8    |  |            |
|  |               |   |          |            | V <sub>FO</sub> = V <sub>F</sub> - V <sub>R</sub>  |  | Exhibit 13-8    |  |            |
|  |               |   |          |            | V <sub>R</sub>   |  | Exhibit 13-10   |  |            |
| <b>Flow Entering Merge Influence Area</b>  |               |   |          |            | <b>Flow Entering Diverge Influence Area</b>  |  |                 |  |            |
|  | Actual        | Max Desirable                                 |          | Violation? |  | Actual   | Max Desirable   |  | Violation? |
| V <sub>R12</sub>   | 476           | Exhibit 13-8                                  | 4600:All | No         | V <sub>12</sub>  |  | Exhibit 13-8    |  |            |
| <b>Level of Service Determination (if not F)</b>   |               |   |          |            | <b>Level of Service Determination (if not F)</b>   |  |                 |  |            |
| D <sub>R</sub> = 5.475 + 0.00734 v <sub>R</sub> + 0.0078 V <sub>12</sub> - 0.00627 L <sub>A</sub>  |               |   |          |            | D <sub>R</sub> = 4.252 + 0.0086 V <sub>12</sub> - 0.009 L <sub>D</sub>   |  |                 |  |            |
| D <sub>R</sub> =      -0.3 (pc/mi/ln)  |               |   |          |            | D <sub>R</sub> =      (pc/mi/ln)   |  |                 |  |            |
| LOS =      A (Exhibit 13-2)  |               |   |          |            | LOS =      (Exhibit 13-2)  |  |                 |  |            |
| <b>Speed Determination</b>   |               |   |          |            | <b>Speed Determination</b>   |  |                 |  |            |
| M <sub>S</sub> =      0.177 (Exhibit 13-11)  |               |   |          |            | D <sub>S</sub> =      (Exhibit 13-12)  |  |                 |  |            |
| S <sub>R</sub> =      60.9 mph (Exhibit 13-11)   |               |   |          |            | S <sub>R</sub> =      mph (Exhibit 13-12)  |  |                 |  |            |
| S <sub>0</sub> =      N/A mph (Exhibit 13-11)  |               |   |          |            | S <sub>0</sub> =      mph (Exhibit 13-12)  |  |                 |  |            |
| S =      60.9 mph (Exhibit 13-13)  |               |   |          |            | S =      mph (Exhibit 13-13)   |  |                 |  |            |



## I-15 Corridor Study

Vistro File: F:\...\I-15 Corridor.vistropdb

Scenario 1: AM Scenario

Report File: F:\...\LOS\_Report\_AM.pdf

9/15/2014

**Intersection Analysis Summary**

| ID | Intersection Name                   | Control Type | Method  | Worst Mvmt | V/C   | Delay (s/veh) | LOS |
|----|-------------------------------------|--------------|---------|------------|-------|---------------|-----|
| 1  | Tri Hill and Frontage Airport Rd    | Two-way stop | HCM2010 | NEBL       | 0.202 | 13.5          | B   |
| 2  | I-15 NB and Airport Rd              | Two-way stop | HCM2010 | NEBT       | 0.000 | 16.9          | C   |
| 3  | I-15 SB On and Airport RD           | Two-way stop | HCM2010 | NWBL       | 0.046 | 8.6           | A   |
| 4  | I-15 SB Off and Airport RD Frontage | Two-way stop | HCM2010 | SWBL       | 0.272 | 12.7          | B   |
| 5  | 14th St SW and I-315 EB             | Signalized   | HCM2010 | SBL        | 0.175 | 14.4          | B   |
| 6  | 14th St SW and I-315 WB             | Signalized   | HCM2010 | EBR        | 0.254 | 23.0          | C   |
| 7  | Fox Farm and I-315                  | Signalized   | HCM2010 | NEBL       | 0.687 | 45.3          | D   |
| 8  | Central Ave and I15 SB              | Two-way stop | HCM2010 | SBL        | 0.499 | 28.0          | D   |
| 9  | Central Ave and I-15 NB             | Two-way stop | HCM2010 | NBL        | 0.080 | 19.9          | C   |
| 10 | Central Ave and Vaughn Rd           | Two-way stop | HCM2010 | SBL        | 0.377 | 27.1          | D   |
| 11 | Vaughn Rd and I-15 SB               | Two-way stop | HCM2010 | SBL        | 0.260 | 10.1          | B   |
| 12 | Vaughn Rd and I-15 NB               | Two-way stop | HCM2010 | EBL        | 0.000 | 7.3           | A   |




V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value; for all other control types, they are taken for the whole intersection.

### Intersection Level Of Service Report #1: Tri Hill and Frontage Airport Rd

Control Type: Two-way stop  
Analysis Method: HCM2010  
Analysis Period: 15 minutes

Delay (sec / veh): 13.5  
Level Of Service: B  
Volume to Capacity (v/c): 0.202

#### Intersection Setup

| Name                   |   |        |  |        |   |        |
|------------------------|---|--------|--|--------|---|--------|
| Approach               | Northeastbound  |        | Northwestbound   |        | Southeastbound  |        |
| Lane Configuration     |  |        |  |        |  |        |
| Turning Movement       | Left  | Right  | Left   | Thru   | Thru  | Right  |
| Lane Width [ft]        | 12.00   | 12.00  | 12.00  | 12.00  | 12.00   | 12.00  |
| No. of Lanes in Pocket | 0   | 0      | 0  | 0      | 0   | 0      |
| Pocket Length [ft]     | 100.00  | 100.00 | 100.00   | 100.00 | 100.00  | 100.00 |
| Speed [mph]            | 30.00   |        | 30.00  |        | 30.00   |        |
| Grade [%]              | 0.00  |        | 0.00   |        | 0.00  |        |
| Crosswalk              | yes   |        | yes  |        | yes   |        |

#### Volumes

| Name                                    |        |        |        |        |        |        |
|---|--------|--------|--------|--------|--------|--------|
| Base Volume Input [veh/h]               | 83     | 19     | 9      | 189    | 97     | 88     |
| Base Volume Adjustment Factor           | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Heavy Vehicles Percentage [%]           | 21.70  | 31.10  | 22.20  | 28.60  | 25.70  | 5.70   |
| Growth Rate                             | 1.00   | 1.00   | 1.00   | 1.00   | 1.00   | 1.00   |
| In-Process Volume [veh/h]               | 0      | 0      | 0      | 0      | 0      | 0      |
| Site-Generated Trips [veh/h]            | 0      | 0      | 0      | 0      | 0      | 0      |
| Diverted Trips [veh/h]                  | 0      | 0      | 0      | 0      | 0      | 0      |
| Pass-by Trips [veh/h]                   | 0      | 0      | 0      | 0      | 0      | 0      |
| Existing Site Adjustment Volume [veh/h] | 0      | 0      | 0      | 0      | 0      | 0      |
| Other Volume [veh/h]                    | 0      | 0      | 0      | 0      | 0      | 0      |
| Total Hourly Volume [veh/h]             | 83     | 19     | 9      | 189    | 97     | 88     |
| Peak Hour Factor                        | 0.7410 | 0.4750 | 0.5630 | 0.8750 | 0.9330 | 0.7590 |
| Other Adjustment Factor                 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Total 15-Minute Volume [veh/h]          | 28     | 10     | 4      | 54     | 26     | 29     |
| Total Analysis Volume [veh/h]           | 112    | 40     | 16     | 216    | 104    | 116    |
| Pedestrian Volume [ped/h]               | 0      |        | 0      |        | 0      |        |
| Bicycle Volume [bicycles/h]             | 0      |        | 0      |        | 0      |        |

**Intersection Settings**

| Priority Scheme                    | Stop | Free | Free |
|------------------------------------|------|------|------|
| Flared Lane                        | no   |      |      |
| Storage Area [veh]                 | 0    | 0    | 0    |
| Two-Stage Gap Acceptance           | no   |      |      |
| Number of Storage Spaces in Median | 0    | 0    | 0    |

**Movement, Approach, & Intersection Results**



|                                    |       |       |      |      |      |      |
|------------------------------------|-------|-------|------|------|------|------|
| V/C, Movement V/C Ratio            | 0.20  | 0.05  | 0.01 | 0.00 | 0.00 | 0.00 |
| d_M, Delay for Movement [s/veh]    | 13.48 | 11.42 | 7.94 | 0.00 | 0.00 | 0.00 |
| Movement LOS                       | B     | B     | A    | A    | A    | A    |
| 95th-Percentile Queue Length [veh] | 0.99  | 0.99  | 0.04 | 0.00 | 0.00 | 0.00 |
| 95th-Percentile Queue Length [ft]  | 24.73 | 24.73 | 0.98 | 0.00 | 0.00 | 0.00 |
| d_A, Approach Delay [s/veh]        | 12.93 |       | 0.55 |      | 0.00 |      |
| Approach LOS                       | B     |       | A    |      | A    |      |
| d_I, Intersection Delay [s/veh]    | 3.47  |       |      |      |      |      |
| Intersection LOS                   | B     |       |      |      |      |      |

### Intersection Level Of Service Report #2: I-15 NB and Airport Rd

Control Type: Two-way stop  
Analysis Method: HCM2010  
Analysis Period: 15 minutes

Delay (sec / veh): 16.9  
Level Of Service: C  
Volume to Capacity (v/c): 0.000

#### Intersection Setup

| Name                   |   |        |        |                |        |        |   |        |        |   |        |        |
|------------------------|---|--------|--------|----------------|--------|--------|---|--------|--------|---|--------|--------|
| Approach               | Northeastbound  |        |        | Southwestbound |        |        | Northwestbound  |        |        | Southeastbound  |        |        |
| Lane Configuration     |  |        |        |                |        |        |  |        |        |  |        |        |
| Turning Movement       | Left  | Thru   | Right  | Left           | Thru   | Right  | Left  | Thru   | Right  | Left  | Thru   | Right  |
| Lane Width [ft]        | 12.00   | 12.00  | 12.00  | 12.00          | 12.00  | 12.00  | 12.00   | 12.00  | 12.00  | 12.00   | 12.00  | 12.00  |
| No. of Lanes in Pocket | 0   | 0      | 0      | 0              | 0      | 0      | 0   | 0      | 0      | 0   | 0      | 0      |
| Pocket Length [ft]     | 100.00  | 100.00 | 100.00 | 100.00         | 100.00 | 100.00 | 100.00  | 100.00 | 100.00 | 100.00  | 100.00 | 100.00 |
| Speed [mph]            | 30.00   |        |        | 30.00          |        |        | 30.00   |        |        | 30.00   |        |        |
| Grade [%]              | 0.00  |        |        | 0.00           |        |        | 0.00  |        |        | 0.00  |        |        |
| Crosswalk              | yes   |        |        | yes            |        |        | yes   |        |        | yes   |        |        |

#### Volumes

| Name                                    |        |        |        |        |        |        |        |        |        |        |        |        |
|---|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| Base Volume Input [veh/h]               | 4      | 0      | 13     | 0      | 0      | 0      | 0      | 49     | 222    | 79     | 173    | 0      |
| Base Volume Adjustment Factor           | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Heavy Vehicles Percentage [%]           | 0.00   | 0.00   | 46.20  | 2.00   | 2.00   | 2.00   | 2.00   | 38.80  | 26.60  | 12.70  | 10.90  | 2.00   |
| Growth Rate                             | 1.00   | 1.00   | 1.00   | 1.00   | 1.00   | 1.00   | 1.00   | 1.00   | 1.00   | 1.00   | 1.00   | 1.00   |
| In-Process Volume [veh/h]               | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Site-Generated Trips [veh/h]            | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Diverted Trips [veh/h]                  | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Pass-by Trips [veh/h]                   | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Existing Site Adjustment Volume [veh/h] | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Other Volume [veh/h]                    | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Total Hourly Volume [veh/h]             | 4      | 0      | 13     | 0      | 0      | 0      | 0      | 49     | 222    | 79     | 173    | 0      |
| Peak Hour Factor                        | 0.5000 | 1.0000 | 0.8130 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 0.7210 | 0.8670 | 0.7050 | 0.9010 | 1.0000 |
| Other Adjustment Factor                 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Total 15-Minute Volume [veh/h]          | 2      | 0      | 4      | 0      | 0      | 0      | 0      | 17     | 64     | 28     | 48     | 0      |
| Total Analysis Volume [veh/h]           | 8      | 0      | 16     | 0      | 0      | 0      | 0      | 68     | 256    | 112    | 192    | 0      |
| Pedestrian Volume [ped/h]               | 0      |        |        | 0      |        |        | 0      |        |        | 0      |        |        |
| Bicycle Volume [bicycles/h]             | 0      |        |        | 0      |        |        | 0      |        |        | 0      |        |        |

**Intersection Settings**

| Priority Scheme                    | Stop | Stop | Free | Free |
|------------------------------------|------|------|------|------|
| Flared Lane                        | no   |      |      |      |
| Storage Area [veh]                 | 0    | 0    | 0    | 0    |
| Two-Stage Gap Acceptance           | no   |      |      |      |
| Number of Storage Spaces in Median | 0    | 0    | 0    | 0    |

**Movement, Approach, & Intersection Results**



|                                    |       |       |       |      |      |      |      |      |      |       |       |      |
|------------------------------------|-------|-------|-------|------|------|------|------|------|------|-------|-------|------|
| V/C, Movement V/C Ratio            | 0.02  | 0.00  | 0.02  | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.10  | 0.00  | 0.00 |
| d_M, Delay for Movement [s/veh]    | 14.89 | 16.91 | 10.09 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 8.38  | 0.00  | 0.00 |
| Movement LOS                       | B     | C     | B     |      |      |      |      | A    | A    | A     | A     |      |
| 95th-Percentile Queue Length [veh] | 0.13  | 0.13  | 0.13  | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.03  | 1.03  | 0.00 |
| 95th-Percentile Queue Length [ft]  | 3.34  | 3.34  | 3.34  | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 25.85 | 25.85 | 0.00 |
| d_A, Approach Delay [s/veh]        | 11.69 |       |       | 0.00 |      |      | 0.00 |      |      | 3.09  |       |      |
| Approach LOS                       | B     |       |       | A    |      |      | A    |      |      | A     |       |      |
| d_I, Intersection Delay [s/veh]    | 1.87  |       |       |      |      |      |      |      |      |       |       |      |
| Intersection LOS                   | C     |       |       |      |      |      |      |      |      |       |       |      |

### Intersection Level Of Service Report #3: I-15 SB On and Airport RD

Control Type: Two-way stop  
Analysis Method: HCM2010  
Analysis Period: 15 minutes

Delay (sec / veh): 8.6  
Level Of Service: A  
Volume to Capacity (v/c): 0.046

#### Intersection Setup

| Name                   |                |        |   |        |   |        |
|------------------------|----------------|--------|---|--------|---|--------|
| Approach               | Northeastbound |        | Northwestbound  |        | Southeastbound  |        |
| Lane Configuration     |                |        |  |        |  |        |
| Turning Movement       | Left           | Right  | Left  | Thru   | Thru  | Right  |
| Lane Width [ft]        | 12.00          | 12.00  | 12.00   | 12.00  | 12.00   | 12.00  |
| No. of Lanes in Pocket | 0              | 0      | 0   | 0      | 0   | 0      |
| Pocket Length [ft]     | 100.00         | 100.00 | 100.00  | 100.00 | 100.00  | 100.00 |
| Speed [mph]            | 30.00          |        | 30.00   |        | 30.00   |        |
| Grade [%]              | 0.00           |        | 0.00  |        | 0.00  |        |
| Crosswalk              | yes            |        | yes   |        | yes   |        |

#### Volumes

| Name                                    |        |        |        |        |        |        |
|---|--------|--------|--------|--------|--------|--------|
| Base Volume Input [veh/h]               | 0      | 0      | 32     | 23     | 251    | 6      |
| Base Volume Adjustment Factor           | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Heavy Vehicles Percentage [%]           | 2.00   | 2.00   | 43.80  | 21.70  | 14.00  | 16.70  |
| Growth Rate                             | 1.00   | 1.00   | 1.00   | 1.00   | 1.00   | 1.00   |
| In-Process Volume [veh/h]               | 0      | 0      | 0      | 0      | 0      | 0      |
| Site-Generated Trips [veh/h]            | 0      | 0      | 0      | 0      | 0      | 0      |
| Diverted Trips [veh/h]                  | 0      | 0      | 0      | 0      | 0      | 0      |
| Pass-by Trips [veh/h]                   | 0      | 0      | 0      | 0      | 0      | 0      |
| Existing Site Adjustment Volume [veh/h] | 0      | 0      | 0      | 0      | 0      | 0      |
| Other Volume [veh/h]                    | 0      | 0      | 0      | 0      | 0      | 0      |
| Total Hourly Volume [veh/h]             | 0      | 0      | 32     | 23     | 251    | 6      |
| Peak Hour Factor                        | 1.0000 | 1.0000 | 0.6670 | 0.6390 | 0.8720 | 0.3750 |
| Other Adjustment Factor                 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Total 15-Minute Volume [veh/h]          | 0      | 0      | 12     | 9      | 72     | 4      |
| Total Analysis Volume [veh/h]           | 0      | 0      | 48     | 36     | 288    | 16     |
| Pedestrian Volume [ped/h]               | 0      |        | 0      |        | 0      |        |
| Bicycle Volume [bicycles/h]             | 0      |        | 0      |        | 0      |        |

**Intersection Settings**

| Priority Scheme                    | Stop | Free | Free |
|------------------------------------|------|------|------|
| Flared Lane                        |      |      |      |
| Storage Area [veh]                 | 0    | 0    | 0    |
| Two-Stage Gap Acceptance           |      |      |      |
| Number of Storage Spaces in Median | 0    | 0    | 0    |

**Movement, Approach, & Intersection Results**





|                                    |      |      |      |      |      |      |
|------------------------------------|------|------|------|------|------|------|
| V/C, Movement V/C Ratio            | 0.00 | 0.00 | 0.05 | 0.00 | 0.00 | 0.00 |
| d_M, Delay for Movement [s/veh]    | 0.00 | 0.00 | 8.58 | 0.00 | 0.00 | 0.00 |
| Movement LOS                       |      |      | A    | A    | A    | A    |
| 95th-Percentile Queue Length [veh] | 0.00 | 0.00 | 0.26 | 0.26 | 0.00 | 0.00 |
| 95th-Percentile Queue Length [ft]  | 0.00 | 0.00 | 6.49 | 6.49 | 0.00 | 0.00 |
| d_A, Approach Delay [s/veh]        | 0.00 |      | 4.90 |      | 0.00 |      |
| Approach LOS                       | A    |      | A    |      | A    |      |
| d_I, Intersection Delay [s/veh]    | 1.06 |      |      |      |      |      |
| Intersection LOS                   | A    |      |      |      |      |      |

### Intersection Level Of Service Report #4: I-15 SB Off and Airport RD Frontage

Control Type: Two-way stop  
Analysis Method: HCM2010  
Analysis Period: 15 minutes

Delay (sec / veh): 12.7  
Level Of Service: B  
Volume to Capacity (v/c): 0.272

#### Intersection Setup

| Name                   |   |        |        |   |        |        |   |        |        |   |        |        |
|------------------------|---|--------|--------|---|--------|--------|---|--------|--------|---|--------|--------|
| Approach               | Northeastbound  |        |        | Southwestbound  |        |        | Northwestbound  |        |        | Southeastbound  |        |        |
| Lane Configuration     |  |        |        |  |        |        |  |        |        |  |        |        |
| Turning Movement       | Left  | Thru   | Right  | Left  | Thru   | Right  | Left  | Thru   | Right  | Left  | Thru   | Right  |
| Lane Width [ft]        | 12.00   | 12.00  | 12.00  | 12.00   | 12.00  | 12.00  | 12.00   | 12.00  | 12.00  | 12.00   | 12.00  | 12.00  |
| No. of Lanes in Pocket | 0   | 0      | 0      | 0   | 0      | 0      | 0   | 0      | 0      | 0   | 0      | 0      |
| Pocket Length [ft]     | 100.00  | 100.00 | 100.00 | 100.00  | 100.00 | 100.00 | 100.00  | 100.00 | 100.00 | 100.00  | 100.00 | 100.00 |
| Speed [mph]            | 30.00   |        |        | 30.00   |        |        | 30.00   |        |        | 30.00   |        |        |
| Grade [%]              | 0.00  |        |        | 0.00  |        |        | 0.00  |        |        | 0.00  |        |        |
| Crosswalk              | yes   |        |        | yes   |        |        | yes   |        |        | yes   |        |        |

#### Volumes

| Name                                    |        |        |        |        |        |        |        |        |        |        |        |        |
|---|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| Base Volume Input [veh/h]               | 5      | 0      | 44     | 159    | 54     | 96     | 8      | 12     | 0      | 0      | 40     | 4      |
| Base Volume Adjustment Factor           | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Heavy Vehicles Percentage [%]           | 0.00   | 2.00   | 11.30  | 10.10  | 7.40   | 3.10   | 12.50  | 8.30   | 2.00   | 2.00   | 2.50   | 0.00   |
| Growth Rate                             | 1.00   | 1.00   | 1.00   | 1.00   | 1.00   | 1.00   | 1.00   | 1.00   | 1.00   | 1.00   | 1.00   | 1.00   |
| In-Process Volume [veh/h]               | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Site-Generated Trips [veh/h]            | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Diverted Trips [veh/h]                  | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Pass-by Trips [veh/h]                   | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Existing Site Adjustment Volume [veh/h] | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Other Volume [veh/h]                    | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Total Hourly Volume [veh/h]             | 5      | 0      | 44     | 159    | 54     | 96     | 8      | 12     | 0      | 0      | 40     | 4      |
| Peak Hour Factor                        | 0.4170 | 1.0000 | 0.5240 | 0.8110 | 0.9000 | 0.7060 | 0.4000 | 0.7500 | 1.0000 | 1.0000 | 0.7690 | 0.5000 |
| Other Adjustment Factor                 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Total 15-Minute Volume [veh/h]          | 3      | 0      | 21     | 49     | 15     | 34     | 5      | 4      | 0      | 0      | 13     | 2      |
| Total Analysis Volume [veh/h]           | 12     | 0      | 84     | 196    | 60     | 136    | 20     | 16     | 0      | 0      | 52     | 8      |
| Pedestrian Volume [ped/h]               | 0      |        |        | 0      |        |        | 0      |        |        | 0      |        |        |
| Bicycle Volume [bicycles/h]             | 0      |        |        | 0      |        |        | 0      |        |        | 0      |        |        |



**Intersection Settings**

| Priority Scheme                    | Stop | Stop | Free | Free |
|------------------------------------|------|------|------|------|
| Flared Lane                        | no   |      |      |      |
| Storage Area [veh]                 | 0    | 0    | 0    | 0    |
| Two-Stage Gap Acceptance           | no   | no   |      |      |
| Number of Storage Spaces in Median | 0    | 0    | 0    | 0    |

**Movement, Approach, & Intersection Results**





|                                    |       |      |      |       |       |       |      |      |      |      |      |      |
|------------------------------------|-------|------|------|-------|-------|-------|------|------|------|------|------|------|
| V/C, Movement V/C Ratio            | 0.02  | 0.00 | 0.09 | 0.27  | 0.08  | 0.13  | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| d_M, Delay for Movement [s/veh]    | 10.78 | 0.00 | 9.10 | 12.67 | 12.44 | 8.90  | 7.47 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Movement LOS                       | B     |      | A    | B     | B     | A     | A    | A    |      |      | A    | A    |
| 95th-Percentile Queue Length [veh] | 0.34  | 0.00 | 0.34 | 1.59  | 1.59  | 0.44  | 0.07 | 0.07 | 0.00 | 0.00 | 0.00 | 0.00 |
| 95th-Percentile Queue Length [ft]  | 8.59  | 0.00 | 8.59 | 39.68 | 39.68 | 11.00 | 1.87 | 1.87 | 0.00 | 0.00 | 0.00 | 0.00 |
| d_A, Approach Delay [s/veh]        | 9.31  |      |      | 11.33 |       |       | 4.15 |      |      | 0.00 |      |      |
| Approach LOS                       | A     |      |      | B     |       |       | A    |      |      | A    |      |      |
| d_I, Intersection Delay [s/veh]    | 9.39  |      |      |       |       |       |      |      |      |      |      |      |
| Intersection LOS                   | B     |      |      |       |       |       |      |      |      |      |      |      |

### Intersection Level Of Service Report #5: 14th St SW and I-315 EB

Control Type: Signalized  
Analysis Method: HCM2010  
Analysis Period: 15 minutes

Delay (sec / veh): 14.4  
Level Of Service: B  
Volume to Capacity (v/c): 0.175

#### Intersection Setup

| Name                   |   |        |        |   |        |        |   |        |        |   |        |        |
|------------------------|---|--------|--------|---|--------|--------|---|--------|--------|---|--------|--------|
| Approach               | Northbound  |        |        | Southbound  |        |        | Eastbound   |        |        | Westbound   |        |        |
| Lane Configuration     |  |        |        |  |        |        |  |        |        |  |        |        |
| Turning Movement       | Left  | Thru   | Right  | Left  | Thru   | Right  | Left  | Thru   | Right  | Left  | Thru   | Right  |
| Lane Width [ft]        | 12.00   | 12.00  | 12.00  | 12.00   | 12.00  | 12.00  | 12.00   | 12.00  | 12.00  | 12.00   | 12.00  | 12.00  |
| No. of Lanes in Pocket | 0   | 0      | 0      | 0   | 0      | 0      | 0   | 0      | 0      | 0   | 0      | 0      |
| Pocket Length [ft]     | 100.00  | 100.00 | 100.00 | 100.00  | 100.00 | 100.00 | 100.00  | 100.00 | 100.00 | 100.00  | 100.00 | 100.00 |
| Speed [mph]            | 30.00   |        |        | 30.00   |        |        | 30.00   |        |        | 30.00   |        |        |
| Grade [%]              | 0.00  |        |        | 0.00  |        |        | 0.00  |        |        | 0.00  |        |        |
| Crosswalk              | yes   |        |        | yes   |        |        | yes   |        |        | yes   |        |        |

#### Volumes

| Name                                    |        |        |        |        |        |        |        |        |        |        |        |        |
|---|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| Base Volume Input [veh/h]               | 7      | 66     | 286    | 142    | 91     | 60     | 44     | 69     | 3      | 20     | 30     | 5      |
| Base Volume Adjustment Factor           | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Heavy Vehicles Percentage [%]           | 14.30  | 1.50   | 1.70   | 3.50   | 4.40   | 5.00   | 0.00   | 4.30   | 0.00   | 10.00  | 3.30   | 0.00   |
| Growth Rate                             | 1.00   | 1.00   | 1.00   | 1.00   | 1.00   | 1.00   | 1.00   | 1.00   | 1.00   | 1.00   | 1.00   | 1.00   |
| In-Process Volume [veh/h]               | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Site-Generated Trips [veh/h]            | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Diverted Trips [veh/h]                  | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Pass-by Trips [veh/h]                   | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Existing Site Adjustment Volume [veh/h] | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Other Volume [veh/h]                    | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Right-Turn on Red Volume [veh/h]        | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Total Hourly Volume [veh/h]             | 7      | 66     | 286    | 142    | 91     | 60     | 44     | 69     | 3      | 20     | 30     | 5      |
| Peak Hour Factor                        | 0.8300 | 0.8300 | 0.8300 | 0.8300 | 0.8300 | 0.8300 | 0.8300 | 0.8300 | 0.8300 | 0.8300 | 0.8300 | 0.8300 |
| Other Adjustment Factor                 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Total 15-Minute Volume [veh/h]          | 2      | 20     | 86     | 43     | 27     | 18     | 13     | 21     | 1      | 6      | 9      | 2      |
| Total Analysis Volume [veh/h]           | 8      | 80     | 345    | 171    | 110    | 72     | 53     | 83     | 4      | 24     | 36     | 6      |
| Presence of On-Street Parking           | no     |        | no     | no     |        | no     | no     |        | no     | no     |        | no     |
| On-Street Parking Maneuver Rate [/h]    | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Local Bus Stopping Rate [/h]            | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Pedestrian Volume [ped/h]               | 0      |        |        | 0      |        |        | 0      |        |        | 0      |        |        |
| Bicycle Volume [bicycles/h]             | 0      |        |        | 0      |        |        | 0      |        |        | 0      |        |        |

Version 2.00-10

**Intersection Settings**

|                           |                                 |
|---------------------------|---------------------------------|
| Located in CBD            | no                              |
| Signal Coordination Group | -                               |
| Cycle Length [s]          | 60                              |
| Coordination Type         | Time of Day Pattern Coordinated |
| Actuation Type            | Semi-actuated                   |
| Offset [s]                | 0.0                             |
| Offset Reference          | LeadGreen                       |
| Permissive Mode           | SingleBand                      |
| Lost time [s]             | 0.00                            |

**Phasing & Timing**

| Control Type                 | Permiss | Permiss | Overlap | Permiss | Permiss | Overlap | Protecte | Permiss | Permiss | Protecte | Permiss | Permiss |
|------------------------------|---------|---------|---------|---------|---------|---------|----------|---------|---------|----------|---------|---------|
| Signal Group                 | 0       | 2       | 3       | 0       | 6       | 7       | 7        | 4       | 0       | 3        | 8       | 0       |
| Lead / Lag                   | -       | -       | -       | -       | -       | -       | Lead     | -       | -       | Lead     | -       | -       |
| Minimum Green [s]            | 0       | 5       | 15      | 0       | 5       | 15      | 15       | 5       | 0       | 15       | 15      | 0       |
| Maximum Green [s]            | 0       | 50      | 20      | 0       | 50      | 20      | 20       | 60      | 0       | 20       | 60      | 0       |
| Amber [s]                    | 0.0     | 3.0     | 3.0     | 0.0     | 3.0     | 3.0     | 3.0      | 3.0     | 0.0     | 3.0      | 3.0     | 0.0     |
| All red [s]                  | 0.0     | 2.0     | 0.0     | 0.0     | 2.0     | 0.0     | 0.0      | 2.0     | 0.0     | 0.0      | 2.0     | 0.0     |
| Split [s]                    | 0       | 22      | 18      | 0       | 22      | 18      | 18       | 20      | 0       | 18       | 20      | 0       |
| Vehicle Extension [s]        | 0.0     | 3.0     | 3.0     | 0.0     | 3.0     | 3.0     | 3.0      | 3.0     | 0.0     | 3.0      | 3.0     | 0.0     |
| Walk [s]                     | 0       | 5       | 5       | 0       | 5       | 0       | 0        | 5       | 0       | 5        | 5       | 0       |
| Pedestrian Clearance [s]     | 0       | 10      | 10      | 0       | 10      | 0       | 0        | 10      | 0       | 10       | 10      | 0       |
| I1, Start-Up Lost Time [s]   | 0.0     | 2.0     | 2.0     | 0.0     | 2.0     | 2.0     | 2.0      | 2.0     | 0.0     | 2.0      | 2.0     | 0.0     |
| I2, Clearance Lost Time [s]  | 0.0     | 3.0     | 1.0     | 0.0     | 3.0     | 1.0     | 1.0      | 3.0     | 0.0     | 1.0      | 3.0     | 0.0     |
| Minimum Recall               |         | no      | no      |         | no      | no      | no       | no      |         | no       | no      |         |
| Maximum Recall               |         | no      | no      |         | no      | no      | no       | no      |         | no       | no      |         |
| Pedestrian Recall            |         | no      | no      |         | no      | no      | no       | no      |         | no       | no      |         |
| Detector Location [ft]       | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0      | 0.0     | 0.0     | 0.0      | 0.0     | 0.0     |
| Detector Length [ft]         | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0      | 0.0     | 0.0     | 0.0      | 0.0     | 0.0     |
| I, Upstream Filtering Factor | 1.00    | 1.00    | 1.00    | 1.00    | 1.00    | 1.00    | 1.00     | 1.00    | 1.00    | 1.00     | 1.00    | 1.00    |

**Lane Group Calculations**

| Lane Group                              | L     | C     | R    | L     | C     | R    | L    | C     | R     | L    | C     | R     |
|---|-------|-------|------|-------|-------|------|------|-------|-------|------|-------|-------|
| L, Total Lost Time per Cycle [s]        | 5.00  | 5.00  | 3.00 | 5.00  | 5.00  | 3.00 | 5.00 | 5.00  | 5.00  | 4.00 | 5.00  | 5.00  |
| l1_p, Permitted Start-Up Lost Time [s]  | 2.00  | 0.00  | 0.00 | 2.00  | 0.00  | 0.00 | 0.00 | 0.00  | 0.00  | 0.00 | 0.00  | 0.00  |
| l2, Clearance Lost Time [s]             | 3.00  | 3.00  | 0.00 | 3.00  | 3.00  | 0.00 | 0.00 | 3.00  | 3.00  | 0.00 | 3.00  | 3.00  |
| g_i, Effective Green Time [s]           | 15    | 15    | 34   | 15    | 15    | 33   | 28   | 12    | 12    | 28   | 10    | 10    |
| g / C, Green / Cycle                    | 0.24  | 0.24  | 0.57 | 0.24  | 0.24  | 0.54 | 0.47 | 0.20  | 0.20  | 0.47 | 0.17  | 0.17  |
| (v / s)_i Volume / Saturation Flow Rate | 0.01  | 0.04  | 0.22 | 0.13  | 0.06  | 0.05 | 0.03 | 0.05  | 0.00  | 0.02 | 0.02  | 0.00  |
| s, saturation flow rate [veh/h]         | 1140  | 1872  | 1588 | 1294  | 1820  | 1538 | 1631 | 1822  | 1615  | 1432 | 1839  | 1615  |
| c, Capacity [veh/h]                     | 299   | 452   | 912  | 342   | 439   | 836  | 920  | 360   | 319   | 797  | 307   | 270   |
| d1, Uniform Delay [s]                   | 21.49 | 18.04 | 6.95 | 23.72 | 18.38 | 6.55 | 8.80 | 20.24 | 19.36 | 8.71 | 21.23 | 20.89 |
| k, delay calibration                    | 0.11  | 0.11  | 0.11 | 0.11  | 0.11  | 0.11 | 0.11 | 0.11  | 0.11  | 0.11 | 0.11  | 0.11  |
| l, Upstream Filtering Factor            | 1.00  | 1.00  | 1.00 | 1.00  | 1.00  | 1.00 | 1.00 | 1.00  | 1.00  | 1.00 | 1.00  | 1.00  |
| d2, Incremental Delay [s]               | 0.04  | 0.19  | 0.26 | 1.13  | 0.30  | 0.04 | 0.03 | 0.32  | 0.02  | 0.02 | 0.17  | 0.03  |
| d3, Initial Queue Delay [s]             | 0.00  | 0.00  | 0.00 | 0.00  | 0.00  | 0.00 | 0.00 | 0.00  | 0.00  | 0.00 | 0.00  | 0.00  |
| Rp, platoon ratio                       | 1.00  | 1.00  | 1.00 | 1.00  | 1.00  | 1.00 | 1.00 | 1.00  | 1.00  | 1.00 | 1.00  | 1.00  |
| PF, progression factor                  | 1.00  | 1.00  | 1.00 | 1.00  | 1.00  | 1.00 | 1.00 | 1.00  | 1.00  | 1.00 | 1.00  | 1.00  |

**Lane Group Results**

|                                    |       |       |       |        |       |       |       |       |       |      |       |       |
|------------------------------------|-------|-------|-------|--------|-------|-------|-------|-------|-------|------|-------|-------|
| X, volume / capacity               | 0.03  | 0.18  | 0.38  | 0.50   | 0.25  | 0.09  | 0.06  | 0.23  | 0.01  | 0.03 | 0.12  | 0.02  |
| d, Delay for Lane Group [s/veh]    | 21.52 | 18.22 | 7.21  | 24.85  | 18.67 | 6.60  | 8.83  | 20.56 | 19.38 | 8.72 | 21.39 | 20.92 |
| Lane Group LOS                     | C     | B     | A     | C      | B     | A     | A     | C     | B     | A    | C     | C     |
| Critical Lane Group                | no    | no    | yes   | no     | no    | no    | no    | no    | no    | no   | yes   | no    |
| 50th-Percentile Queue Length [veh] | 0.09  | 0.84  | 1.92  | 2.26   | 1.18  | 0.37  | 0.33  | 0.94  | 0.04  | 0.15 | 0.42  | 0.07  |
| 50th-Percentile Queue Length [ft]  | 2.32  | 20.94 | 47.91 | 56.41  | 29.43 | 9.15  | 8.37  | 23.62 | 1.09  | 3.74 | 10.46 | 1.72  |
| 95th-Percentile Queue Length [veh] | 0.17  | 1.51  | 3.45  | 4.06   | 2.12  | 0.66  | 0.60  | 1.70  | 0.08  | 0.27 | 0.75  | 0.12  |
| 95th-Percentile Queue Length [ft]  | 4.18  | 37.70 | 86.24 | 101.54 | 52.97 | 16.46 | 15.06 | 42.51 | 1.95  | 6.74 | 18.82 | 3.09  |

**Movement, Approach, & Intersection Results**

|                                 |       |       |      |       |       |      |       |       |       |       |       |       |
|---------------------------------|-------|-------|------|-------|-------|------|-------|-------|-------|-------|-------|-------|
| d_M, Delay for Movement [s/veh] | 21.52 | 18.22 | 7.21 | 24.85 | 18.67 | 6.60 | 8.83  | 20.56 | 19.38 | 8.72  | 21.39 | 20.92 |
| Movement LOS                    | C     | B     | A    | C     | B     | A    | A     | C     | B     | A     | C     | C     |
| d_A, Approach Delay [s/veh]     | 9.51  |       |      | 19.20 |       |      | 16.09 |       |       | 16.74 |       |       |
| Approach LOS                    | A     |       |      | B     |       |      | B     |       |       | B     |       |       |
| d_I, Intersection Delay [s/veh] | 14.37 |       |      |       |       |      |       |       |       |       |       |       |
| Intersection LOS                | B     |       |      |       |       |      |       |       |       |       |       |       |
| Intersection V/C                | 0.175 |       |      |       |       |      |       |       |       |       |       |       |

**Sequence**

|        |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|--------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ring 1 | 2 | 7 | 4 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Ring 2 | 6 | 3 | 8 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Ring 3 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Ring 4 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |







### Intersection Level Of Service Report #6: 14th St SW and I-315 WB

Control Type: Signalized  
Analysis Method: HCM2010  
Analysis Period: 15 minutes

Delay (sec / veh): 23.0  
Level Of Service: C  
Volume to Capacity (v/c): 0.254

#### Intersection Setup

| Name                   |   |        |        |   |        |        |   |        |        |   |        |        |
|------------------------|---|--------|--------|---|--------|--------|---|--------|--------|---|--------|--------|
| Approach               | Northbound  |        |        | Southbound  |        |        | Eastbound   |        |        | Westbound   |        |        |
| Lane Configuration     |  |        |        |  |        |        |  |        |        |  |        |        |
| Turning Movement       | Left  | Thru   | Right  | Left  | Thru   | Right  | Left  | Thru   | Right  | Left  | Thru   | Right  |
| Lane Width [ft]        | 12.00   | 12.00  | 12.00  | 12.00   | 12.00  | 12.00  | 12.00   | 12.00  | 12.00  | 12.00   | 12.00  | 12.00  |
| No. of Lanes in Pocket | 0   | 0      | 0      | 0   | 0      | 0      | 0   | 0      | 0      | 0   | 0      | 0      |
| Pocket Length [ft]     | 100.00  | 100.00 | 100.00 | 100.00  | 100.00 | 100.00 | 100.00  | 100.00 | 100.00 | 100.00  | 100.00 | 100.00 |
| Speed [mph]            | 30.00   |        |        | 30.00   |        |        | 30.00   |        |        | 30.00   |        |        |
| Grade [%]              | 0.00  |        |        | 0.00  |        |        | 0.00  |        |        | 0.00  |        |        |
| Crosswalk              | yes   |        |        | yes   |        |        | yes   |        |        | yes   |        |        |

#### Volumes

| Name                                    |        |        |        |        |        |        |        |        |        |        |        |        |
|---|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| Base Volume Input [veh/h]               | 11     | 17     | 90     | 26     | 136    | 0      | 0      | 7      | 15     | 162    | 16     | 38     |
| Base Volume Adjustment Factor           | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Heavy Vehicles Percentage [%]           | 9.10   | 0.00   | 4.40   | 7.70   | 1.50   | 0.00   | 0.00   | 0.00   | 0.00   | 2.50   | 0.00   | 0.00   |
| Growth Rate                             | 1.00   | 1.00   | 1.00   | 1.00   | 1.00   | 1.00   | 1.00   | 1.00   | 1.00   | 1.00   | 1.00   | 1.00   |
| In-Process Volume [veh/h]               | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Site-Generated Trips [veh/h]            | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Diverted Trips [veh/h]                  | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Pass-by Trips [veh/h]                   | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Existing Site Adjustment Volume [veh/h] | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Other Volume [veh/h]                    | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Right-Turn on Red Volume [veh/h]        | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Total Hourly Volume [veh/h]             | 11     | 17     | 90     | 26     | 136    | 0      | 0      | 7      | 15     | 162    | 16     | 38     |
| Peak Hour Factor                        | 0.8040 | 0.8040 | 0.8040 | 0.8040 | 0.8040 | 0.8040 | 0.8040 | 0.8040 | 0.8040 | 0.8040 | 0.8040 | 0.8040 |
| Other Adjustment Factor                 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Total 15-Minute Volume [veh/h]          | 3      | 5      | 28     | 8      | 42     | 0      | 0      | 2      | 5      | 50     | 5      | 12     |
| Total Analysis Volume [veh/h]           | 14     | 21     | 112    | 32     | 169    | 0      | 0      | 9      | 19     | 201    | 20     | 47     |
| Presence of On-Street Parking           | no     |        | no     | no     |        | no     | no     |        | no     | no     |        | no     |
| On-Street Parking Maneuver Rate [/h]    | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Local Bus Stopping Rate [/h]            | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Pedestrian Volume [ped/h]               | 0      |        |        | 0      |        |        | 0      |        |        | 0      |        |        |
| Bicycle Volume [bicycles/h]             | 0      |        |        | 0      |        |        | 0      |        |        | 0      |        |        |

**Intersection Settings**

|                           |                                 |
|---------------------------|---------------------------------|
| Located in CBD            | yes                             |
| Signal Coordination Group | -                               |
| Cycle Length [s]          | 60                              |
| Coordination Type         | Time of Day Pattern Coordinated |
| Actuation Type            | Semi-actuated                   |
| Offset [s]                | 0.0                             |
| Offset Reference          | LeadGreen                       |
| Permissive Mode           | SingleBand                      |
| Lost time [s]             | 0.00                            |

**Phasing & Timing**

| Control Type                 | Permiss | Permiss | Overlap | Permiss | Permiss | Permiss | Permiss | Permiss | Permiss | Permiss | Permiss | Permiss |
|------------------------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| Signal Group                 | 0       | 1       | 2       | 0       | 1       | 0       | 0       | 3       | 0       | 0       | 2       | 0       |
| Lead / Lag                   | -       | -       | -       | -       | -       | -       | -       | -       | -       | -       | -       | -       |
| Minimum Green [s]            | 0       | 5       | 5       | 0       | 5       | 0       | 0       | 5       | 0       | 0       | 5       | 0       |
| Maximum Green [s]            | 0       | 35      | 40      | 0       | 35      | 0       | 0       | 25      | 0       | 0       | 40      | 0       |
| Amber [s]                    | 0.0     | 3.0     | 3.0     | 0.0     | 3.0     | 0.0     | 0.0     | 3.0     | 0.0     | 0.0     | 3.0     | 0.0     |
| All red [s]                  | 0.0     | 2.0     | 2.0     | 0.0     | 2.0     | 0.0     | 0.0     | 2.0     | 0.0     | 0.0     | 2.0     | 0.0     |
| Split [s]                    | 0       | 25      | 19      | 0       | 25      | 0       | 0       | 16      | 0       | 0       | 19      | 0       |
| Vehicle Extension [s]        | 0.0     | 3.0     | 3.0     | 0.0     | 3.0     | 0.0     | 0.0     | 3.0     | 0.0     | 0.0     | 3.0     | 0.0     |
| Walk [s]                     | 0       | 9       | 7       | 0       | 9       | 0       | 0       | 0       | 0       | 0       | 7       | 0       |
| Pedestrian Clearance [s]     | 0       | 11      | 7       | 0       | 11      | 0       | 0       | 0       | 0       | 0       | 7       | 0       |
| I1, Start-Up Lost Time [s]   | 0.0     | 2.0     | 2.0     | 0.0     | 2.0     | 0.0     | 0.0     | 2.0     | 0.0     | 0.0     | 2.0     | 0.0     |
| I2, Clearance Lost Time [s]  | 0.0     | 3.0     | 3.0     | 0.0     | 3.0     | 0.0     | 0.0     | 3.0     | 0.0     | 0.0     | 3.0     | 0.0     |
| Minimum Recall               |         | no      | no      |         | no      |         |         | no      |         |         | no      |         |
| Maximum Recall               |         | no      | no      |         | no      |         |         | no      |         |         | no      |         |
| Pedestrian Recall            |         | no      | no      |         | no      |         |         | no      |         |         | no      |         |
| Detector Location [ft]       | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     |
| Detector Length [ft]         | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     |
| I, Upstream Filtering Factor | 1.00    | 1.00    | 1.00    | 1.00    | 1.00    | 1.00    | 1.00    | 1.00    | 1.00    | 1.00    | 1.00    | 1.00    |

**Lane Group Calculations**

| Lane Group                              | L     | C     | R    | L     | C     | C     | C     | R     |
|---|-------|-------|------|-------|-------|-------|-------|-------|
| L, Total Lost Time per Cycle [s]        | 5.00  | 5.00  | 5.00 | 5.00  | 5.00  | 5.00  | 5.00  | 5.00  |
| l1_p, Permitted Start-Up Lost Time [s]  | 2.00  | 0.00  | 0.00 | 2.00  | 0.00  | 0.00  | 0.00  | 0.00  |
| l2, Clearance Lost Time [s]             | 3.00  | 3.00  | 0.00 | 3.00  | 3.00  | 3.00  | 3.00  | 3.00  |
| g_i, Effective Green Time [s]           | 11    | 11    | 27   | 11    | 11    | 2     | 11    | 11    |
| g / C, Green / Cycle                    | 0.19  | 0.19  | 0.45 | 0.19  | 0.19  | 0.03  | 0.18  | 0.18  |
| (v / s)_i Volume / Saturation Flow Rate | 0.01  | 0.01  | 0.08 | 0.03  | 0.10  | 0.02  | 0.14  | 0.03  |
| s, saturation flow rate [veh/h]         | 1019  | 1710  | 1392 | 1181  | 1685  | 1527  | 1636  | 1454  |
| c, Capacity [veh/h]                     | 178   | 321   | 624  | 283   | 316   | 48    | 290   | 257   |
| d1, Uniform Delay [s]                   | 27.05 | 20.04 | 9.94 | 22.89 | 22.00 | 28.67 | 23.49 | 20.99 |
| k, delay calibration                    | 0.11  | 0.11  | 0.11 | 0.11  | 0.11  | 0.11  | 0.11  | 0.11  |
| l, Upstream Filtering Factor            | 1.00  | 1.00  | 1.00 | 1.00  | 1.00  | 1.00  | 1.00  | 1.00  |
| d2, Incremental Delay [s]               | 0.19  | 0.08  | 0.14 | 0.17  | 1.40  | 10.79 | 4.15  | 0.34  |
| d3, Initial Queue Delay [s]             | 0.00  | 0.00  | 0.00 | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  |
| Rp, platoon ratio                       | 1.00  | 1.00  | 1.00 | 1.00  | 1.00  | 1.00  | 1.00  | 1.00  |
| PF, progression factor                  | 1.00  | 1.00  | 1.00 | 1.00  | 1.00  | 1.00  | 1.00  | 1.00  |

**Lane Group Results**

|                                    |       |       |       |       |       |       |        |       |
|------------------------------------|-------|-------|-------|-------|-------|-------|--------|-------|
| X, volume / capacity               | 0.08  | 0.07  | 0.18  | 0.11  | 0.53  | 0.58  | 0.76   | 0.18  |
| d, Delay for Lane Group [s/veh]    | 27.24 | 20.13 | 10.07 | 23.06 | 23.41 | 39.47 | 27.64  | 21.33 |
| Lane Group LOS                     | C     | C     | B     | C     | C     | D     | C      | C     |
| Critical Lane Group                | no    | no    | no    | no    | yes   | yes   | yes    | no    |
| 50th-Percentile Queue Length [veh] | 0.19  | 0.23  | 0.79  | 0.39  | 2.12  | 0.52  | 3.10   | 0.55  |
| 50th-Percentile Queue Length [ft]  | 4.78  | 5.84  | 19.74 | 9.76  | 53.01 | 13.05 | 77.54  | 13.75 |
| 95th-Percentile Queue Length [veh] | 0.34  | 0.42  | 1.42  | 0.70  | 3.82  | 0.94  | 5.58   | 0.99  |
| 95th-Percentile Queue Length [ft]  | 8.60  | 10.51 | 35.54 | 17.57 | 95.41 | 23.49 | 139.58 | 24.76 |

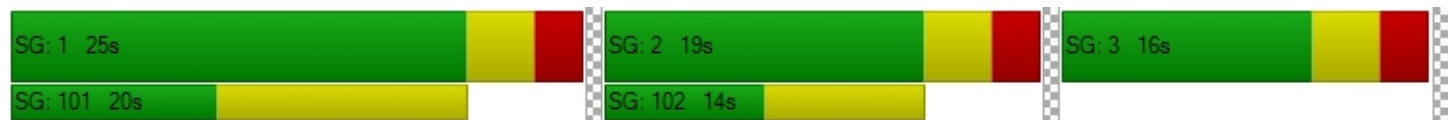


**Movement, Approach, & Intersection Results**

|                                 |       |       |       |       |       |       |       |       |       |       |       |       |
|---------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| d_M, Delay for Movement [s/veh] | 27.24 | 20.13 | 10.07 | 23.06 | 23.41 | 23.41 | 39.47 | 39.47 | 39.47 | 27.64 | 27.64 | 21.33 |
| Movement LOS                    | C     | C     | B     | C     | C     | C     | D     | D     | D     | C     | C     | C     |
| d_A, Approach Delay [s/veh]     | 13.14 |       |       | 23.35 |       |       | 39.47 |       |       | 26.53 |       |       |
| Approach LOS                    | B     |       |       | C     |       |       | D     |       |       | C     |       |       |
| d_I, Intersection Delay [s/veh] | 23.05 |       |       |       |       |       |       |       |       |       |       |       |
| Intersection LOS                | C     |       |       |       |       |       |       |       |       |       |       |       |
| Intersection V/C                | 0.254 |       |       |       |       |       |       |       |       |       |       |       |

**Sequence**

|        |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|--------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ring 1 | 1 | 2 | 3 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Ring 2 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Ring 3 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Ring 4 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |







### Intersection Level Of Service Report #7: Fox Farm and I-315

Control Type: Signalized  
Analysis Method: HCM2010  
Analysis Period: 15 minutes

Delay (sec / veh): 45.3  
Level Of Service: D  
Volume to Capacity (v/c): 0.687

#### Intersection Setup

| Name                   |   |        |        |   |        |        |   |        |        |   |        |        |
|------------------------|---|--------|--------|---|--------|--------|---|--------|--------|---|--------|--------|
| Approach               | Northbound  |        |        | Southbound  |        |        | Northeastbound  |        |        | Southwestbound  |        |        |
| Lane Configuration     |  |        |        |  |        |        |  |        |        |  |        |        |
| Turning Movement       | Left  | Thru   | Right  | Left  | Thru   | Right  | Left  | Thru   | Right  | Left  | Thru   | Right  |
| Lane Width [ft]        | 12.00   | 12.00  | 12.00  | 12.00   | 12.00  | 12.00  | 12.00   | 12.00  | 12.00  | 12.00   | 12.00  | 12.00  |
| No. of Lanes in Pocket | 0   | 0      | 0      | 0   | 0      | 0      | 0   | 0      | 0      | 0   | 0      | 0      |
| Pocket Length [ft]     | 100.00  | 100.00 | 100.00 | 100.00  | 100.00 | 100.00 | 100.00  | 100.00 | 100.00 | 100.00  | 100.00 | 100.00 |
| Speed [mph]            | 30.00   |        |        | 30.00   |        |        | 30.00   |        |        | 30.00   |        |        |
| Grade [%]              | 0.00  |        |        | 0.00  |        |        | 0.00  |        |        | 0.00  |        |        |
| Crosswalk              | yes   |        |        | yes   |        |        | yes   |        |        | yes   |        |        |

#### Volumes

| Name                                    |        |        |        |        |        |        |        |        |        |        |        |        |
|---|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| Base Volume Input [veh/h]               | 50     | 219    | 437    | 172    | 90     | 121    | 161    | 732    | 45     | 101    | 335    | 136    |
| Base Volume Adjustment Factor           | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Heavy Vehicles Percentage [%]           | 2.00   | 0.90   | 0.70   | 1.80   | 2.20   | 4.10   | 6.20   | 5.20   | 2.20   | 4.00   | 6.00   | 3.70   |
| Growth Rate                             | 1.00   | 1.00   | 1.00   | 1.00   | 1.00   | 1.00   | 1.00   | 1.00   | 1.00   | 1.00   | 1.00   | 1.00   |
| In-Process Volume [veh/h]               | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Site-Generated Trips [veh/h]            | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Diverted Trips [veh/h]                  | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Pass-by Trips [veh/h]                   | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Existing Site Adjustment Volume [veh/h] | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Other Volume [veh/h]                    | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Right-Turn on Red Volume [veh/h]        | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Total Hourly Volume [veh/h]             | 50     | 219    | 437    | 172    | 90     | 121    | 161    | 732    | 45     | 101    | 335    | 136    |
| Peak Hour Factor                        | 0.7980 | 0.7980 | 0.7980 | 0.7980 | 0.7980 | 0.7980 | 0.7980 | 0.7980 | 0.7980 | 0.7980 | 0.7980 | 0.7980 |
| Other Adjustment Factor                 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Total 15-Minute Volume [veh/h]          | 16     | 69     | 137    | 54     | 28     | 38     | 50     | 229    | 14     | 32     | 105    | 43     |
| Total Analysis Volume [veh/h]           | 63     | 274    | 548    | 216    | 113    | 152    | 202    | 917    | 56     | 127    | 420    | 170    |
| Presence of On-Street Parking           | no     |        | no     | no     |        | no     | no     |        | no     | no     |        | no     |
| On-Street Parking Maneuver Rate [/h]    | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Local Bus Stopping Rate [/h]            | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Pedestrian Volume [ped/h]               | 0      |        |        | 0      |        |        | 0      |        |        | 0      |        |        |
| Bicycle Volume [bicycles/h]             | 0      |        |        | 0      |        |        | 0      |        |        | 0      |        |        |

**Intersection Settings**

|                           |                                 |
|---------------------------|---------------------------------|
| Located in CBD            | no                              |
| Signal Coordination Group | -                               |
| Cycle Length [s]          | 150                             |
| Coordination Type         | Time of Day Pattern Coordinated |
| Actuation Type            | Semi-actuated                   |
| Offset [s]                | 0.0                             |
| Offset Reference          | LeadGreen                       |
| Permissive Mode           | SingleBand                      |
| Lost time [s]             | 0.00                            |

**Phasing & Timing**

| Control Type                 | Permiss | Permiss | Overlap | Permiss | Permiss | Overlap | Protecte | Permiss | Permiss | Protecte | Permiss | Permiss |
|------------------------------|---------|---------|---------|---------|---------|---------|----------|---------|---------|----------|---------|---------|
| Signal Group                 | 0       | 1       | 8       | 0       | 3       | 6       | 6        | 4       | 0       | 8        | 2       | 5       |
| Lead / Lag                   | -       | -       | -       | -       | -       | -       | Lead     | -       | -       | Lead     | -       | -       |
| Minimum Green [s]            | 0       | 5       | 5       | 0       | 5       | 5       | 5        | 5       | 0       | 5        | 5       | 0       |
| Maximum Green [s]            | 0       | 60      | 60      | 0       | 60      | 60      | 60       | 60      | 0       | 60       | 60      | 0       |
| Amber [s]                    | 0.0     | 3.0     | 3.0     | 0.0     | 3.0     | 3.0     | 3.0      | 3.0     | 0.0     | 3.0      | 3.0     | 0.0     |
| All red [s]                  | 0.0     | 2.0     | 0.0     | 0.0     | 2.0     | 0.0     | 0.0      | 2.0     | 0.0     | 0.0      | 2.0     | 0.0     |
| Split [s]                    | 0       | 21      | 47      | 0       | 28      | 76      | 76       | 54      | 0       | 47       | 25      | 0       |
| Vehicle Extension [s]        | 0.0     | 3.0     | 3.0     | 0.0     | 3.0     | 3.0     | 3.0      | 3.0     | 0.0     | 3.0      | 3.0     | 0.0     |
| Walk [s]                     | 0       | 5       | 0       | 0       | 5       | 0       | 0        | 5       | 0       | 0        | 5       | 0       |
| Pedestrian Clearance [s]     | 0       | 10      | 0       | 0       | 10      | 0       | 0        | 10      | 0       | 0        | 10      | 0       |
| I1, Start-Up Lost Time [s]   | 0.0     | 2.0     | 2.0     | 0.0     | 2.0     | 2.0     | 2.0      | 2.0     | 0.0     | 2.0      | 2.0     | 0.0     |
| I2, Clearance Lost Time [s]  | 0.0     | 3.0     | 1.0     | 0.0     | 3.0     | 1.0     | 1.0      | 3.0     | 0.0     | 1.0      | 3.0     | 0.0     |
| Minimum Recall               |         | no      | no      |         | no      | no      | no       | no      |         | no       | no      |         |
| Maximum Recall               |         | no      | no      |         | no      | no      | no       | no      |         | no       | no      |         |
| Pedestrian Recall            |         | no      | no      |         | no      | no      | no       | no      |         | no       | no      |         |
| Detector Location [ft]       | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0      | 0.0     | 0.0     | 0.0      | 0.0     | 0.0     |
| Detector Length [ft]         | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0      | 0.0     | 0.0     | 0.0      | 0.0     | 0.0     |
| I, Upstream Filtering Factor | 1.00    | 1.00    | 1.00    | 1.00    | 1.00    | 1.00    | 1.00     | 1.00    | 1.00    | 1.00     | 1.00    | 1.00    |

**Lane Group Calculations**

| Lane Group                              | C     | C     | R     | L     | C     | R     | L     | C     | R     | L     | C     | R     |
|---|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| L, Total Lost Time per Cycle [s]        | 5.00  | 5.00  | 3.00  | 5.00  | 5.00  | 3.00  | 3.00  | 5.00  | 5.00  | 3.00  | 5.00  | 5.00  |
| l1_p, Permitted Start-Up Lost Time [s]  | 0.00  | 0.00  | 0.00  | 2.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  |
| l2, Clearance Lost Time [s]             | 3.00  | 3.00  | 0.00  | 3.00  | 3.00  | 0.00  | 1.00  | 3.00  | 3.00  | 1.00  | 3.00  | 3.00  |
| g_i, Effective Green Time [s]           | 31    | 31    | 99    | 27    | 27    | 53    | 20    | 44    | 44    | 31    | 54    | 54    |
| g / C, Green / Cycle                    | 0.21  | 0.21  | 0.66  | 0.18  | 0.18  | 0.35  | 0.14  | 0.29  | 0.29  | 0.20  | 0.36  | 0.36  |
| (v / s)_i Volume / Saturation Flow Rate | 0.04  | 0.16  | 0.34  | 0.15  | 0.03  | 0.10  | 0.12  | 0.27  | 0.04  | 0.04  | 0.12  | 0.11  |
| s, saturation flow rate [veh/h]         | 1793  | 1714  | 1604  | 1414  | 3540  | 1551  | 1704  | 3439  | 1580  | 3379  | 3413  | 1557  |
| c, Capacity [veh/h]                     | 370   | 353   | 1058  | 290   | 649   | 547   | 231   | 997   | 458   | 688   | 1222  | 557   |
| d1, Uniform Delay [s]                   | 48.99 | 56.26 | 13.19 | 60.81 | 51.67 | 34.87 | 63.55 | 51.55 | 39.19 | 49.42 | 35.26 | 34.71 |
| k, delay calibration                    | 0.11  | 0.11  | 0.35  | 0.11  | 0.11  | 0.11  | 0.11  | 0.11  | 0.11  | 0.11  | 0.11  | 0.11  |
| l, Upstream Filtering Factor            | 1.00  | 1.00  | 1.00  | 1.00  | 1.00  | 1.00  | 1.00  | 1.00  | 1.00  | 1.00  | 1.00  | 1.00  |
| d2, Incremental Delay [s]               | 0.22  | 3.68  | 1.29  | 3.78  | 0.13  | 0.27  | 9.88  | 4.00  | 0.12  | 0.13  | 0.17  | 0.31  |
| d3, Initial Queue Delay [s]             | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  |
| Rp, platoon ratio                       | 1.00  | 1.00  | 1.00  | 1.00  | 1.00  | 1.00  | 1.00  | 1.00  | 1.00  | 1.00  | 1.00  | 1.00  |
| PF, progression factor                  | 1.00  | 1.00  | 1.00  | 1.00  | 1.00  | 1.00  | 1.00  | 1.00  | 1.00  | 1.00  | 1.00  | 1.00  |

**Lane Group Results**

|                                    |       |        |        |        |       |        |        |        |       |       |        |        |
|------------------------------------|-------|--------|--------|--------|-------|--------|--------|--------|-------|-------|--------|--------|
| X, volume / capacity               | 0.17  | 0.78   | 0.52   | 0.74   | 0.17  | 0.28   | 0.87   | 0.92   | 0.12  | 0.18  | 0.34   | 0.30   |
| d, Delay for Lane Group [s/veh]    | 49.21 | 59.94  | 14.48  | 64.59  | 51.80 | 35.14  | 73.43  | 55.55  | 39.31 | 49.55 | 35.42  | 35.01  |
| Lane Group LOS                     | D     | E      | B      | E      | D     | D      | E      | E      | D     | D     | D      | D      |
| Critical Lane Group                | no    | no     | yes    | yes    | no    | no     | no     | yes    | no    | no    | no     | no     |
| 50th-Percentile Queue Length [veh] | 1.99  | 10.20  | 9.77   | 8.38   | 1.83  | 4.11   | 8.23   | 17.25  | 1.56  | 2.01  | 5.74   | 4.60   |
| 50th-Percentile Queue Length [ft]  | 49.82 | 255.07 | 244.37 | 209.46 | 45.76 | 102.67 | 205.68 | 431.14 | 39.12 | 50.27 | 143.52 | 114.99 |
| 95th-Percentile Queue Length [veh] | 3.59  | 15.44  | 14.90  | 13.13  | 3.29  | 7.39   | 12.93  | 24.06  | 2.82  | 3.62  | 9.67   | 8.12   |
| 95th-Percentile Queue Length [ft]  | 89.67 | 386.04 | 372.56 | 328.14 | 82.36 | 184.80 | 323.28 | 601.41 | 70.42 | 90.48 | 241.76 | 202.92 |

**Movement, Approach, & Intersection Results**

|                                 |       |       |       |       |       |       |       |       |       |       |       |       |
|---------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| d_M, Delay for Movement [s/veh] | 49.21 | 59.94 | 14.48 | 64.59 | 51.80 | 35.14 | 73.43 | 55.55 | 39.31 | 49.55 | 35.42 | 35.01 |
| Movement LOS                    | D     | E     | B     | E     | D     | D     | E     | E     | D     | D     | D     | D     |
| d_A, Approach Delay [s/veh]     | 31.02 |       |       | 52.28 |       |       | 57.85 |       |       | 37.83 |       |       |
| Approach LOS                    | C     |       |       | D     |       |       | E     |       |       | D     |       |       |
| d_I, Intersection Delay [s/veh] | 45.33 |       |       |       |       |       |       |       |       |       |       |       |
| Intersection LOS                | D     |       |       |       |       |       |       |       |       |       |       |       |
| Intersection V/C                | 0.687 |       |       |       |       |       |       |       |       |       |       |       |

**Sequence**

|        |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|--------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ring 1 | 1 | 3 | 8 | 4 | - | - | - | - | - | - | - | - | - | - | - | - |
| Ring 2 | - | - | 6 | 2 | - | - | - | - | - | - | - | - | - | - | - | - |
| Ring 3 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Ring 4 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |






### Intersection Level Of Service Report #8: Central Ave and I15 SB

Control Type: Two-way stop  
Analysis Method: HCM2010  
Analysis Period: 15 minutes

Delay (sec / veh): 28.0  
Level Of Service: D  
Volume to Capacity (v/c): 0.499

#### Intersection Setup

| Name                   |   |        |        |   |        |        |   |        |        |                |        |        |
|------------------------|---|--------|--------|---|--------|--------|---|--------|--------|----------------|--------|--------|
| Approach               | Southbound  |        |        | Eastbound   |        |        | Westbound   |        |        | Northwestbound |        |        |
| Lane Configuration     |  |        |        |  |        |        |  |        |        |                |        |        |
| Turning Movement       | Left  | Thru   | Right  | Left  | Thru   | Right  | Left  | Thru   | Right  | Left           | Thru   | Right  |
| Lane Width [ft]        | 12.00   | 12.00  | 12.00  | 12.00   | 12.00  | 12.00  | 12.00   | 12.00  | 12.00  | 12.00          | 12.00  | 12.00  |
| No. of Lanes in Pocket | 0   | 0      | 0      | 0   | 0      | 0      | 0   | 0      | 0      | 0              | 0      | 0      |
| Pocket Length [ft]     | 100.00  | 100.00 | 100.00 | 100.00  | 100.00 | 100.00 | 100.00  | 100.00 | 100.00 | 100.00         | 100.00 | 100.00 |
| Speed [mph]            | 30.00   |        |        | 30.00   |        |        | 30.00   |        |        | 30.00          |        |        |
| Grade [%]              | 0.00  |        |        | 0.00  |        |        | 0.00  |        |        | 0.00           |        |        |
| Crosswalk              | yes   |        |        | yes   |        |        | yes   |        |        | yes            |        |        |

#### Volumes

| Name                                    |        |        |        |        |        |        |        |        |        |        |        |        |
|---|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| Base Volume Input [veh/h]               | 130    | 0      | 6      | 0      | 191    | 39     | 123    | 88     | 0      | 0      | 0      | 0      |
| Base Volume Adjustment Factor           | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Heavy Vehicles Percentage [%]           | 2.30   | 0.00   | 0.00   | 2.00   | 3.10   | 0.00   | 6.50   | 11.30  | 2.00   | 2.00   | 2.00   | 2.00   |
| Growth Rate                             | 1.00   | 1.00   | 1.00   | 1.00   | 1.00   | 1.00   | 1.00   | 1.00   | 1.00   | 1.00   | 1.00   | 1.00   |
| In-Process Volume [veh/h]               | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Site-Generated Trips [veh/h]            | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Diverted Trips [veh/h]                  | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Pass-by Trips [veh/h]                   | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Existing Site Adjustment Volume [veh/h] | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Other Volume [veh/h]                    | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Total Hourly Volume [veh/h]             | 130    | 0      | 6      | 0      | 191    | 39     | 123    | 88     | 0      | 0      | 0      | 0      |
| Peak Hour Factor                        | 0.8550 | 1.0000 | 0.7500 | 1.0000 | 0.6920 | 0.7500 | 0.7690 | 0.8150 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Other Adjustment Factor                 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Total 15-Minute Volume [veh/h]          | 38     | 0      | 2      | 0      | 69     | 13     | 40     | 27     | 0      | 0      | 0      | 0      |
| Total Analysis Volume [veh/h]           | 152    | 0      | 8      | 0      | 276    | 52     | 160    | 108    | 0      | 0      | 0      | 0      |
| Pedestrian Volume [ped/h]               | 0      |        |        | 0      |        |        | 0      |        |        | 0      |        |        |
| Bicycle Volume [bicycles/h]             | 0      |        |        | 0      |        |        | 0      |        |        | 0      |        |        |

**Intersection Settings**

| Priority Scheme                    | Stop | Free | Free | Stop |
|------------------------------------|------|------|------|------|
| Flared Lane                        |      |      |      |      |
| Storage Area [veh]                 | 0    | 0    | 0    | 0    |
| Two-Stage Gap Acceptance           | no   |      |      |      |
| Number of Storage Spaces in Median | 0    | 0    | 0    | 0    |

**Movement, Approach, & Intersection Results**




|                                    |       |       |      |      |      |      |       |      |      |      |      |      |
|------------------------------------|-------|-------|------|------|------|------|-------|------|------|------|------|------|
| V/C, Movement V/C Ratio            | 0.50  | 0.00  | 0.01 | 0.00 | 0.00 | 0.00 | 0.13  | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| d_M, Delay for Movement [s/veh]    | 28.03 | 27.54 | 8.82 | 0.00 | 0.00 | 0.00 | 8.27  | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Movement LOS                       | D     | D     | A    |      | A    | A    | A     | A    |      |      |      |      |
| 95th-Percentile Queue Length [veh] | 2.63  | 2.63  | 0.03 | 0.00 | 0.00 | 0.00 | 0.43  | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 95th-Percentile Queue Length [ft]  | 65.65 | 65.65 | 0.64 | 0.00 | 0.00 | 0.00 | 10.86 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| d_A, Approach Delay [s/veh]        | 27.07 |       |      | 0.00 |      |      | 4.94  |      |      | 0.00 |      |      |
| Approach LOS                       | D     |       |      | A    |      |      | A     |      |      | A    |      |      |
| d_I, Intersection Delay [s/veh]    | 7.48  |       |      |      |      |      |       |      |      |      |      |      |
| Intersection LOS                   | D     |       |      |      |      |      |       |      |      |      |      |      |

### Intersection Level Of Service Report #9: Central Ave and I-15 NB

Control Type: Two-way stop  
Analysis Method: HCM2010  
Analysis Period: 15 minutes

Delay (sec / veh): 19.9  
Level Of Service: C  
Volume to Capacity (v/c): 0.080

#### Intersection Setup

| Name                   |   |        |        |   |        |        |   |        |        |                |        |        |
|------------------------|---|--------|--------|---|--------|--------|---|--------|--------|----------------|--------|--------|
| Approach               | Northbound  |        |        | Eastbound   |        |        | Westbound   |        |        | Southeastbound |        |        |
| Lane Configuration     |  |        |        |  |        |        |  |        |        |                |        |        |
| Turning Movement       | Left  | Thru   | Right  | Left  | Thru   | Right  | Left  | Thru   | Right  | Left           | Thru   | Right  |
| Lane Width [ft]        | 12.00   | 12.00  | 12.00  | 12.00   | 12.00  | 12.00  | 12.00   | 12.00  | 12.00  | 12.00          | 12.00  | 12.00  |
| No. of Lanes in Pocket | 0   | 0      | 0      | 0   | 0      | 0      | 0   | 0      | 0      | 0              | 0      | 0      |
| Pocket Length [ft]     | 100.00  | 100.00 | 100.00 | 100.00  | 100.00 | 100.00 | 100.00  | 100.00 | 100.00 | 100.00         | 100.00 | 100.00 |
| Speed [mph]            | 30.00   |        |        | 30.00   |        |        | 30.00   |        |        | 30.00          |        |        |
| Grade [%]              | 0.00  |        |        | 0.00  |        |        | 0.00  |        |        | 0.00           |        |        |
| Crosswalk              | yes   |        |        | yes   |        |        | yes   |        |        | yes            |        |        |

#### Volumes

| Name                                    |        |        |        |        |        |        |        |        |        |        |        |        |
|---|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| Base Volume Input [veh/h]               | 15     | 0      | 177    | 6      | 305    | 0      | 0      | 202    | 44     | 0      | 0      | 0      |
| Base Volume Adjustment Factor           | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Heavy Vehicles Percentage [%]           | 0.00   | 0.00   | 10.80  | 16.70  | 2.00   | 2.00   | 2.00   | 11.40  | 13.60  | 2.00   | 2.00   | 2.00   |
| Growth Rate                             | 1.00   | 1.00   | 1.00   | 1.00   | 1.00   | 1.00   | 1.00   | 1.00   | 1.00   | 1.00   | 1.00   | 1.00   |
| In-Process Volume [veh/h]               | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Site-Generated Trips [veh/h]            | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Diverted Trips [veh/h]                  | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Pass-by Trips [veh/h]                   | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Existing Site Adjustment Volume [veh/h] | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Other Volume [veh/h]                    | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Total Hourly Volume [veh/h]             | 15     | 0      | 177    | 6      | 305    | 0      | 0      | 202    | 44     | 0      | 0      | 0      |
| Peak Hour Factor                        | 0.5360 | 1.0000 | 0.8510 | 0.7500 | 0.7190 | 1.0000 | 1.0000 | 0.8420 | 0.7330 | 1.0000 | 1.0000 | 1.0000 |
| Other Adjustment Factor                 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Total 15-Minute Volume [veh/h]          | 7      | 0      | 52     | 2      | 106    | 0      | 0      | 60     | 15     | 0      | 0      | 0      |
| Total Analysis Volume [veh/h]           | 28     | 0      | 208    | 8      | 424    | 0      | 0      | 240    | 60     | 0      | 0      | 0      |
| Pedestrian Volume [ped/h]               | 0      |        |        | 0      |        |        | 0      |        |        | 0      |        |        |
| Bicycle Volume [bicycles/h]             | 0      |        |        | 0      |        |        | 0      |        |        | 0      |        |        |



**Intersection Settings**

| Priority Scheme                    | Stop | Free | Free | Stop |
|------------------------------------|------|------|------|------|
| Flared Lane                        | no   |      |      |      |
| Storage Area [veh]                 | 0    | 0    | 0    | 0    |
| Two-Stage Gap Acceptance           | no   |      |      |      |
| Number of Storage Spaces in Median | 0    | 0    | 0    | 0    |

**Movement, Approach, & Intersection Results**




|                                    |       |       |       |      |      |      |      |      |      |      |      |      |
|------------------------------------|-------|-------|-------|------|------|------|------|------|------|------|------|------|
| V/C, Movement V/C Ratio            | 0.08  | 0.00  | 0.34  | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| d_M, Delay for Movement [s/veh]    | 19.87 | 19.21 | 15.45 | 7.91 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Movement LOS                       | C     | C     | C     | A    | A    |      |      | A    | A    |      |      |      |
| 95th-Percentile Queue Length [veh] | 2.07  | 2.07  | 2.07  | 0.02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 95th-Percentile Queue Length [ft]  | 51.73 | 51.73 | 51.73 | 0.48 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| d_A, Approach Delay [s/veh]        | 15.98 |       |       | 0.15 |      |      | 0.00 |      |      | 0.00 |      |      |
| Approach LOS                       | C     |       |       | A    |      |      | A    |      |      | A    |      |      |
| d_I, Intersection Delay [s/veh]    | 3.96  |       |       |      |      |      |      |      |      |      |      |      |
| Intersection LOS                   | C     |       |       |      |      |      |      |      |      |      |      |      |

### Intersection Level Of Service Report #10: Central Ave and Vaughn Rd

Control Type: Two-way stop  
Analysis Method: HCM2010  
Analysis Period: 15 minutes

Delay (sec / veh): 27.1  
Level Of Service: D  
Volume to Capacity (v/c): 0.377

#### Intersection Setup

| Name                   |   |        |  |        |   |        |
|------------------------|---|--------|--|--------|---|--------|
| Approach               | Southbound  |        | Eastbound  |        | Westbound   |        |
| Lane Configuration     |  |        |  |        |  |        |
| Turning Movement       | Left  | Right  | Left   | Thru   | Thru  | Right  |
| Lane Width [ft]        | 12.00   | 12.00  | 12.00  | 12.00  | 12.00   | 12.00  |
| No. of Lanes in Pocket | 0   | 0      | 0  | 0      | 0   | 0      |
| Pocket Length [ft]     | 100.00  | 100.00 | 100.00   | 100.00 | 100.00  | 100.00 |
| Speed [mph]            | 30.00   |        | 30.00  |        | 30.00   |        |
| Grade [%]              | 0.00  |        | 0.00   |        | 0.00  |        |
| Crosswalk              | yes   |        | yes  |        | yes   |        |

#### Volumes

| Name                                    |        |        |        |        |        |        |
|---|--------|--------|--------|--------|--------|--------|
| Base Volume Input [veh/h]               | 77     | 60     | 71     | 410    | 184    | 65     |
| Base Volume Adjustment Factor           | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Heavy Vehicles Percentage [%]           | 9.10   | 6.70   | 7.00   | 5.10   | 11.40  | 6.20   |
| Growth Rate                             | 1.00   | 1.00   | 1.00   | 1.00   | 1.00   | 1.00   |
| In-Process Volume [veh/h]               | 0      | 0      | 0      | 0      | 0      | 0      |
| Site-Generated Trips [veh/h]            | 0      | 0      | 0      | 0      | 0      | 0      |
| Diverted Trips [veh/h]                  | 0      | 0      | 0      | 0      | 0      | 0      |
| Pass-by Trips [veh/h]                   | 0      | 0      | 0      | 0      | 0      | 0      |
| Existing Site Adjustment Volume [veh/h] | 0      | 0      | 0      | 0      | 0      | 0      |
| Other Volume [veh/h]                    | 0      | 0      | 0      | 0      | 0      | 0      |
| Total Hourly Volume [veh/h]             | 77     | 60     | 71     | 410    | 184    | 65     |
| Peak Hour Factor                        | 0.7700 | 0.7890 | 0.8450 | 0.8010 | 0.8520 | 0.7740 |
| Other Adjustment Factor                 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Total 15-Minute Volume [veh/h]          | 25     | 19     | 21     | 128    | 54     | 21     |
| Total Analysis Volume [veh/h]           | 100    | 76     | 84     | 512    | 216    | 84     |
| Pedestrian Volume [ped/h]               | 0      |        | 0      |        | 0      |        |
| Bicycle Volume [bicycles/h]             | 0      |        | 0      |        | 0      |        |

**Intersection Settings**

| Priority Scheme                    | Stop | Free | Free |
|------------------------------------|------|------|------|
| Flared Lane                        | no   |      |      |
| Storage Area [veh]                 | 0    | 0    | 0    |
| Two-Stage Gap Acceptance           | no   |      |      |
| Number of Storage Spaces in Median | 0    | 0    | 0    |

**Movement, Approach, & Intersection Results**




|                                    |       |       |      |      |      |      |
|------------------------------------|-------|-------|------|------|------|------|
| V/C, Movement V/C Ratio            | 0.38  | 0.10  | 0.07 | 0.01 | 0.00 | 0.00 |
| d_M, Delay for Movement [s/veh]    | 27.07 | 18.19 | 8.13 | 0.00 | 0.00 | 0.00 |
| Movement LOS                       | D     | C     | A    | A    | A    | A    |
| 95th-Percentile Queue Length [veh] | 2.47  | 2.47  | 0.22 | 0.00 | 0.00 | 0.00 |
| 95th-Percentile Queue Length [ft]  | 61.70 | 61.70 | 5.47 | 0.00 | 0.00 | 0.00 |
| d_A, Approach Delay [s/veh]        | 23.23 |       | 1.15 |      | 0.00 |      |
| Approach LOS                       | C     |       | A    |      | A    |      |
| d_I, Intersection Delay [s/veh]    | 4.45  |       |      |      |      |      |
| Intersection LOS                   | D     |       |      |      |      |      |

### Intersection Level Of Service Report #11: Vaughn Rd and I-15 SB

Control Type: Two-way stop  
Analysis Method: HCM2010  
Analysis Period: 15 minutes

Delay (sec / veh): 10.1  
Level Of Service: B  
Volume to Capacity (v/c): 0.260

#### Intersection Setup

| Name                   |   |        |   |        |   |        |
|------------------------|---|--------|---|--------|---|--------|
| Approach               | Southbound  |        | Eastbound   |        | Westbound   |        |
| Lane Configuration     |  |        |  |        |  |        |
| Turning Movement       | Left  | Right  | Left  | Thru   | Thru  | Right  |
| Lane Width [ft]        | 12.00   | 12.00  | 12.00   | 12.00  | 12.00   | 12.00  |
| No. of Lanes in Pocket | 0   | 0      | 0   | 0      | 0   | 0      |
| Pocket Length [ft]     | 100.00  | 100.00 | 100.00  | 100.00 | 100.00  | 100.00 |
| Speed [mph]            | 30.00   |        | 30.00   |        | 30.00   |        |
| Grade [%]              | 0.00  |        | 0.00  |        | 0.00  |        |
| Crosswalk              | yes   |        | yes   |        | yes   |        |

#### Volumes

| Name                                    |        |        |        |        |        |        |
|---|--------|--------|--------|--------|--------|--------|
| Base Volume Input [veh/h]               | 219    | 1      | 0      | 27     | 12     | 0      |
| Base Volume Adjustment Factor           | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Heavy Vehicles Percentage [%]           | 4.60   | 0.00   | 2.00   | 11.10  | 8.30   | 2.00   |
| Growth Rate                             | 1.00   | 1.00   | 1.00   | 1.00   | 1.00   | 1.00   |
| In-Process Volume [veh/h]               | 0      | 0      | 0      | 0      | 0      | 0      |
| Site-Generated Trips [veh/h]            | 0      | 0      | 0      | 0      | 0      | 0      |
| Diverted Trips [veh/h]                  | 0      | 0      | 0      | 0      | 0      | 0      |
| Pass-by Trips [veh/h]                   | 0      | 0      | 0      | 0      | 0      | 0      |
| Existing Site Adjustment Volume [veh/h] | 0      | 0      | 0      | 0      | 0      | 0      |
| Other Volume [veh/h]                    | 0      | 0      | 0      | 0      | 0      | 0      |
| Total Hourly Volume [veh/h]             | 219    | 1      | 0      | 27     | 12     | 0      |
| Peak Hour Factor                        | 0.8830 | 0.2500 | 1.0000 | 0.8440 | 0.7500 | 1.0000 |
| Other Adjustment Factor                 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Total 15-Minute Volume [veh/h]          | 62     | 1      | 0      | 8      | 4      | 0      |
| Total Analysis Volume [veh/h]           | 248    | 4      | 0      | 32     | 16     | 0      |
| Pedestrian Volume [ped/h]               | 0      |        | 0      |        | 0      |        |
| Bicycle Volume [bicycles/h]             | 0      |        | 0      |        | 0      |        |

**Intersection Settings**

| Priority Scheme                    | Stop | Free | Free |
|------------------------------------|------|------|------|
| Flared Lane                        | no   |      |      |
| Storage Area [veh]                 | 0    | 0    | 0    |
| Two-Stage Gap Acceptance           | no   |      |      |
| Number of Storage Spaces in Median | 0    | 0    | 0    |

**Movement, Approach, & Intersection Results**

|                                    |       |       |      |      |      |      |
|------------------------------------|-------|-------|------|------|------|------|
| V/C, Movement V/C Ratio            | 0.26  | 0.00  | 0.00 | 0.00 | 0.00 | 0.00 |
| d_M, Delay for Movement [s/veh]    | 10.11 | 9.71  | 0.00 | 0.00 | 0.00 | 0.00 |
| Movement LOS                       | B     | A     |      | A    | A    |      |
| 95th-Percentile Queue Length [veh] | 1.06  | 1.06  | 0.00 | 0.00 | 0.00 | 0.00 |
| 95th-Percentile Queue Length [ft]  | 26.50 | 26.50 | 0.00 | 0.00 | 0.00 | 0.00 |
| d_A, Approach Delay [s/veh]        | 10.10 |       | 0.00 |      | 0.00 |      |
| Approach LOS                       | B     |       | A    |      | A    |      |
| d_I, Intersection Delay [s/veh]    | 8.49  |       |      |      |      |      |
| Intersection LOS                   | B     |       |      |      |      |      |

### Intersection Level Of Service Report #12: Vaughn Rd and I-15 NB

Control Type: Two-way stop  
Analysis Method: HCM2010  
Analysis Period: 15 minutes

Delay (sec / veh): 7.3  
Level Of Service: A  
Volume to Capacity (v/c): 0.000

#### Intersection Setup

| Name                   | Eastbound |        | Westbound |        | Southeastbound |        |
|------------------------|-----------|--------|-----------|--------|----------------|--------|
| Approach               | Eastbound |        | Westbound |        | Southeastbound |        |
| Lane Configuration     | 1         |        | 1r        |        |                |        |
| Turning Movement       | Left      | Thru   | Thru      | Right  | Left           | Right  |
| Lane Width [ft]        | 12.00     | 12.00  | 12.00     | 12.00  | 12.00          | 12.00  |
| No. of Lanes in Pocket | 0         | 0      | 0         | 0      | 0              | 0      |
| Pocket Length [ft]     | 100.00    | 100.00 | 100.00    | 100.00 | 100.00         | 100.00 |
| Speed [mph]            | 30.00     |        | 30.00     |        | 30.00          |        |
| Grade [%]              | 0.00      |        | 0.00      |        | 0.00           |        |
| Crosswalk              | yes       |        | yes       |        | yes            |        |

#### Volumes

| Name                                    | Eastbound |        | Westbound |        | Southeastbound |        |
|---|-----------|--------|-----------|--------|----------------|--------|
| Base Volume Input [veh/h]               | 0         | 237    | 19        | 76     | 0              | 0      |
| Base Volume Adjustment Factor           | 1.0000    | 1.0000 | 1.0000    | 1.0000 | 1.0000         | 1.0000 |
| Heavy Vehicles Percentage [%]           | 0.00      | 5.00   | 5.30      | 14.50  | 2.00           | 2.00   |
| Growth Rate                             | 1.00      | 1.00   | 1.00      | 1.00   | 1.00           | 1.00   |
| In-Process Volume [veh/h]               | 0         | 0      | 0         | 0      | 0              | 0      |
| Site-Generated Trips [veh/h]            | 0         | 0      | 0         | 0      | 0              | 0      |
| Diverted Trips [veh/h]                  | 0         | 0      | 0         | 0      | 0              | 0      |
| Pass-by Trips [veh/h]                   | 0         | 0      | 0         | 0      | 0              | 0      |
| Existing Site Adjustment Volume [veh/h] | 0         | 0      | 0         | 0      | 0              | 0      |
| Other Volume [veh/h]                    | 0         | 0      | 0         | 0      | 0              | 0      |
| Total Hourly Volume [veh/h]             | 0         | 237    | 19        | 76     | 0              | 0      |
| Peak Hour Factor                        | 1.0000    | 0.8590 | 0.5940    | 0.8260 | 1.0000         | 1.0000 |
| Other Adjustment Factor                 | 1.0000    | 1.0000 | 1.0000    | 1.0000 | 1.0000         | 1.0000 |
| Total 15-Minute Volume [veh/h]          | 0         | 69     | 8         | 23     | 0              | 0      |
| Total Analysis Volume [veh/h]           | 0         | 276    | 32        | 92     | 0              | 0      |
| Pedestrian Volume [ped/h]               | 0         |        | 0         |        | 0              |        |
| Bicycle Volume [bicycles/h]             | 0         |        | 0         |        | 0              |        |

**Intersection Settings**

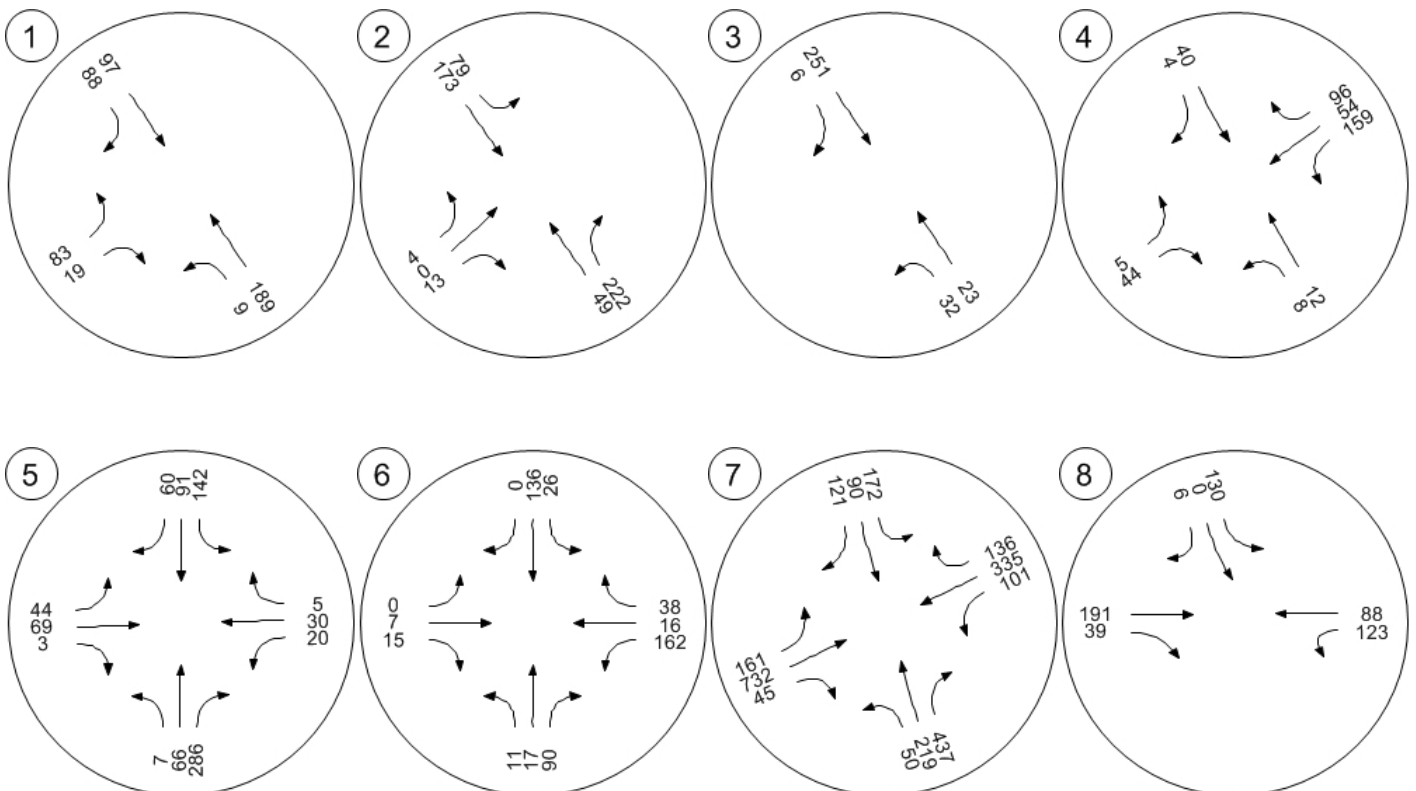
| Priority Scheme                    | Free | Free | Stop |
|------------------------------------|------|------|------|
| Flared Lane                        |      |      |      |
| Storage Area [veh]                 | 0    | 0    | 0    |
| Two-Stage Gap Acceptance           |      |      |      |
| Number of Storage Spaces in Median | 0    | 0    | 0    |

**Movement, Approach, & Intersection Results**

|                                    |      |      |      |      |      |      |
|------------------------------------|------|------|------|------|------|------|
| V/C, Movement V/C Ratio            | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| d_M, Delay for Movement [s/veh]    | 7.26 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Movement LOS                       | A    | A    | A    | A    |      |      |
| 95th-Percentile Queue Length [veh] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 95th-Percentile Queue Length [ft]  | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| d_A, Approach Delay [s/veh]        | 0.00 |      | 0.00 |      | 0.00 |      |
| Approach LOS                       | A    |      | A    |      | A    |      |
| d_I, Intersection Delay [s/veh]    | 0.00 |      |      |      |      |      |
| Intersection LOS                   | A    |      |      |      |      |      |

Version 2.00-10

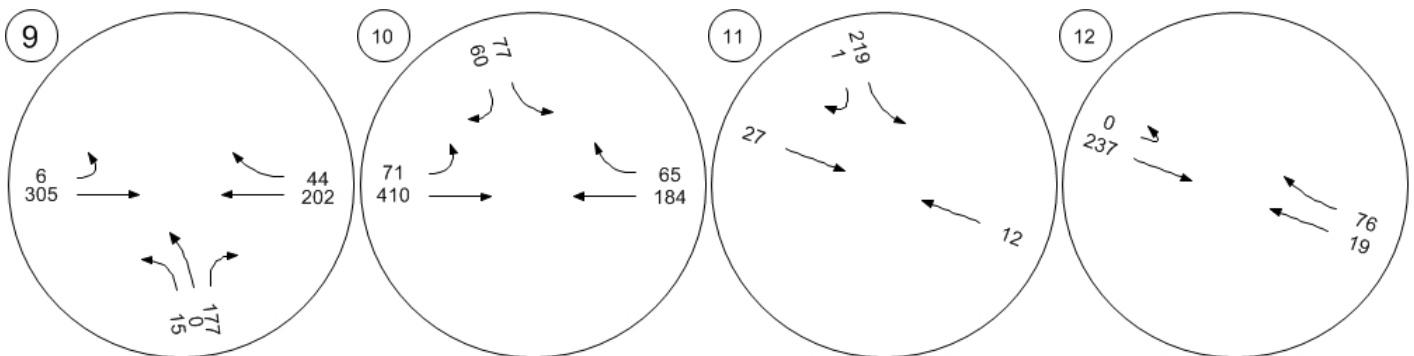
## Traffic Volume - Base Volume



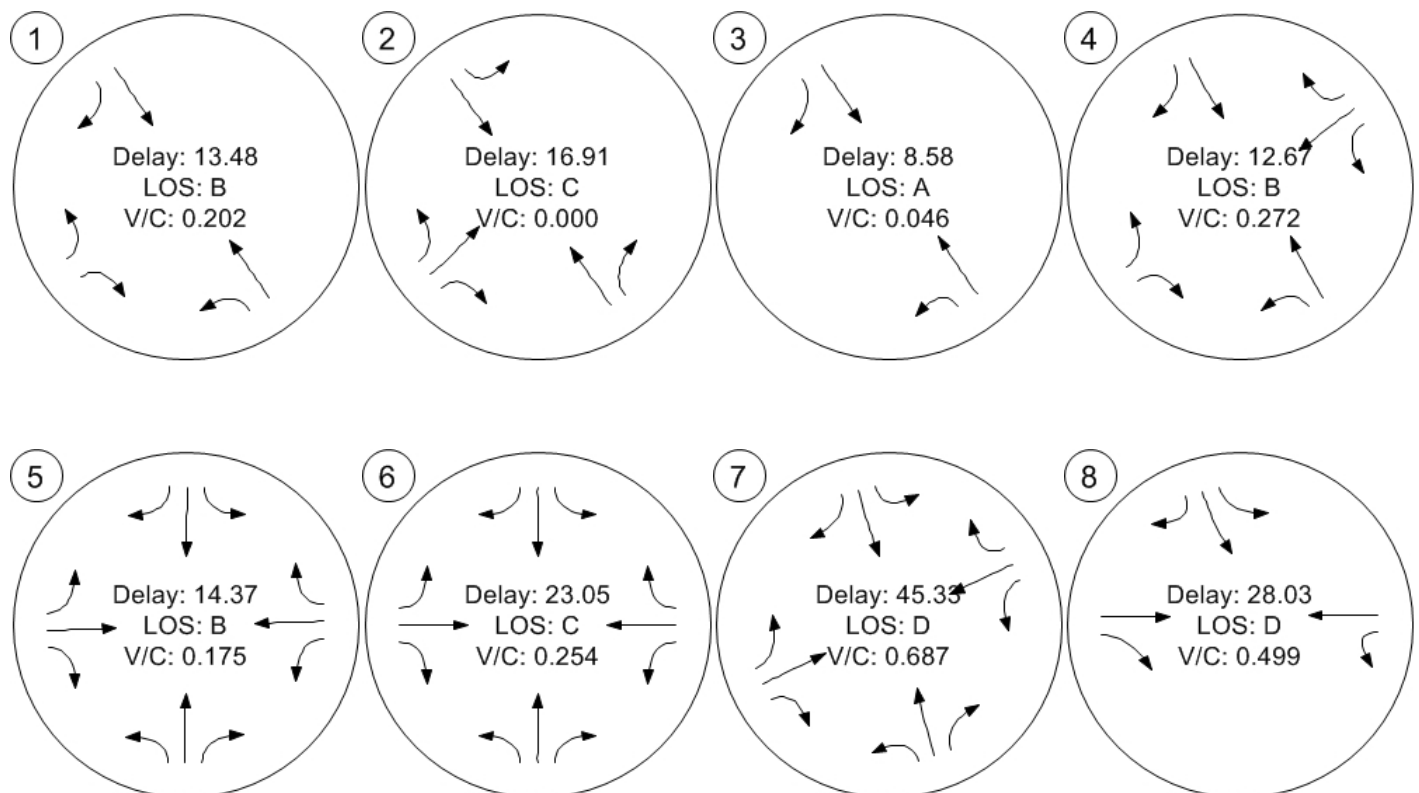


Version 2.00-10

## Traffic Volume - Base Volume



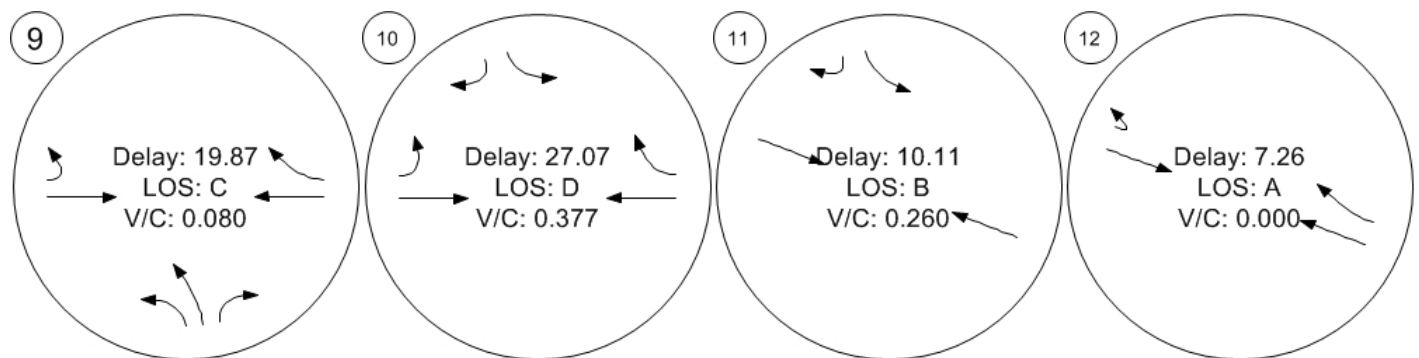
## Traffic Conditions





Version 2.00-10

## Traffic Conditions



## I-15 Corridor Study

Vistro File: F:\...\I-15 Corridor.vistropdb

Scenario 2: PM Scenario

Report File: F:\...\LOS\_Report\_PM.pdf

9/15/2014

**Intersection Analysis Summary**

| ID | Intersection Name                   | Control Type | Method  | Worst Mvmt | V/C   | Delay (s/veh) | LOS |
|----|-------------------------------------|--------------|---------|------------|-------|---------------|-----|
| 1  | Tri Hill and Frontage Airport Rd    | Two-way stop | HCM2010 | NEBL       | 0.256 | 14.5          | B   |
| 2  | I-15 NB and Airport Rd              | Two-way stop | HCM2010 | NEBT       | 0.053 | 55.4          | F   |
| 3  | I-15 SB On and Airport RD           | Two-way stop | HCM2010 | NWBL       | 0.063 | 11.0          | B   |
| 4  | I-15 SB Off and Airport RD Frontage | Two-way stop | HCM2010 | SWBL       | 0.660 | 35.3          | E   |
| 5  | 14th St SW and I-315 EB             | Signalized   | HCM2010 | NBL        | 0.368 | 13.0          | B   |
| 6  | 14th St SW and I-315 WB             | Signalized   | HCM2010 | EBR        | 0.536 | 19.4          | B   |
| 7  | Fox Farm and I-315                  | Signalized   | HCM2010 | NBT        | 0.795 | 38.5          | D   |
| 8  | Central Ave and I15 SB              | Two-way stop | HCM2010 | SBL        | 0.432 | 42.0          | E   |
| 9  | Central Ave and I-15 NB             | Two-way stop | HCM2010 | NBL        | 0.303 | 29.1          | D   |
| 10 | Central Ave and Vaughn Rd           | Two-way stop | HCM2010 | SBL        | 0.576 | 65.0          | F   |
| 11 | Vaughn Rd and I-15 SB               | Two-way stop | HCM2010 | SBL        | 0.177 | 10.1          | B   |
| 12 | Vaughn Rd and I-15 NB               | Two-way stop | HCM2010 | EBL        | 0.000 | 7.3           | A   |




V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value; for all other control types, they are taken for the whole intersection.

### Intersection Level Of Service Report #1: Tri Hill and Frontage Airport Rd

Control Type: Two-way stop  
Analysis Method: HCM2010  
Analysis Period: 15 minutes

Delay (sec / veh): 14.5  
Level Of Service: B  
Volume to Capacity (v/c): 0.256

#### Intersection Setup

| Name                   |   |        |  |        |   |        |
|------------------------|---|--------|--|--------|---|--------|
| Approach               | Northeastbound  |        | Northwestbound   |        | Southeastbound  |        |
| Lane Configuration     |  |        |  |        |  |        |
| Turning Movement       | Left  | Right  | Left   | Thru   | Thru  | Right  |
| Lane Width [ft]        | 12.00   | 12.00  | 12.00  | 12.00  | 12.00   | 12.00  |
| No. of Lanes in Pocket | 0   | 0      | 0  | 0      | 0   | 0      |
| Pocket Length [ft]     | 100.00  | 100.00 | 100.00   | 100.00 | 100.00  | 100.00 |
| Speed [mph]            | 30.00   |        | 30.00  |        | 30.00   |        |
| Grade [%]              | 0.00  |        | 0.00   |        | 0.00  |        |
| Crosswalk              | yes   |        | yes  |        | yes   |        |

#### Volumes

| Name                                    |        |        |        |        |        |        |
|---|--------|--------|--------|--------|--------|--------|
| Base Volume Input [veh/h]               | 75     | 7      | 9      | 160    | 207    | 70     |
| Base Volume Adjustment Factor           | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Heavy Vehicles Percentage [%]           | 2.70   | 0.00   | 22.20  | 33.80  | 18.90  | 15.80  |
| Growth Rate                             | 1.00   | 1.00   | 1.00   | 1.00   | 1.00   | 1.00   |
| In-Process Volume [veh/h]               | 0      | 0      | 0      | 0      | 0      | 0      |
| Site-Generated Trips [veh/h]            | 0      | 0      | 0      | 0      | 0      | 0      |
| Diverted Trips [veh/h]                  | 0      | 0      | 0      | 0      | 0      | 0      |
| Pass-by Trips [veh/h]                   | 0      | 0      | 0      | 0      | 0      | 0      |
| Existing Site Adjustment Volume [veh/h] | 0      | 0      | 0      | 0      | 0      | 0      |
| Other Volume [veh/h]                    | 0      | 0      | 0      | 0      | 0      | 0      |
| Total Hourly Volume [veh/h]             | 75     | 7      | 9      | 160    | 207    | 70     |
| Peak Hour Factor                        | 0.5680 | 0.4380 | 0.7500 | 0.8000 | 0.8480 | 0.8330 |
| Other Adjustment Factor                 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Total 15-Minute Volume [veh/h]          | 33     | 4      | 3      | 50     | 61     | 21     |
| Total Analysis Volume [veh/h]           | 132    | 16     | 12     | 200    | 244    | 84     |
| Pedestrian Volume [ped/h]               | 0      |        | 0      |        | 0      |        |
| Bicycle Volume [bicycles/h]             | 0      |        | 0      |        | 0      |        |

**Intersection Settings**

| Priority Scheme                    | Stop | Free | Free |
|------------------------------------|------|------|------|
| Flared Lane                        | no   |      |      |
| Storage Area [veh]                 | 0    | 0    | 0    |
| Two-Stage Gap Acceptance           | no   |      |      |
| Number of Storage Spaces in Median | 0    | 0    | 0    |

**Movement, Approach, & Intersection Results**



|                                    |       |       |      |      |      |      |
|------------------------------------|-------|-------|------|------|------|------|
| V/C, Movement V/C Ratio            | 0.26  | 0.02  | 0.01 | 0.00 | 0.00 | 0.00 |
| d_M, Delay for Movement [s/veh]    | 14.52 | 12.30 | 8.23 | 0.00 | 0.00 | 0.00 |
| Movement LOS                       | B     | B     | A    | A    | A    | A    |
| 95th-Percentile Queue Length [veh] | 1.12  | 1.12  | 0.03 | 0.00 | 0.00 | 0.00 |
| 95th-Percentile Queue Length [ft]  | 28.04 | 28.04 | 0.81 | 0.00 | 0.00 | 0.00 |
| d_A, Approach Delay [s/veh]        | 14.28 |       | 0.47 |      | 0.00 |      |
| Approach LOS                       | B     |       | A    |      | A    |      |
| d_I, Intersection Delay [s/veh]    | 3.22  |       |      |      |      |      |
| Intersection LOS                   | B     |       |      |      |      |      |

### Intersection Level Of Service Report #2: I-15 NB and Airport Rd

Control Type: Two-way stop  
Analysis Method: HCM2010  
Analysis Period: 15 minutes

Delay (sec / veh): 55.4  
Level Of Service: F  
Volume to Capacity (v/c): 0.053

#### Intersection Setup

| Name                   |   |        |        |                |        |        |   |        |        |   |        |        |
|------------------------|---|--------|--------|----------------|--------|--------|---|--------|--------|---|--------|--------|
| Approach               | Northeastbound  |        |        | Southwestbound |        |        | Northwestbound  |        |        | Southeastbound  |        |        |
| Lane Configuration     |  |        |        |                |        |        |  |        |        |  |        |        |
| Turning Movement       | Left  | Thru   | Right  | Left           | Thru   | Right  | Left  | Thru   | Right  | Left  | Thru   | Right  |
| Lane Width [ft]        | 12.00   | 12.00  | 12.00  | 12.00          | 12.00  | 12.00  | 12.00   | 12.00  | 12.00  | 12.00   | 12.00  | 12.00  |
| No. of Lanes in Pocket | 0   | 0      | 0      | 0              | 0      | 0      | 0   | 0      | 0      | 0   | 0      | 0      |
| Pocket Length [ft]     | 100.00  | 100.00 | 100.00 | 100.00         | 100.00 | 100.00 | 100.00  | 100.00 | 100.00 | 100.00  | 100.00 | 100.00 |
| Speed [mph]            | 30.00   |        |        | 30.00          |        |        | 30.00   |        |        | 30.00   |        |        |
| Grade [%]              | 0.00  |        |        | 0.00           |        |        | 0.00  |        |        | 0.00  |        |        |
| Crosswalk              | yes   |        |        | yes            |        |        | yes   |        |        | yes   |        |        |

#### Volumes

| Name                                    |        |        |        |        |        |        |        |        |        |        |        |        |
|---|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| Base Volume Input [veh/h]               | 2      | 2      | 31     | 0      | 0      | 0      | 0      | 47     | 197    | 307    | 236    | 0      |
| Base Volume Adjustment Factor           | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Heavy Vehicles Percentage [%]           | 0.00   | 0.00   | 47.40  | 2.00   | 2.00   | 2.00   | 2.00   | 40.40  | 20.80  | 0.70   | 17.40  | 2.00   |
| Growth Rate                             | 1.00   | 1.00   | 1.00   | 1.00   | 1.00   | 1.00   | 1.00   | 1.00   | 1.00   | 1.00   | 1.00   | 1.00   |
| In-Process Volume [veh/h]               | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Site-Generated Trips [veh/h]            | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Diverted Trips [veh/h]                  | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Pass-by Trips [veh/h]                   | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Existing Site Adjustment Volume [veh/h] | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Other Volume [veh/h]                    | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Total Hourly Volume [veh/h]             | 2      | 2      | 31     | 0      | 0      | 0      | 0      | 47     | 197    | 307    | 236    | 0      |
| Peak Hour Factor                        | 0.5000 | 0.5000 | 0.7750 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 0.6910 | 0.8210 | 0.6910 | 0.8680 | 1.0000 |
| Other Adjustment Factor                 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Total 15-Minute Volume [veh/h]          | 1      | 1      | 10     | 0      | 0      | 0      | 0      | 17     | 60     | 111    | 68     | 0      |
| Total Analysis Volume [veh/h]           | 4      | 4      | 40     | 0      | 0      | 0      | 0      | 68     | 240    | 444    | 272    | 0      |
| Pedestrian Volume [ped/h]               | 0      |        |        | 0      |        |        | 0      |        |        | 0      |        |        |
| Bicycle Volume [bicycles/h]             | 0      |        |        | 0      |        |        | 0      |        |        | 0      |        |        |

**Intersection Settings**

| Priority Scheme                    | Stop | Stop | Free | Free |
|------------------------------------|------|------|------|------|
| Flared Lane                        | no   |      |      |      |
| Storage Area [veh]                 | 0    | 0    | 0    | 0    |
| Two-Stage Gap Acceptance           | no   |      |      |      |
| Number of Storage Spaces in Median | 0    | 0    | 0    | 0    |

**Movement, Approach, & Intersection Results**

|                                    |       |       |       |      |      |      |      |      |      |       |       |      |
|------------------------------------|-------|-------|-------|------|------|------|------|------|------|-------|-------|------|
| V/C, Movement V/C Ratio            | 0.05  | 0.05  | 0.06  | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.35  | 0.00  | 0.00 |
| d_M, Delay for Movement [s/veh]    | 48.66 | 55.37 | 12.63 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 9.40  | 0.00  | 0.00 |
| Movement LOS                       | E     | F     | B     |      |      |      |      | A    | A    | A     | A     |      |
| 95th-Percentile Queue Length [veh] | 0.56  | 0.56  | 0.56  | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 3.74  | 3.74  | 0.00 |
| 95th-Percentile Queue Length [ft]  | 13.96 | 13.96 | 13.96 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 93.56 | 93.56 | 0.00 |
| d_A, Approach Delay [s/veh]        | 19.19 |       |       | 0.00 |      |      | 0.00 |      |      | 5.83  |       |      |
| Approach LOS                       | C     |       |       | A    |      |      | A    |      |      | A     |       |      |
| d_I, Intersection Delay [s/veh]    | 4.75  |       |       |      |      |      |      |      |      |       |       |      |
| Intersection LOS                   | F     |       |       |      |      |      |      |      |      |       |       |      |





### Intersection Level Of Service Report #3: I-15 SB On and Airport RD

Control Type: Two-way stop  
Analysis Method: HCM2010  
Analysis Period: 15 minutes

Delay (sec / veh): 11.0  
Level Of Service: B  
Volume to Capacity (v/c): 0.063

#### Intersection Setup

| Name                   |                |        |   |        |   |        |
|------------------------|----------------|--------|---|--------|---|--------|
| Approach               | Northeastbound |        | Northwestbound  |        | Southeastbound  |        |
| Lane Configuration     |                |        |  |        |  |        |
| Turning Movement       | Left           | Right  | Left  | Thru   | Thru  | Right  |
| Lane Width [ft]        | 12.00          | 12.00  | 12.00   | 12.00  | 12.00   | 12.00  |
| No. of Lanes in Pocket | 0              | 0      | 0   | 0      | 0   | 0      |
| Pocket Length [ft]     | 100.00         | 100.00 | 100.00  | 100.00 | 100.00  | 100.00 |
| Speed [mph]            | 30.00          |        | 30.00   |        | 30.00   |        |
| Grade [%]              | 0.00           |        | 0.00  |        | 0.00  |        |
| Crosswalk              | yes            |        | yes   |        | yes   |        |

#### Volumes

| Name                                    |        |        |        |        |        |        |
|---|--------|--------|--------|--------|--------|--------|
| Base Volume Input [veh/h]               | 0      | 0      | 25     | 21     | 542    | 14     |
| Base Volume Adjustment Factor           | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Heavy Vehicles Percentage [%]           | 2.00   | 2.00   | 64.00  | 19.10  | 7.30   | 0.00   |
| Growth Rate                             | 1.00   | 1.00   | 1.00   | 1.00   | 1.00   | 1.00   |
| In-Process Volume [veh/h]               | 0      | 0      | 0      | 0      | 0      | 0      |
| Site-Generated Trips [veh/h]            | 0      | 0      | 0      | 0      | 0      | 0      |
| Diverted Trips [veh/h]                  | 0      | 0      | 0      | 0      | 0      | 0      |
| Pass-by Trips [veh/h]                   | 0      | 0      | 0      | 0      | 0      | 0      |
| Existing Site Adjustment Volume [veh/h] | 0      | 0      | 0      | 0      | 0      | 0      |
| Other Volume [veh/h]                    | 0      | 0      | 0      | 0      | 0      | 0      |
| Total Hourly Volume [veh/h]             | 0      | 0      | 25     | 21     | 542    | 14     |
| Peak Hour Factor                        | 1.0000 | 1.0000 | 0.6250 | 0.7500 | 0.7450 | 0.7000 |
| Other Adjustment Factor                 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Total 15-Minute Volume [veh/h]          | 0      | 0      | 10     | 7      | 182    | 5      |
| Total Analysis Volume [veh/h]           | 0      | 0      | 40     | 28     | 728    | 20     |
| Pedestrian Volume [ped/h]               | 0      |        | 0      |        | 0      |        |
| Bicycle Volume [bicycles/h]             | 0      |        | 0      |        | 0      |        |

**Intersection Settings**

| Priority Scheme                    | Stop | Free | Free |
|------------------------------------|------|------|------|
| Flared Lane                        |      |      |      |
| Storage Area [veh]                 | 0    | 0    | 0    |
| Two-Stage Gap Acceptance           |      |      |      |
| Number of Storage Spaces in Median | 0    | 0    | 0    |

**Movement, Approach, & Intersection Results**





|                                    |      |      |       |      |      |      |
|------------------------------------|------|------|-------|------|------|------|
| V/C, Movement V/C Ratio            | 0.00 | 0.00 | 0.06  | 0.00 | 0.01 | 0.00 |
| d_M, Delay for Movement [s/veh]    | 0.00 | 0.00 | 11.03 | 0.00 | 0.00 | 0.00 |
| Movement LOS                       |      |      | B     | A    | A    | A    |
| 95th-Percentile Queue Length [veh] | 0.00 | 0.00 | 0.36  | 0.36 | 0.00 | 0.00 |
| 95th-Percentile Queue Length [ft]  | 0.00 | 0.00 | 8.91  | 8.91 | 0.00 | 0.00 |
| d_A, Approach Delay [s/veh]        | 0.00 |      | 6.49  |      | 0.00 |      |
| Approach LOS                       | A    |      | A     |      | A    |      |
| d_I, Intersection Delay [s/veh]    | 0.54 |      |       |      |      |      |
| Intersection LOS                   | B    |      |       |      |      |      |

### Intersection Level Of Service Report #4: I-15 SB Off and Airport RD Frontage

Control Type: Two-way stop  
Analysis Method: HCM2010  
Analysis Period: 15 minutes

Delay (sec / veh): 35.3  
Level Of Service: E  
Volume to Capacity (v/c): 0.660

#### Intersection Setup

| Name                   |   |        |        |   |        |        |   |        |        |   |        |        |
|------------------------|---|--------|--------|---|--------|--------|---|--------|--------|---|--------|--------|
| Approach               | Northeastbound  |        |        | Southwestbound  |        |        | Northwestbound  |        |        | Southeastbound  |        |        |
| Lane Configuration     |  |        |        |  |        |        |  |        |        |  |        |        |
| Turning Movement       | Left  | Thru   | Right  | Left  | Thru   | Right  | Left  | Thru   | Right  | Left  | Thru   | Right  |
| Lane Width [ft]        | 12.00   | 12.00  | 12.00  | 12.00   | 12.00  | 12.00  | 12.00   | 12.00  | 12.00  | 12.00   | 12.00  | 12.00  |
| No. of Lanes in Pocket | 0   | 0      | 0      | 0   | 0      | 0      | 0   | 0      | 0      | 0   | 0      | 0      |
| Pocket Length [ft]     | 100.00  | 100.00 | 100.00 | 100.00  | 100.00 | 100.00 | 100.00  | 100.00 | 100.00 | 100.00  | 100.00 | 100.00 |
| Speed [mph]            | 30.00   |        |        | 30.00   |        |        | 30.00   |        |        | 30.00   |        |        |
| Grade [%]              | 0.00  |        |        | 0.00  |        |        | 0.00  |        |        | 0.00  |        |        |
| Crosswalk              | yes   |        |        | yes   |        |        | yes   |        |        | yes   |        |        |

#### Volumes

| Name                                    |        |        |        |        |        |        |        |        |        |        |        |        |
|---|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| Base Volume Input [veh/h]               | 0      | 0      | 55     | 217    | 26     | 47     | 8      | 15     | 0      | 0      | 286    | 1      |
| Base Volume Adjustment Factor           | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Heavy Vehicles Percentage [%]           | 0.00   | 2.00   | 1.80   | 18.90  | 11.50  | 2.10   | 37.50  | 6.70   | 2.00   | 2.00   | 1.00   | 0.00   |
| Growth Rate                             | 1.00   | 1.00   | 1.00   | 1.00   | 1.00   | 1.00   | 1.00   | 1.00   | 1.00   | 1.00   | 1.00   | 1.00   |
| In-Process Volume [veh/h]               | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Site-Generated Trips [veh/h]            | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Diverted Trips [veh/h]                  | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Pass-by Trips [veh/h]                   | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Existing Site Adjustment Volume [veh/h] | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Other Volume [veh/h]                    | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Total Hourly Volume [veh/h]             | 0      | 0      | 55     | 217    | 26     | 47     | 8      | 15     | 0      | 0      | 286    | 1      |
| Peak Hour Factor                        | 1.0000 | 1.0000 | 0.7240 | 0.8350 | 0.7220 | 0.6910 | 0.6670 | 0.7500 | 1.0000 | 1.0000 | 0.6810 | 0.2500 |
| Other Adjustment Factor                 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Total 15-Minute Volume [veh/h]          | 0      | 0      | 19     | 65     | 9      | 17     | 3      | 5      | 0      | 0      | 105    | 1      |
| Total Analysis Volume [veh/h]           | 0      | 0      | 76     | 260    | 36     | 68     | 12     | 20     | 0      | 0      | 420    | 4      |
| Pedestrian Volume [ped/h]               | 0      |        |        | 0      |        |        | 0      |        |        | 0      |        |        |
| Bicycle Volume [bicycles/h]             | 0      |        |        | 0      |        |        | 0      |        |        | 0      |        |        |

**Intersection Settings**

| Priority Scheme                    | Stop | Stop | Free | Free |
|------------------------------------|------|------|------|------|
| Flared Lane                        | no   |      |      |      |
| Storage Area [veh]                 | 0    | 0    | 0    | 0    |
| Two-Stage Gap Acceptance           | no   | no   |      |      |
| Number of Storage Spaces in Median | 0    | 0    | 0    | 0    |

**Movement, Approach, & Intersection Results**





|                                    |       |      |       |        |        |      |      |      |      |      |      |      |
|------------------------------------|-------|------|-------|--------|--------|------|------|------|------|------|------|------|
| V/C, Movement V/C Ratio            | 0.00  | 0.00 | 0.12  | 0.66   | 0.08   | 0.06 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| d_M, Delay for Movement [s/veh]    | 14.08 | 0.00 | 11.47 | 35.33  | 33.80  | 8.64 | 8.76 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Movement LOS                       | B     |      | B     | E      | D      | A    | A    | A    |      |      | A    | A    |
| 95th-Percentile Queue Length [veh] | 0.41  | 0.00 | 0.41  | 5.82   | 5.82   | 0.21 | 0.10 | 0.10 | 0.00 | 0.00 | 0.00 | 0.00 |
| 95th-Percentile Queue Length [ft]  | 10.19 | 0.00 | 10.19 | 145.42 | 145.42 | 5.15 | 2.56 | 2.56 | 0.00 | 0.00 | 0.00 | 0.00 |
| d_A, Approach Delay [s/veh]        | 11.47 |      |       | 30.19  |        |      | 3.29 |      |      | 0.00 |      |      |
| Approach LOS                       | B     |      |       | D      |        |      | A    |      |      | A    |      |      |
| d_I, Intersection Delay [s/veh]    | 13.35 |      |       |        |        |      |      |      |      |      |      |      |
| Intersection LOS                   | E     |      |       |        |        |      |      |      |      |      |      |      |

### Intersection Level Of Service Report #5: 14th St SW and I-315 EB

Control Type: Signalized  
Analysis Method: HCM2010  
Analysis Period: 15 minutes

Delay (sec / veh): 13.0  
Level Of Service: B  
Volume to Capacity (v/c): 0.368

#### Intersection Setup

| Name                   |   |        |        |   |        |        |   |        |        |   |        |        |
|------------------------|---|--------|--------|---|--------|--------|---|--------|--------|---|--------|--------|
| Approach               | Northbound  |        |        | Southbound  |        |        | Eastbound   |        |        | Westbound   |        |        |
| Lane Configuration     |  |        |        |  |        |        |  |        |        |  |        |        |
| Turning Movement       | Left  | Thru   | Right  | Left  | Thru   | Right  | Left  | Thru   | Right  | Left  | Thru   | Right  |
| Lane Width [ft]        | 12.00   | 12.00  | 12.00  | 12.00   | 12.00  | 12.00  | 12.00   | 12.00  | 12.00  | 12.00   | 12.00  | 12.00  |
| No. of Lanes in Pocket | 0   | 0      | 0      | 0   | 0      | 0      | 0   | 0      | 0      | 0   | 0      | 0      |
| Pocket Length [ft]     | 100.00  | 100.00 | 100.00 | 100.00  | 100.00 | 100.00 | 100.00  | 100.00 | 100.00 | 100.00  | 100.00 | 100.00 |
| Speed [mph]            | 30.00   |        |        | 30.00   |        |        | 30.00   |        |        | 30.00   |        |        |
| Grade [%]              | 0.00  |        |        | 0.00  |        |        | 0.00  |        |        | 0.00  |        |        |
| Crosswalk              | yes   |        |        | yes   |        |        | yes   |        |        | yes   |        |        |

#### Volumes

| Name                                    |        |        |        |        |        |        |        |        |        |        |        |        |
|---|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| Base Volume Input [veh/h]               | 13     | 82     | 260    | 95     | 396    | 262    | 107    | 168    | 10     | 102    | 50     | 31     |
| Base Volume Adjustment Factor           | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Heavy Vehicles Percentage [%]           | 0.00   | 2.40   | 1.20   | 4.30   | 1.30   | 0.40   | 0.90   | 0.00   | 0.00   | 1.00   | 0.00   | 12.90  |
| Growth Rate                             | 1.00   | 1.00   | 1.00   | 1.00   | 1.00   | 1.00   | 1.00   | 1.00   | 1.00   | 1.00   | 1.00   | 1.00   |
| In-Process Volume [veh/h]               | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Site-Generated Trips [veh/h]            | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Diverted Trips [veh/h]                  | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Pass-by Trips [veh/h]                   | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Existing Site Adjustment Volume [veh/h] | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Other Volume [veh/h]                    | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Right-Turn on Red Volume [veh/h]        | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Total Hourly Volume [veh/h]             | 13     | 82     | 260    | 95     | 396    | 262    | 107    | 168    | 10     | 102    | 50     | 31     |
| Peak Hour Factor                        | 0.9380 | 0.9380 | 0.9380 | 0.9380 | 0.9380 | 0.9380 | 0.9380 | 0.9380 | 0.9380 | 0.9380 | 0.9380 | 0.9380 |
| Other Adjustment Factor                 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Total 15-Minute Volume [veh/h]          | 3      | 22     | 69     | 25     | 106    | 70     | 29     | 45     | 3      | 27     | 13     | 8      |
| Total Analysis Volume [veh/h]           | 14     | 87     | 277    | 101    | 422    | 279    | 114    | 179    | 11     | 109    | 53     | 33     |
| Presence of On-Street Parking           | no     |        | no     | no     |        | no     | no     |        | no     | no     |        | no     |
| On-Street Parking Maneuver Rate [1/h]   | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Local Bus Stopping Rate [1/h]           | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Pedestrian Volume [ped/h]               | 0      |        |        | 0      |        |        | 0      |        |        | 0      |        |        |
| Bicycle Volume [bicycles/h]             | 0      |        |        | 0      |        |        | 0      |        |        | 0      |        |        |

Version 2.00-10

**Intersection Settings**

|                           |                                 |
|---------------------------|---------------------------------|
| Located in CBD            | no                              |
| Signal Coordination Group | -                               |
| Cycle Length [s]          | 60                              |
| Coordination Type         | Time of Day Pattern Coordinated |
| Actuation Type            | Semi-actuated                   |
| Offset [s]                | 0.0                             |
| Offset Reference          | LeadGreen                       |
| Permissive Mode           | SingleBand                      |
| Lost time [s]             | 0.00                            |

**Phasing & Timing**

| Control Type                 | Permiss | Permiss | Overlap | Permiss | Permiss | Overlap | Protecte | Permiss | Permiss | Protecte | Permiss | Permiss |
|------------------------------|---------|---------|---------|---------|---------|---------|----------|---------|---------|----------|---------|---------|
| Signal Group                 | 0       | 2       | 3       | 0       | 6       | 7       | 7        | 4       | 0       | 3        | 8       | 0       |
| Lead / Lag                   | -       | -       | -       | -       | -       | -       | Lead     | -       | -       | Lead     | -       | -       |
| Minimum Green [s]            | 0       | 5       | 15      | 0       | 5       | 15      | 15       | 5       | 0       | 15       | 15      | 0       |
| Maximum Green [s]            | 0       | 50      | 20      | 0       | 50      | 20      | 20       | 45      | 0       | 20       | 45      | 0       |
| Amber [s]                    | 0.0     | 3.0     | 3.0     | 0.0     | 3.0     | 3.0     | 3.0      | 3.0     | 0.0     | 3.0      | 3.0     | 0.0     |
| All red [s]                  | 0.0     | 2.0     | 0.0     | 0.0     | 2.0     | 0.0     | 0.0      | 2.0     | 0.0     | 0.0      | 2.0     | 0.0     |
| Split [s]                    | 0       | 22      | 18      | 0       | 22      | 18      | 18       | 20      | 0       | 18       | 20      | 0       |
| Vehicle Extension [s]        | 0.0     | 3.0     | 3.0     | 0.0     | 3.0     | 3.0     | 3.0      | 3.0     | 0.0     | 3.0      | 3.0     | 0.0     |
| Walk [s]                     | 0       | 5       | 5       | 0       | 5       | 0       | 0        | 5       | 0       | 5        | 5       | 0       |
| Pedestrian Clearance [s]     | 0       | 10      | 10      | 0       | 10      | 0       | 0        | 10      | 0       | 10       | 10      | 0       |
| I1, Start-Up Lost Time [s]   | 0.0     | 2.0     | 2.0     | 0.0     | 2.0     | 2.0     | 2.0      | 2.0     | 0.0     | 2.0      | 2.0     | 0.0     |
| I2, Clearance Lost Time [s]  | 0.0     | 3.0     | 1.0     | 0.0     | 3.0     | 1.0     | 1.0      | 3.0     | 0.0     | 1.0      | 3.0     | 0.0     |
| Minimum Recall               |         | no      | no      |         | no      | no      | no       | no      |         | no       | no      |         |
| Maximum Recall               |         | no      | no      |         | no      | no      | no       | no      |         | no       | no      |         |
| Pedestrian Recall            |         | no      | no      |         | no      | no      | no       | no      |         | no       | no      |         |
| Detector Location [ft]       | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0      | 0.0     | 0.0     | 0.0      | 0.0     | 0.0     |
| Detector Length [ft]         | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0      | 0.0     | 0.0     | 0.0      | 0.0     | 0.0     |
| I, Upstream Filtering Factor | 1.00    | 1.00    | 1.00    | 1.00    | 1.00    | 1.00    | 1.00     | 1.00    | 1.00    | 1.00     | 1.00    | 1.00    |

**Lane Group Calculations**

| Lane Group                              | L     | C     | R    | L     | C     | R    | L    | C     | R     | L    | C     | R     |
|---|-------|-------|------|-------|-------|------|------|-------|-------|------|-------|-------|
| L, Total Lost Time per Cycle [s]        | 5.00  | 5.00  | 3.00 | 5.00  | 5.00  | 3.00 | 3.00 | 5.00  | 5.00  | 4.00 | 5.00  | 5.00  |
| l1_p, Permitted Start-Up Lost Time [s]  | 2.00  | 0.00  | 0.00 | 2.00  | 0.00  | 0.00 | 0.00 | 0.00  | 0.00  | 0.00 | 0.00  | 0.00  |
| l2, Clearance Lost Time [s]             | 3.00  | 3.00  | 0.00 | 3.00  | 3.00  | 0.00 | 0.00 | 3.00  | 3.00  | 0.00 | 3.00  | 3.00  |
| g_i, Effective Green Time [s]           | 18    | 18    | 38   | 18    | 18    | 38   | 32   | 14    | 14    | 32   | 14    | 14    |
| g / C, Green / Cycle                    | 0.31  | 0.31  | 0.64 | 0.31  | 0.31  | 0.64 | 0.54 | 0.24  | 0.24  | 0.54 | 0.24  | 0.24  |
| (v / s)_i Volume / Saturation Flow Rate | 0.01  | 0.05  | 0.17 | 0.08  | 0.22  | 0.17 | 0.07 | 0.09  | 0.01  | 0.07 | 0.03  | 0.02  |
| s, saturation flow rate [veh/h]         | 980   | 1855  | 1596 | 1276  | 1876  | 1609 | 1573 | 1900  | 1615  | 1497 | 1900  | 1430  |
| c, Capacity [veh/h]                     | 181   | 566   | 1018 | 416   | 572   | 1027 | 1004 | 459   | 390   | 897  | 459   | 345   |
| d1, Uniform Delay [s]                   | 26.77 | 15.19 | 4.75 | 19.22 | 18.69 | 4.75 | 6.76 | 19.06 | 17.38 | 6.92 | 17.75 | 17.67 |
| k, delay calibration                    | 0.11  | 0.11  | 0.11 | 0.11  | 0.11  | 0.11 | 0.11 | 0.11  | 0.11  | 0.11 | 0.11  | 0.11  |
| l, Upstream Filtering Factor            | 1.00  | 1.00  | 1.00 | 1.00  | 1.00  | 1.00 | 1.00 | 1.00  | 1.00  | 1.00 | 1.00  | 1.00  |
| d2, Incremental Delay [s]               | 0.18  | 0.12  | 0.14 | 0.30  | 1.88  | 0.14 | 0.05 | 0.54  | 0.03  | 0.06 | 0.11  | 0.12  |
| d3, Initial Queue Delay [s]             | 0.00  | 0.00  | 0.00 | 0.00  | 0.00  | 0.00 | 0.00 | 0.00  | 0.00  | 0.00 | 0.00  | 0.00  |
| Rp, platoon ratio                       | 1.00  | 1.00  | 1.00 | 1.00  | 1.00  | 1.00 | 1.00 | 1.00  | 1.00  | 1.00 | 1.00  | 1.00  |
| PF, progression factor                  | 1.00  | 1.00  | 1.00 | 1.00  | 1.00  | 1.00 | 1.00 | 1.00  | 1.00  | 1.00 | 1.00  | 1.00  |

**Lane Group Results**

|                                    |       |       |       |       |        |       |       |       |       |       |       |       |
|------------------------------------|-------|-------|-------|-------|--------|-------|-------|-------|-------|-------|-------|-------|
| X, volume / capacity               | 0.08  | 0.15  | 0.27  | 0.24  | 0.74   | 0.27  | 0.11  | 0.39  | 0.03  | 0.12  | 0.12  | 0.10  |
| d, Delay for Lane Group [s/veh]    | 26.95 | 15.32 | 4.89  | 19.52 | 20.56  | 4.89  | 6.81  | 19.60 | 17.41 | 6.98  | 17.86 | 17.79 |
| Lane Group LOS                     | C     | B     | A     | B     | C      | A     | A     | B     | B     | A     | B     | B     |
| Critical Lane Group                | no    | no    | no    | no    | yes    | yes   | no    | yes   | no    | no    | no    | no    |
| 50th-Percentile Queue Length [veh] | 0.19  | 0.81  | 1.09  | 1.12  | 5.03   | 1.10  | 0.59  | 2.00  | 0.11  | 0.57  | 0.55  | 0.34  |
| 50th-Percentile Queue Length [ft]  | 4.75  | 20.31 | 27.29 | 28.03 | 125.69 | 27.47 | 14.87 | 49.98 | 2.78  | 14.22 | 13.67 | 8.53  |
| 95th-Percentile Queue Length [veh] | 0.34  | 1.46  | 1.96  | 2.02  | 8.70   | 1.98  | 1.07  | 3.60  | 0.20  | 1.02  | 0.98  | 0.61  |
| 95th-Percentile Queue Length [ft]  | 8.55  | 36.56 | 49.12 | 50.46 | 217.62 | 49.44 | 26.77 | 89.97 | 5.01  | 25.60 | 24.60 | 15.36 |

**Movement, Approach, & Intersection Results**

|                                 |       |       |      |       |       |      |       |       |       |       |       |       |
|---------------------------------|-------|-------|------|-------|-------|------|-------|-------|-------|-------|-------|-------|
| d_M, Delay for Movement [s/veh] | 26.95 | 15.32 | 4.89 | 19.52 | 20.56 | 4.89 | 6.81  | 19.60 | 17.41 | 6.98  | 17.86 | 17.79 |
| Movement LOS                    | C     | B     | A    | B     | C     | A    | A     | B     | B     | A     | B     | B     |
| d_A, Approach Delay [s/veh]     | 8.11  |       |      | 14.98 |       |      | 14.72 |       |       | 11.77 |       |       |
| Approach LOS                    | A     |       |      | B     |       |      | B     |       |       | B     |       |       |
| d_I, Intersection Delay [s/veh] | 13.01 |       |      |       |       |      |       |       |       |       |       |       |
| Intersection LOS                | B     |       |      |       |       |      |       |       |       |       |       |       |
| Intersection V/C                | 0.368 |       |      |       |       |      |       |       |       |       |       |       |

**Sequence**

|        |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|--------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ring 1 | 2 | 7 | 4 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Ring 2 | 6 | 3 | 8 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Ring 3 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Ring 4 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |









### Intersection Level Of Service Report #6: 14th St SW and I-315 WB

Control Type: Signalized  
Analysis Method: HCM2010  
Analysis Period: 15 minutes

Delay (sec / veh): 19.4  
Level Of Service: B  
Volume to Capacity (v/c): 0.536

#### Intersection Setup

| Name                   |   |        |        |   |        |        |   |        |        |   |        |        |
|------------------------|---|--------|--------|---|--------|--------|---|--------|--------|---|--------|--------|
| Approach               | Northbound  |        |        | Southbound  |        |        | Eastbound   |        |        | Westbound   |        |        |
| Lane Configuration     |  |        |        |  |        |        |  |        |        |  |        |        |
| Turning Movement       | Left  | Thru   | Right  | Left  | Thru   | Right  | Left  | Thru   | Right  | Left  | Thru   | Right  |
| Lane Width [ft]        | 12.00   | 12.00  | 12.00  | 12.00   | 12.00  | 12.00  | 12.00   | 12.00  | 12.00  | 12.00   | 12.00  | 12.00  |
| No. of Lanes in Pocket | 0   | 0      | 0      | 0   | 0      | 0      | 0   | 0      | 0      | 0   | 0      | 0      |
| Pocket Length [ft]     | 100.00  | 100.00 | 100.00 | 100.00  | 100.00 | 100.00 | 100.00  | 100.00 | 100.00 | 100.00  | 100.00 | 100.00 |
| Speed [mph]            | 30.00   |        |        | 30.00   |        |        | 30.00   |        |        | 30.00   |        |        |
| Grade [%]              | 0.00  |        |        | 0.00  |        |        | 0.00  |        |        | 0.00  |        |        |
| Crosswalk              | yes   |        |        | yes   |        |        | yes   |        |        | yes   |        |        |

#### Volumes

| Name                                    |        |        |        |        |        |        |        |        |        |        |        |        |
|---|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| Base Volume Input [veh/h]               | 5      | 76     | 146    | 22     | 131    | 2      | 3      | 5      | 19     | 638    | 12     | 142    |
| Base Volume Adjustment Factor           | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Heavy Vehicles Percentage [%]           | 40.00  | 6.60   | 0.70   | 0.00   | 2.30   | 0.00   | 0.00   | 0.00   | 15.80  | 1.80   | 8.30   | 4.20   |
| Growth Rate                             | 1.00   | 1.00   | 1.00   | 1.00   | 1.00   | 1.00   | 1.00   | 1.00   | 1.00   | 1.00   | 1.00   | 1.00   |
| In-Process Volume [veh/h]               | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Site-Generated Trips [veh/h]            | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Diverted Trips [veh/h]                  | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Pass-by Trips [veh/h]                   | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Existing Site Adjustment Volume [veh/h] | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Other Volume [veh/h]                    | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Right-Turn on Red Volume [veh/h]        | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Total Hourly Volume [veh/h]             | 5      | 76     | 146    | 22     | 131    | 2      | 3      | 5      | 19     | 638    | 12     | 142    |
| Peak Hour Factor                        | 0.9880 | 0.9880 | 0.9880 | 0.9880 | 0.9880 | 0.9880 | 0.9880 | 0.9880 | 0.9880 | 0.9880 | 0.9880 | 0.9880 |
| Other Adjustment Factor                 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Total 15-Minute Volume [veh/h]          | 1      | 19     | 37     | 6      | 33     | 1      | 1      | 1      | 5      | 161    | 3      | 36     |
| Total Analysis Volume [veh/h]           | 5      | 77     | 148    | 22     | 133    | 2      | 3      | 5      | 19     | 646    | 12     | 144    |
| Presence of On-Street Parking           | no     |        | no     | no     |        | no     | no     |        | no     | no     |        | no     |
| On-Street Parking Maneuver Rate [1/h]   | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Local Bus Stopping Rate [1/h]           | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Pedestrian Volume [ped/h]               | 0      |        |        | 0      |        |        | 0      |        |        | 0      |        |        |
| Bicycle Volume [bicycles/h]             | 0      |        |        | 0      |        |        | 0      |        |        | 0      |        |        |

**Intersection Settings**

|                           |                                 |
|---------------------------|---------------------------------|
| Located in CBD            | yes                             |
| Signal Coordination Group | -                               |
| Cycle Length [s]          | 60                              |
| Coordination Type         | Time of Day Pattern Coordinated |
| Actuation Type            | Semi-actuated                   |
| Offset [s]                | 0.0                             |
| Offset Reference          | LeadGreen                       |
| Permissive Mode           | SingleBand                      |
| Lost time [s]             | 0.00                            |

**Phasing & Timing**

| Control Type                 | Permiss | Permiss | Overlap | Permiss | Permiss | Permiss | Permiss | Permiss | Permiss | Permiss | Permiss | Permiss |
|------------------------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| Signal Group                 | 0       | 1       | 2       | 0       | 1       | 0       | 0       | 3       | 0       | 0       | 2       | 0       |
| Lead / Lag                   | -       | -       | -       | -       | -       | -       | -       | -       | -       | -       | -       | -       |
| Minimum Green [s]            | 0       | 5       | 5       | 0       | 5       | 0       | 0       | 5       | 0       | 0       | 5       | 0       |
| Maximum Green [s]            | 0       | 35      | 40      | 0       | 35      | 0       | 0       | 25      | 0       | 0       | 40      | 0       |
| Amber [s]                    | 0.0     | 3.0     | 3.0     | 0.0     | 3.0     | 0.0     | 0.0     | 3.0     | 0.0     | 0.0     | 3.0     | 0.0     |
| All red [s]                  | 0.0     | 2.0     | 2.0     | 0.0     | 2.0     | 0.0     | 0.0     | 2.0     | 0.0     | 0.0     | 2.0     | 0.0     |
| Split [s]                    | 0       | 25      | 19      | 0       | 25      | 0       | 0       | 16      | 0       | 0       | 19      | 0       |
| Vehicle Extension [s]        | 0.0     | 3.0     | 3.0     | 0.0     | 3.0     | 0.0     | 0.0     | 3.0     | 0.0     | 0.0     | 3.0     | 0.0     |
| Walk [s]                     | 0       | 9       | 7       | 0       | 9       | 0       | 0       | 0       | 0       | 0       | 7       | 0       |
| Pedestrian Clearance [s]     | 0       | 11      | 7       | 0       | 11      | 0       | 0       | 0       | 0       | 0       | 7       | 0       |
| I1, Start-Up Lost Time [s]   | 0.0     | 2.0     | 2.0     | 0.0     | 2.0     | 0.0     | 0.0     | 2.0     | 0.0     | 0.0     | 2.0     | 0.0     |
| I2, Clearance Lost Time [s]  | 0.0     | 3.0     | 3.0     | 0.0     | 3.0     | 0.0     | 0.0     | 3.0     | 0.0     | 0.0     | 3.0     | 0.0     |
| Minimum Recall               |         | no      | no      |         | no      |         |         | no      |         |         | no      |         |
| Maximum Recall               |         | no      | no      |         | no      |         |         | no      |         |         | no      |         |
| Pedestrian Recall            |         | no      | no      |         | no      |         |         | no      |         |         | no      |         |
| Detector Location [ft]       | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     |
| Detector Length [ft]         | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     |
| I, Upstream Filtering Factor | 1.00    | 1.00    | 1.00    | 1.00    | 1.00    | 1.00    | 1.00    | 1.00    | 1.00    | 1.00    | 1.00    | 1.00    |

**Lane Group Calculations**

| Lane Group                              | L     | C     | R    | L     | C     | C     | C     | R    |
|---|-------|-------|------|-------|-------|-------|-------|------|
| L, Total Lost Time per Cycle [s]        | 5.00  | 5.00  | 5.00 | 5.00  | 5.00  | 5.00  | 5.00  | 5.00 |
| l1_p, Permitted Start-Up Lost Time [s]  | 2.00  | 0.00  | 0.00 | 2.00  | 0.00  | 0.00  | 0.00  | 0.00 |
| l2, Clearance Lost Time [s]             | 3.00  | 3.00  | 0.00 | 3.00  | 3.00  | 3.00  | 3.00  | 3.00 |
| g_i, Effective Green Time [s]           | 10    | 10    | 44   | 10    | 10    | 2     | 29    | 29   |
| g / C, Green / Cycle                    | 0.17  | 0.17  | 0.73 | 0.17  | 0.17  | 0.03  | 0.48  | 0.48 |
| (v / s)_i Volume / Saturation Flow Rate | 0.01  | 0.05  | 0.10 | 0.02  | 0.08  | 0.02  | 0.44  | 0.10 |
| s, saturation flow rate [veh/h]         | 819   | 1604  | 1443 | 1209  | 1667  | 1514  | 1505  | 1395 |
| c, Capacity [veh/h]                     | 164   | 265   | 1050 | 223   | 275   | 46    | 721   | 668  |
| d1, Uniform Delay [s]                   | 27.03 | 21.97 | 2.49 | 25.56 | 22.75 | 28.72 | 14.48 | 9.09 |
| k, delay calibration                    | 0.11  | 0.11  | 0.11 | 0.11  | 0.11  | 0.11  | 0.19  | 0.11 |
| l, Upstream Filtering Factor            | 1.00  | 1.00  | 1.00 | 1.00  | 1.00  | 1.00  | 1.00  | 1.00 |
| d2, Incremental Delay [s]               | 0.07  | 0.60  | 0.06 | 0.19  | 1.35  | 11.38 | 8.39  | 0.16 |
| d3, Initial Queue Delay [s]             | 0.00  | 0.00  | 0.00 | 0.00  | 0.00  | 0.00  | 0.00  | 0.00 |
| Rp, platoon ratio                       | 1.00  | 1.00  | 1.00 | 1.00  | 1.00  | 1.00  | 1.00  | 1.00 |
| PF, progression factor                  | 1.00  | 1.00  | 1.00 | 1.00  | 1.00  | 1.00  | 1.00  | 1.00 |

**Lane Group Results**

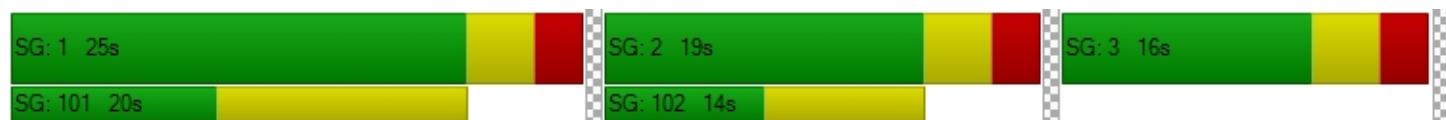
|                                    |       |       |       |       |       |       |        |       |
|------------------------------------|-------|-------|-------|-------|-------|-------|--------|-------|
| X, volume / capacity               | 0.03  | 0.29  | 0.14  | 0.10  | 0.49  | 0.59  | 0.91   | 0.22  |
| d, Delay for Lane Group [s/veh]    | 27.10 | 22.57 | 2.55  | 25.75 | 24.11 | 40.09 | 22.87  | 9.25  |
| Lane Group LOS                     | C     | C     | A     | C     | C     | D     | C      | A     |
| Critical Lane Group                | no    | no    | no    | no    | yes   | yes   | yes    | no    |
| 50th-Percentile Queue Length [veh] | 0.07  | 0.94  | 0.29  | 0.29  | 1.72  | 0.51  | 8.46   | 0.96  |
| 50th-Percentile Queue Length [ft]  | 1.71  | 23.40 | 7.27  | 7.21  | 43.07 | 12.75 | 211.56 | 24.03 |
| 95th-Percentile Queue Length [veh] | 0.12  | 1.68  | 0.52  | 0.52  | 3.10  | 0.92  | 13.23  | 1.73  |
| 95th-Percentile Queue Length [ft]  | 3.07  | 42.12 | 13.09 | 12.99 | 77.53 | 22.96 | 330.84 | 43.26 |

**Movement, Approach, & Intersection Results**

|                                 |       |       |      |       |       |       |       |       |       |       |       |      |
|---------------------------------|-------|-------|------|-------|-------|-------|-------|-------|-------|-------|-------|------|
| d_M, Delay for Movement [s/veh] | 27.10 | 22.57 | 2.55 | 25.75 | 24.11 | 24.11 | 40.09 | 40.09 | 40.09 | 22.87 | 22.87 | 9.25 |
| Movement LOS                    | C     | C     | A    | C     | C     | C     | D     | D     | D     | C     | C     | A    |
| d_A, Approach Delay [s/veh]     | 9.78  |       |      | 24.34 |       |       | 40.09 |       |       | 20.42 |       |      |
| Approach LOS                    | A     |       |      | C     |       |       | D     |       |       | C     |       |      |
| d_I, Intersection Delay [s/veh] | 19.35 |       |      |       |       |       |       |       |       |       |       |      |
| Intersection LOS                | B     |       |      |       |       |       |       |       |       |       |       |      |
| Intersection V/C                | 0.536 |       |      |       |       |       |       |       |       |       |       |      |

**Sequence**

|        |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|--------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ring 1 | 1 | 2 | 3 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Ring 2 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Ring 3 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Ring 4 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |







### Intersection Level Of Service Report #7: Fox Farm and I-315

Control Type: Signalized  
Analysis Method: HCM2010  
Analysis Period: 15 minutes

Delay (sec / veh): 38.5  
Level Of Service: D  
Volume to Capacity (v/c): 0.795

#### Intersection Setup

| Name                   |   |        |        |   |        |        |   |        |        |   |        |        |
|------------------------|---|--------|--------|---|--------|--------|---|--------|--------|---|--------|--------|
| Approach               | Northbound  |        |        | Southbound  |        |        | Northeastbound  |        |        | Southwestbound  |        |        |
| Lane Configuration     |  |        |        |  |        |        |  |        |        |  |        |        |
| Turning Movement       | Left  | Thru   | Right  | Left  | Thru   | Right  | Left  | Thru   | Right  | Left  | Thru   | Right  |
| Lane Width [ft]        | 12.00   | 12.00  | 12.00  | 12.00   | 12.00  | 12.00  | 12.00   | 12.00  | 12.00  | 12.00   | 12.00  | 12.00  |
| No. of Lanes in Pocket | 0   | 0      | 0      | 0   | 0      | 0      | 0   | 0      | 0      | 0   | 0      | 0      |
| Pocket Length [ft]     | 100.00  | 100.00 | 100.00 | 100.00  | 100.00 | 100.00 | 100.00  | 100.00 | 100.00 | 100.00  | 100.00 | 100.00 |
| Speed [mph]            | 30.00   |        |        | 30.00   |        |        | 30.00   |        |        | 30.00   |        |        |
| Grade [%]              | 0.00  |        |        | 0.00  |        |        | 0.00  |        |        | 0.00  |        |        |
| Crosswalk              | yes   |        |        | yes   |        |        | yes   |        |        | yes   |        |        |

#### Volumes

| Name                                    |        |        |        |        |        |        |        |        |        |        |        |        |
|---|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| Base Volume Input [veh/h]               | 71     | 155    | 227    | 153    | 274    | 325    | 242    | 706    | 103    | 486    | 874    | 250    |
| Base Volume Adjustment Factor           | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Heavy Vehicles Percentage [%]           | 2.80   | 1.90   | 0.40   | 1.30   | 0.70   | 2.10   | 2.50   | 3.60   | 2.90   | 0.40   | 3.90   | 1.60   |
| Growth Rate                             | 1.00   | 1.00   | 1.00   | 1.00   | 1.00   | 1.00   | 1.00   | 1.00   | 1.00   | 1.00   | 1.00   | 1.00   |
| In-Process Volume [veh/h]               | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Site-Generated Trips [veh/h]            | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Diverted Trips [veh/h]                  | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Pass-by Trips [veh/h]                   | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Existing Site Adjustment Volume [veh/h] | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Other Volume [veh/h]                    | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Right-Turn on Red Volume [veh/h]        | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Total Hourly Volume [veh/h]             | 71     | 155    | 227    | 153    | 274    | 325    | 242    | 706    | 103    | 486    | 874    | 250    |
| Peak Hour Factor                        | 0.9200 | 0.9200 | 0.9200 | 0.9200 | 0.9200 | 0.9200 | 0.9200 | 0.9200 | 0.9200 | 0.9200 | 0.9200 | 0.9200 |
| Other Adjustment Factor                 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Total 15-Minute Volume [veh/h]          | 19     | 42     | 62     | 42     | 74     | 88     | 66     | 192    | 28     | 132    | 238    | 68     |
| Total Analysis Volume [veh/h]           | 77     | 168    | 247    | 166    | 298    | 353    | 263    | 767    | 112    | 528    | 950    | 272    |
| Presence of On-Street Parking           | no     |        | no     | no     |        | no     | no     |        | no     | no     |        | no     |
| On-Street Parking Maneuver Rate [1/h]   | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Local Bus Stopping Rate [1/h]           | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Pedestrian Volume [ped/h]               | 0      |        |        | 0      |        |        | 0      |        |        | 0      |        |        |
| Bicycle Volume [bicycles/h]             | 0      |        |        | 0      |        |        | 0      |        |        | 0      |        |        |

**Intersection Settings**

|                           |                                 |
|---------------------------|---------------------------------|
| Located in CBD            | yes                             |
| Signal Coordination Group | -                               |
| Cycle Length [s]          | 120                             |
| Coordination Type         | Time of Day Pattern Coordinated |
| Actuation Type            | Semi-actuated                   |
| Offset [s]                | 0.0                             |
| Offset Reference          | LeadGreen                       |
| Permissive Mode           | SingleBand                      |
| Lost time [s]             | 0.00                            |

**Phasing & Timing**

| Control Type                 | Permiss | Permiss | Overlap | Permiss | Permiss | Overlap | Protecte | Permiss | Permiss | Protecte | Permiss | Permiss |
|------------------------------|---------|---------|---------|---------|---------|---------|----------|---------|---------|----------|---------|---------|
| Signal Group                 | 0       | 1       | 8       | 0       | 3       | 6       | 6        | 4       | 0       | 8        | 2       | 5       |
| Lead / Lag                   | -       | -       | -       | -       | -       | -       | Lead     | -       | -       | Lead     | -       | -       |
| Minimum Green [s]            | 0       | 5       | 5       | 0       | 5       | 5       | 5        | 5       | 0       | 5        | 5       | 0       |
| Maximum Green [s]            | 0       | 60      | 60      | 0       | 60      | 60      | 60       | 60      | 0       | 60       | 60      | 0       |
| Amber [s]                    | 0.0     | 3.0     | 3.0     | 0.0     | 3.0     | 3.0     | 3.0      | 3.0     | 0.0     | 3.0      | 3.0     | 0.0     |
| All red [s]                  | 0.0     | 2.0     | 0.0     | 0.0     | 2.0     | 0.0     | 0.0      | 2.0     | 0.0     | 0.0      | 2.0     | 0.0     |
| Split [s]                    | 0       | 31      | 28      | 0       | 20      | 25      | 25       | 41      | 0       | 28       | 44      | 0       |
| Vehicle Extension [s]        | 0.0     | 3.0     | 3.0     | 0.0     | 3.0     | 3.0     | 3.0      | 3.0     | 0.0     | 3.0      | 3.0     | 0.0     |
| Walk [s]                     | 0       | 5       | 0       | 0       | 5       | 0       | 0        | 5       | 0       | 0        | 5       | 0       |
| Pedestrian Clearance [s]     | 0       | 10      | 0       | 0       | 10      | 0       | 0        | 10      | 0       | 0        | 10      | 0       |
| I1, Start-Up Lost Time [s]   | 0.0     | 2.0     | 2.0     | 0.0     | 2.0     | 2.0     | 2.0      | 2.0     | 0.0     | 2.0      | 2.0     | 0.0     |
| I2, Clearance Lost Time [s]  | 0.0     | 3.0     | 1.0     | 0.0     | 3.0     | 1.0     | 1.0      | 3.0     | 0.0     | 1.0      | 3.0     | 0.0     |
| Minimum Recall               |         | no      | no      |         | no      | no      | no       | no      |         | no       | no      |         |
| Maximum Recall               |         | no      | no      |         | no      | no      | no       | no      |         | no       | no      |         |
| Pedestrian Recall            |         | no      | no      |         | no      | no      | no       | no      |         | no       | no      |         |
| Detector Location [ft]       | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0      | 0.0     | 0.0     | 0.0      | 0.0     | 0.0     |
| Detector Length [ft]         | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0      | 0.0     | 0.0     | 0.0      | 0.0     | 0.0     |
| I, Upstream Filtering Factor | 1.00    | 1.00    | 1.00    | 1.00    | 1.00    | 1.00    | 1.00     | 1.00    | 1.00    | 1.00     | 1.00    | 1.00    |

**Lane Group Calculations**

| Lane Group                              | C     | C     | R     | L     | C     | R     | L     | C     | R     | L     | C     | R     |
|---|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| L, Total Lost Time per Cycle [s]        | 5.00  | 5.00  | 3.00  | 5.00  | 5.00  | 3.00  | 3.00  | 5.00  | 5.00  | 3.00  | 5.00  | 5.00  |
| l1_p, Permitted Start-Up Lost Time [s]  | 0.00  | 0.00  | 0.00  | 2.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  |
| l2, Clearance Lost Time [s]             | 3.00  | 3.00  | 0.00  | 3.00  | 3.00  | 0.00  | 1.00  | 3.00  | 3.00  | 1.00  | 3.00  | 3.00  |
| g_i, Effective Green Time [s]           | 16    | 16    | 75    | 25    | 25    | 55    | 25    | 42    | 42    | 24    | 40    | 40    |
| g / C, Green / Cycle                    | 0.13  | 0.13  | 0.62  | 0.21  | 0.21  | 0.46  | 0.21  | 0.35  | 0.35  | 0.20  | 0.34  | 0.34  |
| (v / s)_i Volume / Saturation Flow Rate | 0.05  | 0.11  | 0.17  | 0.13  | 0.09  | 0.25  | 0.17  | 0.24  | 0.08  | 0.17  | 0.30  | 0.19  |
| s, saturation flow rate [veh/h]         | 1604  | 1527  | 1448  | 1279  | 3233  | 1424  | 1589  | 3143  | 1413  | 3150  | 3134  | 1431  |
| c, Capacity [veh/h]                     | 211   | 201   | 903   | 303   | 682   | 657   | 332   | 1093  | 491   | 624   | 1055  | 482   |
| d1, Uniform Delay [s]                   | 47.76 | 50.63 | 10.25 | 45.27 | 41.14 | 23.11 | 44.98 | 33.77 | 27.73 | 46.37 | 37.89 | 32.60 |
| k, delay calibration                    | 0.11  | 0.11  | 0.11  | 0.11  | 0.11  | 0.11  | 0.11  | 0.11  | 0.11  | 0.11  | 0.11  | 0.11  |
| l, Upstream Filtering Factor            | 1.00  | 1.00  | 1.00  | 1.00  | 1.00  | 1.00  | 1.00  | 1.00  | 1.00  | 1.00  | 1.00  | 1.00  |
| d2, Incremental Delay [s]               | 1.21  | 7.40  | 0.16  | 1.55  | 0.44  | 0.68  | 4.26  | 0.83  | 0.23  | 3.29  | 3.12  | 1.04  |
| d3, Initial Queue Delay [s]             | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  |
| Rp, platoon ratio                       | 1.00  | 1.00  | 1.00  | 1.00  | 1.00  | 1.00  | 1.00  | 1.00  | 1.00  | 1.00  | 1.00  | 1.00  |
| PF, progression factor                  | 1.00  | 1.00  | 1.00  | 1.00  | 1.00  | 1.00  | 1.00  | 1.00  | 1.00  | 1.00  | 1.00  | 1.00  |

**Lane Group Results**

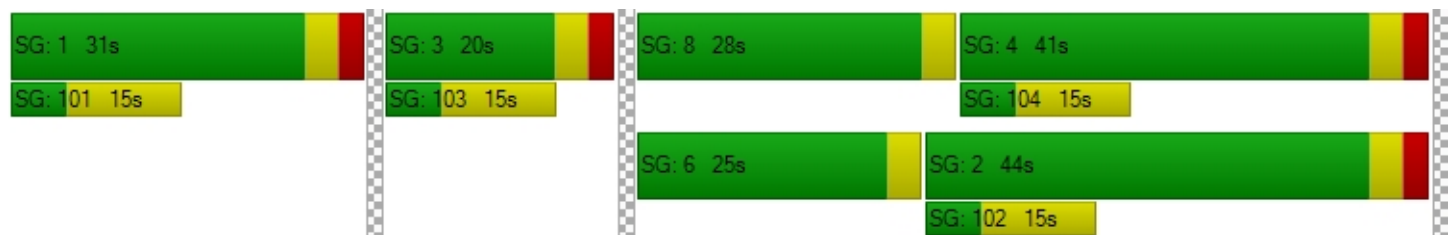
|                                    |        |        |        |        |        |        |        |        |        |        |        |        |
|------------------------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| X, volume / capacity               | 0.40   | 0.81   | 0.27   | 0.55   | 0.44   | 0.54   | 0.79   | 0.70   | 0.23   | 0.85   | 0.90   | 0.56   |
| d, Delay for Lane Group [s/veh]    | 48.97  | 58.03  | 10.41  | 46.82  | 41.59  | 23.80  | 49.23  | 34.60  | 27.96  | 49.65  | 41.02  | 33.65  |
| Lane Group LOS                     | D      | E      | B      | D      | D      | C      | D      | C      | C      | D      | D      | C      |
| Critical Lane Group                | no     | no     | yes    | no     | no     | yes    | yes    | no     | no     | no     | yes    | no     |
| 50th-Percentile Queue Length [veh] | 2.37   | 5.13   | 2.92   | 4.73   | 3.88   | 7.19   | 7.80   | 9.70   | 2.33   | 7.85   | 13.56  | 6.60   |
| 50th-Percentile Queue Length [ft]  | 59.22  | 128.16 | 73.04  | 118.23 | 97.06  | 179.81 | 194.94 | 242.50 | 58.19  | 196.24 | 339.12 | 164.94 |
| 95th-Percentile Queue Length [veh] | 4.26   | 8.84   | 5.26   | 8.30   | 6.99   | 11.59  | 12.38  | 14.81  | 4.19   | 12.44  | 19.60  | 10.81  |
| 95th-Percentile Queue Length [ft]  | 106.59 | 220.99 | 131.48 | 207.39 | 174.71 | 289.77 | 309.43 | 370.20 | 104.74 | 311.11 | 490.12 | 270.25 |

**Movement, Approach, & Intersection Results**

|                                 |       |       |       |       |       |       |       |       |       |       |       |       |
|---------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| d_M, Delay for Movement [s/veh] | 48.97 | 57.68 | 10.41 | 46.82 | 41.59 | 23.80 | 49.23 | 34.60 | 27.96 | 49.65 | 41.02 | 33.65 |
| Movement LOS                    | D     | E     | B     | D     | D     | C     | D     | C     | C     | D     | D     | C     |
| d_A, Approach Delay [s/veh]     | 32.58 |       |       | 34.96 |       |       | 37.32 |       |       | 42.48 |       |       |
| Approach LOS                    | C     |       |       | C     |       |       | D     |       |       | D     |       |       |
| d_I, Intersection Delay [s/veh] | 38.46 |       |       |       |       |       |       |       |       |       |       |       |
| Intersection LOS                | D     |       |       |       |       |       |       |       |       |       |       |       |
| Intersection V/C                | 0.795 |       |       |       |       |       |       |       |       |       |       |       |

**Sequence**

|        |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|--------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ring 1 | 1 | 3 | 8 | 4 | - | - | - | - | - | - | - | - | - | - | - | - |
| Ring 2 | - | - | 6 | 2 | - | - | - | - | - | - | - | - | - | - | - | - |
| Ring 3 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Ring 4 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |








### Intersection Level Of Service Report #8: Central Ave and I15 SB

Control Type: Two-way stop  
Analysis Method: HCM2010  
Analysis Period: 15 minutes

Delay (sec / veh): 42.0  
Level Of Service: E  
Volume to Capacity (v/c): 0.432

#### Intersection Setup

| Name                   |   |        |        |   |        |        |   |        |        |                |        |        |
|------------------------|---|--------|--------|---|--------|--------|---|--------|--------|----------------|--------|--------|
| Approach               | Southbound  |        |        | Eastbound   |        |        | Westbound   |        |        | Northwestbound |        |        |
| Lane Configuration     |  |        |        |  |        |        |  |        |        |                |        |        |
| Turning Movement       | Left  | Thru   | Right  | Left  | Thru   | Right  | Left  | Thru   | Right  | Left           | Thru   | Right  |
| Lane Width [ft]        | 12.00   | 12.00  | 12.00  | 12.00   | 12.00  | 12.00  | 12.00   | 12.00  | 12.00  | 12.00          | 12.00  | 12.00  |
| No. of Lanes in Pocket | 0   | 0      | 0      | 0   | 0      | 0      | 0   | 0      | 0      | 0              | 0      | 0      |
| Pocket Length [ft]     | 100.00  | 100.00 | 100.00 | 100.00  | 100.00 | 100.00 | 100.00  | 100.00 | 100.00 | 100.00         | 100.00 | 100.00 |
| Speed [mph]            | 30.00   |        |        | 30.00   |        |        | 30.00   |        |        | 30.00          |        |        |
| Grade [%]              | 0.00  |        |        | 0.00  |        |        | 0.00  |        |        | 0.00           |        |        |
| Crosswalk              | yes   |        |        | yes   |        |        | yes   |        |        | yes            |        |        |

#### Volumes

| Name                                    |        |        |        |        |        |        |        |        |        |        |        |        |
|---|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| Base Volume Input [veh/h]               | 66     | 0      | 6      | 0      | 166    | 30     | 230    | 299    | 0      | 0      | 0      | 0      |
| Base Volume Adjustment Factor           | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Heavy Vehicles Percentage [%]           | 6.00   | 0.00   | 0.00   | 2.00   | 0.60   | 0.00   | 6.50   | 1.00   | 2.00   | 2.00   | 2.00   | 2.00   |
| Growth Rate                             | 1.00   | 1.00   | 1.00   | 1.00   | 1.00   | 1.00   | 1.00   | 1.00   | 1.00   | 1.00   | 1.00   | 1.00   |
| In-Process Volume [veh/h]               | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Site-Generated Trips [veh/h]            | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Diverted Trips [veh/h]                  | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Pass-by Trips [veh/h]                   | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Existing Site Adjustment Volume [veh/h] | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Other Volume [veh/h]                    | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Total Hourly Volume [veh/h]             | 66     | 0      | 6      | 0      | 166    | 30     | 230    | 299    | 0      | 0      | 0      | 0      |
| Peak Hour Factor                        | 0.9170 | 1.0000 | 0.7500 | 1.0000 | 0.8470 | 0.8330 | 0.8980 | 0.8690 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Other Adjustment Factor                 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Total 15-Minute Volume [veh/h]          | 18     | 0      | 2      | 0      | 49     | 9      | 64     | 86     | 0      | 0      | 0      | 0      |
| Total Analysis Volume [veh/h]           | 72     | 0      | 8      | 0      | 196    | 36     | 256    | 344    | 0      | 0      | 0      | 0      |
| Pedestrian Volume [ped/h]               | 0      |        |        | 0      |        |        | 0      |        |        | 0      |        |        |
| Bicycle Volume [bicycles/h]             | 0      |        |        | 0      |        |        | 0      |        |        | 0      |        |        |

**Intersection Settings**

| Priority Scheme                    | Stop | Free | Free | Stop |
|------------------------------------|------|------|------|------|
| Flared Lane                        |      |      |      |      |
| Storage Area [veh]                 | 0    | 0    | 0    | 0    |
| Two-Stage Gap Acceptance           | no   |      |      |      |
| Number of Storage Spaces in Median | 0    | 0    | 0    | 0    |

**Movement, Approach, & Intersection Results**




|                                    |       |       |       |      |      |      |       |      |      |      |      |      |
|------------------------------------|-------|-------|-------|------|------|------|-------|------|------|------|------|------|
| V/C, Movement V/C Ratio            | 0.43  | 0.00  | 0.01  | 0.00 | 0.00 | 0.00 | 0.19  | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| d_M, Delay for Movement [s/veh]    | 42.03 | 39.90 | 10.18 | 0.00 | 0.00 | 0.00 | 8.29  | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Movement LOS                       | E     | E     | B     |      | A    | A    | A     | A    |      |      |      |      |
| 95th-Percentile Queue Length [veh] | 1.96  | 1.96  | 0.03  | 0.00 | 0.00 | 0.00 | 0.70  | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 95th-Percentile Queue Length [ft]  | 48.88 | 48.88 | 0.86  | 0.00 | 0.00 | 0.00 | 17.46 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| d_A, Approach Delay [s/veh]        | 38.84 |       |       | 0.00 |      |      | 3.54  |      |      | 0.00 |      |      |
| Approach LOS                       | E     |       |       | A    |      |      | A     |      |      | A    |      |      |
| d_I, Intersection Delay [s/veh]    | 5.73  |       |       |      |      |      |       |      |      |      |      |      |
| Intersection LOS                   | E     |       |       |      |      |      |       |      |      |      |      |      |

### Intersection Level Of Service Report #9: Central Ave and I-15 NB

Control Type: Two-way stop  
Analysis Method: HCM2010  
Analysis Period: 15 minutes

Delay (sec / veh): 29.1  
Level Of Service: D  
Volume to Capacity (v/c): 0.303

#### Intersection Setup

| Name                   |   |        |        |   |        |        |   |        |        |                |        |        |
|------------------------|---|--------|--------|---|--------|--------|---|--------|--------|----------------|--------|--------|
| Approach               | Northbound  |        |        | Eastbound   |        |        | Westbound   |        |        | Southeastbound |        |        |
| Lane Configuration     |  |        |        |  |        |        |  |        |        |                |        |        |
| Turning Movement       | Left  | Thru   | Right  | Left  | Thru   | Right  | Left  | Thru   | Right  | Left           | Thru   | Right  |
| Lane Width [ft]        | 12.00   | 12.00  | 12.00  | 12.00   | 12.00  | 12.00  | 12.00   | 12.00  | 12.00  | 12.00          | 12.00  | 12.00  |
| No. of Lanes in Pocket | 0   | 0      | 0      | 0   | 0      | 0      | 0   | 0      | 0      | 0              | 0      | 0      |
| Pocket Length [ft]     | 100.00  | 100.00 | 100.00 | 100.00  | 100.00 | 100.00 | 100.00  | 100.00 | 100.00 | 100.00         | 100.00 | 100.00 |
| Speed [mph]            | 30.00   |        |        | 30.00   |        |        | 30.00   |        |        | 30.00          |        |        |
| Grade [%]              | 0.00  |        |        | 0.00  |        |        | 0.00  |        |        | 0.00           |        |        |
| Crosswalk              | yes   |        |        | yes   |        |        | yes   |        |        | yes            |        |        |

#### Volumes

| Name                                    |        |        |        |        |        |        |        |        |        |        |        |        |
|---|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| Base Volume Input [veh/h]               | 57     | 0      | 170    | 5      | 249    | 0      | 0      | 471    | 113    | 0      | 0      | 0      |
| Base Volume Adjustment Factor           | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Heavy Vehicles Percentage [%]           | 1.80   | 0.00   | 7.00   | 0.00   | 2.00   | 2.00   | 2.00   | 4.60   | 0.90   | 2.00   | 2.00   | 2.00   |
| Growth Rate                             | 1.00   | 1.00   | 1.00   | 1.00   | 1.00   | 1.00   | 1.00   | 1.00   | 1.00   | 1.00   | 1.00   | 1.00   |
| In-Process Volume [veh/h]               | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Site-Generated Trips [veh/h]            | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Diverted Trips [veh/h]                  | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Pass-by Trips [veh/h]                   | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Existing Site Adjustment Volume [veh/h] | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Other Volume [veh/h]                    | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Total Hourly Volume [veh/h]             | 57     | 0      | 170    | 5      | 249    | 0      | 0      | 471    | 113    | 0      | 0      | 0      |
| Peak Hour Factor                        | 0.7130 | 1.0000 | 0.7590 | 0.4170 | 0.8650 | 1.0000 | 1.0000 | 0.9350 | 0.8310 | 1.0000 | 1.0000 | 1.0000 |
| Other Adjustment Factor                 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Total 15-Minute Volume [veh/h]          | 20     | 0      | 56     | 3      | 72     | 0      | 0      | 126    | 34     | 0      | 0      | 0      |
| Total Analysis Volume [veh/h]           | 80     | 0      | 224    | 12     | 288    | 0      | 0      | 504    | 136    | 0      | 0      | 0      |
| Pedestrian Volume [ped/h]               | 0      |        |        | 0      |        |        | 0      |        |        | 0      |        |        |
| Bicycle Volume [bicycles/h]             | 0      |        |        | 0      |        |        | 0      |        |        | 0      |        |        |

**Intersection Settings**

| Priority Scheme                    | Stop | Free | Free | Stop |
|------------------------------------|------|------|------|------|
| Flared Lane                        | no   |      |      |      |
| Storage Area [veh]                 | 0    | 0    | 0    | 0    |
| Two-Stage Gap Acceptance           | no   |      |      |      |
| Number of Storage Spaces in Median | 0    | 0    | 0    | 0    |

**Movement, Approach, & Intersection Results**




|                                    |       |       |       |      |      |      |      |      |      |      |      |      |
|------------------------------------|-------|-------|-------|------|------|------|------|------|------|------|------|------|
| V/C, Movement V/C Ratio            | 0.30  | 0.00  | 0.30  | 0.01 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 |
| d_M, Delay for Movement [s/veh]    | 29.07 | 27.04 | 20.30 | 8.40 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Movement LOS                       | D     | D     | C     | A    | A    |      |      | A    | A    |      |      |      |
| 95th-Percentile Queue Length [veh] | 3.98  | 3.98  | 3.98  | 0.03 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 95th-Percentile Queue Length [ft]  | 99.39 | 99.39 | 99.39 | 0.85 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| d_A, Approach Delay [s/veh]        | 22.61 |       |       | 0.34 |      |      | 0.00 |      |      | 0.00 |      |      |
| Approach LOS                       | C     |       |       | A    |      |      | A    |      |      | A    |      |      |
| d_I, Intersection Delay [s/veh]    | 5.61  |       |       |      |      |      |      |      |      |      |      |      |
| Intersection LOS                   | D     |       |       |      |      |      |      |      |      |      |      |      |

### Intersection Level Of Service Report #10: Central Ave and Vaughn Rd

Control Type: Two-way stop  
Analysis Method: HCM2010  
Analysis Period: 15 minutes

Delay (sec / veh): 65.0  
Level Of Service: F  
Volume to Capacity (v/c): 0.576

#### Intersection Setup

| Name                   |   |        |   |        |   |        |
|------------------------|---|--------|---|--------|---|--------|
| Approach               | Southbound  |        | Eastbound   |        | Westbound   |        |
| Lane Configuration     |  |        |  |        |  |        |
| Turning Movement       | Left  | Right  | Left  | Thru   | Thru  | Right  |
| Lane Width [ft]        | 12.00   | 12.00  | 12.00   | 12.00  | 12.00   | 12.00  |
| No. of Lanes in Pocket | 0   | 0      | 0   | 0      | 0   | 0      |
| Pocket Length [ft]     | 100.00  | 100.00 | 100.00  | 100.00 | 100.00  | 100.00 |
| Speed [mph]            | 30.00   |        | 30.00   |        | 30.00   |        |
| Grade [%]              | 0.00  |        | 0.00  |        | 0.00  |        |
| Crosswalk              | yes   |        | yes   |        | yes   |        |

#### Volumes

| Name                                    |        |        |        |        |        |        |
|---|--------|--------|--------|--------|--------|--------|
| Base Volume Input [veh/h]               | 68     | 121    | 66     | 361    | 462    | 76     |
| Base Volume Adjustment Factor           | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Heavy Vehicles Percentage [%]           | 2.90   | 1.60   | 1.50   | 4.00   | 3.40   | 2.60   |
| Growth Rate                             | 1.00   | 1.00   | 1.00   | 1.00   | 1.00   | 1.00   |
| In-Process Volume [veh/h]               | 0      | 0      | 0      | 0      | 0      | 0      |
| Site-Generated Trips [veh/h]            | 0      | 0      | 0      | 0      | 0      | 0      |
| Diverted Trips [veh/h]                  | 0      | 0      | 0      | 0      | 0      | 0      |
| Pass-by Trips [veh/h]                   | 0      | 0      | 0      | 0      | 0      | 0      |
| Existing Site Adjustment Volume [veh/h] | 0      | 0      | 0      | 0      | 0      | 0      |
| Other Volume [veh/h]                    | 0      | 0      | 0      | 0      | 0      | 0      |
| Total Hourly Volume [veh/h]             | 68     | 121    | 66     | 361    | 462    | 76     |
| Peak Hour Factor                        | 0.6540 | 0.9450 | 0.7500 | 0.7910 | 0.8680 | 0.7310 |
| Other Adjustment Factor                 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Total 15-Minute Volume [veh/h]          | 26     | 32     | 22     | 114    | 133    | 26     |
| Total Analysis Volume [veh/h]           | 104    | 128    | 88     | 456    | 532    | 104    |
| Pedestrian Volume [ped/h]               | 0      |        | 0      |        | 0      |        |
| Bicycle Volume [bicycles/h]             | 0      |        | 0      |        | 0      |        |

**Intersection Settings**

| Priority Scheme                    | Stop | Free | Free |
|------------------------------------|------|------|------|
| Flared Lane                        | no   |      |      |
| Storage Area [veh]                 | 0    | 0    | 0    |
| Two-Stage Gap Acceptance           | no   |      |      |
| Number of Storage Spaces in Median | 0    | 0    | 0    |

**Movement, Approach, & Intersection Results**




|                                    |        |        |      |      |      |      |
|------------------------------------|--------|--------|------|------|------|------|
| V/C, Movement V/C Ratio            | 0.58   | 0.25   | 0.09 | 0.00 | 0.01 | 0.00 |
| d_M, Delay for Movement [s/veh]    | 65.02  | 52.12  | 9.18 | 0.00 | 0.00 | 0.00 |
| Movement LOS                       | F      | F      | A    | A    | A    | A    |
| 95th-Percentile Queue Length [veh] | 6.75   | 6.75   | 0.31 | 0.00 | 0.00 | 0.00 |
| 95th-Percentile Queue Length [ft]  | 168.80 | 168.80 | 7.64 | 0.00 | 0.00 | 0.00 |
| d_A, Approach Delay [s/veh]        | 57.91  |        | 1.48 |      | 0.00 |      |
| Approach LOS                       | F      |        | A    |      | A    |      |
| d_I, Intersection Delay [s/veh]    | 10.09  |        |      |      |      |      |
| Intersection LOS                   | F      |        |      |      |      |      |

### Intersection Level Of Service Report #11: Vaughn Rd and I-15 SB

Control Type: Two-way stop  
Analysis Method: HCM2010  
Analysis Period: 15 minutes

Delay (sec / veh): 10.1  
Level Of Service: B  
Volume to Capacity (v/c): 0.177

#### Intersection Setup

| Name                   |   |        |   |        |   |        |
|------------------------|---|--------|---|--------|---|--------|
| Approach               | Southbound  |        | Eastbound   |        | Westbound   |        |
| Lane Configuration     |  |        |  |        |  |        |
| Turning Movement       | Left  | Right  | Left  | Thru   | Thru  | Right  |
| Lane Width [ft]        | 12.00   | 12.00  | 12.00   | 12.00  | 12.00   | 12.00  |
| No. of Lanes in Pocket | 0   | 0      | 0   | 0      | 0   | 0      |
| Pocket Length [ft]     | 100.00  | 100.00 | 100.00  | 100.00 | 100.00  | 100.00 |
| Speed [mph]            | 30.00   |        | 30.00   |        | 30.00   |        |
| Grade [%]              | 0.00  |        | 0.00  |        | 0.00  |        |
| Crosswalk              | yes   |        | yes   |        | yes   |        |

#### Volumes

| Name                                    |        |        |        |        |        |        |
|---|--------|--------|--------|--------|--------|--------|
| Base Volume Input [veh/h]               | 143    | 1      | 0      | 53     | 50     | 0      |
| Base Volume Adjustment Factor           | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Heavy Vehicles Percentage [%]           | 7.00   | 0.00   | 2.00   | 7.60   | 4.00   | 2.00   |
| Growth Rate                             | 1.00   | 1.00   | 1.00   | 1.00   | 1.00   | 1.00   |
| In-Process Volume [veh/h]               | 0      | 0      | 0      | 0      | 0      | 0      |
| Site-Generated Trips [veh/h]            | 0      | 0      | 0      | 0      | 0      | 0      |
| Diverted Trips [veh/h]                  | 0      | 0      | 0      | 0      | 0      | 0      |
| Pass-by Trips [veh/h]                   | 0      | 0      | 0      | 0      | 0      | 0      |
| Existing Site Adjustment Volume [veh/h] | 0      | 0      | 0      | 0      | 0      | 0      |
| Other Volume [veh/h]                    | 0      | 0      | 0      | 0      | 0      | 0      |
| Total Hourly Volume [veh/h]             | 143    | 1      | 0      | 53     | 50     | 0      |
| Peak Hour Factor                        | 0.9410 | 0.2500 | 1.0000 | 0.7790 | 0.8930 | 1.0000 |
| Other Adjustment Factor                 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Total 15-Minute Volume [veh/h]          | 38     | 1      | 0      | 17     | 14     | 0      |
| Total Analysis Volume [veh/h]           | 152    | 4      | 0      | 68     | 56     | 0      |
| Pedestrian Volume [ped/h]               | 0      |        | 0      |        | 0      |        |
| Bicycle Volume [bicycles/h]             | 0      |        | 0      |        | 0      |        |

**Intersection Settings**

| Priority Scheme                    | Stop | Free | Free |
|------------------------------------|------|------|------|
| Flared Lane                        | no   |      |      |
| Storage Area [veh]                 | 0    | 0    | 0    |
| Two-Stage Gap Acceptance           | no   |      |      |
| Number of Storage Spaces in Median | 0    | 0    | 0    |

**Movement, Approach, & Intersection Results**

|                                    |       |       |      |      |      |      |
|------------------------------------|-------|-------|------|------|------|------|
| V/C, Movement V/C Ratio            | 0.18  | 0.00  | 0.00 | 0.00 | 0.00 | 0.00 |
| d_M, Delay for Movement [s/veh]    | 10.11 | 9.46  | 0.00 | 0.00 | 0.00 | 0.00 |
| Movement LOS                       | B     | A     |      | A    | A    |      |
| 95th-Percentile Queue Length [veh] | 0.66  | 0.66  | 0.00 | 0.00 | 0.00 | 0.00 |
| 95th-Percentile Queue Length [ft]  | 16.44 | 16.44 | 0.00 | 0.00 | 0.00 | 0.00 |
| d_A, Approach Delay [s/veh]        | 10.09 |       | 0.00 |      | 0.00 |      |
| Approach LOS                       | B     |       | A    |      | A    |      |
| d_I, Intersection Delay [s/veh]    | 5.62  |       |      |      |      |      |
| Intersection LOS                   | B     |       |      |      |      |      |





### Intersection Level Of Service Report #12: Vaughn Rd and I-15 NB

Control Type: Two-way stop  
Analysis Method: HCM2010  
Analysis Period: 15 minutes

Delay (sec / veh): 7.3  
Level Of Service: A  
Volume to Capacity (v/c): 0.000

#### Intersection Setup

| Name                   |   |        |   |        |                |        |
|------------------------|---|--------|---|--------|----------------|--------|
| Approach               | Eastbound   |        | Westbound   |        | Southeastbound |        |
| Lane Configuration     |  |        |  |        |                |        |
| Turning Movement       | Left  | Thru   | Thru  | Right  | Left           | Right  |
| Lane Width [ft]        | 12.00   | 12.00  | 12.00   | 12.00  | 12.00          | 12.00  |
| No. of Lanes in Pocket | 0   | 0      | 0   | 0      | 0              | 0      |
| Pocket Length [ft]     | 100.00  | 100.00 | 100.00  | 100.00 | 100.00         | 100.00 |
| Speed [mph]            | 30.00   |        | 30.00   |        | 30.00          |        |
| Grade [%]              | 0.00  |        | 0.00  |        | 0.00           |        |
| Crosswalk              | yes   |        | yes   |        | yes            |        |

#### Volumes

| Name                                    |        |        |        |        |        |        |
|---|--------|--------|--------|--------|--------|--------|
| Base Volume Input [veh/h]               | 0      | 165    | 55     | 334    | 0      | 0      |
| Base Volume Adjustment Factor           | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Heavy Vehicles Percentage [%]           | 0.00   | 6.10   | 1.80   | 4.80   | 2.00   | 2.00   |
| Growth Rate                             | 1.00   | 1.00   | 1.00   | 1.00   | 1.00   | 1.00   |
| In-Process Volume [veh/h]               | 0      | 0      | 0      | 0      | 0      | 0      |
| Site-Generated Trips [veh/h]            | 0      | 0      | 0      | 0      | 0      | 0      |
| Diverted Trips [veh/h]                  | 0      | 0      | 0      | 0      | 0      | 0      |
| Pass-by Trips [veh/h]                   | 0      | 0      | 0      | 0      | 0      | 0      |
| Existing Site Adjustment Volume [veh/h] | 0      | 0      | 0      | 0      | 0      | 0      |
| Other Volume [veh/h]                    | 0      | 0      | 0      | 0      | 0      | 0      |
| Total Hourly Volume [veh/h]             | 0      | 165    | 55     | 334    | 0      | 0      |
| Peak Hour Factor                        | 1.0000 | 0.7500 | 0.8090 | 0.9180 | 1.0000 | 1.0000 |
| Other Adjustment Factor                 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Total 15-Minute Volume [veh/h]          | 0      | 55     | 17     | 91     | 0      | 0      |
| Total Analysis Volume [veh/h]           | 0      | 220    | 68     | 364    | 0      | 0      |
| Pedestrian Volume [ped/h]               | 0      |        | 0      |        | 0      |        |
| Bicycle Volume [bicycles/h]             | 0      |        | 0      |        | 0      |        |

**Intersection Settings**

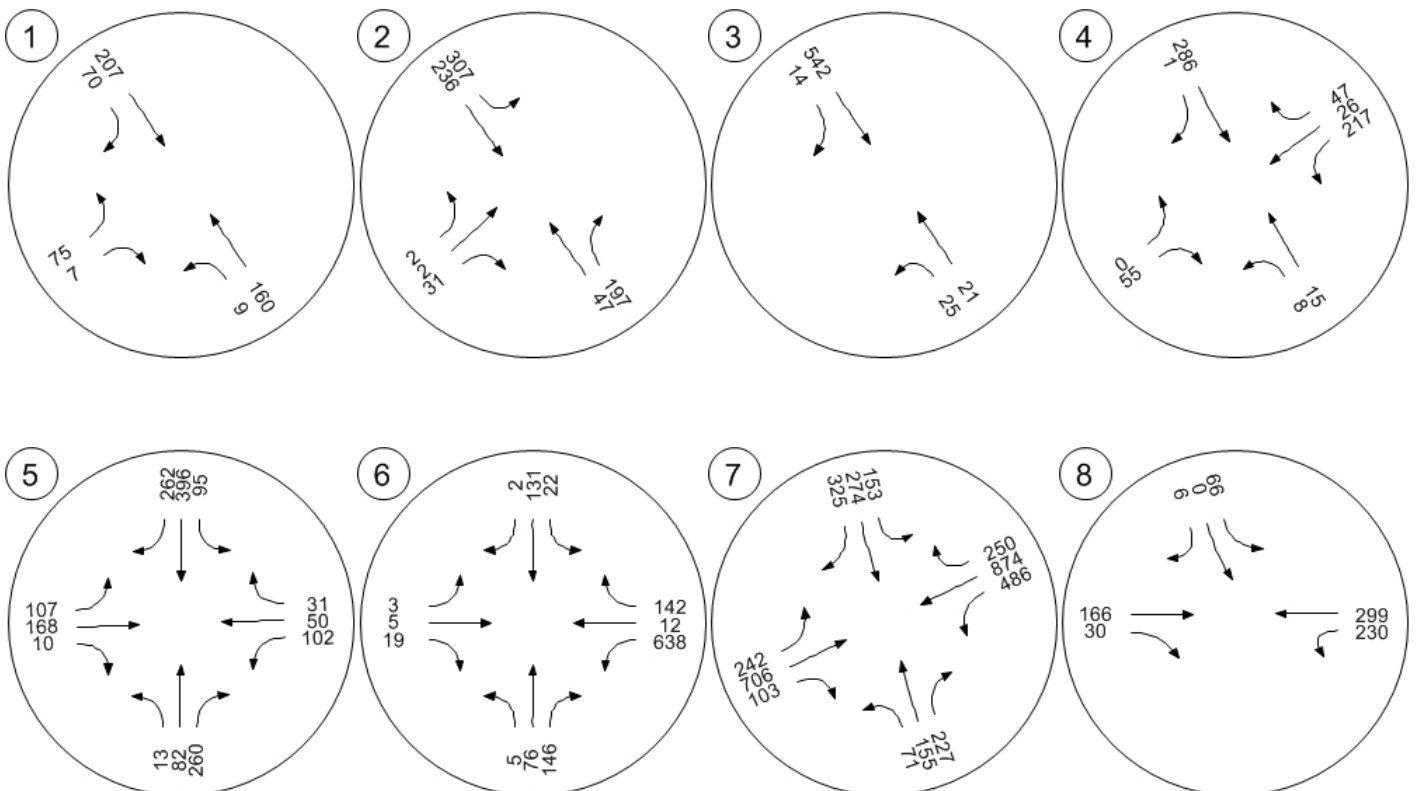
| Priority Scheme                    | Free | Free | Stop |
|------------------------------------|------|------|------|
| Flared Lane                        |      |      |      |
| Storage Area [veh]                 | 0    | 0    | 0    |
| Two-Stage Gap Acceptance           |      |      |      |
| Number of Storage Spaces in Median | 0    | 0    | 0    |

**Movement, Approach, & Intersection Results**

|                                    |      |      |      |      |      |      |
|------------------------------------|------|------|------|------|------|------|
| V/C, Movement V/C Ratio            | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| d_M, Delay for Movement [s/veh]    | 7.33 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Movement LOS                       | A    | A    | A    | A    |      |      |
| 95th-Percentile Queue Length [veh] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 95th-Percentile Queue Length [ft]  | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| d_A, Approach Delay [s/veh]        | 0.00 |      | 0.00 |      | 0.00 |      |
| Approach LOS                       | A    |      | A    |      | A    |      |
| d_I, Intersection Delay [s/veh]    | 0.00 |      |      |      |      |      |
| Intersection LOS                   | A    |      |      |      |      |      |

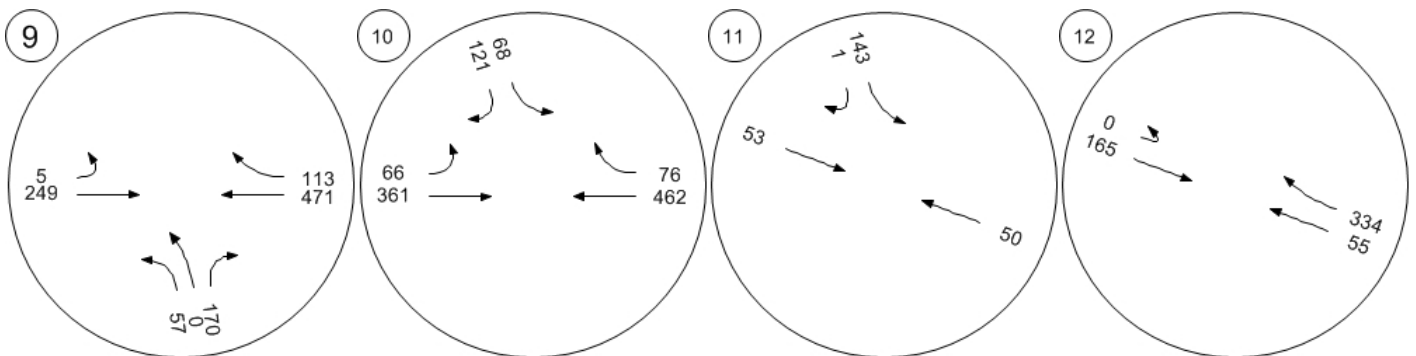
Version 2.00-10

## Traffic Volume - Base Volume



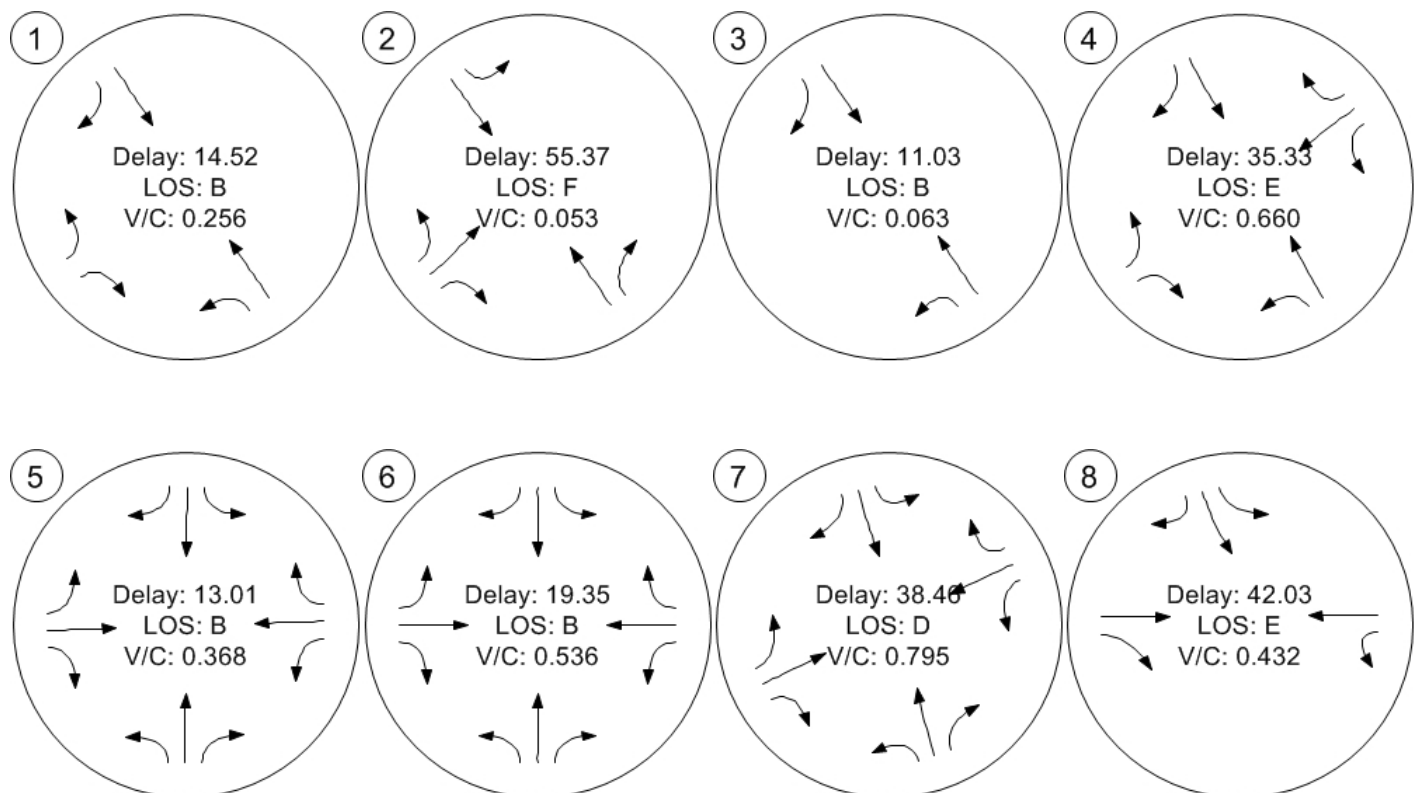
Version 2.00-10

# Traffic Volume - Base Volume



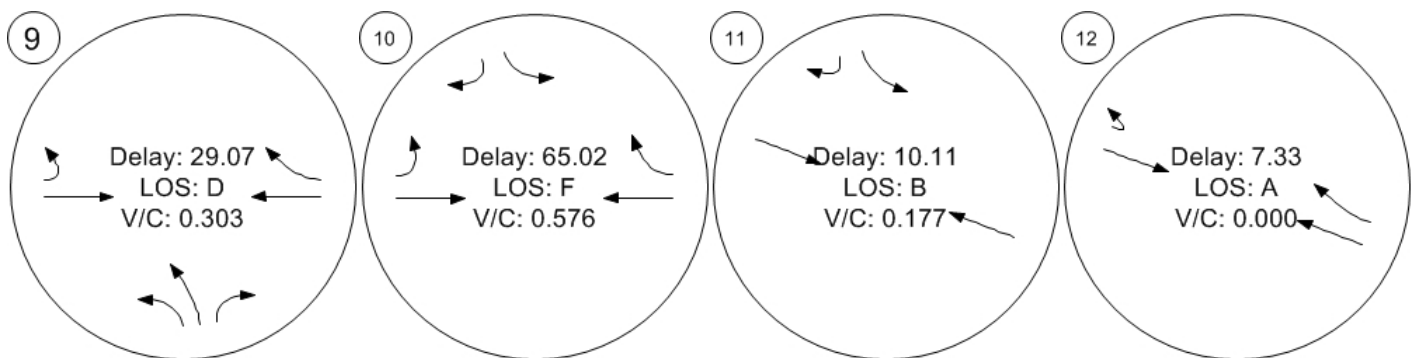


## Traffic Conditions



Version 2.00-10

## Traffic Conditions





# APPENDIX D

---

## *Projected Conditions Traffic Data Analysis*

| BASIC FREEWAY SEGMENTS WORKSHEET                            |                             |                                  |   |  |     |
|---|-----------------------------|----------------------------------|---|--|-----|
| <b>General Information</b>                                  |                             |                                  | <b>Site Information</b>   |  |     |
| Analyst   | Shane Forsythe              |                                  | Highway/Direction of Travel I-315 Eastbound   |  |     |
| Agency or Company   |                             |                                  | From/To   |  |     |
| Date Performed  | 9/15/2014                   |                                  | Jurisdiction  |  |     |
| Analysis Time Period  | AM Peak                     |                                  | Analysis Year 2035  |  |     |
| Project Description I-15 Corridor Study                     |                             |                                  |   |  |     |
| <input checked="" type="checkbox"/> Oper.(LOS)              |                             | <input type="checkbox"/> Des.(N) |   | <input type="checkbox"/> Planning Data |     |
| <b>Flow Inputs</b>  |                             |                                  |   |  |     |
| Volume, V   | 627                         | veh/h                            | Peak-Hour Factor, PHF   | 0.87                                   |     |
| AADT  |                             | veh/day                          | %Trucks and Buses, P <sub>T</sub>   | 6                                      |     |
| Peak-Hr Prop. of AADT, K                                    |                             |                                  | %RVs, P <sub>R</sub>  | 0                                      |     |
| Peak-Hr Direction Prop, D                                   |                             |                                  | General Terrain:  | Level                                  |     |
| DDHV = AADT x K x D   |                             | veh/h                            | Grade % Length  | mi                                     |     |
|   |                             |                                  | Up/Down %   |  |     |
| <b>Calculate Flow Adjustments</b>                           |                             |                                  |   |  |     |
| f <sub>p</sub>  | 1.00                        |                                  | E <sub>R</sub>  | 1.2                                    |     |
| E <sub>T</sub>  | 1.5                         |                                  | f <sub>HV</sub> = 1/[1+P <sub>T</sub> (E <sub>T</sub> - 1) + P <sub>R</sub> (E <sub>R</sub> - 1)] | 0.971                                  |     |
| <b>Speed Inputs</b>   |                             |                                  | <b>Calc Speed Adj and FFS</b>   |  |     |
| Lane Width  |                             | ft                               |   |  |     |
| Rt-Side Lat. Clearance                                      |                             | ft                               | f <sub>LW</sub>   | mph                                    |     |
| Number of Lanes, N  | 2                           |                                  | f <sub>LC</sub>   | mph                                    |     |
| Total Ramp Density, TRD                                     |                             | ramps/mi                         | TRD Adjustment  | mph                                    |     |
| FFS (measured)  | 55.0                        | mph                              | FFS   | 55.0                                   | mph |
| Base free-flow Speed, BFFS                                  |                             | mph                              |   |  |     |
| <b>LOS and Performance Measures</b>                         |                             |                                  | <b>Design (N)</b>   |  |     |
| <u>Operational (LOS)</u>                                    |                             |                                  | <u>Design (N)</u>   |  |     |
| v <sub>p</sub> = (V or DDHV) / (PHF x N x f <sub>HV</sub> ) |                             |                                  | Design LOS  |  |     |
|   | 371                         | pc/h/ln                          | v <sub>p</sub> = (V or DDHV) / (PHF x N x f <sub>HV</sub> )                                       |  |     |
| x f <sub>p</sub> )  |                             |                                  | x f <sub>p</sub> )  |  |     |
| S   | 55.0                        | mph                              | S   |  |     |
| D = v <sub>p</sub> / S                                      | 6.7                         | pc/mi/ln                         | D = v <sub>p</sub> / S  |  |     |
| LOS   | A                           |                                  | Required Number of Lanes, N   |  |     |
| <b>Glossary</b>   |                             |                                  | <b>Factor Location</b>  |  |     |
| N - Number of lanes   | S - Speed                   |                                  | E <sub>R</sub> - Exhibits 11-10, 11-12  | f <sub>LW</sub> - Exhibit 11-8         |     |
| V - Hourly volume   | D - Density                 |                                  | E <sub>T</sub> - Exhibits 11-10, 11-11, 11-13   | f <sub>LC</sub> - Exhibit 11-9         |     |
| v <sub>p</sub> - Flow rate                                  | FFS - Free-flow speed       |                                  | f <sub>p</sub> - Page 11-18   | TRD - Page 11-11                       |     |
| LOS - Level of service                                      | BFFS - Base free-flow speed |                                  | LOS, S, FFS, v <sub>p</sub> - Exhibits 11-2, 11-3   |  |     |
| DDHV - Directional design hour volume                       |                             |                                  |   |  |     |



| BASIC FREEWAY SEGMENTS WORKSHEET                            |                             |                                  |   |  |     |
|---|-----------------------------|----------------------------------|---|--|-----|
| <b>General Information</b>                                  |                             |                                  | <b>Site Information</b>   |  |     |
| Analyst   | Shane Forsythe              |                                  | Highway/Direction of Travel I-315 Westbound   |  |     |
| Agency or Company   |                             |                                  | From/To I-15 to 14th Ave  |  |     |
| Date Performed  | 9/15/2014                   |                                  | Jurisdiction  |  |     |
| Analysis Time Period  | AM Peak                     |                                  | Analysis Year 2035  |  |     |
| Project Description I-15 Corridor Study                     |                             |                                  |   |  |     |
| <input checked="" type="checkbox"/> Oper.(LOS)              |                             | <input type="checkbox"/> Des.(N) |   | <input type="checkbox"/> Planning Data |     |
| <b>Flow Inputs</b>  |                             |                                  |   |  |     |
| Volume, V   | 514                         | veh/h                            | Peak-Hour Factor, PHF   | 0.76                                   |     |
| AADT  |                             | veh/day                          | %Trucks and Buses, P <sub>T</sub>   | 6                                      |     |
| Peak-Hr Prop. of AADT, K                                    |                             |                                  | %RVs, P <sub>R</sub>  | 0                                      |     |
| Peak-Hr Direction Prop, D                                   |                             |                                  | General Terrain:  | Level                                  |     |
| DDHV = AADT x K x D   |                             | veh/h                            | Grade % Length  | mi                                     |     |
| Up/Down %   |                             |                                  |   |  |     |
| <b>Calculate Flow Adjustments</b>                           |                             |                                  |   |  |     |
| f <sub>p</sub>  | 1.00                        |                                  | E <sub>R</sub>  | 1.2                                    |     |
| E <sub>T</sub>  | 1.5                         |                                  | f <sub>HV</sub> = 1/[1+P <sub>T</sub> (E <sub>T</sub> - 1) + P <sub>R</sub> (E <sub>R</sub> - 1)] | 0.971                                  |     |
| <b>Speed Inputs</b>   |                             |                                  | <b>Calc Speed Adj and FFS</b>   |  |     |
| Lane Width  |                             | ft                               |   |  |     |
| Rt-Side Lat. Clearance                                      |                             | ft                               | f <sub>LW</sub>   |  | mph |
| Number of Lanes, N  | 2                           |                                  | f <sub>LC</sub>   |  | mph |
| Total Ramp Density, TRD                                     |                             | ramps/mi                         | TRD Adjustment  |  | mph |
| FFS (measured)  | 55.0                        | mph                              | FFS   | 55.0                                   | mph |
| Base free-flow Speed, BFFS                                  |                             | mph                              |   |  |     |
| <b>LOS and Performance Measures</b>                         |                             |                                  | <b>Design (N)</b>   |  |     |
| <u>Operational (LOS)</u>                                    |                             |                                  | <u>Design (N)</u>   |  |     |
| v <sub>p</sub> = (V or DDHV) / (PHF x N x f <sub>HV</sub> ) |                             |                                  | Design LOS  |  |     |
|   | 348                         | pc/h/ln                          | v <sub>p</sub> = (V or DDHV) / (PHF x N x f <sub>HV</sub> )                                       |  |     |
| x f <sub>p</sub> )  |                             |                                  | x f <sub>p</sub> )  |  |     |
| S   | 55.0                        | mph                              | S   |  |     |
| D = v <sub>p</sub> / S                                      | 6.3                         | pc/mi/ln                         | D = v <sub>p</sub> / S  |  |     |
| LOS   | A                           |                                  | Required Number of Lanes, N   |  |     |
| <b>Glossary</b>   |                             |                                  | <b>Factor Location</b>  |  |     |
| N - Number of lanes   | S - Speed                   |                                  | E <sub>R</sub> - Exhibits 11-10, 11-12  | f <sub>LW</sub> - Exhibit 11-8         |     |
| V - Hourly volume   | D - Density                 |                                  | E <sub>T</sub> - Exhibits 11-10, 11-11, 11-13   | f <sub>LC</sub> - Exhibit 11-9         |     |
| v <sub>p</sub> - Flow rate                                  | FFS - Free-flow speed       |                                  | f <sub>p</sub> - Page 11-18   | TRD - Page 11-11                       |     |
| LOS - Level of service                                      | BFFS - Base free-flow speed |                                  | LOS, S, FFS, v <sub>p</sub> - Exhibits 11-2, 11-3   |  |     |
| DDHV - Directional design hour volume                       |                             |                                  |   |  |     |

| BASIC FREEWAY SEGMENTS WORKSHEET                            |                             |                                  |   |  |     |
|---|-----------------------------|----------------------------------|---|--|-----|
| <b>General Information</b>                                  |                             |                                  | <b>Site Information</b>   |  |     |
| Analyst   | Shane Forsythe              |                                  | Highway/Direction of Travel I-315 Eastbound   |  |     |
| Agency or Company   |                             |                                  | From/To I-15 to 14th Ave  |  |     |
| Date Performed  | 9/15/2014                   |                                  | Jurisdiction  |  |     |
| Analysis Time Period  | PM Peak                     |                                  | Analysis Year 2035  |  |     |
| Project Description I-15 Corridor Study                     |                             |                                  |   |  |     |
| <input checked="" type="checkbox"/> Oper.(LOS)              |                             | <input type="checkbox"/> Des.(N) |   | <input type="checkbox"/> Planning Data |     |
| <b>Flow Inputs</b>  |                             |                                  |   |  |     |
| Volume, V   | 799                         | veh/h                            | Peak-Hour Factor, PHF   | 0.83                                   |     |
| AADT  |                             | veh/day                          | %Trucks and Buses, P <sub>T</sub>   | 4                                      |     |
| Peak-Hr Prop. of AADT, K                                    |                             |                                  | %RVs, P <sub>R</sub>  | 0                                      |     |
| Peak-Hr Direction Prop, D                                   |                             |                                  | General Terrain:  | Level                                  |     |
| DDHV = AADT x K x D   |                             | veh/h                            | Grade % Length  | mi                                     |     |
|   |                             |                                  | Up/Down %   |  |     |
| <b>Calculate Flow Adjustments</b>                           |                             |                                  |   |  |     |
| f <sub>p</sub>  | 1.00                        |                                  | E <sub>R</sub>  | 1.2                                    |     |
| E <sub>T</sub>  | 1.5                         |                                  | f <sub>HV</sub> = 1/[1+P <sub>T</sub> (E <sub>T</sub> - 1) + P <sub>R</sub> (E <sub>R</sub> - 1)] | 0.980                                  |     |
| <b>Speed Inputs</b>   |                             |                                  | <b>Calc Speed Adj and FFS</b>   |  |     |
| Lane Width  |                             | ft                               |   |  |     |
| Rt-Side Lat. Clearance                                      |                             | ft                               | f <sub>LW</sub>   | mph                                    |     |
| Number of Lanes, N  | 2                           |                                  | f <sub>LC</sub>   | mph                                    |     |
| Total Ramp Density, TRD                                     |                             | ramps/mi                         | TRD Adjustment  | mph                                    |     |
| FFS (measured)  | 55.0                        | mph                              | FFS   | 55.0                                   | mph |
| Base free-flow Speed, BFFS                                  |                             | mph                              |   |  |     |
| <b>LOS and Performance Measures</b>                         |                             |                                  | <b>Design (N)</b>   |  |     |
| <u>Operational (LOS)</u>                                    |                             |                                  | <u>Design (N)</u>   |  |     |
| v <sub>p</sub> = (V or DDHV) / (PHF x N x f <sub>HV</sub> ) |                             |                                  | Design LOS  |  |     |
|   | 491                         | pc/h/ln                          | v <sub>p</sub> = (V or DDHV) / (PHF x N x f <sub>HV</sub> )                                       |  |     |
| x f <sub>p</sub> )  |                             |                                  | x f <sub>p</sub> )  |  |     |
| S   | 55.0                        | mph                              | S   |  |     |
| D = v <sub>p</sub> / S                                      | 8.9                         | pc/mi/ln                         | D = v <sub>p</sub> / S  |  |     |
| LOS   | A                           |                                  | Required Number of Lanes, N   |  |     |
| <b>Glossary</b>   |                             |                                  | <b>Factor Location</b>  |  |     |
| N - Number of lanes   | S - Speed                   |                                  | E <sub>R</sub> - Exhibits 11-10, 11-12  | f <sub>LW</sub> - Exhibit 11-8         |     |
| V - Hourly volume   | D - Density                 |                                  | E <sub>T</sub> - Exhibits 11-10, 11-11, 11-13   | f <sub>LC</sub> - Exhibit 11-9         |     |
| v <sub>p</sub> - Flow rate                                  | FFS - Free-flow speed       |                                  | f <sub>p</sub> - Page 11-18   | TRD - Page 11-11                       |     |
| LOS - Level of service                                      | BFFS - Base free-flow speed |                                  | LOS, S, FFS, v <sub>p</sub> - Exhibits 11-2, 11-3   |  |     |
| DDHV - Directional design hour volume                       |                             |                                  |   |  |     |

| BASIC FREEWAY SEGMENTS WORKSHEET                            |                             |                                  |   |  |     |
|---|-----------------------------|----------------------------------|---|--|-----|
| <b>General Information</b>                                  |                             |                                  | <b>Site Information</b>   |  |     |
| Analyst   | Shane Forsythe              |                                  | Highway/Direction of Travel I-315 Westbound   |  |     |
| Agency or Company   |                             |                                  | From/To I-15 to 14th Ave  |  |     |
| Date Performed  | 9/15/2014                   |                                  | Jurisdiction  |  |     |
| Analysis Time Period  | PM Peak                     |                                  | Analysis Year 2035  |  |     |
| Project Description I-15 Corridor Study                     |                             |                                  |   |  |     |
| <input checked="" type="checkbox"/> Oper.(LOS)              |                             | <input type="checkbox"/> Des.(N) |   | <input type="checkbox"/> Planning Data |     |
| <b>Flow Inputs</b>  |                             |                                  |   |  |     |
| Volume, V   | 728                         | veh/h                            | Peak-Hour Factor, PHF   | 0.93                                   |     |
| AADT  |                             | veh/day                          | %Trucks and Buses, P <sub>T</sub>   | 5                                      |     |
| Peak-Hr Prop. of AADT, K                                    |                             |                                  | %RVs, P <sub>R</sub>  | 0                                      |     |
| Peak-Hr Direction Prop, D                                   |                             |                                  | General Terrain:  | Level                                  |     |
| DDHV = AADT x K x D   |                             | veh/h                            | Grade % Length  | mi                                     |     |
|   |                             |                                  | Up/Down %   |  |     |
| <b>Calculate Flow Adjustments</b>                           |                             |                                  |   |  |     |
| f <sub>p</sub>  | 1.00                        |                                  | E <sub>R</sub>  | 1.2                                    |     |
| E <sub>T</sub>  | 1.5                         |                                  | f <sub>HV</sub> = 1/[1+P <sub>T</sub> (E <sub>T</sub> - 1) + P <sub>R</sub> (E <sub>R</sub> - 1)] | 0.976                                  |     |
| <b>Speed Inputs</b>   |                             |                                  | <b>Calc Speed Adj and FFS</b>   |  |     |
| Lane Width  |                             | ft                               |   |  |     |
| Rt-Side Lat. Clearance                                      |                             | ft                               | f <sub>LW</sub>   | mph                                    |     |
| Number of Lanes, N  | 2                           |                                  | f <sub>LC</sub>   | mph                                    |     |
| Total Ramp Density, TRD                                     |                             | ramps/mi                         | TRD Adjustment  | mph                                    |     |
| FFS (measured)  | 55.0                        | mph                              | FFS   | 55.0                                   | mph |
| Base free-flow Speed, BFFS                                  |                             | mph                              |   |  |     |
| <b>LOS and Performance Measures</b>                         |                             |                                  | <b>Design (N)</b>   |  |     |
| <u>Operational (LOS)</u>                                    |                             |                                  | <u>Design (N)</u>   |  |     |
| v <sub>p</sub> = (V or DDHV) / (PHF x N x f <sub>HV</sub> ) |                             |                                  | Design LOS  |  |     |
|   | 401                         | pc/h/ln                          | v <sub>p</sub> = (V or DDHV) / (PHF x N x f <sub>HV</sub> )                                       |  |     |
| x f <sub>p</sub> )  |                             |                                  | x f <sub>p</sub> )  |  |     |
| S   | 55.0                        | mph                              | S   |  |     |
| D = v <sub>p</sub> / S                                      | 7.3                         | pc/mi/ln                         | D = v <sub>p</sub> / S  |  |     |
| LOS   | A                           |                                  | Required Number of Lanes, N   |  |     |
| <b>Glossary</b>   |                             |                                  | <b>Factor Location</b>  |  |     |
| N - Number of lanes   | S - Speed                   |                                  | E <sub>R</sub> - Exhibits 11-10, 11-12  | f <sub>LW</sub> - Exhibit 11-8         |     |
| V - Hourly volume   | D - Density                 |                                  | E <sub>T</sub> - Exhibits 11-10, 11-11, 11-13   | f <sub>LC</sub> - Exhibit 11-9         |     |
| v <sub>p</sub> - Flow rate                                  | FFS - Free-flow speed       |                                  | f <sub>p</sub> - Page 11-18   | TRD - Page 11-11                       |     |
| LOS - Level of service                                      | BFFS - Base free-flow speed |                                  | LOS, S, FFS, v <sub>p</sub> - Exhibits 11-2, 11-3   |  |     |
| DDHV - Directional design hour volume                       |                             |                                  |   |  |     |

| BASIC FREEWAY SEGMENTS WORKSHEET                            |                             |                                  |   |  |     |
|---|-----------------------------|----------------------------------|---|--|-----|
| <b>General Information</b>                                  |                             |                                  | <b>Site Information</b>   |  |     |
| Analyst   | Shane Forsythe              |                                  | Highway/Direction of Travel I-315 Eastbound   |  |     |
| Agency or Company   |                             |                                  | From/To 14th Ave to Fox Farm  |  |     |
| Date Performed  | 9/15/2014                   |                                  | Jurisdiction  |  |     |
| Analysis Time Period  | AM Peak                     |                                  | Analysis Year 2035  |  |     |
| Project Description I-15 Corridor Study                     |                             |                                  |   |  |     |
| <input checked="" type="checkbox"/> Oper.(LOS)              |                             | <input type="checkbox"/> Des.(N) |   | <input type="checkbox"/> Planning Data |     |
| <b>Flow Inputs</b>  |                             |                                  |   |  |     |
| Volume, V   | 979                         | veh/h                            | Peak-Hour Factor, PHF   | 0.83                                   |     |
| AADT  |                             | veh/day                          | %Trucks and Buses, P <sub>T</sub>   | 4                                      |     |
| Peak-Hr Prop. of AADT, K                                    |                             |                                  | %RVs, P <sub>R</sub>  | 0                                      |     |
| Peak-Hr Direction Prop, D                                   |                             |                                  | General Terrain:  | Level                                  |     |
| DDHV = AADT x K x D   |                             | veh/h                            | Grade % Length  | mi                                     |     |
|   |                             |                                  | Up/Down %   |  |     |
| <b>Calculate Flow Adjustments</b>                           |                             |                                  |   |  |     |
| f <sub>p</sub>  | 1.00                        |                                  | E <sub>R</sub>  | 1.2                                    |     |
| E <sub>T</sub>  | 1.5                         |                                  | f <sub>HV</sub> = 1/[1+P <sub>T</sub> (E <sub>T</sub> - 1) + P <sub>R</sub> (E <sub>R</sub> - 1)] | 0.980                                  |     |
| <b>Speed Inputs</b>   |                             |                                  | <b>Calc Speed Adj and FFS</b>   |  |     |
| Lane Width  |                             | ft                               |   |  |     |
| Rt-Side Lat. Clearance                                      |                             | ft                               | f <sub>LW</sub>   | mph                                    |     |
| Number of Lanes, N  | 2                           |                                  | f <sub>LC</sub>   | mph                                    |     |
| Total Ramp Density, TRD                                     |                             | ramps/mi                         | TRD Adjustment  | mph                                    |     |
| FFS (measured)  | 55.0                        | mph                              | FFS   | 55.0                                   | mph |
| Base free-flow Speed, BFFS                                  |                             | mph                              |   |  |     |
| <b>LOS and Performance Measures</b>                         |                             |                                  | <b>Design (N)</b>   |  |     |
| <u>Operational (LOS)</u>                                    |                             |                                  | <u>Design (N)</u>   |  |     |
| v <sub>p</sub> = (V or DDHV) / (PHF x N x f <sub>HV</sub> ) |                             |                                  | Design LOS  |  |     |
|   | 602                         | pc/h/ln                          | v <sub>p</sub> = (V or DDHV) / (PHF x N x f <sub>HV</sub> )                                       |  |     |
| x f <sub>p</sub> )  |                             |                                  | x f <sub>p</sub> )  |  |     |
| S   | 55.0                        | mph                              | S   |  |     |
| D = v <sub>p</sub> / S                                      | 10.9                        | pc/mi/ln                         | D = v <sub>p</sub> / S  |  |     |
| LOS   | A                           |                                  | Required Number of Lanes, N   |  |     |
| <b>Glossary</b>   |                             |                                  | <b>Factor Location</b>  |  |     |
| N - Number of lanes   | S - Speed                   |                                  | E <sub>R</sub> - Exhibits 11-10, 11-12  | f <sub>LW</sub> - Exhibit 11-8         |     |
| V - Hourly volume   | D - Density                 |                                  | E <sub>T</sub> - Exhibits 11-10, 11-11, 11-13   | f <sub>LC</sub> - Exhibit 11-9         |     |
| v <sub>p</sub> - Flow rate                                  | FFS - Free-flow speed       |                                  | f <sub>p</sub> - Page 11-18   | TRD - Page 11-11                       |     |
| LOS - Level of service                                      | BFFS - Base free-flow speed |                                  | LOS, S, FFS, v <sub>p</sub> - Exhibits 11-2, 11-3   |  |     |
| DDHV - Directional design hour volume                       |                             |                                  |   |  |     |

| BASIC FREEWAY SEGMENTS WORKSHEET                            |                             |                                  |   |  |     |
|---|-----------------------------|----------------------------------|---|--|-----|
| <b>General Information</b>                                  |                             |                                  | <b>Site Information</b>   |  |     |
| Analyst   | Shane Forsythe              |                                  | Highway/Direction of Travel I-315 Westbound   |  |     |
| Agency or Company   |                             |                                  | From/To 14th Ave to Fox Farm  |  |     |
| Date Performed  | 9/15/2014                   |                                  | Jurisdiction  |  |     |
| Analysis Time Period  | AM Peak                     |                                  | Analysis Year 2035  |  |     |
| Project Description I-15 Corridor Study                     |                             |                                  |   |  |     |
| <input checked="" type="checkbox"/> Oper.(LOS)              |                             | <input type="checkbox"/> Des.(N) |   | <input type="checkbox"/> Planning Data |     |
| <b>Flow Inputs</b>  |                             |                                  |   |  |     |
| Volume, V   | 585                         | veh/h                            | Peak-Hour Factor, PHF   | 0.82                                   |     |
| AADT  |                             | veh/day                          | %Trucks and Buses, P <sub>T</sub>   | 5                                      |     |
| Peak-Hr Prop. of AADT, K                                    |                             |                                  | %RVs, P <sub>R</sub>  | 0                                      |     |
| Peak-Hr Direction Prop, D                                   |                             |                                  | General Terrain:  | Level                                  |     |
| DDHV = AADT x K x D   |                             | veh/h                            | Grade % Length  | mi                                     |     |
|   |                             |                                  | Up/Down %   |  |     |
| <b>Calculate Flow Adjustments</b>                           |                             |                                  |   |  |     |
| f <sub>p</sub>  | 1.00                        |                                  | E <sub>R</sub>  | 1.2                                    |     |
| E <sub>T</sub>  | 1.5                         |                                  | f <sub>HV</sub> = 1/[1+P <sub>T</sub> (E <sub>T</sub> - 1) + P <sub>R</sub> (E <sub>R</sub> - 1)] | 0.976                                  |     |
| <b>Speed Inputs</b>   |                             |                                  | <b>Calc Speed Adj and FFS</b>   |  |     |
| Lane Width  |                             | ft                               |   |  |     |
| Rt-Side Lat. Clearance                                      |                             | ft                               | f <sub>LW</sub>   | mph                                    |     |
| Number of Lanes, N  | 2                           |                                  | f <sub>LC</sub>   | mph                                    |     |
| Total Ramp Density, TRD                                     |                             | ramps/mi                         | TRD Adjustment  | mph                                    |     |
| FFS (measured)  | 55.0                        | mph                              | FFS   | 55.0                                   | mph |
| Base free-flow Speed, BFFS                                  |                             | mph                              |   |  |     |
| <b>LOS and Performance Measures</b>                         |                             |                                  | <b>Design (N)</b>   |  |     |
| <u>Operational (LOS)</u>                                    |                             |                                  | <u>Design (N)</u>   |  |     |
| v <sub>p</sub> = (V or DDHV) / (PHF x N x f <sub>HV</sub> ) |                             |                                  | Design LOS  |  |     |
|   | 366                         | pc/h/ln                          | v <sub>p</sub> = (V or DDHV) / (PHF x N x f <sub>HV</sub> )                                       |  |     |
| x f <sub>p</sub> )  |                             |                                  | x f <sub>p</sub> )  |  |     |
| S   | 55.0                        | mph                              | S   |  |     |
| D = v <sub>p</sub> / S                                      | 6.7                         | pc/mi/ln                         | D = v <sub>p</sub> / S  |  |     |
| LOS   | A                           |                                  | Required Number of Lanes, N   |  |     |
| <b>Glossary</b>   |                             |                                  | <b>Factor Location</b>  |  |     |
| N - Number of lanes   | S - Speed                   |                                  | E <sub>R</sub> - Exhibits 11-10, 11-12  | f <sub>LW</sub> - Exhibit 11-8         |     |
| V - Hourly volume   | D - Density                 |                                  | E <sub>T</sub> - Exhibits 11-10, 11-11, 11-13   | f <sub>LC</sub> - Exhibit 11-9         |     |
| v <sub>p</sub> - Flow rate                                  | FFS - Free-flow speed       |                                  | f <sub>p</sub> - Page 11-18   | TRD - Page 11-11                       |     |
| LOS - Level of service                                      | BFFS - Base free-flow speed |                                  | LOS, S, FFS, v <sub>p</sub> - Exhibits 11-2, 11-3   |  |     |
| DDHV - Directional design hour volume                       |                             |                                  |   |  |     |

| BASIC FREEWAY SEGMENTS WORKSHEET   |                             |                                  |   |  |     |
|--|-----------------------------|----------------------------------|---|--|-----|
| <b>General Information</b>   |                             |                                  | <b>Site Information</b>   |  |     |
| Analyst  | Shane Forsythe              |                                  | Highway/Direction of Travel I-315 Eastbound   |  |     |
| Agency or Company  |                             |                                  | From/To 14th Ave to Fox Farm  |  |     |
| Date Performed   | 9/15/2014                   |                                  | Jurisdiction  |  |     |
| Analysis Time Period   | PM Peak                     |                                  | Analysis Year 2035  |  |     |
| Project Description I-15 Corridor Study                                      |                             |                                  |   |  |     |
| <input checked="" type="checkbox"/> Oper.(LOS)                               |                             | <input type="checkbox"/> Des.(N) |   | <input type="checkbox"/> Planning Data |     |
| <b>Flow Inputs</b>   |                             |                                  |   |  |     |
| Volume, V  | 1216                        | veh/h                            | Peak-Hour Factor, PHF   | 0.90                                   |     |
| AADT   |                             | veh/day                          | %Trucks and Buses, P <sub>T</sub>   | 3                                      |     |
| Peak-Hr Prop. of AADT, K   |                             |                                  | %RVs, P <sub>R</sub>  | 0                                      |     |
| Peak-Hr Direction Prop, D  |                             |                                  | General Terrain:  | Level                                  |     |
| DDHV = AADT x K x D  |                             | veh/h                            | Grade % Length  | mi                                     |     |
|  |                             |                                  | Up/Down %   |  |     |
| <b>Calculate Flow Adjustments</b>  |                             |                                  |   |  |     |
| f <sub>p</sub>   | 1.00                        |                                  | E <sub>R</sub>  | 1.2                                    |     |
| E <sub>T</sub>   | 1.5                         |                                  | f <sub>HV</sub> = 1/[1+P <sub>T</sub> (E <sub>T</sub> - 1) + P <sub>R</sub> (E <sub>R</sub> - 1)] | 0.985                                  |     |
| <b>Speed Inputs</b>  |                             |                                  | <b>Calc Speed Adj and FFS</b>   |  |     |
| Lane Width   |                             | ft                               |   |  |     |
| Rt-Side Lat. Clearance   |                             | ft                               | f <sub>LW</sub>   | mph                                    |     |
| Number of Lanes, N   | 2                           |                                  | f <sub>LC</sub>   | mph                                    |     |
| Total Ramp Density, TRD  |                             | ramps/mi                         | TRD Adjustment  | mph                                    |     |
| FFS (measured)   | 55.0                        | mph                              | FFS   | 55.0                                   | mph |
| Base free-flow Speed, BFFS   |                             | mph                              |   |  |     |
| <b>LOS and Performance Measures</b>  |                             |                                  | <b>Design (N)</b>   |  |     |
| <u>Operational (LOS)</u>   |                             |                                  | <u>Design (N)</u>   |  |     |
| v <sub>p</sub> = (V or DDHV) / (PHF x N x f <sub>HV</sub> x f <sub>p</sub> ) |                             |                                  | Design LOS  |  |     |
|  | 686                         | pc/h/ln                          | v <sub>p</sub> = (V or DDHV) / (PHF x N x f <sub>HV</sub> x f <sub>p</sub> )                      |  |     |
| S  | 55.0                        | mph                              | S   |  |     |
| D = v <sub>p</sub> / S   | 12.5                        | pc/mi/ln                         | D = v <sub>p</sub> / S  |  |     |
| LOS  | B                           |                                  | Required Number of Lanes, N   |  |     |
| <b>Glossary</b>  |                             |                                  | <b>Factor Location</b>  |  |     |
| N - Number of lanes  | S - Speed                   |                                  | E <sub>R</sub> - Exhibits 11-10, 11-12  | f <sub>LW</sub> - Exhibit 11-8         |     |
| V - Hourly volume  | D - Density                 |                                  | E <sub>T</sub> - Exhibits 11-10, 11-11, 11-13   | f <sub>LC</sub> - Exhibit 11-9         |     |
| v <sub>p</sub> - Flow rate   | FFS - Free-flow speed       |                                  | f <sub>p</sub> - Page 11-18   | TRD - Page 11-11                       |     |
| LOS - Level of service   | BFFS - Base free-flow speed |                                  | LOS, S, FFS, v <sub>p</sub> - Exhibits 11-2, 11-3   |  |     |
| DDHV - Directional design hour volume  |                             |                                  |   |  |     |

| BASIC FREEWAY SEGMENTS WORKSHEET                            |                             |                                  |   |  |     |
|---|-----------------------------|----------------------------------|---|--|-----|
| <b>General Information</b>                                  |                             |                                  | <b>Site Information</b>   |  |     |
| Analyst   | Shane Forsythe              |                                  | Highway/Direction of Travel I-315 Westbound   |  |     |
| Agency or Company   |                             |                                  | From/To 14th Ave to Fox Farm  |  |     |
| Date Performed  | 9/15/2014                   |                                  | Jurisdiction  |  |     |
| Analysis Time Period  | PM Peak                     |                                  | Analysis Year 2035  |  |     |
| Project Description I-15 Corridor Study                     |                             |                                  |   |  |     |
| <input checked="" type="checkbox"/> Oper.(LOS)              |                             | <input type="checkbox"/> Des.(N) |   | <input type="checkbox"/> Planning Data |     |
| <b>Flow Inputs</b>  |                             |                                  |   |  |     |
| Volume, V   | 1418                        | veh/h                            | Peak-Hour Factor, PHF   | 0.95                                   |     |
| AADT  |                             | veh/day                          | %Trucks and Buses, P <sub>T</sub>   | 3                                      |     |
| Peak-Hr Prop. of AADT, K                                    |                             |                                  | %RVs, P <sub>R</sub>  | 0                                      |     |
| Peak-Hr Direction Prop, D                                   |                             |                                  | General Terrain:  | Level                                  |     |
| DDHV = AADT x K x D   |                             | veh/h                            | Grade % Length  | mi                                     |     |
|   |                             |                                  | Up/Down %   |  |     |
| <b>Calculate Flow Adjustments</b>                           |                             |                                  |   |  |     |
| f <sub>p</sub>  | 1.00                        |                                  | E <sub>R</sub>  | 1.2                                    |     |
| E <sub>T</sub>  | 1.5                         |                                  | f <sub>HV</sub> = 1/[1+P <sub>T</sub> (E <sub>T</sub> - 1) + P <sub>R</sub> (E <sub>R</sub> - 1)] | 0.985                                  |     |
| <b>Speed Inputs</b>   |                             |                                  | <b>Calc Speed Adj and FFS</b>   |  |     |
| Lane Width  |                             | ft                               |   |  |     |
| Rt-Side Lat. Clearance                                      |                             | ft                               | f <sub>LW</sub>   | mph                                    |     |
| Number of Lanes, N  | 2                           |                                  | f <sub>LC</sub>   | mph                                    |     |
| Total Ramp Density, TRD                                     |                             | ramps/mi                         | TRD Adjustment  | mph                                    |     |
| FFS (measured)  | 55.0                        | mph                              | FFS   | 55.0                                   | mph |
| Base free-flow Speed, BFFS                                  |                             | mph                              |   |  |     |
| <b>LOS and Performance Measures</b>                         |                             |                                  | <b>Design (N)</b>   |  |     |
| <u>Operational (LOS)</u>                                    |                             |                                  | <u>Design (N)</u>   |  |     |
| v <sub>p</sub> = (V or DDHV) / (PHF x N x f <sub>HV</sub> ) |                             |                                  | Design LOS  |  |     |
|   | 758                         | pc/h/ln                          | v <sub>p</sub> = (V or DDHV) / (PHF x N x f <sub>HV</sub> )                                       |  |     |
| x f <sub>p</sub> )  |                             |                                  | x f <sub>p</sub> )  |  |     |
| S   | 55.0                        | mph                              | S   |  |     |
| D = v <sub>p</sub> / S                                      | 13.8                        | pc/mi/ln                         | D = v <sub>p</sub> / S  |  |     |
| LOS   | B                           |                                  | Required Number of Lanes, N   |  |     |
| <b>Glossary</b>   |                             |                                  | <b>Factor Location</b>  |  |     |
| N - Number of lanes   | S - Speed                   |                                  | E <sub>R</sub> - Exhibits 11-10, 11-12  | f <sub>LW</sub> - Exhibit 11-8         |     |
| V - Hourly volume   | D - Density                 |                                  | E <sub>T</sub> - Exhibits 11-10, 11-11, 11-13   | f <sub>LC</sub> - Exhibit 11-9         |     |
| v <sub>p</sub> - Flow rate                                  | FFS - Free-flow speed       |                                  | f <sub>p</sub> - Page 11-18   | TRD - Page 11-11                       |     |
| LOS - Level of service                                      | BFFS - Base free-flow speed |                                  | LOS, S, FFS, v <sub>p</sub> - Exhibits 11-2, 11-3   |  |     |
| DDHV - Directional design hour volume                       |                             |                                  |   |  |     |

| BASIC FREEWAY SEGMENTS WORKSHEET                            |                             |                                  |   |  |     |
|---|-----------------------------|----------------------------------|---|--|-----|
| <b>General Information</b>                                  |                             |                                  | <b>Site Information</b>   |  |     |
| Analyst   | Shane Forsythe              |                                  | Highway/Direction of Travel I-15 NB   |  |     |
| Agency or Company   |                             |                                  | From/To North of Central  |  |     |
| Date Performed  | 9/8/2014                    |                                  | Jurisdiction  |  |     |
| Analysis Time Period  | AM Peak                     |                                  | Analysis Year 2035  |  |     |
| Project Description I-15 Corridor Study                     |                             |                                  |   |  |     |
| <input checked="" type="checkbox"/> Oper.(LOS)              |                             | <input type="checkbox"/> Des.(N) |   | <input type="checkbox"/> Planning Data |     |
| <b>Flow Inputs</b>  |                             |                                  |   |  |     |
| Volume, V   | 384                         | veh/h                            | Peak-Hour Factor, PHF   | 0.83                                   |     |
| AADT  |                             | veh/day                          | %Trucks and Buses, P <sub>T</sub>   | 7                                      |     |
| Peak-Hr Prop. of AADT, K                                    |                             |                                  | %RVs, P <sub>R</sub>  | 0                                      |     |
| Peak-Hr Direction Prop, D                                   |                             |                                  | General Terrain:  | Level                                  |     |
| DDHV = AADT x K x D   |                             | veh/h                            | Grade % Length  | mi                                     |     |
|   |                             |                                  | Up/Down %   |  |     |
| <b>Calculate Flow Adjustments</b>                           |                             |                                  |   |  |     |
| f <sub>p</sub>  | 1.00                        |                                  | E <sub>R</sub>  | 1.2                                    |     |
| E <sub>T</sub>  | 1.5                         |                                  | f <sub>HV</sub> = 1/[1+P <sub>T</sub> (E <sub>T</sub> - 1) + P <sub>R</sub> (E <sub>R</sub> - 1)] | 0.966                                  |     |
| <b>Speed Inputs</b>   |                             |                                  | <b>Calc Speed Adj and FFS</b>   |  |     |
| Lane Width  |                             | ft                               |   |  |     |
| Rt-Side Lat. Clearance                                      |                             | ft                               | f <sub>LW</sub>   | mph                                    |     |
| Number of Lanes, N  | 2                           |                                  | f <sub>LC</sub>   | mph                                    |     |
| Total Ramp Density, TRD                                     |                             | ramps/mi                         | TRD Adjustment  | mph                                    |     |
| FFS (measured)  | 65.0                        | mph                              | FFS   | 65.0                                   | mph |
| Base free-flow Speed, BFFS                                  |                             | mph                              |   |  |     |
| <b>LOS and Performance Measures</b>                         |                             |                                  | <b>Design (N)</b>   |  |     |
| <u>Operational (LOS)</u>                                    |                             |                                  | <u>Design (N)</u>   |  |     |
| v <sub>p</sub> = (V or DDHV) / (PHF x N x f <sub>HV</sub> ) |                             |                                  | Design LOS  |  |     |
|   | 239                         | pc/h/ln                          | v <sub>p</sub> = (V or DDHV) / (PHF x N x f <sub>HV</sub> )                                       |  |     |
| x f <sub>p</sub> )  |                             |                                  | x f <sub>p</sub> )  |  |     |
| S   | 65.0                        | mph                              | S   |  |     |
| D = v <sub>p</sub> / S                                      | 3.7                         | pc/mi/ln                         | D = v <sub>p</sub> / S  |  |     |
| LOS   | A                           |                                  | Required Number of Lanes, N   |  |     |
| <b>Glossary</b>   |                             |                                  | <b>Factor Location</b>  |  |     |
| N - Number of lanes   | S - Speed                   |                                  | E <sub>R</sub> - Exhibits 11-10, 11-12  | f <sub>LW</sub> - Exhibit 11-8         |     |
| V - Hourly volume   | D - Density                 |                                  | E <sub>T</sub> - Exhibits 11-10, 11-11, 11-13   | f <sub>LC</sub> - Exhibit 11-9         |     |
| v <sub>p</sub> - Flow rate                                  | FFS - Free-flow speed       |                                  | f <sub>p</sub> - Page 11-18   | TRD - Page 11-11                       |     |
| LOS - Level of service                                      | BFFS - Base free-flow speed |                                  | LOS, S, FFS, v <sub>p</sub> - Exhibits 11-2, 11-3   |  |     |
| DDHV - Directional design hour volume                       |                             |                                  |   |  |     |



| BASIC FREEWAY SEGMENTS WORKSHEET                            |                             |                                  |   |  |     |
|---|-----------------------------|----------------------------------|---|--|-----|
| <b>General Information</b>                                  |                             |                                  | <b>Site Information</b>   |  |     |
| Analyst   | Shane Forsythe              |                                  | Highway/Direction of Travel I-15 SB   |  |     |
| Agency or Company   |                             |                                  | From/To North of Central  |  |     |
| Date Performed  | 9/8/2014                    |                                  | Jurisdiction  |  |     |
| Analysis Time Period  | AM Peak                     |                                  | Analysis Year 2035  |  |     |
| Project Description I-15 Corridor Study                     |                             |                                  |   |  |     |
| <input checked="" type="checkbox"/> Oper.(LOS)              |                             | <input type="checkbox"/> Des.(N) |   | <input type="checkbox"/> Planning Data |     |
| <b>Flow Inputs</b>  |                             |                                  |   |  |     |
| Volume, V   | 230                         | veh/h                            | Peak-Hour Factor, PHF   | 0.83                                   |     |
| AADT  |                             | veh/day                          | %Trucks and Buses, P <sub>T</sub>   | 21                                     |     |
| Peak-Hr Prop. of AADT, K                                    |                             |                                  | %RVs, P <sub>R</sub>  | 0                                      |     |
| Peak-Hr Direction Prop, D                                   |                             |                                  | General Terrain:  | Level                                  |     |
| DDHV = AADT x K x D   |                             | veh/h                            | Grade % Length  | mi                                     |     |
|   |                             |                                  | Up/Down %   |  |     |
| <b>Calculate Flow Adjustments</b>                           |                             |                                  |   |  |     |
| f <sub>p</sub>  | 1.00                        |                                  | E <sub>R</sub>  | 1.2                                    |     |
| E <sub>T</sub>  | 1.5                         |                                  | f <sub>HV</sub> = 1/[1+P <sub>T</sub> (E <sub>T</sub> - 1) + P <sub>R</sub> (E <sub>R</sub> - 1)] | 0.905                                  |     |
| <b>Speed Inputs</b>   |                             |                                  | <b>Calc Speed Adj and FFS</b>   |  |     |
| Lane Width  |                             | ft                               |   |  |     |
| Rt-Side Lat. Clearance                                      |                             | ft                               | f <sub>LW</sub>   | mph                                    |     |
| Number of Lanes, N  | 2                           |                                  | f <sub>LC</sub>   | mph                                    |     |
| Total Ramp Density, TRD                                     |                             | ramps/mi                         | TRD Adjustment  | mph                                    |     |
| FFS (measured)  | 65.0                        | mph                              | FFS   | 65.0                                   | mph |
| Base free-flow Speed, BFFS                                  |                             | mph                              |   |  |     |
| <b>LOS and Performance Measures</b>                         |                             |                                  | <b>Design (N)</b>   |  |     |
| <u>Operational (LOS)</u>                                    |                             |                                  | <u>Design (N)</u>   |  |     |
| v <sub>p</sub> = (V or DDHV) / (PHF x N x f <sub>HV</sub> ) |                             |                                  | Design LOS  |  |     |
|   | 153                         | pc/h/ln                          | v <sub>p</sub> = (V or DDHV) / (PHF x N x f <sub>HV</sub> )                                       |  |     |
| x f <sub>p</sub> )  |                             |                                  | x f <sub>p</sub> )  |  |     |
| S   | 65.0                        | mph                              | S   |  |     |
| D = v <sub>p</sub> / S                                      | 2.4                         | pc/mi/ln                         | D = v <sub>p</sub> / S  |  |     |
| LOS   | A                           |                                  | Required Number of Lanes, N   |  |     |
| <b>Glossary</b>   |                             |                                  | <b>Factor Location</b>  |  |     |
| N - Number of lanes   | S - Speed                   |                                  | E <sub>R</sub> - Exhibits 11-10, 11-12  | f <sub>LW</sub> - Exhibit 11-8         |     |
| V - Hourly volume   | D - Density                 |                                  | E <sub>T</sub> - Exhibits 11-10, 11-11, 11-13   | f <sub>LC</sub> - Exhibit 11-9         |     |
| v <sub>p</sub> - Flow rate                                  | FFS - Free-flow speed       |                                  | f <sub>p</sub> - Page 11-18   | TRD - Page 11-11                       |     |
| LOS - Level of service                                      | BFFS - Base free-flow speed |                                  | LOS, S, FFS, v <sub>p</sub> - Exhibits 11-2, 11-3   |  |     |
| DDHV - Directional design hour volume                       |                             |                                  |   |  |     |

| BASIC FREEWAY SEGMENTS WORKSHEET                            |                             |                                  |   |  |     |
|---|-----------------------------|----------------------------------|---|--|-----|
| <b>General Information</b>                                  |                             |                                  | <b>Site Information</b>   |  |     |
| Analyst   | Shane Forsythe              |                                  | Highway/Direction of Travel I-15 NB   |  |     |
| Agency or Company   |                             |                                  | From/To North of Central  |  |     |
| Date Performed  | 9/8/2014                    |                                  | Jurisdiction  |  |     |
| Analysis Time Period  | PM Peak                     |                                  | Analysis Year 2035  |  |     |
| Project Description I-15 Corridor Study                     |                             |                                  |   |  |     |
| <input checked="" type="checkbox"/> Oper.(LOS)              |                             | <input type="checkbox"/> Des.(N) |   | <input type="checkbox"/> Planning Data |     |
| <b>Flow Inputs</b>  |                             |                                  |   |  |     |
| Volume, V   | 413                         | veh/h                            | Peak-Hour Factor, PHF   | 0.97                                   |     |
| AADT  |                             | veh/day                          | %Trucks and Buses, P <sub>T</sub>   | 8                                      |     |
| Peak-Hr Prop. of AADT, K                                    |                             |                                  | %RVs, P <sub>R</sub>  | 0                                      |     |
| Peak-Hr Direction Prop, D                                   |                             |                                  | General Terrain:  | Level                                  |     |
| DDHV = AADT x K x D   |                             | veh/h                            | Grade % Length  | mi                                     |     |
|   |                             |                                  | Up/Down %   |  |     |
| <b>Calculate Flow Adjustments</b>                           |                             |                                  |   |  |     |
| f <sub>p</sub>  | 1.00                        |                                  | E <sub>R</sub>  | 1.2                                    |     |
| E <sub>T</sub>  | 1.5                         |                                  | f <sub>HV</sub> = 1/[1+P <sub>T</sub> (E <sub>T</sub> - 1) + P <sub>R</sub> (E <sub>R</sub> - 1)] | 0.962                                  |     |
| <b>Speed Inputs</b>   |                             |                                  | <b>Calc Speed Adj and FFS</b>   |  |     |
| Lane Width  |                             | ft                               |   |  |     |
| Rt-Side Lat. Clearance                                      |                             | ft                               | f <sub>LW</sub>   | mph                                    |     |
| Number of Lanes, N  | 2                           |                                  | f <sub>LC</sub>   | mph                                    |     |
| Total Ramp Density, TRD                                     |                             | ramps/mi                         | TRD Adjustment  | mph                                    |     |
| FFS (measured)  | 65.0                        | mph                              | FFS   | 65.0                                   | mph |
| Base free-flow Speed, BFFS                                  |                             | mph                              |   |  |     |
| <b>LOS and Performance Measures</b>                         |                             |                                  | <b>Design (N)</b>   |  |     |
| <u>Operational (LOS)</u>                                    |                             |                                  | <u>Design (N)</u>   |  |     |
| v <sub>p</sub> = (V or DDHV) / (PHF x N x f <sub>HV</sub> ) |                             |                                  | Design LOS  |  |     |
|   | 221                         | pc/h/ln                          | v <sub>p</sub> = (V or DDHV) / (PHF x N x f <sub>HV</sub> )                                       |  |     |
| x f <sub>p</sub> )  |                             |                                  | x f <sub>p</sub> )  |  |     |
| S   | 65.0                        | mph                              | S   |  |     |
| D = v <sub>p</sub> / S                                      | 3.4                         | pc/mi/ln                         | D = v <sub>p</sub> / S  |  |     |
| LOS   | A                           |                                  | Required Number of Lanes, N   |  |     |
| <b>Glossary</b>   |                             |                                  | <b>Factor Location</b>  |  |     |
| N - Number of lanes   | S - Speed                   |                                  | E <sub>R</sub> - Exhibits 11-10, 11-12  | f <sub>LW</sub> - Exhibit 11-8         |     |
| V - Hourly volume   | D - Density                 |                                  | E <sub>T</sub> - Exhibits 11-10, 11-11, 11-13   | f <sub>LC</sub> - Exhibit 11-9         |     |
| v <sub>p</sub> - Flow rate                                  | FFS - Free-flow speed       |                                  | f <sub>p</sub> - Page 11-18   | TRD - Page 11-11                       |     |
| LOS - Level of service                                      | BFFS - Base free-flow speed |                                  | LOS, S, FFS, v <sub>p</sub> - Exhibits 11-2, 11-3   |  |     |
| DDHV - Directional design hour volume                       |                             |                                  |   |  |     |

| BASIC FREEWAY SEGMENTS WORKSHEET                            |                             |                                  |   |  |     |
|---|-----------------------------|----------------------------------|---|--|-----|
| <b>General Information</b>                                  |                             |                                  | <b>Site Information</b>   |  |     |
| Analyst   | Shane Forsythe              |                                  | Highway/Direction of Travel I-15 SB   |  |     |
| Agency or Company   |                             |                                  | From/To North of Central  |  |     |
| Date Performed  | 9/8/2014                    |                                  | Jurisdiction  |  |     |
| Analysis Time Period  | PM Peak                     |                                  | Analysis Year 2035  |  |     |
| Project Description I-15 Corridor Study                     |                             |                                  |   |  |     |
| <input checked="" type="checkbox"/> Oper.(LOS)              |                             | <input type="checkbox"/> Des.(N) |   | <input type="checkbox"/> Planning Data |     |
| <b>Flow Inputs</b>  |                             |                                  |   |  |     |
| Volume, V   | 356                         | veh/h                            | Peak-Hour Factor, PHF   | 0.79                                   |     |
| AADT  |                             | veh/day                          | %Trucks and Buses, P <sub>T</sub>   | 14                                     |     |
| Peak-Hr Prop. of AADT, K                                    |                             |                                  | %RVs, P <sub>R</sub>  | 0                                      |     |
| Peak-Hr Direction Prop, D                                   |                             |                                  | General Terrain:  | Level                                  |     |
| DDHV = AADT x K x D   |                             | veh/h                            | Grade % Length  | mi                                     |     |
|   |                             |                                  | Up/Down %   |  |     |
| <b>Calculate Flow Adjustments</b>                           |                             |                                  |   |  |     |
| f <sub>p</sub>  | 1.00                        |                                  | E <sub>R</sub>  | 1.2                                    |     |
| E <sub>T</sub>  | 1.5                         |                                  | f <sub>HV</sub> = 1/[1+P <sub>T</sub> (E <sub>T</sub> - 1) + P <sub>R</sub> (E <sub>R</sub> - 1)] | 0.935                                  |     |
| <b>Speed Inputs</b>   |                             |                                  | <b>Calc Speed Adj and FFS</b>   |  |     |
| Lane Width  |                             | ft                               |   |  |     |
| Rt-Side Lat. Clearance                                      |                             | ft                               | f <sub>LW</sub>   | mph                                    |     |
| Number of Lanes, N  | 2                           |                                  | f <sub>LC</sub>   | mph                                    |     |
| Total Ramp Density, TRD                                     |                             | ramps/mi                         | TRD Adjustment  | mph                                    |     |
| FFS (measured)  | 65.0                        | mph                              | FFS   | 65.0                                   | mph |
| Base free-flow Speed, BFFS                                  |                             | mph                              |   |  |     |
| <b>LOS and Performance Measures</b>                         |                             |                                  | <b>Design (N)</b>   |  |     |
| <u>Operational (LOS)</u>                                    |                             |                                  | <u>Design (N)</u>   |  |     |
| v <sub>p</sub> = (V or DDHV) / (PHF x N x f <sub>HV</sub> ) |                             |                                  | Design LOS  |  |     |
|   | 241                         | pc/h/ln                          | v <sub>p</sub> = (V or DDHV) / (PHF x N x f <sub>HV</sub> )                                       |  |     |
| x f <sub>p</sub> )  |                             |                                  | x f <sub>p</sub> )  |  |     |
| S   | 65.0                        | mph                              | S   |  |     |
| D = v <sub>p</sub> / S                                      | 3.7                         | pc/mi/ln                         | D = v <sub>p</sub> / S  |  |     |
| LOS   | A                           |                                  | Required Number of Lanes, N   |  |     |
| <b>Glossary</b>   |                             |                                  | <b>Factor Location</b>  |  |     |
| N - Number of lanes   | S - Speed                   |                                  | E <sub>R</sub> - Exhibits 11-10, 11-12  | f <sub>LW</sub> - Exhibit 11-8         |     |
| V - Hourly volume   | D - Density                 |                                  | E <sub>T</sub> - Exhibits 11-10, 11-11, 11-13   | f <sub>LC</sub> - Exhibit 11-9         |     |
| v <sub>p</sub> - Flow rate                                  | FFS - Free-flow speed       |                                  | f <sub>p</sub> - Page 11-18   | TRD - Page 11-11                       |     |
| LOS - Level of service                                      | BFFS - Base free-flow speed |                                  | LOS, S, FFS, v <sub>p</sub> - Exhibits 11-2, 11-3   |  |     |
| DDHV - Directional design hour volume                       |                             |                                  |   |  |     |

| BASIC FREEWAY SEGMENTS WORKSHEET                            |                             |                                  |   |  |     |
|---|-----------------------------|----------------------------------|---|--|-----|
| <b>General Information</b>                                  |                             |                                  | <b>Site Information</b>   |  |     |
| Analyst   | Shane Forsythe              |                                  | Highway/Direction of Travel I-15 NB   |  |     |
| Agency or Company   |                             |                                  | From/To North of Emerson Junction   |  |     |
| Date Performed  | 9/8/2014                    |                                  | Jurisdiction  |  |     |
| Analysis Time Period  | AM Peak                     |                                  | Analysis Year 2035  |  |     |
| Project Description I-15 Corridor Study                     |                             |                                  |   |  |     |
| <input checked="" type="checkbox"/> Oper.(LOS)              |                             | <input type="checkbox"/> Des.(N) |   | <input type="checkbox"/> Planning Data |     |
| <b>Flow Inputs</b>  |                             |                                  |   |  |     |
| Volume, V   | 351                         | veh/h                            | Peak-Hour Factor, PHF   | 0.89                                   |     |
| AADT  |                             | veh/day                          | %Trucks and Buses, P <sub>T</sub>   | 21                                     |     |
| Peak-Hr Prop. of AADT, K                                    |                             |                                  | %RVs, P <sub>R</sub>  | 0                                      |     |
| Peak-Hr Direction Prop, D                                   |                             |                                  | General Terrain:  | Level                                  |     |
| DDHV = AADT x K x D   |                             | veh/h                            | Grade % Length  | mi                                     |     |
|   |                             |                                  | Up/Down %   |  |     |
| <b>Calculate Flow Adjustments</b>                           |                             |                                  |   |  |     |
| f <sub>p</sub>  | 1.00                        |                                  | E <sub>R</sub>  | 1.2                                    |     |
| E <sub>T</sub>  | 1.5                         |                                  | f <sub>HV</sub> = 1/[1+P <sub>T</sub> (E <sub>T</sub> - 1) + P <sub>R</sub> (E <sub>R</sub> - 1)] | 0.905                                  |     |
| <b>Speed Inputs</b>   |                             |                                  | <b>Calc Speed Adj and FFS</b>   |  |     |
| Lane Width  |                             | ft                               |   |  |     |
| Rt-Side Lat. Clearance                                      |                             | ft                               | f <sub>LW</sub>   | mph                                    |     |
| Number of Lanes, N  | 2                           |                                  | f <sub>LC</sub>   | mph                                    |     |
| Total Ramp Density, TRD                                     |                             | ramps/mi                         | TRD Adjustment  | mph                                    |     |
| FFS (measured)  | 65.0                        | mph                              | FFS   | 65.0                                   | mph |
| Base free-flow Speed, BFFS                                  |                             | mph                              |   |  |     |
| <b>LOS and Performance Measures</b>                         |                             |                                  | <b>Design (N)</b>   |  |     |
| <u>Operational (LOS)</u>                                    |                             |                                  | <u>Design (N)</u>   |  |     |
| v <sub>p</sub> = (V or DDHV) / (PHF x N x f <sub>HV</sub> ) |                             |                                  | Design LOS  |  |     |
|   | 218                         | pc/h/ln                          | v <sub>p</sub> = (V or DDHV) / (PHF x N x f <sub>HV</sub> )                                       |  |     |
| x f <sub>p</sub> )  |                             |                                  | x f <sub>p</sub> )  |  |     |
| S   | 65.0                        | mph                              | S   |  |     |
| D = v <sub>p</sub> / S                                      | 3.4                         | pc/mi/ln                         | D = v <sub>p</sub> / S  |  |     |
| LOS   | A                           |                                  | Required Number of Lanes, N   |  |     |
| <b>Glossary</b>   |                             |                                  | <b>Factor Location</b>  |  |     |
| N - Number of lanes   | S - Speed                   |                                  | E <sub>R</sub> - Exhibits 11-10, 11-12  | f <sub>LW</sub> - Exhibit 11-8         |     |
| V - Hourly volume   | D - Density                 |                                  | E <sub>T</sub> - Exhibits 11-10, 11-11, 11-13   | f <sub>LC</sub> - Exhibit 11-9         |     |
| v <sub>p</sub> - Flow rate                                  | FFS - Free-flow speed       |                                  | f <sub>p</sub> - Page 11-18   | TRD - Page 11-11                       |     |
| LOS - Level of service                                      | BFFS - Base free-flow speed |                                  | LOS, S, FFS, v <sub>p</sub> - Exhibits 11-2, 11-3   |  |     |
| DDHV - Directional design hour volume                       |                             |                                  |   |  |     |

| BASIC FREEWAY SEGMENTS WORKSHEET                            |                             |                                  |   |  |     |
|---|-----------------------------|----------------------------------|---|--|-----|
| <b>General Information</b>                                  |                             |                                  | <b>Site Information</b>   |  |     |
| Analyst   | Shane Forsythe              |                                  | Highway/Direction of Travel I-15 SB   |  |     |
| Agency or Company   |                             |                                  | From/To North of Emerson Junction   |  |     |
| Date Performed  | 9/8/2014                    |                                  | Jurisdiction  |  |     |
| Analysis Time Period  | AM Peak                     |                                  | Analysis Year 2035  |  |     |
| Project Description I-15 Corridor Study                     |                             |                                  |   |  |     |
| <input checked="" type="checkbox"/> Oper.(LOS)              |                             | <input type="checkbox"/> Des.(N) |   | <input type="checkbox"/> Planning Data |     |
| <b>Flow Inputs</b>  |                             |                                  |   |  |     |
| Volume, V   | 669                         | veh/h                            | Peak-Hour Factor, PHF   | 0.87                                   |     |
| AADT  |                             | veh/day                          | %Trucks and Buses, P <sub>T</sub>   | 6                                      |     |
| Peak-Hr Prop. of AADT, K                                    |                             |                                  | %RVs, P <sub>R</sub>  | 0                                      |     |
| Peak-Hr Direction Prop, D                                   |                             |                                  | General Terrain:  | Level                                  |     |
| DDHV = AADT x K x D   |                             | veh/h                            | Grade % Length  | mi                                     |     |
|   |                             |                                  | Up/Down %   |  |     |
| <b>Calculate Flow Adjustments</b>                           |                             |                                  |   |  |     |
| f <sub>p</sub>  | 1.00                        |                                  | E <sub>R</sub>  | 1.2                                    |     |
| E <sub>T</sub>  | 1.5                         |                                  | f <sub>HV</sub> = 1/[1+P <sub>T</sub> (E <sub>T</sub> - 1) + P <sub>R</sub> (E <sub>R</sub> - 1)] | 0.971                                  |     |
| <b>Speed Inputs</b>   |                             |                                  | <b>Calc Speed Adj and FFS</b>   |  |     |
| Lane Width  |                             | ft                               |   |  |     |
| Rt-Side Lat. Clearance                                      |                             | ft                               | f <sub>LW</sub>   | mph                                    |     |
| Number of Lanes, N  | 2                           |                                  | f <sub>LC</sub>   | mph                                    |     |
| Total Ramp Density, TRD                                     |                             | ramps/mi                         | TRD Adjustment  | mph                                    |     |
| FFS (measured)  | 65.0                        | mph                              | FFS   | 65.0                                   | mph |
| Base free-flow Speed, BFFS                                  |                             | mph                              |   |  |     |
| <b>LOS and Performance Measures</b>                         |                             |                                  | <b>Design (N)</b>   |  |     |
| <u>Operational (LOS)</u>                                    |                             |                                  | <u>Design (N)</u>   |  |     |
| v <sub>p</sub> = (V or DDHV) / (PHF x N x f <sub>HV</sub> ) |                             |                                  | Design LOS  |  |     |
|   | 396                         | pc/h/ln                          | v <sub>p</sub> = (V or DDHV) / (PHF x N x f <sub>HV</sub> )                                       |  |     |
| x f <sub>p</sub> )  |                             |                                  | x f <sub>p</sub> )  |  |     |
| S   | 65.0                        | mph                              | S   |  |     |
| D = v <sub>p</sub> / S                                      | 6.1                         | pc/mi/ln                         | D = v <sub>p</sub> / S  |  |     |
| LOS   | A                           |                                  | Required Number of Lanes, N   |  |     |
| <b>Glossary</b>   |                             |                                  | <b>Factor Location</b>  |  |     |
| N - Number of lanes   | S - Speed                   |                                  | E <sub>R</sub> - Exhibits 11-10, 11-12  | f <sub>LW</sub> - Exhibit 11-8         |     |
| V - Hourly volume   | D - Density                 |                                  | E <sub>T</sub> - Exhibits 11-10, 11-11, 11-13   | f <sub>LC</sub> - Exhibit 11-9         |     |
| v <sub>p</sub> - Flow rate                                  | FFS - Free-flow speed       |                                  | f <sub>p</sub> - Page 11-18   | TRD - Page 11-11                       |     |
| LOS - Level of service                                      | BFFS - Base free-flow speed |                                  | LOS, S, FFS, v <sub>p</sub> - Exhibits 11-2, 11-3   |  |     |
| DDHV - Directional design hour volume                       |                             |                                  |   |  |     |

| BASIC FREEWAY SEGMENTS WORKSHEET                            |                             |                                  |   |  |     |
|---|-----------------------------|----------------------------------|---|--|-----|
| <b>General Information</b>                                  |                             |                                  | <b>Site Information</b>   |  |     |
| Analyst   | Shane Forsythe              |                                  | Highway/Direction of Travel I-15 NB   |  |     |
| Agency or Company   |                             |                                  | From/To North of Emerson Junction   |  |     |
| Date Performed  | 9/8/2014                    |                                  | Jurisdiction  |  |     |
| Analysis Time Period  | PM Peak                     |                                  | Analysis Year 2035  |  |     |
| Project Description I-15 Corridor Study                     |                             |                                  |   |  |     |
| <input checked="" type="checkbox"/> Oper.(LOS)              |                             | <input type="checkbox"/> Des.(N) |   | <input type="checkbox"/> Planning Data |     |
| <b>Flow Inputs</b>  |                             |                                  |   |  |     |
| Volume, V   | 776                         | veh/h                            | Peak-Hour Factor, PHF   | 0.94                                   |     |
| AADT  |                             | veh/day                          | %Trucks and Buses, P <sub>T</sub>   | 6                                      |     |
| Peak-Hr Prop. of AADT, K                                    |                             |                                  | %RVs, P <sub>R</sub>  | 0                                      |     |
| Peak-Hr Direction Prop, D                                   |                             |                                  | General Terrain:  | Level                                  |     |
| DDHV = AADT x K x D   |                             | veh/h                            | Grade % Length  | mi                                     |     |
|   |                             |                                  | Up/Down %   |  |     |
| <b>Calculate Flow Adjustments</b>                           |                             |                                  |   |  |     |
| f <sub>p</sub>  | 1.00                        |                                  | E <sub>R</sub>  | 1.2                                    |     |
| E <sub>T</sub>  | 1.5                         |                                  | f <sub>HV</sub> = 1/[1+P <sub>T</sub> (E <sub>T</sub> - 1) + P <sub>R</sub> (E <sub>R</sub> - 1)] | 0.971                                  |     |
| <b>Speed Inputs</b>   |                             |                                  | <b>Calc Speed Adj and FFS</b>   |  |     |
| Lane Width  |                             | ft                               |   |  |     |
| Rt-Side Lat. Clearance                                      |                             | ft                               | f <sub>LW</sub>   | mph                                    |     |
| Number of Lanes, N  | 2                           |                                  | f <sub>LC</sub>   | mph                                    |     |
| Total Ramp Density, TRD                                     |                             | ramps/mi                         | TRD Adjustment  | mph                                    |     |
| FFS (measured)  | 65.0                        | mph                              | FFS   | 65.0                                   | mph |
| Base free-flow Speed, BFFS                                  |                             | mph                              |   |  |     |
| <b>LOS and Performance Measures</b>                         |                             |                                  | <b>Design (N)</b>   |  |     |
| <u>Operational (LOS)</u>                                    |                             |                                  | <u>Design (N)</u>   |  |     |
| v <sub>p</sub> = (V or DDHV) / (PHF x N x f <sub>HV</sub> ) |                             |                                  | Design LOS  |  |     |
|   | 425                         | pc/h/ln                          | v <sub>p</sub> = (V or DDHV) / (PHF x N x f <sub>HV</sub> )                                       |  |     |
| x f <sub>p</sub> )  |                             |                                  | x f <sub>p</sub> )  |  |     |
| S   | 65.0                        | mph                              | S   |  |     |
| D = v <sub>p</sub> / S                                      | 6.5                         | pc/mi/ln                         | D = v <sub>p</sub> / S  |  |     |
| LOS   | A                           |                                  | Required Number of Lanes, N   |  |     |
| <b>Glossary</b>   |                             |                                  | <b>Factor Location</b>  |  |     |
| N - Number of lanes   | S - Speed                   |                                  | E <sub>R</sub> - Exhibits 11-10, 11-12  | f <sub>LW</sub> - Exhibit 11-8         |     |
| V - Hourly volume   | D - Density                 |                                  | E <sub>T</sub> - Exhibits 11-10, 11-11, 11-13   | f <sub>LC</sub> - Exhibit 11-9         |     |
| v <sub>p</sub> - Flow rate                                  | FFS - Free-flow speed       |                                  | f <sub>p</sub> - Page 11-18   | TRD - Page 11-11                       |     |
| LOS - Level of service                                      | BFFS - Base free-flow speed |                                  | LOS, S, FFS, v <sub>p</sub> - Exhibits 11-2, 11-3   |  |     |
| DDHV - Directional design hour volume                       |                             |                                  |   |  |     |

| BASIC FREEWAY SEGMENTS WORKSHEET  |                |         |   |        |    |
|---|----------------|---------|---|--------|----|
| <b>General Information</b>  |                |         | <b>Site Information</b>   |        |    |
| Analyst   | Shane Forsythe |         | Highway/Direction of Travel <i>I-15 SB</i>  |        |    |
| Agency or Company   |                |         | From/To <i>North of Emerson Junction</i>  |        |    |
| Date Performed  | 9/8/2014       |         | Jurisdiction  |        |    |
| Analysis Time Period  | PM Peak        |         | Analysis Year <i>2035</i>   |        |    |
| Project Description <i>I-15 Corridor Study</i>  |                |         |   |        |    |
| <input checked="" type="checkbox"/> Oper.(LOS) <input type="checkbox"/> Des.(N) <input type="checkbox"/> Planning Data  |                |         |   |        |    |
| <b>Flow Inputs</b>  |                |         |   |        |    |
| Volume, V   | 557            | veh/h   | Peak-Hour Factor, PHF   | 0.88   |    |
| AADT  |                | veh/day | %Trucks and Buses, P <sub>T</sub>   | 13     |    |
| Peak-Hr Prop. of AADT, K  |                |         | %RVs, P <sub>R</sub>  | 0      |    |
| Peak-Hr Direction Prop, D   |                |         | General Terrain:  | Level  |    |
| DDHV = AADT x K x D   |                | veh/h   | Grade %   | Length | mi |
|   |                |         | Up/Down %   |        |    |
| <b>Calculate Flow Adjustments</b>   |                |         |   |        |    |
| f <sub>p</sub>  | 1.00           |         | E <sub>R</sub>  | 1.2    |    |
| E <sub>T</sub>  | 1.5            |         | f <sub>HV</sub> = 1/[1+P <sub>T</sub> (E <sub>T</sub> - 1) + P <sub>R</sub> (E <sub>R</sub> - 1)] 0.939   |        |    |
| <b>Speed Inputs</b>   |                |         | <b>Calc Speed Adj and FFS</b>   |        |    |
| Lane Width  | ft             |         | f <sub>LW</sub> mph<br>f <sub>LC</sub> mph<br>TRD Adjustment mph<br>FFS 65.0 mph  |        |    |
| Rt-Side Lat. Clearance  | ft             |         |   |        |    |
| Number of Lanes, N  | 2              |         |   |        |    |
| Total Ramp Density, TRD   | ramps/mi       |         |   |        |    |
| FFS (measured)  | 65.0 mph       |         |   |        |    |
| Base free-flow Speed, BFFS  | mph            |         |   |        |    |
| <b>LOS and Performance Measures</b>   |                |         | <b>Design (N)</b>   |        |    |
| <u>Operational (LOS)</u><br>$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ 337 pc/h/ln<br>S 65.0 mph<br>$D = v_p / S$ 5.2 pc/mi/ln<br>LOS A   |                |         | <u>Design (N)</u><br>Design LOS<br>$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h/ln<br>S mph<br>$D = v_p / S$ pc/mi/ln<br>Required Number of Lanes, N   |        |    |
| <b>Glossary</b>   |                |         | <b>Factor Location</b>  |        |    |
| N - Number of lanes      S - Speed<br>V - Hourly volume      D - Density<br>v <sub>p</sub> - Flow rate      FFS - Free-flow speed<br>LOS - Level of service      BFFS - Base free-flow speed<br>DDHV - Directional design hour volume |                |         | E <sub>R</sub> - Exhibits 11-10, 11-12      f <sub>LW</sub> - Exhibit 11-8<br>E <sub>T</sub> - Exhibits 11-10, 11-11, 11-13      f <sub>LC</sub> - Exhibit 11-9<br>f <sub>p</sub> - Page 11-18      TRD - Page 11-11<br>LOS, S, FFS, v <sub>p</sub> - Exhibits 11-2, 11-3 |        |    |

| BASIC FREEWAY SEGMENTS WORKSHEET                            |                             |                                  |   |  |        |
|---|-----------------------------|----------------------------------|---|--|--------|
| <b>General Information</b>                                  |                             |                                  | <b>Site Information</b>   |  |        |
| Analyst   | Shane Forsythe              |                                  | Highway/Direction of Travel   | I-15 NB                                |        |
| Agency or Company   |                             |                                  | From/To   | North of Gore Hill                     |        |
| Date Performed  | 9/8/2014                    |                                  | Jurisdiction  |  |        |
| Analysis Time Period  | AM Peak                     |                                  | Analysis Year   | 2035                                   |        |
| Project Description I-15 Corridor Study                     |                             |                                  |   |  |        |
| <input checked="" type="checkbox"/> Oper.(LOS)              |                             | <input type="checkbox"/> Des.(N) |   | <input type="checkbox"/> Planning Data |        |
| <b>Flow Inputs</b>  |                             |                                  |   |  |        |
| Volume, V   | 803                         | veh/h                            | Peak-Hour Factor, PHF   | 0.90                                   |        |
| AADT  |                             | veh/day                          | %Trucks and Buses, P <sub>T</sub>   | 16                                     |        |
| Peak-Hr Prop. of AADT, K                                    |                             |                                  | %RVs, P <sub>R</sub>  | 0                                      |        |
| Peak-Hr Direction Prop, D                                   |                             |                                  | General Terrain:  | Grade                                  |        |
| DDHV = AADT x K x D   |                             | veh/h                            | Grade   | -5.00%                                 | 0.69mi |
|   |                             |                                  | Length  |  |        |
|   |                             |                                  | Up/Down %   | -5.00                                  |        |
| <b>Calculate Flow Adjustments</b>                           |                             |                                  |   |  |        |
| f <sub>p</sub>  | 1.00                        |                                  | E <sub>R</sub>  | 1.2                                    |        |
| E <sub>T</sub>  | 1.5                         |                                  | f <sub>HV</sub> = 1/[1+P <sub>T</sub> (E <sub>T</sub> - 1) + P <sub>R</sub> (E <sub>R</sub> - 1)] | 0.926                                  |        |
| <b>Speed Inputs</b>   |                             |                                  | <b>Calc Speed Adj and FFS</b>   |  |        |
| Lane Width  |                             | ft                               |   |  |        |
| Rt-Side Lat. Clearance                                      |                             | ft                               | f <sub>LW</sub>   | mph                                    |        |
| Number of Lanes, N  | 2                           |                                  | f <sub>LC</sub>   | mph                                    |        |
| Total Ramp Density, TRD                                     |                             | ramps/mi                         | TRD Adjustment  | mph                                    |        |
| FFS (measured)  | 65.0                        | mph                              | FFS   | 65.0                                   | mph    |
| Base free-flow Speed, BFFS                                  |                             | mph                              |   |  |        |
| <b>LOS and Performance Measures</b>                         |                             |                                  | <b>Design (N)</b>   |  |        |
| <u>Operational (LOS)</u>                                    |                             |                                  | <u>Design (N)</u>   |  |        |
| v <sub>p</sub> = (V or DDHV) / (PHF x N x f <sub>HV</sub> ) |                             |                                  | Design LOS  |  |        |
|   | 482                         | pc/h/ln                          | v <sub>p</sub> = (V or DDHV) / (PHF x N x f <sub>HV</sub> )                                       |  |        |
| x f <sub>p</sub> )  |                             |                                  | pc/h/ln   |  |        |
| S   | 65.0                        | mph                              | S   |  |        |
| D = v <sub>p</sub> / S                                      | 7.4                         | pc/mi/ln                         | D = v <sub>p</sub> / S  |  |        |
| LOS   | A                           |                                  | Required Number of Lanes, N   |  |        |
| <b>Glossary</b>   |                             |                                  | <b>Factor Location</b>  |  |        |
| N - Number of lanes   | S - Speed                   |                                  | E <sub>R</sub> - Exhibits 11-10, 11-12  | f <sub>LW</sub> - Exhibit 11-8         |        |
| V - Hourly volume   | D - Density                 |                                  | E <sub>T</sub> - Exhibits 11-10, 11-11, 11-13   | f <sub>LC</sub> - Exhibit 11-9         |        |
| v <sub>p</sub> - Flow rate                                  | FFS - Free-flow speed       |                                  | f <sub>p</sub> - Page 11-18   | TRD - Page 11-11                       |        |
| LOS - Level of service                                      | BFFS - Base free-flow speed |                                  | LOS, S, FFS, v <sub>p</sub> - Exhibits 11-2, 11-3   |  |        |
| DDHV - Directional design hour volume                       |                             |                                  |   |  |        |



| <b>BASIC FREEWAY SEGMENTS WORKSHEET</b>  |                |         |  |           |               |
|--|----------------|---------|--|-----------|---------------|
| <b>General Information</b>   |                |         | <b>Site Information</b>  |           |               |
| Analyst  | Shane Forsythe |         | Highway/Direction of Travel <i>I-15 SB</i>   |           |               |
| Agency or Company  |                |         | From/To <i>North of Gore Hill</i>  |           |               |
| Date Performed   | 9/8/2014       |         | Jurisdiction   |           |               |
| Analysis Time Period   | AM Peak        |         | Analysis Year <i>2035</i>  |           |               |
| Project Description <i>I-15 Corridor Study</i>   |                |         |  |           |               |
| <input checked="" type="checkbox"/> Oper.(LOS) <input type="checkbox"/> Des.(N) <input type="checkbox"/> Planning Data                         |                |         |  |           |               |
| <b>Flow Inputs</b>   |                |         |  |           |               |
| Volume, V  | 712            | veh/h   | Peak-Hour Factor, PHF  | 0.85      |               |
| AADT   |                | veh/day | %Trucks and Buses, P <sub>T</sub>  | 7         |               |
| Peak-Hr Prop. of AADT, K   |                |         | %RVs, P <sub>R</sub>   | 0         |               |
| Peak-Hr Direction Prop, D  |                |         | General Terrain:   | Grade     |               |
| DDHV = AADT x K x D  |                | veh/h   | Grade  | 5.00%     | Length 0.69mi |
|  |                |         |  | Up/Down % | 5.00          |
| <b>Calculate Flow Adjustments</b>  |                |         |  |           |               |
| f <sub>p</sub>   | 1.00           |         | E <sub>R</sub>   | 4.5       |               |
| E <sub>T</sub>   | 2.8            |         | f <sub>HV</sub> = 1/[1+P <sub>T</sub> (E <sub>T</sub> - 1) + P <sub>R</sub> (E <sub>R</sub> - 1)]  | 0.891     |               |
| <b>Speed Inputs</b>  |                |         | <b>Calc Speed Adj and FFS</b>  |           |               |
| Lane Width   | ft             |         | <div style="display: flex; justify-content: space-between;"> <div>f<sub>LW</sub></div> <div>mph</div> </div> <div style="display: flex; justify-content: space-between;"> <div>f<sub>LC</sub></div> <div>mph</div> </div> <div style="display: flex; justify-content: space-between;"> <div>TRD Adjustment</div> <div>mph</div> </div> <div style="display: flex; justify-content: space-between;"> <div>FFS</div> <div>65.0</div> <div>mph</div> </div> |           |               |
| Rt-Side Lat. Clearance   | ft             |         |  |           |               |
| Number of Lanes, N   | 2              |         |  |           |               |
| Total Ramp Density, TRD  | ramps/mi       |         |  |           |               |
| FFS (measured)   | 65.0 mph       |         |  |           |               |
| Base free-flow Speed, BFFS   | mph            |         |  |           |               |
| <b>LOS and Performance Measures</b>  |                |         | <b>Design (N)</b>  |           |               |
| <u>Operational (LOS)</u><br>$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$<br>S = 65.0 mph<br>$D = v_p / S$<br>LOS = A |                |         | <u>Design (N)</u><br>Design LOS<br>$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$<br>S = mph<br>$D = v_p / S$<br>Required Number of Lanes, N   |           |               |
| <b>Glossary</b>  |                |         | <b>Factor Location</b>   |           |               |
| N - Number of lanes<br>V - Hourly volume<br>v <sub>p</sub> - Flow rate<br>LOS - Level of service<br>DDHV - Directional design hour volume      |                |         | S - Speed<br>D - Density<br>FFS - Free-flow speed<br>BFFS - Base free-flow speed<br>E <sub>R</sub> - Exhibits 11-10, 11-12<br>E <sub>T</sub> - Exhibits 11-10, 11-11, 11-13<br>f <sub>p</sub> - Page 11-18<br>LOS, S, FFS, v <sub>p</sub> - Exhibits 11-2, 11-3  |           |               |
|  |                |         | f <sub>LW</sub> - Exhibit 11-8<br>f <sub>LC</sub> - Exhibit 11-9<br>TRD - Page 11-11   |           |               |

| BASIC FREEWAY SEGMENTS WORKSHEET                            |                             |                                  |   |  |     |
|---|-----------------------------|----------------------------------|---|--|-----|
| <b>General Information</b>                                  |                             |                                  | <b>Site Information</b>   |  |     |
| Analyst   | Shane Forsythe              |                                  | Highway/Direction of Travel I-15 NB   |  |     |
| Agency or Company   |                             |                                  | From/To North of Gore Hill  |  |     |
| Date Performed  | 9/8/2014                    |                                  | Jurisdiction  |  |     |
| Analysis Time Period  | PM Peak                     |                                  | Analysis Year 2035  |  |     |
| Project Description I-15 Corridor Study                     |                             |                                  |   |  |     |
| <input checked="" type="checkbox"/> Oper.(LOS)              |                             | <input type="checkbox"/> Des.(N) |   | <input type="checkbox"/> Planning Data |     |
| <b>Flow Inputs</b>  |                             |                                  |   |  |     |
| Volume, V   | 1122                        | veh/h                            | Peak-Hour Factor, PHF   | 0.80                                   |     |
| AADT  |                             | veh/day                          | %Trucks and Buses, P <sub>T</sub>   | 10                                     |     |
| Peak-Hr Prop. of AADT, K                                    |                             |                                  | %RVs, P <sub>R</sub>  | 0                                      |     |
| Peak-Hr Direction Prop, D                                   |                             |                                  | General Terrain:  | Grade                                  |     |
| DDHV = AADT x K x D   |                             | veh/h                            | Grade -5.00%  | 0.69mi                                 |     |
|   |                             |                                  | Length  | Up/Down % -5.00                        |     |
| <b>Calculate Flow Adjustments</b>                           |                             |                                  |   |  |     |
| f <sub>p</sub>  | 1.00                        |                                  | E <sub>R</sub>  | 1.2                                    |     |
| E <sub>T</sub>  | 1.5                         |                                  | f <sub>HV</sub> = 1/[1+P <sub>T</sub> (E <sub>T</sub> - 1) + P <sub>R</sub> (E <sub>R</sub> - 1)] | 0.952                                  |     |
| <b>Speed Inputs</b>   |                             |                                  | <b>Calc Speed Adj and FFS</b>   |  |     |
| Lane Width  |                             | ft                               |   |  |     |
| Rt-Side Lat. Clearance                                      |                             | ft                               | f <sub>LW</sub>   | mph                                    |     |
| Number of Lanes, N  | 2                           |                                  | f <sub>LC</sub>   | mph                                    |     |
| Total Ramp Density, TRD                                     |                             | ramps/mi                         | TRD Adjustment  | mph                                    |     |
| FFS (measured)  | 65.0                        | mph                              | FFS   | 65.0                                   | mph |
| Base free-flow Speed, BFFS                                  |                             | mph                              |   |  |     |
| <b>LOS and Performance Measures</b>                         |                             |                                  | <b>Design (N)</b>   |  |     |
| <u>Operational (LOS)</u>                                    |                             |                                  | <u>Design (N)</u>   |  |     |
| v <sub>p</sub> = (V or DDHV) / (PHF x N x f <sub>HV</sub> ) |                             |                                  | Design LOS  |  |     |
|   | 736                         | pc/h/ln                          | v <sub>p</sub> = (V or DDHV) / (PHF x N x f <sub>HV</sub> )                                       |  |     |
| x f <sub>p</sub> )  |                             |                                  | x f <sub>p</sub> )  |  |     |
| S   | 65.0                        | mph                              | S   |  |     |
| D = v <sub>p</sub> / S                                      | 11.3                        | pc/mi/ln                         | D = v <sub>p</sub> / S  |  |     |
| LOS   | B                           |                                  | Required Number of Lanes, N   |  |     |
| <b>Glossary</b>   |                             |                                  | <b>Factor Location</b>  |  |     |
| N - Number of lanes   | S - Speed                   |                                  | E <sub>R</sub> - Exhibits 11-10, 11-12  | f <sub>LW</sub> - Exhibit 11-8         |     |
| V - Hourly volume   | D - Density                 |                                  | E <sub>T</sub> - Exhibits 11-10, 11-11, 11-13   | f <sub>LC</sub> - Exhibit 11-9         |     |
| v <sub>p</sub> - Flow rate                                  | FFS - Free-flow speed       |                                  | f <sub>p</sub> - Page 11-18   | TRD - Page 11-11                       |     |
| LOS - Level of service                                      | BFFS - Base free-flow speed |                                  | LOS, S, FFS, v <sub>p</sub> - Exhibits 11-2, 11-3   |  |     |
| DDHV - Directional design hour volume                       |                             |                                  |   |  |     |

| <b>BASIC FREEWAY SEGMENTS WORKSHEET</b>   |                |         |  |           |               |
|---|----------------|---------|--|-----------|---------------|
| <b>General Information</b>  |                |         | <b>Site Information</b>  |           |               |
| Analyst   | Shane Forsythe |         | Highway/Direction of Travel <i>I-15 SB</i>   |           |               |
| Agency or Company   |                |         | From/To <i>North of Gore Hill</i>  |           |               |
| Date Performed  | 9/8/2014       |         | Jurisdiction   |           |               |
| Analysis Time Period  | AM Peak        |         | Analysis Year <i>2035</i>  |           |               |
| Project Description <i>I-15 Corridor Study</i>  |                |         |  |           |               |
| <input checked="" type="checkbox"/> Oper.(LOS) <input type="checkbox"/> Des.(N) <input type="checkbox"/> Planning Data                    |                |         |  |           |               |
| <b>Flow Inputs</b>  |                |         |  |           |               |
| Volume, V   | 979            | veh/h   | Peak-Hour Factor, PHF  | 0.93      |               |
| AADT  |                | veh/day | %Trucks and Buses, P <sub>T</sub>  | 10        |               |
| Peak-Hr Prop. of AADT, K  |                |         | %RVs, P <sub>R</sub>   | 0         |               |
| Peak-Hr Direction Prop, D   |                |         | General Terrain:   | Grade     |               |
| DDHV = AADT x K x D   |                | veh/h   | Grade  | 5.00%     | Length 0.69mi |
|   |                |         |  | Up/Down % | 5.00          |
| <b>Calculate Flow Adjustments</b>   |                |         |  |           |               |
| f <sub>p</sub>  | 1.00           |         | E <sub>R</sub>   | 4.5       |               |
| E <sub>T</sub>  | 2.5            |         | f <sub>HV</sub> = 1/[1+P <sub>T</sub> (E <sub>T</sub> - 1) + P <sub>R</sub> (E <sub>R</sub> - 1)] 0.870  |           |               |
| <b>Speed Inputs</b>   |                |         | <b>Calc Speed Adj and FFS</b>  |           |               |
| Lane Width  | ft             |         | <div style="display: flex; justify-content: space-between;"> <div>f<sub>LW</sub></div> <div>mph</div> </div> <div style="display: flex; justify-content: space-between;"> <div>f<sub>LC</sub></div> <div>mph</div> </div> <div style="display: flex; justify-content: space-between;"> <div>TRD Adjustment</div> <div>mph</div> </div> <div style="display: flex; justify-content: space-between;"> <div>FFS</div> <div>65.0</div> <div>mph</div> </div> |           |               |
| Rt-Side Lat. Clearance  | ft             |         |  |           |               |
| Number of Lanes, N  | 2              |         |  |           |               |
| Total Ramp Density, TRD   | ramps/mi       |         |  |           |               |
| FFS (measured)  | 65.0 mph       |         |  |           |               |
| Base free-flow Speed, BFFS  | mph            |         |  |           |               |
| <b>LOS and Performance Measures</b>   |                |         | <b>Design (N)</b>  |           |               |
| <u>Operational (LOS)</u><br>$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$<br>S<br>$D = v_p / S$<br>LOS           |                |         | <u>Design (N)</u><br>Design LOS<br>$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$<br>S<br>$D = v_p / S$<br>Required Number of Lanes, N   |           |               |
| <b>Glossary</b>   |                |         | <b>Factor Location</b>   |           |               |
| N - Number of lanes<br>V - Hourly volume<br>v <sub>p</sub> - Flow rate<br>LOS - Level of service<br>DDHV - Directional design hour volume |                |         | S - Speed<br>D - Density<br>FFS - Free-flow speed<br>BFFS - Base free-flow speed<br>E <sub>R</sub> - Exhibits 11-10, 11-12<br>E <sub>T</sub> - Exhibits 11-10, 11-11, 11-13<br>f <sub>p</sub> - Page 11-18<br>LOS, S, FFS, v <sub>p</sub> - Exhibits 11-2, 11-3  |           |               |
|   |                |         | f <sub>LW</sub> - Exhibit 11-8<br>f <sub>LC</sub> - Exhibit 11-9<br>TRD - Page 11-11   |           |               |

| BASIC FREEWAY SEGMENTS WORKSHEET                            |                             |                                  |   |  |     |
|---|-----------------------------|----------------------------------|---|--|-----|
| <b>General Information</b>                                  |                             |                                  | <b>Site Information</b>   |  |     |
| Analyst   | Shane Forsythe              |                                  | Highway/Direction of Travel I-15 NB   |  |     |
| Agency or Company   |                             |                                  | From/To South of Central  |  |     |
| Date Performed  | 9/8/2014                    |                                  | Jurisdiction  |  |     |
| Analysis Time Period  | AM Peak                     |                                  | Analysis Year 2035  |  |     |
| Project Description I-15 Corridor Study                     |                             |                                  |   |  |     |
| <input checked="" type="checkbox"/> Oper.(LOS)              |                             | <input type="checkbox"/> Des.(N) |   | <input type="checkbox"/> Planning Data |     |
| <b>Flow Inputs</b>  |                             |                                  |   |  |     |
| Volume, V   | 519                         | veh/h                            | Peak-Hour Factor, PHF   | 0.89                                   |     |
| AADT  |                             | veh/day                          | %Trucks and Buses, P <sub>T</sub>   | 14                                     |     |
| Peak-Hr Prop. of AADT, K                                    |                             |                                  | %RVs, P <sub>R</sub>  | 0                                      |     |
| Peak-Hr Direction Prop, D                                   |                             |                                  | General Terrain:  | Level                                  |     |
| DDHV = AADT x K x D   |                             | veh/h                            | Grade % Length  | mi                                     |     |
|   |                             |                                  | Up/Down %   |  |     |
| <b>Calculate Flow Adjustments</b>                           |                             |                                  |   |  |     |
| f <sub>p</sub>  | 1.00                        |                                  | E <sub>R</sub>  | 1.2                                    |     |
| E <sub>T</sub>  | 1.5                         |                                  | f <sub>HV</sub> = 1/[1+P <sub>T</sub> (E <sub>T</sub> - 1) + P <sub>R</sub> (E <sub>R</sub> - 1)] | 0.935                                  |     |
| <b>Speed Inputs</b>   |                             |                                  | <b>Calc Speed Adj and FFS</b>   |  |     |
| Lane Width  |                             | ft                               |   |  |     |
| Rt-Side Lat. Clearance                                      |                             | ft                               | f <sub>LW</sub>   | mph                                    |     |
| Number of Lanes, N  | 2                           |                                  | f <sub>LC</sub>   | mph                                    |     |
| Total Ramp Density, TRD                                     |                             | ramps/mi                         | TRD Adjustment  | mph                                    |     |
| FFS (measured)  | 65.0                        | mph                              | FFS   | 65.0                                   | mph |
| Base free-flow Speed, BFFS                                  |                             | mph                              |   |  |     |
| <b>LOS and Performance Measures</b>                         |                             |                                  | <b>Design (N)</b>   |  |     |
| <u>Operational (LOS)</u>                                    |                             |                                  | <u>Design (N)</u>   |  |     |
| v <sub>p</sub> = (V or DDHV) / (PHF x N x f <sub>HV</sub> ) |                             |                                  | Design LOS  |  |     |
|   | 312                         | pc/h/ln                          | v <sub>p</sub> = (V or DDHV) / (PHF x N x f <sub>HV</sub> )                                       |  |     |
| x f <sub>p</sub> )  |                             |                                  | x f <sub>p</sub> )  |  |     |
| S   | 65.0                        | mph                              | S   |  |     |
| D = v <sub>p</sub> / S                                      | 4.8                         | pc/mi/ln                         | D = v <sub>p</sub> / S  |  |     |
| LOS   | A                           |                                  | Required Number of Lanes, N   |  |     |
| <b>Glossary</b>   |                             |                                  | <b>Factor Location</b>  |  |     |
| N - Number of lanes   | S - Speed                   |                                  | E <sub>R</sub> - Exhibits 11-10, 11-12  | f <sub>LW</sub> - Exhibit 11-8         |     |
| V - Hourly volume   | D - Density                 |                                  | E <sub>T</sub> - Exhibits 11-10, 11-11, 11-13   | f <sub>LC</sub> - Exhibit 11-9         |     |
| v <sub>p</sub> - Flow rate                                  | FFS - Free-flow speed       |                                  | f <sub>p</sub> - Page 11-18   | TRD - Page 11-11                       |     |
| LOS - Level of service                                      | BFFS - Base free-flow speed |                                  | LOS, S, FFS, v <sub>p</sub> - Exhibits 11-2, 11-3   |  |     |
| DDHV - Directional design hour volume                       |                             |                                  |   |  |     |

| BASIC FREEWAY SEGMENTS WORKSHEET                            |                             |                                  |   |  |     |
|---|-----------------------------|----------------------------------|---|--|-----|
| <b>General Information</b>                                  |                             |                                  | <b>Site Information</b>   |  |     |
| Analyst   | Shane Forsythe              |                                  | Highway/Direction of Travel I-15 SB   |  |     |
| Agency or Company   |                             |                                  | From/To South of Central  |  |     |
| Date Performed  | 9/8/2014                    |                                  | Jurisdiction  |  |     |
| Analysis Time Period  | AM Peak                     |                                  | Analysis Year 2035  |  |     |
| Project Description I-15 Corridor Study                     |                             |                                  |   |  |     |
| <input checked="" type="checkbox"/> Oper.(LOS)              |                             | <input type="checkbox"/> Des.(N) |   | <input type="checkbox"/> Planning Data |     |
| <b>Flow Inputs</b>  |                             |                                  |   |  |     |
| Volume, V   | 569                         | veh/h                            | Peak-Hour Factor, PHF   | 0.94                                   |     |
| AADT  |                             | veh/day                          | %Trucks and Buses, P <sub>T</sub>   | 8                                      |     |
| Peak-Hr Prop. of AADT, K                                    |                             |                                  | %RVs, P <sub>R</sub>  | 0                                      |     |
| Peak-Hr Direction Prop, D                                   |                             |                                  | General Terrain:  | Level                                  |     |
| DDHV = AADT x K x D   |                             | veh/h                            | Grade % Length  | mi                                     |     |
|   |                             |                                  | Up/Down %   |  |     |
| <b>Calculate Flow Adjustments</b>                           |                             |                                  |   |  |     |
| f <sub>p</sub>  | 1.00                        |                                  | E <sub>R</sub>  | 1.2                                    |     |
| E <sub>T</sub>  | 1.5                         |                                  | f <sub>HV</sub> = 1/[1+P <sub>T</sub> (E <sub>T</sub> - 1) + P <sub>R</sub> (E <sub>R</sub> - 1)] | 0.962                                  |     |
| <b>Speed Inputs</b>   |                             |                                  | <b>Calc Speed Adj and FFS</b>   |  |     |
| Lane Width  |                             | ft                               |   |  |     |
| Rt-Side Lat. Clearance                                      |                             | ft                               | f <sub>LW</sub>   | mph                                    |     |
| Number of Lanes, N  | 2                           |                                  | f <sub>LC</sub>   | mph                                    |     |
| Total Ramp Density, TRD                                     |                             | ramps/mi                         | TRD Adjustment  | mph                                    |     |
| FFS (measured)  | 65.0                        | mph                              | FFS   | 65.0                                   | mph |
| Base free-flow Speed, BFFS                                  |                             | mph                              |   |  |     |
| <b>LOS and Performance Measures</b>                         |                             |                                  | <b>Design (N)</b>   |  |     |
| <u>Operational (LOS)</u>                                    |                             |                                  | <u>Design (N)</u>   |  |     |
| v <sub>p</sub> = (V or DDHV) / (PHF x N x f <sub>HV</sub> ) |                             |                                  | Design LOS  |  |     |
|   | 315                         | pc/h/ln                          | v <sub>p</sub> = (V or DDHV) / (PHF x N x f <sub>HV</sub> )                                       |  |     |
| x f <sub>p</sub> )  |                             |                                  | x f <sub>p</sub> )  |  |     |
| S   | 65.0                        | mph                              | S   |  |     |
| D = v <sub>p</sub> / S                                      | 4.8                         | pc/mi/ln                         | D = v <sub>p</sub> / S  |  |     |
| LOS   | A                           |                                  | Required Number of Lanes, N   |  |     |
| <b>Glossary</b>   |                             |                                  | <b>Factor Location</b>  |  |     |
| N - Number of lanes   | S - Speed                   |                                  | E <sub>R</sub> - Exhibits 11-10, 11-12  | f <sub>LW</sub> - Exhibit 11-8         |     |
| V - Hourly volume   | D - Density                 |                                  | E <sub>T</sub> - Exhibits 11-10, 11-11, 11-13   | f <sub>LC</sub> - Exhibit 11-9         |     |
| v <sub>p</sub> - Flow rate                                  | FFS - Free-flow speed       |                                  | f <sub>p</sub> - Page 11-18   | TRD - Page 11-11                       |     |
| LOS - Level of service                                      | BFFS - Base free-flow speed |                                  | LOS, S, FFS, v <sub>p</sub> - Exhibits 11-2, 11-3   |  |     |
| DDHV - Directional design hour volume                       |                             |                                  |   |  |     |

| BASIC FREEWAY SEGMENTS WORKSHEET  |                |         |  |        |    |
|---|----------------|---------|--|--------|----|
| <b>General Information</b>  |                |         | <b>Site Information</b>  |        |    |
| Analyst   | Shane Forsythe |         | Highway/Direction of Travel <i>I-15 NB</i>   |        |    |
| Agency or Company   |                |         | From/To <i>South of Central</i>  |        |    |
| Date Performed  | 9/8/2014       |         | Jurisdiction   |        |    |
| Analysis Time Period  | PM Peak        |         | Analysis Year <i>2035</i>  |        |    |
| Project Description <i>I-15 Corridor Study</i>  |                |         |  |        |    |
| <input checked="" type="checkbox"/> Oper.(LOS) <input type="checkbox"/> Des.(N) <input type="checkbox"/> Planning Data                    |                |         |  |        |    |
| <b>Flow Inputs</b>  |                |         |  |        |    |
| Volume, V   | 792            | veh/h   | Peak-Hour Factor, PHF  | 0.87   |    |
| AADT  |                | veh/day | %Trucks and Buses, P <sub>T</sub>  | 11     |    |
| Peak-Hr Prop. of AADT, K  |                |         | %RVs, P <sub>R</sub>   | 0      |    |
| Peak-Hr Direction Prop, D   |                |         | General Terrain:   | Level  |    |
| DDHV = AADT x K x D   |                | veh/h   | Grade %  | Length | mi |
|   |                |         | Up/Down %  |        |    |
| <b>Calculate Flow Adjustments</b>   |                |         |  |        |    |
| f <sub>p</sub>  | 1.00           |         | E <sub>R</sub>   | 1.2    |    |
| E <sub>T</sub>  | 1.5            |         | f <sub>HV</sub> = 1/[1+P <sub>T</sub> (E <sub>T</sub> - 1) + P <sub>R</sub> (E <sub>R</sub> - 1)] 0.948  |        |    |
| <b>Speed Inputs</b>   |                |         | <b>Calc Speed Adj and FFS</b>  |        |    |
| Lane Width  | ft             |         | <div style="display: flex; justify-content: space-between;"> <div>f<sub>LW</sub></div> <div>mph</div> </div> <div style="display: flex; justify-content: space-between;"> <div>f<sub>LC</sub></div> <div>mph</div> </div> <div style="display: flex; justify-content: space-between;"> <div>TRD Adjustment</div> <div>mph</div> </div> <div style="display: flex; justify-content: space-between;"> <div>FFS</div> <div>65.0</div> <div>mph</div> </div> |        |    |
| Rt-Side Lat. Clearance  | ft             |         |  |        |    |
| Number of Lanes, N  | 2              |         |  |        |    |
| Total Ramp Density, TRD   | ramps/mi       |         |  |        |    |
| FFS (measured)  | 65.0 mph       |         |  |        |    |
| Base free-flow Speed, BFFS  | mph            |         |  |        |    |
| <b>LOS and Performance Measures</b>   |                |         | <b>Design (N)</b>  |        |    |
| <u>Operational (LOS)</u><br>$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$<br>S<br>$D = v_p / S$<br>LOS           |                |         | <u>Design (N)</u><br>Design LOS<br>$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$<br>S<br>$D = v_p / S$<br>Required Number of Lanes, N   |        |    |
| <b>Glossary</b>   |                |         | <b>Factor Location</b>   |        |    |
| N - Number of lanes<br>V - Hourly volume<br>v <sub>p</sub> - Flow rate<br>LOS - Level of service<br>DDHV - Directional design hour volume |                |         | S - Speed<br>D - Density<br>FFS - Free-flow speed<br>BFFS - Base free-flow speed<br>E <sub>R</sub> - Exhibits 11-10, 11-12<br>E <sub>T</sub> - Exhibits 11-10, 11-11, 11-13<br>f <sub>p</sub> - Page 11-18<br>LOS, S, FFS, v <sub>p</sub> - Exhibits 11-2, 11-3  |        |    |
|   |                |         | f <sub>LW</sub> - Exhibit 11-8<br>f <sub>LC</sub> - Exhibit 11-9<br>TRD - Page 11-11   |        |    |

| BASIC FREEWAY SEGMENTS WORKSHEET                            |                             |                                  |   |  |     |
|---|-----------------------------|----------------------------------|---|--|-----|
| <b>General Information</b>                                  |                             |                                  | <b>Site Information</b>   |  |     |
| Analyst   | Shane Forsythe              |                                  | Highway/Direction of Travel I-15 SB   |  |     |
| Agency or Company   |                             |                                  | From/To South of Central  |  |     |
| Date Performed  | 9/8/2014                    |                                  | Jurisdiction  |  |     |
| Analysis Time Period  | PM Peak                     |                                  | Analysis Year 2035  |  |     |
| Project Description I-15 Corridor Study                     |                             |                                  |   |  |     |
| <input checked="" type="checkbox"/> Oper.(LOS)              |                             | <input type="checkbox"/> Des.(N) |   | <input type="checkbox"/> Planning Data |     |
| <b>Flow Inputs</b>  |                             |                                  |   |  |     |
| Volume, V   | 793                         | veh/h                            | Peak-Hour Factor, PHF   | 0.90                                   |     |
| AADT  |                             | veh/day                          | %Trucks and Buses, P <sub>T</sub>   | 14                                     |     |
| Peak-Hr Prop. of AADT, K                                    |                             |                                  | %RVs, P <sub>R</sub>  | 0                                      |     |
| Peak-Hr Direction Prop, D                                   |                             |                                  | General Terrain:  | Level                                  |     |
| DDHV = AADT x K x D   |                             | veh/h                            | Grade % Length  | mi                                     |     |
|   |                             |                                  | Up/Down %   |  |     |
| <b>Calculate Flow Adjustments</b>                           |                             |                                  |   |  |     |
| f <sub>p</sub>  | 1.00                        |                                  | E <sub>R</sub>  | 1.2                                    |     |
| E <sub>T</sub>  | 1.5                         |                                  | f <sub>HV</sub> = 1/[1+P <sub>T</sub> (E <sub>T</sub> - 1) + P <sub>R</sub> (E <sub>R</sub> - 1)] | 0.935                                  |     |
| <b>Speed Inputs</b>   |                             |                                  | <b>Calc Speed Adj and FFS</b>   |  |     |
| Lane Width  |                             | ft                               |   |  |     |
| Rt-Side Lat. Clearance                                      |                             | ft                               | f <sub>LW</sub>   | mph                                    |     |
| Number of Lanes, N  | 2                           |                                  | f <sub>LC</sub>   | mph                                    |     |
| Total Ramp Density, TRD                                     |                             | ramps/mi                         | TRD Adjustment  | mph                                    |     |
| FFS (measured)  | 65.0                        | mph                              | FFS   | 65.0                                   | mph |
| Base free-flow Speed, BFFS                                  |                             | mph                              |   |  |     |
| <b>LOS and Performance Measures</b>                         |                             |                                  | <b>Design (N)</b>   |  |     |
| <u>Operational (LOS)</u>                                    |                             |                                  | <u>Design (N)</u>   |  |     |
| v <sub>p</sub> = (V or DDHV) / (PHF x N x f <sub>HV</sub> ) |                             |                                  | Design LOS  |  |     |
|   | 471                         | pc/h/ln                          | v <sub>p</sub> = (V or DDHV) / (PHF x N x f <sub>HV</sub> )                                       |  |     |
| x f <sub>p</sub> )  |                             |                                  | x f <sub>p</sub> )  |  |     |
| S   | 65.0                        | mph                              | S   |  |     |
| D = v <sub>p</sub> / S                                      | 7.2                         | pc/mi/ln                         | D = v <sub>p</sub> / S  |  |     |
| LOS   | A                           |                                  | Required Number of Lanes, N   |  |     |
| <b>Glossary</b>   |                             |                                  | <b>Factor Location</b>  |  |     |
| N - Number of lanes   | S - Speed                   |                                  | E <sub>R</sub> - Exhibits 11-10, 11-12  | f <sub>LW</sub> - Exhibit 11-8         |     |
| V - Hourly volume   | D - Density                 |                                  | E <sub>T</sub> - Exhibits 11-10, 11-11, 11-13   | f <sub>LC</sub> - Exhibit 11-9         |     |
| v <sub>p</sub> - Flow rate                                  | FFS - Free-flow speed       |                                  | f <sub>p</sub> - Page 11-18   | TRD - Page 11-11                       |     |
| LOS - Level of service                                      | BFFS - Base free-flow speed |                                  | LOS, S, FFS, v <sub>p</sub> - Exhibits 11-2, 11-3   |  |     |
| DDHV - Directional design hour volume                       |                             |                                  |   |  |     |

| BASIC FREEWAY SEGMENTS WORKSHEET                            |                             |                                  |   |  |     |
|---|-----------------------------|----------------------------------|---|--|-----|
| <b>General Information</b>                                  |                             |                                  | <b>Site Information</b>   |  |     |
| Analyst   | Shane Forsythe              |                                  | Highway/Direction of Travel I-15 NB   |  |     |
| Agency or Company   |                             |                                  | From/To South of Gore Hill  |  |     |
| Date Performed  | 9/8/2014                    |                                  | Jurisdiction  |  |     |
| Analysis Time Period  | AM Peak                     |                                  | Analysis Year 2035  |  |     |
| Project Description I-15 Corridor Study                     |                             |                                  |   |  |     |
| <input checked="" type="checkbox"/> Oper.(LOS)              |                             | <input type="checkbox"/> Des.(N) |   | <input type="checkbox"/> Planning Data |     |
| <b>Flow Inputs</b>  |                             |                                  |   |  |     |
| Volume, V   | 297                         | veh/h                            | Peak-Hour Factor, PHF   | 0.92                                   |     |
| AADT  |                             | veh/day                          | %Trucks and Buses, P <sub>T</sub>   | 10                                     |     |
| Peak-Hr Prop. of AADT, K                                    |                             |                                  | %RVs, P <sub>R</sub>  | 0                                      |     |
| Peak-Hr Direction Prop, D                                   |                             |                                  | General Terrain:  | Level                                  |     |
| DDHV = AADT x K x D   |                             | veh/h                            | Grade % Length  | mi                                     |     |
|   |                             |                                  | Up/Down %   |  |     |
| <b>Calculate Flow Adjustments</b>                           |                             |                                  |   |  |     |
| f <sub>p</sub>  | 1.00                        |                                  | E <sub>R</sub>  | 1.2                                    |     |
| E <sub>T</sub>  | 1.5                         |                                  | f <sub>HV</sub> = 1/[1+P <sub>T</sub> (E <sub>T</sub> - 1) + P <sub>R</sub> (E <sub>R</sub> - 1)] | 0.952                                  |     |
| <b>Speed Inputs</b>   |                             |                                  | <b>Calc Speed Adj and FFS</b>   |  |     |
| Lane Width  |                             | ft                               |   |  |     |
| Rt-Side Lat. Clearance                                      |                             | ft                               | f <sub>LW</sub>   | mph                                    |     |
| Number of Lanes, N  | 2                           |                                  | f <sub>LC</sub>   | mph                                    |     |
| Total Ramp Density, TRD                                     |                             | ramps/mi                         | TRD Adjustment  | mph                                    |     |
| FFS (measured)  | 65.0                        | mph                              | FFS   | 65.0                                   | mph |
| Base free-flow Speed, BFFS                                  |                             | mph                              |   |  |     |
| <b>LOS and Performance Measures</b>                         |                             |                                  | <b>Design (N)</b>   |  |     |
| <u>Operational (LOS)</u>                                    |                             |                                  | <u>Design (N)</u>   |  |     |
| v <sub>p</sub> = (V or DDHV) / (PHF x N x f <sub>HV</sub> ) |                             |                                  | Design LOS  |  |     |
|   | 169                         | pc/h/ln                          | v <sub>p</sub> = (V or DDHV) / (PHF x N x f <sub>HV</sub> )                                       |  |     |
| x f <sub>p</sub> )  |                             |                                  | x f <sub>p</sub> )  |  |     |
| S   | 65.0                        | mph                              | S   |  |     |
| D = v <sub>p</sub> / S                                      | 2.6                         | pc/mi/ln                         | D = v <sub>p</sub> / S  |  |     |
| LOS   | A                           |                                  | Required Number of Lanes, N   |  |     |
| <b>Glossary</b>   |                             |                                  | <b>Factor Location</b>  |  |     |
| N - Number of lanes   | S - Speed                   |                                  | E <sub>R</sub> - Exhibits 11-10, 11-12  | f <sub>LW</sub> - Exhibit 11-8         |     |
| V - Hourly volume   | D - Density                 |                                  | E <sub>T</sub> - Exhibits 11-10, 11-11, 11-13   | f <sub>LC</sub> - Exhibit 11-9         |     |
| v <sub>p</sub> - Flow rate                                  | FFS - Free-flow speed       |                                  | f <sub>p</sub> - Page 11-18   | TRD - Page 11-11                       |     |
| LOS - Level of service                                      | BFFS - Base free-flow speed |                                  | LOS, S, FFS, v <sub>p</sub> - Exhibits 11-2, 11-3   |  |     |
| DDHV - Directional design hour volume                       |                             |                                  |   |  |     |



| BASIC FREEWAY SEGMENTS WORKSHEET                            |                             |                                  |   |  |     |
|---|-----------------------------|----------------------------------|---|--|-----|
| <b>General Information</b>                                  |                             |                                  | <b>Site Information</b>   |  |     |
| Analyst   | Shane Forsythe              |                                  | Highway/Direction of Travel I-15 SB   |  |     |
| Agency or Company   |                             |                                  | From/To South of Gore Hill  |  |     |
| Date Performed  | 9/8/2014                    |                                  | Jurisdiction  |  |     |
| Analysis Time Period  | AM Peak                     |                                  | Analysis Year 2035  |  |     |
| Project Description I-15 Corridor Study                     |                             |                                  |   |  |     |
| <input checked="" type="checkbox"/> Oper.(LOS)              |                             | <input type="checkbox"/> Des.(N) |   | <input type="checkbox"/> Planning Data |     |
| <b>Flow Inputs</b>  |                             |                                  |   |  |     |
| Volume, V   | 286                         | veh/h                            | Peak-Hour Factor, PHF   | 0.79                                   |     |
| AADT  |                             | veh/day                          | %Trucks and Buses, P <sub>T</sub>   | 20                                     |     |
| Peak-Hr Prop. of AADT, K                                    |                             |                                  | %RVs, P <sub>R</sub>  | 0                                      |     |
| Peak-Hr Direction Prop, D                                   |                             |                                  | General Terrain:  | Level                                  |     |
| DDHV = AADT x K x D   |                             | veh/h                            | Grade % Length  | mi                                     |     |
|   |                             |                                  | Up/Down %   |  |     |
| <b>Calculate Flow Adjustments</b>                           |                             |                                  |   |  |     |
| f <sub>p</sub>  | 1.00                        |                                  | E <sub>R</sub>  | 1.2                                    |     |
| E <sub>T</sub>  | 1.5                         |                                  | f <sub>HV</sub> = 1/[1+P <sub>T</sub> (E <sub>T</sub> - 1) + P <sub>R</sub> (E <sub>R</sub> - 1)] | 0.909                                  |     |
| <b>Speed Inputs</b>   |                             |                                  | <b>Calc Speed Adj and FFS</b>   |  |     |
| Lane Width  |                             | ft                               |   |  |     |
| Rt-Side Lat. Clearance                                      |                             | ft                               | f <sub>LW</sub>   | mph                                    |     |
| Number of Lanes, N  | 2                           |                                  | f <sub>LC</sub>   | mph                                    |     |
| Total Ramp Density, TRD                                     |                             | ramps/mi                         | TRD Adjustment  | mph                                    |     |
| FFS (measured)  | 65.0                        | mph                              | FFS   | 65.0                                   | mph |
| Base free-flow Speed, BFFS                                  |                             | mph                              |   |  |     |
| <b>LOS and Performance Measures</b>                         |                             |                                  | <b>Design (N)</b>   |  |     |
| <u>Operational (LOS)</u>                                    |                             |                                  | <u>Design (N)</u>   |  |     |
| v <sub>p</sub> = (V or DDHV) / (PHF x N x f <sub>HV</sub> ) |                             |                                  | Design LOS  |  |     |
|   | 199                         | pc/h/ln                          | v <sub>p</sub> = (V or DDHV) / (PHF x N x f <sub>HV</sub> )                                       |  |     |
| x f <sub>p</sub> )  |                             |                                  | x f <sub>p</sub> )  |  |     |
| S   | 65.0                        | mph                              | S   |  |     |
| D = v <sub>p</sub> / S                                      | 3.1                         | pc/mi/ln                         | D = v <sub>p</sub> / S  |  |     |
| LOS   | A                           |                                  | Required Number of Lanes, N   |  |     |
| <b>Glossary</b>   |                             |                                  | <b>Factor Location</b>  |  |     |
| N - Number of lanes   | S - Speed                   |                                  | E <sub>R</sub> - Exhibits 11-10, 11-12  | f <sub>LW</sub> - Exhibit 11-8         |     |
| V - Hourly volume   | D - Density                 |                                  | E <sub>T</sub> - Exhibits 11-10, 11-11, 11-13   | f <sub>LC</sub> - Exhibit 11-9         |     |
| v <sub>p</sub> - Flow rate                                  | FFS - Free-flow speed       |                                  | f <sub>p</sub> - Page 11-18   | TRD - Page 11-11                       |     |
| LOS - Level of service                                      | BFFS - Base free-flow speed |                                  | LOS, S, FFS, v <sub>p</sub> - Exhibits 11-2, 11-3   |  |     |
| DDHV - Directional design hour volume                       |                             |                                  |   |  |     |

| BASIC FREEWAY SEGMENTS WORKSHEET                            |                             |                                  |   |  |     |
|---|-----------------------------|----------------------------------|---|--|-----|
| <b>General Information</b>                                  |                             |                                  | <b>Site Information</b>   |  |     |
| Analyst   | Shane Forsythe              |                                  | Highway/Direction of Travel I-15 NB   |  |     |
| Agency or Company   |                             |                                  | From/To South of Gore Hill  |  |     |
| Date Performed  | 9/8/2014                    |                                  | Jurisdiction  |  |     |
| Analysis Time Period  | PM Peak                     |                                  | Analysis Year 2035  |  |     |
| Project Description I-15 Corridor Study                     |                             |                                  |   |  |     |
| <input checked="" type="checkbox"/> Oper.(LOS)              |                             | <input type="checkbox"/> Des.(N) |   | <input type="checkbox"/> Planning Data |     |
| <b>Flow Inputs</b>  |                             |                                  |   |  |     |
| Volume, V   | 303                         | veh/h                            | Peak-Hour Factor, PHF   | 0.96                                   |     |
| AADT  |                             | veh/day                          | %Trucks and Buses, P <sub>T</sub>   | 12                                     |     |
| Peak-Hr Prop. of AADT, K                                    |                             |                                  | %RVs, P <sub>R</sub>  | 0                                      |     |
| Peak-Hr Direction Prop, D                                   |                             |                                  | General Terrain:  | Level                                  |     |
| DDHV = AADT x K x D   |                             | veh/h                            | Grade % Length  | mi                                     |     |
|   |                             |                                  | Up/Down %   |  |     |
| <b>Calculate Flow Adjustments</b>                           |                             |                                  |   |  |     |
| f <sub>p</sub>  | 1.00                        |                                  | E <sub>R</sub>  | 1.2                                    |     |
| E <sub>T</sub>  | 1.5                         |                                  | f <sub>HV</sub> = 1/[1+P <sub>T</sub> (E <sub>T</sub> - 1) + P <sub>R</sub> (E <sub>R</sub> - 1)] | 0.943                                  |     |
| <b>Speed Inputs</b>   |                             |                                  | <b>Calc Speed Adj and FFS</b>   |  |     |
| Lane Width  |                             | ft                               |   |  |     |
| Rt-Side Lat. Clearance                                      |                             | ft                               | f <sub>LW</sub>   | mph                                    |     |
| Number of Lanes, N  | 2                           |                                  | f <sub>LC</sub>   | mph                                    |     |
| Total Ramp Density, TRD                                     |                             | ramps/mi                         | TRD Adjustment  | mph                                    |     |
| FFS (measured)  | 65.0                        | mph                              | FFS   | 65.0                                   | mph |
| Base free-flow Speed, BFFS                                  |                             | mph                              |   |  |     |
| <b>LOS and Performance Measures</b>                         |                             |                                  | <b>Design (N)</b>   |  |     |
| <u>Operational (LOS)</u>                                    |                             |                                  | <u>Design (N)</u>   |  |     |
| v <sub>p</sub> = (V or DDHV) / (PHF x N x f <sub>HV</sub> ) |                             |                                  | Design LOS  |  |     |
|   | 167                         | pc/h/ln                          | v <sub>p</sub> = (V or DDHV) / (PHF x N x f <sub>HV</sub> )                                       |  |     |
| x f <sub>p</sub> )  |                             |                                  | x f <sub>p</sub> )  |  |     |
| S   | 65.0                        | mph                              | S   |  |     |
| D = v <sub>p</sub> / S                                      | 2.6                         | pc/mi/ln                         | D = v <sub>p</sub> / S  |  |     |
| LOS   | A                           |                                  | Required Number of Lanes, N   |  |     |
| <b>Glossary</b>   |                             |                                  | <b>Factor Location</b>  |  |     |
| N - Number of lanes   | S - Speed                   |                                  | E <sub>R</sub> - Exhibits 11-10, 11-12  | f <sub>LW</sub> - Exhibit 11-8         |     |
| V - Hourly volume   | D - Density                 |                                  | E <sub>T</sub> - Exhibits 11-10, 11-11, 11-13   | f <sub>LC</sub> - Exhibit 11-9         |     |
| v <sub>p</sub> - Flow rate                                  | FFS - Free-flow speed       |                                  | f <sub>p</sub> - Page 11-18   | TRD - Page 11-11                       |     |
| LOS - Level of service                                      | BFFS - Base free-flow speed |                                  | LOS, S, FFS, v <sub>p</sub> - Exhibits 11-2, 11-3   |  |     |
| DDHV - Directional design hour volume                       |                             |                                  |   |  |     |

| BASIC FREEWAY SEGMENTS WORKSHEET                            |                             |                                  |   |  |     |
|---|-----------------------------|----------------------------------|---|--|-----|
| <b>General Information</b>                                  |                             |                                  | <b>Site Information</b>   |  |     |
| Analyst   | Shane Forsythe              |                                  | Highway/Direction of Travel I-15 SB   |  |     |
| Agency or Company   |                             |                                  | From/To South of Gore Hill  |  |     |
| Date Performed  | 9/8/2014                    |                                  | Jurisdiction  |  |     |
| Analysis Time Period  | PM Peak                     |                                  | Analysis Year 2035  |  |     |
| Project Description I-15 Corridor Study                     |                             |                                  |   |  |     |
| <input checked="" type="checkbox"/> Oper.(LOS)              |                             | <input type="checkbox"/> Des.(N) |   | <input type="checkbox"/> Planning Data |     |
| <b>Flow Inputs</b>  |                             |                                  |   |  |     |
| Volume, V   | 444                         | veh/h                            | Peak-Hour Factor, PHF   | 0.89                                   |     |
| AADT  |                             | veh/day                          | %Trucks and Buses, P <sub>T</sub>   | 6                                      |     |
| Peak-Hr Prop. of AADT, K                                    |                             |                                  | %RVs, P <sub>R</sub>  | 0                                      |     |
| Peak-Hr Direction Prop, D                                   |                             |                                  | General Terrain:  | Level                                  |     |
| DDHV = AADT x K x D   |                             | veh/h                            | Grade % Length  | mi                                     |     |
|   |                             |                                  | Up/Down %   |  |     |
| <b>Calculate Flow Adjustments</b>                           |                             |                                  |   |  |     |
| f <sub>p</sub>  | 1.00                        |                                  | E <sub>R</sub>  | 1.2                                    |     |
| E <sub>T</sub>  | 1.5                         |                                  | f <sub>HV</sub> = 1/[1+P <sub>T</sub> (E <sub>T</sub> - 1) + P <sub>R</sub> (E <sub>R</sub> - 1)] | 0.971                                  |     |
| <b>Speed Inputs</b>   |                             |                                  | <b>Calc Speed Adj and FFS</b>   |  |     |
| Lane Width  |                             | ft                               |   |  |     |
| Rt-Side Lat. Clearance                                      |                             | ft                               | f <sub>LW</sub>   | mph                                    |     |
| Number of Lanes, N  | 2                           |                                  | f <sub>LC</sub>   | mph                                    |     |
| Total Ramp Density, TRD                                     |                             | ramps/mi                         | TRD Adjustment  | mph                                    |     |
| FFS (measured)  | 65.0                        | mph                              | FFS   | 65.0                                   | mph |
| Base free-flow Speed, BFFS                                  |                             | mph                              |   |  |     |
| <b>LOS and Performance Measures</b>                         |                             |                                  | <b>Design (N)</b>   |  |     |
| <u>Operational (LOS)</u>                                    |                             |                                  | <u>Design (N)</u>   |  |     |
| v <sub>p</sub> = (V or DDHV) / (PHF x N x f <sub>HV</sub> ) |                             |                                  | Design LOS  |  |     |
|   | 257                         | pc/h/ln                          | v <sub>p</sub> = (V or DDHV) / (PHF x N x f <sub>HV</sub> )                                       |  |     |
| x f <sub>p</sub> )  |                             |                                  | x f <sub>p</sub> )  |  |     |
| S   | 65.0                        | mph                              | S   |  |     |
| D = v <sub>p</sub> / S                                      | 4.0                         | pc/mi/ln                         | D = v <sub>p</sub> / S  |  |     |
| LOS   | A                           |                                  | Required Number of Lanes, N   |  |     |
| <b>Glossary</b>   |                             |                                  | <b>Factor Location</b>  |  |     |
| N - Number of lanes   | S - Speed                   |                                  | E <sub>R</sub> - Exhibits 11-10, 11-12  | f <sub>LW</sub> - Exhibit 11-8         |     |
| V - Hourly volume   | D - Density                 |                                  | E <sub>T</sub> - Exhibits 11-10, 11-11, 11-13   | f <sub>LC</sub> - Exhibit 11-9         |     |
| v <sub>p</sub> - Flow rate                                  | FFS - Free-flow speed       |                                  | f <sub>p</sub> - Page 11-18   | TRD - Page 11-11                       |     |
| LOS - Level of service                                      | BFFS - Base free-flow speed |                                  | LOS, S, FFS, v <sub>p</sub> - Exhibits 11-2, 11-3   |  |     |
| DDHV - Directional design hour volume                       |                             |                                  |   |  |     |

| RAMPS AND RAMP JUNCTIONS WORKSHEET  |                 |  |         |                       |  |  |               |                                      |            |
|---|-----------------|--|---------|-----------------------|--|--|---------------|--------------------------------------|------------|
| <b>General Information</b>  |                 |  |         |                       | <b>Site Information</b>  |  |               |                                      |            |
| Analyst   |                 | Shane Forsythe   |         | Freeway/Dir of Travel |  | 10th Ave NB Off-ramp   |               |                                      |            |
| Agency or Company   |                 |  |         | Junction              |  | I-15 and I-315   |               |                                      |            |
| Date Performed  |                 | 9/15/2014  |         | Jurisdiction          |  |  |               |                                      |            |
| Analysis Time Period  |                 | AM Peak  |         | Analysis Year         |  | 2035   |               |                                      |            |
| Project Description   |                 |  |         |                       |  |  |               |                                      |            |
| <b>Inputs</b>   |                 |  |         |                       |  |  |               |                                      |            |
| Upstream Adj Ramp<br><input type="checkbox"/> Yes <input type="checkbox"/> On<br><input checked="" type="checkbox"/> No <input type="checkbox"/> Off<br><br>$L_{up} =$ ft<br><br>$V_u =$ veh/h  |                 | Freeway Number of Lanes, $N$ 2<br>Ramp Number of Lanes, $N$ 1<br>Acceleration Lane Length, $L_A$<br>Deceleration Lane Length $L_D$ 740<br>Freeway Volume, $V_F$ 803<br>Ramp Volume, $V_R$ 206<br>Freeway Free-Flow Speed, $S_{FF}$ 65.0<br>Ramp Free-Flow Speed, $S_{FR}$ 55.0 |         |                       |  | Downstream Adj Ramp<br><input type="checkbox"/> Yes <input type="checkbox"/> On<br><input checked="" type="checkbox"/> No <input type="checkbox"/> Off<br><br>$L_{down} =$ ft<br><br>$V_D =$ veh/h |               |                                      |            |
| <b>Conversion to pc/h Under Base Conditions</b>   |                 |  |         |                       |  |  |               |                                      |            |
| (pc/h)  | $V$<br>(Veh/hr) | PHF  | Terrain | %Truck                | %Rv  | $f_{HV}$   | $f_p$         | $v = V/PHF \times f_{HV} \times f_p$ |            |
| Freeway   | 803             | 0.90   | Level   | 16                    | 0  | 0.926  | 1.00          | 967                                  |            |
| Ramp  | 206             | 0.83   | Level   | 3                     | 0  | 0.985  | 1.00          | 253                                  |            |
| UpStream  |                 |  |         |                       |  |  |               |                                      |            |
| DownStream  |                 |  |         |                       |  |  |               |                                      |            |
| <b>Merge Areas</b>  |                 |  |         |                       | <b>Diverge Areas</b>   |  |               |                                      |            |
| <b>Estimation of <math>v_{12}</math></b>  |                 |  |         |                       | <b>Estimation of <math>v_{12}</math></b>   |  |               |                                      |            |
| $V_{12} = V_F (P_{FM})$<br>$L_{EQ} =$ (Equation 13-6 or 13-7)<br>$P_{FM} =$ using Equation (Exhibit 13-6)<br>$V_{12} =$ pc/h<br>$V_3$ or $V_{av34}$ pc/h (Equation 13-14 or 13-17)<br>Is $V_3$ or $V_{av34} > 2,700$ pc/h? <input type="checkbox"/> Yes <input type="checkbox"/> No<br>Is $V_3$ or $V_{av34} > 1.5 * V_{12}/2$ <input type="checkbox"/> Yes <input type="checkbox"/> No<br>If Yes, $V_{12a} =$ pc/h (Equation 13-16, 13-18, or 13-19) |                 |  |         |                       | $V_{12} = V_R + (V_F - V_R)P_{FD}$<br>$L_{EQ} =$ (Equation 13-12 or 13-13)<br>$P_{FD} =$ 1.000 using Equation (Exhibit 13-7)<br>$V_{12} =$ 967 pc/h<br>$V_3$ or $V_{av34}$ 0 pc/h (Equation 13-14 or 13-17)<br>Is $V_3$ or $V_{av34} > 2,700$ pc/h? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No<br>Is $V_3$ or $V_{av34} > 1.5 * V_{12}/2$ <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No<br>If Yes, $V_{12a} =$ pc/h (Equation 13-16, 13-18, or 13-19) |  |               |                                      |            |
| <b>Capacity Checks</b>  |                 |  |         |                       | <b>Capacity Checks</b>   |  |               |                                      |            |
|   | Actual          | Capacity   |         | LOS F?                |  | Actual   | Capacity      |                                      | LOS F?     |
| $V_{FO}$  |                 | Exhibit 13-8   |         |                       | $V_F$  | 967  | Exhibit 13-8  | 4700                                 | No         |
|   |                 |  |         | $V_{FO} = V_F - V_R$  | 714  | Exhibit 13-8   | 4700          | No                                   |            |
|   |                 |  |         | $V_R$                 | 253  | Exhibit 13-10  | 2200          | No                                   |            |
| <b>Flow Entering Merge Influence Area</b>   |                 |  |         |                       | <b>Flow Entering Diverge Influence Area</b>  |  |               |                                      |            |
|   | Actual          | Max Desirable  |         | Violation?            |  | Actual   | Max Desirable |                                      | Violation? |
| $V_{R12}$   |                 | Exhibit 13-8   |         |                       | $V_{12}$   | 967  | Exhibit 13-8  | 4400:All                             | No         |
| <b>Level of Service Determination (if not F)</b>  |                 |  |         |                       | <b>Level of Service Determination (if not F)</b>   |  |               |                                      |            |
| $D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$<br>$D_R =$ (pc/mi/ln)<br>$LOS =$ (Exhibit 13-2)   |                 |  |         |                       | $D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$<br>$D_R =$ 5.9 (pc/mi/ln)<br>$LOS =$ A (Exhibit 13-2)  |  |               |                                      |            |
| <b>Speed Determination</b>  |                 |  |         |                       | <b>Speed Determination</b>   |  |               |                                      |            |
| $M_S =$ (Exhibit 13-11)<br>$S_R =$ mph (Exhibit 13-11)<br>$S_0 =$ mph (Exhibit 13-11)<br>$S =$ mph (Exhibit 13-13)  |                 |  |         |                       | $D_s =$ 0.191 (Exhibit 13-12)<br>$S_R =$ 60.6 mph (Exhibit 13-12)<br>$S_0 =$ N/A mph (Exhibit 13-12)<br>$S =$ 60.6 mph (Exhibit 13-13)   |  |               |                                      |            |

| RAMPS AND RAMP JUNCTIONS WORKSHEET   |                 |                                 |          |                       |   |                     |               |  |            |
|--|-----------------|---------------------------------|----------|-----------------------|---|---------------------|---------------|--|------------|
| <b>General Information</b>   |                 |                                 |          |                       | <b>Site Information</b>   |                     |               |  |            |
| Analyst  |                 | Shane Forsythe                  |          | Freeway/Dir of Travel |   | 10th Ave NB On-ramp |               |  |            |
| Agency or Company  |                 |                                 |          | Junction              |   | I-15 and I-315      |               |  |            |
| Date Performed   |                 | 9/15/2014                       |          | Jurisdiction          |   |                     |               |  |            |
| Analysis Time Period   |                 | AM Peak                         |          | Analysis Year         |   | 2035                |               |  |            |
| Project Description  |                 |                                 |          |                       |   |                     |               |  |            |
| <b>Inputs</b>  |                 |                                 |          |                       |   |                     |               |  |            |
| Upstream Adj Ramp<br><br><input type="checkbox"/> Yes <input type="checkbox"/> On<br><br><input checked="" type="checkbox"/> No <input type="checkbox"/> Off<br><br>$L_{up} =$ ft<br><br>$V_u =$ veh/h   |                 | Freeway Number of Lanes, $N$    |          |                       |   | 2                   |               | Downstream Adj Ramp<br><br><input type="checkbox"/> Yes <input type="checkbox"/> On<br><br><input checked="" type="checkbox"/> No <input type="checkbox"/> Off<br><br>$L_{down} =$ ft<br><br>$V_D =$ veh/h |            |
|  |                 | Ramp Number of Lanes, $N$       |          |                       |   | 1                   |               |  |            |
|  |                 | Acceleration Lane Length, $L_A$ |          |                       |   | 590                 |               |  |            |
|  |                 | Deceleration Lane Length $L_D$  |          |                       |   |                     |               |  |            |
|  |                 | Freeway Volume, $V_F$           |          |                       |   | 519                 |               |  |            |
|  |                 | Ramp Volume, $V_R$              |          |                       |   | 175                 |               |  |            |
| Freeway Free-Flow Speed, $S_{FF}$  |                 |                                 |          | 65.0                  |   |                     |               |  |            |
| Ramp Free-Flow Speed, $S_{FR}$   |                 |                                 |          | 35.0                  |   |                     |               |  |            |
| <b>Conversion to pc/h Under Base Conditions</b>  |                 |                                 |          |                       |   |                     |               |  |            |
| (pc/h)   | $V$<br>(Veh/hr) | PHF                             | Terrain  | %Truck                | %Rv   | $f_{HV}$            | $f_p$         | $v = V/PHF \times f_{HV} \times f_p$   |            |
| Freeway  | 519             | 0.89                            | Level    | 14                    | 0   | 0.935               | 1.00          | 623  |            |
| Ramp   | 175             | 0.75                            | Level    | 7                     | 0   | 0.966               | 1.00          | 243  |            |
| UpStream   |                 |                                 |          |                       |   |                     |               |  |            |
| DownStream   |                 |                                 |          |                       |   |                     |               |  |            |
| <b>Merge Areas</b>   |                 |                                 |          |                       | <b>Diverge Areas</b>  |                     |               |  |            |
| <b>Estimation of <math>v_{12}</math></b>   |                 |                                 |          |                       | <b>Estimation of <math>v_{12}</math></b>  |                     |               |  |            |
| $V_{12} = V_F (P_{FM})$<br>(Equation 13-6 or 13-7)<br>$P_{FM} =$ 1.000 using Equation (Exhibit 13-6)<br>$V_{12} =$ 623 pc/h<br>$V_3$ or $V_{av34}$ 0 pc/h (Equation 13-14 or 13-17)<br>Is $V_3$ or $V_{av34} > 2,700$ pc/h? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No<br>Is $V_3$ or $V_{av34} > 1.5 * V_{12}/2$ <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No<br>If Yes, $V_{12a} =$ pc/h (Equation 13-16, 13-18, or 13-19) |                 |                                 |          |                       | $V_{12} = V_R + (V_F - V_R)P_{FD}$<br>(Equation 13-12 or 13-13)<br>$P_{FD} =$ using Equation (Exhibit 13-7)<br>$V_{12} =$ pc/h<br>$V_3$ or $V_{av34}$ pc/h (Equation 13-14 or 13-17)<br>Is $V_3$ or $V_{av34} > 2,700$ pc/h? <input type="checkbox"/> Yes <input type="checkbox"/> No<br>Is $V_3$ or $V_{av34} > 1.5 * V_{12}/2$ <input type="checkbox"/> Yes <input type="checkbox"/> No<br>If Yes, $V_{12a} =$ pc/h (Equation 13-16, 13-18, or 13-19) |                     |               |  |            |
| <b>Capacity Checks</b>   |                 |                                 |          |                       | <b>Capacity Checks</b>  |                     |               |  |            |
|  | Actual          | Capacity                        |          | LOS F?                |   | Actual              | Capacity      |  | LOS F?     |
| $V_{FO}$   | 866             | Exhibit 13-8                    |          | No                    | $V_F$   |                     | Exhibit 13-8  |  |            |
|  |                 |                                 |          |                       | $V_{FO} = V_F - V_R$  |                     | Exhibit 13-8  |  |            |
|  |                 |                                 |          |                       | $V_R$   |                     | Exhibit 13-10 |  |            |
| <b>Flow Entering Merge Influence Area</b>  |                 |                                 |          |                       | <b>Flow Entering Diverge Influence Area</b>   |                     |               |  |            |
|  | Actual          | Max Desirable                   |          | Violation?            |   | Actual              | Max Desirable |  | Violation? |
| $V_{R12}$  | 866             | Exhibit 13-8                    | 4600:All | No                    | $V_{12}$  |                     | Exhibit 13-8  |  |            |
| <b>Level of Service Determination (if not F)</b>   |                 |                                 |          |                       | <b>Level of Service Determination (if not F)</b>  |                     |               |  |            |
| $D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$<br>$D_R =$ 8.4 (pc/mi/ln)<br>LOS = A (Exhibit 13-2)  |                 |                                 |          |                       | $D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$<br>$D_R =$ (pc/mi/ln)<br>LOS = (Exhibit 13-2)   |                     |               |  |            |
| <b>Speed Determination</b>   |                 |                                 |          |                       | <b>Speed Determination</b>  |                     |               |  |            |
| $M_S =$ 0.289 (Exhibit 13-11)<br>$S_R =$ 58.4 mph (Exhibit 13-11)<br>$S_0 =$ N/A mph (Exhibit 13-11)<br>$S =$ 58.4 mph (Exhibit 13-13)   |                 |                                 |          |                       | $D_S =$ (Exhibit 13-12)<br>$S_R =$ mph (Exhibit 13-12)<br>$S_0 =$ mph (Exhibit 13-12)<br>$S =$ mph (Exhibit 13-13)  |                     |               |  |            |

| RAMPS AND RAMP JUNCTIONS WORKSHEET   |               |  |               |                       |   |   |                 |  |               |          |            |
|--|---------------|--|---------------|-----------------------|---|---|-----------------|--|---------------|----------|------------|
| <b>General Information</b>   |               |  |               |                       | <b>Site Information</b>   |   |                 |  |               |          |            |
| Analyst  |               | Shane Forsythe                           |               | Freeway/Dir of Travel |   | 10th Ave SB Off-ramp                              |                 |  |               |          |            |
| Agency or Company  |               |  |               | Junction              |   | I-15 and I-315                                    |                 |  |               |          |            |
| Date Performed   |               | 9/15/2014                                |               | Jurisdiction          |   |   |                 |  |               |          |            |
| Analysis Time Period   |               | AM Peak                                  |               | Analysis Year         |   | 2035  |                 |  |               |          |            |
| Project Description  |               |  |               |                       |   |   |                 |  |               |          |            |
| <b>Inputs</b>  |               |  |               |                       |   |   |                 |  |               |          |            |
| Upstream Adj Ramp<br><input type="checkbox"/> Yes <input type="checkbox"/> On<br><br><input checked="" type="checkbox"/> No <input type="checkbox"/> Off<br><br>L <sub>up</sub> =        ft<br><br>V <sub>u</sub> =        veh/h   |               | Freeway Number of Lanes, N               |               |                       |   | 2   |                 | Downstream Adj Ramp<br><input type="checkbox"/> Yes <input type="checkbox"/> On<br><br><input checked="" type="checkbox"/> No <input type="checkbox"/> Off<br><br>L <sub>down</sub> =        ft<br><br>V <sub>D</sub> =        veh/h |               |          |            |
|  |               | Ramp Number of Lanes, N                  |               |                       |   | 1   |                 |  |               |          |            |
|  |               | Acceleration Lane Length, L <sub>A</sub> |               |                       |   |   |                 |  |               |          |            |
|  |               | Deceleration Lane Length L <sub>D</sub>  |               |                       |   | 463   |                 |  |               |          |            |
|  |               | Freeway Volume, V <sub>F</sub>           |               |                       |   | 671   |                 |  |               |          |            |
|  |               | Ramp Volume, V <sub>R</sub>              |               |                       |   | 206   |                 |  |               |          |            |
| Freeway Free-Flow Speed, S <sub>FF</sub>   |               |  |               | 65.0                  |   |   |                 |  |               |          |            |
| Ramp Free-Flow Speed, S <sub>FR</sub>  |               |  |               | 55.0                  |   |   |                 |  |               |          |            |
| <b>Conversion to pc/h Under Base Conditions</b>  |               |  |               |                       |   |   |                 |  |               |          |            |
| (pc/h)   | V<br>(Veh/hr) | PHF                                      | Terrain       | %Truck                | %Rv   | f <sub>HV</sub>                                   | f <sub>p</sub>  | v = V/PHF x f <sub>HV</sub> x f <sub>p</sub>   |               |          |            |
| Freeway  | 671           | 0.94                                     | Level         | 8                     | 0   | 0.962   | 1.00            | 746  |               |          |            |
| Ramp   | 206           | 0.83                                     | Level         | 3                     | 0   | 0.985   | 1.00            | 253  |               |          |            |
| UpStream   |               |  |               |                       |   |   |                 |  |               |          |            |
| DownStream   |               |  |               |                       |   |   |                 |  |               |          |            |
| <b>Merge Areas</b>   |               |  |               |                       | <b>Diverge Areas</b>  |   |                 |  |               |          |            |
| <b>Estimation of v<sub>12</sub></b>  |               |  |               |                       | <b>Estimation of v<sub>12</sub></b>   |   |                 |  |               |          |            |
| V <sub>12</sub> = V <sub>F</sub> (P <sub>FM</sub> )<br>(Equation 13-6 or 13-7)<br>L <sub>EQ</sub> =<br>P <sub>FM</sub> = using Equation (Exhibit 13-6)<br>V <sub>12</sub> = pc/h<br>V <sub>3</sub> or V <sub>av34</sub> pc/h (Equation 13-14 or 13-17)<br>Is V <sub>3</sub> or V <sub>av34</sub> > 2,700 pc/h? <input type="checkbox"/> Yes <input type="checkbox"/> No<br>Is V <sub>3</sub> or V <sub>av34</sub> > 1.5 * V <sub>12</sub> /2 <input type="checkbox"/> Yes <input type="checkbox"/> No<br>If Yes, V <sub>12a</sub> = pc/h (Equation 13-16, 13-18, or 13-19) |               |  |               |                       | V <sub>12</sub> = V <sub>R</sub> + (V <sub>F</sub> - V <sub>R</sub> )P <sub>FD</sub><br>(Equation 13-12 or 13-13)<br>L <sub>EQ</sub> =<br>P <sub>FD</sub> = 1.000 using Equation (Exhibit 13-7)<br>V <sub>12</sub> = 746 pc/h<br>V <sub>3</sub> or V <sub>av34</sub> 0 pc/h (Equation 13-14 or 13-17)<br>Is V <sub>3</sub> or V <sub>av34</sub> > 2,700 pc/h? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No<br>Is V <sub>3</sub> or V <sub>av34</sub> > 1.5 * V <sub>12</sub> /2 <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No<br>If Yes, V <sub>12a</sub> = pc/h (Equation 13-16, 13-18, or 13-19) |   |                 |  |               |          |            |
| <b>Capacity Checks</b>   |               |  |               |                       | <b>Capacity Checks</b>  |   |                 |  |               |          |            |
|  |               | Actual                                   | Capacity      |                       | LOS F?  |   |                 | Actual   | Capacity      |          | LOS F?     |
| V <sub>FO</sub>  |               | Exhibit 13-8                             |               |                       |   | V <sub>F</sub>                                    |                 | 746  | Exhibit 13-8  | 4700     | No         |
|  |               |  |               |                       |   | V <sub>FO</sub> = V <sub>F</sub> - V <sub>R</sub> |                 | 493  | Exhibit 13-8  | 4700     | No         |
|  |               |  |               |                       |   | V <sub>R</sub>                                    |                 | 253  | Exhibit 13-10 | 2200     | No         |
| <b>Flow Entering Merge Influence Area</b>  |               |  |               |                       | <b>Flow Entering Diverge Influence Area</b>   |   |                 |  |               |          |            |
|  |               | Actual                                   | Max Desirable |                       | Violation?  |   |                 | Actual   | Max Desirable |          | Violation? |
| V <sub>R12</sub>   |               |  | Exhibit 13-8  |                       |   |   | V <sub>12</sub> | 746  | Exhibit 13-8  | 4400:All | No         |
| <b>Level of Service Determination (if not F)</b>   |               |  |               |                       | <b>Level of Service Determination (if not F)</b>  |   |                 |  |               |          |            |
| D <sub>R</sub> = 5.475 + 0.00734 v <sub>R</sub> + 0.0078 V <sub>12</sub> - 0.00627 L <sub>A</sub><br>D <sub>R</sub> = (pc/mi/ln)<br>LOS = (Exhibit 13-2)   |               |  |               |                       | D <sub>R</sub> = 4.252 + 0.0086 V <sub>12</sub> - 0.009 L <sub>D</sub><br>D <sub>R</sub> = 6.5 (pc/mi/ln)<br>LOS = A (Exhibit 13-2)   |   |                 |  |               |          |            |
| <b>Speed Determination</b>   |               |  |               |                       | <b>Speed Determination</b>  |   |                 |  |               |          |            |
| M <sub>S</sub> = (Exhibit 13-11)<br>S <sub>R</sub> = mph (Exhibit 13-11)<br>S <sub>0</sub> = mph (Exhibit 13-11)<br>S = mph (Exhibit 13-13)  |               |  |               |                       | D <sub>S</sub> = 0.191 (Exhibit 13-12)<br>S <sub>R</sub> = 60.6 mph (Exhibit 13-12)<br>S <sub>0</sub> = N/A mph (Exhibit 13-12)<br>S = 60.6 mph (Exhibit 13-13)   |   |                 |  |               |          |            |

| RAMPS AND RAMP JUNCTIONS WORKSHEET   |               |  |          |            |  |                 |                     |  |            |
|--|---------------|--|----------|------------|--|-----------------|---------------------|--|------------|
| <b>General Information</b>   |               |  |          |            | <b>Site Information</b>  |                 |                     |  |            |
| Analyst  |               | Shane Forsythe                           |          |            | Freeway/Dir of Travel  |                 | 10th Ave SB On-ramp |  |            |
| Agency or Company  |               |  |          |            | Junction   |                 | I-15 and I-315      |  |            |
| Date Performed   |               | 9/15/2014                                |          |            | Jurisdiction   |                 |                     |  |            |
| Analysis Time Period   |               | AM Peak                                  |          |            | Analysis Year  |                 | 2035                |  |            |
| Project Description  |               |  |          |            |  |                 |                     |  |            |
| <b>Inputs</b>  |               |  |          |            |  |                 |                     |  |            |
| Upstream Adj Ramp<br><input type="checkbox"/> Yes <input type="checkbox"/> On<br><input checked="" type="checkbox"/> No <input type="checkbox"/> Off<br>L <sub>up</sub> =        ft<br>V <sub>u</sub> =        veh/h   |               | Freeway Number of Lanes, N               |          |            |  | 2               |                     | Downstream Adj Ramp<br><input type="checkbox"/> Yes <input type="checkbox"/> On<br><input checked="" type="checkbox"/> No <input type="checkbox"/> Off<br>L <sub>down</sub> =        ft<br>V <sub>D</sub> =        veh/h |            |
|  |               | Ramp Number of Lanes, N                  |          |            |  | 1               |                     |  |            |
|  |               | Acceleration Lane Length, L <sub>A</sub> |          |            |  | 1500            |                     |  |            |
|  |               | Deceleration Lane Length L <sub>D</sub>  |          |            |  |                 |                     |  |            |
|  |               | Freeway Volume, V <sub>F</sub>           |          |            |  | 713             |                     |  |            |
|  |               | Ramp Volume, V <sub>R</sub>              |          |            |  | 339             |                     |  |            |
|  |               | Freeway Free-Flow Speed, S <sub>FF</sub> |          |            |  | 65.0            |                     |  |            |
|  |               | Ramp Free-Flow Speed, S <sub>FR</sub>    |          |            |  | 35.0            |                     |  |            |
| <b>Conversion to pc/h Under Base Conditions</b>  |               |  |          |            |  |                 |                     |  |            |
| (pc/h)   | V<br>(Veh/hr) | PHF                                      | Terrain  | %Truck     | %Rv  | f <sub>HV</sub> | f <sub>p</sub>      | v = V/PHF x f <sub>HV</sub> x f <sub>p</sub>   |            |
| Freeway  | 713           | 0.85                                     | Level    | 7          | 0  | 0.966           | 1.00                | 870  |            |
| Ramp   | 339           | 0.77                                     | Level    | 5          | 0  | 0.976           | 1.00                | 451  |            |
| UpStream   |               |  |          |            |  |                 |                     |  |            |
| DownStream   |               |  |          |            |  |                 |                     |  |            |
| <b>Merge Areas</b>   |               |  |          |            | <b>Diverge Areas</b>   |                 |                     |  |            |
| <b>Estimation of v<sub>12</sub></b>  |               |  |          |            | <b>Estimation of v<sub>12</sub></b>  |                 |                     |  |            |
| $V_{12} = V_F (P_{FM})$<br>(Equation 13-6 or 13-7)<br>P <sub>FM</sub> = 1.000 using Equation (Exhibit 13-6)<br>V <sub>12</sub> = 870 pc/h<br>V <sub>3</sub> or V <sub>av34</sub> = 0 pc/h (Equation 13-14 or 13-17)<br>Is V <sub>3</sub> or V <sub>av34</sub> > 2,700 pc/h? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No<br>Is V <sub>3</sub> or V <sub>av34</sub> > 1.5 * V <sub>12</sub> /2 <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No<br>If Yes, V <sub>12a</sub> =        pc/h (Equation 13-16, 13-18, or 13-19) |               |  |          |            | $V_{12} = V_R + (V_F - V_R)P_{FD}$<br>(Equation 13-12 or 13-13)<br>P <sub>FD</sub> =        using Equation (Exhibit 13-7)<br>V <sub>12</sub> =        pc/h<br>V <sub>3</sub> or V <sub>av34</sub> =        pc/h (Equation 13-14 or 13-17)<br>Is V <sub>3</sub> or V <sub>av34</sub> > 2,700 pc/h? <input type="checkbox"/> Yes <input type="checkbox"/> No<br>Is V <sub>3</sub> or V <sub>av34</sub> > 1.5 * V <sub>12</sub> /2 <input type="checkbox"/> Yes <input type="checkbox"/> No<br>If Yes, V <sub>12a</sub> =        pc/h (Equation 13-16, 13-18, or 13-19) |                 |                     |  |            |
| <b>Capacity Checks</b>   |               |  |          |            | <b>Capacity Checks</b>   |                 |                     |  |            |
|  | Actual        | Capacity                                 |          | LOS F?     |  | Actual          | Capacity            |  | LOS F?     |
| V <sub>FO</sub>  | 1321          | Exhibit 13-8                             |          | No         | V <sub>F</sub>   |                 | Exhibit 13-8        |  |            |
|  |               |  |          |            | V <sub>FO</sub> = V <sub>F</sub> - V <sub>R</sub>  |                 | Exhibit 13-8        |  |            |
|  |               |  |          |            | V <sub>R</sub>   |                 | Exhibit 13-10       |  |            |
| <b>Flow Entering Merge Influence Area</b>  |               |  |          |            | <b>Flow Entering Diverge Influence Area</b>  |                 |                     |  |            |
|  | Actual        | Max Desirable                            |          | Violation? |  | Actual          | Max Desirable       |  | Violation? |
| V <sub>R12</sub>   | 1321          | Exhibit 13-8                             | 4600:All | No         | V <sub>12</sub>  |                 | Exhibit 13-8        |  |            |
| <b>Level of Service Determination (if not F)</b>   |               |  |          |            | <b>Level of Service Determination (if not F)</b>   |                 |                     |  |            |
| $D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$<br>D <sub>R</sub> = 6.2 (pc/mi/ln)<br>LOS = A (Exhibit 13-2)   |               |  |          |            | $D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$<br>D <sub>R</sub> =        (pc/mi/ln)<br>LOS =        (Exhibit 13-2)   |                 |                     |  |            |
| <b>Speed Determination</b>   |               |  |          |            | <b>Speed Determination</b>   |                 |                     |  |            |
| M <sub>S</sub> = 0.231 (Exhibit 13-11)<br>S <sub>R</sub> = 59.7 mph (Exhibit 13-11)<br>S <sub>0</sub> = N/A mph (Exhibit 13-11)<br>S = 59.7 mph (Exhibit 13-13)  |               |  |          |            | D <sub>S</sub> =        (Exhibit 13-12)<br>S <sub>R</sub> =        mph (Exhibit 13-12)<br>S <sub>0</sub> =        mph (Exhibit 13-12)<br>S =        mph (Exhibit 13-13)  |                 |                     |  |            |

| RAMPS AND RAMP JUNCTIONS WORKSHEET  |                 |   |         |                       |   |  |               |                                      |            |
|---|-----------------|---|---------|-----------------------|---|--|---------------|--------------------------------------|------------|
| <b>General Information</b>  |                 |   |         |                       | <b>Site Information</b>   |  |               |                                      |            |
| Analyst   |                 | Shane Forsythe  |         | Freeway/Dir of Travel |   | 10th Ave NB Off-ramp   |               |                                      |            |
| Agency or Company   |                 |   |         | Junction              |   | I-15 and I-315   |               |                                      |            |
| Date Performed  |                 | 9/15/2014   |         | Jurisdiction          |   |  |               |                                      |            |
| Analysis Time Period  |                 | PM Peak   |         | Analysis Year         |   | 2035   |               |                                      |            |
| Project Description   |                 |   |         |                       |   |  |               |                                      |            |
| <b>Inputs</b>   |                 |   |         |                       |   |  |               |                                      |            |
| Upstream Adj Ramp<br><input type="checkbox"/> Yes <input type="checkbox"/> On<br><input checked="" type="checkbox"/> No <input type="checkbox"/> Off<br><br>$L_{up} =$ ft<br><br>$V_u =$ veh/h  |                 | Freeway Number of Lanes, $N$ 2<br>Ramp Number of Lanes, $N$ 1<br>Acceleration Lane Length, $L_A$<br>Deceleration Lane Length $L_D$ 740<br>Freeway Volume, $V_F$ 1122<br>Ramp Volume, $V_R$ 543<br>Freeway Free-Flow Speed, $S_{FF}$ 65.0<br>Ramp Free-Flow Speed, $S_{FR}$ 55.0 |         |                       |   | Downstream Adj Ramp<br><input type="checkbox"/> Yes <input type="checkbox"/> On<br><input checked="" type="checkbox"/> No <input type="checkbox"/> Off<br><br>$L_{down} =$ ft<br><br>$V_D =$ veh/h |               |                                      |            |
| <b>Conversion to pc/h Under Base Conditions</b>   |                 |   |         |                       |   |  |               |                                      |            |
| (pc/h)  | $V$<br>(Veh/hr) | PHF   | Terrain | %Truck                | %Rv   | $f_{HV}$   | $f_p$         | $v = V/PHF \times f_{HV} \times f_p$ |            |
| Freeway   | 1122            | 0.80  | Level   | 10                    | 0   | 0.952  | 1.00          | 1473                                 |            |
| Ramp  | 543             | 0.83  | Level   | 3                     | 0   | 0.985  | 1.00          | 664                                  |            |
| UpStream  |                 |   |         |                       |   |  |               |                                      |            |
| DownStream  |                 |   |         |                       |   |  |               |                                      |            |
| <b>Merge Areas</b>  |                 |   |         |                       | <b>Diverge Areas</b>  |  |               |                                      |            |
| <b>Estimation of <math>v_{12}</math></b>  |                 |   |         |                       | <b>Estimation of <math>v_{12}</math></b>  |  |               |                                      |            |
| $V_{12} = V_F (P_{FM})$<br>$L_{EQ} =$ (Equation 13-6 or 13-7)<br>$P_{FM} =$ using Equation (Exhibit 13-6)<br>$V_{12} =$ pc/h<br>$V_3$ or $V_{av34}$ pc/h (Equation 13-14 or 13-17)<br>Is $V_3$ or $V_{av34} > 2,700$ pc/h? <input type="checkbox"/> Yes <input type="checkbox"/> No<br>Is $V_3$ or $V_{av34} > 1.5 * V_{12}/2$ <input type="checkbox"/> Yes <input type="checkbox"/> No<br>If Yes, $V_{12a} =$ pc/h (Equation 13-16, 13-18, or 13-19) |                 |   |         |                       | $V_{12} = V_R + (V_F - V_R)P_{FD}$<br>$L_{EQ} =$ (Equation 13-12 or 13-13)<br>$P_{FD} =$ 1.000 using Equation (Exhibit 13-7)<br>$V_{12} =$ 1473 pc/h<br>$V_3$ or $V_{av34}$ 0 pc/h (Equation 13-14 or 13-17)<br>Is $V_3$ or $V_{av34} > 2,700$ pc/h? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No<br>Is $V_3$ or $V_{av34} > 1.5 * V_{12}/2$ <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No<br>If Yes, $V_{12a} =$ pc/h (Equation 13-16, 13-18, or 13-19) |  |               |                                      |            |
| <b>Capacity Checks</b>  |                 |   |         |                       | <b>Capacity Checks</b>  |  |               |                                      |            |
|   | Actual          | Capacity  |         | LOS F?                |   | Actual   | Capacity      |                                      | LOS F?     |
| $V_{FO}$  |                 | Exhibit 13-8  |         |                       | $V_F$   | 1473   | Exhibit 13-8  | 4700                                 | No         |
|   |                 |   |         | $V_{FO} = V_F - V_R$  | 809   | Exhibit 13-8   | 4700          | No                                   |            |
|   |                 |   |         | $V_R$                 | 664   | Exhibit 13-10  | 2200          | No                                   |            |
| <b>Flow Entering Merge Influence Area</b>   |                 |   |         |                       | <b>Flow Entering Diverge Influence Area</b>   |  |               |                                      |            |
|   | Actual          | Max Desirable   |         | Violation?            |   | Actual   | Max Desirable |                                      | Violation? |
| $V_{R12}$   |                 | Exhibit 13-8  |         |                       | $V_{12}$  | 1473   | Exhibit 13-8  | 4400:All                             | No         |
| <b>Level of Service Determination (if not F)</b>  |                 |   |         |                       | <b>Level of Service Determination (if not F)</b>  |  |               |                                      |            |
| $D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$<br>$D_R =$ (pc/mi/ln)<br>$LOS =$ (Exhibit 13-2)   |                 |   |         |                       | $D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$<br>$D_R =$ 10.3 (pc/mi/ln)<br>$LOS =$ B (Exhibit 13-2)  |  |               |                                      |            |
| <b>Speed Determination</b>  |                 |   |         |                       | <b>Speed Determination</b>  |  |               |                                      |            |
| $M_S =$ (Exhibit 13-11)<br>$S_R =$ mph (Exhibit 13-11)<br>$S_0 =$ mph (Exhibit 13-11)<br>$S =$ mph (Exhibit 13-13)  |                 |   |         |                       | $D_s =$ 0.228 (Exhibit 13-12)<br>$S_R =$ 59.8 mph (Exhibit 13-12)<br>$S_0 =$ N/A mph (Exhibit 13-12)<br>$S =$ 59.8 mph (Exhibit 13-13)  |  |               |                                      |            |



| RAMPS AND RAMP JUNCTIONS WORKSHEET  |                 |                                 |          |                       |  |                     |               |  |            |
|---|-----------------|---------------------------------|----------|-----------------------|--|---------------------|---------------|--|------------|
| <b>General Information</b>  |                 |                                 |          |                       | <b>Site Information</b>  |                     |               |  |            |
| Analyst   |                 | Shane Forsythe                  |          | Freeway/Dir of Travel |  | 10th Ave NB On-ramp |               |  |            |
| Agency or Company   |                 |                                 |          | Junction              |  | I-15 and I-315      |               |  |            |
| Date Performed  |                 | 9/15/2014                       |          | Jurisdiction          |  |                     |               |  |            |
| Analysis Time Period  |                 | PM Peak                         |          | Analysis Year         |  | 20                  |               |  |            |
| Project Description   |                 |                                 |          |                       |  |                     |               |  |            |
| <b>Inputs</b>   |                 |                                 |          |                       |  |                     |               |  |            |
| Upstream Adj Ramp<br><br><input type="checkbox"/> Yes <input type="checkbox"/> On<br><br><input checked="" type="checkbox"/> No <input type="checkbox"/> Off<br><br>$L_{up} =$ ft<br><br>$V_u =$ veh/h  |                 | Freeway Number of Lanes, $N$    |          |                       |  | 2                   |               | Downstream Adj Ramp<br><br><input type="checkbox"/> Yes <input type="checkbox"/> On<br><br><input checked="" type="checkbox"/> No <input type="checkbox"/> Off<br><br>$L_{down} =$ ft<br><br>$V_D =$ veh/h |            |
|   |                 | Ramp Number of Lanes, $N$       |          |                       |  | 1                   |               |  |            |
|   |                 | Acceleration Lane Length, $L_A$ |          |                       |  | 590                 |               |  |            |
|   |                 | Deceleration Lane Length $L_D$  |          |                       |  |                     |               |  |            |
|   |                 | Freeway Volume, $V_F$           |          |                       |  | 792                 |               |  |            |
|   |                 | Ramp Volume, $V_R$              |          |                       |  | 274                 |               |  |            |
| Freeway Free-Flow Speed, $S_{FF}$   |                 |                                 |          | 65.0                  |  |                     |               |  |            |
| Ramp Free-Flow Speed, $S_{FR}$  |                 |                                 |          | 35.0                  |  |                     |               |  |            |
| <b>Conversion to pc/h Under Base Conditions</b>   |                 |                                 |          |                       |  |                     |               |  |            |
| (pc/h)  | $V$<br>(Veh/hr) | PHF                             | Terrain  | %Truck                | %Rv  | $f_{HV}$            | $f_p$         | $v = V/PHF \times f_{HV} \times f_p$   |            |
| Freeway   | 792             | 0.87                            | Level    | 11                    | 0  | 0.948               | 1.00          | 963  |            |
| Ramp  | 274             | 0.92                            | Level    | 4                     | 0  | 0.980               | 1.00          | 304  |            |
| UpStream  |                 |                                 |          |                       |  |                     |               |  |            |
| DownStream  |                 |                                 |          |                       |  |                     |               |  |            |
| <b>Merge Areas</b>  |                 |                                 |          |                       | <b>Diverge Areas</b>   |                     |               |  |            |
| <b>Estimation of <math>v_{12}</math></b>  |                 |                                 |          |                       | <b>Estimation of <math>v_{12}</math></b>   |                     |               |  |            |
| $V_{12} = V_F (P_{FM})$<br>(Equation 13-6 or 13-7)<br>$P_{FM} =$ 1.000 using Equation (Exhibit 13-6)<br>$V_{12} =$ 963 pc/h<br>$V_3$ or $V_{av34}$ 0 pc/h (Equation 13-14 or 13-17)<br>Is $V_3$ or $V_{av34} > 2,700$ pc/h? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No<br>Is $V_3$ or $V_{av34} > 1.5 \times V_{12}/2$ <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No<br>If Yes, $V_{12a} =$ pc/h (Equation 13-16, 13-18, or 13-19) |                 |                                 |          |                       | $V_{12} = V_R + (V_F - V_R)P_{FD}$<br>(Equation 13-12 or 13-13)<br>$P_{FD} =$ using Equation (Exhibit 13-7)<br>$V_{12} =$ pc/h<br>$V_3$ or $V_{av34}$ pc/h (Equation 13-14 or 13-17)<br>Is $V_3$ or $V_{av34} > 2,700$ pc/h? <input type="checkbox"/> Yes <input type="checkbox"/> No<br>Is $V_3$ or $V_{av34} > 1.5 \times V_{12}/2$ <input type="checkbox"/> Yes <input type="checkbox"/> No<br>If Yes, $V_{12a} =$ pc/h (Equation 13-16, 13-18, or 13-19) |                     |               |  |            |
| <b>Capacity Checks</b>  |                 |                                 |          |                       | <b>Capacity Checks</b>   |                     |               |  |            |
|   | Actual          | Capacity                        |          | LOS F?                |  | Actual              | Capacity      |  | LOS F?     |
| $V_{FO}$  | 1267            | Exhibit 13-8                    |          | No                    | $V_F$  |                     | Exhibit 13-8  |  |            |
|   |                 |                                 |          |                       | $V_{FO} = V_F - V_R$   |                     | Exhibit 13-8  |  |            |
|   |                 |                                 |          |                       | $V_R$  |                     | Exhibit 13-10 |  |            |
| <b>Flow Entering Merge Influence Area</b>   |                 |                                 |          |                       | <b>Flow Entering Diverge Influence Area</b>  |                     |               |  |            |
|   | Actual          | Max Desirable                   |          | Violation?            |  | Actual              | Max Desirable |  | Violation? |
| $V_{R12}$   | 1267            | Exhibit 13-8                    | 4600:All | No                    | $V_{12}$   |                     | Exhibit 13-8  |  |            |
| <b>Level of Service Determination (if not F)</b>  |                 |                                 |          |                       | <b>Level of Service Determination (if not F)</b>   |                     |               |  |            |
| $D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$<br>$D_R =$ 11.5 (pc/mi/ln)<br>LOS = B (Exhibit 13-2)  |                 |                                 |          |                       | $D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$<br>$D_R =$ (pc/mi/ln)<br>LOS = (Exhibit 13-2)  |                     |               |  |            |
| <b>Speed Determination</b>  |                 |                                 |          |                       | <b>Speed Determination</b>   |                     |               |  |            |
| $M_S =$ 0.294 (Exhibit 13-11)<br>$S_R =$ 58.2 mph (Exhibit 13-11)<br>$S_0 =$ N/A mph (Exhibit 13-11)<br>$S =$ 58.2 mph (Exhibit 13-13)  |                 |                                 |          |                       | $D_S =$ (Exhibit 13-12)<br>$S_R =$ mph (Exhibit 13-12)<br>$S_0 =$ mph (Exhibit 13-12)<br>$S =$ mph (Exhibit 13-13)   |                     |               |  |            |

| RAMPS AND RAMP JUNCTIONS WORKSHEET  |                 |  |         |                       |   |  |               |                                      |            |
|---|-----------------|--|---------|-----------------------|---|--|---------------|--------------------------------------|------------|
| <b>General Information</b>  |                 |  |         |                       | <b>Site Information</b>   |  |               |                                      |            |
| Analyst   |                 | Shane Forsythe   |         | Freeway/Dir of Travel |   | 10th Ave NB Off-ramp   |               |                                      |            |
| Agency or Company   |                 |  |         | Junction              |   | I-15 and I-315   |               |                                      |            |
| Date Performed  |                 | 9/15/2014  |         | Jurisdiction          |   |  |               |                                      |            |
| Analysis Time Period  |                 | PM Peak  |         | Analysis Year         |   | 2035   |               |                                      |            |
| Project Description   |                 |  |         |                       |   |  |               |                                      |            |
| <b>Inputs</b>   |                 |  |         |                       |   |  |               |                                      |            |
| Upstream Adj Ramp<br><input type="checkbox"/> Yes <input type="checkbox"/> On<br><input checked="" type="checkbox"/> No <input type="checkbox"/> Off<br><br>$L_{up} =$ ft<br><br>$V_u =$ veh/h  |                 | Freeway Number of Lanes, $N$ 2<br>Ramp Number of Lanes, $N$ 1<br>Acceleration Lane Length, $L_A$<br>Deceleration Lane Length $L_D$ 463<br>Freeway Volume, $V_F$ 936<br>Ramp Volume, $V_R$ 256<br>Freeway Free-Flow Speed, $S_{FF}$ 65.0<br>Ramp Free-Flow Speed, $S_{FR}$ 55.0 |         |                       |   | Downstream Adj Ramp<br><input type="checkbox"/> Yes <input type="checkbox"/> On<br><input checked="" type="checkbox"/> No <input type="checkbox"/> Off<br><br>$L_{down} =$ ft<br><br>$V_D =$ veh/h |               |                                      |            |
| <b>Conversion to pc/h Under Base Conditions</b>   |                 |  |         |                       |   |  |               |                                      |            |
| (pc/h)  | $V$<br>(Veh/hr) | PHF  | Terrain | %Truck                | %Rv   | $f_{HV}$   | $f_p$         | $v = V/PHF \times f_{HV} \times f_p$ |            |
| Freeway   | 936             | 0.90   | Level   | 14                    | 0   | 0.935  | 1.00          | 1118                                 |            |
| Ramp  | 256             | 0.83   | Level   | 7                     | 0   | 0.966  | 1.00          | 320                                  |            |
| UpStream  |                 |  |         |                       |   |  |               |                                      |            |
| DownStream  |                 |  |         |                       |   |  |               |                                      |            |
| <b>Merge Areas</b>  |                 |  |         |                       | <b>Diverge Areas</b>  |  |               |                                      |            |
| <b>Estimation of <math>v_{12}</math></b>  |                 |  |         |                       | <b>Estimation of <math>v_{12}</math></b>  |  |               |                                      |            |
| $V_{12} = V_F (P_{FM})$<br>$L_{EQ} =$ (Equation 13-6 or 13-7)<br>$P_{FM} =$ using Equation (Exhibit 13-6)<br>$V_{12} =$ pc/h<br>$V_3$ or $V_{av34}$ pc/h (Equation 13-14 or 13-17)<br>Is $V_3$ or $V_{av34} > 2,700$ pc/h? <input type="checkbox"/> Yes <input type="checkbox"/> No<br>Is $V_3$ or $V_{av34} > 1.5 * V_{12}/2$ <input type="checkbox"/> Yes <input type="checkbox"/> No<br>If Yes, $V_{12a} =$ pc/h (Equation 13-16, 13-18, or 13-19) |                 |  |         |                       | $V_{12} = V_R + (V_F - V_R)P_{FD}$<br>$L_{EQ} =$ (Equation 13-12 or 13-13)<br>$P_{FD} =$ 1.000 using Equation (Exhibit 13-7)<br>$V_{12} =$ 1118 pc/h<br>$V_3$ or $V_{av34}$ 0 pc/h (Equation 13-14 or 13-17)<br>Is $V_3$ or $V_{av34} > 2,700$ pc/h? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No<br>Is $V_3$ or $V_{av34} > 1.5 * V_{12}/2$ <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No<br>If Yes, $V_{12a} =$ pc/h (Equation 13-16, 13-18, or 13-19) |  |               |                                      |            |
| <b>Capacity Checks</b>  |                 |  |         |                       | <b>Capacity Checks</b>  |  |               |                                      |            |
|   | Actual          | Capacity   |         | LOS F?                |   | Actual   | Capacity      |                                      | LOS F?     |
| $V_{FO}$  |                 | Exhibit 13-8   |         |                       | $V_F$   | 1118   | Exhibit 13-8  | 4700                                 | No         |
|   |                 |  |         | $V_{FO} = V_F - V_R$  | 798   | Exhibit 13-8   | 4700          | No                                   |            |
|   |                 |  |         | $V_R$                 | 320   | Exhibit 13-10  | 2200          | No                                   |            |
| <b>Flow Entering Merge Influence Area</b>   |                 |  |         |                       | <b>Flow Entering Diverge Influence Area</b>   |  |               |                                      |            |
|   | Actual          | Max Desirable  |         | Violation?            |   | Actual   | Max Desirable |                                      | Violation? |
| $V_{R12}$   |                 | Exhibit 13-8   |         |                       | $V_{12}$  | 1118   | Exhibit 13-8  | 4400:All                             | No         |
| <b>Level of Service Determination (if not F)</b>  |                 |  |         |                       | <b>Level of Service Determination (if not F)</b>  |  |               |                                      |            |
| $D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$<br>$D_R =$ (pc/mi/ln)<br>$LOS =$ (Exhibit 13-2)   |                 |  |         |                       | $D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$<br>$D_R =$ 9.7 (pc/mi/ln)<br>$LOS =$ A (Exhibit 13-2)   |  |               |                                      |            |
| <b>Speed Determination</b>  |                 |  |         |                       | <b>Speed Determination</b>  |  |               |                                      |            |
| $M_S =$ (Exhibit 13-11)<br>$S_R =$ mph (Exhibit 13-11)<br>$S_0 =$ mph (Exhibit 13-11)<br>$S =$ mph (Exhibit 13-13)  |                 |  |         |                       | $D_s =$ 0.197 (Exhibit 13-12)<br>$S_R =$ 60.5 mph (Exhibit 13-12)<br>$S_0 =$ N/A mph (Exhibit 13-12)<br>$S =$ 60.5 mph (Exhibit 13-13)  |  |               |                                      |            |

| RAMPS AND RAMP JUNCTIONS WORKSHEET  |                 |                                 |          |                       |   |                     |               |  |            |
|---|-----------------|---------------------------------|----------|-----------------------|---|---------------------|---------------|--|------------|
| <b>General Information</b>  |                 |                                 |          |                       | <b>Site Information</b>   |                     |               |  |            |
| Analyst   |                 | Shane Forsythe                  |          | Freeway/Dir of Travel |   | 10th Ave SB On-ramp |               |  |            |
| Agency or Company   |                 |                                 |          | Junction              |   | I-15 and I-315      |               |  |            |
| Date Performed  |                 | 9/15/2014                       |          | Jurisdiction          |   |                     |               |  |            |
| Analysis Time Period  |                 | PM Peak                         |          | Analysis Year         |   | 2035                |               |  |            |
| Project Description   |                 |                                 |          |                       |   |                     |               |  |            |
| <b>Inputs</b>   |                 |                                 |          |                       |   |                     |               |  |            |
| Upstream Adj Ramp<br><br><input type="checkbox"/> Yes <input type="checkbox"/> On<br><br><input checked="" type="checkbox"/> No <input type="checkbox"/> Off<br><br>$L_{up} =$ ft<br><br>$V_u =$ veh/h  |                 | Freeway Number of Lanes, $N$    |          |                       |   | 2                   |               | Downstream Adj Ramp<br><br><input type="checkbox"/> Yes <input type="checkbox"/> On<br><br><input checked="" type="checkbox"/> No <input type="checkbox"/> Off<br><br>$L_{down} =$ ft<br><br>$V_D =$ veh/h |            |
|   |                 | Ramp Number of Lanes, $N$       |          |                       |   | 1                   |               |  |            |
|   |                 | Acceleration Lane Length, $L_A$ |          |                       |   | 1500                |               |  |            |
|   |                 | Deceleration Lane Length $L_D$  |          |                       |   |                     |               |  |            |
|   |                 | Freeway Volume, $V_F$           |          |                       |   | 981                 |               |  |            |
|   |                 | Ramp Volume, $V_R$              |          |                       |   | 453                 |               |  |            |
| Freeway Free-Flow Speed, $S_{FF}$   |                 |                                 |          | 65.0                  |   |                     |               |  |            |
| Ramp Free-Flow Speed, $S_{FR}$  |                 |                                 |          | 35.0                  |   |                     |               |  |            |
| <b>Conversion to pc/h Under Base Conditions</b>   |                 |                                 |          |                       |   |                     |               |  |            |
| (pc/h)  | $V$<br>(Veh/hr) | PHF                             | Terrain  | %Truck                | %Rv   | $f_{HV}$            | $f_p$         | $v = V/PHF \times f_{HV} \times f_p$   |            |
| Freeway   | 981             | 0.93                            | Level    | 10                    | 0   | 0.952               | 1.00          | 1108   |            |
| Ramp  | 453             | 0.94                            | Level    | 5                     | 0   | 0.976               | 1.00          | 494  |            |
| UpStream  |                 |                                 |          |                       |   |                     |               |  |            |
| DownStream  |                 |                                 |          |                       |   |                     |               |  |            |
| <b>Merge Areas</b>  |                 |                                 |          |                       | <b>Diverge Areas</b>  |                     |               |  |            |
| <b>Estimation of <math>v_{12}</math></b>  |                 |                                 |          |                       | <b>Estimation of <math>v_{12}</math></b>  |                     |               |  |            |
| $V_{12} = V_F (P_{FM})$<br>(Equation 13-6 or 13-7)<br>$P_{FM} =$ 1.000 using Equation (Exhibit 13-6)<br>$V_{12} =$ 1108 pc/h<br>$V_3$ or $V_{av34}$ 0 pc/h (Equation 13-14 or 13-17)<br>Is $V_3$ or $V_{av34} > 2,700$ pc/h? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No<br>Is $V_3$ or $V_{av34} > 1.5 * V_{12}/2$ <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No<br>If Yes, $V_{12a} =$ pc/h (Equation 13-16, 13-18, or 13-19) |                 |                                 |          |                       | $V_{12} = V_R + (V_F - V_R)P_{FD}$<br>(Equation 13-12 or 13-13)<br>$P_{FD} =$ using Equation (Exhibit 13-7)<br>$V_{12} =$ pc/h<br>$V_3$ or $V_{av34}$ pc/h (Equation 13-14 or 13-17)<br>Is $V_3$ or $V_{av34} > 2,700$ pc/h? <input type="checkbox"/> Yes <input type="checkbox"/> No<br>Is $V_3$ or $V_{av34} > 1.5 * V_{12}/2$ <input type="checkbox"/> Yes <input type="checkbox"/> No<br>If Yes, $V_{12a} =$ pc/h (Equation 13-16, 13-18, or 13-19) |                     |               |  |            |
| <b>Capacity Checks</b>  |                 |                                 |          |                       | <b>Capacity Checks</b>  |                     |               |  |            |
|   | Actual          | Capacity                        |          | LOS F?                |   | Actual              | Capacity      |  | LOS F?     |
| $V_{FO}$  | 1602            | Exhibit 13-8                    |          | No                    | $V_F$   |                     | Exhibit 13-8  |  |            |
|   |                 |                                 |          |                       | $V_{FO} = V_F - V_R$  |                     | Exhibit 13-8  |  |            |
|   |                 |                                 |          |                       | $V_R$   |                     | Exhibit 13-10 |  |            |
| <b>Flow Entering Merge Influence Area</b>   |                 |                                 |          |                       | <b>Flow Entering Diverge Influence Area</b>   |                     |               |  |            |
|   | Actual          | Max Desirable                   |          | Violation?            |   | Actual              | Max Desirable |  | Violation? |
| $V_{R12}$   | 1602            | Exhibit 13-8                    | 4600:All | No                    | $V_{12}$  |                     | Exhibit 13-8  |  |            |
| <b>Level of Service Determination (if not F)</b>  |                 |                                 |          |                       | <b>Level of Service Determination (if not F)</b>  |                     |               |  |            |
| $D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$<br>$D_R =$ 8.3 (pc/mi/ln)<br>LOS = A (Exhibit 13-2)   |                 |                                 |          |                       | $D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$<br>$D_R =$ (pc/mi/ln)<br>LOS = (Exhibit 13-2)   |                     |               |  |            |
| <b>Speed Determination</b>  |                 |                                 |          |                       | <b>Speed Determination</b>  |                     |               |  |            |
| $M_S =$ 0.235 (Exhibit 13-11)<br>$S_R =$ 59.6 mph (Exhibit 13-11)<br>$S_0 =$ N/A mph (Exhibit 13-11)<br>$S =$ 59.6 mph (Exhibit 13-13)  |                 |                                 |          |                       | $D_S =$ (Exhibit 13-12)<br>$S_R =$ mph (Exhibit 13-12)<br>$S_0 =$ mph (Exhibit 13-12)<br>$S =$ mph (Exhibit 13-13)  |                     |               |  |            |

| RAMPS AND RAMP JUNCTIONS WORKSHEET  |                 |   |         |                       |  |  |               |                                      |            |
|---|-----------------|---|---------|-----------------------|--|--|---------------|--------------------------------------|------------|
| <b>General Information</b>  |                 |   |         |                       | <b>Site Information</b>  |  |               |                                      |            |
| Analyst   |                 | Shane Forsythe  |         | Freeway/Dir of Travel |  | 14th EB Off-ramp   |               |                                      |            |
| Agency or Company   |                 |   |         | Junction              |  | I-315  |               |                                      |            |
| Date Performed  |                 | 9/15/2014   |         | Jurisdiction          |  |  |               |                                      |            |
| Analysis Time Period  |                 | AM Peak   |         | Analysis Year         |  | 2035   |               |                                      |            |
| Project Description I-15 Corridor Study   |                 |   |         |                       |  |  |               |                                      |            |
| <b>Inputs</b>   |                 |   |         |                       |  |  |               |                                      |            |
| Upstream Adj Ramp<br><input type="checkbox"/> Yes <input type="checkbox"/> On<br><input checked="" type="checkbox"/> No <input type="checkbox"/> Off<br><br>$L_{up} =$ ft<br><br>$V_u =$ veh/h  |                 | Freeway Number of Lanes, $N$ 2<br>Ramp Number of Lanes, $N$ 1<br>Acceleration Lane Length, $L_A$<br>Deceleration Lane Length $L_D$ 503<br>Freeway Volume, $V_F$ 627<br>Ramp Volume, $V_R$ 68<br>Freeway Free-Flow Speed, $S_{FF}$ 55.0<br>Ramp Free-Flow Speed, $S_{FR}$ 35.0 |         |                       |  | Downstream Adj Ramp<br><input type="checkbox"/> Yes <input type="checkbox"/> On<br><input checked="" type="checkbox"/> No <input type="checkbox"/> Off<br><br>$L_{down} =$ ft<br><br>$V_D =$ veh/h |               |                                      |            |
| <b>Conversion to pc/h Under Base Conditions</b>   |                 |   |         |                       |  |  |               |                                      |            |
| (pc/h)  | $V$<br>(Veh/hr) | PHF   | Terrain | %Truck                | %Rv  | $f_{HV}$   | $f_p$         | $v = V/PHF \times f_{HV} \times f_p$ |            |
| Freeway   | 627             | 0.87  | Level   | 6                     | 0  | 0.971  | 1.00          | 742                                  |            |
| Ramp  | 68              | 0.83  | Level   | 5                     | 0  | 0.976  | 1.00          | 84                                   |            |
| UpStream  |                 |   |         |                       |  |  |               |                                      |            |
| DownStream  |                 |   |         |                       |  |  |               |                                      |            |
| <b>Merge Areas</b>  |                 |   |         |                       | <b>Diverge Areas</b>   |  |               |                                      |            |
| <b>Estimation of <math>v_{12}</math></b>  |                 |   |         |                       | <b>Estimation of <math>v_{12}</math></b>   |  |               |                                      |            |
| $V_{12} = V_F (P_{FM})$<br>$L_{EQ} =$ (Equation 13-6 or 13-7)<br>$P_{FM} =$ using Equation (Exhibit 13-6)<br>$V_{12} =$ pc/h<br>$V_3$ or $V_{av34}$ pc/h (Equation 13-14 or 13-17)<br>Is $V_3$ or $V_{av34} > 2,700$ pc/h? <input type="checkbox"/> Yes <input type="checkbox"/> No<br>Is $V_3$ or $V_{av34} > 1.5 * V_{12}/2$ <input type="checkbox"/> Yes <input type="checkbox"/> No<br>If Yes, $V_{12a} =$ pc/h (Equation 13-16, 13-18, or 13-19) |                 |   |         |                       | $V_{12} = V_R + (V_F - V_R)P_{FD}$<br>$L_{EQ} =$ (Equation 13-12 or 13-13)<br>$P_{FD} =$ 1.000 using Equation (Exhibit 13-7)<br>$V_{12} =$ 742 pc/h<br>$V_3$ or $V_{av34}$ 0 pc/h (Equation 13-14 or 13-17)<br>Is $V_3$ or $V_{av34} > 2,700$ pc/h? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No<br>Is $V_3$ or $V_{av34} > 1.5 * V_{12}/2$ <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No<br>If Yes, $V_{12a} =$ pc/h (Equation 13-16, 13-18, or 13-19) |  |               |                                      |            |
| <b>Capacity Checks</b>  |                 |   |         |                       | <b>Capacity Checks</b>   |  |               |                                      |            |
|   | Actual          | Capacity  |         | LOS F?                |  | Actual   | Capacity      |                                      | LOS F?     |
| $V_{FO}$  |                 | Exhibit 13-8  |         |                       | $V_F$  | 742  | Exhibit 13-8  | 4500                                 | No         |
|   |                 |   |         | $V_{FO} = V_F - V_R$  | 658  | Exhibit 13-8   | 4500          | No                                   |            |
|   |                 |   |         | $V_R$                 | 84   | Exhibit 13-10  | 2000          | No                                   |            |
| <b>Flow Entering Merge Influence Area</b>   |                 |   |         |                       | <b>Flow Entering Diverge Influence Area</b>  |  |               |                                      |            |
|   | Actual          | Max Desirable   |         | Violation?            |  | Actual   | Max Desirable |                                      | Violation? |
| $V_{R12}$   |                 | Exhibit 13-8  |         |                       | $V_{12}$   | 742  | Exhibit 13-8  | 4400:All                             | No         |
| <b>Level of Service Determination (if not F)</b>  |                 |   |         |                       | <b>Level of Service Determination (if not F)</b>   |  |               |                                      |            |
| $D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$<br>$D_R =$ (pc/mi/ln)<br>$LOS =$ (Exhibit 13-2)   |                 |   |         |                       | $D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$<br>$D_R =$ 6.1 (pc/mi/ln)<br>$LOS =$ A (Exhibit 13-2)  |  |               |                                      |            |
| <b>Speed Determination</b>  |                 |   |         |                       | <b>Speed Determination</b>   |  |               |                                      |            |
| $M_S =$ (Exhibit 13-11)<br>$S_R =$ mph (Exhibit 13-11)<br>$S_0 =$ mph (Exhibit 13-11)<br>$S =$ mph (Exhibit 13-13)  |                 |   |         |                       | $D_s =$ 0.436 (Exhibit 13-12)<br>$S_R =$ 49.3 mph (Exhibit 13-12)<br>$S_0 =$ N/A mph (Exhibit 13-12)<br>$S =$ 49.3 mph (Exhibit 13-13)   |  |               |                                      |            |

| RAMPS AND RAMP JUNCTIONS WORKSHEET  |               |   |          |            |  |  |                    |  |            |
|---|---------------|---|----------|------------|--|--|--------------------|--|------------|
| <b>General Information</b>  |               |   |          |            | <b>Site Information</b>  |  |                    |  |            |
| Analyst   |               | Shane Forsythe                                |          |            | Freeway/Dir of Travel  |  | 14th St EB On-ramp |  |            |
| Agency or Company   |               |   |          |            | Junction   |  | I-315              |  |            |
| Date Performed  |               | 9/15/2014                                     |          |            | Jurisdiction   |  |                    |  |            |
| Analysis Time Period  |               | AM Peak                                       |          |            | Analysis Year  |  | 2035               |  |            |
| Project Description I-15 Corridor Study   |               |   |          |            |  |  |                    |  |            |
| <b>Inputs</b>   |               |   |          |            |  |  |                    |  |            |
| Upstream Adj Ramp<br><br><input type="checkbox"/> Yes <input type="checkbox"/> On<br><br><input checked="" type="checkbox"/> No <input type="checkbox"/> Off<br><br>L <sub>up</sub> =      ft<br><br>V <sub>u</sub> =      veh/h  |               | Freeway Number of Lanes, N      2             |          |            |  | Downstream Adj Ramp<br><br><input type="checkbox"/> Yes <input type="checkbox"/> On<br><br><input checked="" type="checkbox"/> No <input type="checkbox"/> Off<br><br>L <sub>down</sub> =      ft<br><br>V <sub>D</sub> =      veh/h |                    |  |            |
|   |               | Ramp Number of Lanes, N      1                |          |            |  |  |                    |  |            |
|   |               | Acceleration Lane Length, L <sub>A</sub> 930  |          |            |  |  |                    |  |            |
|   |               | Deceleration Lane Length L <sub>D</sub>       |          |            |  |  |                    |  |            |
|   |               | Freeway Volume, V <sub>F</sub> 1140           |          |            |  |  |                    |  |            |
|   |               | Ramp Volume, V <sub>R</sub> 617               |          |            |  |  |                    |  |            |
|   |               | Freeway Free-Flow Speed, S <sub>FF</sub> 55.0 |          |            |  |  |                    |  |            |
|   |               | Ramp Free-Flow Speed, S <sub>FR</sub> 35.0    |          |            |  |  |                    |  |            |
| <b>Conversion to pc/h Under Base Conditions</b>   |               |   |          |            |  |  |                    |  |            |
| (pc/h)  | V<br>(Veh/hr) | PHF   | Terrain  | %Truck     | %Rv  | f <sub>HV</sub>  | f <sub>p</sub>     | v = V/PHF x f <sub>HV</sub> x f <sub>p</sub> |            |
| Freeway   | 1140          | 0.83  | Level    | 4          | 0  | 0.980  | 1.00               | 1403   |            |
| Ramp  | 617           | 0.83  | Level    | 3          | 0  | 0.985  | 1.00               | 755  |            |
| UpStream  |               |   |          |            |  |  |                    |  |            |
| DownStream  |               |   |          |            |  |  |                    |  |            |
| <b>Merge Areas</b>  |               |   |          |            | <b>Diverge Areas</b>   |  |                    |  |            |
| <b>Estimation of v<sub>12</sub></b>   |               |   |          |            | <b>Estimation of v<sub>12</sub></b>  |  |                    |  |            |
| $V_{12} = V_F (P_{FM})$<br>(Equation 13-6 or 13-7)<br>P <sub>FM</sub> = 1.000 using Equation (Exhibit 13-6)<br>V <sub>12</sub> = 1403 pc/h<br>V <sub>3</sub> or V <sub>av34</sub> = 0 pc/h (Equation 13-14 or 13-17)<br>Is V <sub>3</sub> or V <sub>av34</sub> > 2,700 pc/h? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No<br>Is V <sub>3</sub> or V <sub>av34</sub> > 1.5 * V <sub>12</sub> /2 <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No<br>If Yes, V <sub>12a</sub> =      pc/h (Equation 13-16, 13-18, or 13-19) |               |   |          |            | $V_{12} = V_R + (V_F - V_R)P_{FD}$<br>(Equation 13-12 or 13-13)<br>P <sub>FD</sub> =      using Equation (Exhibit 13-7)<br>V <sub>12</sub> =      pc/h<br>V <sub>3</sub> or V <sub>av34</sub> =      pc/h (Equation 13-14 or 13-17)<br>Is V <sub>3</sub> or V <sub>av34</sub> > 2,700 pc/h? <input type="checkbox"/> Yes <input type="checkbox"/> No<br>Is V <sub>3</sub> or V <sub>av34</sub> > 1.5 * V <sub>12</sub> /2 <input type="checkbox"/> Yes <input type="checkbox"/> No<br>If Yes, V <sub>12a</sub> =      pc/h (Equation 13-16, 13-18, or 13-19) |  |                    |  |            |
| <b>Capacity Checks</b>  |               |   |          |            | <b>Capacity Checks</b>   |  |                    |  |            |
|   | Actual        | Capacity                                      |          | LOS F?     |  | Actual   | Capacity           |  | LOS F?     |
| V <sub>FO</sub>   | 2158          | Exhibit 13-8                                  |          | No         | V <sub>F</sub>   |  | Exhibit 13-8       |  |            |
|   |               |   |          |            | V <sub>FO</sub> = V <sub>F</sub> - V <sub>R</sub>  |  | Exhibit 13-8       |  |            |
|   |               |   |          |            | V <sub>R</sub>   |  | Exhibit 13-10      |  |            |
| <b>Flow Entering Merge Influence Area</b>   |               |   |          |            | <b>Flow Entering Diverge Influence Area</b>  |  |                    |  |            |
|   | Actual        | Max Desirable                                 |          | Violation? |  | Actual   | Max Desirable      |  | Violation? |
| V <sub>R12</sub>  | 2158          | Exhibit 13-8                                  | 4600:All | No         | V <sub>12</sub>  |  | Exhibit 13-8       |  |            |
| <b>Level of Service Determination (if not F)</b>  |               |   |          |            | <b>Level of Service Determination (if not F)</b>   |  |                    |  |            |
| $D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$<br>D <sub>R</sub> = 16.1 (pc/mi/ln)<br>LOS = B (Exhibit 13-2)   |               |   |          |            | $D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$<br>D <sub>R</sub> =      (pc/mi/ln)<br>LOS =      (Exhibit 13-2)   |  |                    |  |            |
| <b>Speed Determination</b>  |               |   |          |            | <b>Speed Determination</b>   |  |                    |  |            |
| M <sub>S</sub> = 0.290 (Exhibit 13-11)<br>S <sub>R</sub> = 51.2 mph (Exhibit 13-11)<br>S <sub>0</sub> = N/A mph (Exhibit 13-11)<br>S = 51.2 mph (Exhibit 13-13)   |               |   |          |            | D <sub>S</sub> =      (Exhibit 13-12)<br>S <sub>R</sub> =      mph (Exhibit 13-12)<br>S <sub>0</sub> =      mph (Exhibit 13-12)<br>S =      mph (Exhibit 13-13)  |  |                    |  |            |

| RAMPS AND RAMP JUNCTIONS WORKSHEET   |               |                                 |         |                       |   |                  |               |  |            |
|--|---------------|---------------------------------|---------|-----------------------|---|------------------|---------------|--|------------|
| <b>General Information</b>   |               |                                 |         |                       | <b>Site Information</b>   |                  |               |  |            |
| Analyst  |               | Shane Forsythe                  |         | Freeway/Dir of Travel |   | 14th WB Off-ramp |               |  |            |
| Agency or Company  |               |                                 |         | Junction              |   | I-315            |               |  |            |
| Date Performed   |               | 9/15/2014                       |         | Jurisdiction          |   |                  |               |  |            |
| Analysis Time Period   |               | AM Peak                         |         | Analysis Year         |   | 2035             |               |  |            |
| Project Description I-15 Corridor Study  |               |                                 |         |                       |   |                  |               |  |            |
| <b>Inputs</b>  |               |                                 |         |                       |   |                  |               |  |            |
| Upstream Adj Ramp<br><input type="checkbox"/> Yes <input type="checkbox"/> On<br><input checked="" type="checkbox"/> No <input type="checkbox"/> Off<br><br>$L_{up} =$ ft<br><br>$V_u =$ veh/h   |               | Freeway Number of Lanes, N      |         |                       |   | 2                |               | Downstream Adj Ramp<br><input type="checkbox"/> Yes <input type="checkbox"/> On<br><input checked="" type="checkbox"/> No <input type="checkbox"/> Off<br><br>$L_{down} =$ ft<br><br>$V_D =$ veh/h |            |
|  |               | Ramp Number of Lanes, N         |         |                       |   | 1                |               |  |            |
|  |               | Acceleration Lane Length, $L_A$ |         |                       |   |                  |               |  |            |
|  |               | Deceleration Lane Length $L_D$  |         |                       |   | 713              |               |  |            |
|  |               | Freeway Volume, $V_F$           |         |                       |   | 585              |               |  |            |
|  |               | Ramp Volume, $V_R$              |         |                       |   | 251              |               |  |            |
| Freeway Free-Flow Speed, $S_{FF}$  |               |                                 |         | 55.0                  |   |                  |               |  |            |
| Ramp Free-Flow Speed, $S_{FR}$   |               |                                 |         | 35.0                  |   |                  |               |  |            |
| <b>Conversion to pc/h Under Base Conditions</b>  |               |                                 |         |                       |   |                  |               |  |            |
| (pc/h)   | V<br>(Veh/hr) | PHF                             | Terrain | %Truck                | %Rv   | $f_{HV}$         | $f_p$         | $v = V/PHF \times f_{HV} \times f_p$   |            |
| Freeway  | 585           | 0.82                            | Level   | 1                     | 0   | 0.995            | 1.00          | 714  |            |
| Ramp   | 251           | 0.80                            | Level   | 0                     | 0   | 1.000            | 1.00          | 312  |            |
| UpStream   |               |                                 |         |                       |   |                  |               |  |            |
| DownStream   |               |                                 |         |                       |   |                  |               |  |            |
| <b>Merge Areas</b>   |               |                                 |         |                       | <b>Diverge Areas</b>  |                  |               |  |            |
| <b>Estimation of <math>v_{12}</math></b>   |               |                                 |         |                       | <b>Estimation of <math>v_{12}</math></b>  |                  |               |  |            |
| $V_{12} = V_F (P_{FM})$<br>$L_{EQ} =$ (Equation 13-6 or 13-7)<br>$P_{FM} =$ using Equation (Exhibit 13-6)<br>$V_{12} =$ pc/h<br>$V_3$ or $V_{av34}$ pc/h (Equation 13-14 or 13-17)<br>Is $V_3$ or $V_{av34} > 2,700$ pc/h? <input type="checkbox"/> Yes <input type="checkbox"/> No<br>Is $V_3$ or $V_{av34} > 1.5 \times V_{12}/2$ <input type="checkbox"/> Yes <input type="checkbox"/> No<br>If Yes, $V_{12a} =$ pc/h (Equation 13-16, 13-18, or 13-19) |               |                                 |         |                       | $V_{12} = V_R + (V_F - V_R)P_{FD}$<br>$L_{EQ} =$ (Equation 13-12 or 13-13)<br>$P_{FD} =$ 1.000 using Equation (Exhibit 13-7)<br>$V_{12} =$ 714 pc/h<br>$V_3$ or $V_{av34}$ 0 pc/h (Equation 13-14 or 13-17)<br>Is $V_3$ or $V_{av34} > 2,700$ pc/h? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No<br>Is $V_3$ or $V_{av34} > 1.5 \times V_{12}/2$ <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No<br>If Yes, $V_{12a} =$ pc/h (Equation 13-16, 13-18, or 13-19) |                  |               |  |            |
| <b>Capacity Checks</b>   |               |                                 |         |                       | <b>Capacity Checks</b>  |                  |               |  |            |
|  | Actual        | Capacity                        |         | LOS F?                |   | Actual           | Capacity      |  | LOS F?     |
| $V_{FO}$   |               |                                 |         |                       | $V_F$   | 714              | Exhibit 13-8  | 4500   | No         |
|  |               | Exhibit 13-8                    |         |                       | $V_{FO} = V_F - V_R$  | 402              | Exhibit 13-8  | 4500   | No         |
|  |               |                                 |         |                       | $V_R$   | 312              | Exhibit 13-10 | 2000   | No         |
| <b>Flow Entering Merge Influence Area</b>  |               |                                 |         |                       | <b>Flow Entering Diverge Influence Area</b>   |                  |               |  |            |
|  | Actual        | Max Desirable                   |         | Violation?            |   | Actual           | Max Desirable |  | Violation? |
| $V_{R12}$  |               | Exhibit 13-8                    |         |                       | $V_{12}$  | 714              | Exhibit 13-8  | 4400:All   | No         |
| <b>Level of Service Determination (if not F)</b>   |               |                                 |         |                       | <b>Level of Service Determination (if not F)</b>  |                  |               |  |            |
| $D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$<br>$D_R =$ (pc/mi/ln)<br>LOS =      (Exhibit 13-2)   |               |                                 |         |                       | $D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$<br>$D_R =$ 4.0 (pc/mi/ln)<br>LOS =      A (Exhibit 13-2)  |                  |               |  |            |
| <b>Speed Determination</b>   |               |                                 |         |                       | <b>Speed Determination</b>  |                  |               |  |            |
| $M_S =$ (Exhibit 13-11)<br>$S_R =$ mph (Exhibit 13-11)<br>$S_0 =$ mph (Exhibit 13-11)<br>$S =$ mph (Exhibit 13-13)   |               |                                 |         |                       | $D_s =$ 0.456 (Exhibit 13-12)<br>$S_R =$ 49.1 mph (Exhibit 13-12)<br>$S_0 =$ N/A mph (Exhibit 13-12)<br>$S =$ 49.1 mph (Exhibit 13-13)  |                  |               |  |            |

| RAMPS AND RAMP JUNCTIONS WORKSHEET   |                 |                                 |          |                       |   |                    |               |  |            |
|--|-----------------|---------------------------------|----------|-----------------------|---|--------------------|---------------|--|------------|
| <b>General Information</b>   |                 |                                 |          |                       | <b>Site Information</b>   |                    |               |  |            |
| Analyst  |                 | Shane Forsythe                  |          | Freeway/Dir of Travel |   | 14th St WB On-ramp |               |  |            |
| Agency or Company  |                 |                                 |          | Junction              |   | I-315              |               |  |            |
| Date Performed   |                 | 9/15/2014                       |          | Jurisdiction          |   |                    |               |  |            |
| Analysis Time Period   |                 | AM Peak                         |          | Analysis Year         |   | 2014               |               |  |            |
| Project Description I-15 Corridor Study  |                 |                                 |          |                       |   |                    |               |  |            |
| <b>Inputs</b>  |                 |                                 |          |                       |   |                    |               |  |            |
| Upstream Adj Ramp<br><br><input type="checkbox"/> Yes <input type="checkbox"/> On<br><br><input checked="" type="checkbox"/> No <input type="checkbox"/> Off<br><br>$L_{up} =$ ft<br><br>$V_u =$ veh/h   |                 | Freeway Number of Lanes, $N$    |          |                       |   | 2                  |               | Downstream Adj Ramp<br><br><input type="checkbox"/> Yes <input type="checkbox"/> On<br><br><input checked="" type="checkbox"/> No <input type="checkbox"/> Off<br><br>$L_{down} =$ ft<br><br>$V_D =$ veh/h |            |
|  |                 | Ramp Number of Lanes, $N$       |          |                       |   | 1                  |               |  |            |
|  |                 | Acceleration Lane Length, $L_A$ |          |                       |   | 505                |               |  |            |
|  |                 | Deceleration Lane Length $L_D$  |          |                       |   |                    |               |  |            |
|  |                 | Freeway Volume, $V_F$           |          |                       |   | 514                |               |  |            |
|  |                 | Ramp Volume, $V_R$              |          |                       |   | 142                |               |  |            |
| Freeway Free-Flow Speed, $S_{FF}$  |                 |                                 |          | 55.0                  |   |                    |               |  |            |
| Ramp Free-Flow Speed, $S_{FR}$   |                 |                                 |          | 35.0                  |   |                    |               |  |            |
| <b>Conversion to pc/h Under Base Conditions</b>  |                 |                                 |          |                       |   |                    |               |  |            |
| (pc/h)   | $V$<br>(Veh/hr) | PHF                             | Terrain  | %Truck                | %Rv   | $f_{HV}$           | $f_p$         | $v = V/PHF \times f_{HV} \times f_p$   |            |
| Freeway  | 514             | 0.76                            | Level    | 6                     | 0   | 0.971              | 1.00          | 696  |            |
| Ramp   | 142             | 0.80                            | Level    | 5                     | 0   | 0.976              | 1.00          | 181  |            |
| UpStream   |                 |                                 |          |                       |   |                    |               |  |            |
| DownStream   |                 |                                 |          |                       |   |                    |               |  |            |
| <b>Merge Areas</b>   |                 |                                 |          |                       | <b>Diverge Areas</b>  |                    |               |  |            |
| <b>Estimation of <math>v_{12}</math></b>   |                 |                                 |          |                       | <b>Estimation of <math>v_{12}</math></b>  |                    |               |  |            |
| $V_{12} = V_F (P_{FM})$<br>(Equation 13-6 or 13-7)<br>$P_{FM} =$ 1.000 using Equation (Exhibit 13-6)<br>$V_{12} =$ 696 pc/h<br>$V_3$ or $V_{av34}$ 0 pc/h (Equation 13-14 or 13-17)<br>Is $V_3$ or $V_{av34} > 2,700$ pc/h? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No<br>Is $V_3$ or $V_{av34} > 1.5 * V_{12}/2$ <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No<br>If Yes, $V_{12a} =$ pc/h (Equation 13-16, 13-18, or 13-19) |                 |                                 |          |                       | $V_{12} = V_R + (V_F - V_R)P_{FD}$<br>(Equation 13-12 or 13-13)<br>$P_{FD} =$ using Equation (Exhibit 13-7)<br>$V_{12} =$ pc/h<br>$V_3$ or $V_{av34}$ pc/h (Equation 13-14 or 13-17)<br>Is $V_3$ or $V_{av34} > 2,700$ pc/h? <input type="checkbox"/> Yes <input type="checkbox"/> No<br>Is $V_3$ or $V_{av34} > 1.5 * V_{12}/2$ <input type="checkbox"/> Yes <input type="checkbox"/> No<br>If Yes, $V_{12a} =$ pc/h (Equation 13-16, 13-18, or 13-19) |                    |               |  |            |
| <b>Capacity Checks</b>   |                 |                                 |          |                       | <b>Capacity Checks</b>  |                    |               |  |            |
|  | Actual          | Capacity                        |          | LOS F?                |   | Actual             | Capacity      |  | LOS F?     |
| $V_{FO}$   | 877             | Exhibit 13-8                    |          | No                    | $V_F$   |                    | Exhibit 13-8  |  |            |
|  |                 |                                 |          |                       | $V_{FO} = V_F - V_R$  |                    | Exhibit 13-8  |  |            |
|  |                 |                                 |          |                       | $V_R$   |                    | Exhibit 13-10 |  |            |
| <b>Flow Entering Merge Influence Area</b>  |                 |                                 |          |                       | <b>Flow Entering Diverge Influence Area</b>   |                    |               |  |            |
|  | Actual          | Max Desirable                   |          | Violation?            |   | Actual             | Max Desirable |  | Violation? |
| $V_{R12}$  | 877             | Exhibit 13-8                    | 4600:All | No                    | $V_{12}$  |                    | Exhibit 13-8  |  |            |
| <b>Level of Service Determination (if not F)</b>   |                 |                                 |          |                       | <b>Level of Service Determination (if not F)</b>  |                    |               |  |            |
| $D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$<br>$D_R =$ 9.1 (pc/mi/ln)<br>LOS = A (Exhibit 13-2)  |                 |                                 |          |                       | $D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$<br>$D_R =$ (pc/mi/ln)<br>LOS = (Exhibit 13-2)   |                    |               |  |            |
| <b>Speed Determination</b>   |                 |                                 |          |                       | <b>Speed Determination</b>  |                    |               |  |            |
| $M_S =$ 0.295 (Exhibit 13-11)<br>$S_R =$ 51.2 mph (Exhibit 13-11)<br>$S_0 =$ N/A mph (Exhibit 13-11)<br>$S =$ 51.2 mph (Exhibit 13-13)   |                 |                                 |          |                       | $D_S =$ (Exhibit 13-12)<br>$S_R =$ mph (Exhibit 13-12)<br>$S_0 =$ mph (Exhibit 13-12)<br>$S =$ mph (Exhibit 13-13)  |                    |               |  |            |

| RAMPS AND RAMP JUNCTIONS WORKSHEET  |                 |  |         |                       |  |  |               |                                      |            |
|---|-----------------|--|---------|-----------------------|--|--|---------------|--------------------------------------|------------|
| <b>General Information</b>  |                 |  |         |                       | <b>Site Information</b>  |  |               |                                      |            |
| Analyst   |                 | Shane Forsythe   |         | Freeway/Dir of Travel |  | 14th EB Off-ramp   |               |                                      |            |
| Agency or Company   |                 |  |         | Junction              |  | I-315  |               |                                      |            |
| Date Performed  |                 | 9/15/2014  |         | Jurisdiction          |  |  |               |                                      |            |
| Analysis Time Period  |                 | PM Peak  |         | Analysis Year         |  | 2035   |               |                                      |            |
| Project Description I-15 Corridor Study   |                 |  |         |                       |  |  |               |                                      |            |
| <b>Inputs</b>   |                 |  |         |                       |  |  |               |                                      |            |
| Upstream Adj Ramp<br><input type="checkbox"/> Yes <input type="checkbox"/> On<br><input checked="" type="checkbox"/> No <input type="checkbox"/> Off<br><br>$L_{up} =$ ft<br><br>$V_u =$ veh/h  |                 | Freeway Number of Lanes, $N$ 2<br>Ramp Number of Lanes, $N$ 1<br>Acceleration Lane Length, $L_A$<br>Deceleration Lane Length $L_D$ 503<br>Freeway Volume, $V_F$ 799<br>Ramp Volume, $V_R$ 226<br>Freeway Free-Flow Speed, $S_{FF}$ 55.0<br>Ramp Free-Flow Speed, $S_{FR}$ 35.0 |         |                       |  | Downstream Adj Ramp<br><input type="checkbox"/> Yes <input type="checkbox"/> On<br><input checked="" type="checkbox"/> No <input type="checkbox"/> Off<br><br>$L_{down} =$ ft<br><br>$V_D =$ veh/h |               |                                      |            |
| <b>Conversion to pc/h Under Base Conditions</b>   |                 |  |         |                       |  |  |               |                                      |            |
| (pc/h)  | $V$<br>(Veh/hr) | PHF  | Terrain | %Truck                | %Rv  | $f_{HV}$   | $f_p$         | $v = V/PHF \times f_{HV} \times f_p$ |            |
| Freeway   | 799             | 0.83   | Level   | 4                     | 0  | 0.980  | 1.00          | 982                                  |            |
| Ramp  | 226             | 0.94   | Level   | 3                     | 0  | 0.985  | 1.00          | 244                                  |            |
| UpStream  |                 |  |         |                       |  |  |               |                                      |            |
| DownStream  |                 |  |         |                       |  |  |               |                                      |            |
| <b>Merge Areas</b>  |                 |  |         |                       | <b>Diverge Areas</b>   |  |               |                                      |            |
| <b>Estimation of <math>v_{12}</math></b>  |                 |  |         |                       | <b>Estimation of <math>v_{12}</math></b>   |  |               |                                      |            |
| $V_{12} = V_F (P_{FM})$<br>$L_{EQ} =$ (Equation 13-6 or 13-7)<br>$P_{FM} =$ using Equation (Exhibit 13-6)<br>$V_{12} =$ pc/h<br>$V_3$ or $V_{av34}$ pc/h (Equation 13-14 or 13-17)<br>Is $V_3$ or $V_{av34} > 2,700$ pc/h? <input type="checkbox"/> Yes <input type="checkbox"/> No<br>Is $V_3$ or $V_{av34} > 1.5 * V_{12}/2$ <input type="checkbox"/> Yes <input type="checkbox"/> No<br>If Yes, $V_{12a} =$ pc/h (Equation 13-16, 13-18, or 13-19) |                 |  |         |                       | $V_{12} = V_R + (V_F - V_R)P_{FD}$<br>$L_{EQ} =$ (Equation 13-12 or 13-13)<br>$P_{FD} =$ 1.000 using Equation (Exhibit 13-7)<br>$V_{12} =$ 982 pc/h<br>$V_3$ or $V_{av34}$ 0 pc/h (Equation 13-14 or 13-17)<br>Is $V_3$ or $V_{av34} > 2,700$ pc/h? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No<br>Is $V_3$ or $V_{av34} > 1.5 * V_{12}/2$ <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No<br>If Yes, $V_{12a} =$ pc/h (Equation 13-16, 13-18, or 13-19) |  |               |                                      |            |
| <b>Capacity Checks</b>  |                 |  |         |                       | <b>Capacity Checks</b>   |  |               |                                      |            |
|   | Actual          | Capacity   |         | LOS F?                |  | Actual   | Capacity      |                                      | LOS F?     |
| $V_{FO}$  |                 | Exhibit 13-8   |         |                       | $V_F$  | 982  | Exhibit 13-8  | 4500                                 | No         |
|   |                 |  |         | $V_{FO} = V_F - V_R$  | 738  | Exhibit 13-8   | 4500          | No                                   |            |
|   |                 |  |         | $V_R$                 | 244  | Exhibit 13-10  | 2000          | No                                   |            |
| <b>Flow Entering Merge Influence Area</b>   |                 |  |         |                       | <b>Flow Entering Diverge Influence Area</b>  |  |               |                                      |            |
|   | Actual          | Max Desirable  |         | Violation?            |  | Actual   | Max Desirable |                                      | Violation? |
| $V_{R12}$   |                 | Exhibit 13-8   |         |                       | $V_{12}$   | 982  | Exhibit 13-8  | 4400:All                             | No         |
| <b>Level of Service Determination (if not F)</b>  |                 |  |         |                       | <b>Level of Service Determination (if not F)</b>   |  |               |                                      |            |
| $D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$<br>$D_R =$ (pc/mi/ln)<br>$LOS =$ (Exhibit 13-2)   |                 |  |         |                       | $D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$<br>$D_R =$ 8.2 (pc/mi/ln)<br>$LOS =$ A (Exhibit 13-2)  |  |               |                                      |            |
| <b>Speed Determination</b>  |                 |  |         |                       | <b>Speed Determination</b>   |  |               |                                      |            |
| $M_S =$ (Exhibit 13-11)<br>$S_R =$ mph (Exhibit 13-11)<br>$S_0 =$ mph (Exhibit 13-11)<br>$S =$ mph (Exhibit 13-13)  |                 |  |         |                       | $D_s =$ 0.450 (Exhibit 13-12)<br>$S_R =$ 49.2 mph (Exhibit 13-12)<br>$S_0 =$ N/A mph (Exhibit 13-12)<br>$S =$ 49.2 mph (Exhibit 13-13)   |  |               |                                      |            |



| RAMPS AND RAMP JUNCTIONS WORKSHEET  |                 |                                 |          |                       |   |                    |               |  |            |
|---|-----------------|---------------------------------|----------|-----------------------|---|--------------------|---------------|--|------------|
| <b>General Information</b>  |                 |                                 |          |                       | <b>Site Information</b>   |                    |               |  |            |
| Analyst   |                 | Shane Forsythe                  |          | Freeway/Dir of Travel |   | 14th St EB On-ramp |               |  |            |
| Agency or Company   |                 |                                 |          | Junction              |   | I-315              |               |  |            |
| Date Performed  |                 | 9/15/2014                       |          | Jurisdiction          |   |                    |               |  |            |
| Analysis Time Period  |                 | PM Peak                         |          | Analysis Year         |   | 2014               |               |  |            |
| Project Description I-15 Corridor Study   |                 |                                 |          |                       |   |                    |               |  |            |
| <b>Inputs</b>   |                 |                                 |          |                       |   |                    |               |  |            |
| Upstream Adj Ramp<br><br><input type="checkbox"/> Yes <input type="checkbox"/> On<br><br><input checked="" type="checkbox"/> No <input type="checkbox"/> Off<br><br>$L_{up} =$ ft<br><br>$V_u =$ veh/h  |                 | Freeway Number of Lanes, $N$    |          |                       |   | 2                  |               | Downstream Adj Ramp<br><br><input type="checkbox"/> Yes <input type="checkbox"/> On<br><br><input checked="" type="checkbox"/> No <input type="checkbox"/> Off<br><br>$L_{down} =$ ft<br><br>$V_D =$ veh/h |            |
|   |                 | Ramp Number of Lanes, $N$       |          |                       |   | 1                  |               |  |            |
|   |                 | Acceleration Lane Length, $L_A$ |          |                       |   | 930                |               |  |            |
|   |                 | Deceleration Lane Length $L_D$  |          |                       |   |                    |               |  |            |
|   |                 | Freeway Volume, $V_F$           |          |                       |   | 1216               |               |  |            |
|   |                 | Ramp Volume, $V_R$              |          |                       |   | 648                |               |  |            |
| Freeway Free-Flow Speed, $S_{FF}$   |                 |                                 |          | 55.0                  |   |                    |               |  |            |
| Ramp Free-Flow Speed, $S_{FR}$  |                 |                                 |          | 35.0                  |   |                    |               |  |            |
| <b>Conversion to pc/h Under Base Conditions</b>   |                 |                                 |          |                       |   |                    |               |  |            |
| (pc/h)  | $V$<br>(Veh/hr) | PHF                             | Terrain  | %Truck                | %Rv   | $f_{HV}$           | $f_p$         | $v = V/PHF \times f_{HV} \times f_p$   |            |
| Freeway   | 1216            | 0.90                            | Level    | 3                     | 0   | 0.985              | 1.00          | 1371   |            |
| Ramp  | 648             | 0.94                            | Level    | 1                     | 0   | 0.995              | 1.00          | 693  |            |
| UpStream  |                 |                                 |          |                       |   |                    |               |  |            |
| DownStream  |                 |                                 |          |                       |   |                    |               |  |            |
| <b>Merge Areas</b>  |                 |                                 |          |                       | <b>Diverge Areas</b>  |                    |               |  |            |
| <b>Estimation of <math>v_{12}</math></b>  |                 |                                 |          |                       | <b>Estimation of <math>v_{12}</math></b>  |                    |               |  |            |
| $V_{12} = V_F (P_{FM})$<br>(Equation 13-6 or 13-7)<br>$P_{FM} =$ 1.000 using Equation (Exhibit 13-6)<br>$V_{12} =$ 1371 pc/h<br>$V_3$ or $V_{av34}$ 0 pc/h (Equation 13-14 or 13-17)<br>Is $V_3$ or $V_{av34} > 2,700$ pc/h? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No<br>Is $V_3$ or $V_{av34} > 1.5 * V_{12}/2$ <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No<br>If Yes, $V_{12a} =$ pc/h (Equation 13-16, 13-18, or 13-19) |                 |                                 |          |                       | $V_{12} = V_R + (V_F - V_R)P_{FD}$<br>(Equation 13-12 or 13-13)<br>$P_{FD} =$ using Equation (Exhibit 13-7)<br>$V_{12} =$ pc/h<br>$V_3$ or $V_{av34}$ pc/h (Equation 13-14 or 13-17)<br>Is $V_3$ or $V_{av34} > 2,700$ pc/h? <input type="checkbox"/> Yes <input type="checkbox"/> No<br>Is $V_3$ or $V_{av34} > 1.5 * V_{12}/2$ <input type="checkbox"/> Yes <input type="checkbox"/> No<br>If Yes, $V_{12a} =$ pc/h (Equation 13-16, 13-18, or 13-19) |                    |               |  |            |
| <b>Capacity Checks</b>  |                 |                                 |          |                       | <b>Capacity Checks</b>  |                    |               |  |            |
|   | Actual          | Capacity                        |          | LOS F?                |   | Actual             | Capacity      |  | LOS F?     |
| $V_{FO}$  | 2064            | Exhibit 13-8                    |          | No                    | $V_F$   |                    | Exhibit 13-8  |  |            |
|   |                 |                                 |          |                       | $V_{FO} = V_F - V_R$  |                    | Exhibit 13-8  |  |            |
|   |                 |                                 |          |                       | $V_R$   |                    | Exhibit 13-10 |  |            |
| <b>Flow Entering Merge Influence Area</b>   |                 |                                 |          |                       | <b>Flow Entering Diverge Influence Area</b>   |                    |               |  |            |
|   | Actual          | Max Desirable                   |          | Violation?            |   | Actual             | Max Desirable |  | Violation? |
| $V_{R12}$   | 2064            | Exhibit 13-8                    | 4600:All | No                    | $V_{12}$  |                    | Exhibit 13-8  |  |            |
| <b>Level of Service Determination (if not F)</b>  |                 |                                 |          |                       | <b>Level of Service Determination (if not F)</b>  |                    |               |  |            |
| $D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$<br>$D_R =$ 15.4 (pc/mi/ln)<br>LOS = B (Exhibit 13-2)  |                 |                                 |          |                       | $D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$<br>$D_R =$ (pc/mi/ln)<br>LOS = (Exhibit 13-2)   |                    |               |  |            |
| <b>Speed Determination</b>  |                 |                                 |          |                       | <b>Speed Determination</b>  |                    |               |  |            |
| $M_S =$ 0.287 (Exhibit 13-11)<br>$S_R =$ 51.3 mph (Exhibit 13-11)<br>$S_0 =$ N/A mph (Exhibit 13-11)<br>$S =$ 51.3 mph (Exhibit 13-13)  |                 |                                 |          |                       | $D_S =$ (Exhibit 13-12)<br>$S_R =$ mph (Exhibit 13-12)<br>$S_0 =$ mph (Exhibit 13-12)<br>$S =$ mph (Exhibit 13-13)  |                    |               |  |            |

| RAMPS AND RAMP JUNCTIONS WORKSHEET  |               |                                 |         |                       |  |                  |               |  |            |
|---|---------------|---------------------------------|---------|-----------------------|--|------------------|---------------|--|------------|
| <b>General Information</b>  |               |                                 |         |                       | <b>Site Information</b>  |                  |               |  |            |
| Analyst   |               | Shane Forsythe                  |         | Freeway/Dir of Travel |  | 14th WB Off-ramp |               |  |            |
| Agency or Company   |               |                                 |         | Junction              |  | I-315            |               |  |            |
| Date Performed  |               | 9/15/2014                       |         | Jurisdiction          |  |                  |               |  |            |
| Analysis Time Period  |               | PM Peak                         |         | Analysis Year         |  | 2035             |               |  |            |
| Project Description I-15 Corridor Study   |               |                                 |         |                       |  |                  |               |  |            |
| <b>Inputs</b>   |               |                                 |         |                       |  |                  |               |  |            |
| Upstream Adj Ramp<br><input type="checkbox"/> Yes <input type="checkbox"/> On<br><input checked="" type="checkbox"/> No <input type="checkbox"/> Off<br><br>$L_{up} =$ ft<br><br>$V_u =$ veh/h  |               | Freeway Number of Lanes, N      |         |                       |  | 2                |               | Downstream Adj Ramp<br><input type="checkbox"/> Yes <input type="checkbox"/> On<br><input checked="" type="checkbox"/> No <input type="checkbox"/> Off<br><br>$L_{down} =$ ft<br><br>$V_D =$ veh/h |            |
|   |               | Ramp Number of Lanes, N         |         |                       |  | 1                |               |  |            |
|   |               | Acceleration Lane Length, $L_A$ |         |                       |  |                  |               |  |            |
|   |               | Deceleration Lane Length $L_D$  |         |                       |  | 713              |               |  |            |
|   |               | Freeway Volume, $V_F$           |         |                       |  | 1418             |               |  |            |
|   |               | Ramp Volume, $V_R$              |         |                       |  | 919              |               |  |            |
| Freeway Free-Flow Speed, $S_{FF}$   |               |                                 |         | 55.0                  |  |                  |               |  |            |
| Ramp Free-Flow Speed, $S_{FR}$  |               |                                 |         | 35.0                  |  |                  |               |  |            |
| <b>Conversion to pc/h Under Base Conditions</b>   |               |                                 |         |                       |  |                  |               |  |            |
| (pc/h)  | V<br>(Veh/hr) | PHF                             | Terrain | %Truck                | %Rv  | $f_{HV}$         | $f_p$         | $v = V/PHF \times f_{HV} \times f_p$   |            |
| Freeway   | 1418          | 0.91                            | Level   | 3                     | 0  | 0.985            | 1.00          | 1582   |            |
| Ramp  | 919           | 0.99                            | Level   | 2                     | 0  | 0.990            | 1.00          | 939  |            |
| UpStream  |               |                                 |         |                       |  |                  |               |  |            |
| DownStream  |               |                                 |         |                       |  |                  |               |  |            |
| <b>Merge Areas</b>  |               |                                 |         |                       | <b>Diverge Areas</b>   |                  |               |  |            |
| <b>Estimation of <math>v_{12}</math></b>  |               |                                 |         |                       | <b>Estimation of <math>v_{12}</math></b>   |                  |               |  |            |
| $V_{12} = V_F (P_{FM})$<br>(Equation 13-6 or 13-7)<br>$L_{EQ} =$ using Equation (Exhibit 13-6)<br>$P_{FM} =$ pc/h<br>$V_{12} =$ pc/h (Equation 13-14 or 13-17)<br>$V_3$ or $V_{av34}$ pc/h (Equation 13-14 or 13-17)<br>Is $V_3$ or $V_{av34} > 2,700$ pc/h? <input type="checkbox"/> Yes <input type="checkbox"/> No<br>Is $V_3$ or $V_{av34} > 1.5 * V_{12}/2$ <input type="checkbox"/> Yes <input type="checkbox"/> No<br>If Yes, $V_{12a} =$ pc/h (Equation 13-16, 13-18, or 13-19) |               |                                 |         |                       | $V_{12} = V_R + (V_F - V_R)P_{FD}$<br>(Equation 13-12 or 13-13)<br>$L_{EQ} =$ using Equation (Exhibit 13-7)<br>$P_{FD} =$ 1.000<br>$V_{12} =$ 1582 pc/h<br>$V_3$ or $V_{av34}$ 0 pc/h (Equation 13-14 or 13-17)<br>Is $V_3$ or $V_{av34} > 2,700$ pc/h? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No<br>Is $V_3$ or $V_{av34} > 1.5 * V_{12}/2$ <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No<br>If Yes, $V_{12a} =$ pc/h (Equation 13-16, 13-18, or 13-19) |                  |               |  |            |
| <b>Capacity Checks</b>  |               |                                 |         |                       | <b>Capacity Checks</b>   |                  |               |  |            |
|   | Actual        | Capacity                        |         | LOS F?                |  | Actual           | Capacity      |  | LOS F?     |
| $V_{FO}$  |               |                                 |         |                       | $V_F$  | 1582             | Exhibit 13-8  | 4500   | No         |
|   |               | Exhibit 13-8                    |         |                       | $V_{FO} = V_F - V_R$   | 643              | Exhibit 13-8  | 4500   | No         |
|   |               |                                 |         |                       | $V_R$  | 939              | Exhibit 13-10 | 2000   | No         |
| <b>Flow Entering Merge Influence Area</b>   |               |                                 |         |                       | <b>Flow Entering Diverge Influence Area</b>  |                  |               |  |            |
|   | Actual        | Max Desirable                   |         | Violation?            |  | Actual           | Max Desirable |  | Violation? |
| $V_{R12}$   |               | Exhibit 13-8                    |         |                       | $V_{12}$   | 1582             | Exhibit 13-8  | 4400:All   | No         |
| <b>Level of Service Determination (if not F)</b>  |               |                                 |         |                       | <b>Level of Service Determination (if not F)</b>   |                  |               |  |            |
| $D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$<br>$D_R =$ (pc/mi/ln)<br>LOS =      (Exhibit 13-2)  |               |                                 |         |                       | $D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$<br>$D_R =$ 11.4 (pc/mi/ln)<br>LOS =      B (Exhibit 13-2)  |                  |               |  |            |
| <b>Speed Determination</b>  |               |                                 |         |                       | <b>Speed Determination</b>   |                  |               |  |            |
| $M_S =$ (Exhibit 13-11)<br>$S_R =$ mph (Exhibit 13-11)<br>$S_0 =$ mph (Exhibit 13-11)<br>$S =$ mph (Exhibit 13-13)  |               |                                 |         |                       | $D_s =$ 0.513 (Exhibit 13-12)<br>$S_R =$ 48.3 mph (Exhibit 13-12)<br>$S_0 =$ N/A mph (Exhibit 13-12)<br>$S =$ 48.3 mph (Exhibit 13-13)   |                  |               |  |            |

| RAMPS AND RAMP JUNCTIONS WORKSHEET   |                 |                                 |          |                       |   |                    |               |  |            |
|--|-----------------|---------------------------------|----------|-----------------------|---|--------------------|---------------|--|------------|
| <b>General Information</b>   |                 |                                 |          |                       | <b>Site Information</b>   |                    |               |  |            |
| Analyst  |                 | Shane Forsythe                  |          | Freeway/Dir of Travel |   | 14th St WB On-ramp |               |  |            |
| Agency or Company  |                 |                                 |          | Junction              |   | I-315              |               |  |            |
| Date Performed   |                 | 9/15/2014                       |          | Jurisdiction          |   |                    |               |  |            |
| Analysis Time Period   |                 | PM Peak                         |          | Analysis Year         |   | 2035               |               |  |            |
| Project Description I-15 Corridor Study  |                 |                                 |          |                       |   |                    |               |  |            |
| <b>Inputs</b>  |                 |                                 |          |                       |   |                    |               |  |            |
| Upstream Adj Ramp<br><br><input type="checkbox"/> Yes <input type="checkbox"/> On<br><br><input checked="" type="checkbox"/> No <input type="checkbox"/> Off<br><br>$L_{up} =$ ft<br><br>$V_u =$ veh/h   |                 | Freeway Number of Lanes, $N$    |          |                       |   | 2                  |               | Downstream Adj Ramp<br><br><input type="checkbox"/> Yes <input type="checkbox"/> On<br><br><input checked="" type="checkbox"/> No <input type="checkbox"/> Off<br><br>$L_{down} =$ ft<br><br>$V_D =$ veh/h |            |
|  |                 | Ramp Number of Lanes, $N$       |          |                       |   | 1                  |               |  |            |
|  |                 | Acceleration Lane Length, $L_A$ |          |                       |   | 505                |               |  |            |
|  |                 | Deceleration Lane Length $L_D$  |          |                       |   |                    |               |  |            |
|  |                 | Freeway Volume, $V_F$           |          |                       |   | 728                |               |  |            |
|  |                 | Ramp Volume, $V_R$              |          |                       |   | 201                |               |  |            |
| Freeway Free-Flow Speed, $S_{FF}$  |                 |                                 |          | 55.0                  |   |                    |               |  |            |
| Ramp Free-Flow Speed, $S_{FR}$   |                 |                                 |          | 35.0                  |   |                    |               |  |            |
| <b>Conversion to pc/h Under Base Conditions</b>  |                 |                                 |          |                       |   |                    |               |  |            |
| (pc/h)   | $V$<br>(Veh/hr) | PHF                             | Terrain  | %Truck                | %Rv   | $f_{HV}$           | $f_p$         | $v = V/PHF \times f_{HV} \times f_p$   |            |
| Freeway  | 728             | 0.93                            | Level    | 5                     | 0   | 0.976              | 1.00          | 802  |            |
| Ramp   | 201             | 0.99                            | Level    | 1                     | 0   | 0.995              | 1.00          | 204  |            |
| UpStream   |                 |                                 |          |                       |   |                    |               |  |            |
| DownStream   |                 |                                 |          |                       |   |                    |               |  |            |
| <b>Merge Areas</b>   |                 |                                 |          |                       | <b>Diverge Areas</b>  |                    |               |  |            |
| <b>Estimation of <math>v_{12}</math></b>   |                 |                                 |          |                       | <b>Estimation of <math>v_{12}</math></b>  |                    |               |  |            |
| $V_{12} = V_F (P_{FM})$<br>(Equation 13-6 or 13-7)<br>$P_{FM} =$ 1.000 using Equation (Exhibit 13-6)<br>$V_{12} =$ 802 pc/h<br>$V_3$ or $V_{av34}$ 0 pc/h (Equation 13-14 or 13-17)<br>Is $V_3$ or $V_{av34} > 2,700$ pc/h? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No<br>Is $V_3$ or $V_{av34} > 1.5 * V_{12}/2$ <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No<br>If Yes, $V_{12a} =$ pc/h (Equation 13-16, 13-18, or 13-19) |                 |                                 |          |                       | $V_{12} = V_R + (V_F - V_R)P_{FD}$<br>(Equation 13-12 or 13-13)<br>$P_{FD} =$ using Equation (Exhibit 13-7)<br>$V_{12} =$ pc/h<br>$V_3$ or $V_{av34}$ pc/h (Equation 13-14 or 13-17)<br>Is $V_3$ or $V_{av34} > 2,700$ pc/h? <input type="checkbox"/> Yes <input type="checkbox"/> No<br>Is $V_3$ or $V_{av34} > 1.5 * V_{12}/2$ <input type="checkbox"/> Yes <input type="checkbox"/> No<br>If Yes, $V_{12a} =$ pc/h (Equation 13-16, 13-18, or 13-19) |                    |               |  |            |
| <b>Capacity Checks</b>   |                 |                                 |          |                       | <b>Capacity Checks</b>  |                    |               |  |            |
|  | Actual          | Capacity                        |          | LOS F?                |   | Actual             | Capacity      |  | LOS F?     |
| $V_{FO}$   | 1006            | Exhibit 13-8                    |          | No                    | $V_F$   |                    | Exhibit 13-8  |  |            |
|  |                 |                                 |          |                       | $V_{FO} = V_F - V_R$  |                    | Exhibit 13-8  |  |            |
|  |                 |                                 |          |                       | $V_R$   |                    | Exhibit 13-10 |  |            |
| <b>Flow Entering Merge Influence Area</b>  |                 |                                 |          |                       | <b>Flow Entering Diverge Influence Area</b>   |                    |               |  |            |
|  | Actual          | Max Desirable                   |          | Violation?            |   | Actual             | Max Desirable |  | Violation? |
| $V_{R12}$  | 1006            | Exhibit 13-8                    | 4600:All | No                    | $V_{12}$  |                    | Exhibit 13-8  |  |            |
| <b>Level of Service Determination (if not F)</b>   |                 |                                 |          |                       | <b>Level of Service Determination (if not F)</b>  |                    |               |  |            |
| $D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$<br>$D_R =$ 10.1 (pc/mi/ln)<br>LOS = B (Exhibit 13-2)   |                 |                                 |          |                       | $D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$<br>$D_R =$ (pc/mi/ln)<br>LOS = (Exhibit 13-2)   |                    |               |  |            |
| <b>Speed Determination</b>   |                 |                                 |          |                       | <b>Speed Determination</b>  |                    |               |  |            |
| $M_S =$ 0.296 (Exhibit 13-11)<br>$S_R =$ 51.1 mph (Exhibit 13-11)<br>$S_0 =$ N/A mph (Exhibit 13-11)<br>$S =$ 51.1 mph (Exhibit 13-13)   |                 |                                 |          |                       | $D_S =$ (Exhibit 13-12)<br>$S_R =$ mph (Exhibit 13-12)<br>$S_0 =$ mph (Exhibit 13-12)<br>$S =$ mph (Exhibit 13-13)  |                    |               |  |            |

| RAMPS AND RAMP JUNCTIONS WORKSHEET  |               |  |         |   |  |  |                |  |            |
|---|---------------|--|---------|---|--|--|----------------|--|------------|
| <b>General Information</b>  |               |  |         |   | <b>Site Information</b>  |  |                |  |            |
| Analyst   |               | Shane Forsythe                               |         | Freeway/Dir of Travel                             |  | Central Ave NB Off   |                |  |            |
| Agency or Company   |               |  |         | Junction  |  |  |                |  |            |
| Date Performed  |               | 9/9/2014                                     |         | Jurisdiction                                      |  |  |                |  |            |
| Analysis Time Period  |               | AM Peak                                      |         | Analysis Year                                     |  | 2035   |                |  |            |
| Project Description   |               |  |         |   |  |  |                |  |            |
| <b>Inputs</b>   |               |  |         |   |  |  |                |  |            |
| Upstream Adj Ramp<br><input type="checkbox"/> Yes <input type="checkbox"/> On<br><br><input checked="" type="checkbox"/> No <input type="checkbox"/> Off<br><br>L <sub>up</sub> =        ft<br><br>V <sub>u</sub> =        veh/h  |               | Freeway Number of Lanes, N        2          |         |   |  | Downstream Adj Ramp<br><input type="checkbox"/> Yes <input type="checkbox"/> On<br><br><input checked="" type="checkbox"/> No <input type="checkbox"/> Off<br><br>L <sub>down</sub> =        ft<br><br>V <sub>D</sub> =        veh/h |                |  |            |
|   |               | Ramp Number of Lanes, N        1             |         |   |  |  |                |  |            |
|   |               | Acceleration Lane Length, L <sub>A</sub>     |         |   |  |  |                |  |            |
|   |               | Deceleration Lane Length L <sub>D</sub> 1388 |         |   |  |  |                |  |            |
|   |               | Freeway Volume, V <sub>F</sub> 519           |         |   |  |  |                |  |            |
|   |               | Ramp Volume, V <sub>R</sub> 315              |         |   |  |  |                |  |            |
| Freeway Free-Flow Speed, S <sub>FF</sub> 65.0   |               |  |         |   |  |  |                |  |            |
| Ramp Free-Flow Speed, S <sub>FR</sub> 45.0  |               |  |         |   |  |  |                |  |            |
| <b>Conversion to pc/h Under Base Conditions</b>   |               |  |         |   |  |  |                |  |            |
| (pc/h)  | V<br>(Veh/hr) | PHF  | Terrain | %Truck  | %Rv  | f <sub>HV</sub>  | f <sub>p</sub> | v = V/PHF x f <sub>HV</sub> x f <sub>p</sub> |            |
| Freeway   | 519           | 0.89   | Level   | 14  | 0  | 0.935  | 1.00           | 624  |            |
| Ramp  | 315           | 0.83   | Level   | 10  | 0  | 0.952  | 1.00           | 400  |            |
| UpStream  |               |  |         |   |  |  |                |  |            |
| DownStream  |               |  |         |   |  |  |                |  |            |
| <b>Merge Areas</b>  |               |  |         |   | <b>Diverge Areas</b>   |  |                |  |            |
| <b>Estimation of v<sub>12</sub></b>   |               |  |         |   | <b>Estimation of v<sub>12</sub></b>  |  |                |  |            |
| $V_{12} = V_F (P_{FM})$<br>L <sub>EQ</sub> =        (Equation 13-6 or 13-7)<br>P <sub>FM</sub> =        using Equation (Exhibit 13-6)<br>V <sub>12</sub> =        pc/h<br>V <sub>3</sub> or V <sub>av34</sub> pc/h (Equation 13-14 or 13-17)<br>Is V <sub>3</sub> or V <sub>av34</sub> > 2,700 pc/h? <input type="checkbox"/> Yes <input type="checkbox"/> No<br>Is V <sub>3</sub> or V <sub>av34</sub> > 1.5 * V <sub>12</sub> /2 <input type="checkbox"/> Yes <input type="checkbox"/> No<br>If Yes, V <sub>12a</sub> =        pc/h (Equation 13-16, 13-18, or 13-19) |               |  |         |   | $V_{12} = V_R + (V_F - V_R)P_{FD}$<br>L <sub>EQ</sub> =        (Equation 13-12 or 13-13)<br>P <sub>FD</sub> =        1.000 using Equation (Exhibit 13-7)<br>V <sub>12</sub> =        624 pc/h<br>V <sub>3</sub> or V <sub>av34</sub> 0 pc/h (Equation 13-14 or 13-17)<br>Is V <sub>3</sub> or V <sub>av34</sub> > 2,700 pc/h? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No<br>Is V <sub>3</sub> or V <sub>av34</sub> > 1.5 * V <sub>12</sub> /2 <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No<br>If Yes, V <sub>12a</sub> =        pc/h (Equation 13-16, 13-18, or 13-19) |  |                |  |            |
| <b>Capacity Checks</b>  |               |  |         |   | <b>Capacity Checks</b>   |  |                |  |            |
|   | Actual        | Capacity                                     |         | LOS F?  |  | Actual   | Capacity       |  | LOS F?     |
| V <sub>FO</sub>   |               | Exhibit 13-8                                 |         |   | V <sub>F</sub>   | 624  | Exhibit 13-8   | 4700   | No         |
|   |               |  |         | V <sub>FO</sub> = V <sub>F</sub> - V <sub>R</sub> | 224  | Exhibit 13-8   | 4700           | No   |            |
|   |               |  |         | V <sub>R</sub>                                    | 400  | Exhibit 13-10  | 2100           | No   |            |
| <b>Flow Entering Merge Influence Area</b>   |               |  |         |   | <b>Flow Entering Diverge Influence Area</b>  |  |                |  |            |
|   | Actual        | Max Desirable                                |         | Violation?  |  | Actual   | Max Desirable  |  | Violation? |
| V <sub>R12</sub>  |               | Exhibit 13-8                                 |         |   | V <sub>12</sub>  | 624  | Exhibit 13-8   | 4400:All                                     | No         |
| <b>Level of Service Determination (if not F)</b>  |               |  |         |   | <b>Level of Service Determination (if not F)</b>   |  |                |  |            |
| $D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$<br>D <sub>R</sub> =        (pc/mi/ln)<br>LOS =        (Exhibit 13-2)  |               |  |         |   | $D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$<br>D <sub>R</sub> =        -2.9 (pc/mi/ln)<br>LOS =        A (Exhibit 13-2)  |  |                |  |            |
| <b>Speed Determination</b>  |               |  |         |   | <b>Speed Determination</b>   |  |                |  |            |
| M <sub>S</sub> =        (Exhibit 13-11)<br>S <sub>R</sub> =        mph (Exhibit 13-11)<br>S <sub>0</sub> =        mph (Exhibit 13-11)<br>S =        mph (Exhibit 13-13)   |               |  |         |   | D <sub>S</sub> =        0.334 (Exhibit 13-12)<br>S <sub>R</sub> =        57.3 mph (Exhibit 13-12)<br>S <sub>0</sub> =        N/A mph (Exhibit 13-12)<br>S =        57.3 mph (Exhibit 13-13)  |  |                |  |            |

| RAMPS AND RAMP JUNCTIONS WORKSHEET  |               |  |          |            |  |                 |                |  |            |
|---|---------------|--|----------|------------|--|-----------------|----------------|--|------------|
| <b>General Information</b>  |               |  |          |            | <b>Site Information</b>  |                 |                |  |            |
| Analyst   |               | Shane Forsythe                           |          |            | Freeway/Dir of Travel  |                 | Central NB On  |  |            |
| Agency or Company   |               |  |          |            | Junction   |                 |                |  |            |
| Date Performed  |               | 9/9/2014                                 |          |            | Jurisdiction   |                 |                |  |            |
| Analysis Time Period  |               | AM Peak                                  |          |            | Analysis Year  |                 | 2035           |  |            |
| Project Description   |               |  |          |            |  |                 |                |  |            |
| <b>Inputs</b>   |               |  |          |            |  |                 |                |  |            |
| Upstream Adj Ramp<br><input type="checkbox"/> Yes <input type="checkbox"/> On<br><input checked="" type="checkbox"/> No <input type="checkbox"/> Off<br>L <sub>up</sub> =        ft<br>V <sub>u</sub> =        veh/h  |               | Freeway Number of Lanes, N               |          |            |  | 2               |                | Downstream Adj Ramp<br><input type="checkbox"/> Yes <input type="checkbox"/> On<br><input checked="" type="checkbox"/> No <input type="checkbox"/> Off<br>L <sub>down</sub> =        ft<br>V <sub>D</sub> =        veh/h |            |
|   |               | Ramp Number of Lanes, N                  |          |            |  | 1               |                |  |            |
|   |               | Acceleration Lane Length, L <sub>A</sub> |          |            |  | 1491            |                |  |            |
|   |               | Deceleration Lane Length L <sub>D</sub>  |          |            |  |                 |                |  |            |
|   |               | Freeway Volume, V <sub>F</sub>           |          |            |  | 230             |                |  |            |
|   |               | Ramp Volume, V <sub>R</sub>              |          |            |  | 82              |                |  |            |
| Freeway Free-Flow Speed, S <sub>FF</sub>  |               |  |          | 65.0       |  |                 |                |  |            |
| Ramp Free-Flow Speed, S <sub>FR</sub>   |               |  |          | 55.0       |  |                 |                |  |            |
| <b>Conversion to pc/h Under Base Conditions</b>   |               |  |          |            |  |                 |                |  |            |
| (pc/h)  | V<br>(Veh/hr) | PHF                                      | Terrain  | %Truck     | %Rv  | f <sub>HV</sub> | f <sub>p</sub> | v = V/PHF x f <sub>HV</sub> x f <sub>p</sub>   |            |
| Freeway   | 230           | 0.83                                     | Level    | 7          | 0  | 0.966           | 1.00           | 287  |            |
| Ramp  | 82            | 0.74                                     | Level    | 14         | 0  | 0.935           | 1.00           | 119  |            |
| UpStream  |               |  |          |            |  |                 |                |  |            |
| DownStream  |               |  |          |            |  |                 |                |  |            |
| <b>Merge Areas</b>  |               |  |          |            | <b>Diverge Areas</b>   |                 |                |  |            |
| <b>Estimation of v<sub>12</sub></b>   |               |  |          |            | <b>Estimation of v<sub>12</sub></b>  |                 |                |  |            |
| $V_{12} = V_F (P_{FM})$<br>L <sub>EQ</sub> =        (Equation 13-6 or 13-7)<br>P <sub>FM</sub> =        1.000 using Equation (Exhibit 13-6)<br>V <sub>12</sub> =        287 pc/h<br>V <sub>3</sub> or V <sub>av34</sub> 0 pc/h (Equation 13-14 or 13-17)<br>Is V <sub>3</sub> or V <sub>av34</sub> > 2,700 pc/h? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No<br>Is V <sub>3</sub> or V <sub>av34</sub> > 1.5 * V <sub>12</sub> /2 <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No<br>If Yes, V <sub>12a</sub> =        pc/h (Equation 13-16, 13-18, or 13-19) |               |  |          |            | $V_{12} = V_R + (V_F - V_R)P_{FD}$<br>L <sub>EQ</sub> =        (Equation 13-12 or 13-13)<br>P <sub>FD</sub> =        using Equation (Exhibit 13-7)<br>V <sub>12</sub> =        pc/h<br>V <sub>3</sub> or V <sub>av34</sub> pc/h (Equation 13-14 or 13-17)<br>Is V <sub>3</sub> or V <sub>av34</sub> > 2,700 pc/h? <input type="checkbox"/> Yes <input type="checkbox"/> No<br>Is V <sub>3</sub> or V <sub>av34</sub> > 1.5 * V <sub>12</sub> /2 <input type="checkbox"/> Yes <input type="checkbox"/> No<br>If Yes, V <sub>12a</sub> =        pc/h (Equation 13-16, 13-18, or 13-19) |                 |                |  |            |
| <b>Capacity Checks</b>  |               |  |          |            | <b>Capacity Checks</b>   |                 |                |  |            |
|   | Actual        | Capacity                                 |          | LOS F?     |  | Actual          | Capacity       |  | LOS F?     |
| V <sub>FO</sub>   | 406           | Exhibit 13-8                             |          | No         | V <sub>F</sub>   |                 | Exhibit 13-8   |  |            |
|   |               |  |          |            | V <sub>FO</sub> = V <sub>F</sub> - V <sub>R</sub>  |                 | Exhibit 13-8   |  |            |
|   |               |  |          |            | V <sub>R</sub>   |                 | Exhibit 13-10  |  |            |
| <b>Flow Entering Merge Influence Area</b>   |               |  |          |            | <b>Flow Entering Diverge Influence Area</b>  |                 |                |  |            |
|   | Actual        | Max Desirable                            |          | Violation? |  | Actual          | Max Desirable  |  | Violation? |
| V <sub>R12</sub>  | 406           | Exhibit 13-8                             | 4600:All | No         | V <sub>12</sub>  |                 | Exhibit 13-8   |  |            |
| <b>Level of Service Determination (if not F)</b>  |               |  |          |            | <b>Level of Service Determination (if not F)</b>   |                 |                |  |            |
| $D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$<br>D <sub>R</sub> =        -0.8 (pc/mi/ln)<br>LOS =        A (Exhibit 13-2)   |               |  |          |            | $D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$<br>D <sub>R</sub> =        (pc/mi/ln)<br>LOS =        (Exhibit 13-2)   |                 |                |  |            |
| <b>Speed Determination</b>  |               |  |          |            | <b>Speed Determination</b>   |                 |                |  |            |
| M <sub>S</sub> =        0.163 (Exhibit 13-11)<br>S <sub>R</sub> =        61.3 mph (Exhibit 13-11)<br>S <sub>0</sub> =        N/A mph (Exhibit 13-11)<br>S =        61.3 mph (Exhibit 13-13)   |               |  |          |            | D <sub>S</sub> =        (Exhibit 13-12)<br>S <sub>R</sub> =        mph (Exhibit 13-12)<br>S <sub>0</sub> =        mph (Exhibit 13-12)<br>S =        mph (Exhibit 13-13)  |                 |                |  |            |

| RAMPS AND RAMP JUNCTIONS WORKSHEET   |               |  |         |   |   |  |                |  |            |
|--|---------------|--|---------|---|---|--|----------------|--|------------|
| <b>General Information</b>   |               |  |         |   | <b>Site Information</b>   |  |                |  |            |
| Analyst  |               | Shane Forsythe                               |         | Freeway/Dir of Travel                             |   | Central Ave SB Off   |                |  |            |
| Agency or Company  |               |  |         | Junction  |   |  |                |  |            |
| Date Performed   |               | 9/9/2014                                     |         | Jurisdiction                                      |   |  |                |  |            |
| Analysis Time Period   |               | AM Peak                                      |         | Analysis Year                                     |   | 2035   |                |  |            |
| Project Description  |               |  |         |   |   |  |                |  |            |
| <b>Inputs</b>  |               |  |         |   |   |  |                |  |            |
| Upstream Adj Ramp<br><input type="checkbox"/> Yes <input type="checkbox"/> On<br><br><input checked="" type="checkbox"/> No <input type="checkbox"/> Off<br><br>L <sub>up</sub> =        ft<br><br>V <sub>u</sub> =        veh/h   |               | Freeway Number of Lanes, N        2          |         |   |   | Downstream Adj Ramp<br><input type="checkbox"/> Yes <input type="checkbox"/> On<br><br><input checked="" type="checkbox"/> No <input type="checkbox"/> Off<br><br>L <sub>down</sub> =        ft<br><br>V <sub>D</sub> =        veh/h |                |  |            |
|  |               | Ramp Number of Lanes, N        1             |         |   |   |  |                |  |            |
|  |               | Acceleration Lane Length, L <sub>A</sub>     |         |   |   |  |                |  |            |
|  |               | Deceleration Lane Length L <sub>D</sub> 1144 |         |   |   |  |                |  |            |
|  |               | Freeway Volume, V <sub>F</sub> 376           |         |   |   |  |                |  |            |
|  |               | Ramp Volume, V <sub>R</sub> 191              |         |   |   |  |                |  |            |
| Freeway Free-Flow Speed, S <sub>FF</sub> 65.0  |               |  |         |   |   |  |                |  |            |
| Ramp Free-Flow Speed, S <sub>FR</sub> 45.0   |               |  |         |   |   |  |                |  |            |
| <b>Conversion to pc/h Under Base Conditions</b>  |               |  |         |   |   |  |                |  |            |
| (pc/h)   | V<br>(Veh/hr) | PHF  | Terrain | %Truck  | %Rv   | f <sub>HV</sub>  | f <sub>p</sub> | v = V/PHF x f <sub>HV</sub> x f <sub>p</sub> |            |
| Freeway  | 376           | 0.83   | Level   | 21  | 0   | 0.905  | 1.00           | 501  |            |
| Ramp   | 191           | 0.85   | Level   | 2   | 0   | 0.990  | 1.00           | 227  |            |
| UpStream   |               |  |         |   |   |  |                |  |            |
| DownStream   |               |  |         |   |   |  |                |  |            |
| <b>Merge Areas</b>   |               |  |         |   | <b>Diverge Areas</b>  |  |                |  |            |
| <b>Estimation of v<sub>12</sub></b>  |               |  |         |   | <b>Estimation of v<sub>12</sub></b>   |  |                |  |            |
| $V_{12} = V_F (P_{FM})$<br>(Equation 13-6 or 13-7)<br>P <sub>FM</sub> =        using Equation (Exhibit 13-6)<br>V <sub>12</sub> =        pc/h<br>V <sub>3</sub> or V <sub>av34</sub> pc/h (Equation 13-14 or 13-17)<br>Is V <sub>3</sub> or V <sub>av34</sub> > 2,700 pc/h? <input type="checkbox"/> Yes <input type="checkbox"/> No<br>Is V <sub>3</sub> or V <sub>av34</sub> > 1.5 * V <sub>12</sub> /2 <input type="checkbox"/> Yes <input type="checkbox"/> No<br>If Yes, V <sub>12a</sub> =        pc/h (Equation 13-16, 13-18, or 13-19) |               |  |         |   | $V_{12} = V_R + (V_F - V_R)P_{FD}$<br>(Equation 13-12 or 13-13)<br>P <sub>FD</sub> =        1.000 using Equation (Exhibit 13-7)<br>V <sub>12</sub> =        501 pc/h<br>V <sub>3</sub> or V <sub>av34</sub> 0 pc/h (Equation 13-14 or 13-17)<br>Is V <sub>3</sub> or V <sub>av34</sub> > 2,700 pc/h? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No<br>Is V <sub>3</sub> or V <sub>av34</sub> > 1.5 * V <sub>12</sub> /2 <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No<br>If Yes, V <sub>12a</sub> =        pc/h (Equation 13-16, 13-18, or 13-19) |  |                |  |            |
| <b>Capacity Checks</b>   |               |  |         |   | <b>Capacity Checks</b>  |  |                |  |            |
|  | Actual        | Capacity                                     |         | LOS F?  |   | Actual   | Capacity       |  | LOS F?     |
| V <sub>FO</sub>  |               | Exhibit 13-8                                 |         |   | V <sub>F</sub>  | 501  | Exhibit 13-8   | 4700   | No         |
|  |               |  |         | V <sub>FO</sub> = V <sub>F</sub> - V <sub>R</sub> | 274   | Exhibit 13-8   | 4700           | No   |            |
|  |               |  |         | V <sub>R</sub>                                    | 227   | Exhibit 13-10  | 2100           | No   |            |
| <b>Flow Entering Merge Influence Area</b>  |               |  |         |   | <b>Flow Entering Diverge Influence Area</b>   |  |                |  |            |
|  | Actual        | Max Desirable                                |         | Violation?  |   | Actual   | Max Desirable  |  | Violation? |
| V <sub>R12</sub>   |               | Exhibit 13-8                                 |         |   | V <sub>12</sub>   | 501  | Exhibit 13-8   | 4400:All                                     | No         |
| <b>Level of Service Determination (if not F)</b>   |               |  |         |   | <b>Level of Service Determination (if not F)</b>  |  |                |  |            |
| $D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$<br>D <sub>R</sub> =        (pc/mi/ln)<br>LOS =        (Exhibit 13-2)   |               |  |         |   | $D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$<br>D <sub>R</sub> =        -1.7 (pc/mi/ln)<br>LOS =        A (Exhibit 13-2)   |  |                |  |            |
| <b>Speed Determination</b>   |               |  |         |   | <b>Speed Determination</b>  |  |                |  |            |
| M <sub>S</sub> =        (Exhibit 13-11)<br>S <sub>R</sub> =        mph (Exhibit 13-11)<br>S <sub>0</sub> =        mph (Exhibit 13-11)<br>S =        mph (Exhibit 13-13)  |               |  |         |   | D <sub>S</sub> =        0.318 (Exhibit 13-12)<br>S <sub>R</sub> =        57.7 mph (Exhibit 13-12)<br>S <sub>0</sub> =        N/A mph (Exhibit 13-12)<br>S =        57.7 mph (Exhibit 13-13)   |  |                |  |            |

| RAMPS AND RAMP JUNCTIONS WORKSHEET   |               |   |          |            |  |  |                |  |            |
|--|---------------|---|----------|------------|--|--|----------------|--|------------|
| <b>General Information</b>   |               |   |          |            | <b>Site Information</b>  |  |                |  |            |
| Analyst  |               | Shane Forsythe                                |          |            | Freeway/Dir of Travel  |  | Central SB On  |  |            |
| Agency or Company  |               |   |          |            | Junction   |  |                |  |            |
| Date Performed   |               | 9/9/2014                                      |          |            | Jurisdiction   |  |                |  |            |
| Analysis Time Period   |               | AM Peak                                       |          |            | Analysis Year  |  | 2035           |  |            |
| Project Description  |               |   |          |            |  |  |                |  |            |
| <b>Inputs</b>  |               |   |          |            |  |  |                |  |            |
| Upstream Adj Ramp<br><input type="checkbox"/> Yes <input type="checkbox"/> On<br><input checked="" type="checkbox"/> No <input type="checkbox"/> Off<br>L <sub>up</sub> =        ft<br>V <sub>u</sub> =        veh/h   |               | Freeway Number of Lanes, N        2           |          |            |  | Downstream Adj Ramp<br><input type="checkbox"/> Yes <input type="checkbox"/> On<br><input checked="" type="checkbox"/> No <input type="checkbox"/> Off<br>L <sub>down</sub> =        ft<br>V <sub>D</sub> =        veh/h |                |  |            |
|  |               | Ramp Number of Lanes, N        1              |          |            |  |  |                |  |            |
|  |               | Acceleration Lane Length, L <sub>A</sub> 1144 |          |            |  |  |                |  |            |
|  |               | Deceleration Lane Length L <sub>D</sub>       |          |            |  |  |                |  |            |
|  |               | Freeway Volume, V <sub>F</sub> 671            |          |            |  |  |                |  |            |
|  |               | Ramp Volume, V <sub>R</sub> 228               |          |            |  |  |                |  |            |
| Freeway Free-Flow Speed, S <sub>FF</sub> 65.0  |               |   |          |            |  |  |                |  |            |
| Ramp Free-Flow Speed, S <sub>FR</sub> 45.0   |               |   |          |            |  |  |                |  |            |
| <b>Conversion to pc/h Under Base Conditions</b>  |               |   |          |            |  |  |                |  |            |
| (pc/h)   | V<br>(Veh/hr) | PHF   | Terrain  | %Truck     | %Rv  | f <sub>HV</sub>  | f <sub>p</sub> | v = V/PHF x f <sub>HV</sub> x f <sub>p</sub> |            |
| Freeway  | 671           | 0.94  | Level    | 8          | 0  | 0.962  | 1.00           | 742  |            |
| Ramp   | 228           | 0.76  | Level    | 5          | 0  | 0.976  | 1.00           | 306  |            |
| UpStream   |               |   |          |            |  |  |                |  |            |
| DownStream   |               |   |          |            |  |  |                |  |            |
| <b>Merge Areas</b>   |               |   |          |            | <b>Diverge Areas</b>   |  |                |  |            |
| <b>Estimation of v<sub>12</sub></b>  |               |   |          |            | <b>Estimation of v<sub>12</sub></b>  |  |                |  |            |
| V <sub>12</sub> = V <sub>F</sub> ( P <sub>FM</sub> )<br>L <sub>EQ</sub> =        (Equation 13-6 or 13-7)<br>P <sub>FM</sub> =        1.000 using Equation (Exhibit 13-6)<br>V <sub>12</sub> =        742 pc/h<br>V <sub>3</sub> or V <sub>av34</sub> 0 pc/h (Equation 13-14 or 13-17)<br>Is V <sub>3</sub> or V <sub>av34</sub> > 2,700 pc/h? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No<br>Is V <sub>3</sub> or V <sub>av34</sub> > 1.5 * V <sub>12</sub> /2 <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No<br>If Yes, V <sub>12a</sub> =        pc/h (Equation 13-16, 13-18, or 13-19) |               |   |          |            | V <sub>12</sub> = V <sub>R</sub> + (V <sub>F</sub> - V <sub>R</sub> )P <sub>FD</sub><br>L <sub>EQ</sub> =        (Equation 13-12 or 13-13)<br>P <sub>FD</sub> =        using Equation (Exhibit 13-7)<br>V <sub>12</sub> =        pc/h<br>V <sub>3</sub> or V <sub>av34</sub> pc/h (Equation 13-14 or 13-17)<br>Is V <sub>3</sub> or V <sub>av34</sub> > 2,700 pc/h? <input type="checkbox"/> Yes <input type="checkbox"/> No<br>Is V <sub>3</sub> or V <sub>av34</sub> > 1.5 * V <sub>12</sub> /2 <input type="checkbox"/> Yes <input type="checkbox"/> No<br>If Yes, V <sub>12a</sub> =        pc/h (Equation 13-16, 13-18, or 13-19) |  |                |  |            |
| <b>Capacity Checks</b>   |               |   |          |            | <b>Capacity Checks</b>   |  |                |  |            |
|  | Actual        | Capacity                                      |          | LOS F?     |  | Actual   | Capacity       |  | LOS F?     |
| V <sub>FO</sub>  | 1048          | Exhibit 13-8                                  |          | No         | V <sub>F</sub>   |  | Exhibit 13-8   |  |            |
|  |               |   |          |            | V <sub>FO</sub> = V <sub>F</sub> - V <sub>R</sub>  |  | Exhibit 13-8   |  |            |
|  |               |   |          |            | V <sub>R</sub>   |  | Exhibit 13-10  |  |            |
| <b>Flow Entering Merge Influence Area</b>  |               |   |          |            | <b>Flow Entering Diverge Influence Area</b>  |  |                |  |            |
|  | Actual        | Max Desirable                                 |          | Violation? |  | Actual   | Max Desirable  |  | Violation? |
| V <sub>R12</sub>   | 1048          | Exhibit 13-8                                  | 4600:All | No         | V <sub>12</sub>  |  | Exhibit 13-8   |  |            |
| <b>Level of Service Determination (if not F)</b>   |               |   |          |            | <b>Level of Service Determination (if not F)</b>   |  |                |  |            |
| D <sub>R</sub> = 5.475 + 0.00734 v <sub>R</sub> + 0.0078 V <sub>12</sub> - 0.00627 L <sub>A</sub><br>D <sub>R</sub> =        6.3 (pc/mi/ln)<br>LOS =        A (Exhibit 13-2)   |               |   |          |            | D <sub>R</sub> = 4.252 + 0.0086 V <sub>12</sub> - 0.009 L <sub>D</sub><br>D <sub>R</sub> =        (pc/mi/ln)<br>LOS =        (Exhibit 13-2)  |  |                |  |            |
| <b>Speed Determination</b>   |               |   |          |            | <b>Speed Determination</b>   |  |                |  |            |
| M <sub>S</sub> =        0.229 (Exhibit 13-11)<br>S <sub>R</sub> =        59.7 mph (Exhibit 13-11)<br>S <sub>0</sub> =        N/A mph (Exhibit 13-11)<br>S =        59.7 mph (Exhibit 13-13)  |               |   |          |            | D <sub>S</sub> =        (Exhibit 13-12)<br>S <sub>R</sub> =        mph (Exhibit 13-12)<br>S <sub>0</sub> =        mph (Exhibit 13-12)<br>S =        mph (Exhibit 13-13)  |  |                |  |            |

| RAMPS AND RAMP JUNCTIONS WORKSHEET   |               |   |         |            |   |                 |  |  |            |
|--|---------------|---|---------|------------|---|-----------------|--|--|------------|
| <b>General Information</b>   |               |   |         |            | <b>Site Information</b>   |                 |  |  |            |
| Analyst  |               | Shane Forsythe                                |         |            | Freeway/Dir of Travel   |                 | Central Ave NB Off   |  |            |
| Agency or Company  |               |   |         |            | Junction  |                 |  |  |            |
| Date Performed   |               | 9/9/2014                                      |         |            | Jurisdiction  |                 |  |  |            |
| Analysis Time Period   |               | PM Peak                                       |         |            | Analysis Year   |                 | 2035   |  |            |
| Project Description  |               |   |         |            |   |                 |  |  |            |
| <b>Inputs</b>  |               |   |         |            |   |                 |  |  |            |
| Upstream Adj Ramp<br><br><input type="checkbox"/> Yes <input type="checkbox"/> On<br><br><input checked="" type="checkbox"/> No <input type="checkbox"/> Off<br><br>L <sub>up</sub> =      ft<br><br>V <sub>u</sub> =      veh/h |               | Freeway Number of Lanes, N      2             |         |            |   |                 | Downstream Adj Ramp<br><br><input type="checkbox"/> Yes <input type="checkbox"/> On<br><br><input checked="" type="checkbox"/> No <input type="checkbox"/> Off<br><br>L <sub>down</sub> =      ft<br><br>V <sub>D</sub> =      veh/h |  |            |
|  |               | Ramp Number of Lanes, N      1                |         |            |   |                 |  |  |            |
|  |               | Acceleration Lane Length, L <sub>A</sub>      |         |            |   |                 |  |  |            |
|  |               | Deceleration Lane Length L <sub>D</sub> 1388  |         |            |   |                 |  |  |            |
|  |               | Freeway Volume, V <sub>F</sub> 792            |         |            |   |                 |  |  |            |
|  |               | Ramp Volume, V <sub>R</sub> 372               |         |            |   |                 |  |  |            |
|  |               | Freeway Free-Flow Speed, S <sub>FF</sub> 65.0 |         |            |   |                 |  |  |            |
|  |               | Ramp Free-Flow Speed, S <sub>FR</sub> 45.0    |         |            |   |                 |  |  |            |
| <b>Conversion to pc/h Under Base Conditions</b>  |               |   |         |            |   |                 |  |  |            |
| (pc/h)   | V<br>(Veh/hr) | PHF   | Terrain | %Truck     | %Rv   | f <sub>HV</sub> | f <sub>p</sub>   | v = V/PHF x f <sub>HV</sub> x f <sub>p</sub> |            |
| Freeway  | 792           | 0.87  | Level   | 11         | 0   | 0.948           | 1.00   | 960  |            |
| Ramp   | 372           | 0.75  | Level   | 6          | 0   | 0.971           | 1.00   | 513  |            |
| UpStream   |               |   |         |            |   |                 |  |  |            |
| DownStream   |               |   |         |            |   |                 |  |  |            |
| <b>Merge Areas</b>   |               |   |         |            | <b>Diverge Areas</b>  |                 |  |  |            |
| <b>Estimation of v<sub>12</sub></b>  |               |   |         |            | <b>Estimation of v<sub>12</sub></b>   |                 |  |  |            |
| V <sub>12</sub> = V <sub>F</sub> (P <sub>FM</sub> )<br>(Equation 13-6 or 13-7)   |               |   |         |            | V <sub>12</sub> = V <sub>R</sub> + (V <sub>F</sub> - V <sub>R</sub> )P <sub>FD</sub><br>(Equation 13-12 or 13-13)                     |                 |  |  |            |
| L <sub>EQ</sub> =  |               |   |         |            | L <sub>EQ</sub> =   |                 |  |  |            |
| P <sub>FM</sub> = using Equation (Exhibit 13-6)  |               |   |         |            | P <sub>FD</sub> = 1.000 using Equation (Exhibit 13-7)   |                 |  |  |            |
| V <sub>12</sub> = pc/h   |               |   |         |            | V <sub>12</sub> = 960 pc/h  |                 |  |  |            |
| V <sub>3</sub> or V <sub>av34</sub> pc/h (Equation 13-14 or 13-17)   |               |   |         |            | V <sub>3</sub> or V <sub>av34</sub> 0 pc/h (Equation 13-14 or 13-17)  |                 |  |  |            |
| Is V <sub>3</sub> or V <sub>av34</sub> > 2,700 pc/h? <input type="checkbox"/> Yes <input type="checkbox"/> No  |               |   |         |            | Is V <sub>3</sub> or V <sub>av34</sub> > 2,700 pc/h? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No              |                 |  |  |            |
| Is V <sub>3</sub> or V <sub>av34</sub> > 1.5 * V <sub>12</sub> /2 <input type="checkbox"/> Yes <input type="checkbox"/> No   |               |   |         |            | Is V <sub>3</sub> or V <sub>av34</sub> > 1.5 * V <sub>12</sub> /2 <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No |                 |  |  |            |
| If Yes, V <sub>12a</sub> = pc/h (Equation 13-16, 13-18, or 13-19)  |               |   |         |            | If Yes, V <sub>12a</sub> = pc/h (Equation 13-16, 13-18, or 13-19)   |                 |  |  |            |
| <b>Capacity Checks</b>   |               |   |         |            | <b>Capacity Checks</b>  |                 |  |  |            |
|  | Actual        | Capacity                                      |         | LOS F?     |   | Actual          | Capacity   |  | LOS F?     |
| V <sub>FO</sub>  |               | Exhibit 13-8                                  |         |            | V <sub>F</sub>  | 960             | Exhibit 13-8   | 4700   | No         |
|  |               |   |         |            | V <sub>FO</sub> = V <sub>F</sub> - V <sub>R</sub>   | 447             | Exhibit 13-8   | 4700   | No         |
|  |               |   |         |            | V <sub>R</sub>  | 513             | Exhibit 13-10  | 2100   | No         |
| <b>Flow Entering Merge Influence Area</b>  |               |   |         |            | <b>Flow Entering Diverge Influence Area</b>   |                 |  |  |            |
|  | Actual        | Max Desirable                                 |         | Violation? |   | Actual          | Max Desirable  |  | Violation? |
| V <sub>R12</sub>   |               | Exhibit 13-8                                  |         |            | V <sub>12</sub>   | 960             | Exhibit 13-8   | 4400:All                                     | No         |
| <b>Level of Service Determination (if not F)</b>   |               |   |         |            | <b>Level of Service Determination (if not F)</b>  |                 |  |  |            |
| D <sub>R</sub> = 5.475 + 0.00734 v <sub>R</sub> + 0.0078 V <sub>12</sub> - 0.00627 L <sub>A</sub>  |               |   |         |            | D <sub>R</sub> = 4.252 + 0.0086 V <sub>12</sub> - 0.009 L <sub>D</sub>  |                 |  |  |            |
| D <sub>R</sub> = (pc/mi/ln)  |               |   |         |            | D <sub>R</sub> = 0.0 (pc/mi/ln)   |                 |  |  |            |
| LOS = (Exhibit 13-2)   |               |   |         |            | LOS = A (Exhibit 13-2)  |                 |  |  |            |
| <b>Speed Determination</b>   |               |   |         |            | <b>Speed Determination</b>  |                 |  |  |            |
| M <sub>S</sub> = (Exhibit 13-11)   |               |   |         |            | D <sub>S</sub> = 0.344 (Exhibit 13-12)  |                 |  |  |            |
| S <sub>R</sub> = mph (Exhibit 13-11)   |               |   |         |            | S <sub>R</sub> = 57.1 mph (Exhibit 13-12)   |                 |  |  |            |
| S <sub>0</sub> = mph (Exhibit 13-11)   |               |   |         |            | S <sub>0</sub> = N/A mph (Exhibit 13-12)  |                 |  |  |            |
| S = mph (Exhibit 13-13)  |               |   |         |            | S = 57.1 mph (Exhibit 13-13)  |                 |  |  |            |



| RAMPS AND RAMP JUNCTIONS WORKSHEET  |                 |                                 |          |                       |  |               |               |  |            |
|---|-----------------|---------------------------------|----------|-----------------------|--|---------------|---------------|--|------------|
| <b>General Information</b>  |                 |                                 |          |                       | <b>Site Information</b>  |               |               |  |            |
| Analyst   |                 | Shane Forsythe                  |          | Freeway/Dir of Travel |  | Central NB On |               |  |            |
| Agency or Company   |                 |                                 |          | Junction              |  |               |               |  |            |
| Date Performed  |                 | 9/9/2014                        |          | Jurisdiction          |  |               |               |  |            |
| Analysis Time Period  |                 | PM Peak                         |          | Analysis Year         |  | 2035          |               |  |            |
| Project Description   |                 |                                 |          |                       |  |               |               |  |            |
| <b>Inputs</b>   |                 |                                 |          |                       |  |               |               |  |            |
| Upstream Adj Ramp<br><input type="checkbox"/> Yes <input type="checkbox"/> On<br><input checked="" type="checkbox"/> No <input type="checkbox"/> Off<br><br>$L_{up} =$ ft<br><br>$V_u =$ veh/h  |                 | Freeway Number of Lanes, $N$    |          |                       |  | 2             |               | Downstream Adj Ramp<br><input type="checkbox"/> Yes <input type="checkbox"/> On<br><input checked="" type="checkbox"/> No <input type="checkbox"/> Off<br><br>$L_{down} =$ ft<br><br>$V_D =$ veh/h |            |
|   |                 | Ramp Number of Lanes, $N$       |          |                       |  | 1             |               |  |            |
|   |                 | Acceleration Lane Length, $L_A$ |          |                       |  | 1491          |               |  |            |
|   |                 | Deceleration Lane Length $L_D$  |          |                       |  |               |               |  |            |
|   |                 | Freeway Volume, $V_F$           |          |                       |  | 413           |               |  |            |
|   |                 | Ramp Volume, $V_R$              |          |                       |  | 193           |               |  |            |
| Freeway Free-Flow Speed, $S_{FF}$   |                 |                                 |          | 65.0                  |  |               |               |  |            |
| Ramp Free-Flow Speed, $S_{FR}$  |                 |                                 |          | 55.0                  |  |               |               |  |            |
| <b>Conversion to pc/h Under Base Conditions</b>   |                 |                                 |          |                       |  |               |               |  |            |
| (pc/h)  | $V$<br>(Veh/hr) | PHF                             | Terrain  | %Truck                | %Rv  | $f_{HV}$      | $f_p$         | $v = V/PHF \times f_{HV} \times f_p$   |            |
| Freeway   | 413             | 0.97                            | Level    | 8                     | 0  | 0.962         | 1.00          | 443  |            |
| Ramp  | 193             | 0.81                            | Level    | 1                     | 0  | 0.995         | 1.00          | 239  |            |
| UpStream  |                 |                                 |          |                       |  |               |               |  |            |
| DownStream  |                 |                                 |          |                       |  |               |               |  |            |
| <b>Merge Areas</b>  |                 |                                 |          |                       | <b>Diverge Areas</b>   |               |               |  |            |
| <b>Estimation of <math>v_{12}</math></b>  |                 |                                 |          |                       | <b>Estimation of <math>v_{12}</math></b>   |               |               |  |            |
| $V_{12} = V_F (P_{FM})$<br>$L_{EQ} =$ (Equation 13-6 or 13-7)<br>$P_{FM} =$ 1.000 using Equation (Exhibit 13-6)<br>$V_{12} =$ 443 pc/h<br>$V_3$ or $V_{av34}$ 0 pc/h (Equation 13-14 or 13-17)<br>Is $V_3$ or $V_{av34} > 2,700$ pc/h? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No<br>Is $V_3$ or $V_{av34} > 1.5 * V_{12}/2$ <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No<br>If Yes, $V_{12a} =$ pc/h (Equation 13-16, 13-18, or 13-19) |                 |                                 |          |                       | $V_{12} = V_R + (V_F - V_R)P_{FD}$<br>$L_{EQ} =$ (Equation 13-12 or 13-13)<br>$P_{FD} =$ using Equation (Exhibit 13-7)<br>$V_{12} =$ pc/h<br>$V_3$ or $V_{av34}$ pc/h (Equation 13-14 or 13-17)<br>Is $V_3$ or $V_{av34} > 2,700$ pc/h? <input type="checkbox"/> Yes <input type="checkbox"/> No<br>Is $V_3$ or $V_{av34} > 1.5 * V_{12}/2$ <input type="checkbox"/> Yes <input type="checkbox"/> No<br>If Yes, $V_{12a} =$ pc/h (Equation 13-16, 13-18, or 13-19) |               |               |  |            |
| <b>Capacity Checks</b>  |                 |                                 |          |                       | <b>Capacity Checks</b>   |               |               |  |            |
|   | Actual          | Capacity                        |          | LOS F?                |  | Actual        | Capacity      |  | LOS F?     |
| $V_{FO}$  | 682             | Exhibit 13-8                    |          | No                    | $V_F$  |               | Exhibit 13-8  |  |            |
|   |                 |                                 |          |                       | $V_{FO} = V_F - V_R$   |               | Exhibit 13-8  |  |            |
|   |                 |                                 |          |                       | $V_R$  |               | Exhibit 13-10 |  |            |
| <b>Flow Entering Merge Influence Area</b>   |                 |                                 |          |                       | <b>Flow Entering Diverge Influence Area</b>  |               |               |  |            |
|   | Actual          | Max Desirable                   |          | Violation?            |  | Actual        | Max Desirable |  | Violation? |
| $V_{R12}$   | 682             | Exhibit 13-8                    | 4600:All | No                    | $V_{12}$   |               | Exhibit 13-8  |  |            |
| <b>Level of Service Determination (if not F)</b>  |                 |                                 |          |                       | <b>Level of Service Determination (if not F)</b>   |               |               |  |            |
| $D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$<br>$D_R =$ 1.3 (pc/mi/ln)<br>LOS =      A (Exhibit 13-2)  |                 |                                 |          |                       | $D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$<br>$D_R =$ (pc/mi/ln)<br>LOS =      (Exhibit 13-2)   |               |               |  |            |
| <b>Speed Determination</b>  |                 |                                 |          |                       | <b>Speed Determination</b>   |               |               |  |            |
| $M_S =$ 0.165 (Exhibit 13-11)<br>$S_R =$ 61.2 mph (Exhibit 13-11)<br>$S_0 =$ N/A mph (Exhibit 13-11)<br>$S =$ 61.2 mph (Exhibit 13-13)  |                 |                                 |          |                       | $D_S =$ (Exhibit 13-12)<br>$S_R =$ mph (Exhibit 13-12)<br>$S_0 =$ mph (Exhibit 13-12)<br>$S =$ mph (Exhibit 13-13)   |               |               |  |            |

| RAMPS AND RAMP JUNCTIONS WORKSHEET   |                 |                                 |         |                      |   |               |                    |  |            |
|--|-----------------|---------------------------------|---------|----------------------|---|---------------|--------------------|--|------------|
| <b>General Information</b>   |                 |                                 |         |                      | <b>Site Information</b>   |               |                    |  |            |
| Analyst  |                 | Shane Forsythe                  |         |                      | Freeway/Dir of Travel   |               | Central Ave SB Off |  |            |
| Agency or Company  |                 |                                 |         |                      | Junction  |               |                    |  |            |
| Date Performed   |                 | 9/9/2014                        |         |                      | Jurisdiction  |               |                    |  |            |
| Analysis Time Period   |                 | PM Peak                         |         |                      | Analysis Year   |               | 2035               |  |            |
| Project Description  |                 |                                 |         |                      |   |               |                    |  |            |
| <b>Inputs</b>  |                 |                                 |         |                      |   |               |                    |  |            |
| Upstream Adj Ramp<br><input type="checkbox"/> Yes <input type="checkbox"/> On<br><input checked="" type="checkbox"/> No <input type="checkbox"/> Off<br><br>$L_{up} =$ ft<br><br>$V_u =$ veh/h   |                 | Freeway Number of Lanes, $N$    |         |                      |   | 2             |                    | Downstream Adj Ramp<br><input type="checkbox"/> Yes <input type="checkbox"/> On<br><input checked="" type="checkbox"/> No <input type="checkbox"/> Off<br><br>$L_{down} =$ ft<br><br>$V_D =$ veh/h |            |
|  |                 | Ramp Number of Lanes, $N$       |         |                      |   | 1             |                    |  |            |
|  |                 | Acceleration Lane Length, $L_A$ |         |                      |   |               |                    |  |            |
|  |                 | Deceleration Lane Length $L_D$  |         |                      |   | 1144          |                    |  |            |
|  |                 | Freeway Volume, $V_F$           |         |                      |   | 348           |                    |  |            |
|  |                 | Ramp Volume, $V_R$              |         |                      |   | 101           |                    |  |            |
| Freeway Free-Flow Speed, $S_{FF}$  |                 |                                 |         | 65.0                 |   |               |                    |  |            |
| Ramp Free-Flow Speed, $S_{FR}$   |                 |                                 |         | 45.0                 |   |               |                    |  |            |
| <b>Conversion to pc/h Under Base Conditions</b>  |                 |                                 |         |                      |   |               |                    |  |            |
| (pc/h)   | $V$<br>(Veh/hr) | PHF                             | Terrain | %Truck               | %Rv   | $f_{HV}$      | $f_p$              | $v = V/PHF \times f_{HV} \times f_p$   |            |
| Freeway  | 348             | 0.79                            | Level   | 14                   | 0   | 0.935         | 1.00               | 471  |            |
| Ramp   | 101             | 0.90                            | Level   | 6                    | 0   | 0.971         | 1.00               | 115  |            |
| UpStream   |                 |                                 |         |                      |   |               |                    |  |            |
| DownStream   |                 |                                 |         |                      |   |               |                    |  |            |
| <b>Merge Areas</b>   |                 |                                 |         |                      | <b>Diverge Areas</b>  |               |                    |  |            |
| <b>Estimation of <math>v_{12}</math></b>   |                 |                                 |         |                      | <b>Estimation of <math>v_{12}</math></b>  |               |                    |  |            |
| $V_{12} = V_F (P_{FM})$<br>(Equation 13-6 or 13-7)<br>$P_{FM} =$ using Equation (Exhibit 13-6)<br>$V_{12} =$ pc/h<br>$V_3$ or $V_{av34}$ pc/h (Equation 13-14 or 13-17)<br>Is $V_3$ or $V_{av34} > 2,700$ pc/h? <input type="checkbox"/> Yes <input type="checkbox"/> No<br>Is $V_3$ or $V_{av34} > 1.5 * V_{12}/2$ <input type="checkbox"/> Yes <input type="checkbox"/> No<br>If Yes, $V_{12a} =$ pc/h (Equation 13-16, 13-18, or 13-19) |                 |                                 |         |                      | $V_{12} = V_R + (V_F - V_R)P_{FD}$<br>(Equation 13-12 or 13-13)<br>$P_{FD} =$ 1.000 using Equation (Exhibit 13-7)<br>$V_{12} =$ 471 pc/h<br>$V_3$ or $V_{av34}$ 0 pc/h (Equation 13-14 or 13-17)<br>Is $V_3$ or $V_{av34} > 2,700$ pc/h? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No<br>Is $V_3$ or $V_{av34} > 1.5 * V_{12}/2$ <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No<br>If Yes, $V_{12a} =$ pc/h (Equation 13-16, 13-18, or 13-19) |               |                    |  |            |
| <b>Capacity Checks</b>   |                 |                                 |         |                      | <b>Capacity Checks</b>  |               |                    |  |            |
|  | Actual          | Capacity                        |         | LOS F?               |   | Actual        | Capacity           |  | LOS F?     |
| $V_{FO}$   |                 | Exhibit 13-8                    |         |                      | $V_F$   | 471           | Exhibit 13-8       | 4700   | No         |
|  |                 |                                 |         | $V_{FO} = V_F - V_R$ | 356   | Exhibit 13-8  | 4700               | No   |            |
|  |                 |                                 |         | $V_R$                | 115   | Exhibit 13-10 | 2100               | No   |            |
| <b>Flow Entering Merge Influence Area</b>  |                 |                                 |         |                      | <b>Flow Entering Diverge Influence Area</b>   |               |                    |  |            |
|  | Actual          | Max Desirable                   |         | Violation?           |   | Actual        | Max Desirable      |  | Violation? |
| $V_{R12}$  |                 | Exhibit 13-8                    |         |                      | $V_{12}$  | 471           | Exhibit 13-8       | 4400:All   | No         |
| <b>Level of Service Determination (if not F)</b>   |                 |                                 |         |                      | <b>Level of Service Determination (if not F)</b>  |               |                    |  |            |
| $D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$<br>$D_R =$ (pc/mi/ln)<br>LOS =      (Exhibit 13-2)   |                 |                                 |         |                      | $D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$<br>$D_R =$ -2.0 (pc/mi/ln)<br>LOS =      A (Exhibit 13-2)   |               |                    |  |            |
| <b>Speed Determination</b>   |                 |                                 |         |                      | <b>Speed Determination</b>  |               |                    |  |            |
| $M_S =$ (Exhibit 13-11)<br>$S_R =$ mph (Exhibit 13-11)<br>$S_0 =$ mph (Exhibit 13-11)<br>$S =$ mph (Exhibit 13-13)   |                 |                                 |         |                      | $D_S =$ 0.308 (Exhibit 13-12)<br>$S_R =$ 57.9 mph (Exhibit 13-12)<br>$S_0 =$ N/A mph (Exhibit 13-12)<br>$S =$ 57.9 mph (Exhibit 13-13)  |               |                    |  |            |

| RAMPS AND RAMP JUNCTIONS WORKSHEET   |               |  |          |            |  |                 |                |  |            |
|--|---------------|--|----------|------------|--|-----------------|----------------|--|------------|
| <b>General Information</b>   |               |  |          |            | <b>Site Information</b>  |                 |                |  |            |
| Analyst  |               | Shane Forsythe                           |          |            | Freeway/Dir of Travel  |                 | Central SB On  |  |            |
| Agency or Company  |               |  |          |            | Junction   |                 |                |  |            |
| Date Performed   |               | 9/9/2014                                 |          |            | Jurisdiction   |                 |                |  |            |
| Analysis Time Period   |               | PM Peak                                  |          |            | Analysis Year  |                 | 2035           |  |            |
| Project Description  |               |  |          |            |  |                 |                |  |            |
| <b>Inputs</b>  |               |  |          |            |  |                 |                |  |            |
| Upstream Adj Ramp<br><input type="checkbox"/> Yes <input type="checkbox"/> On<br><input checked="" type="checkbox"/> No <input type="checkbox"/> Off<br>L <sub>up</sub> =        ft<br>V <sub>u</sub> =        veh/h   |               | Freeway Number of Lanes, N               |          |            |  | 2               |                | Downstream Adj Ramp<br><input type="checkbox"/> Yes <input type="checkbox"/> On<br><input checked="" type="checkbox"/> No <input type="checkbox"/> Off<br>L <sub>down</sub> =        ft<br>V <sub>D</sub> =        veh/h |            |
|  |               | Ramp Number of Lanes, N                  |          |            |  | 1               |                |  |            |
|  |               | Acceleration Lane Length, L <sub>A</sub> |          |            |  | 1144            |                |  |            |
|  |               | Deceleration Lane Length L <sub>D</sub>  |          |            |  |                 |                |  |            |
|  |               | Freeway Volume, V <sub>F</sub>           |          |            |  | 936             |                |  |            |
|  |               | Ramp Volume, V <sub>R</sub>              |          |            |  | 366             |                |  |            |
| Freeway Free-Flow Speed, S <sub>FF</sub>   |               |  |          | 65.0       |  |                 |                |  |            |
| Ramp Free-Flow Speed, S <sub>FR</sub>  |               |  |          | 45.0       |  |                 |                |  |            |
| <b>Conversion to pc/h Under Base Conditions</b>  |               |  |          |            |  |                 |                |  |            |
| (pc/h)   | V<br>(Veh/hr) | PHF                                      | Terrain  | %Truck     | %Rv  | f <sub>HV</sub> | f <sub>p</sub> | v = V/PHF x f <sub>HV</sub> x f <sub>p</sub>   |            |
| Freeway  | 936           | 0.90                                     | Level    | 14         | 0  | 0.935           | 1.00           | 1113   |            |
| Ramp   | 366           | 0.89                                     | Level    | 6          | 0  | 0.971           | 1.00           | 423  |            |
| UpStream   |               |  |          |            |  |                 |                |  |            |
| DownStream   |               |  |          |            |  |                 |                |  |            |
| <b>Merge Areas</b>   |               |  |          |            | <b>Diverge Areas</b>   |                 |                |  |            |
| <b>Estimation of v<sub>12</sub></b>  |               |  |          |            | <b>Estimation of v<sub>12</sub></b>  |                 |                |  |            |
| $V_{12} = V_F (P_{FM})$<br>L <sub>EQ</sub> =        (Equation 13-6 or 13-7)<br>P <sub>FM</sub> =        1.000 using Equation (Exhibit 13-6)<br>V <sub>12</sub> =        1113 pc/h<br>V <sub>3</sub> or V <sub>av34</sub> 0 pc/h (Equation 13-14 or 13-17)<br>Is V <sub>3</sub> or V <sub>av34</sub> > 2,700 pc/h? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No<br>Is V <sub>3</sub> or V <sub>av34</sub> > 1.5 * V <sub>12</sub> /2 <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No<br>If Yes, V <sub>12a</sub> =        pc/h (Equation 13-16, 13-18, or 13-19) |               |  |          |            | $V_{12} = V_R + (V_F - V_R)P_{FD}$<br>L <sub>EQ</sub> =        (Equation 13-12 or 13-13)<br>P <sub>FD</sub> =        using Equation (Exhibit 13-7)<br>V <sub>12</sub> =        pc/h<br>V <sub>3</sub> or V <sub>av34</sub> pc/h (Equation 13-14 or 13-17)<br>Is V <sub>3</sub> or V <sub>av34</sub> > 2,700 pc/h? <input type="checkbox"/> Yes <input type="checkbox"/> No<br>Is V <sub>3</sub> or V <sub>av34</sub> > 1.5 * V <sub>12</sub> /2 <input type="checkbox"/> Yes <input type="checkbox"/> No<br>If Yes, V <sub>12a</sub> =        pc/h (Equation 13-16, 13-18, or 13-19) |                 |                |  |            |
| <b>Capacity Checks</b>   |               |  |          |            | <b>Capacity Checks</b>   |                 |                |  |            |
|  | Actual        | Capacity                                 |          | LOS F?     |  | Actual          | Capacity       |  | LOS F?     |
| V <sub>FO</sub>  | 1536          | Exhibit 13-8                             |          | No         | V <sub>F</sub>   |                 | Exhibit 13-8   |  |            |
|  |               |  |          |            | V <sub>FO</sub> = V <sub>F</sub> - V <sub>R</sub>  |                 | Exhibit 13-8   |  |            |
|  |               |  |          |            | V <sub>R</sub>   |                 | Exhibit 13-10  |  |            |
| <b>Flow Entering Merge Influence Area</b>  |               |  |          |            | <b>Flow Entering Diverge Influence Area</b>  |                 |                |  |            |
|  | Actual        | Max Desirable                            |          | Violation? |  | Actual          | Max Desirable  |  | Violation? |
| V <sub>R12</sub>   | 1536          | Exhibit 13-8                             | 4600:All | No         | V <sub>12</sub>  |                 | Exhibit 13-8   |  |            |
| <b>Level of Service Determination (if not F)</b>   |               |  |          |            | <b>Level of Service Determination (if not F)</b>   |                 |                |  |            |
| $D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$<br>D <sub>R</sub> =        10.1 (pc/mi/ln)<br>LOS =        B (Exhibit 13-2)  |               |  |          |            | $D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$<br>D <sub>R</sub> =        (pc/mi/ln)<br>LOS =        (Exhibit 13-2)   |                 |                |  |            |
| <b>Speed Determination</b>   |               |  |          |            | <b>Speed Determination</b>   |                 |                |  |            |
| M <sub>S</sub> =        0.236 (Exhibit 13-11)<br>S <sub>R</sub> =        59.6 mph (Exhibit 13-11)<br>S <sub>0</sub> =        N/A mph (Exhibit 13-11)<br>S =        59.6 mph (Exhibit 13-13)  |               |  |          |            | D <sub>S</sub> =        (Exhibit 13-12)<br>S <sub>R</sub> =        mph (Exhibit 13-12)<br>S <sub>0</sub> =        mph (Exhibit 13-12)<br>S =        mph (Exhibit 13-13)  |                 |                |  |            |

| RAMPS AND RAMP JUNCTIONS WORKSHEET  |               |  |          |            |  |                 |                        |  |            |
|---|---------------|--|----------|------------|--|-----------------|------------------------|--|------------|
| <b>General Information</b>  |               |  |          |            | <b>Site Information</b>  |                 |                        |  |            |
| Analyst   |               | Shane Forsythe                           |          |            | Freeway/Dir of Travel  |                 | Emerson Junction NB On |  |            |
| Agency or Company   |               |  |          |            | Junction   |                 |                        |  |            |
| Date Performed  |               | 9/9/2014                                 |          |            | Jurisdiction   |                 |                        |  |            |
| Analysis Time Period  |               | AM Peak                                  |          |            | Analysis Year  |                 | 2035                   |  |            |
| Project Description   |               |  |          |            |  |                 |                        |  |            |
| <b>Inputs</b>   |               |  |          |            |  |                 |                        |  |            |
| Upstream Adj Ramp<br><input type="checkbox"/> Yes <input type="checkbox"/> On<br><input checked="" type="checkbox"/> No <input type="checkbox"/> Off<br>L <sub>up</sub> =        ft<br>V <sub>u</sub> =        veh/h  |               | Freeway Number of Lanes, N               |          |            |  | 2               |                        | Downstream Adj Ramp<br><input type="checkbox"/> Yes <input type="checkbox"/> On<br><input checked="" type="checkbox"/> No <input type="checkbox"/> Off<br>L <sub>down</sub> =        ft<br>V <sub>D</sub> =        veh/h |            |
|   |               | Ramp Number of Lanes, N                  |          |            |  | 1               |                        |  |            |
|   |               | Acceleration Lane Length, L <sub>A</sub> |          |            |  | 980             |                        |  |            |
|   |               | Deceleration Lane Length L <sub>D</sub>  |          |            |  |                 |                        |  |            |
|   |               | Freeway Volume, V <sub>F</sub>           |          |            |  | 351             |                        |  |            |
|   |               | Ramp Volume, V <sub>R</sub>              |          |            |  | 104             |                        |  |            |
| Freeway Free-Flow Speed, S <sub>FF</sub>  |               |  |          | 65.0       |  |                 |                        |  |            |
| Ramp Free-Flow Speed, S <sub>FR</sub>   |               |  |          | 55.0       |  |                 |                        |  |            |
| <b>Conversion to pc/h Under Base Conditions</b>   |               |  |          |            |  |                 |                        |  |            |
| (pc/h)  | V<br>(Veh/hr) | PHF                                      | Terrain  | %Truck     | %Rv  | f <sub>HV</sub> | f <sub>p</sub>         | v = V/PHF x f <sub>HV</sub> x f <sub>p</sub>   |            |
| Freeway   | 351           | 0.89                                     | Level    | 21         | 0  | 0.905           | 1.00                   | 436  |            |
| Ramp  | 104           | 0.83                                     | Level    | 15         | 0  | 0.930           | 1.00                   | 135  |            |
| UpStream  |               |  |          |            |  |                 |                        |  |            |
| DownStream  |               |  |          |            |  |                 |                        |  |            |
| <b>Merge Areas</b>  |               |  |          |            | <b>Diverge Areas</b>   |                 |                        |  |            |
| <b>Estimation of v<sub>12</sub></b>   |               |  |          |            | <b>Estimation of v<sub>12</sub></b>  |                 |                        |  |            |
| $V_{12} = V_F (P_{FM})$<br>L <sub>EQ</sub> =        (Equation 13-6 or 13-7)<br>P <sub>FM</sub> =        1.000 using Equation (Exhibit 13-6)<br>V <sub>12</sub> =        436 pc/h<br>V <sub>3</sub> or V <sub>av34</sub> 0 pc/h (Equation 13-14 or 13-17)<br>Is V <sub>3</sub> or V <sub>av34</sub> > 2,700 pc/h? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No<br>Is V <sub>3</sub> or V <sub>av34</sub> > 1.5 * V <sub>12</sub> /2 <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No<br>If Yes, V <sub>12a</sub> =        pc/h (Equation 13-16, 13-18, or 13-19) |               |  |          |            | $V_{12} = V_R + (V_F - V_R)P_{FD}$<br>L <sub>EQ</sub> =        (Equation 13-12 or 13-13)<br>P <sub>FD</sub> =        using Equation (Exhibit 13-7)<br>V <sub>12</sub> =        pc/h<br>V <sub>3</sub> or V <sub>av34</sub> pc/h (Equation 13-14 or 13-17)<br>Is V <sub>3</sub> or V <sub>av34</sub> > 2,700 pc/h? <input type="checkbox"/> Yes <input type="checkbox"/> No<br>Is V <sub>3</sub> or V <sub>av34</sub> > 1.5 * V <sub>12</sub> /2 <input type="checkbox"/> Yes <input type="checkbox"/> No<br>If Yes, V <sub>12a</sub> =        pc/h (Equation 13-16, 13-18, or 13-19) |                 |                        |  |            |
| <b>Capacity Checks</b>  |               |  |          |            | <b>Capacity Checks</b>   |                 |                        |  |            |
|   | Actual        | Capacity                                 |          | LOS F?     |  | Actual          | Capacity               |  | LOS F?     |
| V <sub>FO</sub>   | 571           | Exhibit 13-8                             |          | No         | V <sub>F</sub>   |                 | Exhibit 13-8           |  |            |
|   |               |  |          |            | V <sub>FO</sub> = V <sub>F</sub> - V <sub>R</sub>  |                 | Exhibit 13-8           |  |            |
|   |               |  |          |            | V <sub>R</sub>   |                 | Exhibit 13-10          |  |            |
| <b>Flow Entering Merge Influence Area</b>   |               |  |          |            | <b>Flow Entering Diverge Influence Area</b>  |                 |                        |  |            |
|   | Actual        | Max Desirable                            |          | Violation? |  | Actual          | Max Desirable          |  | Violation? |
| V <sub>R12</sub>  | 571           | Exhibit 13-8                             | 4600:All | No         | V <sub>12</sub>  |                 | Exhibit 13-8           |  |            |
| <b>Level of Service Determination (if not F)</b>  |               |  |          |            | <b>Level of Service Determination (if not F)</b>   |                 |                        |  |            |
| $D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$<br>D <sub>R</sub> =        3.7 (pc/mi/ln)<br>LOS =        A (Exhibit 13-2)  |               |  |          |            | $D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$<br>D <sub>R</sub> =        (pc/mi/ln)<br>LOS =        (Exhibit 13-2)   |                 |                        |  |            |
| <b>Speed Determination</b>  |               |  |          |            | <b>Speed Determination</b>   |                 |                        |  |            |
| M <sub>S</sub> =        0.220 (Exhibit 13-11)<br>S <sub>R</sub> =        59.9 mph (Exhibit 13-11)<br>S <sub>0</sub> =        N/A mph (Exhibit 13-11)<br>S =        59.9 mph (Exhibit 13-13)   |               |  |          |            | D <sub>S</sub> =        (Exhibit 13-12)<br>S <sub>R</sub> =        mph (Exhibit 13-12)<br>S <sub>0</sub> =        mph (Exhibit 13-12)<br>S =        mph (Exhibit 13-13)  |                 |                        |  |            |

| RAMPS AND RAMP JUNCTIONS WORKSHEET  |               |   |         |   |  |  |                |  |            |
|---|---------------|---|---------|---|--|--|----------------|--|------------|
| <b>General Information</b>  |               |   |         |   | <b>Site Information</b>  |  |                |  |            |
| Analyst   |               | Shane Forsythe                                |         | Freeway/Dir of Travel                             |  | Emerson Junction SB Off  |                |  |            |
| Agency or Company   |               |   |         | Junction  |  |  |                |  |            |
| Date Performed  |               | 9/9/2014                                      |         | Jurisdiction                                      |  |  |                |  |            |
| Analysis Time Period  |               | AM Peak                                       |         | Analysis Year                                     |  | 2035   |                |  |            |
| Project Description   |               |   |         |   |  |  |                |  |            |
| <b>Inputs</b>   |               |   |         |   |  |  |                |  |            |
| Upstream Adj Ramp<br><br><input type="checkbox"/> Yes <input type="checkbox"/> On<br><br><input checked="" type="checkbox"/> No <input type="checkbox"/> Off<br><br>L <sub>up</sub> =        ft<br><br>V <sub>u</sub> =        veh/h  |               | Freeway Number of Lanes, N        2           |         |   |  | Downstream Adj Ramp<br><br><input type="checkbox"/> Yes <input type="checkbox"/> On<br><br><input checked="" type="checkbox"/> No <input type="checkbox"/> Off<br><br>L <sub>down</sub> =        ft<br><br>V <sub>D</sub> =        veh/h |                |  |            |
|   |               | Ramp Number of Lanes, N        1              |         |   |  |  |                |  |            |
|   |               | Acceleration Lane Length, L <sub>A</sub>      |         |   |  |  |                |  |            |
|   |               | Deceleration Lane Length L <sub>D</sub> 340   |         |   |  |  |                |  |            |
|   |               | Freeway Volume, V <sub>F</sub> 673            |         |   |  |  |                |  |            |
|   |               | Ramp Volume, V <sub>R</sub> 299               |         |   |  |  |                |  |            |
|   |               | Freeway Free-Flow Speed, S <sub>FF</sub> 65.0 |         |   |  |  |                |  |            |
|   |               | Ramp Free-Flow Speed, S <sub>FR</sub> 50.0    |         |   |  |  |                |  |            |
| <b>Conversion to pc/h Under Base Conditions</b>   |               |   |         |   |  |  |                |  |            |
| (pc/h)  | V<br>(Veh/hr) | PHF   | Terrain | %Truck  | %Rv  | f <sub>HV</sub>  | f <sub>p</sub> | v = V/PHF x f <sub>HV</sub> x f <sub>p</sub> |            |
| Freeway   | 673           | 0.87  | Level   | 6   | 0  | 0.971  | 1.00           | 797  |            |
| Ramp  | 299           | 0.88  | Level   | 5   | 0  | 0.976  | 1.00           | 348  |            |
| UpStream  |               |   |         |   |  |  |                |  |            |
| DownStream  |               |   |         |   |  |  |                |  |            |
| <b>Merge Areas</b>  |               |   |         |   | <b>Diverge Areas</b>   |  |                |  |            |
| <b>Estimation of v<sub>12</sub></b>   |               |   |         |   | <b>Estimation of v<sub>12</sub></b>  |  |                |  |            |
| $V_{12} = V_F (P_{FM})$ (Equation 13-6 or 13-7)<br>P <sub>FM</sub> =        using Equation (Exhibit 13-6)<br>V <sub>12</sub> =        pc/h<br>V <sub>3</sub> or V <sub>av34</sub> pc/h (Equation 13-14 or 13-17)<br>Is V <sub>3</sub> or V <sub>av34</sub> > 2,700 pc/h? <input type="checkbox"/> Yes <input type="checkbox"/> No<br>Is V <sub>3</sub> or V <sub>av34</sub> > 1.5 * V <sub>12</sub> /2 <input type="checkbox"/> Yes <input type="checkbox"/> No<br>If Yes, V <sub>12a</sub> =        pc/h (Equation 13-16, 13-18, or 13-19) |               |   |         |   | $V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 13-12 or 13-13)<br>P <sub>FD</sub> =        1.000 using Equation (Exhibit 13-7)<br>V <sub>12</sub> =        797 pc/h<br>V <sub>3</sub> or V <sub>av34</sub> 0 pc/h (Equation 13-14 or 13-17)<br>Is V <sub>3</sub> or V <sub>av34</sub> > 2,700 pc/h? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No<br>Is V <sub>3</sub> or V <sub>av34</sub> > 1.5 * V <sub>12</sub> /2 <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No<br>If Yes, V <sub>12a</sub> =        pc/h (Equation 13-16, 13-18, or 13-19) |  |                |  |            |
| <b>Capacity Checks</b>  |               |   |         |   | <b>Capacity Checks</b>   |  |                |  |            |
|   | Actual        | Capacity                                      |         | LOS F?  |  | Actual   | Capacity       |  | LOS F?     |
| V <sub>FO</sub>   |               | Exhibit 13-8                                  |         |   | V <sub>F</sub>   | 797  | Exhibit 13-8   | 4700   | No         |
|   |               |   |         | V <sub>FO</sub> = V <sub>F</sub> - V <sub>R</sub> | 449  | Exhibit 13-8   | 4700           | No   |            |
|   |               |   |         | V <sub>R</sub>                                    | 348  | Exhibit 13-10  | 2100           | No   |            |
| <b>Flow Entering Merge Influence Area</b>   |               |   |         |   | <b>Flow Entering Diverge Influence Area</b>  |  |                |  |            |
|   | Actual        | Max Desirable                                 |         | Violation?  |  | Actual   | Max Desirable  |  | Violation? |
| V <sub>R12</sub>  |               | Exhibit 13-8                                  |         |   | V <sub>12</sub>  | 797  | Exhibit 13-8   | 4400:All                                     | No         |
| <b>Level of Service Determination (if not F)</b>  |               |   |         |   | <b>Level of Service Determination (if not F)</b>   |  |                |  |            |
| $D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ D <sub>R</sub> =        (pc/mi/ln)<br>LOS =        (Exhibit 13-2)   |               |   |         |   | $D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$ D <sub>R</sub> =        8.0 (pc/mi/ln)<br>LOS =        A (Exhibit 13-2)  |  |                |  |            |
| <b>Speed Determination</b>  |               |   |         |   | <b>Speed Determination</b>   |  |                |  |            |
| M <sub>S</sub> =        (Exhibit 13-11)<br>S <sub>R</sub> =        mph (Exhibit 13-11)<br>S <sub>0</sub> =        mph (Exhibit 13-11)<br>S =        mph (Exhibit 13-13)   |               |   |         |   | D <sub>S</sub> =        0.264 (Exhibit 13-12)<br>S <sub>R</sub> =        58.9 mph (Exhibit 13-12)<br>S <sub>0</sub> =        N/A mph (Exhibit 13-12)<br>S =        58.9 mph (Exhibit 13-13)  |  |                |  |            |

| RAMPS AND RAMP JUNCTIONS WORKSHEET  |                 |                                 |          |            |  |          |                        |  |            |
|---|-----------------|---------------------------------|----------|------------|--|----------|------------------------|--|------------|
| <b>General Information</b>  |                 |                                 |          |            | <b>Site Information</b>  |          |                        |  |            |
| Analyst   |                 | Shane Forsythe                  |          |            | Freeway/Dir of Travel  |          | Emerson Junction NB On |  |            |
| Agency or Company   |                 |                                 |          |            | Junction   |          |                        |  |            |
| Date Performed  |                 | 9/9/2014                        |          |            | Jurisdiction   |          |                        |  |            |
| Analysis Time Period  |                 | PM Peak                         |          |            | Analysis Year  |          | 2035                   |  |            |
| Project Description   |                 |                                 |          |            |  |          |                        |  |            |
| <b>Inputs</b>   |                 |                                 |          |            |  |          |                        |  |            |
| Upstream Adj Ramp<br><br><input type="checkbox"/> Yes <input type="checkbox"/> On<br><br><input checked="" type="checkbox"/> No <input type="checkbox"/> Off<br><br>$L_{up} =$ ft<br><br>$V_u =$ veh/h  |                 | Freeway Number of Lanes, $N$    |          |            |  | 2        |                        | Downstream Adj Ramp<br><br><input type="checkbox"/> Yes <input type="checkbox"/> On<br><br><input checked="" type="checkbox"/> No <input type="checkbox"/> Off<br><br>$L_{down} =$ ft<br><br>$V_D =$ veh/h |            |
|   |                 | Ramp Number of Lanes, $N$       |          |            |  | 1        |                        |  |            |
|   |                 | Acceleration Lane Length, $L_A$ |          |            |  | 980      |                        |  |            |
|   |                 | Deceleration Lane Length $L_D$  |          |            |  |          |                        |  |            |
|   |                 | Freeway Volume, $V_F$           |          |            |  | 849      |                        |  |            |
|   |                 | Ramp Volume, $V_R$              |          |            |  | 458      |                        |  |            |
| Freeway Free-Flow Speed, $S_{FF}$   |                 |                                 |          | 65.0       |  |          |                        |  |            |
| Ramp Free-Flow Speed, $S_{FR}$  |                 |                                 |          | 55.0       |  |          |                        |  |            |
| <b>Conversion to pc/h Under Base Conditions</b>   |                 |                                 |          |            |  |          |                        |  |            |
| (pc/h)  | $V$<br>(Veh/hr) | PHF                             | Terrain  | %Truck     | %Rv  | $f_{HV}$ | $f_p$                  | $v = V/PHF \times f_{HV} \times f_p$   |            |
| Freeway   | 849             | 0.94                            | Level    | 6          | 0  | 0.971    | 1.00                   | 930  |            |
| Ramp  | 458             | 0.92                            | Level    | 5          | 0  | 0.976    | 1.00                   | 511  |            |
| UpStream  |                 |                                 |          |            |  |          |                        |  |            |
| DownStream  |                 |                                 |          |            |  |          |                        |  |            |
| <b>Merge Areas</b>  |                 |                                 |          |            | <b>Diverge Areas</b>   |          |                        |  |            |
| <b>Estimation of <math>v_{12}</math></b>  |                 |                                 |          |            | <b>Estimation of <math>v_{12}</math></b>   |          |                        |  |            |
| $V_{12} = V_F (P_{FM})$<br>$L_{EQ} =$ (Equation 13-6 or 13-7)<br>$P_{FM} =$ 1.000 using Equation (Exhibit 13-6)<br>$V_{12} =$ 930 pc/h<br>$V_3$ or $V_{av34}$ 0 pc/h (Equation 13-14 or 13-17)<br>Is $V_3$ or $V_{av34} > 2,700$ pc/h? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No<br>Is $V_3$ or $V_{av34} > 1.5 * V_{12}/2$ <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No<br>If Yes, $V_{12a} =$ pc/h (Equation 13-16, 13-18, or 13-19) |                 |                                 |          |            | $V_{12} = V_R + (V_F - V_R)P_{FD}$<br>$L_{EQ} =$ (Equation 13-12 or 13-13)<br>$P_{FD} =$ using Equation (Exhibit 13-7)<br>$V_{12} =$ pc/h<br>$V_3$ or $V_{av34}$ pc/h (Equation 13-14 or 13-17)<br>Is $V_3$ or $V_{av34} > 2,700$ pc/h? <input type="checkbox"/> Yes <input type="checkbox"/> No<br>Is $V_3$ or $V_{av34} > 1.5 * V_{12}/2$ <input type="checkbox"/> Yes <input type="checkbox"/> No<br>If Yes, $V_{12a} =$ pc/h (Equation 13-16, 13-18, or 13-19) |          |                        |  |            |
| <b>Capacity Checks</b>  |                 |                                 |          |            | <b>Capacity Checks</b>   |          |                        |  |            |
|   | Actual          | Capacity                        |          | LOS F?     |  | Actual   | Capacity               |  | LOS F?     |
| $V_{FO}$  | 1441            | Exhibit 13-8                    |          | No         | $V_F$  |          | Exhibit 13-8           |  |            |
|   |                 |                                 |          |            | $V_{FO} = V_F - V_R$   |          | Exhibit 13-8           |  |            |
|   |                 |                                 |          |            | $V_R$  |          | Exhibit 13-10          |  |            |
| <b>Flow Entering Merge Influence Area</b>   |                 |                                 |          |            | <b>Flow Entering Diverge Influence Area</b>  |          |                        |  |            |
|   | Actual          | Max Desirable                   |          | Violation? |  | Actual   | Max Desirable          |  | Violation? |
| $V_{R12}$   | 1441            | Exhibit 13-8                    | 4600:All | No         | $V_{12}$   |          | Exhibit 13-8           |  |            |
| <b>Level of Service Determination (if not F)</b>  |                 |                                 |          |            | <b>Level of Service Determination (if not F)</b>   |          |                        |  |            |
| $D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$<br>$D_R =$ 10.3 (pc/mi/ln)<br>$LOS =$ B (Exhibit 13-2)  |                 |                                 |          |            | $D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$<br>$D_R =$ (pc/mi/ln)<br>$LOS =$ (Exhibit 13-2)  |          |                        |  |            |
| <b>Speed Determination</b>  |                 |                                 |          |            | <b>Speed Determination</b>   |          |                        |  |            |
| $M_S =$ 0.230 (Exhibit 13-11)<br>$S_R =$ 59.7 mph (Exhibit 13-11)<br>$S_0 =$ N/A mph (Exhibit 13-11)<br>$S =$ 59.7 mph (Exhibit 13-13)  |                 |                                 |          |            | $D_S =$ (Exhibit 13-12)<br>$S_R =$ mph (Exhibit 13-12)<br>$S_0 =$ mph (Exhibit 13-12)<br>$S =$ mph (Exhibit 13-13)   |          |                        |  |            |

| RAMPS AND RAMP JUNCTIONS WORKSHEET   |                 |                                 |         |                       |   |                         |               |  |            |
|--|-----------------|---------------------------------|---------|-----------------------|---|-------------------------|---------------|--|------------|
| <b>General Information</b>   |                 |                                 |         |                       | <b>Site Information</b>   |                         |               |  |            |
| Analyst  |                 | Shane Forsythe                  |         | Freeway/Dir of Travel |   | Emerson Junction SB Off |               |  |            |
| Agency or Company  |                 |                                 |         | Junction              |   |                         |               |  |            |
| Date Performed   |                 | 9/9/2014                        |         | Jurisdiction          |   |                         |               |  |            |
| Analysis Time Period   |                 | AM Peak                         |         | Analysis Year         |   | 2035                    |               |  |            |
| Project Description  |                 |                                 |         |                       |   |                         |               |  |            |
| <b>Inputs</b>  |                 |                                 |         |                       |   |                         |               |  |            |
| Upstream Adj Ramp<br><input type="checkbox"/> Yes <input type="checkbox"/> On<br><input checked="" type="checkbox"/> No <input type="checkbox"/> Off<br><br>$L_{up} =$ ft<br><br>$V_u =$ veh/h   |                 | Freeway Number of Lanes, $N$    |         |                       |   | 2                       |               | Downstream Adj Ramp<br><input type="checkbox"/> Yes <input type="checkbox"/> On<br><input checked="" type="checkbox"/> No <input type="checkbox"/> Off<br><br>$L_{down} =$ ft<br><br>$V_D =$ veh/h |            |
|  |                 | Ramp Number of Lanes, $N$       |         |                       |   | 1                       |               |  |            |
|  |                 | Acceleration Lane Length, $L_A$ |         |                       |   |                         |               |  |            |
|  |                 | Deceleration Lane Length $L_D$  |         |                       |   | 340                     |               |  |            |
|  |                 | Freeway Volume, $V_F$           |         |                       |   | 560                     |               |  |            |
|  |                 | Ramp Volume, $V_R$              |         |                       |   | 195                     |               |  |            |
| Freeway Free-Flow Speed, $S_{FF}$  |                 |                                 |         | 65.0                  |   |                         |               |  |            |
| Ramp Free-Flow Speed, $S_{FR}$   |                 |                                 |         | 50.0                  |   |                         |               |  |            |
| <b>Conversion to pc/h Under Base Conditions</b>  |                 |                                 |         |                       |   |                         |               |  |            |
| (pc/h)   | $V$<br>(Veh/hr) | PHF                             | Terrain | %Truck                | %Rv   | $f_{HV}$                | $f_p$         | $v = V/PHF \times f_{HV} \times f_p$   |            |
| Freeway  | 560             | 0.88                            | Level   | 13                    | 0   | 0.939                   | 1.00          | 678  |            |
| Ramp   | 195             | 0.94                            | Level   | 7                     | 0   | 0.966                   | 1.00          | 216  |            |
| UpStream   |                 |                                 |         |                       |   |                         |               |  |            |
| DownStream   |                 |                                 |         |                       |   |                         |               |  |            |
| <b>Merge Areas</b>   |                 |                                 |         |                       | <b>Diverge Areas</b>  |                         |               |  |            |
| <b>Estimation of <math>v_{12}</math></b>   |                 |                                 |         |                       | <b>Estimation of <math>v_{12}</math></b>  |                         |               |  |            |
| $V_{12} = V_F (P_{FM})$<br>(Equation 13-6 or 13-7)<br>$P_{FM} =$ using Equation (Exhibit 13-6)<br>$V_{12} =$ pc/h<br>$V_3$ or $V_{av34}$ pc/h (Equation 13-14 or 13-17)<br>Is $V_3$ or $V_{av34} > 2,700$ pc/h? <input type="checkbox"/> Yes <input type="checkbox"/> No<br>Is $V_3$ or $V_{av34} > 1.5 * V_{12}/2$ <input type="checkbox"/> Yes <input type="checkbox"/> No<br>If Yes, $V_{12a} =$ pc/h (Equation 13-16, 13-18, or 13-19) |                 |                                 |         |                       | $V_{12} = V_R + (V_F - V_R)P_{FD}$<br>(Equation 13-12 or 13-13)<br>$P_{FD} =$ 1.000 using Equation (Exhibit 13-7)<br>$V_{12} =$ 678 pc/h<br>$V_3$ or $V_{av34}$ 0 pc/h (Equation 13-14 or 13-17)<br>Is $V_3$ or $V_{av34} > 2,700$ pc/h? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No<br>Is $V_3$ or $V_{av34} > 1.5 * V_{12}/2$ <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No<br>If Yes, $V_{12a} =$ pc/h (Equation 13-16, 13-18, or 13-19) |                         |               |  |            |
| <b>Capacity Checks</b>   |                 |                                 |         |                       | <b>Capacity Checks</b>  |                         |               |  |            |
|  | Actual          | Capacity                        |         | LOS F?                |   | Actual                  | Capacity      |  | LOS F?     |
| $V_{FO}$   |                 | Exhibit 13-8                    |         |                       | $V_F$   | 678                     | Exhibit 13-8  | 4700   | No         |
|  |                 |                                 |         | $V_{FO} = V_F - V_R$  | 462   | Exhibit 13-8            | 4700          | No   |            |
|  |                 |                                 |         | $V_R$                 | 216   | Exhibit 13-10           | 2100          | No   |            |
| <b>Flow Entering Merge Influence Area</b>  |                 |                                 |         |                       | <b>Flow Entering Diverge Influence Area</b>   |                         |               |  |            |
|  | Actual          | Max Desirable                   |         | Violation?            |   | Actual                  | Max Desirable |  | Violation? |
| $V_{R12}$  |                 | Exhibit 13-8                    |         |                       | $V_{12}$  | 678                     | Exhibit 13-8  | 4400:All   | No         |
| <b>Level of Service Determination (if not F)</b>   |                 |                                 |         |                       | <b>Level of Service Determination (if not F)</b>  |                         |               |  |            |
| $D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$<br>$D_R =$ (pc/mi/ln)<br>LOS =      (Exhibit 13-2)   |                 |                                 |         |                       | $D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$<br>$D_R =$ 7.0 (pc/mi/ln)<br>LOS =      A (Exhibit 13-2)  |                         |               |  |            |
| <b>Speed Determination</b>   |                 |                                 |         |                       | <b>Speed Determination</b>  |                         |               |  |            |
| $M_S =$ (Exhibit 13-11)<br>$S_R =$ mph (Exhibit 13-11)<br>$S_0 =$ mph (Exhibit 13-11)<br>$S =$ mph (Exhibit 13-13)   |                 |                                 |         |                       | $D_S =$ 0.252 (Exhibit 13-12)<br>$S_R =$ 59.2 mph (Exhibit 13-12)<br>$S_0 =$ N/A mph (Exhibit 13-12)<br>$S =$ 59.2 mph (Exhibit 13-13)  |                         |               |  |            |

| RAMPS AND RAMP JUNCTIONS WORKSHEET  |               |   |         |   |  |  |                |  |            |
|---|---------------|---|---------|---|--|--|----------------|--|------------|
| <b>General Information</b>  |               |   |         |   | <b>Site Information</b>  |  |                |  |            |
| Analyst   |               | Shane Forsythe                                |         | Freeway/Dir of Travel                             |  | Gore Hill NB Off   |                |  |            |
| Agency or Company   |               |   |         | Junction  |  |  |                |  |            |
| Date Performed  |               | 9/9/2014                                      |         | Jurisdiction                                      |  |  |                |  |            |
| Analysis Time Period  |               | AM Peak                                       |         | Analysis Year                                     |  | 2035   |                |  |            |
| Project Description   |               |   |         |   |  |  |                |  |            |
| <b>Inputs</b>   |               |   |         |   |  |  |                |  |            |
| Upstream Adj Ramp<br><br><input type="checkbox"/> Yes <input type="checkbox"/> On<br><br><input checked="" type="checkbox"/> No <input type="checkbox"/> Off<br><br>L <sub>up</sub> =        ft<br><br>V <sub>u</sub> =        veh/h  |               | Freeway Number of Lanes, N        2           |         |   |  | Downstream Adj Ramp<br><br><input type="checkbox"/> Yes <input type="checkbox"/> On<br><br><input checked="" type="checkbox"/> No <input type="checkbox"/> Off<br><br>L <sub>down</sub> =        ft<br><br>V <sub>D</sub> =        veh/h |                |  |            |
|   |               | Ramp Number of Lanes, N        1              |         |   |  |  |                |  |            |
|   |               | Acceleration Lane Length, L <sub>A</sub>      |         |   |  |  |                |  |            |
|   |               | Deceleration Lane Length L <sub>D</sub> 323   |         |   |  |  |                |  |            |
|   |               | Freeway Volume, V <sub>F</sub> 442            |         |   |  |  |                |  |            |
|   |               | Ramp Volume, V <sub>R</sub> 33                |         |   |  |  |                |  |            |
|   |               | Freeway Free-Flow Speed, S <sub>FF</sub> 65.0 |         |   |  |  |                |  |            |
|   |               | Ramp Free-Flow Speed, S <sub>FR</sub> 50.0    |         |   |  |  |                |  |            |
| <b>Conversion to pc/h Under Base Conditions</b>   |               |   |         |   |  |  |                |  |            |
| (pc/h)  | V<br>(Veh/hr) | PHF   | Terrain | %Truck  | %Rv  | f <sub>HV</sub>  | f <sub>p</sub> | v = V/PHF x f <sub>HV</sub> x f <sub>p</sub> |            |
| Freeway   | 442           | 0.92  | Level   | 10  | 0  | 0.952  | 1.00           | 504  |            |
| Ramp  | 33            | 0.74  | Level   | 35  | 0  | 0.851  | 1.00           | 52   |            |
| UpStream  |               |   |         |   |  |  |                |  |            |
| DownStream  |               |   |         |   |  |  |                |  |            |
| <b>Merge Areas</b>  |               |   |         |   | <b>Diverge Areas</b>   |  |                |  |            |
| <b>Estimation of v<sub>12</sub></b>   |               |   |         |   | <b>Estimation of v<sub>12</sub></b>  |  |                |  |            |
| $V_{12} = V_F (P_{FM})$ (Equation 13-6 or 13-7)<br>P <sub>FM</sub> =        using Equation (Exhibit 13-6)<br>V <sub>12</sub> =        pc/h<br>V <sub>3</sub> or V <sub>av34</sub> pc/h (Equation 13-14 or 13-17)<br>Is V <sub>3</sub> or V <sub>av34</sub> > 2,700 pc/h? <input type="checkbox"/> Yes <input type="checkbox"/> No<br>Is V <sub>3</sub> or V <sub>av34</sub> > 1.5 * V <sub>12</sub> /2 <input type="checkbox"/> Yes <input type="checkbox"/> No<br>If Yes, V <sub>12a</sub> =        pc/h (Equation 13-16, 13-18, or 13-19) |               |   |         |   | $V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 13-12 or 13-13)<br>P <sub>FD</sub> =        1.000 using Equation (Exhibit 13-7)<br>V <sub>12</sub> =        504 pc/h<br>V <sub>3</sub> or V <sub>av34</sub> 0 pc/h (Equation 13-14 or 13-17)<br>Is V <sub>3</sub> or V <sub>av34</sub> > 2,700 pc/h? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No<br>Is V <sub>3</sub> or V <sub>av34</sub> > 1.5 * V <sub>12</sub> /2 <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No<br>If Yes, V <sub>12a</sub> =        pc/h (Equation 13-16, 13-18, or 13-19) |  |                |  |            |
| <b>Capacity Checks</b>  |               |   |         |   | <b>Capacity Checks</b>   |  |                |  |            |
|   | Actual        | Capacity                                      |         | LOS F?  |  | Actual   | Capacity       |  | LOS F?     |
| V <sub>FO</sub>   |               | Exhibit 13-8                                  |         |   | V <sub>F</sub>   | 504  | Exhibit 13-8   | 4700   | No         |
|   |               |   |         | V <sub>FO</sub> = V <sub>F</sub> - V <sub>R</sub> | 452  | Exhibit 13-8   | 4700           | No   |            |
|   |               |   |         | V <sub>R</sub>                                    | 52   | Exhibit 13-10  | 2100           | No   |            |
| <b>Flow Entering Merge Influence Area</b>   |               |   |         |   | <b>Flow Entering Diverge Influence Area</b>  |  |                |  |            |
|   | Actual        | Max Desirable                                 |         | Violation?  |  | Actual   | Max Desirable  |  | Violation? |
| V <sub>R12</sub>  |               | Exhibit 13-8                                  |         |   | V <sub>12</sub>  | 504  | Exhibit 13-8   | 4400:All                                     | No         |
| <b>Level of Service Determination (if not F)</b>  |               |   |         |   | <b>Level of Service Determination (if not F)</b>   |  |                |  |            |
| $D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ D <sub>R</sub> =        (pc/mi/ln)<br>LOS =        (Exhibit 13-2)   |               |   |         |   | $D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$ D <sub>R</sub> =        5.7 (pc/mi/ln)<br>LOS =        A (Exhibit 13-2)  |  |                |  |            |
| <b>Speed Determination</b>  |               |   |         |   | <b>Speed Determination</b>   |  |                |  |            |
| M <sub>S</sub> =        (Exhibit 13-11)<br>S <sub>R</sub> =        mph (Exhibit 13-11)<br>S <sub>0</sub> =        mph (Exhibit 13-11)<br>S =        mph (Exhibit 13-13)   |               |   |         |   | D <sub>S</sub> =        0.238 (Exhibit 13-12)<br>S <sub>R</sub> =        59.5 mph (Exhibit 13-12)<br>S <sub>0</sub> =        N/A mph (Exhibit 13-12)<br>S =        59.5 mph (Exhibit 13-13)  |  |                |  |            |



| RAMPS AND RAMP JUNCTIONS WORKSHEET  |               |  |          |            |  |                 |                 |  |            |
|---|---------------|--|----------|------------|--|-----------------|-----------------|--|------------|
| <b>General Information</b>  |               |  |          |            | <b>Site Information</b>  |                 |                 |  |            |
| Analyst   |               | Shane Forsythe                           |          |            | Freeway/Dir of Travel  |                 | Gore Hill NB On |  |            |
| Agency or Company   |               |  |          |            | Junction   |                 |                 |  |            |
| Date Performed  |               | 9/9/2014                                 |          |            | Jurisdiction   |                 |                 |  |            |
| Analysis Time Period  |               | AM Peak                                  |          |            | Analysis Year  |                 | 2035            |  |            |
| Project Description   |               |  |          |            |  |                 |                 |  |            |
| <b>Inputs</b>   |               |  |          |            |  |                 |                 |  |            |
| Upstream Adj Ramp<br><input type="checkbox"/> Yes <input type="checkbox"/> On<br><input checked="" type="checkbox"/> No <input type="checkbox"/> Off<br>L <sub>up</sub> =        ft<br>V <sub>u</sub> =        veh/h  |               | Freeway Number of Lanes, N               |          |            |  | 2               |                 | Downstream Adj Ramp<br><input type="checkbox"/> Yes <input type="checkbox"/> On<br><input checked="" type="checkbox"/> No <input type="checkbox"/> Off<br>L <sub>down</sub> =        ft<br>V <sub>D</sub> =        veh/h |            |
|   |               | Ramp Number of Lanes, N                  |          |            |  | 1               |                 |  |            |
|   |               | Acceleration Lane Length, L <sub>A</sub> |          |            |  | 1500            |                 |  |            |
|   |               | Deceleration Lane Length L <sub>D</sub>  |          |            |  |                 |                 |  |            |
|   |               | Freeway Volume, V <sub>F</sub>           |          |            |  | 803             |                 |  |            |
|   |               | Ramp Volume, V <sub>R</sub>              |          |            |  | 572             |                 |  |            |
| Freeway Free-Flow Speed, S <sub>FF</sub>  |               |  |          | 65.0       |  |                 |                 |  |            |
| Ramp Free-Flow Speed, S <sub>FR</sub>   |               |  |          | 50.0       |  |                 |                 |  |            |
| <b>Conversion to pc/h Under Base Conditions</b>   |               |  |          |            |  |                 |                 |  |            |
| (pc/h)  | V<br>(Veh/hr) | PHF                                      | Terrain  | %Truck     | %Rv  | f <sub>HV</sub> | f <sub>p</sub>  | v = V/PHF x f <sub>HV</sub> x f <sub>p</sub>   |            |
| Freeway   | 803           | 0.90                                     | Grade    | 16         | 0  | 0.926           | 1.00            | 964  |            |
| Ramp  | 572           | 0.82                                     | Level    | 23         | 0  | 0.897           | 1.00            | 774  |            |
| UpStream  |               |  |          |            |  |                 |                 |  |            |
| DownStream  |               |  |          |            |  |                 |                 |  |            |
| <b>Merge Areas</b>  |               |  |          |            | <b>Diverge Areas</b>   |                 |                 |  |            |
| <b>Estimation of v<sub>12</sub></b>   |               |  |          |            | <b>Estimation of v<sub>12</sub></b>  |                 |                 |  |            |
| $V_{12} = V_F (P_{FM})$<br>L <sub>EQ</sub> =        (Equation 13-6 or 13-7)<br>P <sub>FM</sub> =        1.000 using Equation (Exhibit 13-6)<br>V <sub>12</sub> =        964 pc/h<br>V <sub>3</sub> or V <sub>av34</sub> 0 pc/h (Equation 13-14 or 13-17)<br>Is V <sub>3</sub> or V <sub>av34</sub> > 2,700 pc/h? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No<br>Is V <sub>3</sub> or V <sub>av34</sub> > 1.5 * V <sub>12</sub> /2 <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No<br>If Yes, V <sub>12a</sub> =        pc/h (Equation 13-16, 13-18, or 13-19) |               |  |          |            | $V_{12} = V_R + (V_F - V_R)P_{FD}$<br>L <sub>EQ</sub> =        (Equation 13-12 or 13-13)<br>P <sub>FD</sub> =        using Equation (Exhibit 13-7)<br>V <sub>12</sub> =        pc/h<br>V <sub>3</sub> or V <sub>av34</sub> pc/h (Equation 13-14 or 13-17)<br>Is V <sub>3</sub> or V <sub>av34</sub> > 2,700 pc/h? <input type="checkbox"/> Yes <input type="checkbox"/> No<br>Is V <sub>3</sub> or V <sub>av34</sub> > 1.5 * V <sub>12</sub> /2 <input type="checkbox"/> Yes <input type="checkbox"/> No<br>If Yes, V <sub>12a</sub> =        pc/h (Equation 13-16, 13-18, or 13-19) |                 |                 |  |            |
| <b>Capacity Checks</b>  |               |  |          |            | <b>Capacity Checks</b>   |                 |                 |  |            |
|   | Actual        | Capacity                                 |          | LOS F?     |  | Actual          | Capacity        |  | LOS F?     |
| V <sub>FO</sub>   | 1738          | Exhibit 13-8                             |          | No         | V <sub>F</sub>   |                 | Exhibit 13-8    |  |            |
|   |               |  |          |            | V <sub>FO</sub> = V <sub>F</sub> - V <sub>R</sub>  |                 | Exhibit 13-8    |  |            |
|   |               |  |          |            | V <sub>R</sub>   |                 | Exhibit 13-10   |  |            |
| <b>Flow Entering Merge Influence Area</b>   |               |  |          |            | <b>Flow Entering Diverge Influence Area</b>  |                 |                 |  |            |
|   | Actual        | Max Desirable                            |          | Violation? |  | Actual          | Max Desirable   |  | Violation? |
| V <sub>R12</sub>  | 1738          | Exhibit 13-8                             | 4600:All | No         | V <sub>12</sub>  |                 | Exhibit 13-8    |  |            |
| <b>Level of Service Determination (if not F)</b>  |               |  |          |            | <b>Level of Service Determination (if not F)</b>   |                 |                 |  |            |
| $D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$<br>D <sub>R</sub> =        9.3 (pc/mi/ln)<br>LOS =        A (Exhibit 13-2)  |               |  |          |            | $D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$<br>D <sub>R</sub> =        (pc/mi/ln)<br>LOS =        (Exhibit 13-2)   |                 |                 |  |            |
| <b>Speed Determination</b>  |               |  |          |            | <b>Speed Determination</b>   |                 |                 |  |            |
| M <sub>S</sub> =        0.193 (Exhibit 13-11)<br>S <sub>R</sub> =        60.6 mph (Exhibit 13-11)<br>S <sub>0</sub> =        N/A mph (Exhibit 13-11)<br>S =        60.6 mph (Exhibit 13-13)   |               |  |          |            | D <sub>S</sub> =        (Exhibit 13-12)<br>S <sub>R</sub> =        mph (Exhibit 13-12)<br>S <sub>0</sub> =        mph (Exhibit 13-12)<br>S =        mph (Exhibit 13-13)  |                 |                 |  |            |

| RAMPS AND RAMP JUNCTIONS WORKSHEET  |               |   |         |   |  |  |                |  |            |
|---|---------------|---|---------|---|--|--|----------------|--|------------|
| <b>General Information</b>  |               |   |         |   | <b>Site Information</b>  |  |                |  |            |
| Analyst   |               | Shane Forsythe                                |         | Freeway/Dir of Travel                             |  | Gore Hill SB Off   |                |  |            |
| Agency or Company   |               |   |         | Junction  |  |  |                |  |            |
| Date Performed  |               | 9/9/2014                                      |         | Jurisdiction                                      |  |  |                |  |            |
| Analysis Time Period  |               | AM Peak                                       |         | Analysis Year                                     |  | 2035   |                |  |            |
| Project Description   |               |   |         |   |  |  |                |  |            |
| <b>Inputs</b>   |               |   |         |   |  |  |                |  |            |
| Upstream Adj Ramp<br><br><input type="checkbox"/> Yes <input type="checkbox"/> On<br><br><input checked="" type="checkbox"/> No <input type="checkbox"/> Off<br><br>L <sub>up</sub> =        ft<br><br>V <sub>u</sub> =        veh/h  |               | Freeway Number of Lanes, N        2           |         |   |  | Downstream Adj Ramp<br><br><input type="checkbox"/> Yes <input type="checkbox"/> On<br><br><input checked="" type="checkbox"/> No <input type="checkbox"/> Off<br><br>L <sub>down</sub> =        ft<br><br>V <sub>D</sub> =        veh/h |                |  |            |
|   |               | Ramp Number of Lanes, N        1              |         |   |  |  |                |  |            |
|   |               | Acceleration Lane Length, L <sub>A</sub>      |         |   |  |  |                |  |            |
|   |               | Deceleration Lane Length L <sub>D</sub> 358   |         |   |  |  |                |  |            |
|   |               | Freeway Volume, V <sub>F</sub> 713            |         |   |  |  |                |  |            |
|   |               | Ramp Volume, V <sub>R</sub> 686               |         |   |  |  |                |  |            |
|   |               | Freeway Free-Flow Speed, S <sub>FF</sub> 65.0 |         |   |  |  |                |  |            |
|   |               | Ramp Free-Flow Speed, S <sub>FR</sub> 50.0    |         |   |  |  |                |  |            |
| <b>Conversion to pc/h Under Base Conditions</b>   |               |   |         |   |  |  |                |  |            |
| (pc/h)  | V<br>(Veh/hr) | PHF   | Terrain | %Truck  | %Rv  | f <sub>HV</sub>  | f <sub>p</sub> | v = V/PHF x f <sub>HV</sub> x f <sub>p</sub> |            |
| Freeway   | 713           | 0.85  | Grade   | 7   | 0  | 0.891  | 1.00           | 942  |            |
| Ramp  | 686           | 0.79  | Level   | 7   | 0  | 0.966  | 1.00           | 894  |            |
| UpStream  |               |   |         |   |  |  |                |  |            |
| DownStream  |               |   |         |   |  |  |                |  |            |
| <b>Merge Areas</b>  |               |   |         |   | <b>Diverge Areas</b>   |  |                |  |            |
| <b>Estimation of v<sub>12</sub></b>   |               |   |         |   | <b>Estimation of v<sub>12</sub></b>  |  |                |  |            |
| $V_{12} = V_F (P_{FM})$ (Equation 13-6 or 13-7)<br>P <sub>FM</sub> =        using Equation (Exhibit 13-6)<br>V <sub>12</sub> =        pc/h<br>V <sub>3</sub> or V <sub>av34</sub> pc/h (Equation 13-14 or 13-17)<br>Is V <sub>3</sub> or V <sub>av34</sub> > 2,700 pc/h? <input type="checkbox"/> Yes <input type="checkbox"/> No<br>Is V <sub>3</sub> or V <sub>av34</sub> > 1.5 * V <sub>12</sub> /2 <input type="checkbox"/> Yes <input type="checkbox"/> No<br>If Yes, V <sub>12a</sub> =        pc/h (Equation 13-16, 13-18, or 13-19) |               |   |         |   | $V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 13-12 or 13-13)<br>P <sub>FD</sub> =        1.000 using Equation (Exhibit 13-7)<br>V <sub>12</sub> =        942 pc/h<br>V <sub>3</sub> or V <sub>av34</sub> 0 pc/h (Equation 13-14 or 13-17)<br>Is V <sub>3</sub> or V <sub>av34</sub> > 2,700 pc/h? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No<br>Is V <sub>3</sub> or V <sub>av34</sub> > 1.5 * V <sub>12</sub> /2 <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No<br>If Yes, V <sub>12a</sub> =        pc/h (Equation 13-16, 13-18, or 13-19) |  |                |  |            |
| <b>Capacity Checks</b>  |               |   |         |   | <b>Capacity Checks</b>   |  |                |  |            |
|   | Actual        | Capacity                                      |         | LOS F?  |  | Actual   | Capacity       |  | LOS F?     |
| V <sub>FO</sub>   |               | Exhibit 13-8                                  |         |   | V <sub>F</sub>   | 942  | Exhibit 13-8   | 4700   | No         |
|   |               |   |         | V <sub>FO</sub> = V <sub>F</sub> - V <sub>R</sub> | 48   | Exhibit 13-8   | 4700           | No   |            |
|   |               |   |         | V <sub>R</sub>                                    | 894  | Exhibit 13-10  | 2100           | No   |            |
| <b>Flow Entering Merge Influence Area</b>   |               |   |         |   | <b>Flow Entering Diverge Influence Area</b>  |  |                |  |            |
|   | Actual        | Max Desirable                                 |         | Violation?  |  | Actual   | Max Desirable  |  | Violation? |
| V <sub>R12</sub>  |               | Exhibit 13-8                                  |         |   | V <sub>12</sub>  | 942  | Exhibit 13-8   | 4400:All                                     | No         |
| <b>Level of Service Determination (if not F)</b>  |               |   |         |   | <b>Level of Service Determination (if not F)</b>   |  |                |  |            |
| $D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ D <sub>R</sub> =        (pc/mi/ln)<br>LOS =        (Exhibit 13-2)   |               |   |         |   | $D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$ D <sub>R</sub> =        9.1 (pc/mi/ln)<br>LOS =        A (Exhibit 13-2)  |  |                |  |            |
| <b>Speed Determination</b>  |               |   |         |   | <b>Speed Determination</b>   |  |                |  |            |
| M <sub>S</sub> =        (Exhibit 13-11)<br>S <sub>R</sub> =        mph (Exhibit 13-11)<br>S <sub>0</sub> =        mph (Exhibit 13-11)<br>S =        mph (Exhibit 13-13)   |               |   |         |   | D <sub>S</sub> =        0.313 (Exhibit 13-12)<br>S <sub>R</sub> =        57.8 mph (Exhibit 13-12)<br>S <sub>0</sub> =        N/A mph (Exhibit 13-12)<br>S =        57.8 mph (Exhibit 13-13)  |  |                |  |            |

| RAMPS AND RAMP JUNCTIONS WORKSHEET  |               |  |          |            |  |                 |                 |  |            |
|---|---------------|--|----------|------------|--|-----------------|-----------------|--|------------|
| <b>General Information</b>  |               |  |          |            | <b>Site Information</b>  |                 |                 |  |            |
| Analyst   |               | Shane Forsythe                           |          |            | Freeway/Dir of Travel  |                 | Gore Hill SB On |  |            |
| Agency or Company   |               |  |          |            | Junction   |                 |                 |  |            |
| Date Performed  |               | 9/9/2014                                 |          |            | Jurisdiction   |                 |                 |  |            |
| Analysis Time Period  |               | AM Peak                                  |          |            | Analysis Year  |                 | 2035            |  |            |
| Project Description   |               |  |          |            |  |                 |                 |  |            |
| <b>Inputs</b>   |               |  |          |            |  |                 |                 |  |            |
| Upstream Adj Ramp<br><input type="checkbox"/> Yes <input type="checkbox"/> On<br><input checked="" type="checkbox"/> No <input type="checkbox"/> Off<br>L <sub>up</sub> =        ft<br>V <sub>u</sub> =        veh/h  |               | Freeway Number of Lanes, N               |          |            |  | 2               |                 | Downstream Adj Ramp<br><input type="checkbox"/> Yes <input type="checkbox"/> On<br><input checked="" type="checkbox"/> No <input type="checkbox"/> Off<br>L <sub>down</sub> =        ft<br>V <sub>D</sub> =        veh/h |            |
|   |               | Ramp Number of Lanes, N                  |          |            |  | 1               |                 |  |            |
|   |               | Acceleration Lane Length, L <sub>A</sub> |          |            |  | 1500            |                 |  |            |
|   |               | Deceleration Lane Length L <sub>D</sub>  |          |            |  |                 |                 |  |            |
|   |               | Freeway Volume, V <sub>F</sub>           |          |            |  | 286             |                 |  |            |
|   |               | Ramp Volume, V <sub>R</sub>              |          |            |  | 81              |                 |  |            |
| Freeway Free-Flow Speed, S <sub>FF</sub>  |               |  |          | 65.0       |  |                 |                 |  |            |
| Ramp Free-Flow Speed, S <sub>FR</sub>   |               |  |          | 50.0       |  |                 |                 |  |            |
| <b>Conversion to pc/h Under Base Conditions</b>   |               |  |          |            |  |                 |                 |  |            |
| (pc/h)  | V<br>(Veh/hr) | PHF                                      | Terrain  | %Truck     | %Rv  | f <sub>HV</sub> | f <sub>p</sub>  | v = V/PHF x f <sub>HV</sub> x f <sub>p</sub>   |            |
| Freeway   | 286           | 0.79                                     | Level    | 20         | 0  | 0.909           | 1.00            | 398  |            |
| Ramp  | 81            | 0.62                                     | Level    | 40         | 0  | 0.833           | 1.00            | 157  |            |
| UpStream  |               |  |          |            |  |                 |                 |  |            |
| DownStream  |               |  |          |            |  |                 |                 |  |            |
| <b>Merge Areas</b>  |               |  |          |            | <b>Diverge Areas</b>   |                 |                 |  |            |
| <b>Estimation of v<sub>12</sub></b>   |               |  |          |            | <b>Estimation of v<sub>12</sub></b>  |                 |                 |  |            |
| $V_{12} = V_F (P_{FM})$<br>L <sub>EQ</sub> =        (Equation 13-6 or 13-7)<br>P <sub>FM</sub> =        1.000 using Equation (Exhibit 13-6)<br>V <sub>12</sub> =        398 pc/h<br>V <sub>3</sub> or V <sub>av34</sub> 0 pc/h (Equation 13-14 or 13-17)<br>Is V <sub>3</sub> or V <sub>av34</sub> > 2,700 pc/h? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No<br>Is V <sub>3</sub> or V <sub>av34</sub> > 1.5 * V <sub>12</sub> /2 <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No<br>If Yes, V <sub>12a</sub> =        pc/h (Equation 13-16, 13-18, or 13-19) |               |  |          |            | $V_{12} = V_R + (V_F - V_R)P_{FD}$<br>L <sub>EQ</sub> =        (Equation 13-12 or 13-13)<br>P <sub>FD</sub> =        using Equation (Exhibit 13-7)<br>V <sub>12</sub> =        pc/h<br>V <sub>3</sub> or V <sub>av34</sub> pc/h (Equation 13-14 or 13-17)<br>Is V <sub>3</sub> or V <sub>av34</sub> > 2,700 pc/h? <input type="checkbox"/> Yes <input type="checkbox"/> No<br>Is V <sub>3</sub> or V <sub>av34</sub> > 1.5 * V <sub>12</sub> /2 <input type="checkbox"/> Yes <input type="checkbox"/> No<br>If Yes, V <sub>12a</sub> =        pc/h (Equation 13-16, 13-18, or 13-19) |                 |                 |  |            |
| <b>Capacity Checks</b>  |               |  |          |            | <b>Capacity Checks</b>   |                 |                 |  |            |
|   | Actual        | Capacity                                 |          | LOS F?     |  | Actual          | Capacity        |  | LOS F?     |
| V <sub>FO</sub>   | 555           | Exhibit 13-8                             |          | No         | V <sub>F</sub>   |                 | Exhibit 13-8    |  |            |
|   |               |  |          |            | V <sub>FO</sub> = V <sub>F</sub> - V <sub>R</sub>  |                 | Exhibit 13-8    |  |            |
|   |               |  |          |            | V <sub>R</sub>   |                 | Exhibit 13-10   |  |            |
| <b>Flow Entering Merge Influence Area</b>   |               |  |          |            | <b>Flow Entering Diverge Influence Area</b>  |                 |                 |  |            |
|   | Actual        | Max Desirable                            |          | Violation? |  | Actual          | Max Desirable   |  | Violation? |
| V <sub>R12</sub>  | 555           | Exhibit 13-8                             | 4600:All | No         | V <sub>12</sub>  |                 | Exhibit 13-8    |  |            |
| <b>Level of Service Determination (if not F)</b>  |               |  |          |            | <b>Level of Service Determination (if not F)</b>   |                 |                 |  |            |
| $D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$<br>D <sub>R</sub> =        0.3 (pc/mi/ln)<br>LOS =        A (Exhibit 13-2)  |               |  |          |            | $D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$<br>D <sub>R</sub> =        (pc/mi/ln)<br>LOS =        (Exhibit 13-2)   |                 |                 |  |            |
| <b>Speed Determination</b>  |               |  |          |            | <b>Speed Determination</b>   |                 |                 |  |            |
| M <sub>S</sub> =        0.178 (Exhibit 13-11)<br>S <sub>R</sub> =        60.9 mph (Exhibit 13-11)<br>S <sub>0</sub> =        N/A mph (Exhibit 13-11)<br>S =        60.9 mph (Exhibit 13-13)   |               |  |          |            | D <sub>S</sub> =        (Exhibit 13-12)<br>S <sub>R</sub> =        mph (Exhibit 13-12)<br>S <sub>0</sub> =        mph (Exhibit 13-12)<br>S =        mph (Exhibit 13-13)  |                 |                 |  |            |

| RAMPS AND RAMP JUNCTIONS WORKSHEET  |               |   |         |            |  |                 |  |  |            |
|---|---------------|---|---------|------------|--|-----------------|--|--|------------|
| <b>General Information</b>  |               |   |         |            | <b>Site Information</b>  |                 |  |  |            |
| Analyst   |               | Shane Forsythe                                |         |            | Freeway/Dir of Travel  |                 | Gore Hill NB Off   |  |            |
| Agency or Company   |               |   |         |            | Junction   |                 |  |  |            |
| Date Performed  |               | 9/9/2014                                      |         |            | Jurisdiction   |                 |  |  |            |
| Analysis Time Period  |               | AM Peak                                       |         |            | Analysis Year  |                 | 2035   |  |            |
| Project Description   |               |   |         |            |  |                 |  |  |            |
| <b>Inputs</b>   |               |   |         |            |  |                 |  |  |            |
| Upstream Adj Ramp<br><br><input type="checkbox"/> Yes <input type="checkbox"/> On<br><br><input checked="" type="checkbox"/> No <input type="checkbox"/> Off<br><br>L <sub>up</sub> =        ft<br><br>V <sub>u</sub> =        veh/h  |               | Freeway Number of Lanes, N        2           |         |            |  |                 | Downstream Adj Ramp<br><br><input type="checkbox"/> Yes <input type="checkbox"/> On<br><br><input checked="" type="checkbox"/> No <input type="checkbox"/> Off<br><br>L <sub>down</sub> =        ft<br><br>V <sub>D</sub> =        veh/h |  |            |
|   |               | Ramp Number of Lanes, N        1              |         |            |  |                 |  |  |            |
|   |               | Acceleration Lane Length, L <sub>A</sub>      |         |            |  |                 |  |  |            |
|   |               | Deceleration Lane Length L <sub>D</sub> 323   |         |            |  |                 |  |  |            |
|   |               | Freeway Volume, V <sub>F</sub> 451            |         |            |  |                 |  |  |            |
|   |               | Ramp Volume, V <sub>R</sub> 67                |         |            |  |                 |  |  |            |
|   |               | Freeway Free-Flow Speed, S <sub>FF</sub> 65.0 |         |            |  |                 |  |  |            |
|   |               | Ramp Free-Flow Speed, S <sub>FR</sub> 50.0    |         |            |  |                 |  |  |            |
| <b>Conversion to pc/h Under Base Conditions</b>   |               |   |         |            |  |                 |  |  |            |
| (pc/h)  | V<br>(Veh/hr) | PHF   | Terrain | %Truck     | %Rv  | f <sub>HV</sub> | f <sub>p</sub>   | v = V/PHF x f <sub>HV</sub> x f <sub>p</sub> |            |
| Freeway   | 451           | 0.96  | Level   | 12         | 0  | 0.943           | 1.00   | 498  |            |
| Ramp  | 67            | 0.74  | Level   | 42         | 0  | 0.826           | 1.00   | 109  |            |
| UpStream  |               |   |         |            |  |                 |  |  |            |
| DownStream  |               |   |         |            |  |                 |  |  |            |
| <b>Merge Areas</b>  |               |   |         |            | <b>Diverge Areas</b>   |                 |  |  |            |
| <b>Estimation of v<sub>12</sub></b>   |               |   |         |            | <b>Estimation of v<sub>12</sub></b>  |                 |  |  |            |
| $V_{12} = V_F (P_{FM})$ (Equation 13-6 or 13-7)<br>P <sub>FM</sub> =        using Equation (Exhibit 13-6)<br>V <sub>12</sub> =        pc/h<br>V <sub>3</sub> or V <sub>av34</sub> pc/h (Equation 13-14 or 13-17)<br>Is V <sub>3</sub> or V <sub>av34</sub> > 2,700 pc/h? <input type="checkbox"/> Yes <input type="checkbox"/> No<br>Is V <sub>3</sub> or V <sub>av34</sub> > 1.5 * V <sub>12</sub> /2 <input type="checkbox"/> Yes <input type="checkbox"/> No<br>If Yes, V <sub>12a</sub> =        pc/h (Equation 13-16, 13-18, or 13-19) |               |   |         |            | $V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 13-12 or 13-13)<br>P <sub>FD</sub> =        1.000 using Equation (Exhibit 13-7)<br>V <sub>12</sub> =        498 pc/h<br>V <sub>3</sub> or V <sub>av34</sub> 0 pc/h (Equation 13-14 or 13-17)<br>Is V <sub>3</sub> or V <sub>av34</sub> > 2,700 pc/h? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No<br>Is V <sub>3</sub> or V <sub>av34</sub> > 1.5 * V <sub>12</sub> /2 <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No<br>If Yes, V <sub>12a</sub> =        pc/h (Equation 13-16, 13-18, or 13-19) |                 |  |  |            |
| <b>Capacity Checks</b>  |               |   |         |            | <b>Capacity Checks</b>   |                 |  |  |            |
|   | Actual        | Capacity                                      |         | LOS F?     |  | Actual          | Capacity   |  | LOS F?     |
| V <sub>FO</sub>   |               | Exhibit 13-8                                  |         |            | V <sub>F</sub>   | 498             | Exhibit 13-8   | 4700   | No         |
|   |               |   |         |            | V <sub>FO</sub> = V <sub>F</sub> - V <sub>R</sub>  | 389             | Exhibit 13-8   | 4700   | No         |
|   |               |   |         |            | V <sub>R</sub>   | 109             | Exhibit 13-10  | 2100   | No         |
| <b>Flow Entering Merge Influence Area</b>   |               |   |         |            | <b>Flow Entering Diverge Influence Area</b>  |                 |  |  |            |
|   | Actual        | Max Desirable                                 |         | Violation? |  | Actual          | Max Desirable  |  | Violation? |
| V <sub>R12</sub>  |               | Exhibit 13-8                                  |         |            | V <sub>12</sub>  | 498             | Exhibit 13-8   | 4400:All                                     | No         |
| <b>Level of Service Determination (if not F)</b>  |               |   |         |            | <b>Level of Service Determination (if not F)</b>   |                 |  |  |            |
| $D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ D <sub>R</sub> =        (pc/mi/ln)<br>LOS =        (Exhibit 13-2)   |               |   |         |            | $D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$ D <sub>R</sub> =        5.6 (pc/mi/ln)<br>LOS =        A (Exhibit 13-2)  |                 |  |  |            |
| <b>Speed Determination</b>  |               |   |         |            | <b>Speed Determination</b>   |                 |  |  |            |
| M <sub>S</sub> =        (Exhibit 13-11)<br>S <sub>R</sub> =        mph (Exhibit 13-11)<br>S <sub>0</sub> =        mph (Exhibit 13-11)<br>S =        mph (Exhibit 13-13)   |               |   |         |            | D <sub>S</sub> =        0.243 (Exhibit 13-12)<br>S <sub>R</sub> =        59.4 mph (Exhibit 13-12)<br>S <sub>0</sub> =        N/A mph (Exhibit 13-12)<br>S =        59.4 mph (Exhibit 13-13)  |                 |  |  |            |

| RAMPS AND RAMP JUNCTIONS WORKSHEET   |               |  |          |            |  |                 |                 |  |            |
|--|---------------|--|----------|------------|--|-----------------|-----------------|--|------------|
| <b>General Information</b>   |               |  |          |            | <b>Site Information</b>  |                 |                 |  |            |
| Analyst  |               | Shane Forsythe                           |          |            | Freeway/Dir of Travel  |                 | Gore Hill NB On |  |            |
| Agency or Company  |               |  |          |            | Junction   |                 |                 |  |            |
| Date Performed   |               | 9/9/2014                                 |          |            | Jurisdiction   |                 |                 |  |            |
| Analysis Time Period   |               | AM Peak                                  |          |            | Analysis Year  |                 | 2035            |  |            |
| Project Description  |               |  |          |            |  |                 |                 |  |            |
| <b>Inputs</b>  |               |  |          |            |  |                 |                 |  |            |
| Upstream Adj Ramp<br><input type="checkbox"/> Yes <input type="checkbox"/> On<br><input checked="" type="checkbox"/> No <input type="checkbox"/> Off<br>L <sub>up</sub> =        ft<br>V <sub>u</sub> =        veh/h   |               | Freeway Number of Lanes, N               |          |            |  | 2               |                 | Downstream Adj Ramp<br><input type="checkbox"/> Yes <input type="checkbox"/> On<br><input checked="" type="checkbox"/> No <input type="checkbox"/> Off<br>L <sub>down</sub> =        ft<br>V <sub>D</sub> =        veh/h |            |
|  |               | Ramp Number of Lanes, N                  |          |            |  | 1               |                 |  |            |
|  |               | Acceleration Lane Length, L <sub>A</sub> |          |            |  | 1500            |                 |  |            |
|  |               | Deceleration Lane Length L <sub>D</sub>  |          |            |  |                 |                 |  |            |
|  |               | Freeway Volume, V <sub>F</sub>           |          |            |  | 1122            |                 |  |            |
|  |               | Ramp Volume, V <sub>R</sub>              |          |            |  | 961             |                 |  |            |
| Freeway Free-Flow Speed, S <sub>FF</sub>   |               |  |          | 65.0       |  |                 |                 |  |            |
| Ramp Free-Flow Speed, S <sub>FR</sub>  |               |  |          | 50.0       |  |                 |                 |  |            |
| <b>Conversion to pc/h Under Base Conditions</b>  |               |  |          |            |  |                 |                 |  |            |
| (pc/h)   | V<br>(Veh/hr) | PHF                                      | Terrain  | %Truck     | %Rv  | f <sub>HV</sub> | f <sub>p</sub>  | v = V/PHF x f <sub>HV</sub> x f <sub>p</sub>   |            |
| Freeway  | 1122          | 0.80                                     | Grade    | 10         | 0  | 0.952           | 1.00            | 1473   |            |
| Ramp   | 961           | 0.74                                     | Level    | 9          | 0  | 0.957           | 1.00            | 1357   |            |
| UpStream   |               |  |          |            |  |                 |                 |  |            |
| DownStream   |               |  |          |            |  |                 |                 |  |            |
| <b>Merge Areas</b>   |               |  |          |            | <b>Diverge Areas</b>   |                 |                 |  |            |
| <b>Estimation of v<sub>12</sub></b>  |               |  |          |            | <b>Estimation of v<sub>12</sub></b>  |                 |                 |  |            |
| $V_{12} = V_F (P_{FM})$<br>L <sub>EQ</sub> =        (Equation 13-6 or 13-7)<br>P <sub>FM</sub> =        1.000 using Equation (Exhibit 13-6)<br>V <sub>12</sub> =        1473 pc/h<br>V <sub>3</sub> or V <sub>av34</sub> 0 pc/h (Equation 13-14 or 13-17)<br>Is V <sub>3</sub> or V <sub>av34</sub> > 2,700 pc/h? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No<br>Is V <sub>3</sub> or V <sub>av34</sub> > 1.5 * V <sub>12</sub> /2 <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No<br>If Yes, V <sub>12a</sub> =        pc/h (Equation 13-16, 13-18, or 13-19) |               |  |          |            | $V_{12} = V_R + (V_F - V_R)P_{FD}$<br>L <sub>EQ</sub> =        (Equation 13-12 or 13-13)<br>P <sub>FD</sub> =        using Equation (Exhibit 13-7)<br>V <sub>12</sub> =        pc/h<br>V <sub>3</sub> or V <sub>av34</sub> pc/h (Equation 13-14 or 13-17)<br>Is V <sub>3</sub> or V <sub>av34</sub> > 2,700 pc/h? <input type="checkbox"/> Yes <input type="checkbox"/> No<br>Is V <sub>3</sub> or V <sub>av34</sub> > 1.5 * V <sub>12</sub> /2 <input type="checkbox"/> Yes <input type="checkbox"/> No<br>If Yes, V <sub>12a</sub> =        pc/h (Equation 13-16, 13-18, or 13-19) |                 |                 |  |            |
| <b>Capacity Checks</b>   |               |  |          |            | <b>Capacity Checks</b>   |                 |                 |  |            |
|  | Actual        | Capacity                                 |          | LOS F?     |  | Actual          | Capacity        |  | LOS F?     |
| V <sub>FO</sub>  | 2830          | Exhibit 13-8                             |          | No         | V <sub>F</sub>   |                 | Exhibit 13-8    |  |            |
|  |               |  |          |            | V <sub>FO</sub> = V <sub>F</sub> - V <sub>R</sub>  |                 | Exhibit 13-8    |  |            |
|  |               |  |          |            | V <sub>R</sub>   |                 | Exhibit 13-10   |  |            |
| <b>Flow Entering Merge Influence Area</b>  |               |  |          |            | <b>Flow Entering Diverge Influence Area</b>  |                 |                 |  |            |
|  | Actual        | Max Desirable                            |          | Violation? |  | Actual          | Max Desirable   |  | Violation? |
| V <sub>R12</sub>   | 2830          | Exhibit 13-8                             | 4600:All | No         | V <sub>12</sub>  |                 | Exhibit 13-8    |  |            |
| <b>Level of Service Determination (if not F)</b>   |               |  |          |            | <b>Level of Service Determination (if not F)</b>   |                 |                 |  |            |
| $D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$<br>D <sub>R</sub> =        17.5 (pc/mi/ln)<br>LOS =        B (Exhibit 13-2)  |               |  |          |            | $D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$<br>D <sub>R</sub> =        (pc/mi/ln)<br>LOS =        (Exhibit 13-2)   |                 |                 |  |            |
| <b>Speed Determination</b>   |               |  |          |            | <b>Speed Determination</b>   |                 |                 |  |            |
| M <sub>S</sub> =        0.237 (Exhibit 13-11)<br>S <sub>R</sub> =        59.5 mph (Exhibit 13-11)<br>S <sub>0</sub> =        N/A mph (Exhibit 13-11)<br>S =        59.5 mph (Exhibit 13-13)  |               |  |          |            | D <sub>S</sub> =        (Exhibit 13-12)<br>S <sub>R</sub> =        mph (Exhibit 13-12)<br>S <sub>0</sub> =        mph (Exhibit 13-12)<br>S =        mph (Exhibit 13-13)  |                 |                 |  |            |

| RAMPS AND RAMP JUNCTIONS WORKSHEET  |               |   |         |   |   |  |                |  |            |
|---|---------------|---|---------|---|---|--|----------------|--|------------|
| <b>General Information</b>  |               |   |         |   | <b>Site Information</b>   |  |                |  |            |
| Analyst   |               | Shane Forsythe                              |         | Freeway/Dir of Travel                             |   | Gore Hill SB Off   |                |  |            |
| Agency or Company   |               |   |         | Junction  |   |  |                |  |            |
| Date Performed  |               | 9/9/2014                                    |         | Jurisdiction                                      |   |  |                |  |            |
| Analysis Time Period  |               | PM Peak                                     |         | Analysis Year                                     |   | 2035   |                |  |            |
| Project Description   |               |   |         |   |   |  |                |  |            |
| <b>Inputs</b>   |               |   |         |   |   |  |                |  |            |
| Upstream Adj Ramp<br><input type="checkbox"/> Yes <input type="checkbox"/> On<br><br><input checked="" type="checkbox"/> No <input type="checkbox"/> Off<br><br>L <sub>up</sub> =        ft<br><br>V <sub>u</sub> =        veh/h  |               | Freeway Number of Lanes, N        2         |         |   |   | Downstream Adj Ramp<br><input type="checkbox"/> Yes <input type="checkbox"/> On<br><br><input checked="" type="checkbox"/> No <input type="checkbox"/> Off<br><br>L <sub>down</sub> =        ft<br><br>V <sub>D</sub> =        veh/h |                |  |            |
|   |               | Ramp Number of Lanes, N        1            |         |   |   |  |                |  |            |
|   |               | Acceleration Lane Length, L <sub>A</sub>    |         |   |   |  |                |  |            |
|   |               | Deceleration Lane Length L <sub>D</sub> 358 |         |   |   |  |                |  |            |
|   |               | Freeway Volume, V <sub>F</sub> 981          |         |   |   |  |                |  |            |
|   |               | Ramp Volume, V <sub>R</sub> 644             |         |   |   |  |                |  |            |
| Freeway Free-Flow Speed, S <sub>FF</sub> 65.0   |               |   |         |   |   |  |                |  |            |
| Ramp Free-Flow Speed, S <sub>FR</sub> 50.0  |               |   |         |   |   |  |                |  |            |
| <b>Conversion to pc/h Under Base Conditions</b>   |               |   |         |   |   |  |                |  |            |
| (pc/h)  | V<br>(Veh/hr) | PHF   | Terrain | %Truck  | %Rv   | f <sub>HV</sub>  | f <sub>p</sub> | v = V/PHF x f <sub>HV</sub> x f <sub>p</sub> |            |
| Freeway   | 981           | 0.93  | Grade   | 10  | 0   | 0.870  | 1.00           | 1213   |            |
| Ramp  | 644           | 0.80  | Level   | 16  | 0   | 0.926  | 1.00           | 867  |            |
| UpStream  |               |   |         |   |   |  |                |  |            |
| DownStream  |               |   |         |   |   |  |                |  |            |
| <b>Merge Areas</b>  |               |   |         |   | <b>Diverge Areas</b>  |  |                |  |            |
| <b>Estimation of v<sub>12</sub></b>   |               |   |         |   | <b>Estimation of v<sub>12</sub></b>   |  |                |  |            |
| $V_{12} = V_F (P_{FM})$<br>L <sub>EQ</sub> =        (Equation 13-6 or 13-7)<br>P <sub>FM</sub> =        using Equation (Exhibit 13-6)<br>V <sub>12</sub> =        pc/h<br>V <sub>3</sub> or V <sub>av34</sub> pc/h (Equation 13-14 or 13-17)<br>Is V <sub>3</sub> or V <sub>av34</sub> > 2,700 pc/h? <input type="checkbox"/> Yes <input type="checkbox"/> No<br>Is V <sub>3</sub> or V <sub>av34</sub> > 1.5 * V <sub>12</sub> /2 <input type="checkbox"/> Yes <input type="checkbox"/> No<br>If Yes, V <sub>12a</sub> =        pc/h (Equation 13-16, 13-18, or 13-19) |               |   |         |   | $V_{12} = V_R + (V_F - V_R)P_{FD}$<br>L <sub>EQ</sub> =        (Equation 13-12 or 13-13)<br>P <sub>FD</sub> =        1.000 using Equation (Exhibit 13-7)<br>V <sub>12</sub> =        1213 pc/h<br>V <sub>3</sub> or V <sub>av34</sub> 0 pc/h (Equation 13-14 or 13-17)<br>Is V <sub>3</sub> or V <sub>av34</sub> > 2,700 pc/h? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No<br>Is V <sub>3</sub> or V <sub>av34</sub> > 1.5 * V <sub>12</sub> /2 <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No<br>If Yes, V <sub>12a</sub> =        pc/h (Equation 13-16, 13-18, or 13-19) |  |                |  |            |
| <b>Capacity Checks</b>  |               |   |         |   | <b>Capacity Checks</b>  |  |                |  |            |
|   | Actual        | Capacity                                    |         | LOS F?  |   | Actual   | Capacity       |  | LOS F?     |
| V <sub>FO</sub>   |               | Exhibit 13-8                                |         |   | V <sub>F</sub>  | 1213   | Exhibit 13-8   | 4700   | No         |
|   |               |   |         | V <sub>FO</sub> = V <sub>F</sub> - V <sub>R</sub> | 346   | Exhibit 13-8   | 4700           | No   |            |
|   |               |   |         | V <sub>R</sub>                                    | 867   | Exhibit 13-10  | 2100           | No   |            |
| <b>Flow Entering Merge Influence Area</b>   |               |   |         |   | <b>Flow Entering Diverge Influence Area</b>   |  |                |  |            |
|   | Actual        | Max Desirable                               |         | Violation?  |   | Actual   | Max Desirable  |  | Violation? |
| V <sub>R12</sub>  |               | Exhibit 13-8                                |         |   | V <sub>12</sub>   | 1213   | Exhibit 13-8   | 4400:All                                     | No         |
| <b>Level of Service Determination (if not F)</b>  |               |   |         |   | <b>Level of Service Determination (if not F)</b>  |  |                |  |            |
| $D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$<br>D <sub>R</sub> =        (pc/mi/ln)<br>LOS =        (Exhibit 13-2)  |               |   |         |   | $D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$<br>D <sub>R</sub> =        11.5 (pc/mi/ln)<br>LOS =        B (Exhibit 13-2)   |  |                |  |            |
| <b>Speed Determination</b>  |               |   |         |   | <b>Speed Determination</b>  |  |                |  |            |
| M <sub>S</sub> =        (Exhibit 13-11)<br>S <sub>R</sub> =        mph (Exhibit 13-11)<br>S <sub>0</sub> =        mph (Exhibit 13-11)<br>S =        mph (Exhibit 13-13)   |               |   |         |   | D <sub>S</sub> =        0.311 (Exhibit 13-12)<br>S <sub>R</sub> =        57.8 mph (Exhibit 13-12)<br>S <sub>0</sub> =        N/A mph (Exhibit 13-12)<br>S =        57.8 mph (Exhibit 13-13)   |  |                |  |            |

| RAMPS AND RAMP JUNCTIONS WORKSHEET  |               |  |          |            |  |                 |                 |  |            |
|---|---------------|--|----------|------------|--|-----------------|-----------------|--|------------|
| <b>General Information</b>  |               |  |          |            | <b>Site Information</b>  |                 |                 |  |            |
| Analyst   |               | Shane Forsythe                           |          |            | Freeway/Dir of Travel  |                 | Gore Hill SB On |  |            |
| Agency or Company   |               |  |          |            | Junction   |                 |                 |  |            |
| Date Performed  |               | 9/9/2014                                 |          |            | Jurisdiction   |                 |                 |  |            |
| Analysis Time Period  |               | PM Peak                                  |          |            | Analysis Year  |                 | 2035            |  |            |
| Project Description   |               |  |          |            |  |                 |                 |  |            |
| <b>Inputs</b>   |               |  |          |            |  |                 |                 |  |            |
| Upstream Adj Ramp<br><input type="checkbox"/> Yes <input type="checkbox"/> On<br><input checked="" type="checkbox"/> No <input type="checkbox"/> Off<br>L <sub>up</sub> =        ft<br>V <sub>u</sub> =        veh/h  |               | Freeway Number of Lanes, N               |          |            |  | 2               |                 | Downstream Adj Ramp<br><input type="checkbox"/> Yes <input type="checkbox"/> On<br><input checked="" type="checkbox"/> No <input type="checkbox"/> Off<br>L <sub>down</sub> =        ft<br>V <sub>D</sub> =        veh/h |            |
|   |               | Ramp Number of Lanes, N                  |          |            |  | 1               |                 |  |            |
|   |               | Acceleration Lane Length, L <sub>A</sub> |          |            |  | 1500            |                 |  |            |
|   |               | Deceleration Lane Length L <sub>D</sub>  |          |            |  |                 |                 |  |            |
|   |               | Freeway Volume, V <sub>F</sub>           |          |            |  | 444             |                 |  |            |
|   |               | Ramp Volume, V <sub>R</sub>              |          |            |  | 83              |                 |  |            |
| Freeway Free-Flow Speed, S <sub>FF</sub>  |               |  |          | 65.0       |  |                 |                 |  |            |
| Ramp Free-Flow Speed, S <sub>FR</sub>   |               |  |          | 50.0       |  |                 |                 |  |            |
| <b>Conversion to pc/h Under Base Conditions</b>   |               |  |          |            |  |                 |                 |  |            |
| (pc/h)  | V<br>(Veh/hr) | PHF                                      | Terrain  | %Truck     | %Rv  | f <sub>HV</sub> | f <sub>p</sub>  | v = V/PHF x f <sub>HV</sub> x f <sub>p</sub>   |            |
| Freeway   | 444           | 0.89                                     | Level    | 6          | 0  | 0.971           | 1.00            | 514  |            |
| Ramp  | 83            | 0.65                                     | Level    | 41         | 0  | 0.830           | 1.00            | 153  |            |
| UpStream  |               |  |          |            |  |                 |                 |  |            |
| DownStream  |               |  |          |            |  |                 |                 |  |            |
| <b>Merge Areas</b>  |               |  |          |            | <b>Diverge Areas</b>   |                 |                 |  |            |
| <b>Estimation of v<sub>12</sub></b>   |               |  |          |            | <b>Estimation of v<sub>12</sub></b>  |                 |                 |  |            |
| $V_{12} = V_F (P_{FM})$<br>L <sub>EQ</sub> =        (Equation 13-6 or 13-7)<br>P <sub>FM</sub> =        1.000 using Equation (Exhibit 13-6)<br>V <sub>12</sub> =        514 pc/h<br>V <sub>3</sub> or V <sub>av34</sub> 0 pc/h (Equation 13-14 or 13-17)<br>Is V <sub>3</sub> or V <sub>av34</sub> > 2,700 pc/h? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No<br>Is V <sub>3</sub> or V <sub>av34</sub> > 1.5 * V <sub>12</sub> /2 <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No<br>If Yes, V <sub>12a</sub> =        pc/h (Equation 13-16, 13-18, or 13-19) |               |  |          |            | $V_{12} = V_R + (V_F - V_R)P_{FD}$<br>L <sub>EQ</sub> =        (Equation 13-12 or 13-13)<br>P <sub>FD</sub> =        using Equation (Exhibit 13-7)<br>V <sub>12</sub> =        pc/h<br>V <sub>3</sub> or V <sub>av34</sub> pc/h (Equation 13-14 or 13-17)<br>Is V <sub>3</sub> or V <sub>av34</sub> > 2,700 pc/h? <input type="checkbox"/> Yes <input type="checkbox"/> No<br>Is V <sub>3</sub> or V <sub>av34</sub> > 1.5 * V <sub>12</sub> /2 <input type="checkbox"/> Yes <input type="checkbox"/> No<br>If Yes, V <sub>12a</sub> =        pc/h (Equation 13-16, 13-18, or 13-19) |                 |                 |  |            |
| <b>Capacity Checks</b>  |               |  |          |            | <b>Capacity Checks</b>   |                 |                 |  |            |
|   | Actual        | Capacity                                 |          | LOS F?     |  | Actual          | Capacity        |  | LOS F?     |
| V <sub>FO</sub>   | 667           | Exhibit 13-8                             |          | No         | V <sub>F</sub>   |                 | Exhibit 13-8    |  |            |
|   |               |  |          |            | V <sub>FO</sub> = V <sub>F</sub> - V <sub>R</sub>  |                 | Exhibit 13-8    |  |            |
|   |               |  |          |            | V <sub>R</sub>   |                 | Exhibit 13-10   |  |            |
| <b>Flow Entering Merge Influence Area</b>   |               |  |          |            | <b>Flow Entering Diverge Influence Area</b>  |                 |                 |  |            |
|   | Actual        | Max Desirable                            |          | Violation? |  | Actual          | Max Desirable   |  | Violation? |
| V <sub>R12</sub>  | 667           | Exhibit 13-8                             | 4600:All | No         | V <sub>12</sub>  |                 | Exhibit 13-8    |  |            |
| <b>Level of Service Determination (if not F)</b>  |               |  |          |            | <b>Level of Service Determination (if not F)</b>   |                 |                 |  |            |
| $D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$<br>D <sub>R</sub> =        1.2 (pc/mi/ln)<br>LOS =        A (Exhibit 13-2)  |               |  |          |            | $D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$<br>D <sub>R</sub> =        (pc/mi/ln)<br>LOS =        (Exhibit 13-2)   |                 |                 |  |            |
| <b>Speed Determination</b>  |               |  |          |            | <b>Speed Determination</b>   |                 |                 |  |            |
| M <sub>S</sub> =        0.179 (Exhibit 13-11)<br>S <sub>R</sub> =        60.9 mph (Exhibit 13-11)<br>S <sub>0</sub> =        N/A mph (Exhibit 13-11)<br>S =        60.9 mph (Exhibit 13-13)   |               |  |          |            | D <sub>S</sub> =        (Exhibit 13-12)<br>S <sub>R</sub> =        mph (Exhibit 13-12)<br>S <sub>0</sub> =        mph (Exhibit 13-12)<br>S =        mph (Exhibit 13-13)  |                 |                 |  |            |

Vistro File: F:\...\I-15 Corridor.vistropdb

Scenario 3: Future AM Scenario

Report File: F:\...\Future\_LOS\_Report\_AM.pdf

8/19/2014

**Intersection Analysis Summary**

| ID | Intersection Name                   | Control Type | Method  | Worst Mvmt | V/C   | Delay (s/veh) | LOS |
|----|-------------------------------------|--------------|---------|------------|-------|---------------|-----|
| 1  | Tri Hill and Frontage Airport Rd    | Two-way stop | HCM2010 | NEBL       | 0.514 | 27.3          | D   |
| 2  | I-15 NB and Airport Rd              | Two-way stop | HCM2010 | NEBT       | 0.000 | 44.2          | E   |
| 3  | I-15 SB On and Airport RD           | Two-way stop | HCM2010 | NWBL       | 0.133 | 10.4          | B   |
| 4  | I-15 SB Off and Airport RD Frontage | Two-way stop | HCM2010 | SWBL       | 0.947 | 121.8         | F   |
| 5  | 14th St SW and I-315 EB             | Signalized   | HCM2010 | SBL        | 0.218 | 13.3          | B   |
| 6  | 14th St SW and I-315 WB             | Signalized   | HCM2010 | EBR        | 0.295 | 22.2          | C   |
| 7  | Fox Farm and I-315                  | Signalized   | HCM2010 | NEBL       | 0.760 | 39.0          | D   |
| 8  | Central Ave and I15 SB              | Two-way stop | HCM2010 | SBL        | 1.188 | 178.9         | F   |
| 9  | Central Ave and I-15 NB             | Two-way stop | HCM2010 | NBL        | 0.274 | 113.1         | F   |
| 10 | Central Ave and Vaughn Rd           | Two-way stop | HCM2010 | SBL        | 1.518 | 406.0         | F   |
| 11 | Vaughn Rd and I-15 SB               | Two-way stop | HCM2010 | SBL        | 0.361 | 11.0          | B   |
| 12 | Vaughn Rd and I-15 NB               | Two-way stop | HCM2010 | EBL        | 0.000 | 7.3           | A   |

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value; for all other control types, they are taken for the whole intersection.






**Intersection Level Of Service Report  
#1: Tri Hill and Frontage Airport Rd**

Control Type: Two-way stop  
 Analysis Method: HCM2010  
 Analysis Period: 15 minutes

Delay (sec / veh): 27.3  
 Level Of Service: D  
 Volume to Capacity (v/c): 0.514

**Intersection Setup**

| Name                   |   |        |  |        |   |        |
|------------------------|---|--------|--|--------|---|--------|
| Approach               | Northeastbound  |        | Northwestbound   |        | Southeastbound  |        |
| Lane Configuration     |  |        |  |        |  |        |
| Turning Movement       | Left  | Right  | Left   | Thru   | Thru  | Right  |
| Lane Width [ft]        | 12.00   | 12.00  | 12.00  | 12.00  | 12.00   | 12.00  |
| No. of Lanes in Pocket | 0   | 0      | 0  | 0      | 0   | 0      |
| Pocket Length [ft]     | 100.00  | 100.00 | 100.00   | 100.00 | 100.00  | 100.00 |
| Speed [mph]            | 30.00   |        | 30.00  |        | 30.00   |        |
| Grade [%]              | 0.00  |        | 0.00   |        | 0.00  |        |
| Crosswalk              | yes   |        | yes  |        | yes   |        |

**Volumes**

| Name                                    |        |        |        |        |        |        |
|---|--------|--------|--------|--------|--------|--------|
| Base Volume Input [veh/h]               | 83     | 19     | 9      | 189    | 97     | 88     |
| Base Volume Adjustment Factor           | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Heavy Vehicles Percentage [%]           | 21.70  | 31.10  | 22.20  | 28.60  | 25.70  | 5.70   |
| Growth Rate                             | 1.70   | 1.70   | 1.70   | 1.70   | 1.70   | 1.70   |
| In-Process Volume [veh/h]               | 0      | 0      | 0      | 0      | 0      | 0      |
| Site-Generated Trips [veh/h]            | 0      | 0      | 0      | 0      | 0      | 0      |
| Diverted Trips [veh/h]                  | 0      | 0      | 0      | 0      | 0      | 0      |
| Pass-by Trips [veh/h]                   | 0      | 0      | 0      | 0      | 0      | 0      |
| Existing Site Adjustment Volume [veh/h] | 0      | 0      | 0      | 0      | 0      | 0      |
| Other Volume [veh/h]                    | 0      | 0      | 0      | 0      | 0      | 0      |
| Total Hourly Volume [veh/h]             | 141    | 32     | 15     | 321    | 165    | 150    |
| Peak Hour Factor                        | 0.7410 | 0.4750 | 0.5630 | 0.8750 | 0.9330 | 0.7590 |
| Other Adjustment Factor                 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Total 15-Minute Volume [veh/h]          | 48     | 17     | 7      | 92     | 44     | 49     |
| Total Analysis Volume [veh/h]           | 190    | 67     | 27     | 367    | 177    | 198    |
| Pedestrian Volume [ped/h]               | 0      |        | 0      |        | 0      |        |
| Bicycle Volume [bicycles/h]             | 0      |        | 0      |        | 0      |        |

**Intersection Settings**

| Priority Scheme                    | Stop | Free | Free |
|------------------------------------|------|------|------|
| Flared Lane                        | no   |      |      |
| Storage Area [veh]                 | 0    | 0    | 0    |
| Two-Stage Gap Acceptance           | no   |      |      |
| Number of Storage Spaces in Median | 0    | 0    | 0    |

**Movement, Approach, & Intersection Results**


|                                    |       |       |      |      |      |      |
|------------------------------------|-------|-------|------|------|------|------|
| V/C, Movement V/C Ratio            | 0.51  | 0.10  | 0.02 | 0.00 | 0.00 | 0.00 |
| d_M, Delay for Movement [s/veh]    | 27.25 | 22.66 | 8.42 | 0.00 | 0.00 | 0.00 |
| Movement LOS                       | D     | C     | A    | A    | A    | A    |
| 95th-Percentile Queue Length [veh] | 3.94  | 3.94  | 0.08 | 0.00 | 0.00 | 0.00 |
| 95th-Percentile Queue Length [ft]  | 98.56 | 98.56 | 1.92 | 0.00 | 0.00 | 0.00 |
| d_A, Approach Delay [s/veh]        | 26.06 |       | 0.58 |      | 0.00 |      |
| Approach LOS                       | D     |       | A    |      | A    |      |
| d_I, Intersection Delay [s/veh]    | 6.75  |       |      |      |      |      |
| Intersection LOS                   | D     |       |      |      |      |      |

### Intersection Level Of Service Report #2: I-15 NB and Airport Rd

Control Type: Two-way stop  
Analysis Method: HCM2010  
Analysis Period: 15 minutes

Delay (sec / veh): 44.2  
Level Of Service: E  
Volume to Capacity (v/c): 0.000

#### Intersection Setup

| Name                   |   |        |        |                |        |        |   |        |        |   |        |        |
|------------------------|---|--------|--------|----------------|--------|--------|---|--------|--------|---|--------|--------|
| Approach               | Northeastbound  |        |        | Southwestbound |        |        | Northwestbound  |        |        | Southeastbound  |        |        |
| Lane Configuration     |  |        |        |                |        |        |  |        |        |  |        |        |
| Turning Movement       | Left  | Thru   | Right  | Left           | Thru   | Right  | Left  | Thru   | Right  | Left  | Thru   | Right  |
| Lane Width [ft]        | 12.00   | 12.00  | 12.00  | 12.00          | 12.00  | 12.00  | 12.00   | 12.00  | 12.00  | 12.00   | 12.00  | 12.00  |
| No. of Lanes in Pocket | 0   | 0      | 0      | 0              | 0      | 0      | 0   | 0      | 0      | 0   | 0      | 0      |
| Pocket Length [ft]     | 100.00  | 100.00 | 100.00 | 100.00         | 100.00 | 100.00 | 100.00  | 100.00 | 100.00 | 100.00  | 100.00 | 100.00 |
| Speed [mph]            | 30.00   |        |        | 30.00          |        |        | 30.00   |        |        | 30.00   |        |        |
| Grade [%]              | 0.00  |        |        | 0.00           |        |        | 0.00  |        |        | 0.00  |        |        |
| Crosswalk              | yes   |        |        | yes            |        |        | yes   |        |        | yes   |        |        |

#### Volumes

| Name                                    |        |        |        |        |        |        |        |        |        |        |        |        |
|---|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| Base Volume Input [veh/h]               | 4      | 0      | 13     | 0      | 0      | 0      | 0      | 49     | 222    | 79     | 173    | 0      |
| Base Volume Adjustment Factor           | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Heavy Vehicles Percentage [%]           | 0.00   | 0.00   | 46.20  | 2.00   | 2.00   | 2.00   | 2.00   | 38.80  | 26.60  | 12.70  | 10.90  | 2.00   |
| Growth Rate                             | 1.90   | 1.90   | 1.90   | 1.00   | 1.00   | 1.00   | 1.00   | 1.90   | 1.90   | 1.90   | 1.90   | 1.00   |
| In-Process Volume [veh/h]               | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Site-Generated Trips [veh/h]            | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Diverted Trips [veh/h]                  | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Pass-by Trips [veh/h]                   | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Existing Site Adjustment Volume [veh/h] | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Other Volume [veh/h]                    | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Total Hourly Volume [veh/h]             | 8      | 0      | 25     | 0      | 0      | 0      | 0      | 93     | 422    | 150    | 329    | 0      |
| Peak Hour Factor                        | 0.5000 | 1.0000 | 0.8130 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 0.7210 | 0.8670 | 0.7050 | 0.9010 | 1.0000 |
| Other Adjustment Factor                 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Total 15-Minute Volume [veh/h]          | 4      | 0      | 8      | 0      | 0      | 0      | 0      | 32     | 122    | 53     | 91     | 0      |
| Total Analysis Volume [veh/h]           | 16     | 0      | 31     | 0      | 0      | 0      | 0      | 129    | 487    | 213    | 365    | 0      |
| Pedestrian Volume [ped/h]               | 0      |        |        | 0      |        |        | 0      |        |        | 0      |        |        |
| Bicycle Volume [bicycles/h]             | 0      |        |        | 0      |        |        | 0      |        |        | 0      |        |        |

**Intersection Settings**

| Priority Scheme                    | Stop | Stop | Free | Free |
|------------------------------------|------|------|------|------|
| Flared Lane                        | no   |      |      |      |
| Storage Area [veh]                 | 0    | 0    | 0    | 0    |
| Two-Stage Gap Acceptance           | no   |      |      |      |
| Number of Storage Spaces in Median | 0    | 0    | 0    | 0    |

**Movement, Approach, & Intersection Results**



|                                    |       |       |       |      |      |      |      |      |      |        |        |      |
|------------------------------------|-------|-------|-------|------|------|------|------|------|------|--------|--------|------|
| V/C, Movement V/C Ratio            | 0.12  | 0.00  | 0.05  | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.23   | 0.00   | 0.00 |
| d_M, Delay for Movement [s/veh]    | 34.72 | 44.22 | 13.81 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 10.13  | 0.00   | 0.00 |
| Movement LOS                       | D     | E     | B     |      |      |      |      | A    | A    | B      | A      |      |
| 95th-Percentile Queue Length [veh] | 0.61  | 0.61  | 0.61  | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 4.65   | 4.65   | 0.00 |
| 95th-Percentile Queue Length [ft]  | 15.29 | 15.29 | 15.29 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 116.18 | 116.18 | 0.00 |
| d_A, Approach Delay [s/veh]        | 20.93 |       |       | 0.00 |      |      | 0.00 |      |      | 3.73   |        |      |
| Approach LOS                       | C     |       |       | A    |      |      | A    |      |      | A      |        |      |
| d_I, Intersection Delay [s/veh]    | 2.53  |       |       |      |      |      |      |      |      |        |        |      |
| Intersection LOS                   | E     |       |       |      |      |      |      |      |      |        |        |      |

### Intersection Level Of Service Report #3: I-15 SB On and Airport RD

Control Type: Two-way stop  
Analysis Method: HCM2010  
Analysis Period: 15 minutes

Delay (sec / veh): 10.4  
Level Of Service: B  
Volume to Capacity (v/c): 0.133

#### Intersection Setup

| Name                   |                |        |   |        |   |        |
|------------------------|----------------|--------|---|--------|---|--------|
| Approach               | Northeastbound |        | Northwestbound  |        | Southeastbound  |        |
| Lane Configuration     |                |        |  |        |  |        |
| Turning Movement       | Left           | Right  | Left  | Thru   | Thru  | Right  |
| Lane Width [ft]        | 12.00          | 12.00  | 12.00   | 12.00  | 12.00   | 12.00  |
| No. of Lanes in Pocket | 0              | 0      | 0   | 0      | 0   | 0      |
| Pocket Length [ft]     | 100.00         | 100.00 | 100.00  | 100.00 | 100.00  | 100.00 |
| Speed [mph]            | 30.00          |        | 30.00   |        | 30.00   |        |
| Grade [%]              | 0.00           |        | 0.00  |        | 0.00  |        |
| Crosswalk              | yes            |        | yes   |        | yes   |        |

#### Volumes

| Name                                    |        |        |        |        |        |        |
|---|--------|--------|--------|--------|--------|--------|
| Base Volume Input [veh/h]               | 0      | 0      | 32     | 23     | 251    | 6      |
| Base Volume Adjustment Factor           | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Heavy Vehicles Percentage [%]           | 2.00   | 2.00   | 43.80  | 21.70  | 14.00  | 16.70  |
| Growth Rate                             | 1.00   | 1.00   | 2.12   | 2.12   | 2.12   | 2.12   |
| In-Process Volume [veh/h]               | 0      | 0      | 0      | 0      | 0      | 0      |
| Site-Generated Trips [veh/h]            | 0      | 0      | 0      | 0      | 0      | 0      |
| Diverted Trips [veh/h]                  | 0      | 0      | 0      | 0      | 0      | 0      |
| Pass-by Trips [veh/h]                   | 0      | 0      | 0      | 0      | 0      | 0      |
| Existing Site Adjustment Volume [veh/h] | 0      | 0      | 0      | 0      | 0      | 0      |
| Other Volume [veh/h]                    | 0      | 0      | 0      | 0      | 0      | 0      |
| Total Hourly Volume [veh/h]             | 0      | 0      | 68     | 49     | 532    | 13     |
| Peak Hour Factor                        | 1.0000 | 1.0000 | 0.6670 | 0.6390 | 0.8720 | 0.3750 |
| Other Adjustment Factor                 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Total 15-Minute Volume [veh/h]          | 0      | 0      | 25     | 19     | 153    | 9      |
| Total Analysis Volume [veh/h]           | 0      | 0      | 102    | 77     | 610    | 35     |
| Pedestrian Volume [ped/h]               | 0      |        | 0      |        | 0      |        |
| Bicycle Volume [bicycles/h]             | 0      |        | 0      |        | 0      |        |

**Intersection Settings**

| Priority Scheme                    | Stop | Free | Free |
|------------------------------------|------|------|------|
| Flared Lane                        |      |      |      |
| Storage Area [veh]                 | 0    | 0    | 0    |
| Two-Stage Gap Acceptance           |      |      |      |
| Number of Storage Spaces in Median | 0    | 0    | 0    |

**Movement, Approach, & Intersection Results**





|                                    |      |      |       |       |      |      |
|------------------------------------|------|------|-------|-------|------|------|
| V/C, Movement V/C Ratio            | 0.00 | 0.00 | 0.13  | 0.00  | 0.01 | 0.00 |
| d_M, Delay for Movement [s/veh]    | 0.00 | 0.00 | 10.39 | 0.00  | 0.00 | 0.00 |
| Movement LOS                       |      |      | B     | A     | A    | A    |
| 95th-Percentile Queue Length [veh] | 0.00 | 0.00 | 0.90  | 0.90  | 0.00 | 0.00 |
| 95th-Percentile Queue Length [ft]  | 0.00 | 0.00 | 22.46 | 22.46 | 0.00 | 0.00 |
| d_A, Approach Delay [s/veh]        | 0.00 |      | 5.92  |       | 0.00 |      |
| Approach LOS                       | A    |      | A     |       | A    |      |
| d_I, Intersection Delay [s/veh]    | 1.29 |      |       |       |      |      |
| Intersection LOS                   | B    |      |       |       |      |      |

### Intersection Level Of Service Report #4: I-15 SB Off and Airport RD Frontage

Control Type: Two-way stop  
Analysis Method: HCM2010  
Analysis Period: 15 minutes

Delay (sec / veh): 121.8  
Level Of Service: F  
Volume to Capacity (v/c): 0.947

#### Intersection Setup

| Name                   |   |        |        |   |        |        |   |        |        |   |        |        |
|------------------------|---|--------|--------|---|--------|--------|---|--------|--------|---|--------|--------|
| Approach               | Northeastbound  |        |        | Southwestbound  |        |        | Northwestbound  |        |        | Southeastbound  |        |        |
| Lane Configuration     |  |        |        |  |        |        |  |        |        |  |        |        |
| Turning Movement       | Left  | Thru   | Right  | Left  | Thru   | Right  | Left  | Thru   | Right  | Left  | Thru   | Right  |
| Lane Width [ft]        | 12.00   | 12.00  | 12.00  | 12.00   | 12.00  | 12.00  | 12.00   | 12.00  | 12.00  | 12.00   | 12.00  | 12.00  |
| No. of Lanes in Pocket | 0   | 0      | 0      | 0   | 0      | 0      | 0   | 0      | 0      | 0   | 0      | 0      |
| Pocket Length [ft]     | 100.00  | 100.00 | 100.00 | 100.00  | 100.00 | 100.00 | 100.00  | 100.00 | 100.00 | 100.00  | 100.00 | 100.00 |
| Speed [mph]            | 30.00   |        |        | 30.00   |        |        | 30.00   |        |        | 30.00   |        |        |
| Grade [%]              | 0.00  |        |        | 0.00  |        |        | 0.00  |        |        | 0.00  |        |        |
| Crosswalk              | yes   |        |        | yes   |        |        | yes   |        |        | yes   |        |        |

#### Volumes

| Name                                    |        |        |        |        |        |        |        |        |        |        |        |        |
|---|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| Base Volume Input [veh/h]               | 5      | 0      | 44     | 159    | 54     | 96     | 8      | 12     | 0      | 0      | 40     | 4      |
| Base Volume Adjustment Factor           | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Heavy Vehicles Percentage [%]           | 0.00   | 2.00   | 11.30  | 10.10  | 7.40   | 3.10   | 12.50  | 8.30   | 2.00   | 2.00   | 2.50   | 0.00   |
| Growth Rate                             | 2.22   | 1.00   | 2.22   | 2.22   | 2.22   | 2.22   | 2.22   | 2.22   | 1.00   | 1.00   | 2.22   | 2.22   |
| In-Process Volume [veh/h]               | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Site-Generated Trips [veh/h]            | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Diverted Trips [veh/h]                  | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Pass-by Trips [veh/h]                   | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Existing Site Adjustment Volume [veh/h] | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Other Volume [veh/h]                    | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Total Hourly Volume [veh/h]             | 11     | 0      | 98     | 353    | 120    | 213    | 18     | 27     | 0      | 0      | 89     | 9      |
| Peak Hour Factor                        | 0.4170 | 1.0000 | 0.5240 | 0.8110 | 0.9000 | 0.7060 | 0.4000 | 0.7500 | 1.0000 | 1.0000 | 0.7690 | 0.5000 |
| Other Adjustment Factor                 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Total 15-Minute Volume [veh/h]          | 7      | 0      | 47     | 109    | 33     | 75     | 11     | 9      | 0      | 0      | 29     | 5      |
| Total Analysis Volume [veh/h]           | 26     | 0      | 187    | 435    | 133    | 302    | 45     | 36     | 0      | 0      | 116    | 18     |
| Pedestrian Volume [ped/h]               | 0      |        |        | 0      |        |        | 0      |        |        | 0      |        |        |
| Bicycle Volume [bicycles/h]             | 0      |        |        | 0      |        |        | 0      |        |        | 0      |        |        |

**Intersection Settings**

| Priority Scheme                    | Stop | Stop | Free | Free |
|------------------------------------|------|------|------|------|
| Flared Lane                        | no   |      |      |      |
| Storage Area [veh]                 | 0    | 0    | 0    | 0    |
| Two-Stage Gap Acceptance           | no   | no   |      |      |
| Number of Storage Spaces in Median | 0    | 0    | 0    | 0    |

**Movement, Approach, & Intersection Results**

|                                    |       |      |       |        |        |       |      |      |      |      |      |      |
|------------------------------------|-------|------|-------|--------|--------|-------|------|------|------|------|------|------|
| V/C, Movement V/C Ratio            | 0.07  | 0.00 | 0.21  | 0.95   | 0.22   | 0.29  | 0.03 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| d_M, Delay for Movement [s/veh]    | 16.59 | 0.00 | 10.80 | 121.78 | 119.80 | 9.92  | 7.68 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Movement LOS                       | C     |      | B     | F      | F      | A     | A    | A    |      |      | A    | A    |
| 95th-Percentile Queue Length [veh] | 1.14  | 0.00 | 1.14  | 20.41  | 20.41  | 1.22  | 0.19 | 0.19 | 0.00 | 0.00 | 0.00 | 0.00 |
| 95th-Percentile Queue Length [ft]  | 28.44 | 0.00 | 28.44 | 510.19 | 510.19 | 30.56 | 4.64 | 4.64 | 0.00 | 0.00 | 0.00 | 0.00 |
| d_A, Approach Delay [s/veh]        | 11.50 |      |       | 82.65  |        |       | 4.27 |      |      | 0.00 |      |      |
| Approach LOS                       | B     |      |       | F      |        |       | A    |      |      | A    |      |      |
| d_I, Intersection Delay [s/veh]    | 57.55 |      |       |        |        |       |      |      |      |      |      |      |
| Intersection LOS                   | F     |      |       |        |        |       |      |      |      |      |      |      |







### Intersection Level Of Service Report #5: 14th St SW and I-315 EB

Control Type: Signalized  
Analysis Method: HCM2010  
Analysis Period: 15 minutes

Delay (sec / veh): 13.3  
Level Of Service: B  
Volume to Capacity (v/c): 0.218

#### Intersection Setup

| Name                   |   |        |        |   |        |        |   |        |        |   |        |        |
|------------------------|---|--------|--------|---|--------|--------|---|--------|--------|---|--------|--------|
| Approach               | Northbound  |        |        | Southbound  |        |        | Eastbound   |        |        | Westbound   |        |        |
| Lane Configuration     |  |        |        |  |        |        |  |        |        |  |        |        |
| Turning Movement       | Left  | Thru   | Right  | Left  | Thru   | Right  | Left  | Thru   | Right  | Left  | Thru   | Right  |
| Lane Width [ft]        | 12.00   | 12.00  | 12.00  | 12.00   | 12.00  | 12.00  | 12.00   | 12.00  | 12.00  | 12.00   | 12.00  | 12.00  |
| No. of Lanes in Pocket | 0   | 0      | 0      | 0   | 0      | 0      | 0   | 0      | 0      | 0   | 0      | 0      |
| Pocket Length [ft]     | 100.00  | 100.00 | 100.00 | 100.00  | 100.00 | 100.00 | 100.00  | 100.00 | 100.00 | 100.00  | 100.00 | 100.00 |
| Speed [mph]            | 30.00   |        |        | 30.00   |        |        | 30.00   |        |        | 30.00   |        |        |
| Grade [%]              | 0.00  |        |        | 0.00  |        |        | 0.00  |        |        | 0.00  |        |        |
| Crosswalk              | yes   |        |        | yes   |        |        | yes   |        |        | yes   |        |        |

#### Volumes

| Name                                    |        |        |        |        |        |        |        |        |        |        |        |        |
|---|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| Base Volume Input [veh/h]               | 7      | 66     | 286    | 142    | 91     | 60     | 44     | 69     | 3      | 20     | 30     | 5      |
| Base Volume Adjustment Factor           | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Heavy Vehicles Percentage [%]           | 14.30  | 1.50   | 1.70   | 3.50   | 4.40   | 5.00   | 0.00   | 4.30   | 0.00   | 10.00  | 3.30   | 0.00   |
| Growth Rate                             | 1.24   | 1.24   | 1.24   | 1.24   | 1.24   | 1.24   | 1.24   | 1.24   | 1.24   | 1.24   | 1.24   | 1.24   |
| In-Process Volume [veh/h]               | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Site-Generated Trips [veh/h]            | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Diverted Trips [veh/h]                  | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Pass-by Trips [veh/h]                   | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Existing Site Adjustment Volume [veh/h] | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Other Volume [veh/h]                    | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Right-Turn on Red Volume [veh/h]        | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Total Hourly Volume [veh/h]             | 9      | 82     | 355    | 176    | 113    | 74     | 55     | 86     | 4      | 25     | 37     | 6      |
| Peak Hour Factor                        | 0.8300 | 0.8300 | 0.8300 | 0.8300 | 0.8300 | 0.8300 | 0.8300 | 0.8300 | 0.8300 | 0.8300 | 0.8300 | 0.8300 |
| Other Adjustment Factor                 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Total 15-Minute Volume [veh/h]          | 3      | 25     | 107    | 53     | 34     | 22     | 17     | 26     | 1      | 8      | 11     | 2      |
| Total Analysis Volume [veh/h]           | 11     | 99     | 428    | 212    | 136    | 89     | 66     | 104    | 5      | 30     | 45     | 7      |
| Presence of On-Street Parking           | no     |        | no     | no     |        | no     | no     |        | no     | no     |        | no     |
| On-Street Parking Maneuver Rate [/h]    | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Local Bus Stopping Rate [/h]            | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Pedestrian Volume [ped/h]               | 0      |        |        | 0      |        |        | 0      |        |        | 0      |        |        |
| Bicycle Volume [bicycles/h]             | 0      |        |        | 0      |        |        | 0      |        |        | 0      |        |        |

**Intersection Settings**

|                           |                                 |
|---------------------------|---------------------------------|
| Located in CBD            | no                              |
| Signal Coordination Group | -                               |
| Cycle Length [s]          | 60                              |
| Coordination Type         | Time of Day Pattern Coordinated |
| Actuation Type            | Semi-actuated                   |
| Offset [s]                | 0.0                             |
| Offset Reference          | LeadGreen                       |
| Permissive Mode           | SingleBand                      |
| Lost time [s]             | 0.00                            |

**Phasing & Timing**

| Control Type                 | Permiss | Permiss | Overlap | Permiss | Permiss | Overlap | Protecte | Permiss | Permiss | Protecte | Permiss | Permiss |
|------------------------------|---------|---------|---------|---------|---------|---------|----------|---------|---------|----------|---------|---------|
| Signal Group                 | 0       | 2       | 3       | 0       | 6       | 7       | 7        | 4       | 0       | 3        | 8       | 0       |
| Lead / Lag                   | -       | -       | -       | -       | -       | -       | Lead     | -       | -       | Lead     | -       | -       |
| Minimum Green [s]            | 0       | 5       | 15      | 0       | 5       | 15      | 15       | 5       | 0       | 15       | 15      | 0       |
| Maximum Green [s]            | 0       | 50      | 20      | 0       | 50      | 20      | 20       | 60      | 0       | 20       | 60      | 0       |
| Amber [s]                    | 0.0     | 3.0     | 3.0     | 0.0     | 3.0     | 3.0     | 3.0      | 3.0     | 0.0     | 3.0      | 3.0     | 0.0     |
| All red [s]                  | 0.0     | 2.0     | 0.0     | 0.0     | 2.0     | 0.0     | 0.0      | 2.0     | 0.0     | 0.0      | 2.0     | 0.0     |
| Split [s]                    | 0       | 22      | 18      | 0       | 22      | 18      | 18       | 20      | 0       | 18       | 20      | 0       |
| Vehicle Extension [s]        | 0.0     | 3.0     | 3.0     | 0.0     | 3.0     | 3.0     | 3.0      | 3.0     | 0.0     | 3.0      | 3.0     | 0.0     |
| Walk [s]                     | 0       | 5       | 5       | 0       | 5       | 0       | 0        | 5       | 0       | 5        | 5       | 0       |
| Pedestrian Clearance [s]     | 0       | 10      | 10      | 0       | 10      | 0       | 0        | 10      | 0       | 10       | 10      | 0       |
| I1, Start-Up Lost Time [s]   | 0.0     | 2.0     | 2.0     | 0.0     | 2.0     | 2.0     | 2.0      | 2.0     | 0.0     | 2.0      | 2.0     | 0.0     |
| I2, Clearance Lost Time [s]  | 0.0     | 3.0     | 1.0     | 0.0     | 3.0     | 1.0     | 1.0      | 3.0     | 0.0     | 1.0      | 3.0     | 0.0     |
| Minimum Recall               |         | no      | no      |         | no      | no      | no       | no      |         | no       | no      |         |
| Maximum Recall               |         | no      | no      |         | no      | no      | no       | no      |         | no       | no      |         |
| Pedestrian Recall            |         | no      | no      |         | no      | no      | no       | no      |         | no       | no      |         |
| Detector Location [ft]       | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0      | 0.0     | 0.0     | 0.0      | 0.0     | 0.0     |
| Detector Length [ft]         | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0      | 0.0     | 0.0     | 0.0      | 0.0     | 0.0     |
| I, Upstream Filtering Factor | 1.00    | 1.00    | 1.00    | 1.00    | 1.00    | 1.00    | 1.00     | 1.00    | 1.00    | 1.00     | 1.00    | 1.00    |

**Lane Group Calculations**

| Lane Group                              | L     | C     | R    | L     | C     | R    | L    | C     | R     | L    | C     | R     |
|---|-------|-------|------|-------|-------|------|------|-------|-------|------|-------|-------|
| L, Total Lost Time per Cycle [s]        | 5.00  | 5.00  | 3.00 | 5.00  | 5.00  | 3.00 | 5.00 | 5.00  | 5.00  | 4.00 | 5.00  | 5.00  |
| l1_p, Permitted Start-Up Lost Time [s]  | 2.00  | 0.00  | 0.00 | 2.00  | 0.00  | 0.00 | 0.00 | 0.00  | 0.00  | 0.00 | 0.00  | 0.00  |
| l2, Clearance Lost Time [s]             | 3.00  | 3.00  | 0.00 | 3.00  | 3.00  | 0.00 | 0.00 | 3.00  | 3.00  | 0.00 | 3.00  | 3.00  |
| g_i, Effective Green Time [s]           | 17    | 17    | 37   | 17    | 17    | 36   | 29   | 12    | 12    | 29   | 11    | 11    |
| g / C, Green / Cycle                    | 0.28  | 0.28  | 0.62 | 0.28  | 0.28  | 0.60 | 0.49 | 0.21  | 0.21  | 0.49 | 0.19  | 0.19  |
| (v / s)_i Volume / Saturation Flow Rate | 0.01  | 0.05  | 0.27 | 0.17  | 0.07  | 0.06 | 0.04 | 0.06  | 0.00  | 0.02 | 0.02  | 0.00  |
| s, saturation flow rate [veh/h]         | 1114  | 1872  | 1588 | 1272  | 1820  | 1538 | 1616 | 1822  | 1615  | 1422 | 1839  | 1615  |
| c, Capacity [veh/h]                     | 334   | 530   | 979  | 387   | 515   | 920  | 948  | 376   | 333   | 816  | 346   | 304   |
| d1, Uniform Delay [s]                   | 19.78 | 16.28 | 6.04 | 22.47 | 16.66 | 5.14 | 8.16 | 20.04 | 18.95 | 8.07 | 20.26 | 19.85 |
| k, delay calibration                    | 0.11  | 0.11  | 0.11 | 0.11  | 0.11  | 0.11 | 0.11 | 0.11  | 0.11  | 0.11 | 0.11  | 0.11  |
| l, Upstream Filtering Factor            | 1.00  | 1.00  | 1.00 | 1.00  | 1.00  | 1.00 | 1.00 | 1.00  | 1.00  | 1.00 | 1.00  | 1.00  |
| d2, Incremental Delay [s]               | 0.04  | 0.17  | 0.31 | 1.21  | 0.27  | 0.05 | 0.03 | 0.39  | 0.02  | 0.02 | 0.17  | 0.03  |
| d3, Initial Queue Delay [s]             | 0.00  | 0.00  | 0.00 | 0.00  | 0.00  | 0.00 | 0.00 | 0.00  | 0.00  | 0.00 | 0.00  | 0.00  |
| Rp, platoon ratio                       | 1.00  | 1.00  | 1.00 | 1.00  | 1.00  | 1.00 | 1.00 | 1.00  | 1.00  | 1.00 | 1.00  | 1.00  |
| PF, progression factor                  | 1.00  | 1.00  | 1.00 | 1.00  | 1.00  | 1.00 | 1.00 | 1.00  | 1.00  | 1.00 | 1.00  | 1.00  |

**Lane Group Results**

|                                    |       |       |       |        |       |       |       |       |       |      |       |       |
|------------------------------------|-------|-------|-------|--------|-------|-------|-------|-------|-------|------|-------|-------|
| X, volume / capacity               | 0.03  | 0.19  | 0.44  | 0.55   | 0.26  | 0.10  | 0.07  | 0.28  | 0.01  | 0.04 | 0.13  | 0.02  |
| d, Delay for Lane Group [s/veh]    | 19.82 | 16.44 | 6.35  | 23.68  | 16.93 | 5.19  | 8.20  | 20.43 | 18.97 | 8.08 | 20.43 | 19.88 |
| Lane Group LOS                     | B     | B     | A     | C      | B     | A     | A     | C     | B     | A    | C     | B     |
| Critical Lane Group                | no    | no    | yes   | no     | no    | no    | no    | no    | no    | no   | yes   | no    |
| 50th-Percentile Queue Length [veh] | 0.12  | 0.97  | 2.14  | 2.75   | 1.37  | 0.37  | 0.40  | 1.18  | 0.05  | 0.18 | 0.51  | 0.08  |
| 50th-Percentile Queue Length [ft]  | 3.03  | 24.30 | 53.51 | 68.66  | 34.27 | 9.31  | 9.90  | 29.58 | 1.34  | 4.43 | 12.70 | 1.94  |
| 95th-Percentile Queue Length [veh] | 0.22  | 1.75  | 3.85  | 4.94   | 2.47  | 0.67  | 0.71  | 2.13  | 0.10  | 0.32 | 0.91  | 0.14  |
| 95th-Percentile Queue Length [ft]  | 5.46  | 43.75 | 96.31 | 123.59 | 61.69 | 16.75 | 17.82 | 53.25 | 2.41  | 7.97 | 22.86 | 3.49  |

**Movement, Approach, & Intersection Results**

|                                 |       |       |      |       |       |      |       |       |       |       |       |       |
|---------------------------------|-------|-------|------|-------|-------|------|-------|-------|-------|-------|-------|-------|
| d_M, Delay for Movement [s/veh] | 19.82 | 16.44 | 6.35 | 23.68 | 16.93 | 5.19 | 8.20  | 20.43 | 18.97 | 8.08  | 20.43 | 19.88 |
| Movement LOS                    | B     | B     | A    | C     | B     | A    | A     | C     | B     | A     | C     | B     |
| d_A, Approach Delay [s/veh]     | 8.48  |       |      | 17.81 |       |      | 15.78 |       |       | 15.87 |       |       |
| Approach LOS                    | A     |       |      | B     |       |      | B     |       |       | B     |       |       |
| d_I, Intersection Delay [s/veh] | 13.32 |       |      |       |       |      |       |       |       |       |       |       |
| Intersection LOS                | B     |       |      |       |       |      |       |       |       |       |       |       |
| Intersection V/C                | 0.218 |       |      |       |       |      |       |       |       |       |       |       |

**Sequence**

|        |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|--------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ring 1 | 2 | 7 | 4 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Ring 2 | 6 | 3 | 8 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Ring 3 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Ring 4 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |







### Intersection Level Of Service Report #6: 14th St SW and I-315 WB

Control Type: Signalized  
Analysis Method: HCM2010  
Analysis Period: 15 minutes

Delay (sec / veh): 22.2  
Level Of Service: C  
Volume to Capacity (v/c): 0.295

#### Intersection Setup

| Name                   |   |        |        |   |        |        |   |        |        |   |        |        |
|------------------------|---|--------|--------|---|--------|--------|---|--------|--------|---|--------|--------|
| Approach               | Northbound  |        |        | Southbound  |        |        | Eastbound   |        |        | Westbound   |        |        |
| Lane Configuration     |  |        |        |  |        |        |  |        |        |  |        |        |
| Turning Movement       | Left  | Thru   | Right  | Left  | Thru   | Right  | Left  | Thru   | Right  | Left  | Thru   | Right  |
| Lane Width [ft]        | 12.00   | 12.00  | 12.00  | 12.00   | 12.00  | 12.00  | 12.00   | 12.00  | 12.00  | 12.00   | 12.00  | 12.00  |
| No. of Lanes in Pocket | 0   | 0      | 0      | 0   | 0      | 0      | 0   | 0      | 0      | 0   | 0      | 0      |
| Pocket Length [ft]     | 100.00  | 100.00 | 100.00 | 100.00  | 100.00 | 100.00 | 100.00  | 100.00 | 100.00 | 100.00  | 100.00 | 100.00 |
| Speed [mph]            | 30.00   |        |        | 30.00   |        |        | 30.00   |        |        | 30.00   |        |        |
| Grade [%]              | 0.00  |        |        | 0.00  |        |        | 0.00  |        |        | 0.00  |        |        |
| Crosswalk              | yes   |        |        | yes   |        |        | yes   |        |        | yes   |        |        |

#### Volumes

| Name                                    |        |        |        |        |        |        |        |        |        |        |        |        |
|---|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| Base Volume Input [veh/h]               | 11     | 17     | 90     | 26     | 136    | 0      | 0      | 7      | 15     | 162    | 16     | 38     |
| Base Volume Adjustment Factor           | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Heavy Vehicles Percentage [%]           | 9.10   | 0.00   | 4.40   | 7.70   | 1.50   | 0.00   | 0.00   | 0.00   | 0.00   | 2.50   | 0.00   | 0.00   |
| Growth Rate                             | 1.16   | 1.16   | 1.16   | 1.16   | 1.16   | 1.16   | 1.16   | 1.16   | 1.16   | 1.16   | 1.16   | 1.16   |
| In-Process Volume [veh/h]               | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Site-Generated Trips [veh/h]            | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Diverted Trips [veh/h]                  | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Pass-by Trips [veh/h]                   | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Existing Site Adjustment Volume [veh/h] | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Other Volume [veh/h]                    | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Right-Turn on Red Volume [veh/h]        | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Total Hourly Volume [veh/h]             | 13     | 20     | 104    | 30     | 158    | 0      | 0      | 8      | 17     | 188    | 19     | 44     |
| Peak Hour Factor                        | 0.8040 | 0.8040 | 0.8040 | 0.8040 | 0.8040 | 0.8040 | 0.8040 | 0.8040 | 0.8040 | 0.8040 | 0.8040 | 0.8040 |
| Other Adjustment Factor                 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Total 15-Minute Volume [veh/h]          | 4      | 6      | 32     | 9      | 49     | 0      | 0      | 2      | 5      | 58     | 6      | 14     |
| Total Analysis Volume [veh/h]           | 16     | 25     | 129    | 37     | 197    | 0      | 0      | 10     | 21     | 234    | 24     | 55     |
| Presence of On-Street Parking           | no     |        | no     | no     |        | no     | no     |        | no     | no     |        | no     |
| On-Street Parking Maneuver Rate [/h]    | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Local Bus Stopping Rate [/h]            | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Pedestrian Volume [ped/h]               | 0      |        |        | 0      |        |        | 0      |        |        | 0      |        |        |
| Bicycle Volume [bicycles/h]             | 0      |        |        | 0      |        |        | 0      |        |        | 0      |        |        |

**Intersection Settings**

|                           |                                 |
|---------------------------|---------------------------------|
| Located in CBD            | yes                             |
| Signal Coordination Group | -                               |
| Cycle Length [s]          | 60                              |
| Coordination Type         | Time of Day Pattern Coordinated |
| Actuation Type            | Semi-actuated                   |
| Offset [s]                | 0.0                             |
| Offset Reference          | LeadGreen                       |
| Permissive Mode           | SingleBand                      |
| Lost time [s]             | 0.00                            |

**Phasing & Timing**

| Control Type                 | Permiss | Permiss | Overlap | Permiss | Permiss | Permiss | Permiss | Permiss | Permiss | Permiss | Permiss | Permiss |
|------------------------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| Signal Group                 | 0       | 1       | 2       | 0       | 1       | 0       | 0       | 3       | 0       | 0       | 2       | 0       |
| Lead / Lag                   | -       | -       | -       | -       | -       | -       | -       | -       | -       | -       | -       | -       |
| Minimum Green [s]            | 0       | 5       | 5       | 0       | 5       | 0       | 0       | 5       | 0       | 0       | 5       | 0       |
| Maximum Green [s]            | 0       | 35      | 40      | 0       | 35      | 0       | 0       | 25      | 0       | 0       | 40      | 0       |
| Amber [s]                    | 0.0     | 3.0     | 3.0     | 0.0     | 3.0     | 0.0     | 0.0     | 3.0     | 0.0     | 0.0     | 3.0     | 0.0     |
| All red [s]                  | 0.0     | 2.0     | 2.0     | 0.0     | 2.0     | 0.0     | 0.0     | 2.0     | 0.0     | 0.0     | 2.0     | 0.0     |
| Split [s]                    | 0       | 25      | 19      | 0       | 25      | 0       | 0       | 16      | 0       | 0       | 19      | 0       |
| Vehicle Extension [s]        | 0.0     | 3.0     | 3.0     | 0.0     | 3.0     | 0.0     | 0.0     | 3.0     | 0.0     | 0.0     | 3.0     | 0.0     |
| Walk [s]                     | 0       | 9       | 7       | 0       | 9       | 0       | 0       | 0       | 0       | 0       | 7       | 0       |
| Pedestrian Clearance [s]     | 0       | 11      | 7       | 0       | 11      | 0       | 0       | 0       | 0       | 0       | 7       | 0       |
| I1, Start-Up Lost Time [s]   | 0.0     | 2.0     | 2.0     | 0.0     | 2.0     | 0.0     | 0.0     | 2.0     | 0.0     | 0.0     | 2.0     | 0.0     |
| I2, Clearance Lost Time [s]  | 0.0     | 3.0     | 3.0     | 0.0     | 3.0     | 0.0     | 0.0     | 3.0     | 0.0     | 0.0     | 3.0     | 0.0     |
| Minimum Recall               |         | no      | no      |         | no      |         |         | no      |         |         | no      |         |
| Maximum Recall               |         | no      | no      |         | no      |         |         | no      |         |         | no      |         |
| Pedestrian Recall            |         | no      | no      |         | no      |         |         | no      |         |         | no      |         |
| Detector Location [ft]       | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     |
| Detector Length [ft]         | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     |
| I, Upstream Filtering Factor | 1.00    | 1.00    | 1.00    | 1.00    | 1.00    | 1.00    | 1.00    | 1.00    | 1.00    | 1.00    | 1.00    | 1.00    |

**Lane Group Calculations**

| Lane Group                              | L     | C     | R    | L     | C     | C     | C     | R     |
|---|-------|-------|------|-------|-------|-------|-------|-------|
| L, Total Lost Time per Cycle [s]        | 5.00  | 5.00  | 5.00 | 5.00  | 5.00  | 5.00  | 5.00  | 5.00  |
| l1_p, Permitted Start-Up Lost Time [s]  | 2.00  | 0.00  | 0.00 | 2.00  | 0.00  | 0.00  | 0.00  | 0.00  |
| l2, Clearance Lost Time [s]             | 3.00  | 3.00  | 0.00 | 3.00  | 3.00  | 3.00  | 3.00  | 3.00  |
| g_i, Effective Green Time [s]           | 13    | 13    | 30   | 13    | 13    | 2     | 12    | 12    |
| g / C, Green / Cycle                    | 0.21  | 0.21  | 0.49 | 0.21  | 0.21  | 0.03  | 0.20  | 0.20  |
| (v / s)_i Volume / Saturation Flow Rate | 0.02  | 0.01  | 0.09 | 0.03  | 0.12  | 0.02  | 0.16  | 0.04  |
| s, saturation flow rate [veh/h]         | 994   | 1710  | 1392 | 1176  | 1685  | 1527  | 1636  | 1454  |
| c, Capacity [veh/h]                     | 183   | 356   | 686  | 305   | 350   | 52    | 329   | 292   |
| d1, Uniform Delay [s]                   | 26.76 | 19.09 | 8.52 | 21.98 | 21.31 | 28.58 | 22.73 | 19.90 |
| k, delay calibration                    | 0.11  | 0.11  | 0.11 | 0.11  | 0.11  | 0.11  | 0.11  | 0.11  |
| l, Upstream Filtering Factor            | 1.00  | 1.00  | 1.00 | 1.00  | 1.00  | 1.00  | 1.00  | 1.00  |
| d2, Incremental Delay [s]               | 0.20  | 0.08  | 0.13 | 0.18  | 1.41  | 10.57 | 4.12  | 0.31  |
| d3, Initial Queue Delay [s]             | 0.00  | 0.00  | 0.00 | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  |
| Rp, platoon ratio                       | 1.00  | 1.00  | 1.00 | 1.00  | 1.00  | 1.00  | 1.00  | 1.00  |
| PF, progression factor                  | 1.00  | 1.00  | 1.00 | 1.00  | 1.00  | 1.00  | 1.00  | 1.00  |

**Lane Group Results**

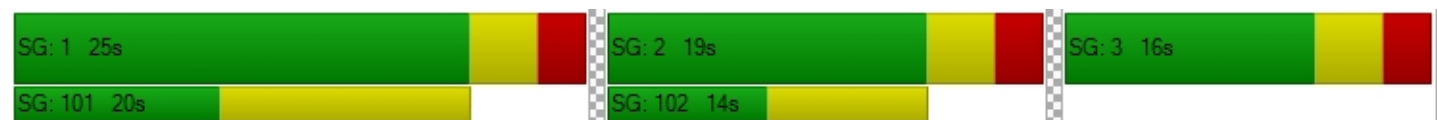
|                                    |       |       |       |       |        |       |        |       |
|------------------------------------|-------|-------|-------|-------|--------|-------|--------|-------|
| X, volume / capacity               | 0.09  | 0.07  | 0.19  | 0.12  | 0.56   | 0.60  | 0.78   | 0.19  |
| d, Delay for Lane Group [s/veh]    | 26.96 | 19.18 | 8.65  | 22.16 | 22.72  | 39.15 | 26.86  | 20.21 |
| Lane Group LOS                     | C     | B     | A     | C     | C      | D     | C      | C     |
| Critical Lane Group                | no    | no    | no    | no    | yes    | yes   | yes    | no    |
| 50th-Percentile Queue Length [veh] | 0.22  | 0.27  | 0.82  | 0.44  | 2.44   | 0.57  | 3.57   | 0.62  |
| 50th-Percentile Queue Length [ft]  | 5.43  | 6.74  | 20.40 | 11.02 | 60.90  | 14.26 | 89.30  | 15.53 |
| 95th-Percentile Queue Length [veh] | 0.39  | 0.49  | 1.47  | 0.79  | 4.38   | 1.03  | 6.43   | 1.12  |
| 95th-Percentile Queue Length [ft]  | 9.77  | 12.13 | 36.71 | 19.83 | 109.62 | 25.67 | 160.74 | 27.96 |

**Movement, Approach, & Intersection Results**

|                                 |       |       |      |       |       |       |       |       |       |       |       |       |
|---------------------------------|-------|-------|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| d_M, Delay for Movement [s/veh] | 26.96 | 19.18 | 8.65 | 22.16 | 22.72 | 22.72 | 39.15 | 39.15 | 39.15 | 26.86 | 26.86 | 20.21 |
| Movement LOS                    | C     | B     | A    | C     | C     | C     | D     | D     | D     | C     | C     | C     |
| d_A, Approach Delay [s/veh]     | 11.92 |       |      | 22.63 |       |       | 39.15 |       |       | 25.69 |       |       |
| Approach LOS                    | B     |       |      | C     |       |       | D     |       |       | C     |       |       |
| d_I, Intersection Delay [s/veh] | 22.16 |       |      |       |       |       |       |       |       |       |       |       |
| Intersection LOS                | C     |       |      |       |       |       |       |       |       |       |       |       |
| Intersection V/C                | 0.295 |       |      |       |       |       |       |       |       |       |       |       |

**Sequence**

|        |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|--------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ring 1 | 1 | 2 | 3 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Ring 2 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Ring 3 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Ring 4 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |









### Intersection Level Of Service Report #7: Fox Farm and I-315

Control Type: Signalized  
Analysis Method: HCM2010  
Analysis Period: 15 minutes

Delay (sec / veh): 39.0  
Level Of Service: D  
Volume to Capacity (v/c): 0.760

#### Intersection Setup

| Name                   |   |        |        |   |        |        |   |        |        |   |        |        |
|------------------------|---|--------|--------|---|--------|--------|---|--------|--------|---|--------|--------|
| Approach               | Northbound  |        |        | Southbound  |        |        | Northeastbound  |        |        | Southwestbound  |        |        |
| Lane Configuration     |  |        |        |  |        |        |  |        |        |  |        |        |
| Turning Movement       | Left  | Thru   | Right  | Left  | Thru   | Right  | Left  | Thru   | Right  | Left  | Thru   | Right  |
| Lane Width [ft]        | 12.00   | 12.00  | 12.00  | 12.00   | 12.00  | 12.00  | 12.00   | 12.00  | 12.00  | 12.00   | 12.00  | 12.00  |
| No. of Lanes in Pocket | 0   | 0      | 0      | 0   | 0      | 0      | 0   | 0      | 0      | 0   | 0      | 0      |
| Pocket Length [ft]     | 100.00  | 100.00 | 100.00 | 100.00  | 100.00 | 100.00 | 100.00  | 100.00 | 100.00 | 100.00  | 100.00 | 100.00 |
| Speed [mph]            | 30.00   |        |        | 30.00   |        |        | 30.00   |        |        | 30.00   |        |        |
| Grade [%]              | 0.00  |        |        | 0.00  |        |        | 0.00  |        |        | 0.00  |        |        |
| Crosswalk              | yes   |        |        | yes   |        |        | yes   |        |        | yes   |        |        |

#### Volumes

| Name                                    |        |        |        |        |        |        |        |        |        |        |        |        |
|---|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| Base Volume Input [veh/h]               | 50     | 219    | 437    | 172    | 90     | 121    | 161    | 732    | 45     | 101    | 335    | 136    |
| Base Volume Adjustment Factor           | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Heavy Vehicles Percentage [%]           | 2.00   | 0.90   | 0.70   | 1.80   | 2.20   | 4.10   | 6.20   | 5.20   | 2.20   | 4.00   | 6.00   | 3.70   |
| Growth Rate                             | 1.17   | 1.17   | 1.17   | 1.17   | 1.17   | 1.17   | 1.17   | 1.17   | 1.17   | 1.17   | 1.17   | 1.17   |
| In-Process Volume [veh/h]               | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Site-Generated Trips [veh/h]            | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Diverted Trips [veh/h]                  | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Pass-by Trips [veh/h]                   | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Existing Site Adjustment Volume [veh/h] | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Other Volume [veh/h]                    | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Right-Turn on Red Volume [veh/h]        | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Total Hourly Volume [veh/h]             | 59     | 256    | 511    | 201    | 105    | 142    | 188    | 856    | 53     | 118    | 392    | 159    |
| Peak Hour Factor                        | 0.7980 | 0.7980 | 0.7980 | 0.7980 | 0.7980 | 0.7980 | 0.7980 | 0.7980 | 0.7980 | 0.7980 | 0.7980 | 0.7980 |
| Other Adjustment Factor                 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Total 15-Minute Volume [veh/h]          | 18     | 80     | 160    | 63     | 33     | 44     | 59     | 268    | 17     | 37     | 123    | 50     |
| Total Analysis Volume [veh/h]           | 74     | 321    | 640    | 252    | 132    | 178    | 236    | 1073   | 66     | 148    | 491    | 199    |
| Presence of On-Street Parking           | no     |        | no     | no     |        | no     | no     |        | no     | no     |        | no     |
| On-Street Parking Maneuver Rate [/h]    | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Local Bus Stopping Rate [/h]            | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Pedestrian Volume [ped/h]               | 0      |        |        | 0      |        |        | 0      |        |        | 0      |        |        |
| Bicycle Volume [bicycles/h]             | 0      |        |        | 0      |        |        | 0      |        |        | 0      |        |        |

**Intersection Settings**

|                           |                                 |
|---------------------------|---------------------------------|
| Located in CBD            | no                              |
| Signal Coordination Group | -                               |
| Cycle Length [s]          | 140                             |
| Coordination Type         | Time of Day Pattern Coordinated |
| Actuation Type            | Semi-actuated                   |
| Offset [s]                | 0.0                             |
| Offset Reference          | LeadGreen                       |
| Permissive Mode           | SingleBand                      |
| Lost time [s]             | 0.00                            |

**Phasing & Timing**

| Control Type                 | Permiss | Permiss | Overlap | Permiss | Permiss | Overlap | Protecte | Permiss | Permiss | Protecte | Permiss | Permiss |
|------------------------------|---------|---------|---------|---------|---------|---------|----------|---------|---------|----------|---------|---------|
| Signal Group                 | 0       | 1       | 8       | 0       | 3       | 6       | 6        | 4       | 0       | 8        | 2       | 5       |
| Lead / Lag                   | -       | -       | -       | -       | -       | -       | Lead     | -       | -       | Lead     | -       | -       |
| Minimum Green [s]            | 0       | 5       | 5       | 0       | 5       | 5       | 5        | 5       | 0       | 5        | 5       | 0       |
| Maximum Green [s]            | 0       | 60      | 60      | 0       | 60      | 60      | 60       | 60      | 0       | 60       | 60      | 0       |
| Amber [s]                    | 0.0     | 3.0     | 3.0     | 0.0     | 3.0     | 3.0     | 3.0      | 3.0     | 0.0     | 3.0      | 3.0     | 0.0     |
| All red [s]                  | 0.0     | 2.0     | 0.0     | 0.0     | 2.0     | 0.0     | 0.0      | 2.0     | 0.0     | 0.0      | 2.0     | 0.0     |
| Split [s]                    | 0       | 20      | 41      | 0       | 33      | 67      | 67       | 46      | 0       | 41       | 20      | 0       |
| Vehicle Extension [s]        | 0.0     | 3.0     | 3.0     | 0.0     | 3.0     | 3.0     | 3.0      | 3.0     | 0.0     | 3.0      | 3.0     | 0.0     |
| Walk [s]                     | 0       | 5       | 0       | 0       | 5       | 0       | 0        | 5       | 0       | 0        | 5       | 0       |
| Pedestrian Clearance [s]     | 0       | 10      | 0       | 0       | 10      | 0       | 0        | 10      | 0       | 0        | 10      | 0       |
| I1, Start-Up Lost Time [s]   | 0.0     | 2.0     | 2.0     | 0.0     | 2.0     | 2.0     | 2.0      | 2.0     | 0.0     | 2.0      | 2.0     | 0.0     |
| I2, Clearance Lost Time [s]  | 0.0     | 3.0     | 1.0     | 0.0     | 3.0     | 1.0     | 1.0      | 3.0     | 0.0     | 1.0      | 3.0     | 0.0     |
| Minimum Recall               |         | no      | no      |         | no      | no      | no       | no      |         | no       | no      |         |
| Maximum Recall               |         | no      | no      |         | no      | no      | no       | no      |         | no       | no      |         |
| Pedestrian Recall            |         | no      | no      |         | no      | no      | no       | no      |         | no       | no      |         |
| Detector Location [ft]       | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0      | 0.0     | 0.0     | 0.0      | 0.0     | 0.0     |
| Detector Length [ft]         | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0      | 0.0     | 0.0     | 0.0      | 0.0     | 0.0     |
| I, Upstream Filtering Factor | 1.00    | 1.00    | 1.00    | 1.00    | 1.00    | 1.00    | 1.00     | 1.00    | 1.00    | 1.00     | 1.00    | 1.00    |

**Lane Group Calculations**

| Lane Group                              | C     | C     | R    | L     | C     | R     | L     | C     | R     | L     | C     | R     |
|---|-------|-------|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| L, Total Lost Time per Cycle [s]        | 5.00  | 5.00  | 3.00 | 5.00  | 5.00  | 3.00  | 3.00  | 5.00  | 5.00  | 3.00  | 5.00  | 5.00  |
| l1_p, Permitted Start-Up Lost Time [s]  | 0.00  | 0.00  | 0.00 | 2.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  |
| l2, Clearance Lost Time [s]             | 3.00  | 3.00  | 0.00 | 3.00  | 3.00  | 0.00  | 1.00  | 3.00  | 3.00  | 1.00  | 3.00  | 3.00  |
| g_i, Effective Green Time [s]           | 31    | 31    | 97   | 25    | 25    | 52    | 22    | 47    | 47    | 31    | 56    | 56    |
| g / C, Green / Cycle                    | 0.22  | 0.22  | 0.69 | 0.18  | 0.18  | 0.37  | 0.16  | 0.34  | 0.34  | 0.22  | 0.40  | 0.40  |
| (v / s)_i Volume / Saturation Flow Rate | 0.04  | 0.19  | 0.40 | 0.14  | 0.04  | 0.11  | 0.14  | 0.31  | 0.04  | 0.04  | 0.14  | 0.13  |
| s, saturation flow rate [veh/h]         | 1793  | 1714  | 1604 | 1778  | 3540  | 1551  | 1704  | 3439  | 1580  | 3379  | 3413  | 1557  |
| c, Capacity [veh/h]                     | 405   | 387   | 1160 | 365   | 727   | 618   | 268   | 1167  | 536   | 750   | 1378  | 629   |
| d1, Uniform Delay [s]                   | 43.76 | 51.63 | 8.93 | 51.50 | 45.91 | 28.61 | 57.70 | 44.43 | 31.90 | 44.32 | 29.06 | 28.52 |
| k, delay calibration                    | 0.11  | 0.11  | 0.41 | 0.11  | 0.11  | 0.11  | 0.11  | 0.11  | 0.11  | 0.11  | 0.11  | 0.11  |
| l, Upstream Filtering Factor            | 1.00  | 1.00  | 1.00 | 1.00  | 1.00  | 1.00  | 1.00  | 1.00  | 1.00  | 1.00  | 1.00  | 1.00  |
| d2, Incremental Delay [s]               | 0.21  | 4.62  | 1.56 | 2.33  | 0.12  | 0.25  | 9.13  | 3.49  | 0.10  | 0.13  | 0.16  | 0.29  |
| d3, Initial Queue Delay [s]             | 0.00  | 0.00  | 0.00 | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  |
| Rp, platoon ratio                       | 1.00  | 1.00  | 1.00 | 1.00  | 1.00  | 1.00  | 1.00  | 1.00  | 1.00  | 1.00  | 1.00  | 1.00  |
| PF, progression factor                  | 1.00  | 1.00  | 1.00 | 1.00  | 1.00  | 1.00  | 1.00  | 1.00  | 1.00  | 1.00  | 1.00  | 1.00  |

**Lane Group Results**

|                                    |       |        |        |        |       |        |        |        |       |       |        |        |
|------------------------------------|-------|--------|--------|--------|-------|--------|--------|--------|-------|-------|--------|--------|
| X, volume / capacity               | 0.18  | 0.83   | 0.55   | 0.69   | 0.18  | 0.29   | 0.88   | 0.92   | 0.12  | 0.20  | 0.36   | 0.32   |
| d, Delay for Lane Group [s/veh]    | 43.98 | 56.25  | 10.49  | 53.83  | 46.03 | 28.87  | 66.82  | 47.91  | 32.00 | 44.45 | 29.22  | 28.81  |
| Lane Group LOS                     | D     | E      | B      | D      | D     | C      | E      | D      | C     | D     | C      | C      |
| Critical Lane Group                | no    | no     | yes    | yes    | no    | no     | no     | yes    | no    | no    | no     | no     |
| 50th-Percentile Queue Length [veh] | 2.13  | 11.29  | 10.10  | 9.13   | 2.00  | 4.36   | 8.87   | 18.35  | 1.59  | 2.14  | 5.88   | 4.71   |
| 50th-Percentile Queue Length [ft]  | 53.34 | 282.26 | 252.44 | 228.16 | 49.99 | 109.09 | 221.67 | 458.87 | 39.66 | 53.49 | 147.02 | 117.63 |
| 95th-Percentile Queue Length [veh] | 3.84  | 16.80  | 15.31  | 14.08  | 3.60  | 7.79   | 13.75  | 25.38  | 2.86  | 3.85  | 9.86   | 8.26   |
| 95th-Percentile Queue Length [ft]  | 96.01 | 420.02 | 382.72 | 352.03 | 89.98 | 194.73 | 343.76 | 634.52 | 71.39 | 96.29 | 246.44 | 206.56 |

**Movement, Approach, & Intersection Results**

|                                 |       |       |       |       |       |       |       |       |       |       |       |       |
|---------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| d_M, Delay for Movement [s/veh] | 43.98 | 56.25 | 10.49 | 53.83 | 46.03 | 28.87 | 66.82 | 47.91 | 32.00 | 44.45 | 29.22 | 28.81 |
| Movement LOS                    | D     | E     | B     | D     | D     | C     | E     | D     | C     | D     | C     | C     |
| d_A, Approach Delay [s/veh]     | 27.07 |       |       | 44.09 |       |       | 50.39 |       |       | 31.81 |       |       |
| Approach LOS                    | C     |       |       | D     |       |       | D     |       |       | C     |       |       |
| d_I, Intersection Delay [s/veh] | 39.04 |       |       |       |       |       |       |       |       |       |       |       |
| Intersection LOS                | D     |       |       |       |       |       |       |       |       |       |       |       |
| Intersection V/C                | 0.760 |       |       |       |       |       |       |       |       |       |       |       |

**Sequence**

|        |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|--------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ring 1 | 1 | 3 | 8 | 4 | - | - | - | - | - | - | - | - | - | - | - | - |
| Ring 2 | - | - | 6 | 2 | - | - | - | - | - | - | - | - | - | - | - | - |
| Ring 3 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Ring 4 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |






### Intersection Level Of Service Report #8: Central Ave and I15 SB

Control Type: Two-way stop  
Analysis Method: HCM2010  
Analysis Period: 15 minutes

Delay (sec / veh): 178.9  
Level Of Service: F  
Volume to Capacity (v/c): 1.188

#### Intersection Setup

| Name                   |   |        |        |   |        |        |   |        |        |                |        |        |
|------------------------|---|--------|--------|---|--------|--------|---|--------|--------|----------------|--------|--------|
| Approach               | Southbound  |        |        | Eastbound   |        |        | Westbound   |        |        | Northwestbound |        |        |
| Lane Configuration     |  |        |        |  |        |        |  |        |        |                |        |        |
| Turning Movement       | Left  | Thru   | Right  | Left  | Thru   | Right  | Left  | Thru   | Right  | Left           | Thru   | Right  |
| Lane Width [ft]        | 12.00   | 12.00  | 12.00  | 12.00   | 12.00  | 12.00  | 12.00   | 12.00  | 12.00  | 12.00          | 12.00  | 12.00  |
| No. of Lanes in Pocket | 0   | 0      | 0      | 0   | 0      | 0      | 0   | 0      | 0      | 0              | 0      | 0      |
| Pocket Length [ft]     | 100.00  | 100.00 | 100.00 | 100.00  | 100.00 | 100.00 | 100.00  | 100.00 | 100.00 | 100.00         | 100.00 | 100.00 |
| Speed [mph]            | 30.00   |        |        | 30.00   |        |        | 30.00   |        |        | 30.00          |        |        |
| Grade [%]              | 0.00  |        |        | 0.00  |        |        | 0.00  |        |        | 0.00           |        |        |
| Crosswalk              | yes   |        |        | yes   |        |        | yes   |        |        | yes            |        |        |

#### Volumes

| Name                                    |        |        |        |        |        |        |        |        |        |        |        |        |
|---|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| Base Volume Input [veh/h]               | 130    | 0      | 6      | 0      | 191    | 39     | 123    | 88     | 0      | 0      | 0      | 0      |
| Base Volume Adjustment Factor           | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Heavy Vehicles Percentage [%]           | 2.30   | 0.00   | 0.00   | 2.00   | 3.10   | 0.00   | 6.50   | 11.30  | 2.00   | 2.00   | 2.00   | 2.00   |
| Growth Rate                             | 1.41   | 1.41   | 1.41   | 1.00   | 1.41   | 1.41   | 1.41   | 1.41   | 1.00   | 1.00   | 1.00   | 1.00   |
| In-Process Volume [veh/h]               | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Site-Generated Trips [veh/h]            | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Diverted Trips [veh/h]                  | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Pass-by Trips [veh/h]                   | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Existing Site Adjustment Volume [veh/h] | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Other Volume [veh/h]                    | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Total Hourly Volume [veh/h]             | 183    | 0      | 8      | 0      | 269    | 55     | 173    | 124    | 0      | 0      | 0      | 0      |
| Peak Hour Factor                        | 0.8550 | 1.0000 | 0.7500 | 1.0000 | 0.6920 | 0.7500 | 0.7690 | 0.8150 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Other Adjustment Factor                 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Total 15-Minute Volume [veh/h]          | 54     | 0      | 3      | 0      | 97     | 18     | 56     | 38     | 0      | 0      | 0      | 0      |
| Total Analysis Volume [veh/h]           | 214    | 0      | 11     | 0      | 389    | 73     | 225    | 152    | 0      | 0      | 0      | 0      |
| Pedestrian Volume [ped/h]               | 0      |        |        | 0      |        |        | 0      |        |        | 0      |        |        |
| Bicycle Volume [bicycles/h]             | 0      |        |        | 0      |        |        | 0      |        |        | 0      |        |        |

**Intersection Settings**

| Priority Scheme                    | Stop | Free | Free | Stop |
|------------------------------------|------|------|------|------|
| Flared Lane                        |      |      |      |      |
| Storage Area [veh]                 | 0    | 0    | 0    | 0    |
| Two-Stage Gap Acceptance           | no   |      |      |      |
| Number of Storage Spaces in Median | 0    | 0    | 0    | 0    |

**Movement, Approach, & Intersection Results**




|                                    |        |        |      |      |      |      |       |      |      |      |      |      |
|------------------------------------|--------|--------|------|------|------|------|-------|------|------|------|------|------|
| V/C, Movement V/C Ratio            | 1.19   | 0.00   | 0.01 | 0.00 | 0.00 | 0.00 | 0.20  | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| d_M, Delay for Movement [s/veh]    | 178.88 | 176.96 | 9.05 | 0.00 | 0.00 | 0.00 | 8.91  | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Movement LOS                       | F      | F      | A    |      | A    | A    | A     | A    |      |      |      |      |
| 95th-Percentile Queue Length [veh] | 11.32  | 11.32  | 0.04 | 0.00 | 0.00 | 0.00 | 0.73  | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 95th-Percentile Queue Length [ft]  | 282.97 | 282.97 | 0.93 | 0.00 | 0.00 | 0.00 | 18.22 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| d_A, Approach Delay [s/veh]        | 170.57 |        |      | 0.00 |      |      | 5.32  |      |      | 0.00 |      |      |
| Approach LOS                       | F      |        |      | A    |      |      | A     |      |      | A    |      |      |
| d_I, Intersection Delay [s/veh]    | 37.95  |        |      |      |      |      |       |      |      |      |      |      |
| Intersection LOS                   | F      |        |      |      |      |      |       |      |      |      |      |      |

### Intersection Level Of Service Report #9: Central Ave and I-15 NB

Control Type: Two-way stop  
Analysis Method: HCM2010  
Analysis Period: 15 minutes

Delay (sec / veh): 113.1  
Level Of Service: F  
Volume to Capacity (v/c): 0.274

#### Intersection Setup

| Name                   |   |        |        |   |        |        |   |        |        |                |        |        |
|------------------------|---|--------|--------|---|--------|--------|---|--------|--------|----------------|--------|--------|
| Approach               | Northbound  |        |        | Eastbound   |        |        | Westbound   |        |        | Southeastbound |        |        |
| Lane Configuration     |  |        |        |  |        |        |  |        |        |                |        |        |
| Turning Movement       | Left  | Thru   | Right  | Left  | Thru   | Right  | Left  | Thru   | Right  | Left           | Thru   | Right  |
| Lane Width [ft]        | 12.00   | 12.00  | 12.00  | 12.00   | 12.00  | 12.00  | 12.00   | 12.00  | 12.00  | 12.00          | 12.00  | 12.00  |
| No. of Lanes in Pocket | 0   | 0      | 0      | 0   | 0      | 0      | 0   | 0      | 0      | 0              | 0      | 0      |
| Pocket Length [ft]     | 100.00  | 100.00 | 100.00 | 100.00  | 100.00 | 100.00 | 100.00  | 100.00 | 100.00 | 100.00         | 100.00 | 100.00 |
| Speed [mph]            | 30.00   |        |        | 30.00   |        |        | 30.00   |        |        | 30.00          |        |        |
| Grade [%]              | 0.00  |        |        | 0.00  |        |        | 0.00  |        |        | 0.00           |        |        |
| Crosswalk              | yes   |        |        | yes   |        |        | yes   |        |        | yes            |        |        |

#### Volumes

| Name                                    |        |        |        |        |        |        |        |        |        |        |        |        |
|---|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| Base Volume Input [veh/h]               | 15     | 0      | 177    | 6      | 305    | 0      | 0      | 202    | 44     | 0      | 0      | 0      |
| Base Volume Adjustment Factor           | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Heavy Vehicles Percentage [%]           | 0.00   | 0.00   | 10.80  | 16.70  | 2.00   | 2.00   | 2.00   | 11.40  | 13.60  | 2.00   | 2.00   | 2.00   |
| Growth Rate                             | 1.64   | 1.64   | 1.64   | 1.64   | 1.64   | 1.00   | 1.00   | 1.64   | 1.64   | 1.00   | 1.00   | 1.00   |
| In-Process Volume [veh/h]               | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Site-Generated Trips [veh/h]            | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Diverted Trips [veh/h]                  | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Pass-by Trips [veh/h]                   | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Existing Site Adjustment Volume [veh/h] | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Other Volume [veh/h]                    | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Total Hourly Volume [veh/h]             | 25     | 0      | 290    | 10     | 500    | 0      | 0      | 331    | 72     | 0      | 0      | 0      |
| Peak Hour Factor                        | 0.5360 | 1.0000 | 0.8510 | 0.7500 | 0.7190 | 1.0000 | 1.0000 | 0.8420 | 0.7330 | 1.0000 | 1.0000 | 1.0000 |
| Other Adjustment Factor                 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Total 15-Minute Volume [veh/h]          | 12     | 0      | 85     | 3      | 174    | 0      | 0      | 98     | 25     | 0      | 0      | 0      |
| Total Analysis Volume [veh/h]           | 47     | 0      | 341    | 13     | 695    | 0      | 0      | 393    | 98     | 0      | 0      | 0      |
| Pedestrian Volume [ped/h]               | 0      |        |        | 0      |        |        | 0      |        |        | 0      |        |        |
| Bicycle Volume [bicycles/h]             | 0      |        |        | 0      |        |        | 0      |        |        | 0      |        |        |

**Intersection Settings**

| Priority Scheme                    | Stop | Free | Free | Stop |
|------------------------------------|------|------|------|------|
| Flared Lane                        | no   |      |      |      |
| Storage Area [veh]                 | 0    | 0    | 0    | 0    |
| Two-Stage Gap Acceptance           | no   |      |      |      |
| Number of Storage Spaces in Median | 0    | 0    | 0    | 0    |

**Movement, Approach, & Intersection Results**

|                                    |        |        |        |      |      |      |      |      |      |      |      |      |
|------------------------------------|--------|--------|--------|------|------|------|------|------|------|------|------|------|
| V/C, Movement V/C Ratio            | 0.27   | 0.00   | 0.80   | 0.01 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| d_M, Delay for Movement [s/veh]    | 113.09 | 109.47 | 100.54 | 8.34 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Movement LOS                       | F      | F      | F      | A    | A    |      |      | A    | A    |      |      |      |
| 95th-Percentile Queue Length [veh] | 13.79  | 13.79  | 13.79  | 0.04 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 95th-Percentile Queue Length [ft]  | 344.63 | 344.63 | 344.63 | 0.91 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| d_A, Approach Delay [s/veh]        | 102.06 |        |        | 0.15 |      |      | 0.00 |      |      | 0.00 |      |      |
| Approach LOS                       | F      |        |        | A    |      |      | A    |      |      | A    |      |      |
| d_I, Intersection Delay [s/veh]    | 25.02  |        |        |      |      |      |      |      |      |      |      |      |
| Intersection LOS                   | F      |        |        |      |      |      |      |      |      |      |      |      |






### Intersection Level Of Service Report #10: Central Ave and Vaughn Rd

Control Type: Two-way stop  
Analysis Method: HCM2010  
Analysis Period: 15 minutes

Delay (sec / veh): 406.0  
Level Of Service: F  
Volume to Capacity (v/c): 1.518

#### Intersection Setup

| Name                   |   |        |  |        |   |        |
|------------------------|---|--------|--|--------|---|--------|
| Approach               | Southbound  |        | Eastbound  |        | Westbound   |        |
| Lane Configuration     |  |        |  |        |  |        |
| Turning Movement       | Left  | Right  | Left   | Thru   | Thru  | Right  |
| Lane Width [ft]        | 12.00   | 12.00  | 12.00  | 12.00  | 12.00   | 12.00  |
| No. of Lanes in Pocket | 0   | 0      | 0  | 0      | 0   | 0      |
| Pocket Length [ft]     | 100.00  | 100.00 | 100.00   | 100.00 | 100.00  | 100.00 |
| Speed [mph]            | 30.00   |        | 30.00  |        | 30.00   |        |
| Grade [%]              | 0.00  |        | 0.00   |        | 0.00  |        |
| Crosswalk              | yes   |        | yes  |        | yes   |        |

#### Volumes

| Name                                    |        |        |        |        |        |        |
|---|--------|--------|--------|--------|--------|--------|
| Base Volume Input [veh/h]               | 77     | 60     | 71     | 410    | 184    | 65     |
| Base Volume Adjustment Factor           | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Heavy Vehicles Percentage [%]           | 9.10   | 6.70   | 7.00   | 5.10   | 11.40  | 6.20   |
| Growth Rate                             | 1.63   | 1.63   | 1.63   | 1.63   | 1.63   | 1.63   |
| In-Process Volume [veh/h]               | 0      | 0      | 0      | 0      | 0      | 0      |
| Site-Generated Trips [veh/h]            | 0      | 0      | 0      | 0      | 0      | 0      |
| Diverted Trips [veh/h]                  | 0      | 0      | 0      | 0      | 0      | 0      |
| Pass-by Trips [veh/h]                   | 0      | 0      | 0      | 0      | 0      | 0      |
| Existing Site Adjustment Volume [veh/h] | 0      | 0      | 0      | 0      | 0      | 0      |
| Other Volume [veh/h]                    | 0      | 0      | 0      | 0      | 0      | 0      |
| Total Hourly Volume [veh/h]             | 126    | 98     | 116    | 668    | 300    | 106    |
| Peak Hour Factor                        | 0.7700 | 0.7890 | 0.8450 | 0.8010 | 0.8520 | 0.7740 |
| Other Adjustment Factor                 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Total 15-Minute Volume [veh/h]          | 41     | 31     | 34     | 208    | 88     | 34     |
| Total Analysis Volume [veh/h]           | 164    | 124    | 137    | 834    | 352    | 137    |
| Pedestrian Volume [ped/h]               | 0      |        | 0      |        | 0      |        |
| Bicycle Volume [bicycles/h]             | 0      |        | 0      |        | 0      |        |

**Intersection Settings**

| Priority Scheme                    | Stop | Free | Free |
|------------------------------------|------|------|------|
| Flared Lane                        | no   |      |      |
| Storage Area [veh]                 | 0    | 0    | 0    |
| Two-Stage Gap Acceptance           | no   |      |      |
| Number of Storage Spaces in Median | 0    | 0    | 0    |

**Movement, Approach, & Intersection Results**




|                                    |        |        |       |      |      |      |
|------------------------------------|--------|--------|-------|------|------|------|
| V/C, Movement V/C Ratio            | 1.52   | 0.20   | 0.13  | 0.01 | 0.00 | 0.00 |
| d_M, Delay for Movement [s/veh]    | 405.95 | 378.42 | 8.95  | 0.00 | 0.00 | 0.00 |
| Movement LOS                       | F      | F      | A     | A    | A    | A    |
| 95th-Percentile Queue Length [veh] | 20.34  | 20.34  | 0.45  | 0.00 | 0.00 | 0.00 |
| 95th-Percentile Queue Length [ft]  | 508.50 | 508.50 | 11.23 | 0.00 | 0.00 | 0.00 |
| d_A, Approach Delay [s/veh]        | 394.10 |        | 1.26  |      | 0.00 |      |
| Approach LOS                       | F      |        | A     |      | A    |      |
| d_I, Intersection Delay [s/veh]    | 65.63  |        |       |      |      |      |
| Intersection LOS                   | F      |        |       |      |      |      |

**Intersection Level Of Service Report  
#11: Vaughn Rd and I-15 SB**

Control Type: Two-way stop  
 Analysis Method: HCM2010  
 Analysis Period: 15 minutes

Delay (sec / veh): 11.0  
 Level Of Service: B  
 Volume to Capacity (v/c): 0.361

**Intersection Setup**

| Name                   |   |        |   |        |   |        |
|------------------------|---|--------|---|--------|---|--------|
| Approach               | Southbound  |        | Eastbound   |        | Westbound   |        |
| Lane Configuration     |  |        |  |        |  |        |
| Turning Movement       | Left  | Right  | Left  | Thru   | Thru  | Right  |
| Lane Width [ft]        | 12.00   | 12.00  | 12.00   | 12.00  | 12.00   | 12.00  |
| No. of Lanes in Pocket | 0   | 0      | 0   | 0      | 0   | 0      |
| Pocket Length [ft]     | 100.00  | 100.00 | 100.00  | 100.00 | 100.00  | 100.00 |
| Speed [mph]            | 30.00   |        | 30.00   |        | 30.00   |        |
| Grade [%]              | 0.00  |        | 0.00  |        | 0.00  |        |
| Crosswalk              | yes   |        | yes   |        | yes   |        |

**Volumes**

| Name                                    |        |        |        |        |        |        |
|---|--------|--------|--------|--------|--------|--------|
| Base Volume Input [veh/h]               | 219    | 1      | 0      | 27     | 12     | 0      |
| Base Volume Adjustment Factor           | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Heavy Vehicles Percentage [%]           | 4.60   | 0.00   | 2.00   | 11.10  | 8.30   | 2.00   |
| Growth Rate                             | 1.36   | 1.36   | 1.00   | 1.36   | 1.36   | 1.00   |
| In-Process Volume [veh/h]               | 0      | 0      | 0      | 0      | 0      | 0      |
| Site-Generated Trips [veh/h]            | 0      | 0      | 0      | 0      | 0      | 0      |
| Diverted Trips [veh/h]                  | 0      | 0      | 0      | 0      | 0      | 0      |
| Pass-by Trips [veh/h]                   | 0      | 0      | 0      | 0      | 0      | 0      |
| Existing Site Adjustment Volume [veh/h] | 0      | 0      | 0      | 0      | 0      | 0      |
| Other Volume [veh/h]                    | 0      | 0      | 0      | 0      | 0      | 0      |
| Total Hourly Volume [veh/h]             | 298    | 1      | 0      | 37     | 16     | 0      |
| Peak Hour Factor                        | 0.8830 | 0.2500 | 1.0000 | 0.8440 | 0.7500 | 1.0000 |
| Other Adjustment Factor                 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Total 15-Minute Volume [veh/h]          | 84     | 1      | 0      | 11     | 5      | 0      |
| Total Analysis Volume [veh/h]           | 337    | 4      | 0      | 44     | 21     | 0      |
| Pedestrian Volume [ped/h]               | 0      |        | 0      |        | 0      |        |
| Bicycle Volume [bicycles/h]             | 0      |        | 0      |        | 0      |        |

**Intersection Settings**

| Priority Scheme                    | Stop | Free | Free |
|------------------------------------|------|------|------|
| Flared Lane                        | no   |      |      |
| Storage Area [veh]                 | 0    | 0    | 0    |
| Two-Stage Gap Acceptance           | no   |      |      |
| Number of Storage Spaces in Median | 0    | 0    | 0    |

**Movement, Approach, & Intersection Results**



|                                    |       |       |      |      |      |      |
|------------------------------------|-------|-------|------|------|------|------|
| V/C, Movement V/C Ratio            | 0.36  | 0.00  | 0.00 | 0.00 | 0.00 | 0.00 |
| d_M, Delay for Movement [s/veh]    | 11.04 | 10.58 | 0.00 | 0.00 | 0.00 | 0.00 |
| Movement LOS                       | B     | B     |      | A    | A    |      |
| 95th-Percentile Queue Length [veh] | 1.68  | 1.68  | 0.00 | 0.00 | 0.00 | 0.00 |
| 95th-Percentile Queue Length [ft]  | 42.07 | 42.07 | 0.00 | 0.00 | 0.00 | 0.00 |
| d_A, Approach Delay [s/veh]        | 11.04 |       | 0.00 |      | 0.00 |      |
| Approach LOS                       | B     |       | A    |      | A    |      |
| d_I, Intersection Delay [s/veh]    | 9.27  |       |      |      |      |      |
| Intersection LOS                   | B     |       |      |      |      |      |

**Intersection Level Of Service Report  
#12: Vaughn Rd and I-15 NB**

Control Type: Two-way stop  
 Analysis Method: HCM2010  
 Analysis Period: 15 minutes

Delay (sec / veh): 7.3  
 Level Of Service: A  
 Volume to Capacity (v/c): 0.000

**Intersection Setup**

| Name                   |   |        |   |        |                |        |
|------------------------|---|--------|---|--------|----------------|--------|
| Approach               | Eastbound   |        | Westbound   |        | Southeastbound |        |
| Lane Configuration     |  |        |  |        |                |        |
| Turning Movement       | Left  | Thru   | Thru  | Right  | Left           | Right  |
| Lane Width [ft]        | 12.00   | 12.00  | 12.00   | 12.00  | 12.00          | 12.00  |
| No. of Lanes in Pocket | 0   | 0      | 0   | 0      | 0              | 0      |
| Pocket Length [ft]     | 100.00  | 100.00 | 100.00  | 100.00 | 100.00         | 100.00 |
| Speed [mph]            | 30.00   |        | 30.00   |        | 30.00          |        |
| Grade [%]              | 0.00  |        | 0.00  |        | 0.00           |        |
| Crosswalk              | yes   |        | yes   |        | yes            |        |

**Volumes**

| Name                                    |        |        |        |        |        |        |
|---|--------|--------|--------|--------|--------|--------|
| Base Volume Input [veh/h]               | 0      | 237    | 19     | 76     | 0      | 0      |
| Base Volume Adjustment Factor           | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Heavy Vehicles Percentage [%]           | 0.00   | 5.00   | 5.30   | 14.50  | 2.00   | 2.00   |
| Growth Rate                             | 1.37   | 1.37   | 1.37   | 1.37   | 1.00   | 1.00   |
| In-Process Volume [veh/h]               | 0      | 0      | 0      | 0      | 0      | 0      |
| Site-Generated Trips [veh/h]            | 0      | 0      | 0      | 0      | 0      | 0      |
| Diverted Trips [veh/h]                  | 0      | 0      | 0      | 0      | 0      | 0      |
| Pass-by Trips [veh/h]                   | 0      | 0      | 0      | 0      | 0      | 0      |
| Existing Site Adjustment Volume [veh/h] | 0      | 0      | 0      | 0      | 0      | 0      |
| Other Volume [veh/h]                    | 0      | 0      | 0      | 0      | 0      | 0      |
| Total Hourly Volume [veh/h]             | 0      | 325    | 26     | 104    | 0      | 0      |
| Peak Hour Factor                        | 1.0000 | 0.8590 | 0.5940 | 0.8260 | 1.0000 | 1.0000 |
| Other Adjustment Factor                 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Total 15-Minute Volume [veh/h]          | 0      | 95     | 11     | 31     | 0      | 0      |
| Total Analysis Volume [veh/h]           | 0      | 378    | 44     | 126    | 0      | 0      |
| Pedestrian Volume [ped/h]               | 0      |        | 0      |        | 0      |        |
| Bicycle Volume [bicycles/h]             | 0      |        | 0      |        | 0      |        |

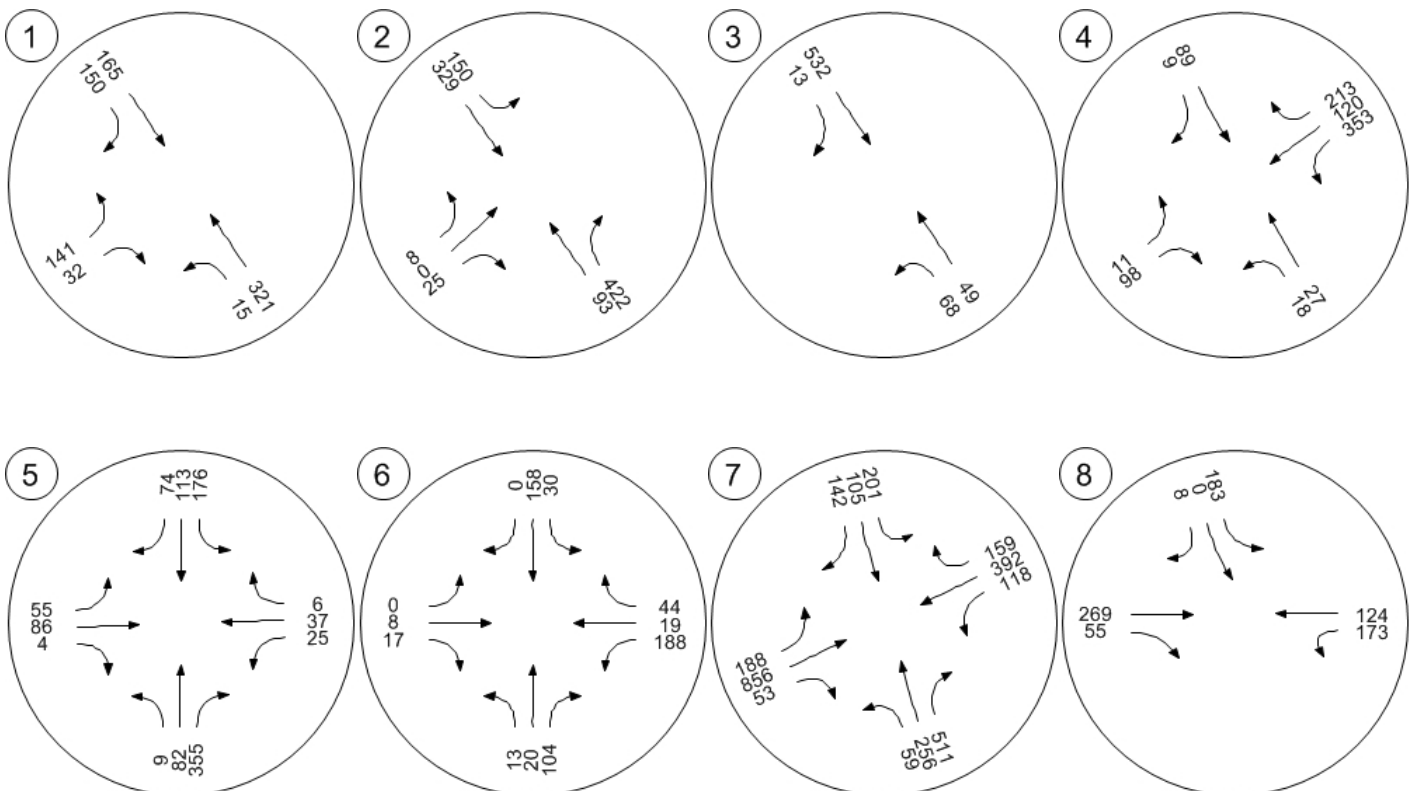
**Intersection Settings**

| Priority Scheme                    | Free | Free | Stop |
|------------------------------------|------|------|------|
| Flared Lane                        |      |      |      |
| Storage Area [veh]                 | 0    | 0    | 0    |
| Two-Stage Gap Acceptance           |      |      |      |
| Number of Storage Spaces in Median | 0    | 0    | 0    |

**Movement, Approach, & Intersection Results**

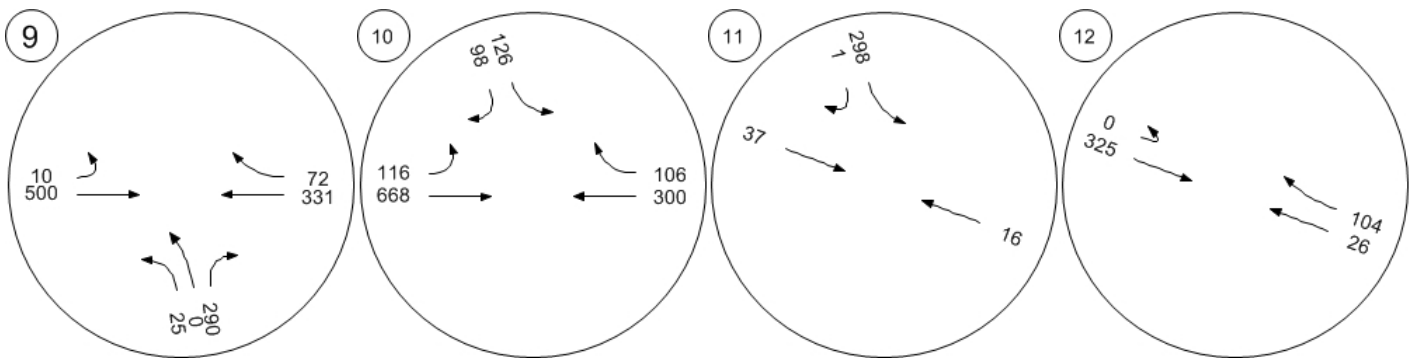
|                                    |      |      |      |      |      |      |
|------------------------------------|------|------|------|------|------|------|
| V/C, Movement V/C Ratio            | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| d_M, Delay for Movement [s/veh]    | 7.28 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Movement LOS                       | A    | A    | A    | A    |      |      |
| 95th-Percentile Queue Length [veh] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 95th-Percentile Queue Length [ft]  | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| d_A, Approach Delay [s/veh]        | 0.00 |      | 0.00 |      | 0.00 |      |
| Approach LOS                       | A    |      | A    |      | A    |      |
| d_I, Intersection Delay [s/veh]    | 0.00 |      |      |      |      |      |
| Intersection LOS                   | A    |      |      |      |      |      |

## Traffic Volume - Future Total Volume



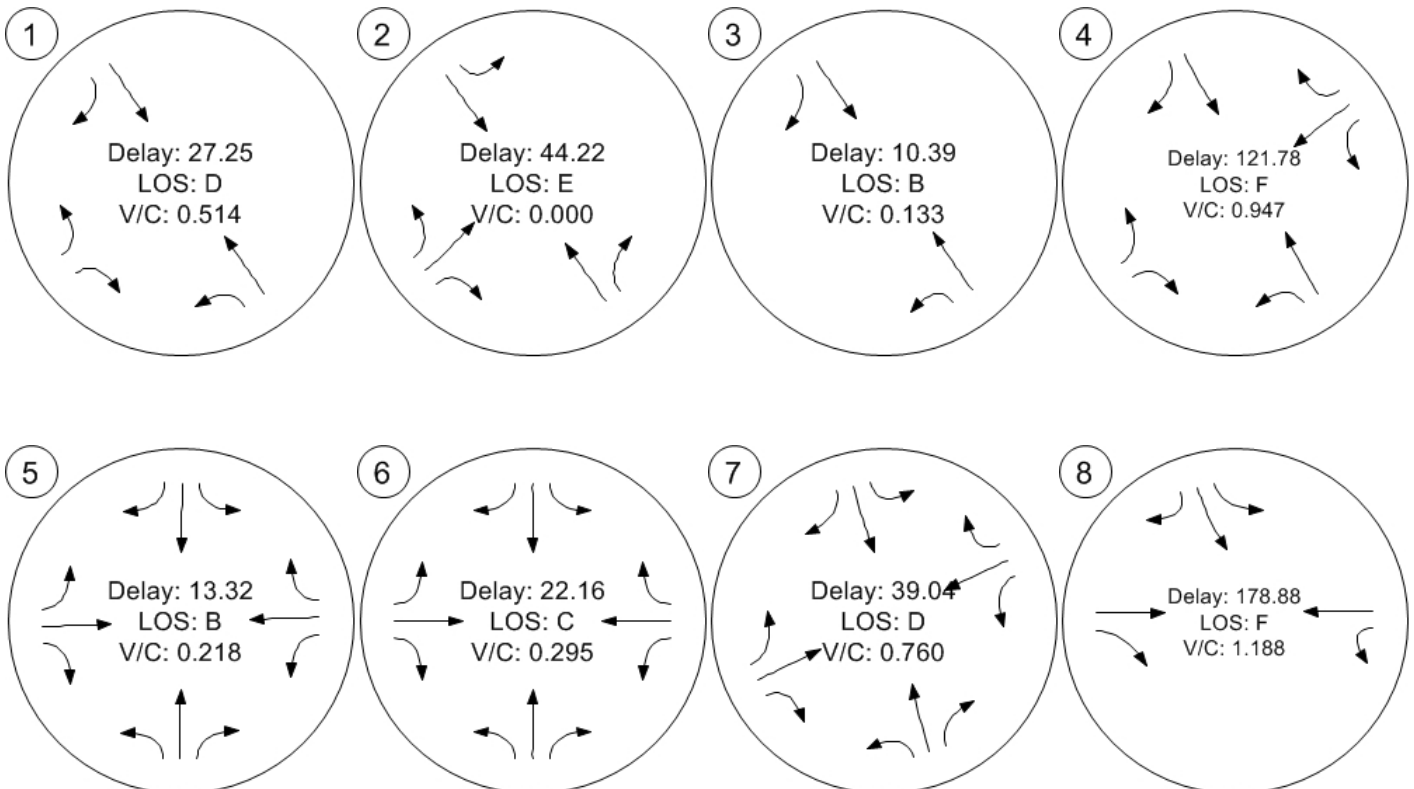


## Traffic Volume - Future Total Volume

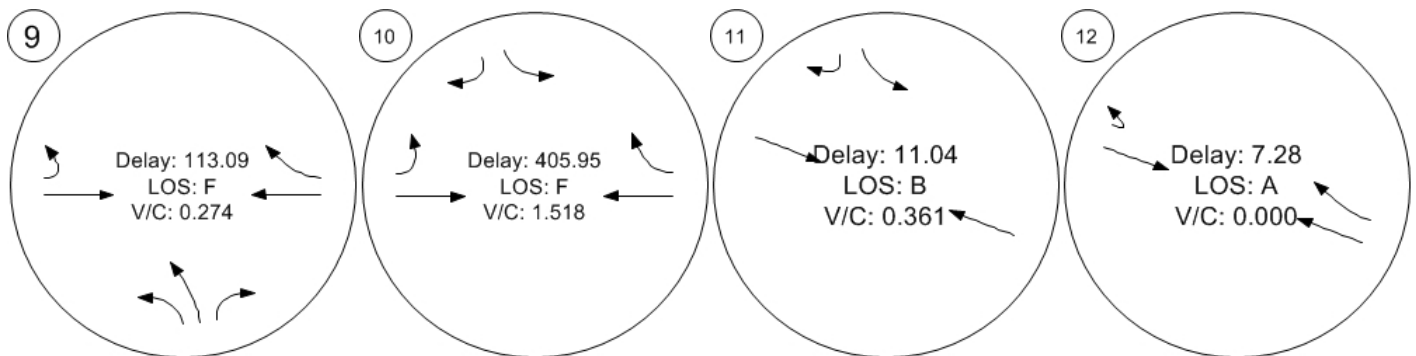




## Traffic Conditions



## Traffic Conditions



## I-15 Corridor Study

Vistro File: F:\...\I-15 Corridor.vistropdb

Scenario 4: Future PM Scenario

Report File: F:\...\Future\_LOS\_Report\_PM.pdf

9/15/2014

**Intersection Analysis Summary**

| ID | Intersection Name                   | Control Type | Method  | Worst Mvmt | V/C   | Delay (s/veh) | LOS |
|----|-------------------------------------|--------------|---------|------------|-------|---------------|-----|
| 1  | Tri Hill and Frontage Airport Rd    | Two-way stop | HCM2010 | NEBL       | 0.713 | 43.7          | E   |
| 2  | I-15 NB and Airport Rd              | Two-way stop | HCM2010 | NEBR       | 0.159 | 10,000.0      | F   |
| 3  | I-15 SB On and Airport RD           | Two-way stop | HCM2010 | NWBL       | 0.305 | 23.5          | C   |
| 4  | I-15 SB Off and Airport RD Frontage | Two-way stop | HCM2010 | SWBL       | 7.378 | 3,138.9       | F   |
| 5  | 14th St SW and I-315 EB             | Signalized   | HCM2010 | NBL        | 0.457 | 12.4          | B   |
| 6  | 14th St SW and I-315 WB             | Signalized   | HCM2010 | EBR        | 0.621 | 19.6          | B   |
| 7  | Fox Farm and I-315                  | Signalized   | HCM2010 | NBT        | 0.891 | 35.6          | D   |
| 8  | Central Ave and I15 SB              | Two-way stop | HCM2010 | SBL        | 1.339 | 314.9         | F   |
| 9  | Central Ave and I-15 NB             | Two-way stop | HCM2010 | NBL        | 1.211 | 445.2         | F   |
| 10 | Central Ave and Vaughn Rd           | Two-way stop | HCM2010 | SBL        | 3.231 | 1,422.7       | F   |
| 11 | Vaughn Rd and I-15 SB               | Two-way stop | HCM2010 | SBL        | 0.254 | 11.0          | B   |
| 12 | Vaughn Rd and I-15 NB               | Two-way stop | HCM2010 | EBL        | 0.000 | 7.4           | A   |




V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value; for all other control types, they are taken for the whole intersection.

### Intersection Level Of Service Report #1: Tri Hill and Frontage Airport Rd

Control Type: Two-way stop  
Analysis Method: HCM2010  
Analysis Period: 15 minutes

Delay (sec / veh): 43.7  
Level Of Service: E  
Volume to Capacity (v/c): 0.713

#### Intersection Setup

| Name                   |   |        |   |        |   |        |
|------------------------|---|--------|---|--------|---|--------|
| Approach               | Northeastbound  |        | Northwestbound  |        | Southeastbound  |        |
| Lane Configuration     |  |        |  |        |  |        |
| Turning Movement       | Left  | Right  | Left  | Thru   | Thru  | Right  |
| Lane Width [ft]        | 12.00   | 12.00  | 12.00   | 12.00  | 12.00   | 12.00  |
| No. of Lanes in Pocket | 0   | 0      | 0   | 0      | 0   | 0      |
| Pocket Length [ft]     | 100.00  | 100.00 | 100.00  | 100.00 | 100.00  | 100.00 |
| Speed [mph]            | 30.00   |        | 30.00   |        | 30.00   |        |
| Grade [%]              | 0.00  |        | 0.00  |        | 0.00  |        |
| Crosswalk              | yes   |        | yes   |        | yes   |        |

#### Volumes

| Name                                    |        |        |        |        |        |        |
|---|--------|--------|--------|--------|--------|--------|
| Base Volume Input [veh/h]               | 75     | 7      | 9      | 160    | 207    | 70     |
| Base Volume Adjustment Factor           | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Heavy Vehicles Percentage [%]           | 2.70   | 0.00   | 22.20  | 33.80  | 18.90  | 15.80  |
| Growth Rate                             | 1.70   | 1.70   | 1.70   | 1.70   | 1.70   | 1.70   |
| In-Process Volume [veh/h]               | 0      | 0      | 0      | 0      | 0      | 0      |
| Site-Generated Trips [veh/h]            | 0      | 0      | 0      | 0      | 0      | 0      |
| Diverted Trips [veh/h]                  | 0      | 0      | 0      | 0      | 0      | 0      |
| Pass-by Trips [veh/h]                   | 0      | 0      | 0      | 0      | 0      | 0      |
| Existing Site Adjustment Volume [veh/h] | 0      | 0      | 0      | 0      | 0      | 0      |
| Other Volume [veh/h]                    | 0      | 0      | 0      | 0      | 0      | 0      |
| Total Hourly Volume [veh/h]             | 128    | 12     | 15     | 272    | 352    | 119    |
| Peak Hour Factor                        | 0.5680 | 0.4380 | 0.7500 | 0.8000 | 0.8480 | 0.8330 |
| Other Adjustment Factor                 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Total 15-Minute Volume [veh/h]          | 56     | 7      | 5      | 85     | 104    | 36     |
| Total Analysis Volume [veh/h]           | 225    | 27     | 20     | 340    | 415    | 143    |
| Pedestrian Volume [ped/h]               | 0      |        | 0      |        | 0      |        |
| Bicycle Volume [bicycles/h]             | 0      |        | 0      |        | 0      |        |

**Intersection Settings**

| Priority Scheme                    | Stop | Free | Free |
|------------------------------------|------|------|------|
| Flared Lane                        | no   |      |      |
| Storage Area [veh]                 | 0    | 0    | 0    |
| Two-Stage Gap Acceptance           | no   |      |      |
| Number of Storage Spaces in Median | 0    | 0    | 0    |

**Movement, Approach, & Intersection Results**



|                                    |        |        |      |      |      |      |
|------------------------------------|--------|--------|------|------|------|------|
| V/C, Movement V/C Ratio            | 0.71   | 0.05   | 0.02 | 0.00 | 0.00 | 0.00 |
| d_M, Delay for Movement [s/veh]    | 43.71  | 38.46  | 9.00 | 0.00 | 0.00 | 0.00 |
| Movement LOS                       | E      | E      | A    | A    | A    | A    |
| 95th-Percentile Queue Length [veh] | 5.93   | 5.93   | 0.07 | 0.00 | 0.00 | 0.00 |
| 95th-Percentile Queue Length [ft]  | 148.33 | 148.33 | 1.67 | 0.00 | 0.00 | 0.00 |
| d_A, Approach Delay [s/veh]        | 43.15  |        | 0.50 |      | 0.00 |      |
| Approach LOS                       | E      |        | A    |      | A    |      |
| d_I, Intersection Delay [s/veh]    | 9.45   |        |      |      |      |      |
| Intersection LOS                   | E      |        |      |      |      |      |

### Intersection Level Of Service Report #2: I-15 NB and Airport Rd

Control Type: Two-way stop  
Analysis Method: HCM2010  
Analysis Period: 15 minutes

Delay (sec / veh): 10,000.0  
Level Of Service: F  
Volume to Capacity (v/c): 0.159

#### Intersection Setup

| Name                   |   |        |        |                |        |        |   |        |        |   |        |        |
|------------------------|---|--------|--------|----------------|--------|--------|---|--------|--------|---|--------|--------|
| Approach               | Northeastbound  |        |        | Southwestbound |        |        | Northwestbound  |        |        | Southeastbound  |        |        |
| Lane Configuration     |  |        |        |                |        |        |  |        |        |  |        |        |
| Turning Movement       | Left  | Thru   | Right  | Left           | Thru   | Right  | Left  | Thru   | Right  | Left  | Thru   | Right  |
| Lane Width [ft]        | 12.00   | 12.00  | 12.00  | 12.00          | 12.00  | 12.00  | 12.00   | 12.00  | 12.00  | 12.00   | 12.00  | 12.00  |
| No. of Lanes in Pocket | 0   | 0      | 0      | 0              | 0      | 0      | 0   | 0      | 0      | 0   | 0      | 0      |
| Pocket Length [ft]     | 100.00  | 100.00 | 100.00 | 100.00         | 100.00 | 100.00 | 100.00  | 100.00 | 100.00 | 100.00  | 100.00 | 100.00 |
| Speed [mph]            | 30.00   |        |        | 30.00          |        |        | 30.00   |        |        | 30.00   |        |        |
| Grade [%]              | 0.00  |        |        | 0.00           |        |        | 0.00  |        |        | 0.00  |        |        |
| Crosswalk              | yes   |        |        | yes            |        |        | yes   |        |        | yes   |        |        |

#### Volumes

| Name                                    |        |        |        |        |        |        |        |        |        |        |        |        |
|---|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| Base Volume Input [veh/h]               | 2      | 2      | 31     | 0      | 0      | 0      | 0      | 47     | 197    | 307    | 236    | 0      |
| Base Volume Adjustment Factor           | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Heavy Vehicles Percentage [%]           | 0.00   | 0.00   | 47.40  | 2.00   | 2.00   | 2.00   | 2.00   | 40.40  | 20.80  | 0.70   | 17.40  | 2.00   |
| Growth Rate                             | 1.90   | 1.90   | 1.90   | 1.00   | 1.00   | 1.00   | 1.00   | 1.90   | 1.90   | 1.90   | 1.90   | 1.00   |
| In-Process Volume [veh/h]               | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Site-Generated Trips [veh/h]            | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Diverted Trips [veh/h]                  | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Pass-by Trips [veh/h]                   | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Existing Site Adjustment Volume [veh/h] | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Other Volume [veh/h]                    | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Total Hourly Volume [veh/h]             | 4      | 4      | 59     | 0      | 0      | 0      | 0      | 89     | 374    | 583    | 448    | 0      |
| Peak Hour Factor                        | 0.5000 | 0.5000 | 0.7750 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 0.6910 | 0.8210 | 0.6910 | 0.8680 | 1.0000 |
| Other Adjustment Factor                 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Total 15-Minute Volume [veh/h]          | 2      | 2      | 19     | 0      | 0      | 0      | 0      | 32     | 114    | 211    | 129    | 0      |
| Total Analysis Volume [veh/h]           | 8      | 8      | 76     | 0      | 0      | 0      | 0      | 129    | 456    | 844    | 516    | 0      |
| Pedestrian Volume [ped/h]               | 0      |        |        | 0      |        |        | 0      |        |        | 0      |        |        |
| Bicycle Volume [bicycles/h]             | 0      |        |        | 0      |        |        | 0      |        |        | 0      |        |        |



**Intersection Settings**

| Priority Scheme                    | Stop | Stop | Free | Free |
|------------------------------------|------|------|------|------|
| Flared Lane                        | no   |      |      |      |
| Storage Area [veh]                 | 0    | 0    | 0    | 0    |
| Two-Stage Gap Acceptance           | no   |      |      |      |
| Number of Storage Spaces in Median | 0    | 0    | 0    | 0    |

**Movement, Approach, & Intersection Results**



|                                    |          |         |         |      |      |      |      |      |      |         |         |      |
|------------------------------------|----------|---------|---------|------|------|------|------|------|------|---------|---------|------|
| V/C, Movement V/C Ratio            | 0.00     | 0.00    | 0.16    | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.85    | 0.01    | 0.00 |
| d_M, Delay for Movement [s/veh]    | 10000.0  | 10000.0 | 10000.0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 24.83   | 0.00    | 0.00 |
| Movement LOS                       | F        | F       | F       |      |      |      |      | A    | A    | C       | A       |      |
| 95th-Percentile Queue Length [veh] | 13.97    | 13.97   | 13.97   | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 54.79   | 54.79   | 0.00 |
| 95th-Percentile Queue Length [ft]  | 349.24   | 349.24  | 349.24  | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1369.74 | 1369.74 | 0.00 |
| d_A, Approach Delay [s/veh]        | 10000.00 |         |         | 0.00 |      |      | 0.00 |      |      | 15.41   |         |      |
| Approach LOS                       | F        |         |         | A    |      |      | A    |      |      | F       |         |      |
| d_I, Intersection Delay [s/veh]    | 461.93   |         |         |      |      |      |      |      |      |         |         |      |
| Intersection LOS                   | F        |         |         |      |      |      |      |      |      |         |         |      |

### Intersection Level Of Service Report #3: I-15 SB On and Airport RD

Control Type: Two-way stop  
Analysis Method: HCM2010  
Analysis Period: 15 minutes

Delay (sec / veh): 23.5  
Level Of Service: C  
Volume to Capacity (v/c): 0.305

#### Intersection Setup

| Name                   |                |        |   |        |   |        |
|------------------------|----------------|--------|---|--------|---|--------|
| Approach               | Northeastbound |        | Northwestbound  |        | Southeastbound  |        |
| Lane Configuration     |                |        |  |        |  |        |
| Turning Movement       | Left           | Right  | Left  | Thru   | Thru  | Right  |
| Lane Width [ft]        | 12.00          | 12.00  | 12.00   | 12.00  | 12.00   | 12.00  |
| No. of Lanes in Pocket | 0              | 0      | 0   | 0      | 0   | 0      |
| Pocket Length [ft]     | 100.00         | 100.00 | 100.00  | 100.00 | 100.00  | 100.00 |
| Speed [mph]            | 30.00          |        | 30.00   |        | 30.00   |        |
| Grade [%]              | 0.00           |        | 0.00  |        | 0.00  |        |
| Crosswalk              | yes            |        | yes   |        | yes   |        |

#### Volumes

| Name                                    |        |        |        |        |        |        |
|---|--------|--------|--------|--------|--------|--------|
| Base Volume Input [veh/h]               | 0      | 0      | 25     | 21     | 542    | 14     |
| Base Volume Adjustment Factor           | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Heavy Vehicles Percentage [%]           | 2.00   | 2.00   | 64.00  | 19.10  | 7.30   | 0.00   |
| Growth Rate                             | 1.00   | 1.00   | 2.12   | 2.12   | 2.12   | 2.12   |
| In-Process Volume [veh/h]               | 0      | 0      | 0      | 0      | 0      | 0      |
| Site-Generated Trips [veh/h]            | 0      | 0      | 0      | 0      | 0      | 0      |
| Diverted Trips [veh/h]                  | 0      | 0      | 0      | 0      | 0      | 0      |
| Pass-by Trips [veh/h]                   | 0      | 0      | 0      | 0      | 0      | 0      |
| Existing Site Adjustment Volume [veh/h] | 0      | 0      | 0      | 0      | 0      | 0      |
| Other Volume [veh/h]                    | 0      | 0      | 0      | 0      | 0      | 0      |
| Total Hourly Volume [veh/h]             | 0      | 0      | 53     | 45     | 1149   | 30     |
| Peak Hour Factor                        | 1.0000 | 1.0000 | 0.6250 | 0.7500 | 0.7450 | 0.7000 |
| Other Adjustment Factor                 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Total 15-Minute Volume [veh/h]          | 0      | 0      | 21     | 15     | 386    | 11     |
| Total Analysis Volume [veh/h]           | 0      | 0      | 85     | 60     | 1542   | 43     |
| Pedestrian Volume [ped/h]               | 0      |        | 0      |        | 0      |        |
| Bicycle Volume [bicycles/h]             | 0      |        | 0      |        | 0      |        |



**Intersection Settings**

| Priority Scheme                    | Stop | Free | Free |
|------------------------------------|------|------|------|
| Flared Lane                        |      |      |      |
| Storage Area [veh]                 | 0    | 0    | 0    |
| Two-Stage Gap Acceptance           |      |      |      |
| Number of Storage Spaces in Median | 0    | 0    | 0    |

**Movement, Approach, & Intersection Results**





|                                    |      |      |       |       |      |      |
|------------------------------------|------|------|-------|-------|------|------|
| V/C, Movement V/C Ratio            | 0.00 | 0.00 | 0.30  | 0.00  | 0.02 | 0.00 |
| d_M, Delay for Movement [s/veh]    | 0.00 | 0.00 | 23.48 | 0.00  | 0.00 | 0.00 |
| Movement LOS                       |      |      | C     | A     | A    | A    |
| 95th-Percentile Queue Length [veh] | 0.00 | 0.00 | 2.79  | 2.79  | 0.00 | 0.00 |
| 95th-Percentile Queue Length [ft]  | 0.00 | 0.00 | 69.68 | 69.68 | 0.00 | 0.00 |
| d_A, Approach Delay [s/veh]        | 0.00 |      | 13.76 |       | 0.00 |      |
| Approach LOS                       | A    |      | B     |       | A    |      |
| d_I, Intersection Delay [s/veh]    | 1.15 |      |       |       |      |      |
| Intersection LOS                   | C    |      |       |       |      |      |

### Intersection Level Of Service Report #4: I-15 SB Off and Airport RD Frontage

Control Type: Two-way stop  
Analysis Method: HCM2010  
Analysis Period: 15 minutes

Delay (sec / veh): 3,138.9  
Level Of Service: F  
Volume to Capacity (v/c): 7.378

#### Intersection Setup

| Name                   |   |        |        |   |        |        |   |        |        |   |        |        |
|------------------------|---|--------|--------|---|--------|--------|---|--------|--------|---|--------|--------|
| Approach               | Northeastbound  |        |        | Southwestbound  |        |        | Northwestbound  |        |        | Southeastbound  |        |        |
| Lane Configuration     |  |        |        |  |        |        |  |        |        |  |        |        |
| Turning Movement       | Left  | Thru   | Right  | Left  | Thru   | Right  | Left  | Thru   | Right  | Left  | Thru   | Right  |
| Lane Width [ft]        | 12.00   | 12.00  | 12.00  | 12.00   | 12.00  | 12.00  | 12.00   | 12.00  | 12.00  | 12.00   | 12.00  | 12.00  |
| No. of Lanes in Pocket | 0   | 0      | 0      | 0   | 0      | 0      | 0   | 0      | 0      | 0   | 0      | 0      |
| Pocket Length [ft]     | 100.00  | 100.00 | 100.00 | 100.00  | 100.00 | 100.00 | 100.00  | 100.00 | 100.00 | 100.00  | 100.00 | 100.00 |
| Speed [mph]            | 30.00   |        |        | 30.00   |        |        | 30.00   |        |        | 30.00   |        |        |
| Grade [%]              | 0.00  |        |        | 0.00  |        |        | 0.00  |        |        | 0.00  |        |        |
| Crosswalk              | yes   |        |        | yes   |        |        | yes   |        |        | yes   |        |        |

#### Volumes

| Name                                    |        |        |        |        |        |        |        |        |        |        |        |        |
|---|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| Base Volume Input [veh/h]               | 0      | 0      | 55     | 217    | 26     | 47     | 8      | 15     | 0      | 0      | 286    | 1      |
| Base Volume Adjustment Factor           | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Heavy Vehicles Percentage [%]           | 0.00   | 2.00   | 1.80   | 18.90  | 11.50  | 2.10   | 37.50  | 6.70   | 2.00   | 2.00   | 1.00   | 0.00   |
| Growth Rate                             | 2.22   | 1.00   | 2.22   | 2.22   | 2.22   | 2.22   | 2.22   | 2.22   | 1.00   | 1.00   | 2.22   | 2.22   |
| In-Process Volume [veh/h]               | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Site-Generated Trips [veh/h]            | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Diverted Trips [veh/h]                  | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Pass-by Trips [veh/h]                   | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Existing Site Adjustment Volume [veh/h] | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Other Volume [veh/h]                    | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Total Hourly Volume [veh/h]             | 0      | 0      | 122    | 482    | 58     | 104    | 18     | 33     | 0      | 0      | 635    | 2      |
| Peak Hour Factor                        | 1.0000 | 1.0000 | 0.7240 | 0.8350 | 0.7220 | 0.6910 | 0.6670 | 0.7500 | 1.0000 | 1.0000 | 0.6810 | 0.2500 |
| Other Adjustment Factor                 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Total 15-Minute Volume [veh/h]          | 0      | 0      | 42     | 144    | 20     | 38     | 7      | 11     | 0      | 0      | 233    | 2      |
| Total Analysis Volume [veh/h]           | 0      | 0      | 169    | 577    | 80     | 151    | 27     | 44     | 0      | 0      | 932    | 8      |
| Pedestrian Volume [ped/h]               | 0      |        |        | 0      |        |        | 0      |        |        | 0      |        |        |
| Bicycle Volume [bicycles/h]             | 0      |        |        | 0      |        |        | 0      |        |        | 0      |        |        |

**Intersection Settings**

| Priority Scheme                    | Stop | Stop | Free | Free |
|------------------------------------|------|------|------|------|
| Flared Lane                        | no   |      |      |      |
| Storage Area [veh]                 | 0    | 0    | 0    | 0    |
| Two-Stage Gap Acceptance           | no   | no   |      |      |
| Number of Storage Spaces in Median | 0    | 0    | 0    | 0    |

**Movement, Approach, & Intersection Results**





|                                    |         |      |       |         |         |       |       |      |      |      |      |      |
|------------------------------------|---------|------|-------|---------|---------|-------|-------|------|------|------|------|------|
| V/C, Movement V/C Ratio            | 0.00    | 0.00 | 0.53  | 7.38    | 0.38    | 0.15  | 0.04  | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 |
| d_M, Delay for Movement [s/veh]    | 47.75   | 0.00 | 27.94 | 3138.95 | 3109.90 | 9.11  | 11.25 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Movement LOS                       | E       |      | D     | F       | F       | A     | B     | A    |      |      | A    | A    |
| 95th-Percentile Queue Length [veh] | 2.88    | 0.00 | 2.88  | 74.83   | 74.83   | 0.52  | 0.40  | 0.40 | 0.00 | 0.00 | 0.00 | 0.00 |
| 95th-Percentile Queue Length [ft]  | 72.12   | 0.00 | 72.12 | 1870.70 | 1870.70 | 12.88 | 9.95  | 9.95 | 0.00 | 0.00 | 0.00 | 0.00 |
| d_A, Approach Delay [s/veh]        | 27.94   |      |       | 2551.16 |         |       | 4.28  |      |      | 0.00 |      |      |
| Approach LOS                       | D       |      |       | F       |         |       | A     |      |      | A    |      |      |
| d_I, Intersection Delay [s/veh]    | 1039.42 |      |       |         |         |       |       |      |      |      |      |      |
| Intersection LOS                   | F       |      |       |         |         |       |       |      |      |      |      |      |

### Intersection Level Of Service Report #5: 14th St SW and I-315 EB

Control Type: Signalized  
Analysis Method: HCM2010  
Analysis Period: 15 minutes

Delay (sec / veh): 12.4  
Level Of Service: B  
Volume to Capacity (v/c): 0.457

#### Intersection Setup

| Name                   |   |        |        |   |        |        |   |        |        |   |        |        |
|------------------------|---|--------|--------|---|--------|--------|---|--------|--------|---|--------|--------|
| Approach               | Northbound  |        |        | Southbound  |        |        | Eastbound   |        |        | Westbound   |        |        |
| Lane Configuration     |  |        |        |  |        |        |  |        |        |  |        |        |
| Turning Movement       | Left  | Thru   | Right  | Left  | Thru   | Right  | Left  | Thru   | Right  | Left  | Thru   | Right  |
| Lane Width [ft]        | 12.00   | 12.00  | 12.00  | 12.00   | 12.00  | 12.00  | 12.00   | 12.00  | 12.00  | 12.00   | 12.00  | 12.00  |
| No. of Lanes in Pocket | 0   | 0      | 0      | 0   | 0      | 0      | 0   | 0      | 0      | 0   | 0      | 0      |
| Pocket Length [ft]     | 100.00  | 100.00 | 100.00 | 100.00  | 100.00 | 100.00 | 100.00  | 100.00 | 100.00 | 100.00  | 100.00 | 100.00 |
| Speed [mph]            | 30.00   |        |        | 30.00   |        |        | 30.00   |        |        | 30.00   |        |        |
| Grade [%]              | 0.00  |        |        | 0.00  |        |        | 0.00  |        |        | 0.00  |        |        |
| Crosswalk              | yes   |        |        | yes   |        |        | yes   |        |        | yes   |        |        |

#### Volumes

| Name                                    |        |        |        |        |        |        |        |        |        |        |        |        |
|---|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| Base Volume Input [veh/h]               | 13     | 82     | 260    | 95     | 396    | 262    | 107    | 168    | 10     | 102    | 50     | 31     |
| Base Volume Adjustment Factor           | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Heavy Vehicles Percentage [%]           | 0.00   | 2.40   | 1.20   | 4.30   | 1.30   | 0.40   | 0.90   | 0.00   | 0.00   | 1.00   | 0.00   | 12.90  |
| Growth Rate                             | 1.24   | 1.24   | 1.24   | 1.24   | 1.24   | 1.24   | 1.24   | 1.24   | 1.24   | 1.24   | 1.24   | 1.24   |
| In-Process Volume [veh/h]               | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Site-Generated Trips [veh/h]            | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Diverted Trips [veh/h]                  | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Pass-by Trips [veh/h]                   | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Existing Site Adjustment Volume [veh/h] | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Other Volume [veh/h]                    | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Right-Turn on Red Volume [veh/h]        | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Total Hourly Volume [veh/h]             | 16     | 102    | 322    | 118    | 491    | 325    | 133    | 208    | 12     | 126    | 62     | 38     |
| Peak Hour Factor                        | 0.9380 | 0.9380 | 0.9380 | 0.9380 | 0.9380 | 0.9380 | 0.9380 | 0.9380 | 0.9380 | 0.9380 | 0.9380 | 0.9380 |
| Other Adjustment Factor                 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Total 15-Minute Volume [veh/h]          | 4      | 27     | 86     | 31     | 131    | 87     | 35     | 55     | 3      | 34     | 17     | 10     |
| Total Analysis Volume [veh/h]           | 17     | 109    | 343    | 126    | 523    | 346    | 142    | 222    | 13     | 134    | 66     | 41     |
| Presence of On-Street Parking           | no     |        | no     | no     |        | no     | no     |        | no     | no     |        | no     |
| On-Street Parking Maneuver Rate [1/h]   | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Local Bus Stopping Rate [1/h]           | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Pedestrian Volume [ped/h]               | 0      |        |        | 0      |        |        | 0      |        |        | 0      |        |        |
| Bicycle Volume [bicycles/h]             | 0      |        |        | 0      |        |        | 0      |        |        | 0      |        |        |

**Intersection Settings**

|                           |                                 |
|---------------------------|---------------------------------|
| Located in CBD            | no                              |
| Signal Coordination Group | -                               |
| Cycle Length [s]          | 60                              |
| Coordination Type         | Time of Day Pattern Coordinated |
| Actuation Type            | Semi-actuated                   |
| Offset [s]                | 0.0                             |
| Offset Reference          | LeadGreen                       |
| Permissive Mode           | SingleBand                      |
| Lost time [s]             | 0.00                            |

**Phasing & Timing**

| Control Type                 | Permiss | Permiss | Overlap | Permiss | Permiss | Overlap | Protecte | Permiss | Permiss | Protecte | Permiss | Permiss |
|------------------------------|---------|---------|---------|---------|---------|---------|----------|---------|---------|----------|---------|---------|
| Signal Group                 | 0       | 2       | 3       | 0       | 6       | 7       | 7        | 4       | 0       | 3        | 8       | 0       |
| Lead / Lag                   | -       | -       | -       | -       | -       | -       | Lead     | -       | -       | Lead     | -       | -       |
| Minimum Green [s]            | 0       | 5       | 15      | 0       | 5       | 15      | 15       | 5       | 0       | 15       | 15      | 0       |
| Maximum Green [s]            | 0       | 50      | 20      | 0       | 50      | 20      | 20       | 45      | 0       | 20       | 45      | 0       |
| Amber [s]                    | 0.0     | 3.0     | 3.0     | 0.0     | 3.0     | 3.0     | 3.0      | 3.0     | 0.0     | 3.0      | 3.0     | 0.0     |
| All red [s]                  | 0.0     | 2.0     | 0.0     | 0.0     | 2.0     | 0.0     | 0.0      | 2.0     | 0.0     | 0.0      | 2.0     | 0.0     |
| Split [s]                    | 0       | 22      | 18      | 0       | 22      | 18      | 18       | 20      | 0       | 18       | 20      | 0       |
| Vehicle Extension [s]        | 0.0     | 3.0     | 3.0     | 0.0     | 3.0     | 3.0     | 3.0      | 3.0     | 0.0     | 3.0      | 3.0     | 0.0     |
| Walk [s]                     | 0       | 5       | 5       | 0       | 5       | 0       | 0        | 5       | 0       | 5        | 5       | 0       |
| Pedestrian Clearance [s]     | 0       | 10      | 10      | 0       | 10      | 0       | 0        | 10      | 0       | 10       | 10      | 0       |
| I1, Start-Up Lost Time [s]   | 0.0     | 2.0     | 2.0     | 0.0     | 2.0     | 2.0     | 2.0      | 2.0     | 0.0     | 2.0      | 2.0     | 0.0     |
| I2, Clearance Lost Time [s]  | 0.0     | 3.0     | 1.0     | 0.0     | 3.0     | 1.0     | 1.0      | 3.0     | 0.0     | 1.0      | 3.0     | 0.0     |
| Minimum Recall               |         | no      | no      |         | no      | no      | no       | no      |         | no       | no      |         |
| Maximum Recall               |         | no      | no      |         | no      | no      | no       | no      |         | no       | no      |         |
| Pedestrian Recall            |         | no      | no      |         | no      | no      | no       | no      |         | no       | no      |         |
| Detector Location [ft]       | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0      | 0.0     | 0.0     | 0.0      | 0.0     | 0.0     |
| Detector Length [ft]         | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0      | 0.0     | 0.0     | 0.0      | 0.0     | 0.0     |
| I, Upstream Filtering Factor | 1.00    | 1.00    | 1.00    | 1.00    | 1.00    | 1.00    | 1.00     | 1.00    | 1.00    | 1.00     | 1.00    | 1.00    |

**Lane Group Calculations**

| Lane Group                              | L     | C     | R    | L     | C     | R    | L    | C     | R     | L    | C     | R     |
|---|-------|-------|------|-------|-------|------|------|-------|-------|------|-------|-------|
| L, Total Lost Time per Cycle [s]        | 5.00  | 5.00  | 3.00 | 5.00  | 5.00  | 3.00 | 3.00 | 5.00  | 5.00  | 4.00 | 5.00  | 5.00  |
| l1_p, Permitted Start-Up Lost Time [s]  | 2.00  | 0.00  | 0.00 | 2.00  | 0.00  | 0.00 | 0.00 | 0.00  | 0.00  | 0.00 | 0.00  | 0.00  |
| l2, Clearance Lost Time [s]             | 3.00  | 3.00  | 0.00 | 3.00  | 3.00  | 0.00 | 0.00 | 3.00  | 3.00  | 0.00 | 3.00  | 3.00  |
| g_i, Effective Green Time [s]           | 21    | 21    | 41   | 21    | 21    | 41   | 33   | 15    | 15    | 33   | 15    | 15    |
| g / C, Green / Cycle                    | 0.35  | 0.35  | 0.68 | 0.35  | 0.35  | 0.68 | 0.55 | 0.25  | 0.25  | 0.55 | 0.25  | 0.25  |
| (v / s)_i Volume / Saturation Flow Rate | 0.02  | 0.06  | 0.21 | 0.10  | 0.28  | 0.22 | 0.09 | 0.12  | 0.01  | 0.09 | 0.03  | 0.03  |
| s, saturation flow rate [veh/h]         | 893   | 1855  | 1596 | 1251  | 1876  | 1609 | 1564 | 1900  | 1615  | 1472 | 1900  | 1430  |
| c, Capacity [veh/h]                     | 183   | 647   | 1089 | 469   | 654   | 1097 | 998  | 466   | 396   | 872  | 466   | 351   |
| d1, Uniform Delay [s]                   | 26.40 | 13.51 | 3.86 | 17.33 | 17.64 | 3.86 | 6.75 | 19.34 | 17.22 | 7.01 | 17.69 | 17.58 |
| k, delay calibration                    | 0.11  | 0.11  | 0.11 | 0.11  | 0.11  | 0.20 | 0.11 | 0.11  | 0.11  | 0.11 | 0.11  | 0.11  |
| l, Upstream Filtering Factor            | 1.00  | 1.00  | 1.00 | 1.00  | 1.00  | 1.00 | 1.00 | 1.00  | 1.00  | 1.00 | 1.00  | 1.00  |
| d2, Incremental Delay [s]               | 0.22  | 0.12  | 0.16 | 0.30  | 2.31  | 0.30 | 0.06 | 0.75  | 0.03  | 0.08 | 0.14  | 0.15  |
| d3, Initial Queue Delay [s]             | 0.00  | 0.00  | 0.00 | 0.00  | 0.00  | 0.00 | 0.00 | 0.00  | 0.00  | 0.00 | 0.00  | 0.00  |
| Rp, platoon ratio                       | 1.00  | 1.00  | 1.00 | 1.00  | 1.00  | 1.00 | 1.00 | 1.00  | 1.00  | 1.00 | 1.00  | 1.00  |
| PF, progression factor                  | 1.00  | 1.00  | 1.00 | 1.00  | 1.00  | 1.00 | 1.00 | 1.00  | 1.00  | 1.00 | 1.00  | 1.00  |

**Lane Group Results**

|                                    |       |       |       |       |        |       |       |        |       |       |       |       |
|------------------------------------|-------|-------|-------|-------|--------|-------|-------|--------|-------|-------|-------|-------|
| X, volume / capacity               | 0.09  | 0.17  | 0.32  | 0.27  | 0.80   | 0.32  | 0.14  | 0.48   | 0.03  | 0.15  | 0.14  | 0.12  |
| d, Delay for Lane Group [s/veh]    | 26.62 | 13.63 | 4.03  | 17.63 | 19.95  | 4.16  | 6.82  | 20.09  | 17.25 | 7.09  | 17.83 | 17.73 |
| Lane Group LOS                     | C     | B     | A     | B     | B      | A     | A     | C      | B     | A     | B     | B     |
| Critical Lane Group                | no    | no    | no    | no    | yes    | yes   | no    | yes    | no    | no    | no    | no    |
| 50th-Percentile Queue Length [veh] | 0.23  | 0.94  | 1.10  | 1.32  | 6.19   | 1.15  | 0.74  | 2.53   | 0.13  | 0.70  | 0.68  | 0.42  |
| 50th-Percentile Queue Length [ft]  | 5.73  | 23.57 | 27.43 | 32.90 | 154.65 | 28.69 | 18.54 | 63.35  | 3.27  | 17.48 | 17.01 | 10.58 |
| 95th-Percentile Queue Length [veh] | 0.41  | 1.70  | 1.97  | 2.37  | 10.26  | 2.07  | 1.33  | 4.56   | 0.24  | 1.26  | 1.22  | 0.76  |
| 95th-Percentile Queue Length [ft]  | 10.31 | 42.42 | 49.37 | 59.22 | 256.62 | 51.65 | 33.37 | 114.02 | 5.88  | 31.46 | 30.62 | 19.05 |

**Movement, Approach, & Intersection Results**

|                                 |       |       |      |       |       |      |       |       |       |       |       |       |
|---------------------------------|-------|-------|------|-------|-------|------|-------|-------|-------|-------|-------|-------|
| d_M, Delay for Movement [s/veh] | 26.62 | 13.63 | 4.03 | 17.63 | 19.95 | 4.16 | 6.82  | 20.09 | 17.25 | 7.09  | 17.83 | 17.73 |
| Movement LOS                    | C     | B     | A    | B     | B     | A    | A     | C     | B     | A     | B     | B     |
| d_A, Approach Delay [s/veh]     | 7.08  |       |      | 14.16 |       |      | 15.00 |       |       | 11.84 |       |       |
| Approach LOS                    | A     |       |      | B     |       |      | B     |       |       | B     |       |       |
| d_I, Intersection Delay [s/veh] | 12.45 |       |      |       |       |      |       |       |       |       |       |       |
| Intersection LOS                | B     |       |      |       |       |      |       |       |       |       |       |       |
| Intersection V/C                | 0.457 |       |      |       |       |      |       |       |       |       |       |       |

**Sequence**

|        |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|--------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ring 1 | 2 | 7 | 4 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Ring 2 | 6 | 3 | 8 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Ring 3 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Ring 4 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |







### Intersection Level Of Service Report #6: 14th St SW and I-315 WB

Control Type: Signalized  
Analysis Method: HCM2010  
Analysis Period: 15 minutes

Delay (sec / veh): 19.6  
Level Of Service: B  
Volume to Capacity (v/c): 0.621

#### Intersection Setup

| Name                   |   |        |        |   |        |        |   |        |        |   |        |        |
|------------------------|---|--------|--------|---|--------|--------|---|--------|--------|---|--------|--------|
| Approach               | Northbound  |        |        | Southbound  |        |        | Eastbound   |        |        | Westbound   |        |        |
| Lane Configuration     |  |        |        |  |        |        |  |        |        |  |        |        |
| Turning Movement       | Left  | Thru   | Right  | Left  | Thru   | Right  | Left  | Thru   | Right  | Left  | Thru   | Right  |
| Lane Width [ft]        | 12.00   | 12.00  | 12.00  | 12.00   | 12.00  | 12.00  | 12.00   | 12.00  | 12.00  | 12.00   | 12.00  | 12.00  |
| No. of Lanes in Pocket | 0   | 0      | 0      | 0   | 0      | 0      | 0   | 0      | 0      | 0   | 0      | 0      |
| Pocket Length [ft]     | 100.00  | 100.00 | 100.00 | 100.00  | 100.00 | 100.00 | 100.00  | 100.00 | 100.00 | 100.00  | 100.00 | 100.00 |
| Speed [mph]            | 30.00   |        |        | 30.00   |        |        | 30.00   |        |        | 30.00   |        |        |
| Grade [%]              | 0.00  |        |        | 0.00  |        |        | 0.00  |        |        | 0.00  |        |        |
| Crosswalk              | yes   |        |        | yes   |        |        | yes   |        |        | yes   |        |        |

#### Volumes

| Name                                    |        |        |        |        |        |        |        |        |        |        |        |        |
|---|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| Base Volume Input [veh/h]               | 5      | 76     | 146    | 22     | 131    | 2      | 3      | 5      | 19     | 638    | 12     | 142    |
| Base Volume Adjustment Factor           | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Heavy Vehicles Percentage [%]           | 40.00  | 6.60   | 0.70   | 0.00   | 2.30   | 0.00   | 0.00   | 0.00   | 15.80  | 1.80   | 8.30   | 4.20   |
| Growth Rate                             | 1.16   | 1.16   | 1.16   | 1.16   | 1.16   | 1.16   | 1.16   | 1.16   | 1.16   | 1.16   | 1.16   | 1.16   |
| In-Process Volume [veh/h]               | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Site-Generated Trips [veh/h]            | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Diverted Trips [veh/h]                  | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Pass-by Trips [veh/h]                   | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Existing Site Adjustment Volume [veh/h] | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Other Volume [veh/h]                    | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Right-Turn on Red Volume [veh/h]        | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Total Hourly Volume [veh/h]             | 6      | 88     | 169    | 26     | 152    | 2      | 3      | 6      | 22     | 740    | 14     | 165    |
| Peak Hour Factor                        | 0.9880 | 0.9880 | 0.9880 | 0.9880 | 0.9880 | 0.9880 | 0.9880 | 0.9880 | 0.9880 | 0.9880 | 0.9880 | 0.9880 |
| Other Adjustment Factor                 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Total 15-Minute Volume [veh/h]          | 2      | 22     | 43     | 7      | 38     | 1      | 1      | 2      | 6      | 187    | 4      | 42     |
| Total Analysis Volume [veh/h]           | 6      | 89     | 171    | 26     | 154    | 2      | 3      | 6      | 22     | 749    | 14     | 167    |
| Presence of On-Street Parking           | no     |        | no     | no     |        | no     | no     |        | no     | no     |        | no     |
| On-Street Parking Maneuver Rate [1/h]   | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Local Bus Stopping Rate [1/h]           | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Pedestrian Volume [ped/h]               | 0      |        |        | 0      |        |        | 0      |        |        | 0      |        |        |
| Bicycle Volume [bicycles/h]             | 0      |        |        | 0      |        |        | 0      |        |        | 0      |        |        |



**Intersection Settings**

|                           |                                 |
|---------------------------|---------------------------------|
| Located in CBD            | yes                             |
| Signal Coordination Group | -                               |
| Cycle Length [s]          | 60                              |
| Coordination Type         | Time of Day Pattern Coordinated |
| Actuation Type            | Semi-actuated                   |
| Offset [s]                | 0.0                             |
| Offset Reference          | LeadGreen                       |
| Permissive Mode           | SingleBand                      |
| Lost time [s]             | 0.00                            |

**Phasing & Timing**

| Control Type                 | Permiss | Permiss | Overlap | Permiss | Permiss | Permiss | Permiss | Permiss | Permiss | Permiss | Permiss | Permiss |
|------------------------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| Signal Group                 | 0       | 1       | 2       | 0       | 1       | 0       | 0       | 3       | 0       | 0       | 2       | 0       |
| Lead / Lag                   | -       | -       | -       | -       | -       | -       | -       | -       | -       | -       | -       | -       |
| Minimum Green [s]            | 0       | 5       | 5       | 0       | 5       | 0       | 0       | 5       | 0       | 0       | 5       | 0       |
| Maximum Green [s]            | 0       | 35      | 40      | 0       | 35      | 0       | 0       | 25      | 0       | 0       | 40      | 0       |
| Amber [s]                    | 0.0     | 3.0     | 3.0     | 0.0     | 3.0     | 0.0     | 0.0     | 3.0     | 0.0     | 0.0     | 3.0     | 0.0     |
| All red [s]                  | 0.0     | 2.0     | 2.0     | 0.0     | 2.0     | 0.0     | 0.0     | 2.0     | 0.0     | 0.0     | 2.0     | 0.0     |
| Split [s]                    | 0       | 25      | 19      | 0       | 25      | 0       | 0       | 16      | 0       | 0       | 19      | 0       |
| Vehicle Extension [s]        | 0.0     | 3.0     | 3.0     | 0.0     | 3.0     | 0.0     | 0.0     | 3.0     | 0.0     | 0.0     | 3.0     | 0.0     |
| Walk [s]                     | 0       | 9       | 7       | 0       | 9       | 0       | 0       | 0       | 0       | 0       | 7       | 0       |
| Pedestrian Clearance [s]     | 0       | 11      | 7       | 0       | 11      | 0       | 0       | 0       | 0       | 0       | 7       | 0       |
| I1, Start-Up Lost Time [s]   | 0.0     | 2.0     | 2.0     | 0.0     | 2.0     | 0.0     | 0.0     | 2.0     | 0.0     | 0.0     | 2.0     | 0.0     |
| I2, Clearance Lost Time [s]  | 0.0     | 3.0     | 3.0     | 0.0     | 3.0     | 0.0     | 0.0     | 3.0     | 0.0     | 0.0     | 3.0     | 0.0     |
| Minimum Recall               |         | no      | no      |         | no      |         |         | no      |         |         | no      |         |
| Maximum Recall               |         | no      | no      |         | no      |         |         | no      |         |         | no      |         |
| Pedestrian Recall            |         | no      | no      |         | no      |         |         | no      |         |         | no      |         |
| Detector Location [ft]       | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     |
| Detector Length [ft]         | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     |
| I, Upstream Filtering Factor | 1.00    | 1.00    | 1.00    | 1.00    | 1.00    | 1.00    | 1.00    | 1.00    | 1.00    | 1.00    | 1.00    | 1.00    |

**Lane Group Calculations**

| Lane Group                              | L     | C     | R    | L     | C     | C     | C     | R    |
|---|-------|-------|------|-------|-------|-------|-------|------|
| L, Total Lost Time per Cycle [s]        | 5.00  | 5.00  | 5.00 | 5.00  | 5.00  | 5.00  | 5.00  | 5.00 |
| l1_p, Permitted Start-Up Lost Time [s]  | 2.00  | 0.00  | 0.00 | 2.00  | 0.00  | 0.00  | 0.00  | 0.00 |
| l2, Clearance Lost Time [s]             | 3.00  | 3.00  | 0.00 | 3.00  | 3.00  | 3.00  | 3.00  | 3.00 |
| g_i, Effective Green Time [s]           | 11    | 11    | 49   | 11    | 11    | 2     | 33    | 33   |
| g / C, Green / Cycle                    | 0.18  | 0.18  | 0.81 | 0.18  | 0.18  | 0.03  | 0.54  | 0.54 |
| (v / s)_i Volume / Saturation Flow Rate | 0.01  | 0.06  | 0.12 | 0.02  | 0.09  | 0.02  | 0.51  | 0.12 |
| s, saturation flow rate [veh/h]         | 804   | 1604  | 1443 | 1196  | 1668  | 1513  | 1505  | 1395 |
| c, Capacity [veh/h]                     | 167   | 290   | 1168 | 234   | 301   | 51    | 820   | 760  |
| d1, Uniform Delay [s]                   | 26.79 | 21.32 | 1.24 | 25.10 | 22.21 | 28.59 | 12.61 | 7.06 |
| k, delay calibration                    | 0.11  | 0.11  | 0.11 | 0.11  | 0.11  | 0.11  | 0.27  | 0.11 |
| l, Upstream Filtering Factor            | 1.00  | 1.00  | 1.00 | 1.00  | 1.00  | 1.00  | 1.00  | 1.00 |
| d2, Incremental Delay [s]               | 0.09  | 0.59  | 0.06 | 0.21  | 1.37  | 11.05 | 11.60 | 0.14 |
| d3, Initial Queue Delay [s]             | 0.00  | 0.00  | 0.00 | 0.00  | 0.00  | 0.00  | 0.00  | 0.00 |
| Rp, platoon ratio                       | 1.00  | 1.00  | 1.00 | 1.00  | 1.00  | 1.00  | 1.00  | 1.00 |
| PF, progression factor                  | 1.00  | 1.00  | 1.00 | 1.00  | 1.00  | 1.00  | 1.00  | 1.00 |

**Lane Group Results**

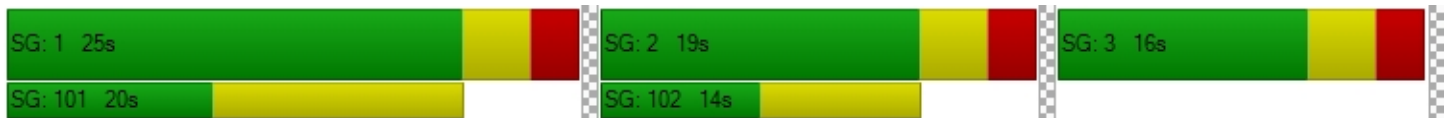
|                                    |       |       |      |       |       |       |        |       |
|------------------------------------|-------|-------|------|-------|-------|-------|--------|-------|
| X, volume / capacity               | 0.04  | 0.31  | 0.15 | 0.11  | 0.52  | 0.61  | 0.93   | 0.22  |
| d, Delay for Lane Group [s/veh]    | 26.88 | 21.91 | 1.30 | 25.31 | 23.59 | 39.64 | 24.21  | 7.20  |
| Lane Group LOS                     | C     | C     | A    | C     | C     | D     | C      | A     |
| Critical Lane Group                | no    | no    | no   | no    | yes   | yes   | yes    | no    |
| 50th-Percentile Queue Length [veh] | 0.08  | 1.06  | 0.08 | 0.34  | 1.97  | 0.58  | 9.92   | 0.92  |
| 50th-Percentile Queue Length [ft]  | 2.04  | 26.57 | 1.93 | 8.44  | 49.22 | 14.38 | 247.97 | 23.06 |
| 95th-Percentile Queue Length [veh] | 0.15  | 1.91  | 0.14 | 0.61  | 3.54  | 1.04  | 15.08  | 1.66  |
| 95th-Percentile Queue Length [ft]  | 3.67  | 47.82 | 3.47 | 15.19 | 88.60 | 25.89 | 377.09 | 41.51 |

**Movement, Approach, & Intersection Results**

|                                 |       |       |      |       |       |       |       |       |       |       |       |      |
|---------------------------------|-------|-------|------|-------|-------|-------|-------|-------|-------|-------|-------|------|
| d_M, Delay for Movement [s/veh] | 26.88 | 21.91 | 1.30 | 25.31 | 23.59 | 23.59 | 39.64 | 39.64 | 39.64 | 24.21 | 24.21 | 7.20 |
| Movement LOS                    | C     | C     | A    | C     | C     | C     | D     | D     | D     | C     | C     | A    |
| d_A, Approach Delay [s/veh]     | 8.77  |       |      | 23.83 |       |       | 39.64 |       |       | 21.15 |       |      |
| Approach LOS                    | A     |       |      | C     |       |       | D     |       |       | C     |       |      |
| d_I, Intersection Delay [s/veh] | 19.57 |       |      |       |       |       |       |       |       |       |       |      |
| Intersection LOS                | B     |       |      |       |       |       |       |       |       |       |       |      |
| Intersection V/C                | 0.621 |       |      |       |       |       |       |       |       |       |       |      |

**Sequence**

|        |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|--------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ring 1 | 1 | 2 | 3 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Ring 2 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Ring 3 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Ring 4 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |







### Intersection Level Of Service Report #7: Fox Farm and I-315

Control Type: Signalized  
Analysis Method: HCM2010  
Analysis Period: 15 minutes

Delay (sec / veh): 35.6  
Level Of Service: D  
Volume to Capacity (v/c): 0.891

#### Intersection Setup

| Name                   |   |        |        |   |        |        |   |        |        |   |        |        |
|------------------------|---|--------|--------|---|--------|--------|---|--------|--------|---|--------|--------|
| Approach               | Northbound  |        |        | Southbound  |        |        | Northeastbound  |        |        | Southwestbound  |        |        |
| Lane Configuration     |  |        |        |  |        |        |  |        |        |  |        |        |
| Turning Movement       | Left  | Thru   | Right  | Left  | Thru   | Right  | Left  | Thru   | Right  | Left  | Thru   | Right  |
| Lane Width [ft]        | 12.00   | 12.00  | 12.00  | 12.00   | 12.00  | 12.00  | 12.00   | 12.00  | 12.00  | 12.00   | 12.00  | 12.00  |
| No. of Lanes in Pocket | 0   | 0      | 0      | 0   | 0      | 0      | 0   | 0      | 0      | 0   | 0      | 0      |
| Pocket Length [ft]     | 100.00  | 100.00 | 100.00 | 100.00  | 100.00 | 100.00 | 100.00  | 100.00 | 100.00 | 100.00  | 100.00 | 100.00 |
| Speed [mph]            | 30.00   |        |        | 30.00   |        |        | 30.00   |        |        | 30.00   |        |        |
| Grade [%]              | 0.00  |        |        | 0.00  |        |        | 0.00  |        |        | 0.00  |        |        |
| Crosswalk              | yes   |        |        | yes   |        |        | yes   |        |        | yes   |        |        |

#### Volumes

| Name                                    |        |        |        |        |        |        |        |        |        |        |        |        |
|---|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| Base Volume Input [veh/h]               | 71     | 155    | 227    | 153    | 274    | 325    | 242    | 706    | 103    | 486    | 874    | 250    |
| Base Volume Adjustment Factor           | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Heavy Vehicles Percentage [%]           | 2.80   | 1.90   | 0.40   | 1.30   | 0.70   | 2.10   | 2.50   | 3.60   | 2.90   | 0.40   | 3.90   | 1.60   |
| Growth Rate                             | 1.17   | 1.17   | 1.17   | 1.17   | 1.17   | 1.17   | 1.17   | 1.17   | 1.17   | 1.17   | 1.17   | 1.17   |
| In-Process Volume [veh/h]               | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Site-Generated Trips [veh/h]            | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Diverted Trips [veh/h]                  | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Pass-by Trips [veh/h]                   | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Existing Site Adjustment Volume [veh/h] | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Other Volume [veh/h]                    | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Right-Turn on Red Volume [veh/h]        | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Total Hourly Volume [veh/h]             | 83     | 181    | 266    | 179    | 321    | 380    | 283    | 826    | 121    | 569    | 1023   | 293    |
| Peak Hour Factor                        | 0.9200 | 0.9200 | 0.9200 | 0.9200 | 0.9200 | 0.9200 | 0.9200 | 0.9200 | 0.9200 | 0.9200 | 0.9200 | 0.9200 |
| Other Adjustment Factor                 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Total 15-Minute Volume [veh/h]          | 23     | 49     | 72     | 49     | 87     | 103    | 77     | 224    | 33     | 155    | 278    | 80     |
| Total Analysis Volume [veh/h]           | 90     | 197    | 289    | 195    | 349    | 413    | 308    | 898    | 132    | 618    | 1112   | 318    |
| Presence of On-Street Parking           | no     |        | no     | no     |        | no     | no     |        | no     | no     |        | no     |
| On-Street Parking Maneuver Rate [1/h]   | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Local Bus Stopping Rate [1/h]           | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Pedestrian Volume [ped/h]               | 0      |        |        | 0      |        |        | 0      |        |        | 0      |        |        |
| Bicycle Volume [bicycles/h]             | 0      |        |        | 0      |        |        | 0      |        |        | 0      |        |        |

**Intersection Settings**

|                           |                                 |
|---------------------------|---------------------------------|
| Located in CBD            | yes                             |
| Signal Coordination Group | -                               |
| Cycle Length [s]          | 120                             |
| Coordination Type         | Time of Day Pattern Coordinated |
| Actuation Type            | Semi-actuated                   |
| Offset [s]                | 0.0                             |
| Offset Reference          | LeadGreen                       |
| Permissive Mode           | SingleBand                      |
| Lost time [s]             | 0.00                            |

**Phasing & Timing**

| Control Type                 | Permiss | Permiss | Overlap | Permiss | Permiss | Overlap | Protecte | Permiss | Permiss | Protecte | Permiss | Permiss |
|------------------------------|---------|---------|---------|---------|---------|---------|----------|---------|---------|----------|---------|---------|
| Signal Group                 | 0       | 1       | 8       | 0       | 3       | 6       | 6        | 4       | 0       | 8        | 2       | 5       |
| Lead / Lag                   | -       | -       | -       | -       | -       | -       | Lead     | -       | -       | Lead     | -       | -       |
| Minimum Green [s]            | 0       | 5       | 5       | 0       | 5       | 5       | 5        | 5       | 0       | 5        | 5       | 0       |
| Maximum Green [s]            | 0       | 60      | 60      | 0       | 60      | 60      | 60       | 60      | 0       | 60       | 60      | 0       |
| Amber [s]                    | 0.0     | 3.0     | 3.0     | 0.0     | 3.0     | 3.0     | 3.0      | 3.0     | 0.0     | 3.0      | 3.0     | 0.0     |
| All red [s]                  | 0.0     | 2.0     | 0.0     | 0.0     | 2.0     | 0.0     | 0.0      | 2.0     | 0.0     | 0.0      | 2.0     | 0.0     |
| Split [s]                    | 0       | 35      | 26      | 0       | 20      | 23      | 23       | 39      | 0       | 26       | 42      | 0       |
| Vehicle Extension [s]        | 0.0     | 3.0     | 3.0     | 0.0     | 3.0     | 3.0     | 3.0      | 3.0     | 0.0     | 3.0      | 3.0     | 0.0     |
| Walk [s]                     | 0       | 5       | 0       | 0       | 5       | 0       | 0        | 5       | 0       | 0        | 5       | 0       |
| Pedestrian Clearance [s]     | 0       | 10      | 0       | 0       | 10      | 0       | 0        | 10      | 0       | 0        | 10      | 0       |
| I1, Start-Up Lost Time [s]   | 0.0     | 2.0     | 2.0     | 0.0     | 2.0     | 2.0     | 2.0      | 2.0     | 0.0     | 2.0      | 2.0     | 0.0     |
| I2, Clearance Lost Time [s]  | 0.0     | 3.0     | 1.0     | 0.0     | 3.0     | 1.0     | 1.0      | 3.0     | 0.0     | 1.0      | 3.0     | 0.0     |
| Minimum Recall               |         | no      | no      |         | no      | no      | no       | no      |         | no       | no      |         |
| Maximum Recall               |         | no      | no      |         | no      | no      | no       | no      |         | no       | no      |         |
| Pedestrian Recall            |         | no      | no      |         | no      | no      | no       | no      |         | no       | no      |         |
| Detector Location [ft]       | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0      | 0.0     | 0.0     | 0.0      | 0.0     | 0.0     |
| Detector Length [ft]         | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0      | 0.0     | 0.0     | 0.0      | 0.0     | 0.0     |
| I, Upstream Filtering Factor | 1.00    | 1.00    | 1.00    | 1.00    | 1.00    | 1.00    | 1.00     | 1.00    | 1.00    | 1.00     | 1.00    | 1.00    |

**Lane Group Calculations**

| Lane Group                              | C     | C     | R    | L     | C     | R     | L     | C     | R     | L     | C     | R     |
|---|-------|-------|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| L, Total Lost Time per Cycle [s]        | 5.00  | 5.00  | 5.00 | 5.00  | 5.00  | 3.00  | 3.00  | 5.00  | 5.00  | 3.00  | 5.00  | 5.00  |
| l1_p, Permitted Start-Up Lost Time [s]  | 0.00  | 0.00  | 0.00 | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  |
| l2, Clearance Lost Time [s]             | 3.00  | 3.00  | 0.00 | 3.00  | 3.00  | 0.00  | 1.00  | 3.00  | 3.00  | 1.00  | 3.00  | 3.00  |
| g_i, Effective Green Time [s]           | 18    | 18    | 82   | 28    | 28    | 61    | 28    | 47    | 47    | 27    | 47    | 47    |
| g / C, Green / Cycle                    | 0.15  | 0.15  | 0.68 | 0.24  | 0.24  | 0.51  | 0.23  | 0.40  | 0.40  | 0.23  | 0.39  | 0.39  |
| (v / s)_i Volume / Saturation Flow Rate | 0.06  | 0.12  | 0.20 | 0.12  | 0.11  | 0.29  | 0.19  | 0.29  | 0.09  | 0.20  | 0.35  | 0.22  |
| s, saturation flow rate [veh/h]         | 1604  | 1527  | 1448 | 1608  | 3233  | 1424  | 1589  | 3143  | 1413  | 3150  | 3134  | 1431  |
| c, Capacity [veh/h]                     | 243   | 231   | 985  | 380   | 764   | 729   | 371   | 1245  | 559   | 719   | 1224  | 559   |
| d1, Uniform Delay [s]                   | 46.00 | 49.37 | 7.66 | 39.82 | 39.22 | 20.15 | 43.70 | 30.64 | 24.14 | 44.46 | 34.54 | 28.65 |
| k, delay calibration                    | 0.11  | 0.11  | 0.11 | 0.11  | 0.11  | 0.15  | 0.11  | 0.11  | 0.11  | 0.11  | 0.11  | 0.11  |
| l, Upstream Filtering Factor            | 1.00  | 1.00  | 1.00 | 1.00  | 1.00  | 1.00  | 1.00  | 1.00  | 1.00  | 1.00  | 1.00  | 1.00  |
| d2, Incremental Delay [s]               | 1.06  | 7.18  | 0.16 | 1.07  | 0.43  | 0.96  | 4.79  | 0.80  | 0.21  | 3.15  | 2.94  | 0.91  |
| d3, Initial Queue Delay [s]             | 0.00  | 0.00  | 0.00 | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  |
| Rp, platoon ratio                       | 1.00  | 1.00  | 1.00 | 1.00  | 1.00  | 1.00  | 1.00  | 1.00  | 1.00  | 1.00  | 1.00  | 1.00  |
| PF, progression factor                  | 1.00  | 1.00  | 1.00 | 1.00  | 1.00  | 1.00  | 1.00  | 1.00  | 1.00  | 1.00  | 1.00  | 1.00  |

**Lane Group Results**

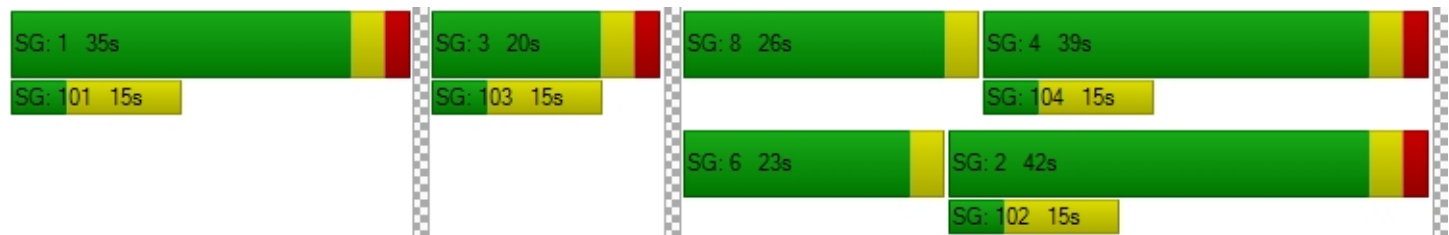
|                                    |        |        |        |        |        |        |        |        |        |        |        |        |
|------------------------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| X, volume / capacity               | 0.40   | 0.82   | 0.29   | 0.51   | 0.46   | 0.57   | 0.83   | 0.72   | 0.24   | 0.86   | 0.91   | 0.57   |
| d, Delay for Lane Group [s/veh]    | 47.07  | 56.55  | 7.83   | 40.89  | 39.65  | 21.11  | 48.50  | 31.44  | 24.35  | 47.61  | 37.48  | 29.57  |
| Lane Group LOS                     | D      | E      | A      | D      | D      | C      | D      | C      | C      | D      | D      | C      |
| Critical Lane Group                | no     | yes    | no     | no     | no     | yes    | yes    | no     | no     | no     | yes    | no     |
| 50th-Percentile Queue Length [veh] | 2.70   | 5.98   | 2.86   | 5.12   | 4.46   | 7.98   | 9.16   | 10.99  | 2.55   | 9.09   | 15.51  | 7.26   |
| 50th-Percentile Queue Length [ft]  | 67.38  | 149.57 | 71.39  | 127.98 | 111.45 | 199.62 | 228.90 | 274.66 | 63.65  | 227.31 | 387.83 | 181.61 |
| 95th-Percentile Queue Length [veh] | 4.85   | 9.99   | 5.14   | 8.83   | 7.92   | 12.62  | 14.12  | 16.42  | 4.58   | 14.04  | 21.97  | 11.68  |
| 95th-Percentile Queue Length [ft]  | 121.29 | 249.86 | 128.51 | 220.75 | 198.02 | 315.47 | 352.97 | 410.56 | 114.57 | 350.95 | 549.31 | 292.12 |

**Movement, Approach, & Intersection Results**

|                                 |       |       |      |       |       |       |       |       |       |       |       |       |
|---------------------------------|-------|-------|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| d_M, Delay for Movement [s/veh] | 47.07 | 56.22 | 7.83 | 40.89 | 39.65 | 21.11 | 48.50 | 31.44 | 24.35 | 47.61 | 37.48 | 29.57 |
| Movement LOS                    | D     | E     | A    | D     | D     | C     | D     | C     | C     | D     | D     | C     |
| d_A, Approach Delay [s/veh]     | 30.51 |       |      | 31.90 |       |       | 34.67 |       |       | 39.31 |       |       |
| Approach LOS                    | C     |       |      | C     |       |       | C     |       |       | D     |       |       |
| d_I, Intersection Delay [s/veh] | 35.58 |       |      |       |       |       |       |       |       |       |       |       |
| Intersection LOS                | D     |       |      |       |       |       |       |       |       |       |       |       |
| Intersection V/C                | 0.891 |       |      |       |       |       |       |       |       |       |       |       |

**Sequence**

|        |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|--------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ring 1 | 1 | 3 | 8 | 4 | - | - | - | - | - | - | - | - | - | - | - | - |
| Ring 2 | - | - | 6 | 2 | - | - | - | - | - | - | - | - | - | - | - | - |
| Ring 3 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Ring 4 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |






### Intersection Level Of Service Report #8: Central Ave and I15 SB

Control Type: Two-way stop  
Analysis Method: HCM2010  
Analysis Period: 15 minutes

Delay (sec / veh): 314.9  
Level Of Service: F  
Volume to Capacity (v/c): 1.339

#### Intersection Setup

| Name                   |   |        |        |   |        |        |   |        |        |                |        |        |
|------------------------|---|--------|--------|---|--------|--------|---|--------|--------|----------------|--------|--------|
| Approach               | Southbound  |        |        | Eastbound   |        |        | Westbound   |        |        | Northwestbound |        |        |
| Lane Configuration     |  |        |        |  |        |        |  |        |        |                |        |        |
| Turning Movement       | Left  | Thru   | Right  | Left  | Thru   | Right  | Left  | Thru   | Right  | Left           | Thru   | Right  |
| Lane Width [ft]        | 12.00   | 12.00  | 12.00  | 12.00   | 12.00  | 12.00  | 12.00   | 12.00  | 12.00  | 12.00          | 12.00  | 12.00  |
| No. of Lanes in Pocket | 0   | 0      | 0      | 0   | 0      | 0      | 0   | 0      | 0      | 0              | 0      | 0      |
| Pocket Length [ft]     | 100.00  | 100.00 | 100.00 | 100.00  | 100.00 | 100.00 | 100.00  | 100.00 | 100.00 | 100.00         | 100.00 | 100.00 |
| Speed [mph]            | 30.00   |        |        | 30.00   |        |        | 30.00   |        |        | 30.00          |        |        |
| Grade [%]              | 0.00  |        |        | 0.00  |        |        | 0.00  |        |        | 0.00           |        |        |
| Crosswalk              | yes   |        |        | yes   |        |        | yes   |        |        | yes            |        |        |

#### Volumes

| Name                                    |        |        |        |        |        |        |        |        |        |        |        |        |
|---|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| Base Volume Input [veh/h]               | 66     | 0      | 6      | 0      | 166    | 30     | 230    | 299    | 0      | 0      | 0      | 0      |
| Base Volume Adjustment Factor           | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Heavy Vehicles Percentage [%]           | 6.00   | 0.00   | 0.00   | 2.00   | 0.60   | 0.00   | 6.50   | 1.00   | 2.00   | 2.00   | 2.00   | 2.00   |
| Growth Rate                             | 1.41   | 1.41   | 1.41   | 1.00   | 1.41   | 1.41   | 1.41   | 1.41   | 1.00   | 1.00   | 1.00   | 1.00   |
| In-Process Volume [veh/h]               | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Site-Generated Trips [veh/h]            | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Diverted Trips [veh/h]                  | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Pass-by Trips [veh/h]                   | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Existing Site Adjustment Volume [veh/h] | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Other Volume [veh/h]                    | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Total Hourly Volume [veh/h]             | 93     | 0      | 8      | 0      | 234    | 42     | 324    | 422    | 0      | 0      | 0      | 0      |
| Peak Hour Factor                        | 0.9170 | 1.0000 | 0.7500 | 1.0000 | 0.8470 | 0.8330 | 0.8980 | 0.8690 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Other Adjustment Factor                 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Total 15-Minute Volume [veh/h]          | 25     | 0      | 3      | 0      | 69     | 13     | 90     | 121    | 0      | 0      | 0      | 0      |
| Total Analysis Volume [veh/h]           | 101    | 0      | 11     | 0      | 276    | 50     | 361    | 486    | 0      | 0      | 0      | 0      |
| Pedestrian Volume [ped/h]               | 0      |        |        | 0      |        |        | 0      |        |        | 0      |        |        |
| Bicycle Volume [bicycles/h]             | 0      |        |        | 0      |        |        | 0      |        |        | 0      |        |        |



**Intersection Settings**

| Priority Scheme                    | Stop | Free | Free | Stop |
|------------------------------------|------|------|------|------|
| Flared Lane                        |      |      |      |      |
| Storage Area [veh]                 | 0    | 0    | 0    | 0    |
| Two-Stage Gap Acceptance           | no   |      |      |      |
| Number of Storage Spaces in Median | 0    | 0    | 0    | 0    |

**Movement, Approach, & Intersection Results**




|                                    |        |        |       |      |      |      |       |      |      |      |      |      |
|------------------------------------|--------|--------|-------|------|------|------|-------|------|------|------|------|------|
| V/C, Movement V/C Ratio            | 1.34   | 0.00   | 0.02  | 0.00 | 0.00 | 0.00 | 0.29  | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| d_M, Delay for Movement [s/veh]    | 314.89 | 307.18 | 11.27 | 0.00 | 0.00 | 0.00 | 8.99  | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Movement LOS                       | F      | F      | B     |      | A    | A    | A     | A    |      |      |      |      |
| 95th-Percentile Queue Length [veh] | 7.96   | 7.96   | 0.06  | 0.00 | 0.00 | 0.00 | 1.19  | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 95th-Percentile Queue Length [ft]  | 198.90 | 198.90 | 1.44  | 0.00 | 0.00 | 0.00 | 29.75 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| d_A, Approach Delay [s/veh]        | 285.07 |        |       | 0.00 |      |      | 3.83  |      |      | 0.00 |      |      |
| Approach LOS                       | F      |        |       | A    |      |      | A     |      |      | A    |      |      |
| d_I, Intersection Delay [s/veh]    | 27.37  |        |       |      |      |      |       |      |      |      |      |      |
| Intersection LOS                   | F      |        |       |      |      |      |       |      |      |      |      |      |

### Intersection Level Of Service Report #9: Central Ave and I-15 NB

Control Type: Two-way stop  
Analysis Method: HCM2010  
Analysis Period: 15 minutes

Delay (sec / veh): 445.2  
Level Of Service: F  
Volume to Capacity (v/c): 1.211

#### Intersection Setup

| Name                   |   |        |        |   |        |        |   |        |        |                |        |        |
|------------------------|---|--------|--------|---|--------|--------|---|--------|--------|----------------|--------|--------|
| Approach               | Northbound  |        |        | Eastbound   |        |        | Westbound   |        |        | Southeastbound |        |        |
| Lane Configuration     |  |        |        |  |        |        |  |        |        |                |        |        |
| Turning Movement       | Left  | Thru   | Right  | Left  | Thru   | Right  | Left  | Thru   | Right  | Left           | Thru   | Right  |
| Lane Width [ft]        | 12.00   | 12.00  | 12.00  | 12.00   | 12.00  | 12.00  | 12.00   | 12.00  | 12.00  | 12.00          | 12.00  | 12.00  |
| No. of Lanes in Pocket | 0   | 0      | 0      | 0   | 0      | 0      | 0   | 0      | 0      | 0              | 0      | 0      |
| Pocket Length [ft]     | 100.00  | 100.00 | 100.00 | 100.00  | 100.00 | 100.00 | 100.00  | 100.00 | 100.00 | 100.00         | 100.00 | 100.00 |
| Speed [mph]            | 30.00   |        |        | 30.00   |        |        | 30.00   |        |        | 30.00          |        |        |
| Grade [%]              | 0.00  |        |        | 0.00  |        |        | 0.00  |        |        | 0.00           |        |        |
| Crosswalk              | yes   |        |        | yes   |        |        | yes   |        |        | yes            |        |        |

#### Volumes

| Name                                    |        |        |        |        |        |        |        |        |        |        |        |        |
|---|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| Base Volume Input [veh/h]               | 57     | 0      | 170    | 5      | 249    | 0      | 0      | 471    | 113    | 0      | 0      | 0      |
| Base Volume Adjustment Factor           | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Heavy Vehicles Percentage [%]           | 1.80   | 0.00   | 7.00   | 0.00   | 2.00   | 2.00   | 2.00   | 4.60   | 0.90   | 2.00   | 2.00   | 2.00   |
| Growth Rate                             | 1.64   | 1.64   | 1.64   | 1.64   | 1.64   | 1.00   | 1.00   | 1.64   | 1.64   | 1.00   | 1.00   | 1.00   |
| In-Process Volume [veh/h]               | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Site-Generated Trips [veh/h]            | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Diverted Trips [veh/h]                  | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Pass-by Trips [veh/h]                   | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Existing Site Adjustment Volume [veh/h] | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Other Volume [veh/h]                    | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Total Hourly Volume [veh/h]             | 93     | 0      | 279    | 8      | 408    | 0      | 0      | 772    | 185    | 0      | 0      | 0      |
| Peak Hour Factor                        | 0.7130 | 1.0000 | 0.7590 | 0.4170 | 0.8650 | 1.0000 | 1.0000 | 0.9350 | 0.8310 | 1.0000 | 1.0000 | 1.0000 |
| Other Adjustment Factor                 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Total 15-Minute Volume [veh/h]          | 33     | 0      | 92     | 5      | 118    | 0      | 0      | 206    | 56     | 0      | 0      | 0      |
| Total Analysis Volume [veh/h]           | 130    | 0      | 368    | 19     | 472    | 0      | 0      | 826    | 223    | 0      | 0      | 0      |
| Pedestrian Volume [ped/h]               | 0      |        |        | 0      |        |        | 0      |        |        | 0      |        |        |
| Bicycle Volume [bicycles/h]             | 0      |        |        | 0      |        |        | 0      |        |        | 0      |        |        |

**Intersection Settings**

| Priority Scheme                    | Stop | Free | Free | Stop |
|------------------------------------|------|------|------|------|
| Flared Lane                        | no   |      |      |      |
| Storage Area [veh]                 | 0    | 0    | 0    | 0    |
| Two-Stage Gap Acceptance           | no   |      |      |      |
| Number of Storage Spaces in Median | 0    | 0    | 0    | 0    |

**Movement, Approach, & Intersection Results**




|                                    |        |        |        |      |      |      |      |      |      |      |      |      |
|------------------------------------|--------|--------|--------|------|------|------|------|------|------|------|------|------|
| V/C, Movement V/C Ratio            | 1.21   | 0.00   | 0.63   | 0.02 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 |
| d_M, Delay for Movement [s/veh]    | 445.19 | 435.47 | 417.85 | 9.53 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Movement LOS                       | F      | F      | F      | A    | A    |      |      | A    | A    |      |      |      |
| 95th-Percentile Queue Length [veh] | 33.98  | 33.98  | 33.98  | 0.07 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 95th-Percentile Queue Length [ft]  | 849.39 | 849.39 | 849.39 | 1.79 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| d_A, Approach Delay [s/veh]        | 424.99 |        |        | 0.37 |      |      | 0.00 |      |      | 0.00 |      |      |
| Approach LOS                       | F      |        |        | A    |      |      | A    |      |      | A    |      |      |
| d_I, Intersection Delay [s/veh]    | 103.94 |        |        |      |      |      |      |      |      |      |      |      |
| Intersection LOS                   | F      |        |        |      |      |      |      |      |      |      |      |      |

### Intersection Level Of Service Report #10: Central Ave and Vaughn Rd

Control Type: Two-way stop  
Analysis Method: HCM2010  
Analysis Period: 15 minutes

Delay (sec / veh): 1,422.7  
Level Of Service: F  
Volume to Capacity (v/c): 3.231

#### Intersection Setup

| Name                   |   |        |   |        |   |        |
|------------------------|---|--------|---|--------|---|--------|
| Approach               | Southbound  |        | Eastbound   |        | Westbound   |        |
| Lane Configuration     |  |        |  |        |  |        |
| Turning Movement       | Left  | Right  | Left  | Thru   | Thru  | Right  |
| Lane Width [ft]        | 12.00   | 12.00  | 12.00   | 12.00  | 12.00   | 12.00  |
| No. of Lanes in Pocket | 0   | 0      | 0   | 0      | 0   | 0      |
| Pocket Length [ft]     | 100.00  | 100.00 | 100.00  | 100.00 | 100.00  | 100.00 |
| Speed [mph]            | 30.00   |        | 30.00   |        | 30.00   |        |
| Grade [%]              | 0.00  |        | 0.00  |        | 0.00  |        |
| Crosswalk              | yes   |        | yes   |        | yes   |        |

#### Volumes

| Name                                    |        |        |        |        |        |        |
|---|--------|--------|--------|--------|--------|--------|
| Base Volume Input [veh/h]               | 68     | 121    | 66     | 361    | 462    | 76     |
| Base Volume Adjustment Factor           | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Heavy Vehicles Percentage [%]           | 2.90   | 1.60   | 1.50   | 4.00   | 3.40   | 2.60   |
| Growth Rate                             | 1.63   | 1.63   | 1.63   | 1.63   | 1.63   | 1.63   |
| In-Process Volume [veh/h]               | 0      | 0      | 0      | 0      | 0      | 0      |
| Site-Generated Trips [veh/h]            | 0      | 0      | 0      | 0      | 0      | 0      |
| Diverted Trips [veh/h]                  | 0      | 0      | 0      | 0      | 0      | 0      |
| Pass-by Trips [veh/h]                   | 0      | 0      | 0      | 0      | 0      | 0      |
| Existing Site Adjustment Volume [veh/h] | 0      | 0      | 0      | 0      | 0      | 0      |
| Other Volume [veh/h]                    | 0      | 0      | 0      | 0      | 0      | 0      |
| Total Hourly Volume [veh/h]             | 111    | 197    | 108    | 588    | 753    | 124    |
| Peak Hour Factor                        | 0.6540 | 0.9450 | 0.7500 | 0.7910 | 0.8680 | 0.7310 |
| Other Adjustment Factor                 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Total 15-Minute Volume [veh/h]          | 42     | 52     | 36     | 186    | 217    | 42     |
| Total Analysis Volume [veh/h]           | 170    | 208    | 144    | 743    | 868    | 170    |
| Pedestrian Volume [ped/h]               | 0      |        | 0      |        | 0      |        |
| Bicycle Volume [bicycles/h]             | 0      |        | 0      |        | 0      |        |

**Intersection Settings**

| Priority Scheme                    | Stop | Free | Free |
|------------------------------------|------|------|------|
| Flared Lane                        | no   |      |      |
| Storage Area [veh]                 | 0    | 0    | 0    |
| Two-Stage Gap Acceptance           | no   |      |      |
| Number of Storage Spaces in Median | 0    | 0    | 0    |

**Movement, Approach, & Intersection Results**




|                                    |         |         |       |      |      |      |
|------------------------------------|---------|---------|-------|------|------|------|
| V/C, Movement V/C Ratio            | 3.23    | 0.66    | 0.21  | 0.01 | 0.01 | 0.00 |
| d_M, Delay for Movement [s/veh]    | 1422.75 | 1365.77 | 11.82 | 0.00 | 0.00 | 0.00 |
| Movement LOS                       | F       | F       | B     | A    | A    | A    |
| 95th-Percentile Queue Length [veh] | 38.77   | 38.77   | 0.81  | 0.00 | 0.00 | 0.00 |
| 95th-Percentile Queue Length [ft]  | 969.13  | 969.13  | 20.22 | 0.00 | 0.00 | 0.00 |
| d_A, Approach Delay [s/veh]        | 1391.39 |         | 1.92  |      | 0.00 |      |
| Approach LOS                       | F       |         | A     |      | A    |      |
| d_I, Intersection Delay [s/veh]    | 229.11  |         |       |      |      |      |
| Intersection LOS                   | F       |         |       |      |      |      |

### Intersection Level Of Service Report #11: Vaughn Rd and I-15 SB

Control Type: Two-way stop  
Analysis Method: HCM2010  
Analysis Period: 15 minutes

Delay (sec / veh): 11.0  
Level Of Service: B  
Volume to Capacity (v/c): 0.254

#### Intersection Setup

| Name                   |   |        |   |        |   |        |
|------------------------|---|--------|---|--------|---|--------|
| Approach               | Southbound  |        | Eastbound   |        | Westbound   |        |
| Lane Configuration     |  |        |  |        |  |        |
| Turning Movement       | Left  | Right  | Left  | Thru   | Thru  | Right  |
| Lane Width [ft]        | 12.00   | 12.00  | 12.00   | 12.00  | 12.00   | 12.00  |
| No. of Lanes in Pocket | 0   | 0      | 0   | 0      | 0   | 0      |
| Pocket Length [ft]     | 100.00  | 100.00 | 100.00  | 100.00 | 100.00  | 100.00 |
| Speed [mph]            | 30.00   |        | 30.00   |        | 30.00   |        |
| Grade [%]              | 0.00  |        | 0.00  |        | 0.00  |        |
| Crosswalk              | yes   |        | yes   |        | yes   |        |

#### Volumes

| Name                                    |        |        |        |        |        |        |
|---|--------|--------|--------|--------|--------|--------|
| Base Volume Input [veh/h]               | 143    | 1      | 0      | 53     | 50     | 0      |
| Base Volume Adjustment Factor           | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Heavy Vehicles Percentage [%]           | 7.00   | 0.00   | 2.00   | 7.60   | 4.00   | 2.00   |
| Growth Rate                             | 1.36   | 1.36   | 1.00   | 1.36   | 1.36   | 1.00   |
| In-Process Volume [veh/h]               | 0      | 0      | 0      | 0      | 0      | 0      |
| Site-Generated Trips [veh/h]            | 0      | 0      | 0      | 0      | 0      | 0      |
| Diverted Trips [veh/h]                  | 0      | 0      | 0      | 0      | 0      | 0      |
| Pass-by Trips [veh/h]                   | 0      | 0      | 0      | 0      | 0      | 0      |
| Existing Site Adjustment Volume [veh/h] | 0      | 0      | 0      | 0      | 0      | 0      |
| Other Volume [veh/h]                    | 0      | 0      | 0      | 0      | 0      | 0      |
| Total Hourly Volume [veh/h]             | 194    | 1      | 0      | 72     | 68     | 0      |
| Peak Hour Factor                        | 0.9410 | 0.2500 | 1.0000 | 0.7790 | 0.8930 | 1.0000 |
| Other Adjustment Factor                 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Total 15-Minute Volume [veh/h]          | 52     | 1      | 0      | 23     | 19     | 0      |
| Total Analysis Volume [veh/h]           | 206    | 4      | 0      | 92     | 76     | 0      |
| Pedestrian Volume [ped/h]               | 0      |        | 0      |        | 0      |        |
| Bicycle Volume [bicycles/h]             | 0      |        | 0      |        | 0      |        |

**Intersection Settings**

| Priority Scheme                    | Stop | Free | Free |
|------------------------------------|------|------|------|
| Flared Lane                        | no   |      |      |
| Storage Area [veh]                 | 0    | 0    | 0    |
| Two-Stage Gap Acceptance           | no   |      |      |
| Number of Storage Spaces in Median | 0    | 0    | 0    |

**Movement, Approach, & Intersection Results**



|                                    |       |       |      |      |      |      |
|------------------------------------|-------|-------|------|------|------|------|
| V/C, Movement V/C Ratio            | 0.25  | 0.00  | 0.00 | 0.00 | 0.00 | 0.00 |
| d_M, Delay for Movement [s/veh]    | 10.97 | 10.17 | 0.00 | 0.00 | 0.00 | 0.00 |
| Movement LOS                       | B     | B     |      | A    | A    |      |
| 95th-Percentile Queue Length [veh] | 1.03  | 1.03  | 0.00 | 0.00 | 0.00 | 0.00 |
| 95th-Percentile Queue Length [ft]  | 25.74 | 25.74 | 0.00 | 0.00 | 0.00 | 0.00 |
| d_A, Approach Delay [s/veh]        | 10.96 |       | 0.00 |      | 0.00 |      |
| Approach LOS                       | B     |       | A    |      | A    |      |
| d_I, Intersection Delay [s/veh]    | 6.09  |       |      |      |      |      |
| Intersection LOS                   | B     |       |      |      |      |      |

### Intersection Level Of Service Report #12: Vaughn Rd and I-15 NB

Control Type: Two-way stop  
Analysis Method: HCM2010  
Analysis Period: 15 minutes

Delay (sec / veh): 7.4  
Level Of Service: A  
Volume to Capacity (v/c): 0.000

#### Intersection Setup

| Name                   |   |        |   |        |                |        |
|------------------------|---|--------|---|--------|----------------|--------|
| Approach               | Eastbound   |        | Westbound   |        | Southeastbound |        |
| Lane Configuration     |  |        |  |        |                |        |
| Turning Movement       | Left  | Thru   | Thru  | Right  | Left           | Right  |
| Lane Width [ft]        | 12.00   | 12.00  | 12.00   | 12.00  | 12.00          | 12.00  |
| No. of Lanes in Pocket | 0   | 0      | 0   | 0      | 0              | 0      |
| Pocket Length [ft]     | 100.00  | 100.00 | 100.00  | 100.00 | 100.00         | 100.00 |
| Speed [mph]            | 30.00   |        | 30.00   |        | 30.00          |        |
| Grade [%]              | 0.00  |        | 0.00  |        | 0.00           |        |
| Crosswalk              | yes   |        | yes   |        | yes            |        |

#### Volumes

| Name                                    |        |        |        |        |        |        |
|---|--------|--------|--------|--------|--------|--------|
| Base Volume Input [veh/h]               | 0      | 165    | 55     | 334    | 0      | 0      |
| Base Volume Adjustment Factor           | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Heavy Vehicles Percentage [%]           | 0.00   | 6.10   | 1.80   | 4.80   | 2.00   | 2.00   |
| Growth Rate                             | 1.37   | 1.37   | 1.37   | 1.37   | 1.00   | 1.00   |
| In-Process Volume [veh/h]               | 0      | 0      | 0      | 0      | 0      | 0      |
| Site-Generated Trips [veh/h]            | 0      | 0      | 0      | 0      | 0      | 0      |
| Diverted Trips [veh/h]                  | 0      | 0      | 0      | 0      | 0      | 0      |
| Pass-by Trips [veh/h]                   | 0      | 0      | 0      | 0      | 0      | 0      |
| Existing Site Adjustment Volume [veh/h] | 0      | 0      | 0      | 0      | 0      | 0      |
| Other Volume [veh/h]                    | 0      | 0      | 0      | 0      | 0      | 0      |
| Total Hourly Volume [veh/h]             | 0      | 226    | 75     | 458    | 0      | 0      |
| Peak Hour Factor                        | 1.0000 | 0.7500 | 0.8090 | 0.9180 | 1.0000 | 1.0000 |
| Other Adjustment Factor                 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Total 15-Minute Volume [veh/h]          | 0      | 75     | 23     | 125    | 0      | 0      |
| Total Analysis Volume [veh/h]           | 0      | 301    | 93     | 499    | 0      | 0      |
| Pedestrian Volume [ped/h]               | 0      |        | 0      |        | 0      |        |
| Bicycle Volume [bicycles/h]             | 0      |        | 0      |        | 0      |        |



**Intersection Settings**

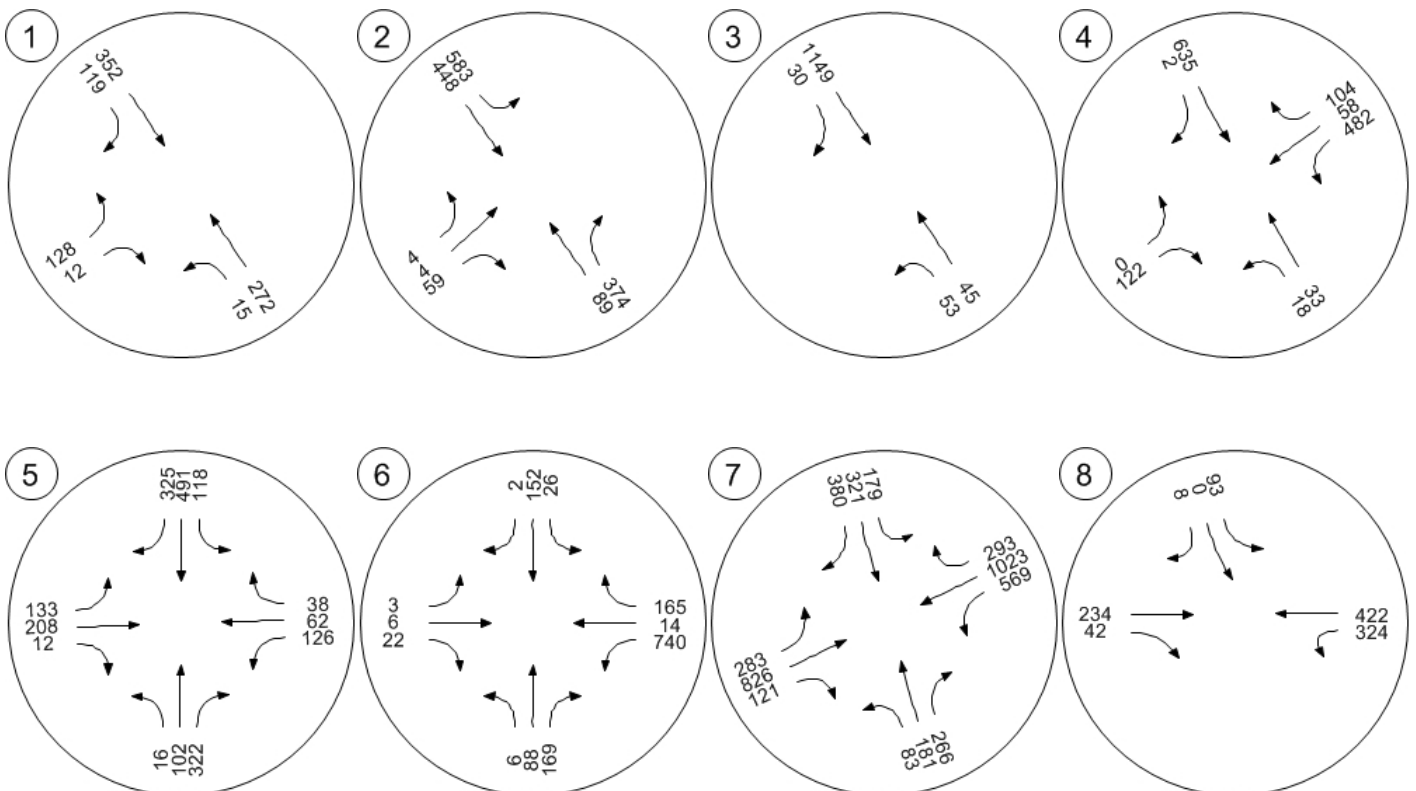
| Priority Scheme                    | Free | Free | Stop |
|------------------------------------|------|------|------|
| Flared Lane                        |      |      |      |
| Storage Area [veh]                 | 0    | 0    | 0    |
| Two-Stage Gap Acceptance           |      |      |      |
| Number of Storage Spaces in Median | 0    | 0    | 0    |

**Movement, Approach, & Intersection Results**

|                                    |      |      |      |      |      |      |
|------------------------------------|------|------|------|------|------|------|
| V/C, Movement V/C Ratio            | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| d_M, Delay for Movement [s/veh]    | 7.38 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Movement LOS                       | A    | A    | A    | A    |      |      |
| 95th-Percentile Queue Length [veh] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 95th-Percentile Queue Length [ft]  | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| d_A, Approach Delay [s/veh]        | 0.00 |      | 0.00 |      | 0.00 |      |
| Approach LOS                       | A    |      | A    |      | A    |      |
| d_I, Intersection Delay [s/veh]    | 0.00 |      |      |      |      |      |
| Intersection LOS                   | A    |      |      |      |      |      |

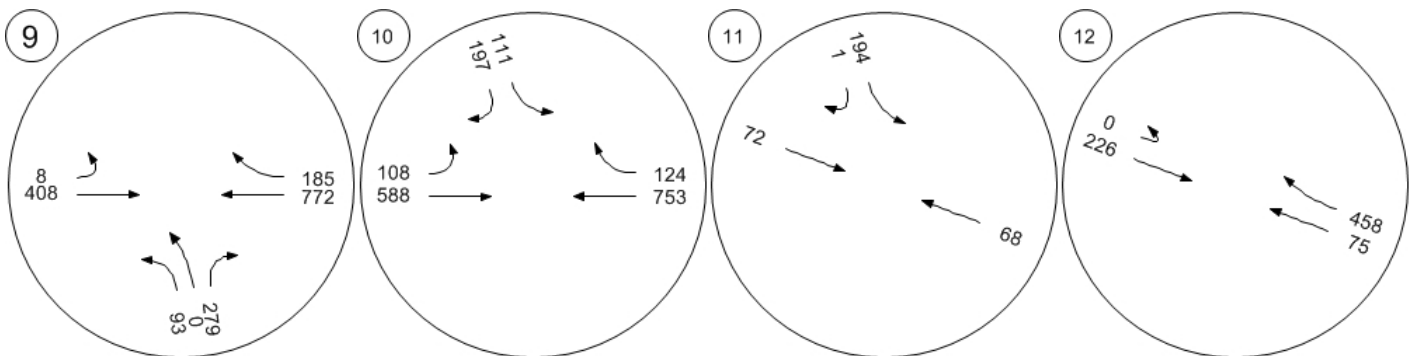
Version 2.00-10

## Traffic Volume - Future Total Volume



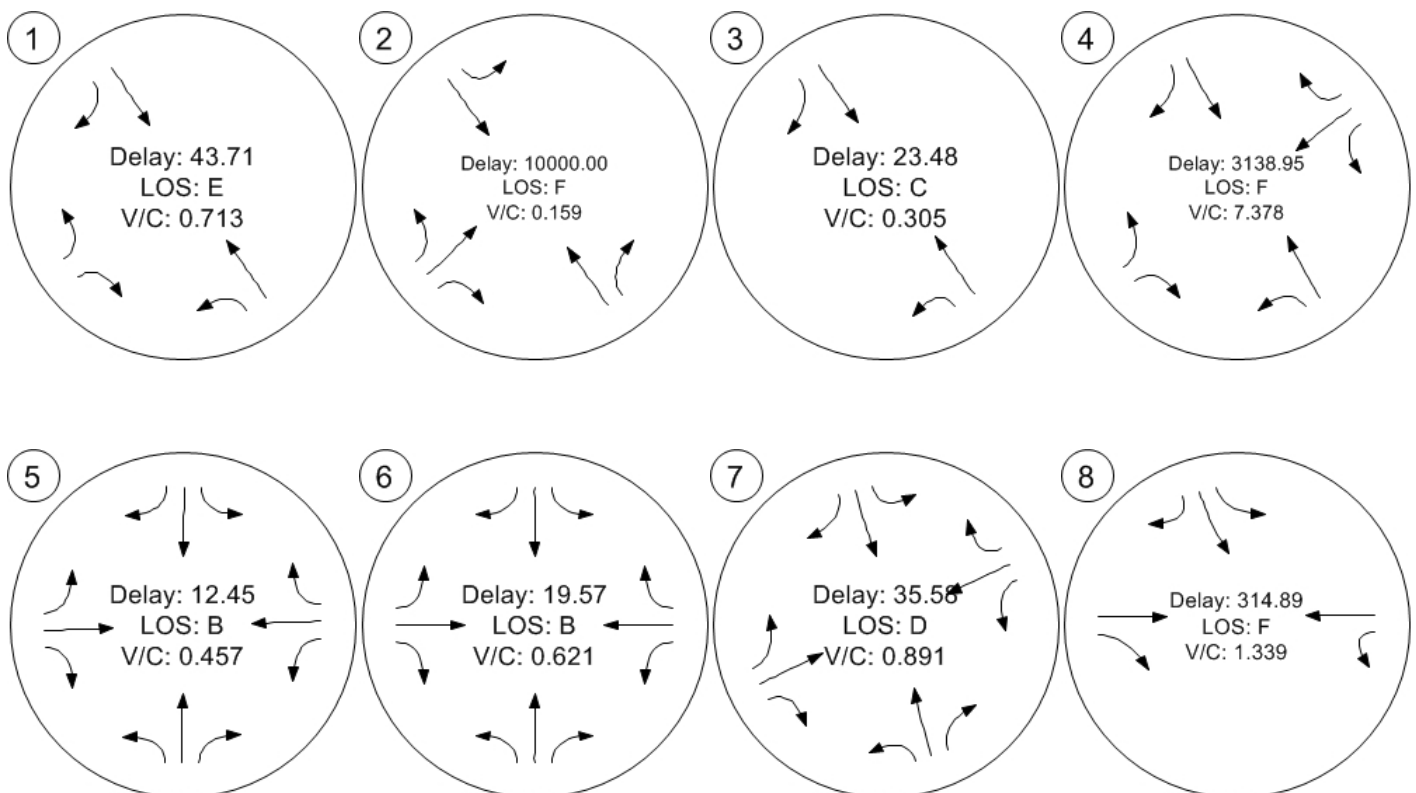
Version 2.00-10

## Traffic Volume - Future Total Volume





## Traffic Conditions



Version 2.00-10

## Traffic Conditions

