Great Falls South Arterial



Alignment Study

2009

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Disclaimer

This study is part of a long-term planning process that carries forward recommendations from a recently completed Arterial Feasibility Study and the current Great Falls Transportation Plan, both of which recommend further study of the South Arterial. The planning-level analysis, being conducted under this study, allows for the identification, selection and elimination of potential alignments, but lacks the precision to identify the specific properties or other features impacted. After the currently proposed alignments are reduced to one or more alignments, additional detailed and specific environmental analysis and design will then be conducted, including the identification of specifically impacted properties and possible mitigation measures. The reader should also be advised that even after completion of these types of environmental analyses, major roadway improvement projects can typically take from seven to ten years to reach the construction phase. This project development process is also highly dependent on funding availability, which can add to the timeline.

Abstract

The *Great Falls South Arterial Alignment Study* analyzes a wide array of data and identifies one alignment as the recommended alignment within a broad corridor located along the southern edge of the Great Falls urbanized area. The concept of connecting I-15 with US 87/89 through a southern corridor was documented in the *2004 Great Falls Arterial Feasibility Study*.

The following purpose statement is derived from this *South Arterial Alignment Study*: ***The purpose of the proposed project is to reduce congestion and improve safety on the 10th Avenue South corridor, improve street network mobility, and provide an additional Missouri River bridge crossing, south of 10th Avenue South.***

The project management team, consisting of representatives from the City of Great Falls, Cascade County, Montana Department of Transportation, and Federal Highway Administration, refined thousands of alignments, produced by a specialized route optimization software, into six optimized alignments. These alignments were screened utilizing selected analysis criteria, and the alignment with the fewest overall impacts and lowest cost was identified as the recommended alignment. If the project advances beyond this study, the recommended alignment will need to be reviewed under a National Environmental Policy Act/Montana Environmental Policy Act (NEPA/MEPA) process to ensure that the proposed roadway design would minimize impacts to the surrounding and natural environments.

Federal regulations allow large projects, such as the South Arterial, to be divided into smaller independent segments, but each segment must have independent utility and logical termini. Given the substantial projected project costs, a phased approach to construction is recommended. Along with identifying a recommended complete alignment, this study also identifies a segment of that complete alignment with "independent utility", meaning a segment that would function independent of the rest of the facility and meet the stated goals and objectives.

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EXECUTIVE SUMMARY

A. BACKGROUND

A southern arterial link between I-15 and US 87/89 has been under consideration by Great Falls and Cascade County officials, as well as other local public and private entities, for many years. In 1994, a local working group was assembled to support development of the arterial. The working group prepared a "Strategy Plan" which identified steps to make the arterial a reality. An initial step was to incorporate the arterial into the *2000 Great Falls Area Transportation Plan* for further study. In 2004, a *Great Falls Arterial Feasibility Study* evaluated northern and southern arterial corridors. The study found that the southern arterial was feasible, in that it would provide a variety of benefits to the transportation system. Under the 2005 Federal Transportation Bill (SAFETEA-LU), Great Falls and Cascade County received a $4.5 million earmark to conduct a location study and environmental analysis for the South Arterial.

B. PURPOSE OF THE STUDY

This Alignment Study builds on analysis from the *Feasibility Study*. It provides an examination of the opportunities and constraints in the study area (Figure A) and includes cost estimates of proposed alignments. This study identifies a recommended alignment, which, if projects are forwarded with federal and state funding, will need to be reviewed under a future National Environmental Policy Act/Montana Environmental Policy Act (NEPA/MEPA) process to ensure that the proposed roadway design would minimize impacts to the surrounding built and natural environments.

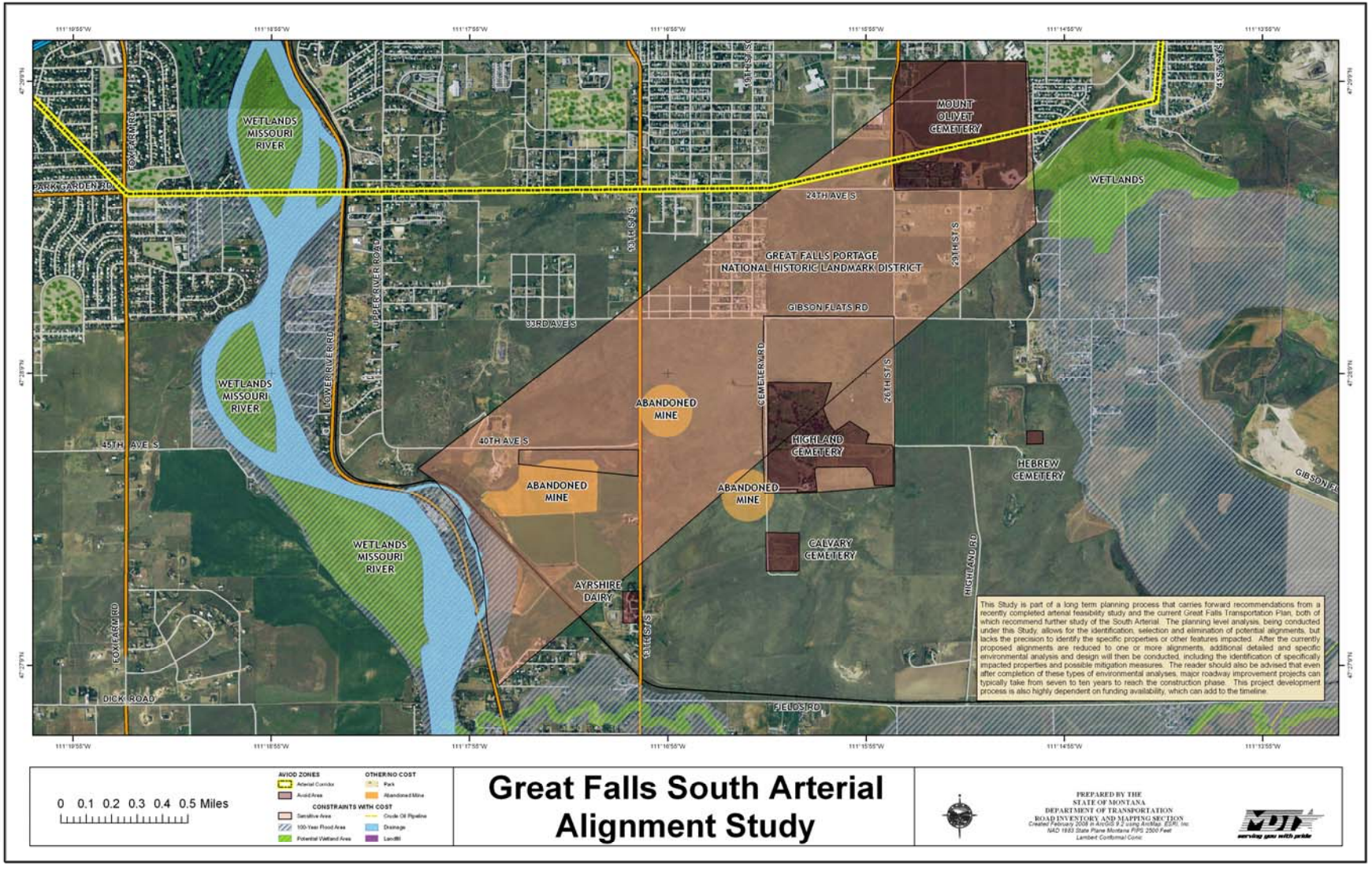
The primary purposes of this study are to:

- Confirm the goals and objectives and develop a purpose and need statement for the South Arterial;
- Select a single or limited number of alignments for an arterial along the south edge of Great Falls;
- Identify sections with independent utility along the selected alignment;
- Identify the approximate recommended footprint for future build-out of the alignment including; access points, lane configuration, and design speed; and,
- Identify areas along the alignment that may require mitigation due to impacts.

C. METHODOLOGY AND FRAMEWORK

The study was advanced through the Great Falls Metropolitan Planning Organization (MPO) which includes representatives from the City of Great Falls, Cascade County, Great Falls Transit District, Montana Department of Transportation (MDT), and Federal Highway Administration (FHWA). A project management team with representatives from these agencies developed the study for review and acceptance through the MPO.

Figure A – Study Area Opportunities and Constraints



Key elements of the study included:

- Involvement of the public, resource agencies, local governments and community leaders;
- An environmental scan that considered the geographic setting for physical, biological, and cultural resources to identify opportunities and constraints within the study area;
- An alignment analysis utilizing a route optimization software tool called "Quantm" that considered engineering design standards as well as built and natural constraints in the area to develop and screen new roadway alignment options. The system simultaneously weighed factors such as impacts to homes and businesses, historic and cultural sites, and wetlands, as well as construction costs associated with topography and earthwork, structures, and paving to identify optimal alignments for the South Arterial;
- Analysis of travel demand for a South Arterial utilizing the travel demand model developed for the *2003 Great Falls Area Transportation Plan* and based on land use assumptions developed as part of that plan. Forecasts were generated for the 2035 study horizon year;
- Development of a purpose and need statement for the South Arterial; and,
- Financial analysis considering currently available funding sources and potential future federal, state, and local funding sources.

D. KEY FINDINGS

Purpose and Need

The purpose and need identified in this study are consistent with the goals, objectives, and policies set forth in the Great Falls Growth Policy and Great Falls Area Transportation Plan. It will be used as part of the overall project development process consistent with NEPA/MEPA.

Based on the information contained in previous studies and plans, as well as information gathered from the public and stakeholders, the following purpose statement was derived from the South Arterial Alignment Study: ***The purpose of the proposed project is to reduce congestion and improve safety on the 10th Avenue South corridor, improve street network mobility, and provide an additional Missouri River bridge crossing, south of 10th Avenue South.***

Additional benefits expected if the entire arterial is developed include:

- Improved air quality by reducing congestion and stopping and idling times;
- Improved international and regional trade corridors and reduced travel time between the area's two military operations; and,
- Reduced emergency response times to and from the southwest Great Falls area and an additional emergency egress in case of disaster.

Alignment Analysis

After general beginning and end points were identified near the Gore Hill Interchange on the west end and the intersection of 57th Street South and 10th Avenue South on the east, thousands of alignments were generated through a defined corridor which was consistent with the corridor identified in the *2004 Great Falls Arterial Feasibility Study*. The alignments were narrowed to the 50 lowest cost alignments, and presented in a "spaghetti map" (Figure B).

For ease of analysis and to obtain effective, meaningful and specific public and stakeholder comment, the project management team further refined the Quantm-produced alignments into five possible alignments. The five alignments were selected based on feasibility and general alignment trends. In addition, one other alignment (the "Purple Alignment," Figure C) was added based on resource agency input as an option that would totally avoid the Great Falls Portage National Historic Landmark, a Section 4(f)[1] property. Prior to approving a project that uses Section 4(f) property, the Federal Highway Administration (FHWA) must find that there is no prudent or feasible alternative that completely avoids 4(f) resources.

These six alignments were carried forward for review under this planning-level analysis. To focus the review and establish measurable comparison criteria, four main areas of concern under NEPA/MEPA were considered, including Section 4(f) properties, wetlands, floodplains, and rights-of-way (this includes both private-land impacts and possible relocations) as summarized in Table A. Cost was also an analysis factor. For consistent comparison, the analysis was based on a four-lane, rural principal arterial with limited access control, turning lanes at access points, and a general design speed of 60 mph. In addition, travel forecasts for the 2035 horizon year were generated using the Great Falls area travel demand model. Based on future travel demand, traffic volumes in the range of 10,000 to 17,000 vehicles per day (vpd) between I-15 and 13th Street South demonstrate the need for a four-lane. However, for the horizon year, a two-lane roadway would be adequate to accommodate the projected 7,000 to 8,000 vpd east of 13th Street South with sufficient right-of-way preserved for an eventual four-lane.

Table A. Alignment Analysis Summary

Alignment Identifier	4(f) Acres Impacted 0-63 Acres	Wetland Acres Impacted 9-16 Acres	Floodplain Acres Impacted 46-91 Acres	Parcels with Structures 26-56 Parcels	RW Acres Impacted 214-282 Acres	Cost (in millions) $275-$540
Purple	*	▲▲	▲▲	▲▲	▲▲	▲▲
Aqua	►	▲▲	►	▲▲	►	▲▲
Blue	►	▲▲	►	▲▲	▲▲	▲▲
Green	▲▲	▲▲	▼	▼	▼	►
Red	▼	▲▲	►	►	►	▼
Yellow	▲▲	▼	▲▲	►	►	▲▲

* No Impacts
▼ Least Impactive
► Impacts within 20% of least impactive alignment
▲▲ Greatest Impact - beyond 20% of least impactive alignment

[1] "Section 4(f)" of the U.S. Department of Transportation Act of 1966 (49 USC 303) protects the use of land (for transportation purposes) from a significant public owned park, recreation area, or wildlife and waterfowl refuge, or any significant historic site unless the following determinations are made: 1. There is no feasible and prudent alternative to the use of land from the property; and, 2. The action includes all possible planning to minimize harm to the property resulting from such use.

Figure B – Range of Alignment Options

Range of Alignment Options

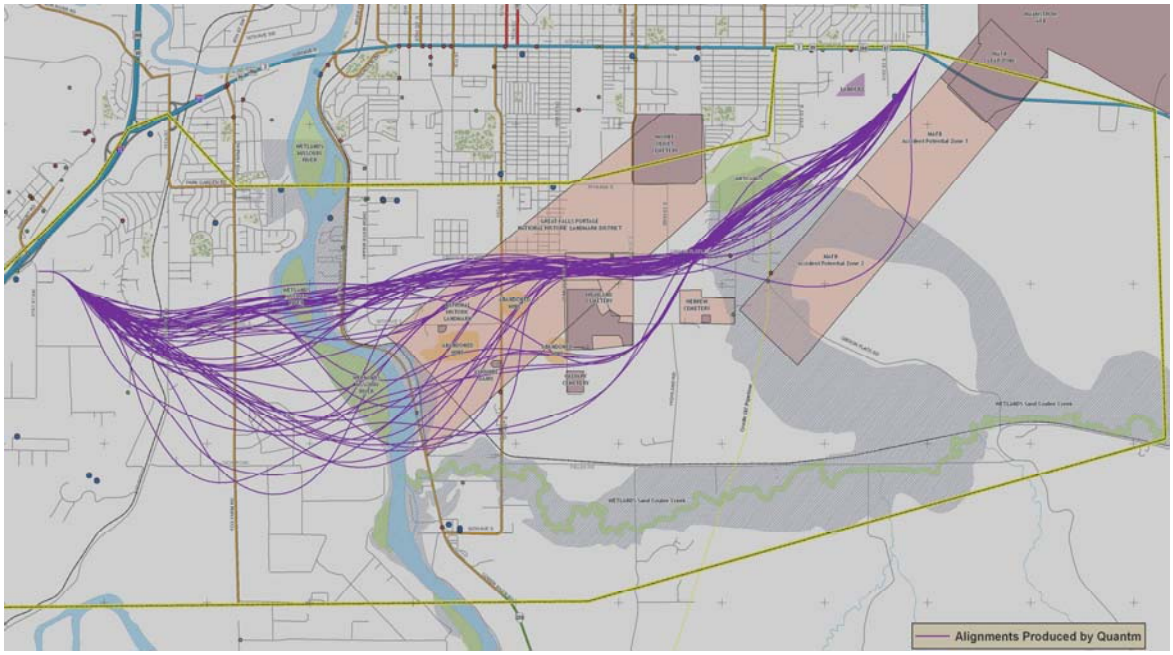
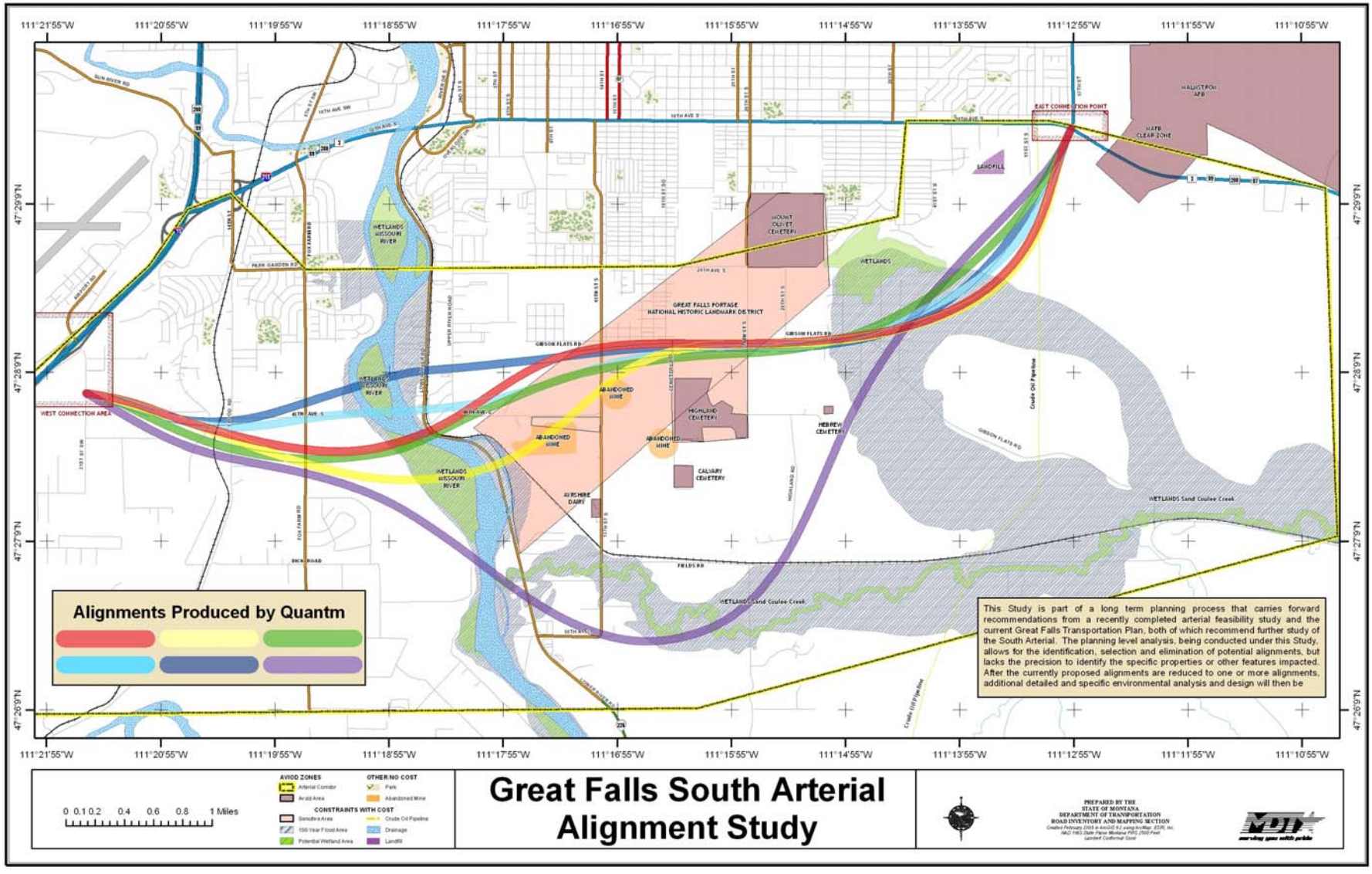


Figure C – Analyzed Alignment Options



Although the "Purple Alignment" (as identified in Figure C) entirely avoids the use of 4(f) resources, the alignment was deemed infeasible and imprudent based on adverse impacts to property and floodplains, extraordinary cost, and inability to meet purpose and need. Compared to the other five alignments, the Purple Alignment:

- Impacts nearly twice as many floodplain acres;
- Impacts 17-30% more right-of-way acres;
- Impacts nearly twice as many parcels with structures;
- Costs 70-95% more;
- Attracts 50-60% less travel between Fox Farm Road and US 87/89 due to its long length, and provides 50% less traffic relief on other key network links[2]; and,
- Impacts the viewshed south from the National Historic Landmark.

It is not considered prudent to carry the Purple Alignment forward based on its failure to best meet the purpose and need, as well as its significantly greater impacts to developed parcels, floodplains, right-of-way acquisition, and cost.

Of the remaining five alignments, impacts are relatively similar, with the exception that the Red Alignment has the least impact upon 4(f) properties and the lowest cost. Although the Green Alignment appears to have similar impacts to the Red Alignment, it impacts over 40% more acres of the National Historic Landmark than the Red Alignment. In addition, the majority of citizens who responded to a survey regarding the five alignments (distributed at the second public meeting) selected the Red Alignment as the most preferred. Based on this analysis, the Red Alignment is the alignment recommended for consideration in the formal NEPA/MEPA level environmental review process**.**

Estimated Cost[3]

Based on most recently available unit costs, the full arterial (Red Alignment) is estimated to cost $208,000,000 for a two-lane rural arterial roadway and $285,000,000 for a four-lane rural arterial roadway in 2035. A partial arterial, from Fox Farm Road to 13th Street South, is projected to generate traffic volumes of 10,000 to 13,000 vehicles per day (vpd) and reduce volumes on both 10th Avenue South and Fox Farm Road, demonstrating independent utility. The estimated cost for a four-lane partial arterial is $83,000,000 to $93,000,000. This is a 2017 cost estimate.

The ability of this project to be funded for continued development (including final design, right-of-way acquisition, and construction) is a function of the availability of existing and future federal, state, local, and private funding sources. Due to the tremendous costs anticipated for right-of-way acquisition and construction of a South Arterial, the project is generally considered to be beyond the ability of the participating agencies to fund through existing traditional funding avenues. As such, special congressional appropriations, coupled with funds from the State of

[2] Travel demand for the Purple Alignment, which completely avoids 4(f) resources, was up to 7,000 vehicles per day (vpd) between Fox Farm Road and US 87/89 with limited traffic relief to 10th Avenue South and other network links, compared to approximately 18,000 vpd for the five alignments that enter the National Historic Landmark and do demonstrate beneficial reductions in traffic and improved level-of-service on the 10th Avenue South corridor and other network links. Travel demand between I-15 and Fox Farm Road is generally the same for all alignments at 9,000 to 11,000 vpd.

[3] Estimated cost includes inflationary factors and indirect costs charged by the Montana Department of Transportation to all Federal Funds it receives. The full arterial estimated cost is for the year 2035, using Global Insight's Project Cost Inflation Calculator and a 3% annual inflation rate. The partial arterial is for year 2017 for all phases but PE (design) which is 2012, again using Global Insight's Project Cost Inflation Calculator.

Montana, Cascade County the City of Great Falls, and private development are anticipated to be the best means to further develop the project. In addition, it is critical that local governments take actions within their jurisdictions to preserve the corridor for the future build-out of the South Arterial.

E. CONCLUSION AND NEXT STEPS

The *2004 Great Falls Arterial Feasibility Study* recommended a four-lane arterial serve as the basis for future studies. Both two-lane and four-lane arterial configurations were examined during this Alignment Study. As a result of this analysis, the study proposes the Red Alignment (Figure D) as the recommended alignment, and that it be designed as an undivided four-lane rural principal arterial with limited access control, at-grade intersections including turn lanes and a 60 mile per hour design speed. As this project moves forward these recommendations may be adjusted to further reduce impacts. The arterial should have direct access from:

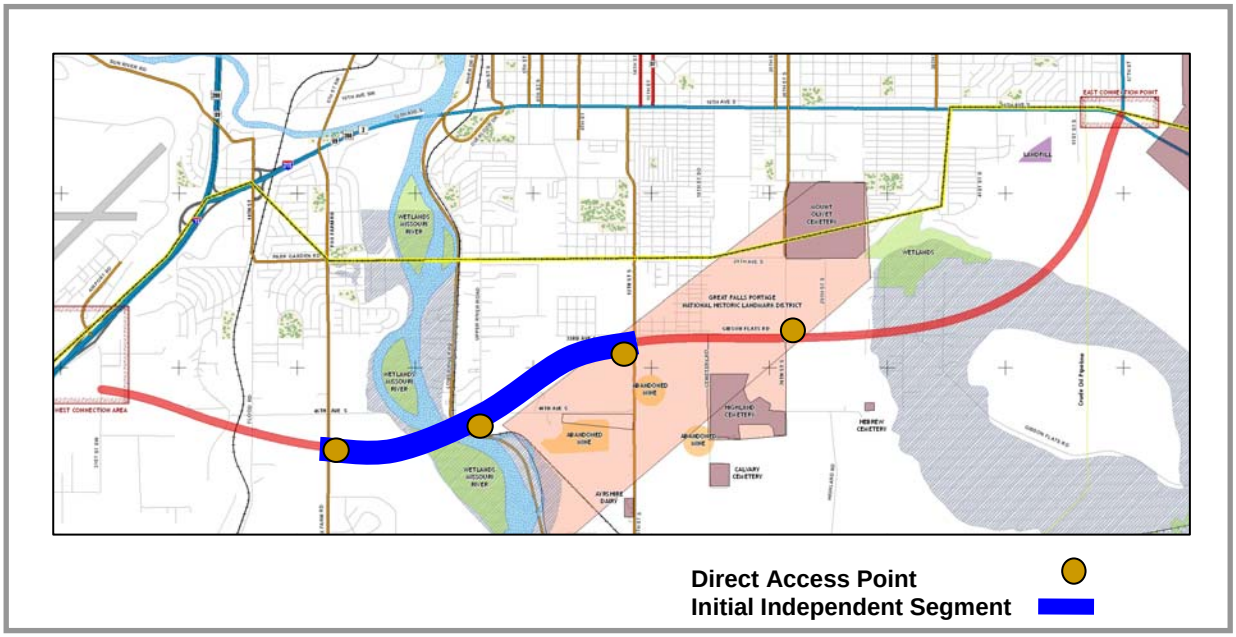
- Fox Farm Road
- Upper River Road
- 13th Street South
- 26th Street South
- 10th Avenue South (US 87/89)

Given federal planning requirements and the high project costs, the ability to advance the South Arterial will be highly dependent on successfully financing and constructing independent segments of the arterial, as reasonably available funding sources are secured.

If the Fox Farm Road to 13th Street South segment was pursued as the initial independent segment, the estimated cost in 2017 would be:

Preliminary Engineering	$ 5,000,000
Right-of-Way	$14,000,000 to $17,000,000
Incidental Construction	$10,000,000
Construction	$51,000,000 to $58,000,000
Construction Engineering	$ 3,000,000
TOTAL	$83,000,000 to $93,000,000

Figure D – Recommended Alignment and Segment of Independent Utility



Considering the amount of currently available funding (approximately $4,900,000 of the SAFETEA-LU earmark, plus state match), there are sufficient funds for development of an environmental document, which is part of the Preliminary Engineering phase. However, to achieve federal approval of the environmental document and ensure continued development of the South Arterial, it is critical that the participating agencies continue to work together to secure the remainder of the financing package by conducting the two following steps[4]:

1) Demonstrate reasonably available revenues to cover the estimated cost of the initial independent segment from Fox Farm Road to 13th Street South and reflect funding for this segment in the *Great Falls Area Transportation Plan;* and,
2) Identify available funding for a subsequent phase (i.e., final design[5]) and update the MPO Transportation Improvement Program (TIP) and MDT Statewide Transportation Improvement Program (STIP) to include funding for this project phase.

Until these steps are accomplished, the NEPA/MEPA compliant environmental review should not be advanced.

Additional critical steps in the financing package are:

1) Update of the *Great Falls Area Transportation Plan* - This plan update should include improvements as needed to other network links that would experience increased pressure with construction of the full arterial or partial arterial (i.e. 13th Street South, Upper River Road, 33rd Avenue/Gibson Flat Road, Flood Road, etc). In addition to item one above; and,
2) Local governments should take appropriate steps, to the extent allowed by local land use policies and regulations, to preserve the recommended South Arterial corridor as lands are developed and as other opportunities arise.

[4] These steps are necessary if the environmental document identifies a preferred alternative other than the "No-Build".

[5] Currently, project phases are as follows: Preliminary Engineering (PE), Right-of-Way (RW), Incidental Construction (IC), Construction (CN), and Construction Engineering (CE). Recognizing "final design" as a project phase would require an MDT business process change allowing a two-tier approach to PE. The first tier would be the NEPA/MEPA process and formal definition of the project and the second tier would be final design.

1. INTRODUCTION

The concept of a new arterial along the southern edge of Great Falls was first proposed in the late 1960s. It has been the subject of several planning studies. The current concept, connecting Interstate 15 with US Highway 87/89 (Montana Highway 3), has been most recently documented in the *2003 Great Falls Area Transportation Plan* and the *2004 Great Falls Arterial Feasibility Study*. These documents were developed through the federally required Great Falls Metropolitan Planning Process by the former Great Falls City-County Planning Board (now the Great Falls Planning Advisory Board). The arterial has received broad-based support from the following:

- City of Great Falls
- Cascade County
- Great Falls Area Chamber of Commerce
- Great Falls Development Authority
- Montana Department of Transportation (MDT)
- Great Falls International Airport Authority

This *Great Falls South Arterial Alignment Study* is also being advanced through the Great Falls Metropolitan Planning Organization (MPO). A project management team consisting of representatives from the City of Great Falls, Cascade County, MDT, and Federal Highway Administration (FHWA) conducted the study. In addition, the consulting firm of HKM Engineering was hired to facilitate public involvement activities and to coordinate resource agency involvement in the study.

1.1. Study Purpose

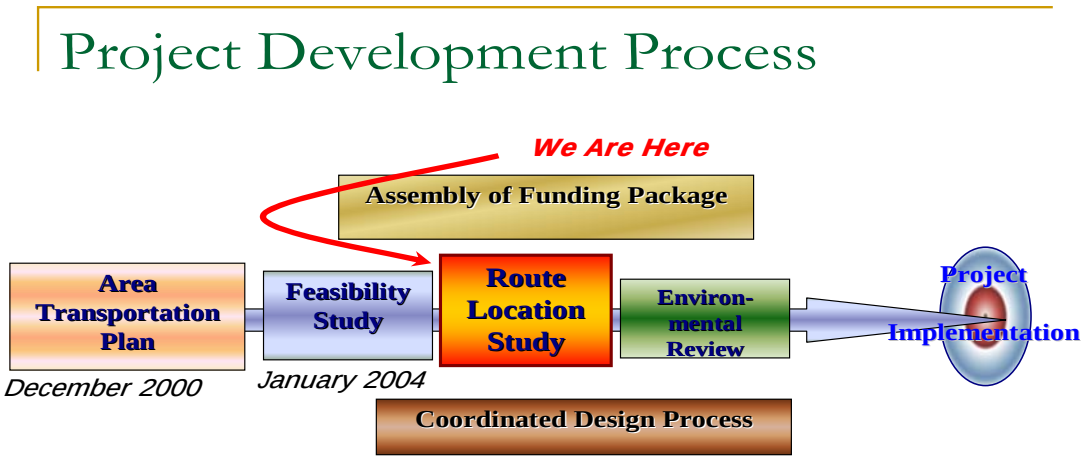
The primary purposes of this study are to:

- Confirm goals and objectives and develop a purpose and need statement for the South Arterial;
- Select a single or limited number of alignments for an arterial along the south edge of Great Falls;
- Identify sections with independent utility along the selected alignment;
- Identify the appropriate recommended footprint for future build-out of the alignment, including access points, lane configuration, and design speed; and,
- Identify areas along the alignment that may require mitigation due to impacts.

The selected alignment or independent segment may advance through a formal environmental review governed by the National Environmental Policy Act / Montana Environmental Policy Act (NEPA/MEPA) process based on federal funding availability. The intent of the study was to minimize cost, identify environmentally, culturally, and socially sensitive areas, weigh engineering needs, and consider both public and resource agency input.

This study further builds on the analysis conducted in the *2004 Great Falls Arterial Feasibility Study* (which found a South Arterial feasible from an broad economic, engineering, traffic, environmental, and community perspective) by providing a more detailed analysis of the opportunities and constraints in the general study area; identifying engineering, environmental, and funding challenges; and, preparing preliminary cost estimates to aid in the identification of a recommended alignment for the South Arterial. Once a specific alignment is selected and the impacts are analyzed and disclosed through the NEPA/MEPA process, the project could move into final design and construction depending on funding availability (Figure 1).

Figure 1 – Project Development Process



To avoid duplication of effort, this study incorporates information from previous planning efforts, including the *2003 Great Falls Area Transportation Plan, 2004 Great Falls Arterial Feasibility Study,* and *2005 Great Falls Growth Policy*. However, because this study involves a more extensive examination and refinement of corridor issues, the study recommendations may not necessarily be synonymous with recommendations from these other referenced documents.

1.2. Study Area

The study area is located along the southern edge of the Great Falls urbanized area. Great Falls, located in north-central Montana at the juncture of three principal highways (I-15, US 87/89, and Montana 200), serves as the county seat for Cascade County. Great Falls is also the economic center of a wide region extending from central Montana to the Canadian border and from the Missouri River badlands to the Rocky Mountains. Major economic attractions and employment centers include the Great Falls International Airport, Malmstrom Air Force Base, the Montana Air National Guard, major medical centers, and various industrial, wholesale, and retail businesses.

The Study Area, as initially defined in the *Feasibility Study,* is generally a three-mile-wide, eight-mile-long corridor located almost entirely beyond the city limits but within the southern edge of the Great Falls urbanized area. The corridor generally begins on the west at Interstate 15 (I-15) at or near Exit 277 (commonly referred to as the Airport Interchange or Gore Hill Interchange), and proceeds generally eastward through and south of the Ranchos Grande Vista residential subdivision areas. After crossing the Missouri River, it extends easterly toward the Gibson Flats area to an intersection with 10th Avenue South and US 87/89 (MT Highway 3), at or near 57th Street South.

The northern boundary of the corridor is generally delineated by 24th Avenue South, while the southern boundary of the study corridor generally follows the southern boundary of the Great

Falls urban area on the western half (at Fawn Drive), and generally follows Sand Coulee Creek along the eastern half of the Study Area. Intermittent east-west routes exist within the corridor; however, none provide a continuous connection between I-15 and US 87/89. "Fingers" of north/south roadways extend into the Study Area from the north, with a few roadways passing entirely through the Study Area. Two railroad lines run north-south through the Study Area – one along the bluffs on the west and the second along the east bank of the Missouri River, bending east-west through the southern edge of the corridor along Sand Coulee Creek. The east terminus of the corridor is near Malmstrom Air Force Base, while the west terminus is near the Great Falls International Airport.

Land uses within the corridor are predominantly agricultural and low-density residential with some pockets of commercial development, typically near both ends of the corridor. All or parts of four cemeteries are also located in the corridor. The majority of land within the corridor is undeveloped and located outside of the corporate limits of Great Falls. Predominant non-built features of the corridor include the Missouri River and associated wetlands, a large floodplain associated with Sand Coulee Creek, a prominent bluff, and the Great Falls Portage National Historic Landmark, which runs diagonally through a center portion of the corridor. The study area is illustrated in Figure 2.

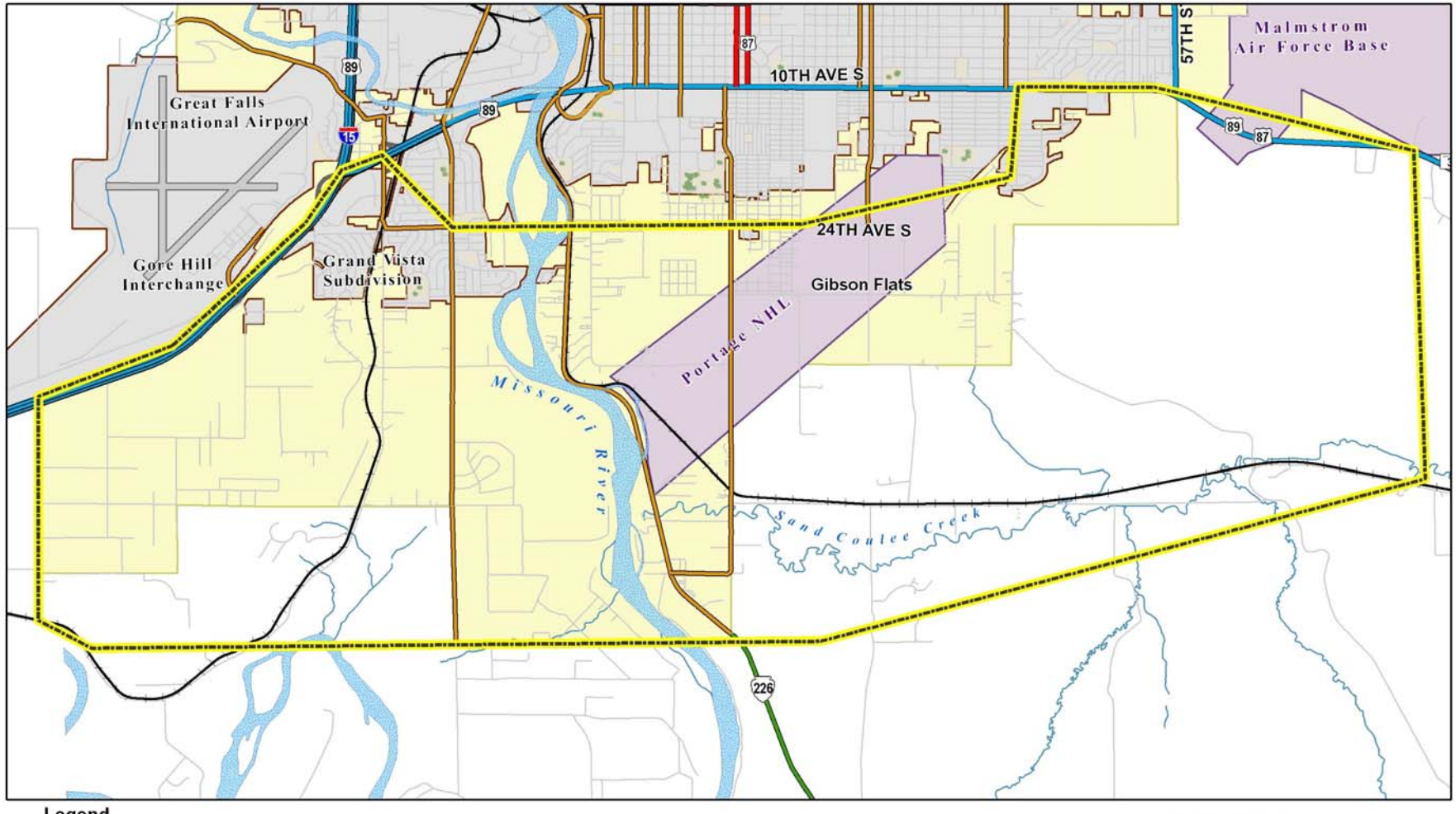
1.3. Study Process

The study process involved corridor mapping, a planning-level environmental review, alignment analysis based on engineering design criteria and identified corridor constraints, public input, resource agency coordination, and funding considerations.

Quantm, a modeling software program, was used to help identify feasible alignment or route options. Quantm is a route-optimization software program that uses engineering design standards, as well as man-made and natural constraints, to develop and evaluate new roadway alignments. The program simultaneously weighs factors such as impacts to homes and businesses, historic and cultural sites, and wetlands, as well as construction costs associated with topography, earthwork, structures, and paving. The program can generate thousands of alignments to help determine the most cost-effective option given the defined constraints.

An important part of the study process was the identification of route location opportunities and issues by the region's stakeholders, which generally included federal, state, and local agencies with a direct interest in the project or those who offered special technical expertise. The early identification of corridor issues helps to improve the transportation planning process by providing a more efficient, less costly NEPA/MEPA process.

Figure 2 – Study Area



1.4. Linking Transportation Planning and NEPA

In February 2005, the U.S. Department of Transportation issued guidance on how transportation planning-level products and analyses can be incorporated into the NEPA/MEPA process, based on long-term congressional intent that transportation planning should serve as the foundation for project level decisions. Although the statewide and metropolitan-planning provisions have been a federal requirement for over 40 years, formal NEPA/MEPA analyses have been largely disconnected from transportation plans. There has been no meaningful way for federal or state regulatory agencies to participate in and be a part of the planning process, especially considering most statewide plans are policy plans that are not project-specific. Historically, plans that recommended specific projects were done by planners based on federal requirements. Generally, it wasn't until funding was identified for project development and implementation that a preliminary design concept for the project was advanced through the NEPA process. Often work and analyses already done at the planning-level were repeated. This often resulted in redundancy of analyses, costly and often unfundable preferred alternatives requiring phasing of projects, and consequently, delays in implementing the entire preferred alternative.

Environmental review, analyses, and coordination at the planning-level should provide for better project scoping before a formal environmental review process is initiated. Linking transportation planning and NEPA has been strengthened in recent federal transportation legislation. The most recent is the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU), which requires planning-level coordination with natural resource regulatory agencies and encourages consideration of results from transportation planning efforts in the NEPA/MEPA process. In doing so, savings in project development and implementation time and cost should be realized.

This study was done in accordance with the "linking transportation planning and NEPA/MEPA" guidelines contained in the FHWA and Federal Transit Administration's (FTA) February 14, 2007, *Final Rule on Statewide Transportation Planning and Metropolitan Transportation Planning–Appendix A*. The products and analyses developed through this planning-level study are intended to be incorporated into and relied upon in a future, more detailed NEPA/MEPA document.

2. BACKGROUND

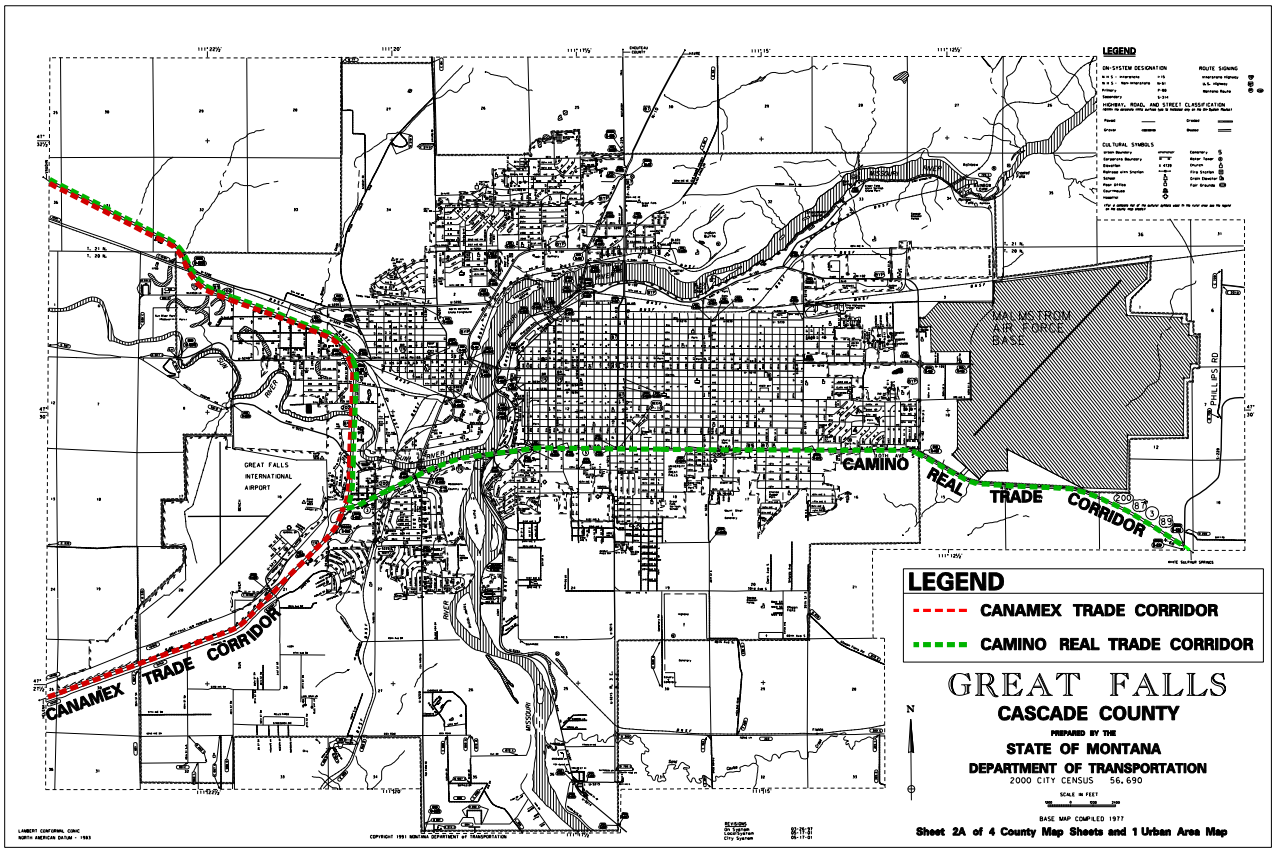
2.1. History

The South Arterial has been the subject of numerous plans, studies, and news articles since the late 1960s. By the late 1970s and early 1980s, Great Falls was on the verge of buying right-of-way for the project after completion of a route study in 1981. However at the same time, the refinery on Smelter Hill closed, the air base experienced personnel reductions, and other downturns in the local economy didn't support budgeting for right-of-way acquisition. Considering this economic slump, the Great Falls community leaders chose not to proceed with the acquisition. Consequently, available federal transportation funds were declined.

In the early to mid-1980s, the U.S. Department of Defense also studied the possibility of a South Arterial serving as an alternate route to 10th Avenue South for transporting a proposed missile deployment vehicle dubbed the "Midgetman." The interest in the prototype vehicle and arterial were dropped in about 1988.

With passage of the North American Free Trade Agreement (NAFTA) in 1993, there was renewed interest to pursue an arterial connector route between US 87/89 and I-15 as a means to promote regional and international trade along the Camino Real and CANAMEX trade corridors (Figure 3).

Figure 3 – Trade Corridors through Great Falls



In 1994, both the Great Falls City and Cascade County Commissions adopted resolutions supporting a process to solicit commitments to secure funds for the South Arterial and to dovetail it into a broader need for upgrading the highway between Great Falls and Billings. A "working group" representing the City, County, Chamber of Commerce, City-County Planning Board, and Great Falls Economic Development Authority was created to secure broad-based commitments for the proposed arterial project.

Working group representatives held numerous meetings and discussions with various community and statewide groups and organizations, including the Montana Department of Transportation, the Montana Transportation Commission, and the Governor's office. The culmination of its efforts was the development of a "Strategy Plan." The plan contained the following specific steps for development of the arterial:

1. Formally incorporate the arterial into the *Great Falls Area Transportation Plan*.
2. Conduct a corridor feasibility study.
3. Conduct a route location study and environmental review process.
4. Work with the Montana Department of Transportation to place the route on a federal-aid system and on its construction priority program.
5. Work with the Montana Department of Transportation, the Montana congressional delegation, and others to secure funds for final design and right-of-way acquisition.
6. Continue long-term plans for phased project construction.

The first two steps of the Strategy Plan have been completed. The proposed arterial was included in the *Great Falls Transportation Plan* in 2000, and a Feasibility Study was completed in 2004. In February 2005, based upon favorable recommendations from the Feasibility Study, the Montana Transportation Commission authorized MDT to take the lead of the project and to pursue federal discretionary funding for continued development of the South Arterial, including preparation of an Alignment Study, an environmental document, and project design. The advancement of each of these phases requires separate Commission action. This Alignment Study was initiated after $4,500,000 of congressional funding was secured through SAFETEA-LU.

2.2. Previous Planning Efforts and Products

2.2.1. *Great Falls Growth Policy* - 2005

The *Great Falls Growth Policy* recommended the transportation plan place a high priority on planning to preserve right-of-way for a limited-access freeway south of Great Falls. The growth policy also recommended that the City and County should carefully regulate the design and location of future land uses, utilities, and major street intersections along the corridor where the South Arterial may be located.

The *2005 Great Falls Growth Policy* is based largely upon the former *2003 Great Falls City-County Growth Policy* with only minor editorial changes to reflect a change in planning area jurisdiction. The new jurisdiction includes primarily the City of Great Falls and those unincorporated areas into which it will logically expand in the next few decades. Due to a Cascade County Commission resolution, the Great Falls City-County Planning Board and associated jurisdictional area were dissolved effective July 1, 2005. To provide continued guidance to the City of Great Falls on growth issues, the City Commission created the Great Falls Planning Board and requested it revise the *2003 Great Falls City-County Growth Policy* to represent the needs of the City. This revised *2005 Great Falls Growth Policy* provides the legal

and rational basis for land use and zoning regulations, public investments, or government programs or actions.

2.2.2. *Great Falls Arterial Feasibility Study* - 2004

The Feasibility Study was completed and distributed in March 2004. It evaluated the engineering and economic feasibility of alignment corridors both north and south of Great Falls. It also provided first-level environmental screening for a variety of roadway alternatives ranging from four-lane freeways to rural two-lane arterials. Based on Federal Highway Administration *Guidelines for Highway Feasibility Studies*, the study concluded that compared to a "no-build" alternative, a southern corridor is feasible and preferred. It was found to be feasible from a number of specific perspectives including:

- An economic perspective - in that, a favorable benefit/cost ratio of 3.54 could be derived, meaning there would be a net return of $3.54 for each $1 expended to build and maintain the arterial;
- An engineering perspective - in that, standard project development and design procedures could adequately identify and address any engineering issues associated with the arterial;
- An environmental perspective - in that, no "fatal flaws" were identified that could preclude further development of the arterial;
- A traffic perspective - in that, the arterial would improve safety and reduce congestion, which would help reduce crashes and solve intersection capacity problems on 10th Avenue South, Fox Farm Road, and elsewhere on the Great Falls street network; and,
- A community perspective - in that, the arterial was found to be consistent with community goals and plans and fulfills recommendations made in local planning documents and policies.

The study also concluded that a northern corridor would not satisfy the FHWA-recommended guidelines for project feasibility, because it failed to achieve an economic threshold benefit/cost ratio of 1.0 or better. As such, it recommended that no further study of the northern corridor be conducted. However, the report did recommend the continued study and development of the southern corridor to include preparation of an Alignment Study and environmental document. A four-lane urban arterial was selected as the "technically recommended" roadway alternative to best serve current and future needs in the Great Falls urbanized area.

2.2.3. *Great Falls Area Transportation Plan* - 2003

The transportation plan involved both short-term and long-term planning and recommended improvements to the Great Falls major street network. The recommendations contained within the transportation plan serve to ease congestion, improve safety and mobility, and prepare the Great Falls street network to meet future traffic needs.

The plan noted that the Great Falls street network exhibited congestion along 10th Avenue South, Fox Farm Road, and various other adjacent roadways. The plan identified the lack of a sufficient direct roadway link between two highways of national significance (I-15 and US 87/89). The plan recommended that a minimum two-lane roadway be constructed south of Great Falls, between I-15 and the intersection of 10th Avenue South/57th Street South with consideration for an ultimate four-lane roadway in the future. The plan continued by stating "*the facility will help to not only better serve, promote, and accommodate regional and international trade through the*

community, but will also benefit the Great Falls area transportation system by providing an additional east-west route suitable for economic development" as well as provide additional benefits "*to include improved local access and circulation, promotion of economic development, and the development of an additional Missouri River crossing for emergency services.*"

2.2.4. Other Studies

Over the last several years, additional studies have been conducted regarding the need and public support for a South Arterial. The following are summarized in the *Great Falls Arterial Feasibility Study*:

a. *Great Falls City-County Growth Policy* – 2003
b. *Great Falls City-County Comprehensive Plan* – 1999
c. *Findings of No Significant Impact on the Environmental Assessment for Great Falls, 10th Avenue South* – 1998
d. *Environmental Assessment for Great Falls, 10th Avenue South* – 1997
e. *Traffic Impact of Small Intercontinental Ballistic Missile (SICBM) Program on 10th Avenue South* – 1987
f. *Great Falls South Arterial Final Environmental Impact Statement* – 1981
g. *Great Falls Area Transportation Plan Updates* (1961, 1969, 1979)

These studies all document or discuss the need for a South Arterial as a major component or probable element of the future street network for the Great Falls area. Most indicate that a South Arterial would be necessary to reduce congestion on the Great Falls street network, especially in reducing the amount of traffic on 10th Avenue South. Some of these studies also emphasize the importance of preserving right-of-way for a future South Arterial and that local officials should carefully regulate, to the extent allowed by local land use policies and regulations, the design and location of future land uses, utilities, and major street intersections along the proposed South Arterial corridor.

3. GOALS AND OBJECTIVES

Consideration of and interest in a new arterial are in response to the long-range planning goals and objectives documented in the community planning reports and studies noted in the previous section. Additionally, consistent public input has indicated a need for an east-west arterial south of 10th Avenue South. These planning documents and detailed traffic analysis indicate that roadways within the 10th Avenue South corridor and adjoining street network have high crash rates, poor levels of service, and high truck volumes. Based on the Feasibility Study findings, the goals for and objectives of a new east-west arterial south of Great Falls are to:

- Improve an international and regional trade corridor;
- Reduce congestion along 10th Avenue South and numerous other urban area arterial and collector streets;
- Improve safety and mobility throughout the Great Falls transportation network;
- Improve air quality by reducing congestion as well as stopping and idling times; and,
- Provide an additional Missouri River crossing essential for efficient emergency vehicle access.

These goals and objectives will be further considered through this study process and refined as appropriate, based on the study's analysis, public involvement, and resource agency consultation efforts.

4. PUBLIC INVOLVEMENT AND AGENCY OUTREACH

As part of the *Great Falls South Arterial Alignment Study* public involvement process three public meetings were held: February 15, 2007, October 9, 2007, and September 25, 2008. All meetings followed the same format with a brief opening presentation, followed with an "open house" where participants could individually ask questions. Handouts and comment sheets were circulated at each of the meetings, which were advertised using direct postcard mailings, print ads, and press releases through the Great Falls Tribune. All comments and the presentations for the public meetings are included in Appendix 4A of this document.

Meetings with regulatory agencies and local officials were also conducted during this study and are summarized in the following section.

4.1. Public Meeting #1

Darryl James from HKM Engineering provided a brief presentation to outline the history of the project and explain the project development process.

There was an extensive question and answer period during which HKM and MDT staff provided more detail on the proposed project and comments were then taken from those in attendance. There were 143 people that signed in at the meeting.

Recurring themes in the comments received included:

- Questions about where the arterial would begin and end;
- Concern over whether trucks would be attracted to the south arterial;
- Opposition to the project due to potential impacts upon nearby residents; and,
- Strong support for the arterial based on growth of the community and the need for an additional river crossing.

4.2. Public Meeting #2

Darryl James, of HKM Engineering, provided a brief presentation that gave the history of the project, the project development process, the Quantm software, and the range of alternatives being considered. Questions and comments were then taken from those in attendance. There were 128 people that signed in at the meeting.

Common themes of the comments received included:

- How access would be provided to the new arterial;
- What the road itself would look like;
- What type of land use would be allowed near the roadway;
- Opposition to the project based on the belief that the roadway would change the character of the area; and,
- Strong support for the South Arterial to move forward and that "it is time to stop talking about it".

The public participants in attendance were asked to prioritize the goals for the South Arterial and asked to identify a recommended alignment. Respondents felt that reducing congestion along 10th Avenue South and numerous other urban arterial collector streets was of utmost importance, while improving safety and providing an additional river crossing south of 10th Avenue South were highly desirable as well. Improving air quality and providing an opportunity for a future

international trade corridor were rated lower by the participants. The majority in attendance identified the Red Alignment as their recommended alignment.

4.3. Agency Coordination Meetings

Representatives from the Montana Department of Environmental Quality, Montana Fish, Wildlife & Parks, US Fish and Wildlife Service, US Army Corps of Engineers, Montana Department of Natural Resource and Conservation, Montana State Historic Preservation Office, and the National Park Service attended at least one of three Agency Coordination Meetings held in Helena during early project development.

Darryl James, of HKM Engineering, provided presentations to outline the project history, project development process, Quantm software, known constraints and avoid zones used within Quantm, and the alignment analysis process.

An initial meeting was held to discuss known and potential corridor constraints, as well as analysis methodologies for the Alignment Study and the initial five alignments were presented. The National Historic Landmark (NHL) was discussed as an important 4(f) resource and participants requested that options that avoid this resource be analyzed, also.

The second meeting presented the recommended alignment as recommended by the project management team consisting of the City of Great Falls, Cascade County, MDT and FHWA representatives. The team requested concurrence from the agencies on the purpose and need statement, as well as the recommended alignment.

The group discussed the six alignment options and the analysis criteria and screening process. The team explained that five of the six alignments cross the Great Falls Portage National Historic Landmark, a Section 4(f) property, and the sixth alignment was developed to completely avoid the NHL. The resource agency representatives agreed that four of the alignments could be eliminated from further evaluation based on impacts. The group also agreed that two of the alignments should be investigated further. The alignments included the Red Alignment, which crosses the Landmark and the Purple Alignment, which totally avoids the Landmark.

The discussion continued on the characteristics of the Red Alignment, including the proposed termini near the Gore Hill Interchange and at 57th Street South. The roadway is anticipated to be a four-lane rural principal arterial with a 60 mph design speed with direct access from Fox Farm Road, Upper River Road, 13th Street South, and 26th Street South. The group then discussed the potential of phased implementation with construction of the shortest segment with independent utility and logical termini. It was determined through earlier analysis that the segment from Fox Farm Road to 13th Street South is the shortest segment that could be constructed and fulfill the primary parts of the purpose and need statement.

With the inclusion of the Purple Alignment as a potential avoidance alternative, the resource agency representatives expressed their support for the proposed project. The team discussed the opportunity for further review and comment as the draft report would be issued in the coming months.

Travel demand modeling was performed for the NHL avoid alignment (Purple) as follow up to comments received at the second resource agency meeting. Results from model runs on the NHL avoid alignment showed greatly reduced travel demand on the segment between Fox Farm

Road and US 87/89 (50% to 60% reduction), due to extended travel times and lack of road network connections. Also, beneficial relief in traffic volumes on the 10th Avenue South and other major network corridors was not achieved. As such it was determined that the NHL avoid alignment would not meet the purpose and need of the study.

A follow-up meeting was held in Great Falls with project management team members and representatives from the National Park Service and state and local historic preservation groups to explain the study in greater detail. After the meeting the group went on a field review of the study area. They were shown the probable path of the recommended and NHL avoid alignments as well as major features of the area. Once the general location of the avoid alignment was understood, they agreed it would detract from the viewshed of the NHL. After the field review, resource agency and preservation group members expressed their appreciation to team members although no decisions were reached.

4.4. Meetings with Local Officials

Two meetings were held with local officials during the study process. The first was held in Great Falls to introduce the study and to gauge local support. The meeting also included a discussion of the limited availability of funds in state and federal transportation budgets to construct an arterial. MDT officials encouraged local officials to help define a realistic funding package that would include local and private assistance.

A second meeting was held through video conferencing, during which local officials were provided an overview of the study process to date and were presented the draft purpose and need statement for the Arterial. They advised that the project management team recommended the Red Alignment. The purpose of the meeting was to obtain local official concurrence on the draft purpose and need statement and the recommended alignment. Most of those in attendance suggested they wanted to withhold a formal decision until they had an opportunity to discuss the project in more detail.

There was a detailed discussion of project costs and funding options. At present, the project is anticipated to cost approximately $208 to $285 million for a full arterial and $83 to $93 million for an initial phase from Fox Farm Road to 13th Street South. Under new FHWA rules, the MPO must demonstrate reasonable availability of funding for the next phase of the project before the project can proceed. In this case, MDT advised there are sufficient funds available to develop a NEPA/MEPA compliance document, but that the reasonably available funds for the full arterial or an operationally independent segment need to be included in the ongoing *Great Falls Transportation Plan Update*. A subsequent project phase such as full PE or RW would also need to be included in the MPO Transportation Improvement Program (TIP) and MDT Statewide Transportation Improvement Program (STIP).

The project management team identified the following as potential sources of funding for future project phases:

> Congestion Mitigation and Air Quality Program (CMAQ) - for projects that improve air quality in "non-attainment" or "maintenance" areas.
>
> Transportation and Community and System Preservation Pilot Program (TCSP) - for projects that improve the efficiency of the transportation system, reduce impacts, and

reduce future need for infrastructure improvements through more efficient access. Recent trends have directed grants to the six largest cities nationwide.

Congressional Appropriations - note that a January executive order pledged to veto any appropriations bill that does not cut the number and cost of "earmarks" in half.

State Fuel Tax - annual allocation to local governments based on formulas provided through state statute and must be used on construction, reconstruction, maintenance, and repair of rural roads or city streets and alleys.

State Sales Tax - establishment of a state sales tax could provide a valuable source of additional funding.

City/County General Fund - includes property taxes, development fees, and other sources of general fund revenue.

Local Fees - includes impact fees, permits, vehicle license fees, etc.

Local Option Taxes - Approved by a local referendum and can include a gas tax, motor vehicle tax, and resort tax.

4.5. Public Meeting #3

Darryl James from HKM Engineering provided a brief presentation that gave the history of the project and the preferred alignment, including its access points and traffic modeling. During and after the presentation, HKM and MDT staff fielded questions and comments from a number of the 123 signed-in participants.

Persistent themes in the comments received included:

- Clarification of previous, continued, and future project costs and funding.
- Opposition of preferred alternative based on residential impacts and lack of truck usage.
- Support of preferred alternative and phased development based on safety, development, and growth reasons.
- Feasibility of a North route where there is agricultural land.

4.6. Draft Alignment Study Document

The Draft Alignment Study document was made available for public and agency comment. The Working Group reviewed comments, both written and those received at the third public meeting, and developed a comment/response summary document. This summary document is included in Appendix 4A. One of the common concerns with the arterial was the impact to development along the river corridor. The Working Group analyzed the available information within the river corridor concerning new developments and reaffirmed the original recommendation is still valid, as there was no significant change in the number of impacted lots with structures.

The Red Alignment remains as the recommended alignment. However, if a project is forwarded from this Alignment Study, the river crossing will require further analysis through the NEPA/MEPA process due to changing conditions, which will likely include changes to land uses.

5. QUANTM

The Quantm system is a planning tool that uses route optimization software to generate multiple cost-based alignments that satisfy defined constraints and scenarios. The Quantm system generates multiple alignments allowing the project management team to balance social and environmental impacts against alignment costs. The Quantm system also provides the project management team with the ability to optimize sections of alignments to allow construction of portions of a corridor as funding becomes available.

5.1. Background

Historically, the first step in the selection of new highway alignments is to survey the existing terrain, roadways, utilities, streams, wetlands, structures, and other improvements. Additionally, information is collected regarding geology, floodplains, land use, social and economic impact, and historical and environmentally sensitive areas. Collection of this data can take a substantial amount of time and can alert local communities and landowners who may become concerned they will be adversely affected by an alignment long before the Alignment Study has started.

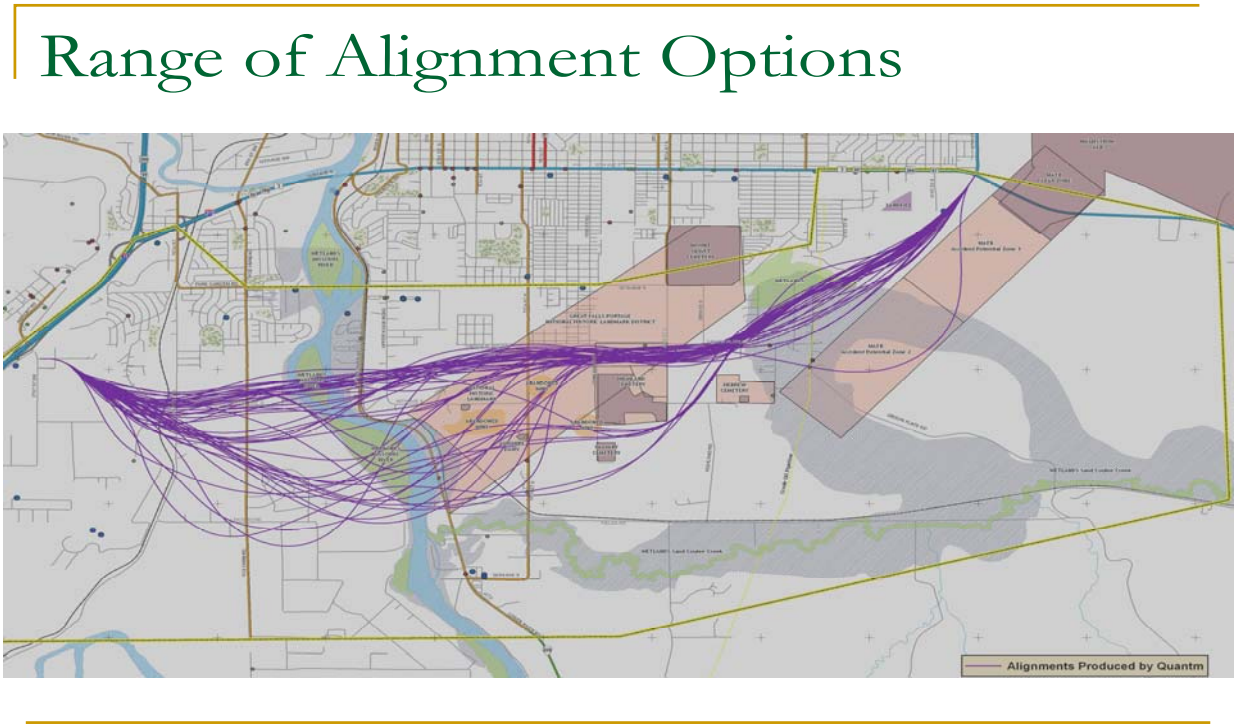
Proposed alignments are then developed using the survey information and data collected within a corridor. The surveyed corridor widths have historically been limited by available survey staff, terrain, funding, and time. Each optimized alignment could take from several days to several months to develop. The most cost-effective alignments follow existing terrain and limit large cut and fill sections; however, the alignments must also meet Geometric Design Standards and avoid social and environmentally sensitive areas.

5.2. Optimization

The corridor selected for the *Great Falls South Arterial Alignment Study* was taken from the *Great Falls Arterial Feasibility Study*. Within this broad corridor the Quantm system incorporates a variety of information including terrain (DTM data), linear features (rivers, roadways, railroads, pipelines), special zones (parks, cemeteries, floodplains, wetlands, property data, subdivisions), geotechnical zones, geometric standards, structure sizes, and construction cost estimates.

Once a beginning and end point were specified, several thousand alignments were generated through a defined corridor. The 50 lowest cost alignments were then color coded and presented in a "spaghetti map" (Figure 4). Each alignment included a horizontal and vertical profile, cross sections, mass diagram, structure locations and lengths, list of impacts, estimate of right-of-way impacts, and a detailed cost estimate.

Figure 4 - Range of Alignments



The project management team then selected several unique alignments based on cost and minimal social, economic, and environmental impacts to the area. These "seed" alignments were then returned to Quantm for optimization, which was the process of making improvements to the vertical profile and earthwork with minor adjustments to the horizontal alignment. The project management team again selected several recommended alignments from the optimized alignments, further balancing social and environmental impacts against alignment costs.

These selected alignments were presented to the public, resource agencies, and other stakeholder groups for review and comment. Comments from these groups were used to further refine the accuracy of the base map and to select final alignments for further optimization and analysis.

5.3. Model Interface

Geometry

The Quantm system requires a basic description of the minimum geometric standards of the alignment including minimum radii of curvature, maximum gradients, sight distance, and location and bearing at project endpoints.

Terrain

A form of Digital Terrain Model is necessary to calculate earthwork.

Geology

The cost of earthwork is dependent on local geology. Each geological type specified can have a number of strata with individual characteristics of batter, bench width, and excavation costs.

Linear Features

Most corridors include linear features such as roads, rivers, railways, and pipelines that must be crossed. Some crossings must be at grade and others may require overhead structures providing specified horizontal and vertical clearances.

Special Zones

There are frequently zones that require special treatment for social or environmental reasons. Special zones can be designated as complete avoid areas, additional cost, or special mitigation. Even when an alignment is allowed through a special zone it may require a specified roadbed elevation, additional cost, or mitigation measures.

Construction Costs

The latest construction cost estimates are used to estimate structure cost, culverts, fill, cut (based on strata), tunnels, and retaining walls. Additional costs are also included in the linear feature descriptions and special zones.

6. DATA INPUT AND EXISTING CONDITIONS

6.1. Geographic Data and Mapping

6.1.1. Data Creation

Data was collected and created by the Road Inventory and Mapping Section (RIM) using ESRI ArcGIS software. As needs were identified for certain data sets to be included in Quantm as Special Zones and/or Linear Features (Table 1), RIM first relied on currently available data sets. If a data set was not available from another source such as the City of Great Falls or Geographic Information System (GIS) data repositories like National Resource Information System (NRIS), the data was digitized using Ortho Imagery from the 2005 National Agriculture Imagery Program (NAIP). Data was verified by appropriate MDT staff once it was identified and mapped. The data that was verified was then used as the parameters for Quantm. The verified data sets were sent to Quantm to be exported in the appropriate format to be used in the software for analysis of possible new alignments.

Table 1. Data Used Within Quantm

Linear Features	Roads, Interchange Ramps, Railroad
Special Zones	AVOID: Ayrshire Dairy, Ayrshire Dairy Undaunted Site, Malmstrom Air Force Base, Calvary Cemetery, Mount Olivet Cemetery, Hebrew Cemetery, Highland Cemetery ADDITIONAL COSTS: Great Falls Portage National Historic Landmark[1], Wetlands, Missouri River, Floodplains, Private Land & Structures, Landfill
Additional Data	Study Area Boundary, Drainage, Abandoned Mines, Public Water Supplies, Underground Storage Tanks, Parks, Crude Oil Pipeline

6.1.2. Mapping

Data that was produced by Quantm was exported to GIS layers, so it could be used for mapping. These maps were produced with the original data submitted to be used for analysis in Quantm, along with the Quantm alignments.

These maps were used for public meetings and for project management team meetings while the study was taking place. They are intended to be used as a visual representation of what Quantm is analyzing and producing. They are also used as a planning tool for identification of created data sets used in Quantm.

6.2 Construction and Project Costs

A key component to the Quantm software is the input of reliable costs. Quantm allows the user to input construction and material costs, land acquisition costs, environmental mitigation costs, and any additional fixed cost that may be associated with a particular project. By using the most reliable and up-to-date information available, the Quantm model produces fiscally responsible

alignments which meet all design and land use criteria. This section will discuss these "data-based" costs, which were researched in depth to produce reliable construction and project costs.

6.2.1. Geological Type

In Quantm, the geological-type data field allows the user to enter cost data associated with the earthwork required to build the roadway specified by design and geometric criteria. The costs associated with this data field are costs to haul material, cut or excavate material in the roadway, fill or place the material in the roadway, the cost to waste excess material, and the cost to borrow material, which means the importing of material to build the roadway. For this study, haul-and-waste costs are set to zero, because these costs are not tracked and paid for under current MDT federal-aid contracts. They are considered incidental costs and not separated out for payment. These costs can be applied to different geological types identified within the studied corridor. Examples of geological types are rock formations or floodplain areas.

Because this study is a planning-based study, a formal soil survey or soil identification study was not conducted. Instead, general observations were made based on visual inspection of the study area. The results of this inspection yielded three general geological types:

- Normal Area – typical earthwork conditions for road building. A "default" value was used for this type, which includes a majority of the project area.
- Floodplain Area – requires special means to construct the roadway due to soft and/or saturated soil conditions.
- "Gore Rock" Area – requires ripping and possibly blasting of material to build roadway (Gore Hill rock plateau area located on the west-end).

The floodplain areas and the "Gore Rock" area have higher construction costs associated with them for the reasons stated above.

The costs assigned to these geological types are derived from recent federal-aid construction projects administered by MDT's Great Falls District. These costs are located in Appendix 6B. Contracts completed within the last five years were studied with emphasis given to the most recent contracts completed in and around the City of Great Falls. It should be noted recent fuel price escalation has caused a dramatic increase in contract bid items such as asphalt oil, roadway excavation, gravel, and numerous other items. These increases have all occurred since the completion of the *Feasibility Study*.

6.2.2. Network/Geometric-Based Costs

Quantm's network-based or geometric-based costs are indirect costs based on the geometric design criteria used. What this means is the overall cost model output is influenced by the geometric design criteria. For both two-lane and four-lane configurations, MDT design criteria were used with much discussion centering around the start and endpoints for this study.

For this study, the western start point was assumed to be near the Flying J Truck Stop at the I-15 Airport Interchange. During this study, numerous public comments were received asking questions about how the South Arterial would connect to the interstate and other roadways in this area. It was decided more detailed information and study were required before the location of the start point could be defined. Therefore, the start point will remain variable at this time and open to solutions based on future study.

The eastern endpoint for this study was located at the intersection of 10th Avenue South and 57th Street. Like the start point, this endpoint will also remain variable at this time and open to solutions based on future study. From a cost standpoint, any future study should recognize that moving these critical points could generate additional project cost.

The remaining geometric design factors require little discussion from a cost standpoint except the horizontal and vertical "stiffness" factors.

In Quantm, these "stiffness" factors represent how straight an alignment is from both the horizontal and vertical perspective. Since this "stiffness" factor is somewhat subjective to the user, numerous iterations were performed to best optimize cost and the creation of a reasonably straight alignment and profile. The Great Falls area generally has a consistent north-south/east-west grid with minimal curvature in most roads in the study area. This observation was used in determining the most appropriate stiffness factors while maintaining a reasonable project cost.

6.2.3. Roadway Surfacing and Bridge Costs

The roadway surfacing costs were derived from the most recent federal-aid projects available at the time of this study. The roadway surfacing costs include gravel, asphalt surfacing, chip sealing, and final roadway striping. Since the *Feasibility Study* was completed, these roadway costs have increased substantially due mainly to higher fuel costs and material availability and supply. Even with these increases, asphalt surfacing was still less expensive than concrete surfacing. However, this study recommends concrete surfacing should not be discounted as a viable solution in future studies, especially at intersections.

Through the Quantm modeling, several obstacles were identified which required the incorporation of a bridge. These include the Missouri River; Burlington Northern Santa Fe (BNSF) Railroad tracks adjacent to Flood Road and Flood Road itself; Lower River Road; and, the BNSF Railroad tracks adjacent to Lower River Road. Aside from the direct cost of these bridges, the required clearances associated with spanning the railroad tracks, Flood Road, Lower River Road, and the Missouri River directly affect the vertical alignment and earthwork requirements.

Because Flood Road and the adjacent tracks are close together, the Quantm model created a single bridge to span both obstacles. This also means direct access to the South Arterial from Flood Road would not be physically possible. Access to the South Arterial from Flood Road would be indirect utilizing existing roadway networks.

The Missouri River crossing is by far the largest and most complicated crossing in the study area. Aside from the direct cost of this structure, one major indirect cost is if this bridge is completed prior to the roadway on either side, the embankment material will not be allowed to be hauled across the bridge due to structural concerns. This increases the overall project cost for the earthwork.

In general, the bridge costs for both a two-lane and a four-lane configuration include the cost of sidewalks, aesthetic features, and sound walls. Further study would determine what and if these items are needed or desired. The bridge costs also take into account the structure's complexities due to its overall length and size. Constructability and work access during bridge construction are issues that were factored into the cost of this bridge.

While the west-shore landing area is relatively straightforward, many issues revolving around the east-shore landing were recognized. The main issue is the fact that Lower River Road is located on top of the east-shore bank throughout the study area. Also, the BNSF Railroad tracks are adjacent and very close to Lower River Road. These two factors limit available landing areas near the bank.

After review of the Quantm modeling runs, it is assumed in most locations one bridge will span the Missouri River, Lower River Road, and the BNSF railroad tracks. While this increases the overall bridge length and cost, it is the most feasible solution. Also, direct access from the South Arterial to Lower River Road would not be possible. Indirect access would be possible by using other existing roadway links.

6.2.4. Special Zone Costs

For the purpose of this study, a special zone is defined as an area or location that has a special condition attached to it such as a cost, limitation, or sensitive feature. This study includes the following types of special zones:

- Areas that must be avoided such as cemeteries
- Land and housing values
- Subdivision damage costs
- Wetlands and other environmentally sensitive areas
- Floodplains
- 4(f) properties

6.2.4.1. Avoid Areas

Areas such as cemeteries and developed parks should be avoided due to the difficult nature and great cost of relocation, as well as the public perception of such impacts. The Quantm model will not allow alignments to enter into these areas, which generally means an alignment increases in length and cost. The major Section 4(f) property in the study area is the Great Falls Portage National Historic Landmark. The National Historic Landmark (NHL) is located primarily on privately owned lands and covers a large area on the east side of the Missouri River. It was recognized if federal aid was used to construct an alignment in this area, evidence must be presented that shows avoiding this area is cost prohibitive and carries high social and economic impacts, and mitigation would likely be a component of any identified impact.

At the request of the resource agencies, the Quantm model was run with the NHL set as an avoid zone. The overall cost and housing impact was much greater than the other five alignments selected for public comment. The higher costs and greater housing impacts are due to the increased project length, impacts to the Sand Coulee floodplain area, and the numerous housing developments located south of the NHL.

6.2.4.2. Land and Housing Values

The alignment study area contains numerous housing developments which must be considered in Quantm's cost model. In recent years, this area has seen an increase in housing, which is expected to continue. Based on review of this area and the public comments received, housing and land impacts were identified as an important consideration in this study.

Geographic Information System (GIS) mapping information was used to display every parcel of land in the study area. The mapping information was then combined with the most current Montana Department of Revenue (DOR) appraisal information. With this combined data, parcels were considered based on zone type, size, number of structures associated with the parcel, condition of structures, and taxable value.

In addition, the most recent real estate sales information was collected through the local Multiple Listing Service (MLS) for the Great Falls area. The data included improved and unimproved property values broken out by size and general location. The MLS data revealed a wide array of land values. Property on the east end of the project is mostly farmland and has a relatively low cost per acre. Higher-cost properties are generally subdivided and developed, and are located in the vicinity of the Missouri River and at various locations between the Missouri River and the Gore Hill area on the west end of the corridor.

Using the MLS and DOR data as a guide, the most reliable property values possible at a planning-level were assigned to every parcel in the study area.[6] Thus, when the Quantm model was run, planning-level property costs were taken into account along with the construction costs to build the roadway. Assigning values ensured that the model would attempt to avoid as many houses as possible to keep the overall project cost and impacts as low as possible. Despite this effort to minimize impacts to housing, every Quantm model run resulted in acquisitions of some houses and structures to construct the South Arterial. It is worth noting that specific properties impacted cannot be determined through this planning-level study. Identification of specific impacted properties and potential mitigations will be done during the future environmental review and design processes.

With all property values in place, the Quantm model run produced 50 alignments to analyze. Upon review of the alignments, it was clear that they could be grouped into five distinct patterns or sub-corridors. The lowest-cost alignment in each of these patterns or sub-corridors was selected to present to the public for comment. At this point in the process, each of the five alignments was scrutinized closer in terms of housing impacts. A "buffer" zone was created for each alignment both for the two-lane and four-lane configuration. This buffer zone is a distance outside the limits of the roadway construction. If a house is inside this "buffer" zone, it was assumed the house or structure would have to be purchased for roadway construction. If a house or structure was close to this "buffer" zone, it would be evaluated on a case-by-case basis.

It should be noted all property values used in this study represent 2006 values. Given the growth in this area and expected inflation, the land and housing costs may increase. It is recommended land acquisition for corridor preservation be made a high priority in this project's future schedule.

[6] This planning-level analysis allows for the identification, selection, and elimination of potential alignments, but lacks the precision to identify the specific properties or other features impacted. Property values were assigned only at a planning-level to ensure that the Quantm model runs would attempt to avoid as many impacts to houses as possible and to enhance comparison of impacts between various alignments. After the currently proposed alignments are reduced to one or more alignments, additional detailed and specific environmental analysis and design will then be conducted in future efforts, including the identification of specifically impacted properties and possible mitigation measures.

6.2.4.3. Subdivision Impact Costs

Above and beyond housing and land costs, a separate cost was developed to account for the cost to mitigate subdivisions. This cost includes the relocation and rerouting of city and county connecting streets and roads, housing and structure demolition, infrastructure demolition, the redistribution of city utilities, the redistribution of utilities such as gas and electric lines, and the overall impact to the surrounding area. Aesthetic and sound mitigation measures were also considered in this cost. Comparable cost data was not available, so these damage costs were assumed to be very high, in the range of $500,000 to $3,000,000 per acre depending on the size and location of each subdivision.

6.2.4.4. Wetlands and Other Environmentally Sensitive Areas

A cost was assigned to identified wetland areas and other environmental areas, such as underground fuel storage tanks. The cost represents mitigation measures which could be required and is based on cost information from mitigation efforts performed in conjunction with past MDT projects.

6.2.4.5. Floodplains

Floodways and floodplains associated with the Missouri River and Sand Coulee Creek are located within the project corridor. The following FEMA floodplain maps for Cascade County delineate the floodways and floodplains within the project corridor:

Community – Panel Number	Map Revised
300008406B	December 8, 1981
300008407C	February 15, 2002
300008426C	February 15, 2002
300008427C	February 15, 2002
Community – Panel Number	Map Revised
300008408B	December 8, 1981
300008409B	December 8, 1981
300008428C	February 15, 2002
300008429C	February 15, 2002

These areas were mapped and made a part of the Quantm model. The Quantm model required bridges across floodways. Costs in floodplain areas were increased to account for minimum elevation requirements and hydraulic conveyance. This cost represents the extra requirements needed for approval to build in the floodplain.

6.2.5. Additional Fixed Costs

The Quantm model allows the use of fixed costs, which are assumed to remain unchanged regardless of the alignment selected. The following are the fixed cost elements used for both the two-lane and four-lane configurations:

- A New or Upgraded Gore Hill Interchange
- Electrical Items and Traffic Signals
- Design and Preliminary Engineering Costs
- Utility Relocation Costs (Gas, Electric, Phone, TV)
- Traffic Control
- Construction Engineering

- Miscellaneous Items
- City Utilities (Water, Sewer, Storm Drain)

A New Gore Hill Interchange was included because the existing Gore Hill Interchange with its frontage roads has very little room for expansion. However, before design would begin on any new interchange, a close look at capacity and demand at the existing interchange would need to take place. In addition, the current and future function of the existing interchange would also need to be considered, as well as its relationship to the new interchange and the South Arterial.

If a new interchange is required, it appears a new interchange southeast of the existing interchange would be the likely solution.[7] The new interchange cost includes the building of a new interchange, modification to the frontage roads and connecting roads, traffic signals, land acquisition, and the demolition of the ramps on the existing Gore Hill Interchange. Most likely, the ramps on the existing interchange would require demolition because of the close proximity of the new interchange.

Construction of the new interchange could occur before, and independently from, the South Arterial construction, if further analysis and study warrants such due to the stated limited capacity of the current interchange.

6.3. Design Criteria

Design criteria for roadways include maximum grades, design speed, minimum rates of vertical curvature (crest and sag), superelevation, minimum horizontal curvature (radii), and vertical clearances. Recommended ranges and minimum and maximum values for these design features are listed within the MDT Road Design Manual.

Tables 2 and 3 on the following pages list the design criteria input into the Quantm Model Interface for the four lane and two lane undivided highway alternatives.

Detailed information from MDT's Road Design Manual regarding the design criteria selected is included in Appendix 6C of this report.

[7] Based on MDT travel demand modeling, the further south the route would begin, the less traffic the new roadway would attract, and the less likely a South Arterial would meet its intended purpose. Additionally, the longer the road length, the greater the project cost. Beginning the new roadway at the Ulm Interchange and extending to US 87/89 would add an estimated $54 million to the project cost based on an estimated cost-per-mile factor of $7.4 million.

Table 2. Quantm Data – Four-Lane – Rural Principal Arterial

Criteria	Note	Input
Start Point		TBD
End Point		TBD
Maximum Design Grade	Downhill	-4% - Rolling Terrain w/60 mph design speed (-7% - Mountainous)
	Uphill	+4% - Rolling Terrain w/60 mph design speed (+7% - Mountainous)
Maximum Sustained Grade	Downhill	N/A
	Uphill	N/A
	Sustained Distance	N/A
Formation Width (ft) in Cut		154 ft
Formation Width (ft) in Fill		114 ft
Minimum Vertical Radii	Crests (k value)	151 (60 mph)
	Sags (k value)	136 (60 mph)
Minimum Horizontal Radii		1200 ft @ 8.0%
Road Coordination	Sight Distance	570 ft - level ; 610 ft - downhill ; 530 ft - uphill
	Eye Level	3.5 ft
	Object Level	2.0 ft
Batter Slope (Fill)	Inslope	6:1
Batter Slope (Cut)	Backslope	3:1

*Formation width is based on roadway template hinge points for cut/fill sections.
**Batter (Cut/Fill) is roadway inslope and backslope.

Table 3. Quantm Data – Two-Lane – Rural Principal Arterial

Criteria	Note	Input
Start Point		TBD
End Point		TBD
Maximum Design Grade	Downhill	-4% - Rolling Terrain w/60 mph design speed (-7% - Mountainous)
	Uphill	+4% - Rolling Terrain w/60 mph design speed (+7% - Mountainous)
Maximum Sustained Grade	Downhill	N/A
	Uphill	N/A
	Sustained Distance	N/A
Formation Width (ft) in Cut		110 ft
Formation Width (ft) in Fill		70 ft
Minimum Vertical Radii	Crests (k value)	151 (60 mph)
	Sags (k value)	136 (60 mph)
Minimum Horizontal Radii		1200 ft @ 8.0%
Road Coordination	Sight Distance	570 ft - level ; 610 ft - downhill ; 530 ft - uphill
	Eye Level	3.5 ft
	Object Level	2.0 ft
Batter Slope (Fill)	Inslope	6:1
Batter Slope (Cut)	Backslope	3:1

*Formation width is based on roadway template hinge points for cut/fill sections.
**Batter (Cut/Fill) is roadway inslope and backslope.

6.4. Environmental

The primary objective of the Environmental Scan Report was to determine the potential environmental impacts or constraints that may be imposed upon the Great Falls South Arterial Alignment Study. The Environmental Scan Report contains a description of the following sections.

- Physical Resources
  - Land Ownership
  - Geology and Soils
  - Surface Water and Groundwater
  - Floodplains
  - Wetlands
  - Hazardous Waste Areas
  - Air Quality
  - Noise
- Biological Resources
  - Fish and Wildlife
  - Vegetation

- Cultural Resources
- Utilities

Based on a planning-level overview of environmental resources in the corridor it was determined that the proposed South Arterial would likely have no impacts to the following:

- 6(f) properties
- Threatened & endangered species
- Air quality (non attainment areas)

The following resource areas may potentially be negatively impacted by the South Arterial:

- Great Falls Portage National Historic Landmark – 4(f) property
- Missouri River
- Sand Coulee Creek
- Farmland

Probable future permits and/or actions based on the environmental scan include, but not limited to, and may require mitigation:

- Floodplain permit
- Biological survey/Wetland Determination and Delineation
- Cultural Resource survey
- Noise analysis
- Air Quality (Mobile Source Air Toxics Evaluation)
- Hazardous Waste Site Evaluation
- Clean Water Act Section 404 Permit (from the US Army Corps of Engineers)
- Stream Protection Act 124 Notification (from MT Department of Fish, Wildlife and Parks)
- Coordination with the Natural Resources Conservation Service (farmland conversion impact rating form)
- Coordination with the United States Fish and Wildlife Service

For detailed information regarding any of these elements, the Environmental Scan Report is contained in Appendix 6D.

6.5. Utilities

The following GIS-based utility information was reviewed in the study corridor:

- Electricity
- Public water supplies
- Waste water
- Telecommunications

Existing Great Falls South Arterial Corridor

Utilities in the Great Falls South Arterial Corridor include electricity, public water supplies, waste water, and telecommunications. A summary of utilities identified from GIS-based information in the existing Great Falls South Arterial Corridor is presented in Table 4. Because of their abundance, public water supplies were not summarized individually in the table (see Appendix 6H for a list of public water supplies located in Cascade County). Petroleum pipelines and mine sites also exist in the Great Falls South Arterial Corridor project area.

Table 4. Utilities in the Great Falls South Arterial Corridor

Utility	Location
Electricity	Electrical utility services are provided throughout the project area.
Waste water	Waste-water services are provided throughout the project area.
Telecommunications	Service in the project area is provided by a network of aerial and buried cables.

7. ALIGNMENT ANALYSIS

The planning-level analysis conducted for this study allows for the identification, selection, and elimination of potential alignments, but lacks the precision to identify the specific properties or other features impacted. The proposed alignments were screened and one identified as the recommended alignment based on the best available data and mapping through February, 2008. Additional detailed and specific environmental analysis and design will be conducted, including the identification of specifically impacted properties and possible mitigation measures if a project is advanced from this study.

The Montana Department of Transportation, City of Great Falls, Cascade County and Federal Highway Administration refined thousands of alignments produced by the Quantm software program into five optimized alignments. The five alignments were selected based on feasibility and general alignment trends. These alignments were presented to the public and resource agencies. Based on resource agency concerns regarding protected properties under Section 4(f) of the Transportation Act, a sixth alignment (the Purple Alignment), swinging to the south edge of the corridor (as shown in Appendix 7A), was added as an option that would entirely avoid the Great Falls Portage National Historic Landmark. These six alignments were carried forward for review under this planning-level analysis (Figure 5).

Although the Purple Alignment avoids the use of Section 4(f) resources, it is not considered prudent to carry this alignment forward to the environmental review process. The Purple Alignment was rejected due to adverse impacts to floodplains and property, extraordinary cost, and inability to meet purpose and need as detailed in Section 7.2 of this study.

Based on the documented analysis, it is proposed that the Red Alignment be advanced as the ***recommended alignment*** (Figure 6) for consideration in the NEPA/MEPA environmental review phase. In an effort to clearly illustrate how this recommendation was made, the six tables below were prepared to show how the other five alignments (shown in Figure 5) compare to the Red Alignment. This information demonstrates that the Red Alignment minimizes impacts to Section 4(f) resources and is least costly compared to the other alignments.

Figure 5 – Optimized Alignments

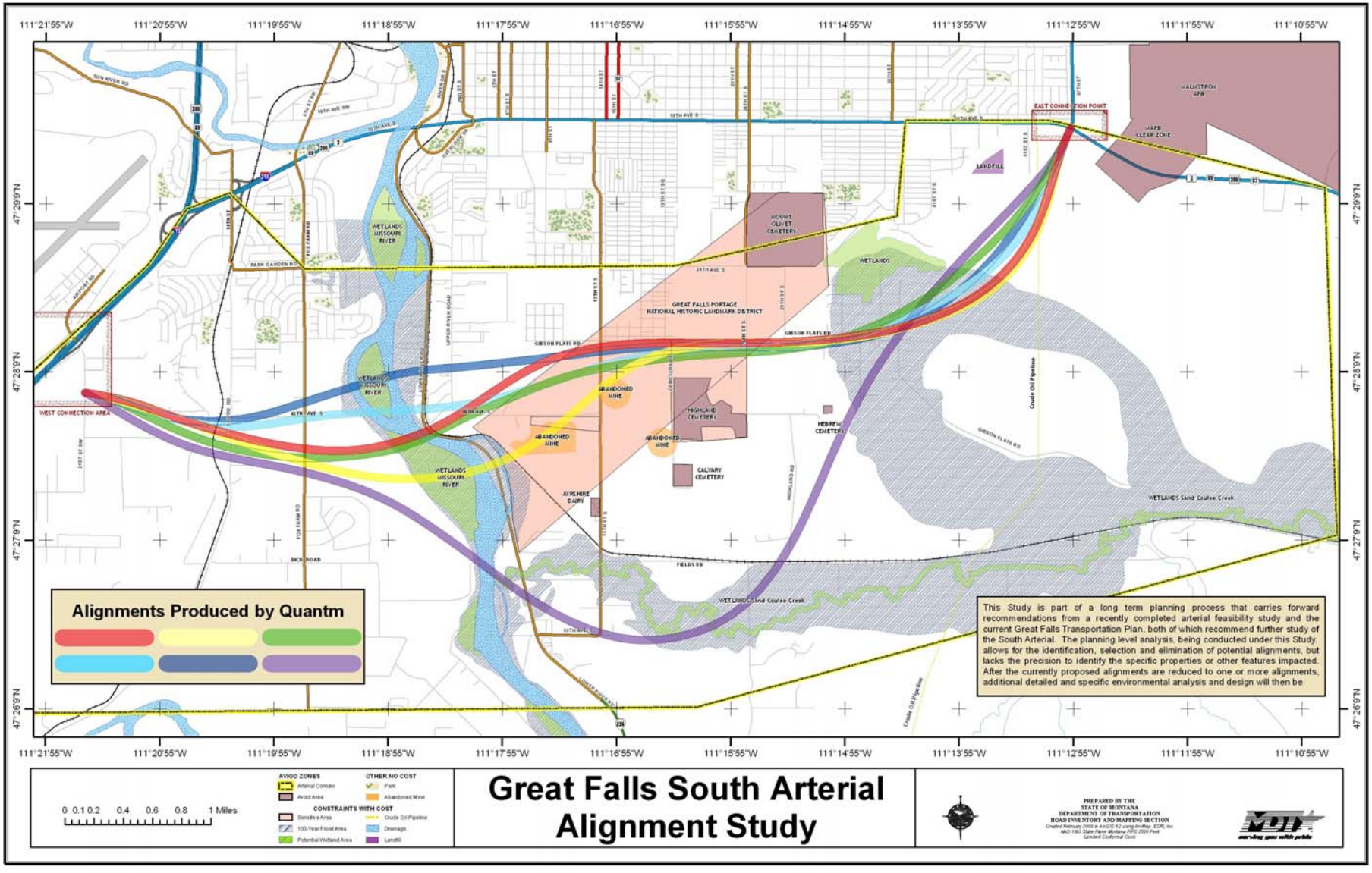
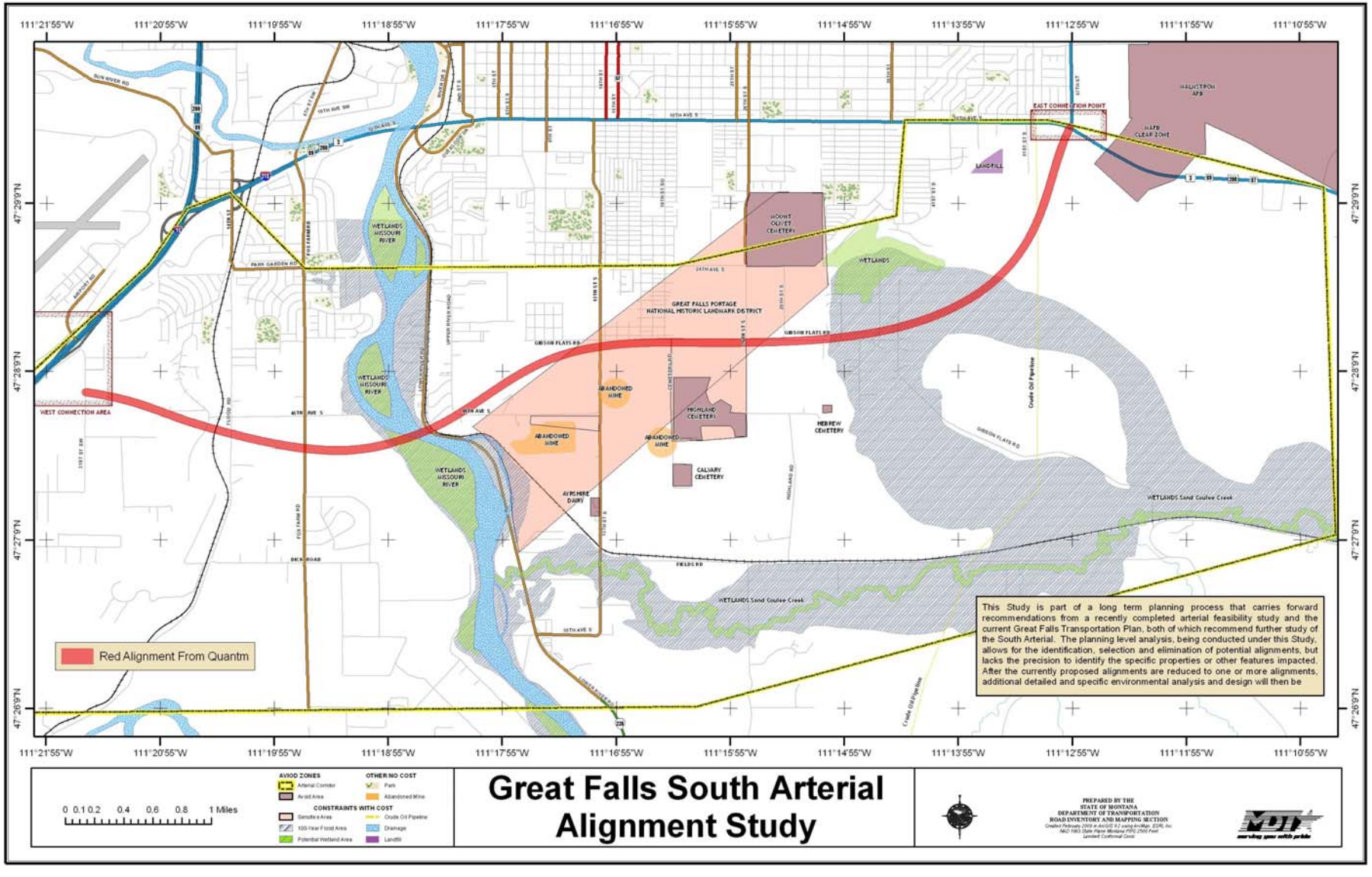


Figure 6 – Recommended Alignment



7.1. Analysis Criteria

Based on a planning-level overview of natural resources in the study area[8] it was determined that the six proposed alignments could possibly impact at least four areas of concern under the National Environmental Policy Act (NEPA) and the Montana Environmental Policy Act (MEPA), thus requiring additional analysis. The areas were Section 4(f) properties, wetlands, floodplains, and rights-of-way (this includes both private-land impacts and possible relocations). There are other areas that will need to be analyzed through the future NEPA/MEPA environmental analysis process. However, these other areas did not rise to a level of concern that would require additional consideration during this planning-level analysis.

All alignment impacts are estimates and stated in general terms. This allows for minor shifts in the selected alignment during final design to further lessen impacts on any features or properties. Although the final design may include a two-way facility with a slower traveling speed, this analysis was based on a four-lane rural principal arterial with limited access control, including turning lanes at access points, and a design speed of 60 mph to consider the greatest potential impact. Analyzing the greatest potential impact area will help facilitate the ability to phase construction by building a two-lane facility and protecting right-of-way for a future four-lane facility.

Bridges are typically designed for a 75-year life. Predicting traffic volumes out 75 years with any accuracy is not realistic. The staff recommendation during the design phase is to look at a four-lane structure or a two-lane structure that can easily be expanded for additional lane widths. Given the Clean Water Act 404 permitting process requirements for the project sponsor to minimize impacts, it is difficult to predict these requirements for the construction of two side-by-side structures separated by a length of time as laws and rules change. Options for final bridge design will be developed when a project is forwarded.

Using these described criteria, the following analysis was conducted.

7.2. Section 4(f) Properties

Section 4(f) of the U.S. Department of Transportation Act of 1966 (49 USC 303) protects the use of land from a significant publicly owned public park, recreation area, or wildlife and waterfowl refuge, or any significant historic site unless the following determinations are made:

- There is no feasible and prudent alternative to the use of land from the property
- The action includes all possible planning to minimize harm to the property resulting from such use

Prior to approving a project that uses a Section 4(f) resource, FHWA must find that there is no prudent or feasible alternative that completely avoids 4(f) resources. The Great Falls Portage National Historic Landmark is a large 4(f) resource that extends through the middle of the study area. The Quantm tool was used to generate alignments that completely avoid 4(f) resources. From the alignments generated, the Purple Alignment was selected and optimized for consideration in the detailed alignment analysis along with the original five alignments that cross the National Historic Landmark. Based on the information in Table 5, the Purple Alignment is

[8] All alignment impacts are estimates and stated in general terms based on the best available data and mapping through February 8, 2008. This allows for minor shifts in the selected alignment during final design to further lessen impacts on any features or properties.

the only route with no 4(f) use. Under section 4(f), if there is a feasible and prudent alternative that avoids the use of a 4(f) resource among alternatives that use a 4(f) resource, the avoidance alternative must be selected.

An alternative may be rejected as not prudent for any of the following reasons:

- It does not meet the project purpose and need;
- It involves extraordinary operational or safety problems;
- There are unique problems or truly unusual factors present with it;
- It results in unacceptable and severe adverse social, economic, or other environmental impacts;
- It would cause extraordinary community disruption;
- It has additional construction costs of an extraordinary magnitude; or,
- There is an accumulation of factors that collectively, rather than individually, have adverse impacts that present unique problems or reach extraordinary magnitudes.

Although the Purple Alignment avoids any use of 4(f) resources, the alignment was rejected based on adverse impacts to property and floodplains, extraordinary cost, and inability to meet purpose and need. Compared to the other five alignments, the Purple Alignment:

- Impacts nearly twice as many floodplain acres;
- Impacts 17-30% more right-of-way acres;
- Impacts nearly twice as many parcels with structures;
- Costs 70-95% more;
- Generates 50-60% less travel demand between Fox Farm Road and US 87/89 due to its long length with 50% less traffic relief on other key network links; and,
- Impacts the view-shed south from the National Historic Landmark.

It is not considered prudent to carry the Purple Alignment forward based on purpose and need along with extraordinary differences in impacts and costs.

Of those alignments that cross the National Historic Landmark, the Green and Yellow Alignments have the greatest impact on Section 4(f) properties. A way to minimize impacts to this protected property is to use the existing 33rd Avenue South/Gibson Flats Road Corridor, which currently bisects the Landmark. As illustrated in Table 5, the proposed Red Alignment best maximizes the use of this option, resulting in the fewest number of acres in the National Historic Landmark being impacted. The strategy of incorporating existing roadways and rights-of-ways in each alignment may further lessen the "use" of, or impact to, the National Historic Landmark.

Table 5. Section 4(f) Impact Analysis

Alignment Color	Acres Impacted	Difference from Red Alignment (Acres)
Purple	0	-
Red	34	0
Aqua	37	3
Blue	40	6
Green	48	14
Yellow	63	29

7.3. Wetlands

Wetland impacts are governed by Section 404 of the Federal Clean Water Act. When a project is forwarded, additional design for avoidance and minimization will be completed, which may reduce impacts to wetlands. This Alignment Study understands that unavoidable impacts must be mitigated. The mitigation plan will be developed when a project is forwarded.

This evaluation only looks at total differences of conservative assumptions. Wetlands were not formally delineated for this study. The wetland identification was made using aerial photos and a field review which looked at vegetation and land characteristics, and made assumptions near waterways. When a project is forwarded, wetlands that may be impacted will be delineated according to United States Army Corps of Engineers procedures.

Although the Yellow Alignment would impact the least amount of wetlands, the differences in the number of wetland acres impacted by the first four alignments as listed in Table 6 below, which includes the Red Alignment, are negligible. This may be due, in part, to the conservative method used to determine wetlands. The Aqua and Blue Alignments have the greatest impact on wetlands.

Table 6. Wetland Impact Analysis

Alignment Color	Acres Impacted	Difference from Red Alignment(Acres)
Yellow	9	-2
Red	11	0
Green	11	0
Purple	12	+1
Aqua	16	+5
Blue	16	+5

7.4. Floodplains

FHWA has set forth policies and procedures for the location and hydraulic design of highway encroachments on floodplains. The FHWA polices are:

- To encourage a broad and unified effort to prevent uneconomic, hazardous, or incompatible use and development of the nation's floodplains;
- To avoid longitudinal encroachment where practicable;
- To avoid significant encroachment where practicable;
- To minimize impact of highway agency actions that adversely affect base floodplains;
- To restore and preserve the natural and beneficial floodplain values that are adversely impacted by highway agency actions;
- To avoid support of incompatible floodplain development;
- To be consistent with the intent of the Standards and Criteria of the National Flood Insurance Program where appropriate; and,
- To incorporate "A Unified National Program for Floodplain Management" of the Water Resources Council into FHWA procedures.

The six alignments were reviewed to determine impacts to identified floodplain areas. The number of acres impacted by each alignment is presented in Table 7 below. The Green Alignment is the least impactive to floodplain areas, while the Purple Alignment impacts nearly twice as many acres as any of the other alignments. The results of this evaluation alone would not eliminate any of the alignments.

Table 7. Floodplain Impact Analysis

Alignment Color	Acres Impacted	Difference from Red Alignment (Acres)
Green	46	-9
Aqua	54	-1
Blue	54	-1
Red	55	0
Yellow	56	+1
Purple	91	+36

Additionally, impacts can be further mitigated by designing roadways and structures to prevent additional flooding or to minimize increases in floodwater elevations.

7.5. Right-of-Way

When using federal funds, a project sponsor must look at impacts to private property. Under each alignment, additional right-of-way would need to be acquired to accommodate any new alignment and/or roadway widening. In some cases, right-of-way acquisitions may require relocating homes, outbuildings, and/or utility structures and reconfiguring urban layout and connectivity. The amount of new right-of-way purchased and impacts to individual residences were minimized where possible.

As federal funds may be used for the acquisition of right-of-way, the acquisition process will comply with state and federal statues governing right-of-way appraisal, acquisition, and relocation assistance. Utility relocations will require coordination with local utility companies.

Understanding that these right-of-way acquisition needs are based on planning-level estimates, additional avoidance or minimization measures may be possible during design. As presented in Table 8 below, it appears the Green, Aqua, and Red Alignments would impact the least number

of acres. Additionally, as presented in Table 9 below, the Green, Yellow and Red Alignments would impact the least number of parcels with structures.

Table 8. Right-of-Way Impact Analysis (Total Acres Impacted)

Alignment Color	Acres Impacted	Difference from Red Alignment (Acres)
Green	214	-4
Aqua	215	-3
Red	218	0
Yellow	232	14
Blue	241	23
Purple	282	64

Table 9. Right-of-Way Impact Analysis (Parcels With Structures)

Alignment Color	Parcels Affected	Difference from Red Alignment (Parcels)
Green	≈ 26	-5
Yellow	≈ 27	-4
Red	≈ 31	0
Blue	≈ 38	+7
Aqua	≈ 52	+21
Purple	≈ 56	+25

7.6. Cost Estimates

The estimated costs for each alignment are based on construction, design, right-of-way, utilities, and other miscellaneous costs. These are estimated using 2035 dollars for a comparison. Actual costs may increase in the future due to inflation, material costs, and other unknowns. As this is a planning study, these estimated costs can be reviewed and used to determine which alternatives to advance. Based on the information presented in Table 10 below, the Red Alignment is the least costly.

Table 10. Cost Estimates[1]

Alignment Color	Cost (In Millions)	Difference from Red Alignment
Red	$275	$ 0
Green	$301	$ 26
Aqua	$311	$ 36
Yellow	$323	$ 48
Blue	$323	$ 48
Purple	$540	$265

[1] Estimated cost includes inflationary factors and indirect costs for year 2035, using Global Insights Project Cost Inflation Calculator and a 3% annual inflation rate. Also includes the following: construction, right-of-way, structures, mitigation, a new interchange at I-15 on Gore Hill, design, utilities, and other miscellaneous costs.

7.7. Summary

The Purple Alignment has the least impact on Section 4(f) properties. By using the existing 33rd Avenue South/Gibson Flats Road corridor that bisects the National Historic Landmark, the Red Alignment has the next fewest impacts on Section 4(f) properties. When the analyses of the other criteria are factored into the equation, the Purple Alignment has an extraordinary difference in impacts to developed parcels, right-of-way acquisition, and cost as demonstrated by the analysis and summarized in Table 11. In addition, it impacts the viewshed south from the National Historic Landmark. And, most notably, the Purple Alignment does not meet the goals and objectives of this study. It would not be considered prudent to carry the Purple Alignment forward to further analysis based on impacts and costs.

Of the remaining five alignments, impacts are similar except that the Red Alignment is the least impactive to 4(f) properties and the least costly. Although the Green Alignment appears to have similar impacts as the Red Alignment, it impacts over 40% more acres of the National Historic Landmark than the Red Alignment. Based on this analysis, the Red Alignment is proposed as the ***recommended alignment*** for consideration in the formal NEPA/MEPA environmental review process.

Table 11. Alignment Analysis Summary

Range	4(f) Acres Impacted 0-63 Acres	Wetland Acres Impacted 9-16 Acres	Floodplain Acres Impacted 46-91 Acres	Parcels with Structures 26-56 Parcels	RW Acres Impacted 214-282 Acres	Cost (in millions) $275-$540
Purple	*	▲▲	▲▲	▲▲	▲▲	▲▲
Aqua	►	▲▲	►	▲▲	►	▲▲
Blue	►	▲▲	►	▲▲	▲▲	▲▲
Green	▲▲	▲▲	▼	▼	▼	►
Red	▼	▲▲	►	►	►	▼
Yellow	▲▲	▼	▲▲	►	►	▲▲

* No Impacts

▼ Least Impactive

► Impacts within 20% of least impactive alignment

▲▲ Greatest Impact - beyond 20% of least impactive alignment

8. TRAVEL DEMAND FORECASTING

8.1. Background

8.1.1. Introduction

The traffic model used for this study was developed by the Montana Department of Transportation in support of the *2003 Great Falls Area Transportation Plan*. The model used to predict future traffic conditions for the plan was based on the existing Great Falls transportation network and committed system improvements. Future land use was projected by locals as part of the transportation plan. Typically, a 20-year horizon is chosen as the target year for projections. This process predicted population, housing, and employment growth trends out to 2025. Utilizing socioeconomic growth projections, the existing road network and committed improvements, the travel demand model forecasts year 2025 traffic volumes.

The future year (2025) traffic model analyzed the effects on the transportation system from the South Arterial and its potential alignments. For the purposes of this report, primarily the transportation system impacts from the recommended alignment are presented here. Impacts to the system from the full arterial along with its individual segments were analyzed.

8.1.2. Review of 2004 Great Falls Arterial Feasibility Study

The traffic model was one of the tools used to assess the impacts of a South Arterial for the *2004 Great Falls Arterial Feasibility Study*. Analysis of 2025 model runs in the study showed a new South Arterial would provide connectivity between major north-south links and satisfy the demand for east-west travel lacking in the existing transportation network. This was illustrated by the traffic volumes carried by the South Arterial. Model volumes ranged from approximately 5,000 to 13,000 vehicles per day (vpd).

Total vehicle miles of travel (VMT) and vehicle hours of travel (VHT) from model runs are an indication of the operational efficiency of the transportation network. They are useful to analyze the effects transportation improvements might have upon the network. VMT and VHT were compared with and without the South Arterial. With the arterial, both VMT and VHT decreased system-wide. VMT decreased 2 percent, and VHT decreased by 3.3 percent, indicating the road network is more efficient with the arterial.

Review of future year (2025) model runs indicated additional benefits from a South Arterial. There were significant reductions in traffic volumes on the 10th Avenue South corridor and Fox Farm Road. The *2003 Great Falls Area Transportation Plan* indicates many intersections on 10th Avenue South and on Fox Farm Road are projected to have unacceptable levels of service (LOS) under 2025 peak-hour traffic conditions. The reduction in traffic volumes as a result of the South Arterial would ease the congestion predicted for the future.

8.2. Analysis

8.2.1. Current Conditions

A list of current traffic counts on key roadways influenced by the South Arterial, are included in Appendix 8A.

8.2.2. Full Arterial

The traffic model was upgraded with information developed for this Alignment Study, including aligning the modeled arterial generally along the route identified as the recommended alternative. Once a recommended alignment for the arterial was identified through Quantm software, the alignment was reflected in model runs. Also, utilizing growth rates, the timeframe for the model exercise was extended to 2035 for this study.

Initial model runs on the full South Arterial assumed a limited-access facility with connections at major road crossings to the junction with 13th Street South. At 13th Street South, the arterial would utilize an existing roadway. It would follow 33rd Avenue South and Gibson Flats Road to the point where Gibson Flats Road turns south. At that point, the arterial would resume a limited-access nature to its termination at US 87/89. The arterial would connect to the road network at Fox Farm Road, Upper River Road, 13th Street South, and 26th Street South, with end points near the Gore Hill Interchange and on US 87/89 near 57th Street South. Results from model runs with the full arterial are shown in Table 12 and Figure 7.

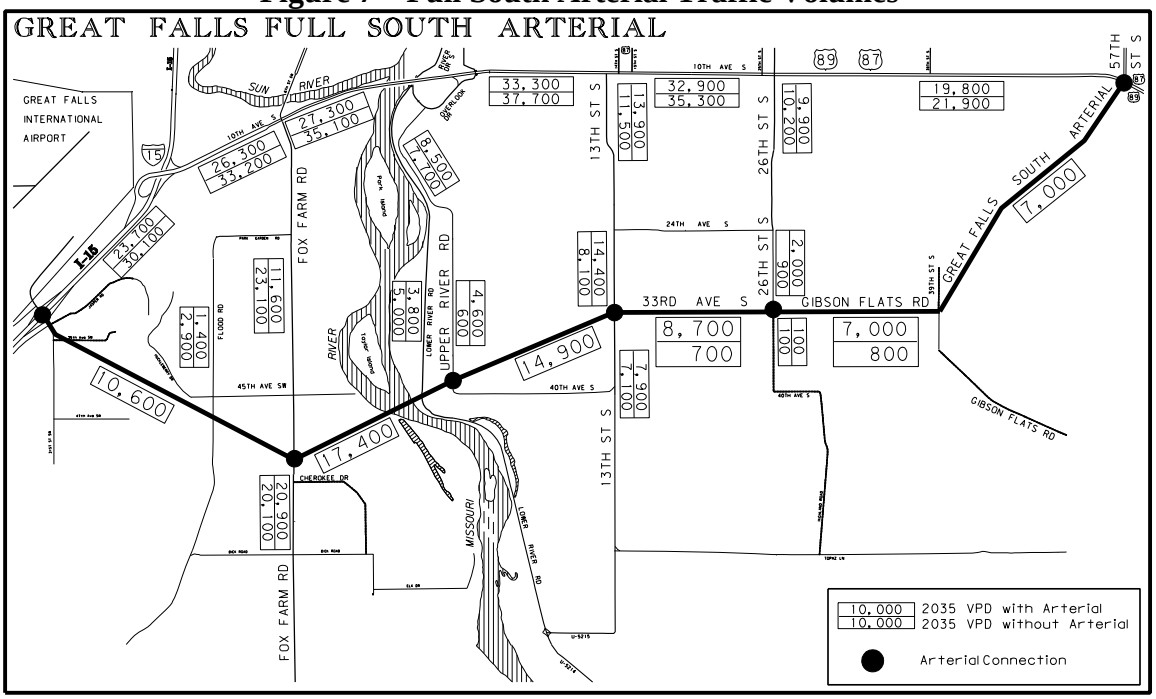
Table 12. Full Arterial Traffic Volumes

Roadway	Segment	2035 Traffic Volumes
Great Falls South Arterial	I-15–Fox Farm Road	10,000–11,000 vpd
	Fox Farm Road–Upper River Road	17,000–18,000 vpd
	Upper River Road–13th Street South	14,000–15,000 vpd
	13th Street South–26th Street South	8,000–9,000 vpd
	26th Street South–US 87/89	6,000–7,000 vpd
10th Avenue South	I-15–Fox Farm Road	21% decrease
	Fox Farm Road–River Drive South	22% decrease
	River Drive South–13th Street South	12% decrease
	13th Street South–26th Street South	7% decrease
	26th Street South–57th Street South	10% decrease
Flood Road	North of 45th Avenue SW	52% decrease
Fox Farm Road	North of 45th Avenue SW	52% decrease
	South of Cherokee Drive	6% increase
Upper River Road	South of Overlook Drive	10% increase
Lower River Road	South of 10th Avenue South	24% decrease
13th Street South	North of 33rd Avenue South	50% increase
	South of 33rd Avenue South	11% increase

26th Street South	South of 10th Avenue South	3% decrease
	South of 24th Avenue South	120% increase*
	South of 33rd Avenue South	no change

*Note that the increase is from less than 1,000 vpd to less than 1,200 vpd; which is an insignificant change in traffic volumes for this roadway segment.

Figure 7 – Full South Arterial Traffic Volumes



Review of the 2035 traffic volumes shows the arterial would carry 6,000 to 18,000 vehicles per day. The most heavily used section would be Fox Farm Road to 13th Street South, which would carry 14,000 to 18,000 vehicles per day. As in the *Great Falls Arterial Feasibility Study*, this analysis shows beneficial reductions in traffic on the entire 10th Avenue South corridor and on Fox Farm Road north of 45th Avenue South with the arterial versus without. The reductions in traffic volumes should increase the level of service on these facilities. Flood Road and Lower River Road would also see a reduction in traffic volumes. A portion of 13th Street South would experience large increases in traffic with the arterial. The increase could be large enough to degrade the level of service. The other roadways shown above would experience a slight increase in traffic, but should not have a decrease in level of service due to projected volumes of less than 10,000 vpd on those links. Although a 120 percent increase is predicted for a portion of 26th Street South, it should be noted that the future volume without the South Arterial is less than 1,000 vpd, so impacts from this increase would be negligible. The South Arterial would have little impact on the rest of the major street network. To review the complete model analysis, refer to Appendix 8B.

VMT and VHT from model runs were compared with and without the arterial. With the arterial, VMT decreased 2 percent and VHT decreased 3.3 percent system wide. This indicates the road network would be more efficient with the arterial.

The ratio of volume to capacity on a roadway can be used to calculate the level of service of that roadway. The results of the calculation are usually translated into a grading system that ranges from LOS A to LOS F. LOS A indicates smooth operation with no congestion, and LOS F indicates oversaturation and results in gridlock. The interim letters, B through E indicate an intermediate condition. Level of service calculations on the South Arterial from Fox Farm Road to 13th Street South translate to LOS E and F if built as a two-lane facility. Consequently, a four-lane is likely for this segment.

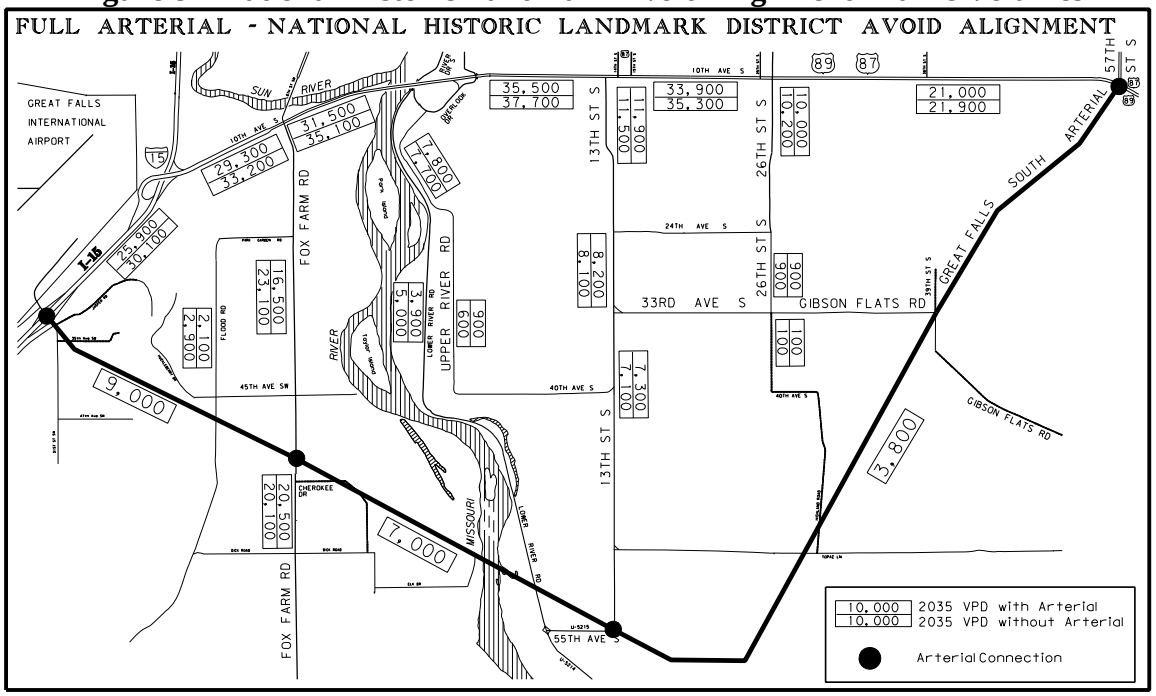
8.2.3. Full Arterial – National Historic Landmark Avoid Alignment

A model analysis was completed on a full South Arterial alignment which completely avoided the National Historic Landmark (NHL). For this model run, the arterial connects to the street network at Fox Farm Road and 13th Street South, while the endpoints remained identical to the recommended full arterial. The number of possible street connections was limited by the southern location of this alignment. The results of the model run are shown in Table 13 and Figure 8.

Table 13. NHL Avoid Alignment Traffic Volumes

Roadway	Segment	2035 Traffic Volumes
Great Falls South Arterial	I-15-Fox Farm Road	9,000-10,000 vpd
	Fox Farm Road-13th Street South	6,000-7,000 vpd
	13th Street South-US 87/89	3,000-4,000 vpd

Figure 8 – National Historic Landmark Avoid Alignment Traffic Volumes



Traffic volumes from the NHL avoid alignment model run show the I-15 to Fox Farm Road segment would carry almost as much traffic volume as that segment from the recommended full arterial. This segment of the avoid alignment closely follows the recommended alignment with similar travel times. At Fox Farm Road the avoid alignment departs to the southeast to avoid the NHL. Due to the extended travel times and lack of road network connections, traffic volumes on the avoid alignment between Fox Farm Road and US 87/89 drop. This portion of the arterial would carry 3,000 to 7,000 vehicles per day versus 6,000 to 18,000 vehicles per day for the recommended full arterial alignment. As traffic volumes on the avoid alignment decline, so do the beneficial reductions in traffic on 10th Avenue South and Fox Farm Road from a South Arterial. The decreases in traffic on 10th Avenue South and Fox Farm Road from the arterial are approximately half the decreases with the recommended full arterial alignment. Flood Road and Lower River Road would also see reductions in traffic with the avoid alignment. There was no change in traffic on Upper River Road, 13th Street South and 26th Street South. To review the complete model analysis, refer to Appendix 8C.

8.2.4. Segments

The traffic model was used to analyze the effects to the road network from independent segments of the South Arterial. Table 14 contains traffic volumes for individual, stand alone segments.

Table 14. Arterial Segment Traffic Volumes

Roadway	Segment	2035 Traffic Volumes
Great Falls South Arterial	I-15–Fox Farm Road	7,000–8,000 vpd
	Fox Farm Road–Upper River Road	11,000–12,000 vpd
	Upper River Road–13th Street South	less than 1,000 vpd
	13th Street South–26th Street South	less than 1,000 vpd
	26th Street South–US 87/89	1,000–2,000 vpd
	Fox Farm Road–13th Street South*	10,000–13,000 vpd

*Traffic volume on partial segment

The traffic volumes shown above represent results when each separate segment of the arterial was modeled as a stand-alone section and as a partial arterial segment. The results illustrate the Fox Farm Road to Upper River Road segment would carry the most traffic if built independent of the other sections of the arterial. The I-15 to Fox Farm Road segment would also carry a fairly heavy volume of traffic. The other segments generate minimal traffic when operated independently. The Fox Farm Road to 13th Street South segment would offer the greatest independent utility, illustrated by the range of traffic volumes it would carry (10,000 – 13,000 vpd).

8.2.5. Partial South Arterial

Funding limitations may necessitate the South Arterial be constructed in shorter segments of independent utility with logical termini. The first independent segment recommended for

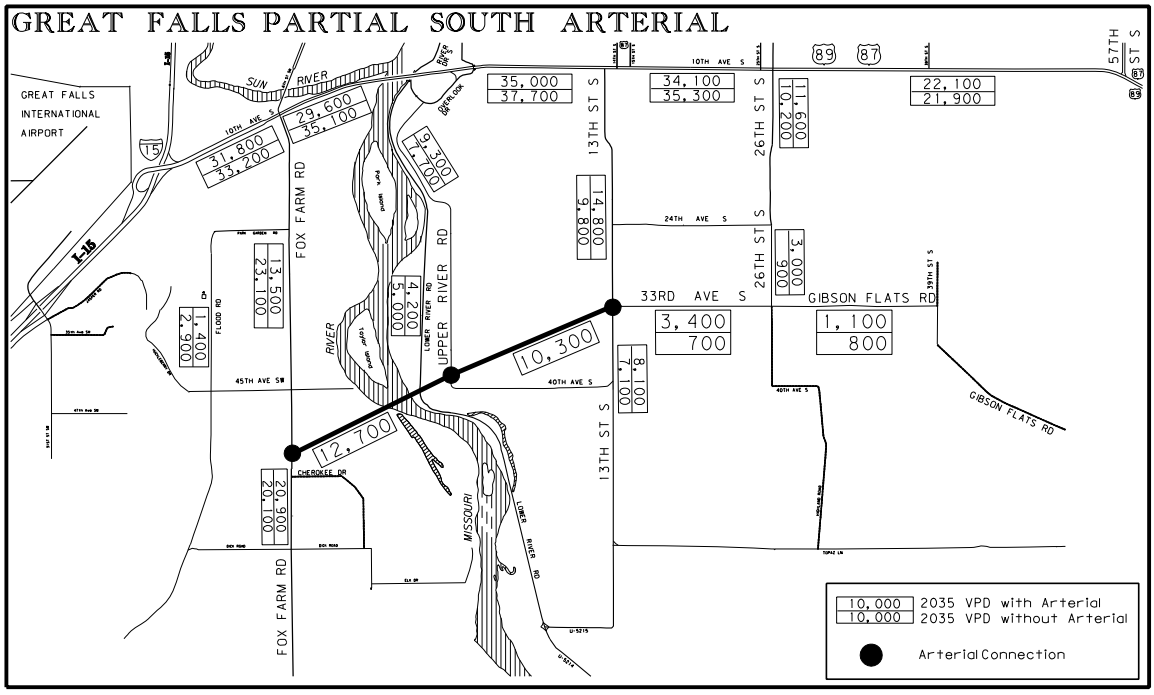
construction is Fox Farm Road to 13th Street South. The traffic model was used to examine the effects to the road network with this segment of the South Arterial. The traffic volumes on arterial segments and other impacted roadways are shown in Table 15 and in Figure 9.

Table 15. Partial Arterial Traffic Volumes

Roadway	Segment	2035 Traffic Volumes
Great Falls South Arterial	Fox Farm Road–Upper River Road	12,000–13,000 vpd
	Upper River Road–13th Street South	10,000–11,000 vpd
10th Avenue South	I-15–Fox Farm Road	4% decrease
	Fox Farm Road–River Drive South	16% decrease
	River Drive South–13th Street South	7% decrease
	13th Street South–26th Street South	3% decrease
	26th Street South–57th Street South	1% decrease
Flood Road	North of 45th Avenue SW	52% decrease
Fox Farm Road	North of 45th Avenue SW	43% decrease
	South of Cherokee Drive	4% increase
Upper River Road	South of Overlook Drive	21% increase
Lower River Road	South of 10th Avenue South	16% decrease
13th Street South	North of 33rd Avenue South	56% increase
	South of 33rd Avenue South	14% increase
26th Street South	South of 10th Avenue South	14% decrease
	South of 24th Avenue South	233% increase*
	South of 33rd Avenue South	no change

*Note that the increase is from less than 1,000 vpd to less than 1,200 vpd; which is an insignificant change in traffic volumes for this roadway segment.

Figure 9 – Partial South Arterial Traffic Volumes



Review of traffic volumes with a section of the arterial from Fox Farm Road to 13th Street South shows the partial arterial would carry 10,000 to 13,000 vehicles per day. This would reduce volumes on 10th Avenue South, although not to the same degree as the full arterial. The decrease in traffic volume on Fox Farm Road is almost the same as with the full arterial and there would be an increase in the level of service. A partial arterial would decrease traffic on Flood Road and Lower River Road. Also, there would be increases in traffic on Upper River Road and 26th Street South. The increases on these roadways should not be large enough to cause a decrease in the level of service. Although an increase of 230 percent is predicted for a portion of 26th Street South, it should be noted that the future volume without the arterial is less than 1,000 vpd; therefore, impacts from this increase would be minimal. The traffic increases on 13th Street South would be large enough to degrade the level of service. The partial arterial would have little impact on the rest of the major street network. To review the complete model analysis, refer to Appendix 8D.

VMT and VHT from model runs were compared with and without the partial arterial. With the partial arterial, VMT decreased 1.6 percent and VHT decreased 0.4 percent system wide. This indicates the road network operates more efficiently with the partial arterial, although benefits are not as great as with the full arterial.

Calculating the volume-to-capacity ratio on the Fox Farm Road to Upper River Road segment of the partial arterial yields a value of approximately 0.85. That value translates to a LOS D. This level of service is indicative of a roadway nearing capacity and congestion could be expected. The segment of the partial arterial from Upper River Road to 13th Street South would operate at a mid-range LOS C. A four-lane is likely for the first segment of the partial arterial. If built as a four-lane, the partial arterial would operate in the LOS A to B range with smooth operation and no congestion.

8.2.6. Crash Analysis

Crash data for the 10th Avenue South Corridor (57th Street South to Fox Farm Road) from January 1, 2005, through December 31, 2007, was considered. Two ways to interpret crash data to statewide averages, for comparison purposes, are crash rates and severity indices. Crash rates are defined as the number of crashes per million vehicle-miles. Severity indices are somewhat more complicated, but are weighted ratios relating the seriousness of the injuries in a crash to the total number of crashes. Covering the latest three-year period, the crash rate on the 10th Avenue South corridor is 6.10 and the severity index is 1.62. These compare to corresponding statewide averages for similar roadways within city limits of 5.66 and 1.67. For the latest three-year time period, the 10th Avenue South corridor has had a slightly higher crash rate and slightly lower severity index than the statewide averages. There were a total of 271 injury crashes of various types out of a total of 992 crashes.

In the *2004 Great Falls Arterial Feasibility Study*, crash projections were made based on traffic volume forecasts from model runs. The *2004 Great Falls Arterial Feasibility Study* predicted a system-wide reduction in all types of crashes with a southern arterial. The proposed reduction in crash potential was based on traffic-model-projected decreases in traffic volumes on key links within the transportation system. Following the same reasoning with updated model runs and corresponding decreases in volumes on major links, an overall reduction in crash potential might be expected, especially with the full arterial.

9. PURPOSE AND NEED

The *Great Falls South Arterial Alignment Study* is an extension of the *Great Falls Growth Policy* (2005), *Great Falls Area Transportation Plan* (2003), and the *Great Falls Arterial Feasibility Study* (2004). This alignment study is a refinement of the southern corridor four-lane urban arterial recommended in the *Great Falls Arterial Feasibility Study*.

The purpose and need developed from this study must be consistent with the goals, objectives, and policies as set forth in the growth policy and transportation plan. It must also be consistent with the benefits presented in the *2004 Great Falls Arterial Feasibility Study*. The working group, with input from the public and stakeholders, reviewed and expanded upon the information presented in these documents to develop the purpose and need statement in this study.

The purpose and need identified in this study will be used as part of the overall project development process consistent with the National Environmental Policy Act and the Montana Environmental Policy Act (NEPA/MEPA).

In the development of a purpose statement, the needs or issues that will be addressed by a project must be determined if it is to be advanced through the project development process. Based on the information contained in the previously noted studies and plans and information gathered from the public and stakeholders, the following needs were identified that would be met or improved upon from development of the South Arterial:

- Reduce congestion on the 10th Avenue South corridor;
- Improve safety on the 10th Avenue South corridor;
- Improve mobility on the Great Falls street network; and,
- Provide an additional Missouri River bridge crossing, south of 10th Avenue South.

There would also be other benefits when the entire arterial is developed. These would include:

- Improving air quality by reducing congestion and stopping and idling times;
- Improving an international and regional trade corridor and reducing travel time between the area's two military operations; and,
- Reducing emergency response times to and from the southwest Great Falls area and providing an additional emergency egress in case of disaster.

Using the above identified needs and benefits, the following purpose statement was derived from this study: ***The purpose of the proposed project is to reduce congestion and improve safety on the 10th Avenue South corridor, improve street network mobility, and provide an additional Missouri River bridge crossing, south of 10th Avenue South.***

10. FINANCIAL ANALYSIS

The financial feasibility of the South Arterial was considered in the *2004 Great Falls Arterial Feasibility Study*. Although a new arterial was demonstrated to meet the economic benefit/cost threshold, the study concluded that funding for this project will continue to be a challenge. The ability of this project to be funded for continued development, including final design, right-of-way acquisition, and construction is a function of the availability of existing and future federal, state, local, and private funding sources. Due to the tremendous costs anticipated for right-of-way acquisition and construction of a new South Arterial, the project is generally considered to be beyond the ability of the participating agencies to fund through existing funding avenues. As such, special congressional appropriations, coupled with funds from the State of Montana, Cascade County, City of Great Falls, and private development, as opportunities arise, are anticipated to be the best means by which to continue the development of this project.

A summary of the planning requirements and listing of the potential funding sources that may be utilized to advance this project are discussed herein. The list should not be considered inclusive, nor should the program funds listed be considered readily available.

10.1. Planning Requirements

As defined in federal regulations, the South Arterial is a "regionally significant project" located within the Great Falls Metropolitan Planning Area (Figure 10).

Federal regulations require that, to achieve federal approval of the environmental document for regionally significant projects or independent segments of larger projects within a metropolitan planning area (MPO), the project must be included in these financially constrained[9] documents:

- MPO long-range transportation plan
- MPO Transportation Improvement Program (TIP)
- State Transportation Improvement Program (STIP)

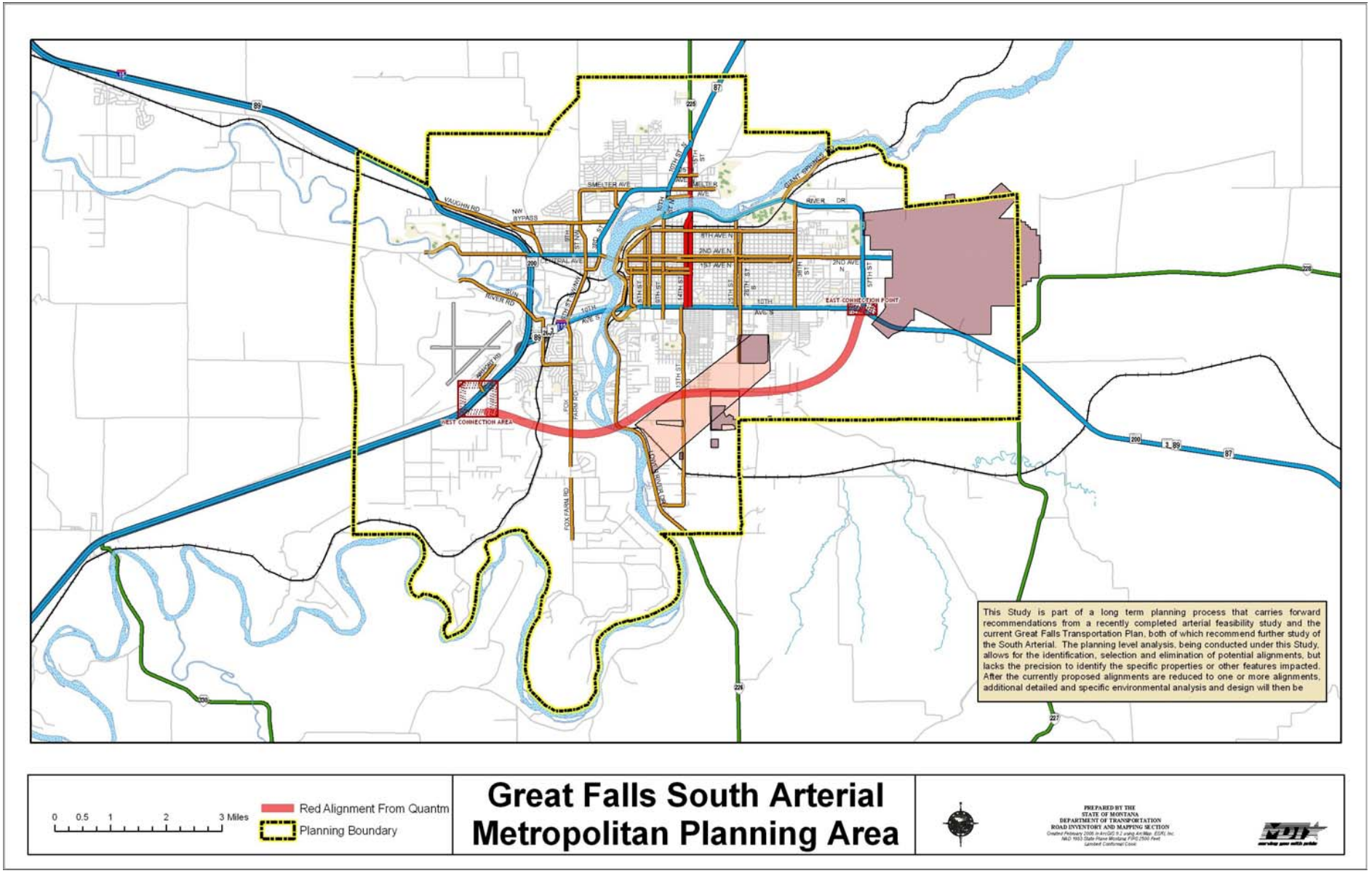
Federal regulations allow larger projects, such as the South Arterial, to be divided into smaller independent segments, but each must have independent utility and logical termini while still contributing to the function of the overall project. The long-range transportation plan must demonstrate that revenues are reasonably expected to be available and sufficient to cover the cost of the entire project or independent segments of a larger project. Regarding the TIP/STIP, if construction is beyond the time frame of these documents, then funding for at least one subsequent project phase (i.e., final design, right-of-way, utility relocation, or construction) must be reflected in these documents to achieve FHWA approval of the environmental document.

The South Arterial is not in Great Falls' current TIP and would need to be included in the fiscally-constrained *Great Falls Area Transportation Plan* prior to inclusion in the TIP. Although the latest *2003 Great Falls Area Transportation Plan* included the South Arterial as an "illustrative project,"[10] it is important that a financial plan for constructing at least an independent segment of the South Arterial is included in the update of the fiscally constrained *Great Falls Area Transportation Plan* with inclusion of a subsequent phase(s) (i.e., final design, right-of-way, utility relocation, or construction) in the TIP and STIP following the plan update.

[9] *Financially constrained* is a demonstration of sufficient funds (federal, state, local, and private) to implement proposed transportation system improvements, as well as to operate and maintain the entire system through the comparison of revenues and costs (23 CFR 450.104).

[10] *Illustrative project* means that no specific or guaranteed funding source has been identified at this time.

Figure 10 – Great Falls Metropolitan Planning Area



During updates of the *Great Falls Area Transportation Plan,* existing and recommended projects are evaluated to determine the optimum mixture that best meets the needs of the area's integrated multimodal transportation system to ensure the safe and efficient movement of people and goods. If the South Arterial or smaller segment with independent utility and logical termini is included in the fiscally constrained, air-quality-conforming transportation plan and a subsequent phase in the TIP, the FHWA could sign an environmental decision document (i.e. A Finding of no Significant Impacts or a Record of Decision) for this project. Conversely, if it is not in such plans, then FHWA would not sign an environmental decision document advancing a build alternative. FHWA could either delay issuance of an environmental document until the long-range plan and TIP include the project or could select the No-Action Alternative. In addition, the preservation of corridors within metropolitan areas is not eligible for federal-aid funds if the construction project within the preserved corridor cannot be completed within the planning horizon (20 years).

10.2. Potential Funding Sources

10.2.1 Federal Funding

Federal funding for highway construction is supported by the Federal Highway Trust Fund and generally comes from a congressional transportation-spending bill that is reauthorized every six years. The most recent surface transportation spending bill, the "Safe Accountable Flexible and Efficient Transportation Equity Act: A Legacy for Users" (SAFETEA-LU) enacted on August 10, 2005, provides transportation funding through September 30, 2009. Continued federal funding is subject to a future reauthorization of SAFETEA-LU by Congress.

Currently available funds for the South Arterial were provided through SAFETEA-LU, which earmarked funds for 33 Montana projects, including $4,500,000 for the *Great Falls South Arterial Development.* The Montana Department of Transportation is providing the required 13.42 percent matching funds for this earmark based on Montana Transportation Commission approval at its November 1, 2005, meeting. The estimated total available for this project, including match, is $5,197,500. A portion of the earmarked and state matching funds has been used for this alignment study with the majority of the funds remaining for development of the environmental document, project design, and (based on availability) future right-of-way acquisitions.

The *2004 Great Falls Arterial Feasibility Study* discussed potential federal funding sources as listed in Table 12. The most recent status of these federal sources and eligibility criteria, as related to the South Arterial, are reflected.

Table 16. Status of Potential Federal Funding Sources Identified in the 2004 *Great Falls Arterial Feasibility Study*

Federal Sources	Status	Eligibility
National Corridor Planning & Development Program (NCPD)	Inactive	N/A
Coordinated Border Infrastructure Program (CBI)	Active	No[1]
Congestion Mitigation & Air Quality Improvement Program (CMAQ)	Active	Yes
Transportation Community and System Preservation Program (TCSP)	Active	Yes
National Highway System (NHS)	Active	Yes[2]
Congressional Appropriations	Active	Yes

1. *Projects must be within 100 miles of an international land border with Canada or Mexico; the South Arterial is not.*
2. *Projects must be on the federally designated National Highway System. The South Arterial is not an existing road and could only be considered for NHS designation by FHWA if there's a complete funding package to build the route within six years of designation, and it is determined that the route is an eligible NHS route. However, the intersections at the termini with I-15 and US 87/89, both on the NHS, would be eligible.*

The eligible federal funding sources are discussed below:

- **Congestion Mitigation and Air Quality Improvement Program (CMAQ)**
  CMAQ funds are federally apportioned to Montana and allocated to various eligible programs by federal formula and the Transportation Commission. These funds pay for transportation projects that improve air quality in "non-attainment" and "maintenance" areas, those areas where the Environmental Protection Agency (EPA) considers air quality to be poor, or where there have been air quality problems in the past. Eligible activities include transit improvements, traffic signal synchronization, bike/pedestrian projects, intersection improvements, travel demand management strategies, traffic flow improvements, and public fleet conversions to cleaner fuels. At the project level, the use of CMAQ funds is not constrained to a particular system (i.e. Primary, Urban, and NHS). Of the total received, 86.58 percent is federal and 13.42 percent is non-federal match. A requirement for the use of these funds is the estimation of the reduction in pollutants resulting from implementing the program or project. These estimates are reported yearly to the Federal Highway Administration (FHWA).

  Although a certain portion of CMAQ funds must be directed to Missoula—Montana's only moderate carbon monoxide (CO) nonattainment area—the Transportation Commission also provides funds from this source for other programs, including the Montana Air and Congestion Initiative (MACI) program.

  Montana Air & Congestion Initiative (MACI) Guaranteed Funds - This is a state program funded with flexible CMAQ funds that the Commission allocates annually to Billings and Great Falls to address carbon monoxide issues in these CO "limited maintenance" areas. The air quality in these cities is roughly equivalent to Missoula; however, since these cities are "not classified," they do not get direct funding through the federal formula. The Great Falls MPO is allocated approximately $1,200,000 annually through this funding source.

- **Transportation and Community and System Preservation Program (TCSP)**
  The TCSP provides funding to states, local governments, and MPOs for discretionary grants to plan and implement strategies that improve the efficiency of the transportation

system, reduce environmental impacts of transportation, reduce the need for costly future public infrastructure investments by ensuring efficient access to jobs, services, and centers of trade, and to examine private-sector development patterns and investments that support these goals.

Most recently, USDOT and FHWA have directed these federal discretionary program funds to projects that are consistent with the federal Congestion Initiative to fight traffic gridlock. Therefore, recent years have seen funding directed to large urbanized communities in a limited number of urban-type states. If this trend continues, it may be difficult for Montana communities to compete for these types of funds.

- **Congressional Appropriations**
  These funds, also referred to as "earmarks," are appropriated by Congress for the specific use of a project. The $4,500,000 earmark authorized through SAFETEA-LU for the South Arterial came from this source. However, future earmarked funds are not assured, and there is a January 28, 2008, Executive Order by the President pledging to veto any appropriations bill from Congress that does not cut the number and cost of earmarks in half.

10.2.2. State Funding

The *2004 Great Falls Arterial Feasibility Study* discussed the possible use of state revenues for the project. Potential state funding sources are listed in Table 17.

Table 17. Potential State Funding Sources Identified in the *2004 Great Falls Arterial Feasibility Study*

State Sources	Description
State Fuel Tax	Per MCA 15-17-101, cities, towns, and counties are allocated a portion of state fuel-tax funds based on formulas provided through state statute. All fuel-tax funds allocated to city and county governments must be used for the construction, reconstruction, maintenance, and repair of rural roads or city streets and alleys.
State Sales Tax	Although Montana does not have a statewide sales tax, establishment of such a tax could provide a valuable source of additional funding for public improvements.

10.2.3. Local Funding

The *2004 Great Falls Arterial Feasibility Study* also discussed the possible use of a range of local revenues for the project. Potential local funding sources are listed in Table 18.

Table 18. Potential Local Funding Sources Identified in the *2004 Great Falls Arterial Feasibility Study*

Local Sources	Description
City and/or County General Fund	Includes property taxes, development fees, and other sources of general fund revenue
Local Fees	Includes impact fees, permits, motor vehicle license fees, and other fees
Local Option Taxes	Under state law, local option taxes must be imposed on a jurisdiction-wide basis and approved by a local referendum (the local option vehicle tax does not require voter approval). Montana law currently authorizes three local option taxes that can be imposed at the local level including a gas tax (not to exceed two cents per gallon), motor vehicle tax (0.7 percent), and resort tax. No county has successfully imposed the gas tax; several counties have imposed a vehicle class, while only a handful of cities have a resort tax.
Bonded Debt	A general-obligation bond could be passed to offset some project costs or used for a required local funding match. Some Montana communities have successfully issued this type of bond for transportation improvements.

Although not identified in the *2004 Great Falls Arterial Feasibility Study*, another local-funding mechanism is improvement districts. State law provides authority for counties to create Rural Improvement Districts, Road Improvement Districts, and Local Improvement Districts. Cities have statutory authority to create Special Improvement Districts.

10.2.4. Other Funding Sources

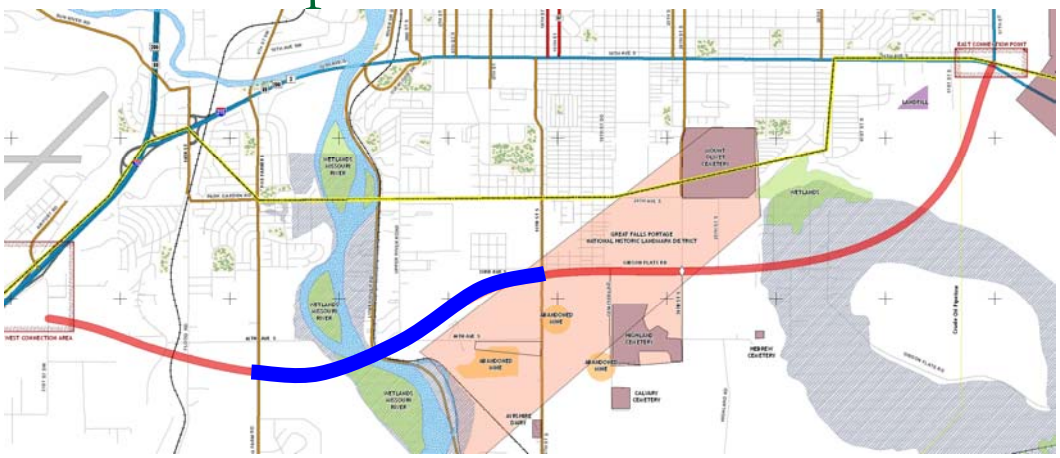
Additional funding could be realized through cost-sharing programs designed to make use of developer construction and contributions along the arterial corridor. Also, private donations of money and/or right-of-way could help to offset the cost of development and construction.

10.3. Estimated Costs

Based on most recently available unit costs, the recommended alignment for the South Arterial is estimated to cost in 2035 from approximately $208,000,000 (two-lane) to $285,000,000 (four-lane). A shorter segment of the arterial that could demonstrate independent utility with logical termini includes the segment from Fox Farm Road to 13th Street South (Figure 11), estimated to cost from $83,000,000 to $93,000,000 for a four-lane in 2017.

Figure 11 – Phased Implementation

Phased Implementation



- Initial Phase from Fox Farm Road to 13th Street South
  - Shortest segment with “independent utility” and “logical termini”
  - Shorter segment in this area would be difficult to construct

11. CONCLUSION AND NEXT STEPS

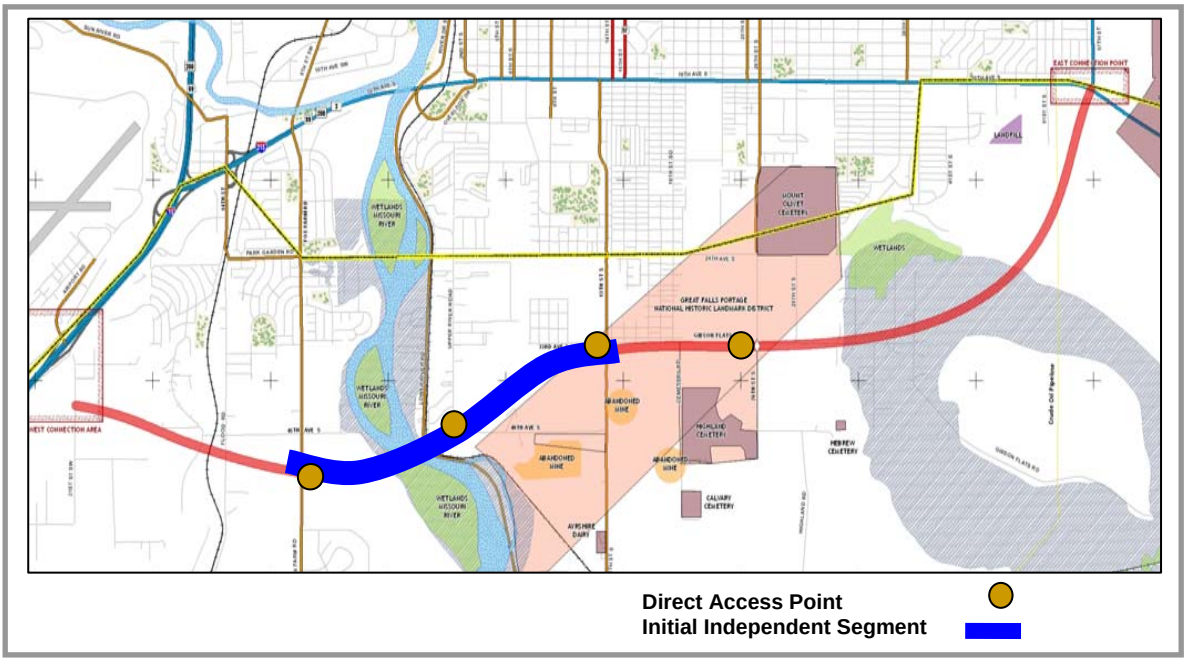
The analysis from the *Great Falls Arterial Feasibility Study* recommended a four-lane arterial serve as the basis for future studies. Both two-lane and four-lane arterial configurations were examined during this Alignment Study. As a result of this analysis the study recommends the Red Alignment (Figure 12) as the recommended alignment and that it be designed as a limited access, undivided, four-lane rural principal arterial with at-grade intersections and a 60 mph design speed. Based on 2035 travel demand, a four-lane is needed from I-15 to 13th Street South. However, east of 13th Street South a two-lane can accommodate future travel demand through the 2035 horizon but local governments should work to preserve the corridor for an eventual four-lane. The arterial should have direct access from Fox Farm Road, Upper River Road, and 13th Street South. At 13th Street South, it would utilize existing 33rd Avenue South/Gibson Flats Road with direct access at 26th Street South. From 33rd Avenue South/Gibson Flats Road, it would head towards its termination on 10th Avenue South (US 87/89). End points would be at I-15, near Gore Hill Interchange, and 10th Avenue South (US 87/89), near 57th Street South.

Given federal planning requirements and the substantial project costs, the ability to advance the South Arterial will be highly dependent on successfully financing and constructing independent segments of the arterial, as reasonably available funding sources are secured.

If the Fox Farm Road to 13th Street South segment was pursued as the initial independent segment, the estimated cost by phase in 2017 dollars would be:

Preliminary Engineering	$ 5,000,000
Right-of-Way	$14,000,000 – $17,000,000
Incidental Construction	$10,000,000
Construction	$51,000,000 – $58,000,000
Construction Engineering	$ 3,000,000
TOTAL	$83,000,000 – $93,000,000

Figure 12 – Recommended Alignment and Segment of Independent Utility



Considering the amount of currently available funding (approximately $4,900,000 of the SAFETEA-LU earmark, plus state match remain), there are sufficient funds for development of an environmental document, which is part of the preliminary engineering phase. However, in order to achieve federal approval of the environmental decision document and ensure continued development of the South Arterial, it is critical that the participating agencies continue to work together to secure the remainder of the financing package to[11]:

- Demonstrate reasonably available revenues to cover the estimated cost of the initial independent segment from Fox Farm Road to 13th Street South and reflect funding for this segment in the *Great Falls Area Transportation Plan;* and
- Identify available funding for a subsequent phase (i.e., Final Design[12]) and update the Metropolitan Planning Organization (MPO) Transportation Improvement Program (TIP) and MDT Statewide Transportation Improvement Program (STIP) to include funding for this project phase.

Additional critical steps in the financing package are:

- Update the *Great Falls Area Transportation Plan* - This plan update should include improvements as needed to other network links that would experience increased pressure with construction of the south arterial or partial arterial (i.e. 13th Street South, Upper River Road, 33rd Avenue/Gibson Flat Road, Flood Road, etc).
- Local governments should take appropriate steps to preserve the recommended South Arterial corridor, as lands are developed and as other opportunities arise.

[11] These steps are necessary if the environmental document identifies a preferred alternative other than the "No-Build".

[12] Currently, project phases are as follows: Preliminary Engineering (PE), Right-of-Way (RW), Incidental Construction (IC), Construction (CN), and Construction Engineering (CE). Recognizing "final design" as a project phase would require an MDT business process change allowing a two-tier approach to PE - the first tier being through the scope of work and the second tier being final design.

Appendix 4a

PUBLIC MEETING & REPORT COMMENTS/RESPONSES & PRESENTATIONS

MEMORANDUM

Physical Address:
The Power Block
7 West 6th Avenue
Suite 4 W
Helena, Montana 59601

Mailing Address:
P.O. Box 1009
Helena, Montana 59624

(406) 442 - 0370 Tel
(406) 442 - 0377 Fax

To: Tom Kahle

From: Darryl James, AICP and Jennifer Peterson

Date: February 22, 2007

Subject: Great Falls South Arterial Public Meeting Memo #1

Darryl James from HKM Engineering provided a brief presentation that gave the history of the project and explained the project development process. Comments were then taken from those in attendance. The following is a list of the comments received at the meeting. We are compiling all the written comments as we receive them.

Comments received during the Great Falls South Arterial Public Meeting

Trucks may not use a southern alignment.
Plan for the bridge over the Missouri to be six-lanes.
The Airport Interchange is a hazard.
How do you deal with the potential neighborhood impacts?
Consider a new interchange.
The aerials we are using need to be updated.
Fed/Ex and Malmstrom require that the analysis be multi-modal.
Fox Farm Road is too narrow.
What will be the mitigation measures for the residential areas?
Look at a terminus south of Gore Hill Road.
What will be the noise impacts from trucks?
People are not going to divert from 10th Avenue South.
Will trucks use the route if it is designed as an Arterial?
Access should be limited.
Grade separate the intersections.
This project should have been done 20 years ago!

The road will need some access.
Will the road be concrete or asphalt?
The islands on the Missouri are pristine – try not to affect them.
Plan for growth and preserve the right-of-way now.
How far apart would the access points be?
There needs to be a crosswalk between Upper and Lower River Roads.
Can road pass through the floodplain?
There is an intensifying deer population.
What constraint is untouchable?
Consider residential impacts!
Look at an interchange at Ulm.
Think about the termini…
Don’t focus on the Gore Hill interchange.
Keep the road access controlled.
We don’t need the road.
There are not a lot of options for alignment as you look at constraints.
Most trucks appear to be Canadian.
Is there funding?

MEMORANDUM

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Helena, Montana 59601

Mailing Address:
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Helena, Montana 59624

(406) 442 - 0370 Tel
(406) 442 - 0377 Fax

To: Tom Kahle

From: Darryl James, AICP
Jennifer James

Date: November 19, 2007

Subject: **Great Falls South Arterial Alignment Study**
October 9, 2007 - Public Meeting Summary

NOTE: *This is the final version of this memo prepared after the close of the comment period on November 9, 2007.*

Darryl James, of HKM Engineering, provided a brief presentation that gave the history of the project, the project development process, the Quantm software and the range of alternatives being considered. Questions and comments were then taken from those in attendance. There were 128 people that signed in at the meeting. The following is a list of the comments received at the meeting.

Comments received during the October 9, 2007 Public Meeting Question and Answer Period

- What would the alignment look like?
- Where would the intersections occur?
- How will access work?
- What will happen to Huckleberry?
- What is the funding source?
- How large would the bridge structure be?
- I this the same study that was completed 30 years ago?
- What is the time frame for construction?
- Is a 2-lane bridge more feasible than a 4-lane bridge?
- Are there any developers involved in the project and if so who?
- Are the costs estimated at 2007 prices?
- Does cost include right of way cost?

- Does cost include intersection cost?
- Will used car lots be allowed near the new alignment?
- Has there been a cost/benefit analysis completed?
- What would be the elevation of the new alignment over Lower River Road?
- Are you aware that the Gibson Flat area is a swamp?
- There are some businesses near the proposed alignment that need to be taken into consideration.
- Lower River Road and 13th are both major routes that need access to the new alignment.
- Will there be any noise or visual mitigation measures?
- Does the map illustrate planned development?
- Is it possible that the Railroad would be abandoned eliminating the need for an elevated alignment?
- The South Arterial will destroy the Fox Farm area!
- Have litigation expenses been included in your estimates?
- People will not travel out of direction to use this alignment.
- Who is the prime user?
- Why would the alignment not tie in before Gore Hill?
- Is this a 70 mph highway?
- Will the new alignment take traffic off of 10th Avenue South and hurt businesses?
- It appears that the alignment goes through the new Ice Arena.

Written Comments received as of Oct. 11, 2007

Nine respondents preferred the Red alignment, two for the Blue alignment, and two for the Green alignment.

Fourteen respondents ranked the goals. The following shows the average scores in order of preference:

1 (score = 3.3) Reduce congestion along 10th Avenue South and numerous other urban arterial collector streets.
2 (score = 1.9) Improve safety and mobility throughout the Great Falls transportation network.
3 (score = 2.4) Provide additional Missouri River crossing essential for efficient emergency vehicle access.
4 (score = 3.8) Improve an international and regional trade corridor.
5 (score = 3.1) Improve air quality by reducing congestion as well as stopping and idling times.

Comments Sorted into Categories

The speaker was very knowledgeable. I am sure he and the design team are open to issues people have that are real issues. When it comes down to it, most people here tonight are here because of impact on their land and not with information about the real goals of the project. That other input is important too. Thank you for the change to hear and see more about this.

Flexibility for future needs should also be considered. Well organized meeting and sharing of information. Questions handled well.

Opposed to Project

The Fox Farm area is the only rural residential area in Cascade County where residents take care of their property. This is largely due to the lack of main roads. The South Arterial would absolutely ruin the only safe, quiet and nice rural area in Cascade County. Rezoned commercial property would not benefit the Fox Farm area. I would like to see the arterial linked up with the existing 10th Avenue (Warden Bridge). The route also provides no real community benefit. Trucks are unlikely to drive south to go north either. It is an expensive new road that will bypass Billings to Helena traffic. I do not see that the benefits outweigh the costs, especially since one of the best rural areas in Cascade County will be ruined as a result.

Other issues that should be considered are existing houses and devaluing property.

I don't think any of the goals above are important enough to justify the expense of this project. I don't think we have a $150 million problem to solve. Send this cash elsewhere. State lands? Are they involved in this arterial at all? There are many, many roads in this county and other counties within this state that need work and could truly use these funds. Please don't waste tax payer dollars where there really is not a strong need!

None of the goals will be met by the proposed alignments or need to be met. The only possible priority would be to provide an additional Missouri River crossing. Other issues to consider; what roadway would look like, development along side of roadway, and frontage roads taking additional space. The preferred alignment would be the one furthest from 45th Ave. SW (my home). I don't see that this project meets stated goals. Additionally local traffic options are poor based on the limitations for on and off the highway. Won't benefit the community. It will ruin the very nice area of Fox Farm. We have moved here from Southern California to get away from traffic and congestion. Please don't destroy the beauty of Fox Farm.

The proposed alignments do more harm than good. They all run through the fastest growing areas of Great Falls and all will disrupt the orderly growth which is taking place in this area. The project should either be scrapped or, if built at all, placed much further to the south.

Consider long-term growth around Great Falls, where do we really want things to grow. None of these alignments are preferable because of cost-benefit to the area. Please get better input on long-term growth first before pursuing this project.

Issues that should be considered are views of existing homes. None of the alternative is preferable. I believe it needs to go further south. We need a road to improve our potential for growth.

Great Falls South Arterial-- The red, green and aqua routes converge on the east side of the Missouri River passing directly through three subdivisions with recently built homes and many others under construction. All three routes together with the blue route to the North are within the Upper/Lower River Road Water and Sewer District, which has recently completed a multi-million dollar water and sewer project, and is about to undertake another. The Pearson Addittion, Southridge condominiums and Gene Thayer's new development when fully developed will contain approximately 100 homes. Routes blue and aqua pass directly over wet lands on Taylor Island in addition to residential areas on both sides of the river. There is also a power line corridor from the West side of the river, across Taylor Island to the East side of the river. We suggest that existing roads such as Fields road, junction of Lower River Road and Montana 226, proceeding to Fields Road, to Montana 227, connecting to US 87/89 be considered.

I am not really sure if the south arterial is really needed. By moving the road out into the county are you not reducing air quality there and introducing noise pollution in other wise nice areas. If I had to choose between the 5 routes listed it would probably be the aqua or the blue. They are closest to the city. If the red , green, or yellow were developed they would most impact boating recreation on the river. The area down by dead mans corner and up by white bear is heavily used in the summer by boats. It is one of the widest and less plagued by sand bars areas on the river. It has been called wake board alley. The aqua route just cuts through the tip if the island and appears to have the least affect on wetlands. Also only on side of the island is really accessible by boats during most of the year. Of course the blue route is the closest to the city and roads would be closer. However it does cut through the center of a wet land. The yellow route cuts through the center of one of the few wet land s left along the shore. This area is full of wildlife. Which I have watched for years. This year we had eagles nesting up river a little ways from this proposed route. Also this area is full of deer, cats, fox beavers and many different birds. It is one of the few places you still see stands of cotton wood close to the city. So much of the river front has been developed and this is still such a large natural area. I love kayaking along over there you never know what you will see. Also this route cuts through the Lewis and Clark portage area the most. This is a piece of important history. Also besides having a difficult river crossing there is the slew on the other side of Whitebear which is a natural habitat in its self. The bridge would also have to deal with the rail road at this option. The area would be destroyed by the bridge and in the name of progress. The red option is the lowest cost option although it would affect river recreation also. The subdivision is not yet built along the river and maybe the developers could compensate for the noise easier then in an already existing subdivision. Personally I don’t feel this is needed but the aqua route or the blue route would be less

disturbing and the cost differences for a project this size between any of the options is not that great.

The creators of this project have not conclusively thought through each of these routes. Of the five routes being considered, it appears that the Aqua route would be the best suited. This is based on the several reasons. First, the yellow route, i.e. the furthest south, is projected to go through the center of the wetlands. This will cause severe environmental impact on the wetlands, because the building process will destroy the area physically and the noise pollution itself will reduce the amount of animals that consider this a habitat, including a family of three bald eagles that have lived in the area for years. This projected route will also be put through an existing subdivision. Furthermore, the yellow route is projected to be built over White Bear Island, which has a historical significance to the Lewis and Clark trail. Both the red and green routes are also to be built through one of the most thriving wetlands south of Great Falls. This route also has a detrimental effect to the recreational users of the river. This is because both the red and green routes cross the river in the middle of a popular and safe boating area that is constantly used for recreational water sports. This is because it is one of the few areas that allow large inboard, and inboard/outboard to drive safely based on the given depth. With a bridge being built, the bridge supports will congest one of the heaviest used passageways on the river from Broadwater bay to the booming area of big bend. The blue passageway, i.e. the one that is the farthest to the north also crosses through the middle of a wetlands area. Finally, the aqua route, i.e. the second farthest to the north, shows to have the least impact on the wetlands, and the environment. This site would also allow for the bridge supports to be placed on the island and the eastern fork of the river, which is a passageway that cannot be navigated based of its lack of a deep-water channel. This would allow the main passageway to remain free of congestion. Furthermore, this route does not go through a preexisting subdivision, which would allow for any future subdivision to build itself in a manner to help with the noise pollution. Note, if any other routes were plausible, it would be a route that was near the very bottom of the arterial corridor so that it completely missed the subdivisions south of town, followed the arterial boundary until the crude oil pipeline, and proceeded north paralleling that line. This would have the least impact on the environment and would avoid almost all of the existing subdivisions around great falls. The best alternative to these routes would be to have a north arterial, but you have already made this decision for the public.

The idea of placing highway according to the yellow, green, red plans indcated on the map will have very negative effects for the citzens of Great Falls. The yellow plan involves disturbing the historic district located on white bear island. Not only does this area contain monuments to Lewis and Clark but also supports the habitat of many animals. This area has even been noted to be home to families of bald eagles. The read and green plans also contain negative effects, because both of
these plans affect areas that are strong in water recreation sports for the citzens of Great Falls. This will ruin a part of Great Fall's economy as well as destory activites that many people in Great Falls enjoy. These three plans, yellow, green, and red contain many

negative effects for the people of Great Falls. They will create harmul effects on the environment, animals, history, enocnomy, and life style of Great Falls Montanta. Clearly these plans threaten many of the things that
make Great Falls a fantastic place to call home.

I am opposed to the Great Falls South Arterial as proposed at the February and October Public Meetings. This project was proposed almost 30 years ago and if a route had been picked at that time, the many homes, streets and buildings that currently exist along this proposed route would not have been built where they presently exist, and the project would have had a chance. This proposed route will detract from some of the nicest residential districts that exist in Great Falls and if built their value diminished immensely, and neighborhood esthetics
significantly reduced.

Character of Roadway
Long-term growth and development opportunity should also be considered. The alignment should look, feel and drive like a parkway – wetlands, trees, bushes, grass, natural significance and historical significance.

There has to be no business built-up adjacent to the arterial

Need to build in school bus pull outs – similar to Vaughn.

Visual impact should also be considered. The interchange should be located further south.

No Casinos allowed on the by-pass. No Bars allowed on the by-pass. Red alignment is preferred because of cost. 4- lane, controlled access.

Support for Project
This is needed for the future of Great Falls!!

I attended the meeting last night at the Great Falls Civic Center. I know there were many concerns expressed and good questions asked but overall I felt the demeanor of the crowd was more inquisitive than divided. Certainly some are very concerned and a few with very good reason. Some friends of mine who it appears could be completely displaced by the proposed project and only recently completed their home were among those upset. Certainly, these types of impacts should be held in top priority but some will just have to move to help our community expand. Those who feel this is an unnecessary project and will destroy their neighborhood should have moved out a little further. We all want our acreage as close to town as possible but that is not what cities are all about.

Alignment Preference
The Red alignment appeals to me for several reasons. The cost is the cheapest, shortest bridge, lowest ROW and the 4-lane option would benefit the growth of great Falls and allow me a quicker access to Malmstrom AFB.

The Red alignment is the most cost effective. The Green is good, but the most costly. Build it within one of the proposed routes.

An alignment as far south as possible is preferable. I feel traffic on 10th Avenue will not change! This needs to be a by-pass not an arterial. Your current maps need to be on the internet.

An additional issue of concern – potential MAFB runway issues – not currently resolved. The preferred alignment would be the Blue until they intersect near Gibson Flat Road and then switch to Red. The citizens of Great Falls always state they want the community to grow but "not in my backyard" you cannot have development without change. GOOD JOB!

Of the optimized alignments, the Red route, which is also the shortest and cheapest appears to approach the Missouri River crossing in the most effective and stable crossing location, making it the most preferable of the 5 alignments.

Climbing Gore Hill should be eliminated in favor of Exit with Flood Road and the elimination of the Railroad. Connections should be made on Flood, Fox Farm, Lower River Road, Upper River Road, 4th, 9th, 13th, 25th, 30 something, 42nd and 56th. Blue is preferred because it is closed to 10th and people. Yellow would be preferred long-term.

We like the red alignment. Overall urge financially feasible. Less ROW less cost to build bridge. Just a better overall route. We believe there should be an exchange at the lower river road that also gives access to upper river road. Lower River Road is a main arterial to residents living to the south of Great Falls. There should be an interchange at 13th St. as this is a well traveled for people living to the south of town.

The best route is the blue. It is closest to the city and infringes less on the country. The yellow route shouldn't even be considered it cuts through the Lewis and Clark portage and would most destroy a historical place.

Of the five routes being considered, it appears that the Aqua route would be the best suited. This is based on the several reasons. First, the yellow route, i.e. the furthest south, is projected to go through the center of the wetlands. This will cause severe environmental impact on the wetlands, because the building process will destroy the area physically and the noise pollution itself will reduce the amount of animals that consider this a habitat, including a family of three bald eagles that have lived in the area for years. This projected route will also be put through an existing subdivision. Furthermore, the yellow route is projected to be built over White Bear Island, which has a historical significance to the Lewis and Clark trail. Both the red and green routes are also to be built through one of the most thriving wetlands south of Great Falls. This route also has a detrimental effect to the recreational users of the river. This is because both the red and green routes cross the river in the middle of a popular and safe boating area that is constantly used for recreational water sports. This is because it is one of the few areas that allow large inboard, and inboard/outboard to drive safely based on the given depth.

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based on the project map it appears that the aqua route will have the least impact on the environment", and that " the yellow route would be destroying the integrity of the Lewis and Clark trail

feilds road should be considered as the southern arterial .you already have the right of way and that would tie in half of your project, from the missiouri river to the east at the sand coulee/ stockett highway.

Concerns
How will this new alignment affect the regional prison? (Public Safety Issue)

Looking at the map there are three businesses. Locations in Gibson Flats – Mickeys Packing Plant, Northwest Junk Yard and Liberty Electric. Red alignment is preferable because of price. Do not let them build businesses along the bypass.

Northern Alignment
The traffic on 10th Avenue South is 95% us, i.e. those of us who live in and around Great Falls. Through traffic on 10th is primarily from Canada to points East, Lewistown, Billings, Denver, etc. As proposed the new route will do little to attract local traffic as it will be too far south for residents to use effectively and the through trucks from Calgary to Billings will continue to use 10th as it will be shorter and easier to negotiate. If the south route is to be effective, it needs to be on 24th Ave So or no further than 33rd Ave So and allow entry and exit at Fox Farm Road, River Road, 13th Street, and 25th Street at a minimum. It should be fashioned after the exiting NW bypass and it might have a chance. However, going up Gore Hill in the vicinity of Bel-View will destroy that area, and provide little if any access for anyone to anywhere.

In the early portion of your "Alignment Study" you considered a North route which was thrown out as too expensive, primarily due to crossing the Missouri near Rainbow Dam with an extremely expensive high and long bridge and it went so far north, that even you

realized no one locally would use it. What you overlooked, in my opinion, is a much easier, cheaper alternative which would utilize the existing NW bypass and the NE bypass and connect them with a bridge across the river. Starting from the intersection of the NW bypass and 3rd St NW, across the Missouri near Sacajawea Island and intersecting River Road near the horse shoe pits by the 6th St No underpass. This would utilize almost 10 miles of existing roadway, 6 miles of which is already 3 or 4 lanes wide and the remaining 4 miles of 2 lane road could be updated to 3 or 4 lanes for fractions of what the South Arterial proposal is suggested to cost. This would make for a 10½ mile long bypass from 10th and 57th streets to Emerson Junction that would allow through trucks etc to traverse Great Falls, missing 10th Ave So and do so in about 15 minutes. It also provides an alternative to 10th avenue south traffic for local residents along the entire route. (I personally drove it, added a minute for the bridge that is not there, and covered 9.8 existing miles of roadway in 14 minutes). This option answers all 5 of your goals listed on the comment sheet far better than the South Arterial proposal and does it for a small fraction of the cost, and does not threaten neighborhood after neighborhood with new 4 lane roadways.

If you are serious in trying to improve the traffic flow in Great Falls, you should not over look this option as an economical, intelligent option.

Comments Received by Project Team at the Meeting

- Will the map showing the alignments be on the website? (multiple requests for this)
- Consider Vinegar Jones' homestead (no physical remains, though)
- Why not go further south, avoid most of the existing development conflicts?
- Why not go north where there is just farmland and no one will be affected?
- Isn't the main intent to bypass town?
- Isn't the reason for this to get the trucks off of 10th?
- The route should have gone north up Fox Farm and tied into the interstate below Gore Hill.
- The RR along Flood Rd and 14th St SW should be abandoned and the route go up the ROW and tie into the interstate near Exit 0.
- Have you looked at Fields Road alignment, following tracks?
    - Dave Sutton, County Rd Supervisor and TAC member asked this
- Have you looked at a north rather than a south arterial?
- We need to know where the access points will be before we can choose an alignment.
- How close can a house be before you buy it?
- What will be the funding source? Is it fundable?
- We did this 30 years ago. What makes you think it will get built this time?
- What kind of timeframe can we expect?
  Who are the private developers on board, and what is the criteria for them to get on board?

- If a South Arterial goes through, will it become a State route? What will happen to 10th? Who will maintain both routes? Has that cost been factored in?
    - Dan Rice asked this
- Is there a cost assigned to the development of critical intersections?
- Will it all be used car lots along it?
- Do we have enough funds for a full environmental review?
- Has a cost benefit analysis been done?
- Are the 5 routes set in stone?
- Are there any specific design features to mitigate noise impact, impact on view, etc?
- Has the swampy ground of Gibson Flats been considered?
- If the RR is abandoned, this could reduce the cost.
- The south arterial will destroy the rural nature of the Fox Farm area.
- Is this designed as a 70 mph roadway?
- This will take out of towners around down, not through it. How will this benefit the community?

E-mail Comment Received

Cheryl,

I need your input on the southern arterial issue. I have serious concerns about it.

One of the proposed routes would go behind my home. It would run through state land and across an island. Cheryl, I just can't see this. This tract of land is a beautiful piece of open space. It and the island are home to deer, fox, beavers, muskrat, hawks, cranes and numerous species of birds. We hear over and over again how valuable open space is and, yet, time and again Montanans attempt to destroy it.

The court upon which I live is a great example. It was originally platted for 8 homes. It has 11. I have to assume the additional plats were created in order to make more money - probably for the developer and the city, too. We're pretty squished. 8 homes would have been much better.

My thoughts on some of the issues raised with regard to the arterial:

The emergency vehicle issue: I can understand the argument that emergency vehicles encounter problems with traffic on 10th Ave. S. However, I'm thinking that building a southern arterial would effect very little change in this situation. First of all, a lot of the traffic is due to people shopping on 10th. The shopppers won't be using the arterial. Also, there are fire stations all over town. How many times does an emergency vehicle have to run all the way down 10th? Would these vehicles really use a southern arterial? Maybe - occasionally. We could find out.

The convenience issue: There are days when I'd like to be able to zip to the other end of town by bypassing 10th, but there aren't **that** many. I will happily travel through stop-and-go traffic in order to maintain the integrity of the land south of town.

The pollution issue: There may be some air pollution issues due to traffic on 10th, but that doesn't justify bringing pollution to other areas. Also, the wind usually makes pollution issues moot.

The state land issue: Perhaps you can clarify for me how state land can be used for a project such as this. State land cannot be purchased outright. It has to be exchanged for a

parcel of equal or higher value. It can be leased, but for a highway?? I can't see it. What kind of return would the state education system reap from that?

The relocation issue: What about the people who would be removed from their homes? That's pretty serious business. Unless this road is absolutely guaranteed to make life so much easier and better than it is now, I sure wouldn't want to take anyone's home away from them.

Who is actually pushing for this? I have to admit that I'm thinking it's development people. It's just not worth it, Cheryl. We need to fight for our open spaces and the habitat they provide for wildlife and vegetation. After all, Montana's open space is a major draw to out-of-staters and businesses who relocate here. Why do we want to wreck one of the most attractive areas in our community by running a highway through it? The unimpeded stretch of the Missouri River south of the Country Club is priceless and we're talking about putting bridges and highways over it.

There seem to be a lot of unanswered questions about this project. It's also a tremendous amount of money. We could do a lot of great things with that much money.

Please give me your feedback, Cheryl. I appreciate your time.

Jenny

Great Falls South Arterial 3rd Public Meeting – September 25, 2008

Darryl James from HKM Engineering provided a brief presentation that gave the history of the project and the preferred alignment, including its access points and traffic modeling. During and after the presentation, HKM and MDT staff fielded questions and comments from a number of the 123 signed-in participants.

Persistent themes in the comments received included:

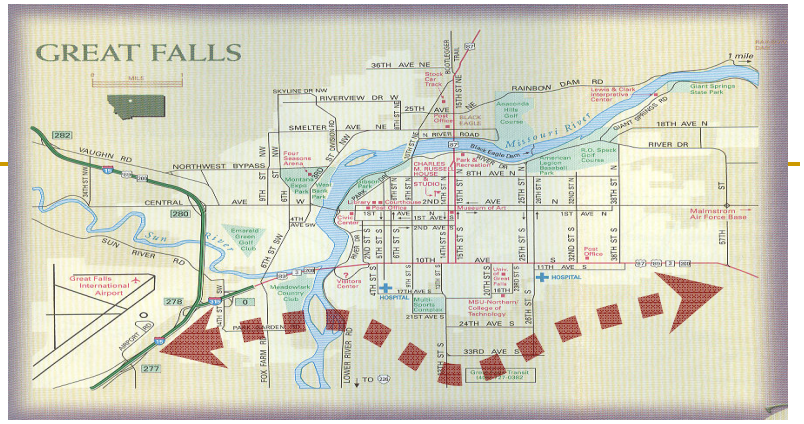
- Clarification of previous, continued, and future project costs and funding.
- Opposition of preferred alternative based on residential impacts and lack of truck usage.
- Support of preferred alternative and phased development based on safety, development, and growth reasons.
- Feasibility of a North route where there is agricultural land.

Comments received during the Great Falls South Arterial 3rd Public Meeting:

- How do you know that traffic will use this roadway?
- How will the arterial cross the railroad?
- How do you know how much traffic will use the first segment (Fox Farm – 13th St. S.)?
- The costs of upgrading other local streets due to traffic increases are not included in cost estimates so estimates are low.
- When will the first segment be built?
- People trying to improve or sell property in the area don't know what to do with their property since no dates are given for construction.
- What year do the dollar figures represent and how did we arrive at the future year figures?
- Is it possible to abandon the red alignment and go with the blue?
- Where did the money come from to do the alignment study and environmental study?
- We should be doing something to improve 10th Avenue South.
- There is to much traffic on 10th Avenue South and it's ruined property values.
- Does the red alignment take into account the new houses being built? It could harm local tax structure and cause litigation.
- Why didn't we choose a route in the northern corridor?
- Has there been a study on not doing the project?
- Where's the money coming from?
- Can the project be stopped?
- If an arterial is built, businesses will boom in the area just like what happened in Missoula along Reserve Street.
- Support for the arterial from the previous study was based on improving trade corridors and that is not mentioned in the south arterial study.

- With the growth in the south part of the community the arterial would be a good idea.
- If the town wants to grow it needs the business development that would come with the arterial.
- The arterial should not use the existing Gibson Flats Road.
- The arterial should be used to move traffic, not create a new business district.
- People against the arterial must be against growth.
- People aren't trying to get from one end of 10th Avenue South to the other.
- The blue alignment is the best alignment.
- The south arterial makes more sense than a north arterial because that's where the growth is.
- When will the project be done?
- How will we pay for the arterial when we haven't even factored in the costs of upgrading local roads.
- The red alignment would run through the Upper and Lower River Road Water and Sewer District and disrupt development of the area. Recommend a different alignment.
- The 2008 report is based on 2006 information.
- Who makes the decision on the arterial?
- There should be a study of what happens if we don't do this.
- How will this be funded?
- How is the Kalispell bypass funded?
- Will money for the arterial take money away from existing roads?
- A 60mph speed limit would be unsafe.
- How were our numbers arrived at?
- How do you decide on the value of right-of-way?
- How much money has been spent with no conclusion.
- Could we still pursue a north arterial?
- What can the earmark be used for?
- How will this affect the Lewis and Clark Portage Route?
- This will not have any impacts on current truck traffic.
- Is this a worthwhile investment?

Great Falls South Arterial Alignment Study



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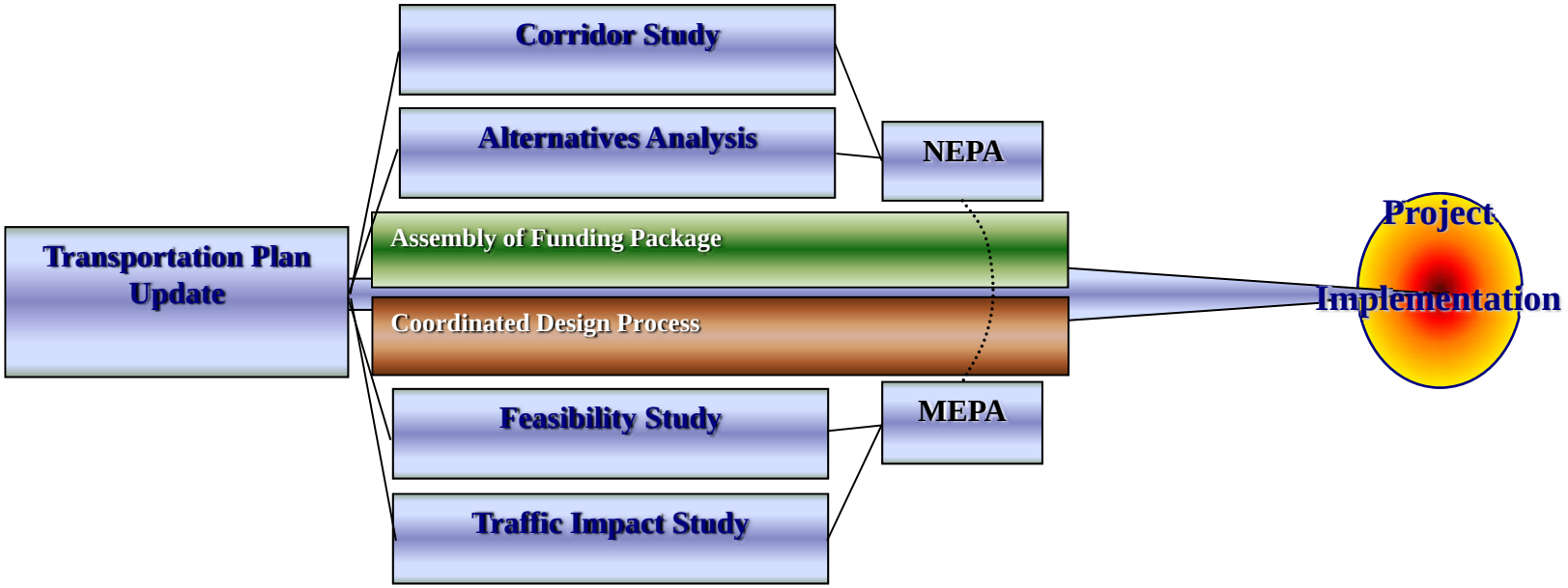
COUNTY OF CASCADE STATE OF MONTANA

HKM ENGINEERING

Project Team

- Montana Department of Transportation
- City of Great Falls/Cascade County
- HKM Engineering

Project Development Process

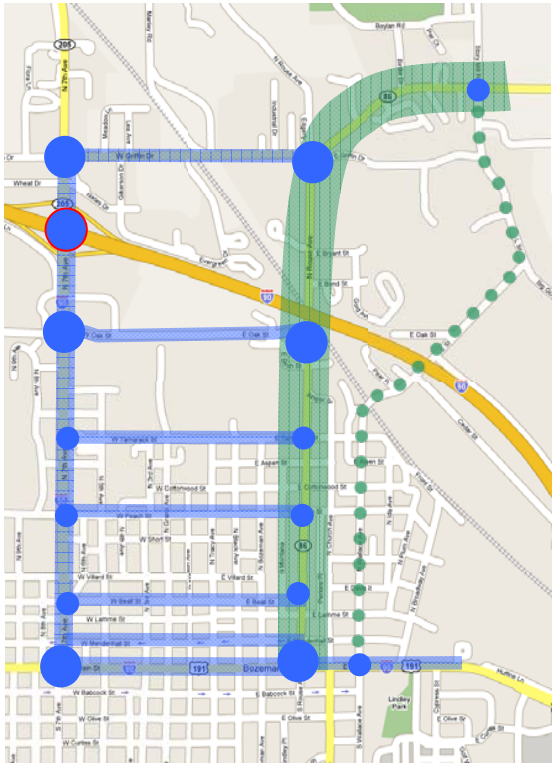


Project Development Process

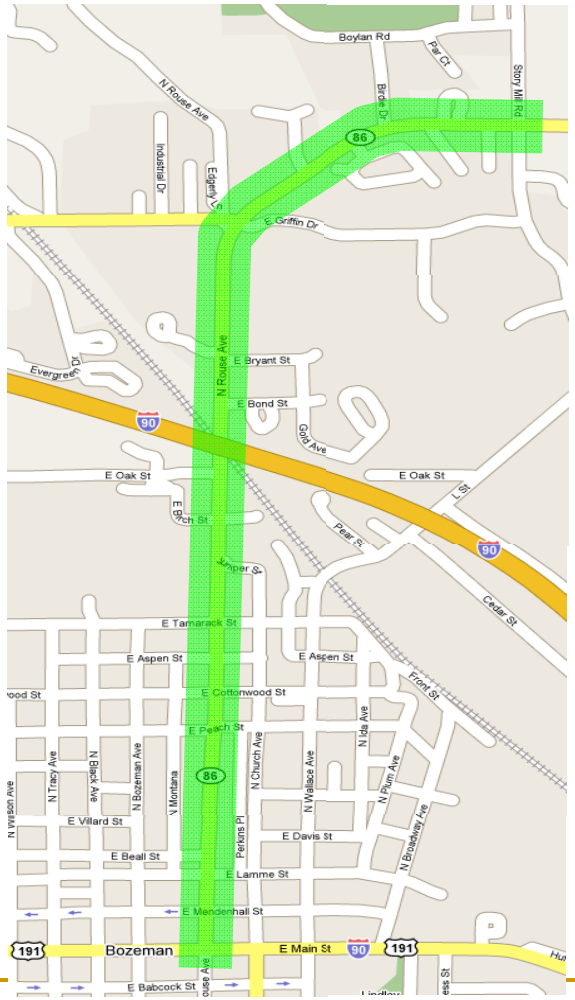
Transportation Plan



Feasibility Study



Alignment Analysis and Design



Project History

- 1968 – Studies began
- 1981 – Economic downturn prevented ROW acquisition
- 1988 – “Midgetman” deployment caused Malmstrom to briefly consider arterial
- 1993 – NAFTA gave purpose and function to arterial
- 1994 – City and County Commissions adopt resolutions supporting arterial
- 2000 – Arterial included in Transportation Plan
- 2004 – Feasibility Study Completed

What has been completed to date?

- Feasibility Study Findings
  - Improve Safety and Mobility
  - Improve Air Quality
  - Enhance Juncture of CANAMEX and Camino Real
  - Catalyst for Long Term Local and Regional Economic Development
  - Improved Access
  - Positively Direct Future Orderly Growth
  - Address Malmstrom AFB Operational Concerns

Purpose of the Alignment Study

- To Identify Optimal Alignments for the South Arterial
  - Minimize cost
  - Minimize impacts
  - Avoid environmentally sensitive areas
  - Optimize safety and operations

Quantm

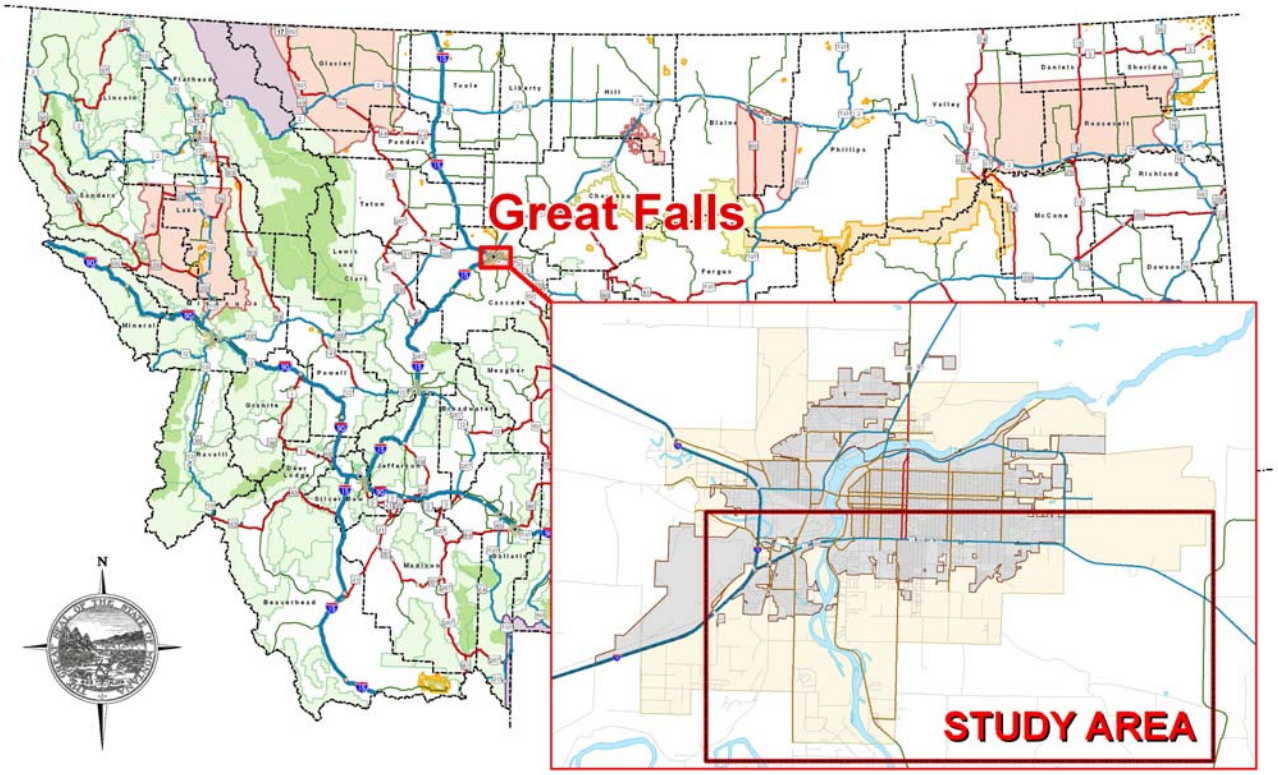
- New planning tool
- Successfully used in other areas of the country
- Confident in data output

Recent Public Outreach

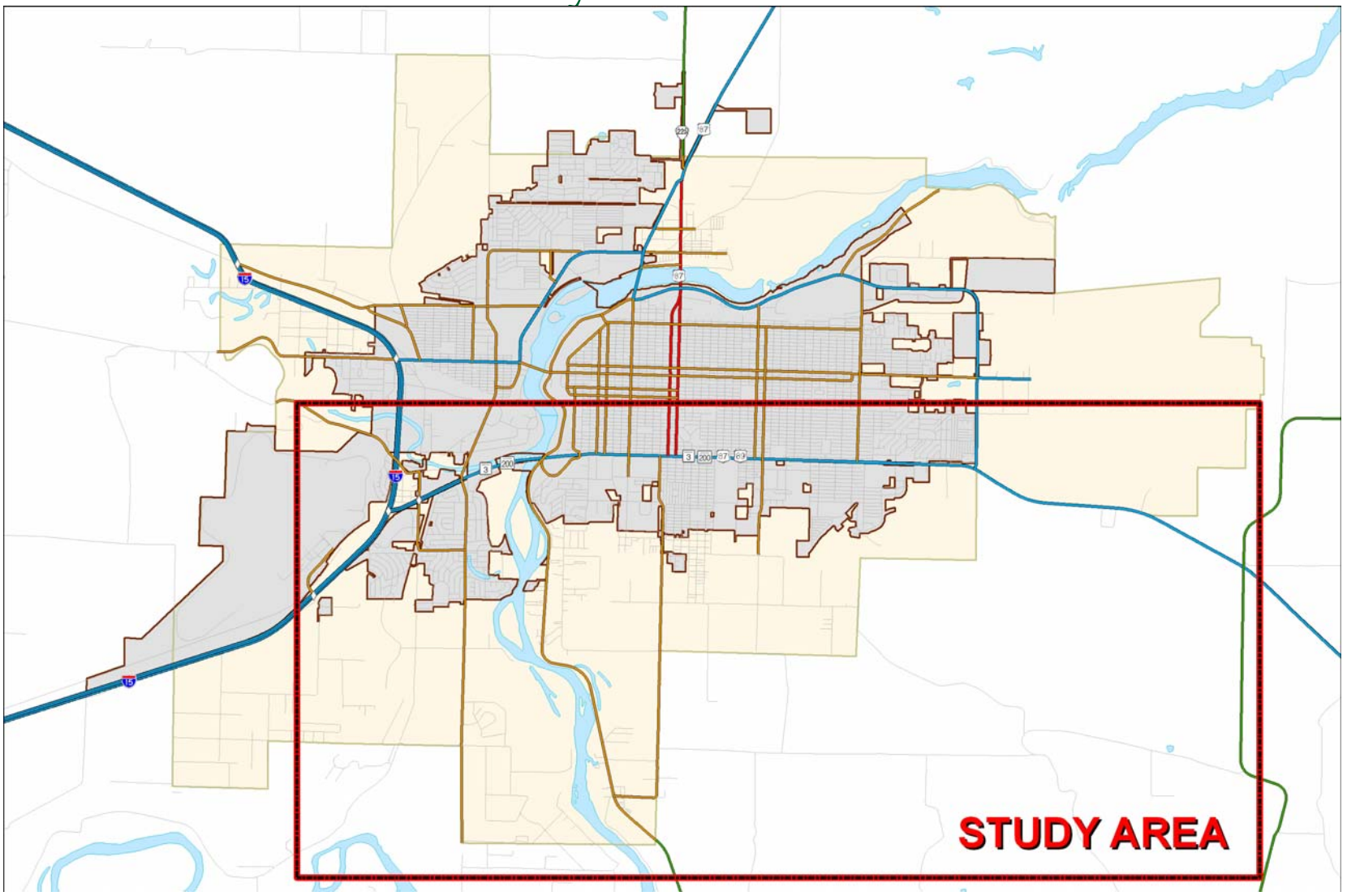
The community has been talking about this project since the late 1960's.

- July 24, 2002 – Public Information Meeting #1
- July 30, 2003 – Public Information Meeting #2
- December 17, 2003 – Public Information Meeting #3
- Project Web Site

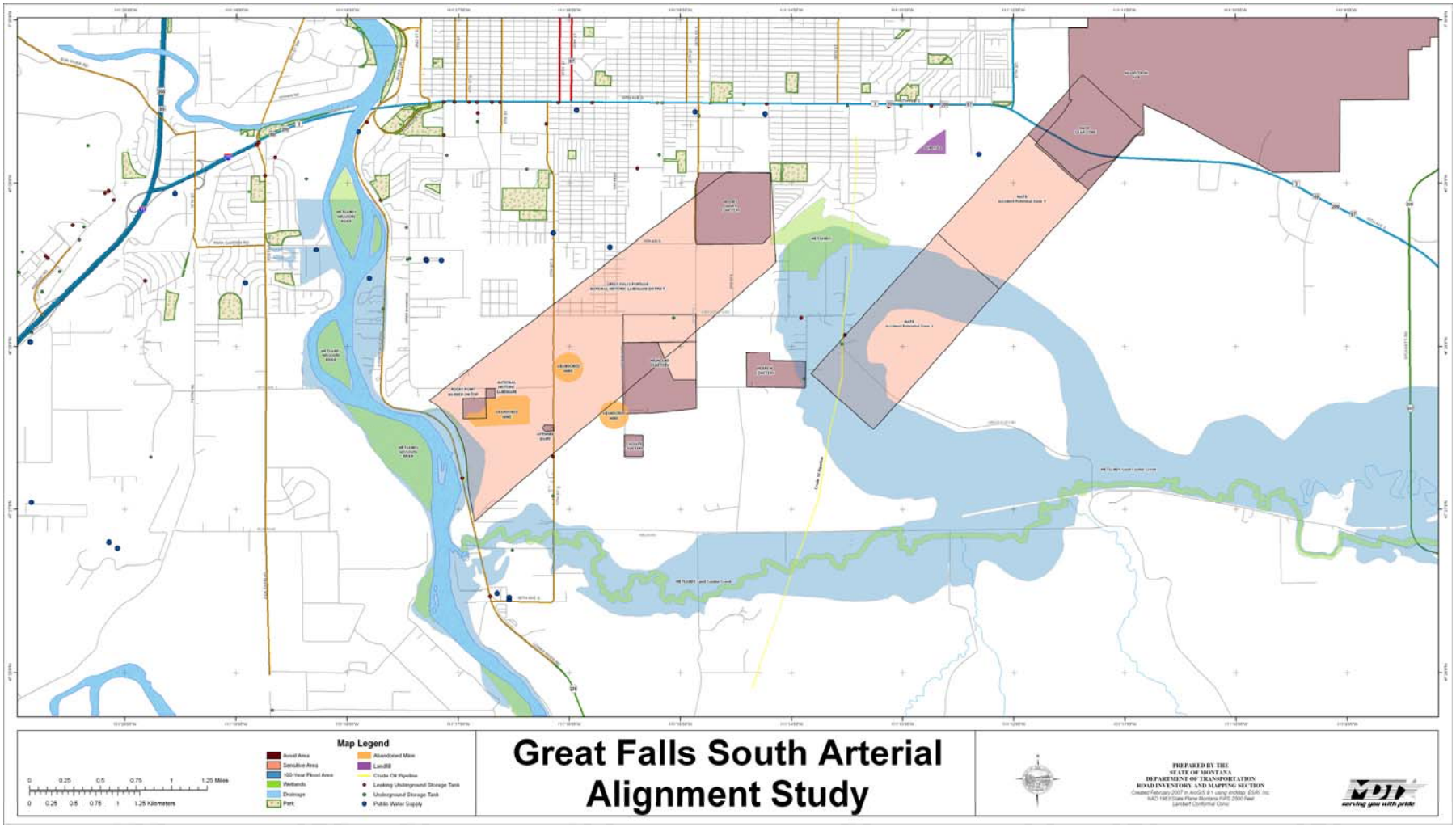
Study Area



Great Falls Study Area



Corridor Constraints



Known Constraints

- Malmstrom AFB accidental potential zones (former)
- Parks
- Cemeteries
- Developed residential areas
- Wetlands
- Floodplains
- Hazardous materials
- Abandoned mines
- Public water supplies
- Topography

What are your major issues and concerns?

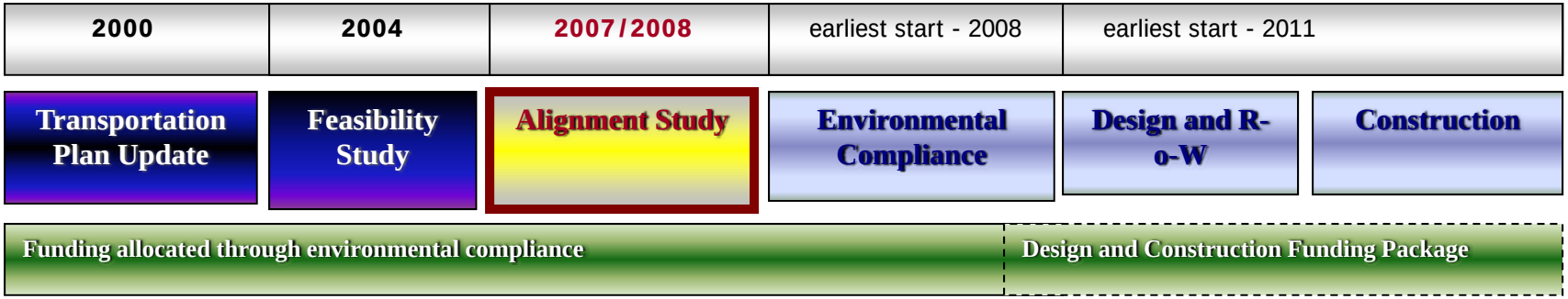
- What are the primary transportation needs for the facility?
- What are the travel concerns?
- What are the most logical termini?
- What are some major opportunities and constraints?

What goals and objectives should be used to evaluate alignment options?

Next Steps

- Alignment Modeling – Quantm
- 2nd Public Meeting to discuss alignment and screening process
- 3rd Public Meeting to present proposed project and route location

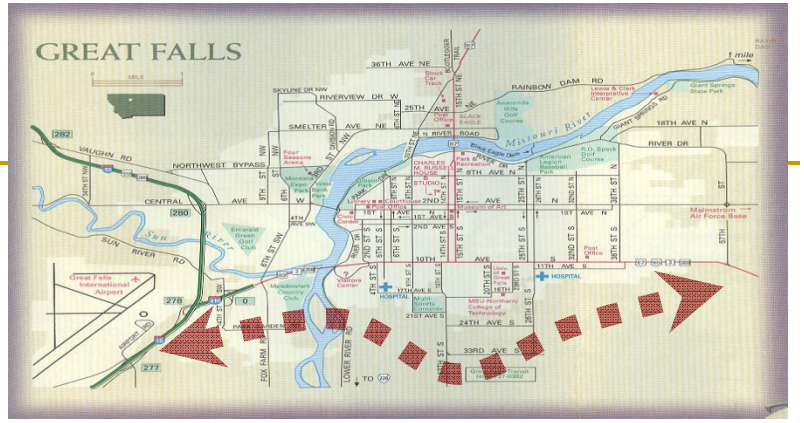
Overall Schedule



Further Opportunities for Involvement

- Website – www.mdt.mt.gov/pubinvolve/greatfalls/
- Focus Groups
- Press Releases
- Comment Sheets

Great Falls South Arterial Alignment Study



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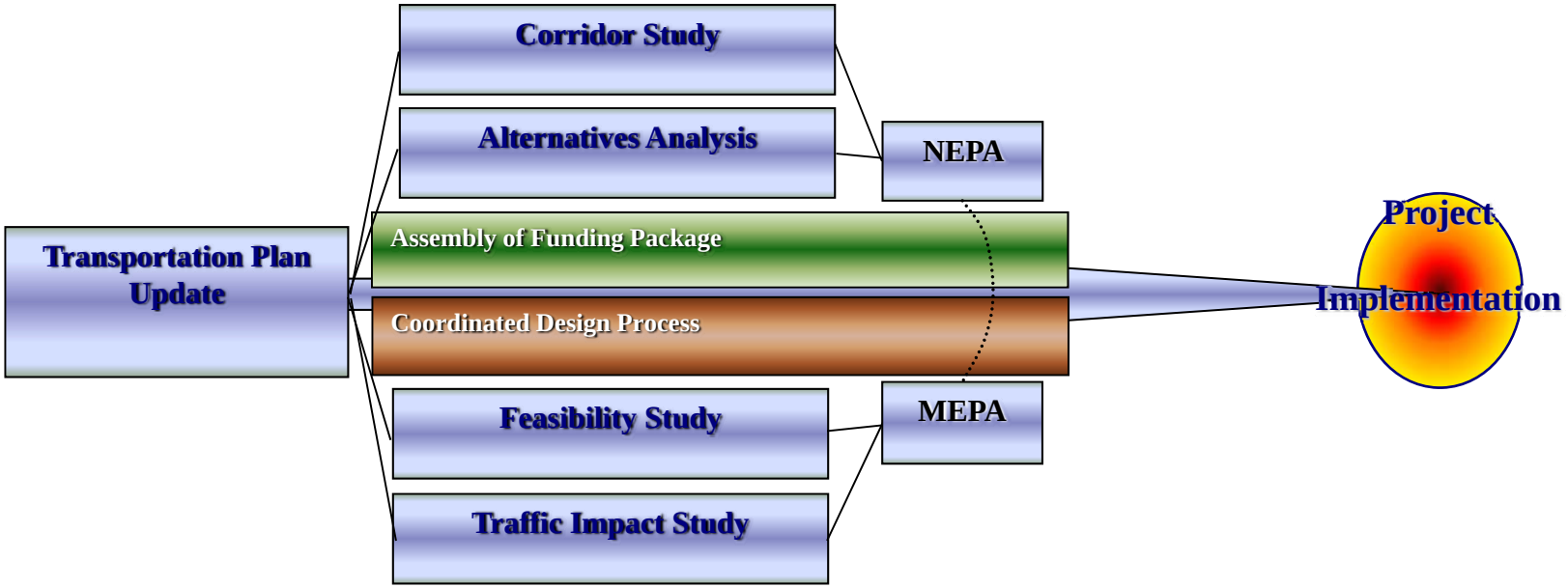
COUNTY OF CASCADE STATE OF MONTANA

HKM ENGINEERING

Project Team

- Montana Department of Transportation
- City of Great Falls
- Cascade County
- HKM Engineering

Project Development Process



Project History

- 1968 – Studies began
- 1981 – Economic downturn prevented ROW acquisition
- 1988 – “Midgetman” deployment caused Malmstrom to briefly consider arterial
- 1993 – NAFTA gave purpose and function to arterial
- 1994 – City and County Commissions adopt resolutions supporting arterial
- 2000 – Arterial included in Transportation Plan
- 2004 – Feasibility Study Completed
- February 2007 – First South Alignment Study Public Meeting
- Sept. 10 2007 – City of Great Falls, Cascade County and MDT Coordination Meeting

What has been completed to date?

- Feasibility Study Findings of Benefits from a new South Arterial
  - Improve an international and regional trade corridor.
  - Reduce congestion along 10th Avenue South and numerous other urban area arterial and collector streets.
  - Improve safety and mobility throughout the Great Falls transportation network.
  - Improve air quality by reducing congestion as well as stopping and idling times.
  - Provide additional Missouri River crossing essential for efficient emergency vehicle access.

Purpose of the Alignment Study

- To Identify Optimal Alignments for the South Arterial
  - Minimize cost
  - Minimize impacts
  - Avoid environmentally sensitive areas
  - Optimize safety and operations

Quantm

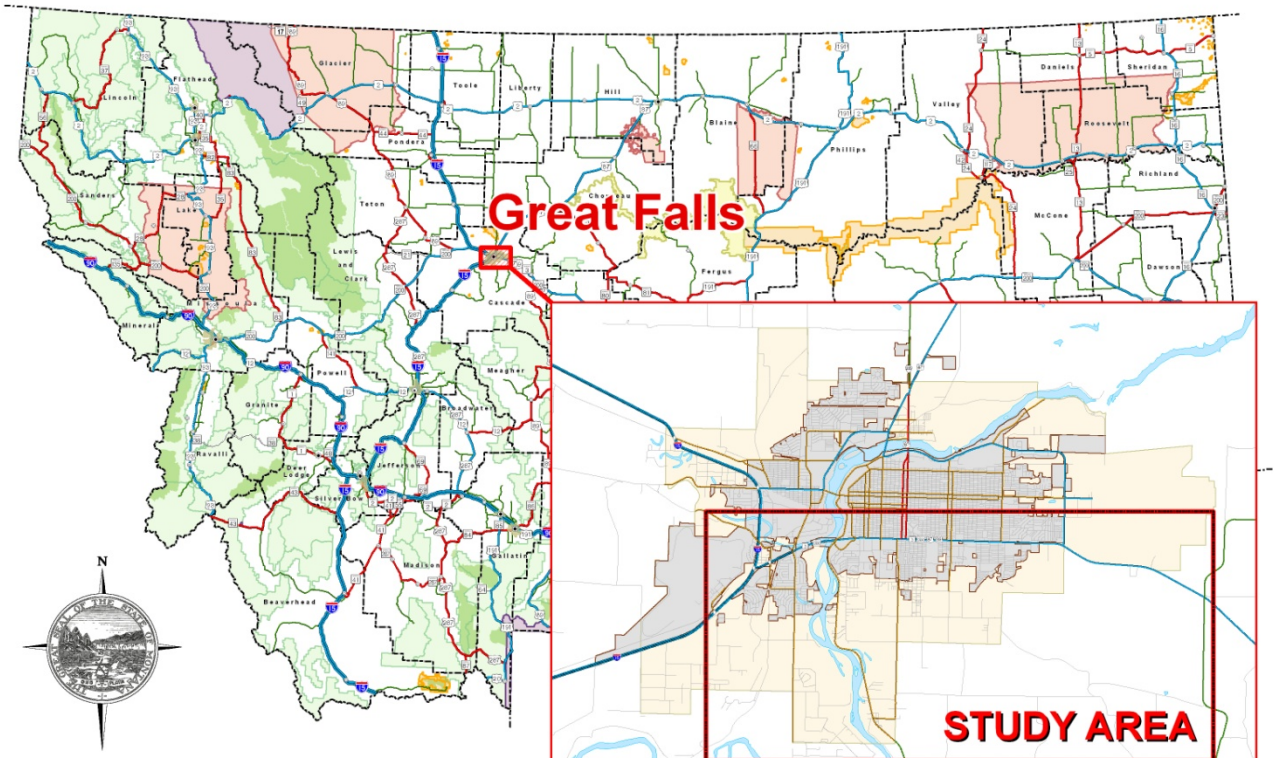
- New planning tool
- Successfully used in other areas of the country
- Confident in data output

Recent Public Outreach

The community has been talking about this project since the late 1960's.

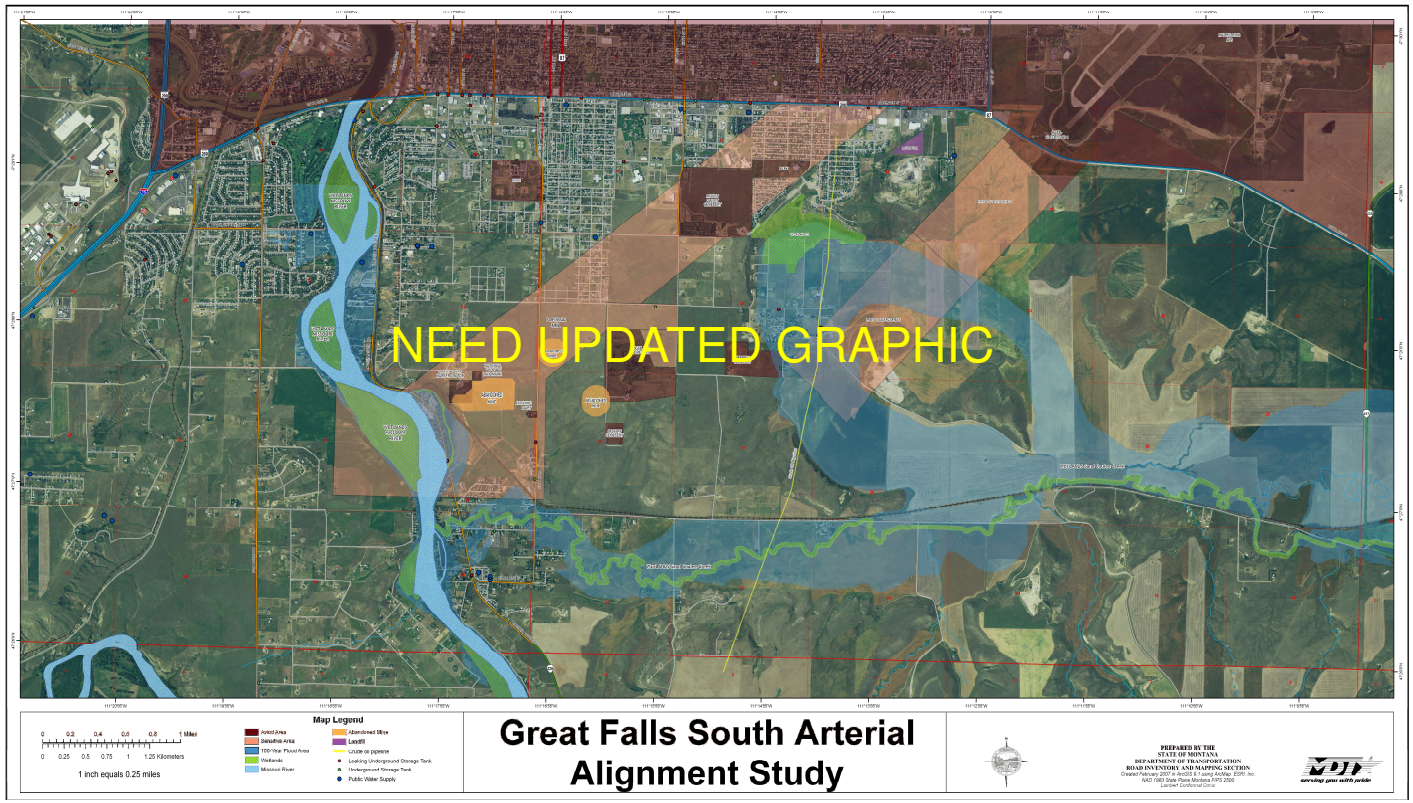
- July 24, 2002 – Public Information Meeting #1
- July 30, 2003 – Public Information Meeting #2
- December 17, 2003 – Public Information Meeting #3
- Project Web Site
- February 15, 2007 – South Arterial Public Information Meeting #1

Study Area



Confirm Endpoints

Corridor Constraints



Known Constraints

- Malmstrom AFB accidental potential zones (former)
- Parks
- Cemeteries
- Developed residential areas
- Wetlands
- Floodplains
- Hazardous materials
- Abandoned mines
- Public water supplies
- Topography

Alignment Options

- INSERT QUANTUM GRAPHIC

Summary of Impacts

- Bullet point major differences between alignments.

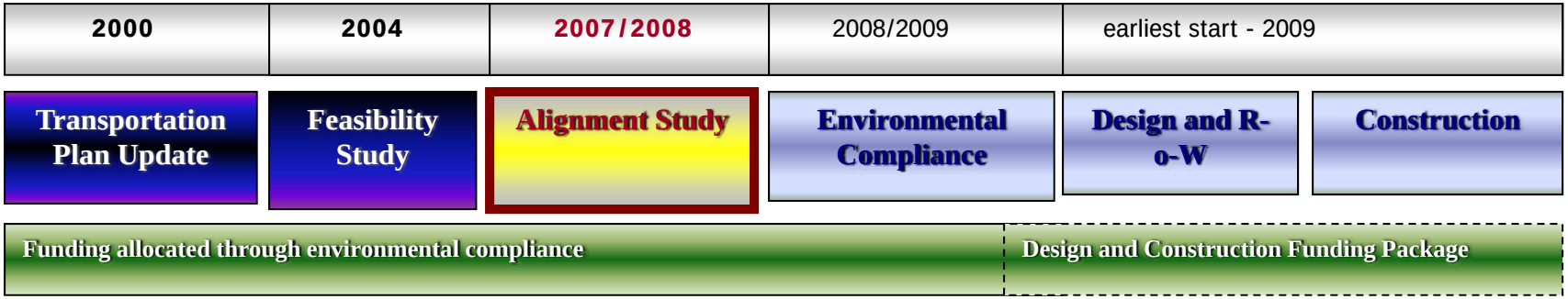
Are there additional resource concerns?

Next Steps

- Continued Alignment Refinement – Quantm Modeling
- 3rd Public Meeting to present proposed project and route location
- Continued Cooperation between local agencies and MDT

Overall Schedule

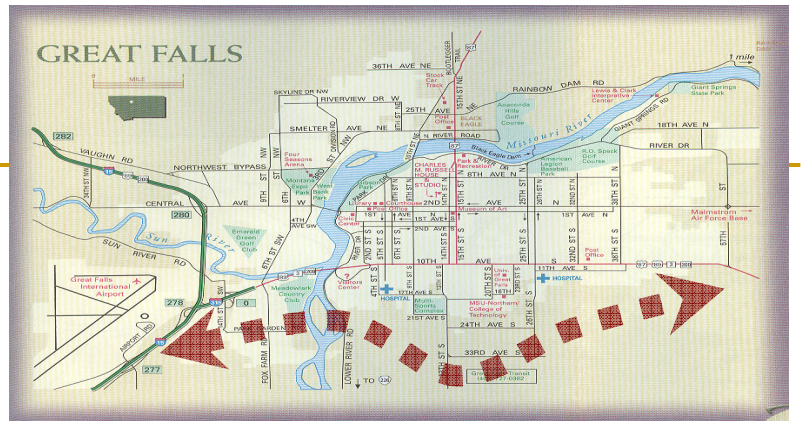
I'm not sure we even want this now. Any ideas?



Further Opportunities for Involvement

- Website – www.mdt.mt.gov/pubinvolve/greatfalls/
- Focus Groups
- Press Releases
- Comment Sheets

Great Falls South Arterial Alignment Study



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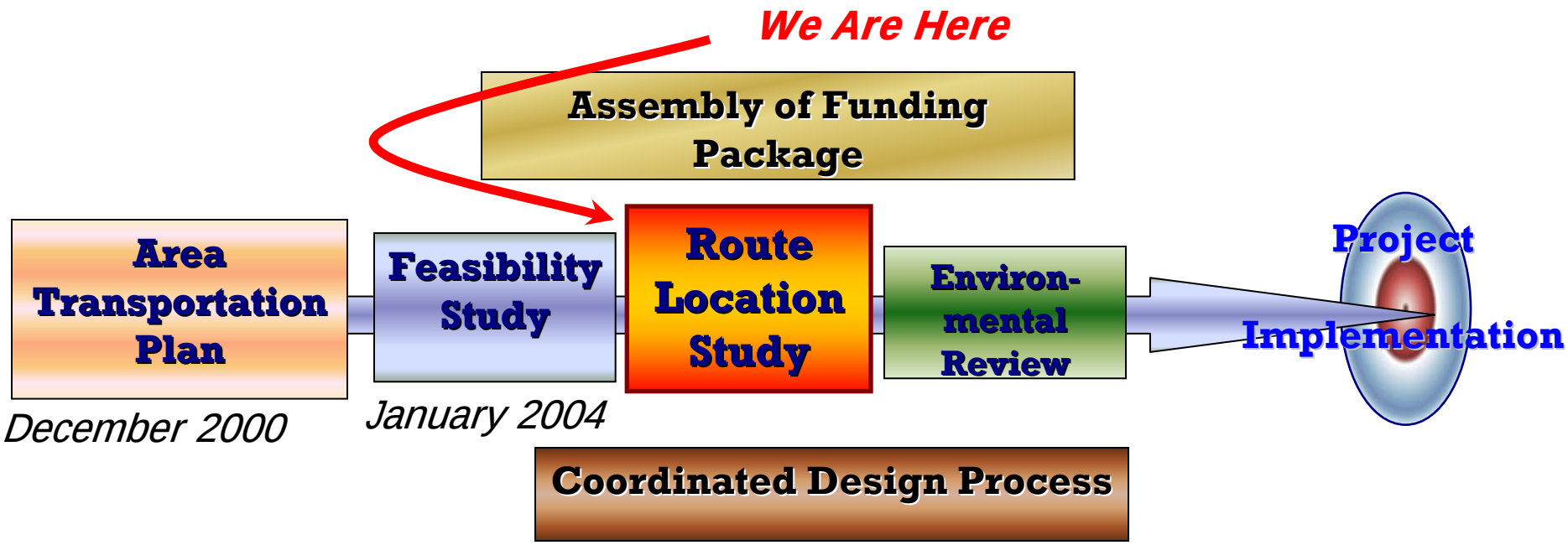
STATE OF MONTANA COUNTY OF CASCADE

HKM ENGINEERING

Project Team

- Montana Department of Transportation
- City of Great Falls
- Cascade County
- Federal Highway Administration
- HKM Engineering

Project Development Process



Recent Public Outreach

- Feasibility Study
  - July 24, 2002 – Public Information Meeting #1
  - July 30, 2003 – Public Information Meeting #2
  - December 17, 2003 – Public Information Meeting #3

- South Arterial Study
  - Project Web Site www.mdt.mt.gov/pubinvolve/greatfalls/
  - February 15, 2007 – Public Information Meeting #1
  - September 10, 2007 – Local Officials Meeting
  - September 27, 2007 – Agency Coordination Meeting
  - October 9, 2007 – Public Information Meeting #2

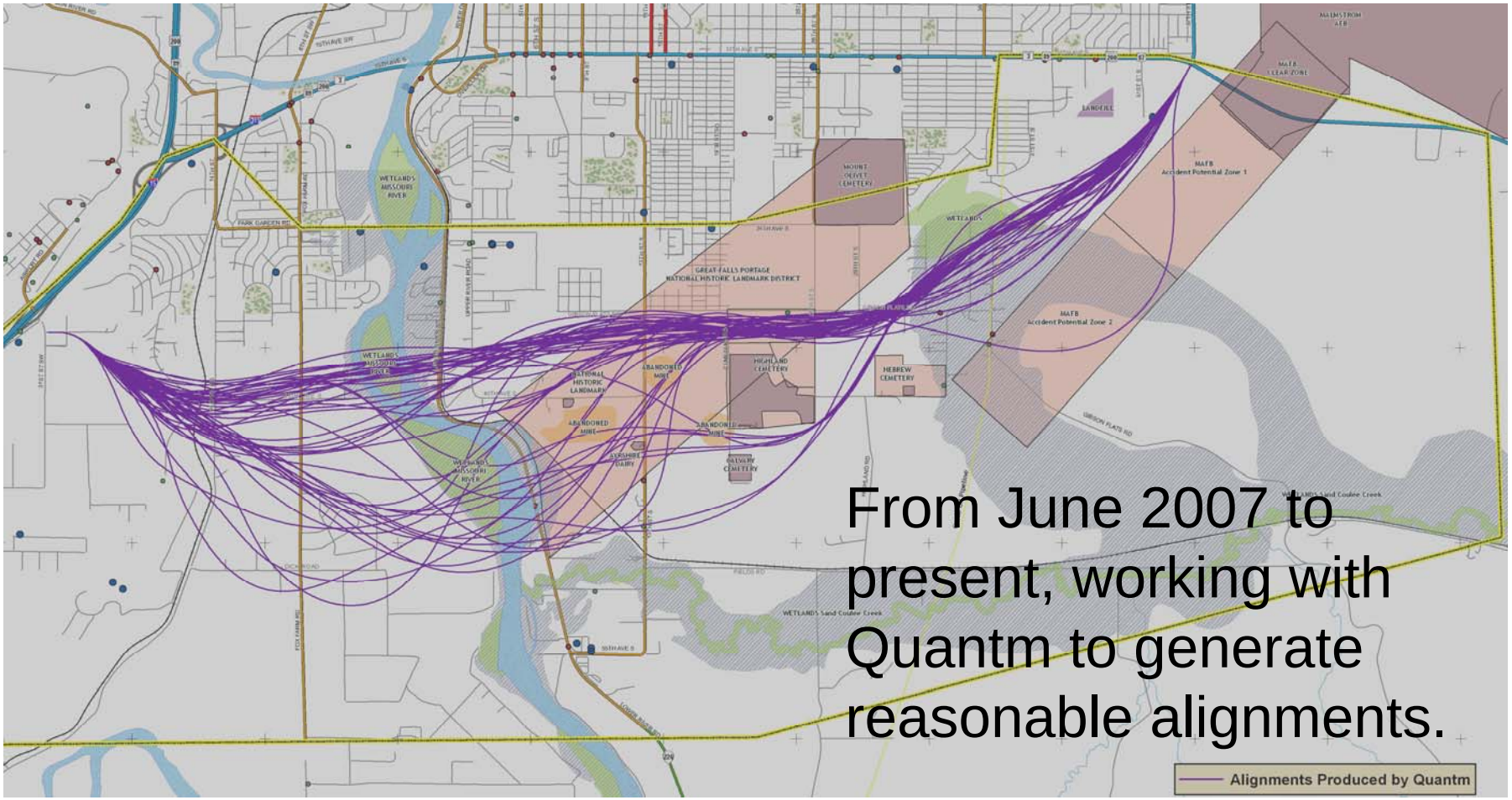
Purpose of the Proposed Project:

- As developed through the Feasibility Study and the Arterial Alignment Study, the arterial is intended to:
  - Reduce congestion and improve safety along 10th Avenue South.
  - Improve street network mobility.
  - Provide additional Missouri River crossing south of 10th Avenue South.

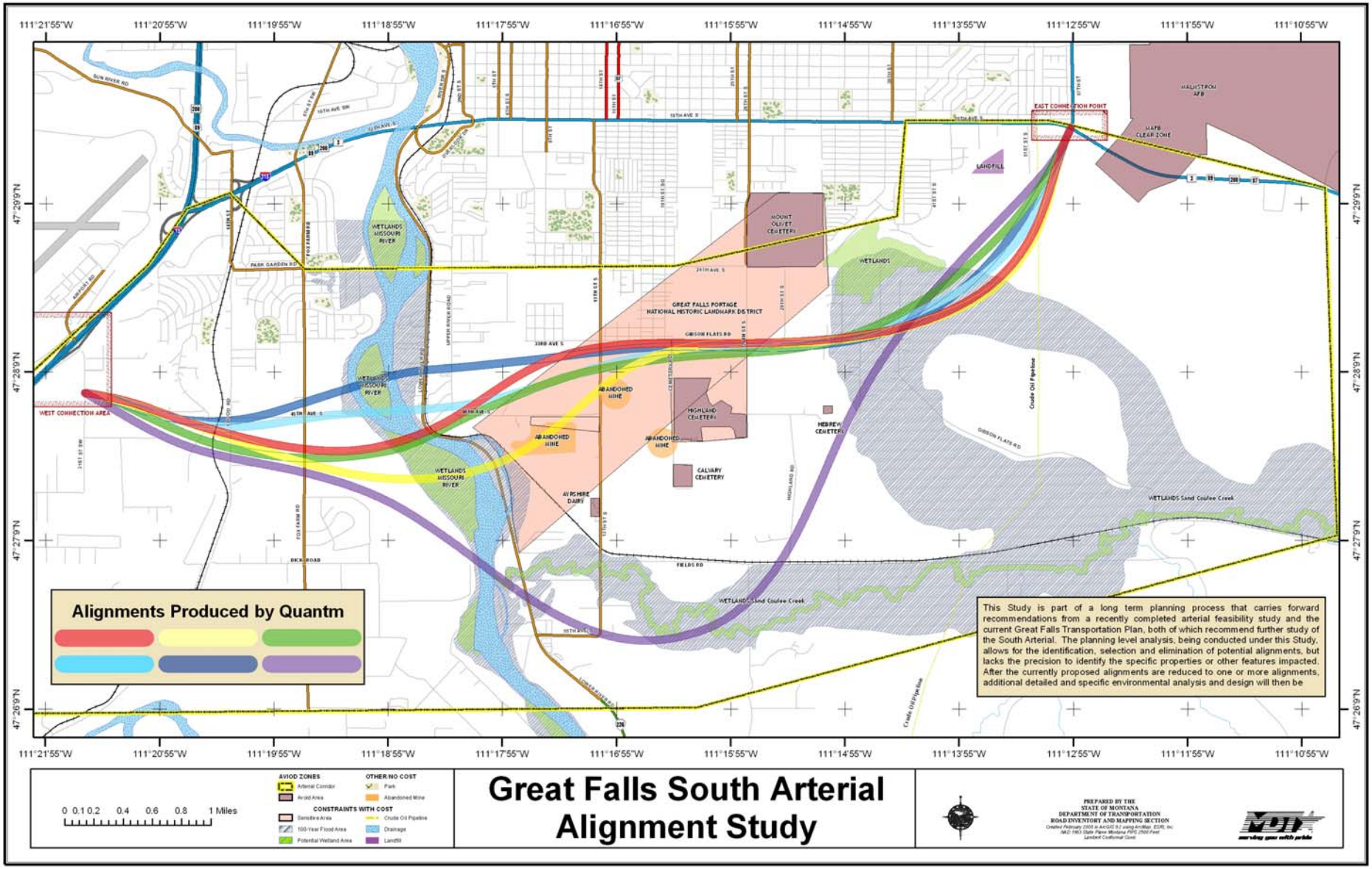
Purpose of the Alignment Study

- To Identify Optimal Alignments for the South Arterial that . . .
  - Minimize impacts
  - Avoid environmentally sensitive areas
  - Optimize safety and operations
  - Minimize cost

Range of Alignment Options



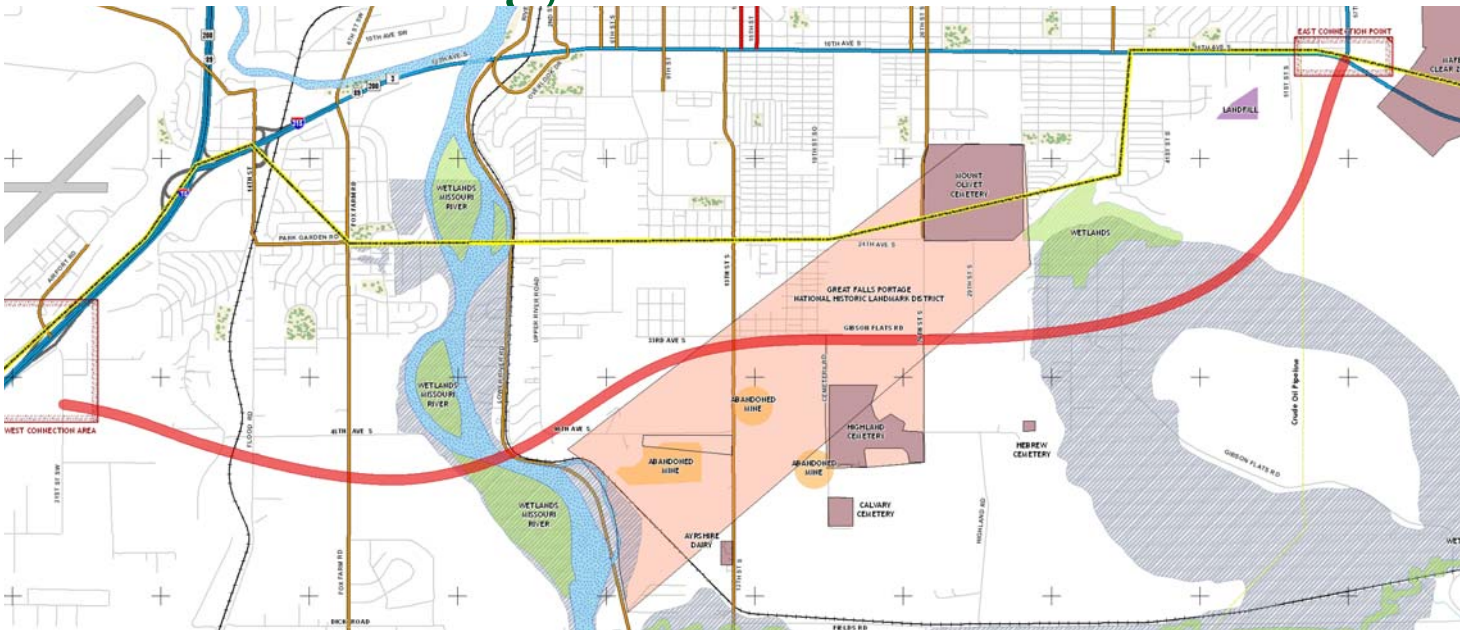
Optimized Alignments



Alignment Summary

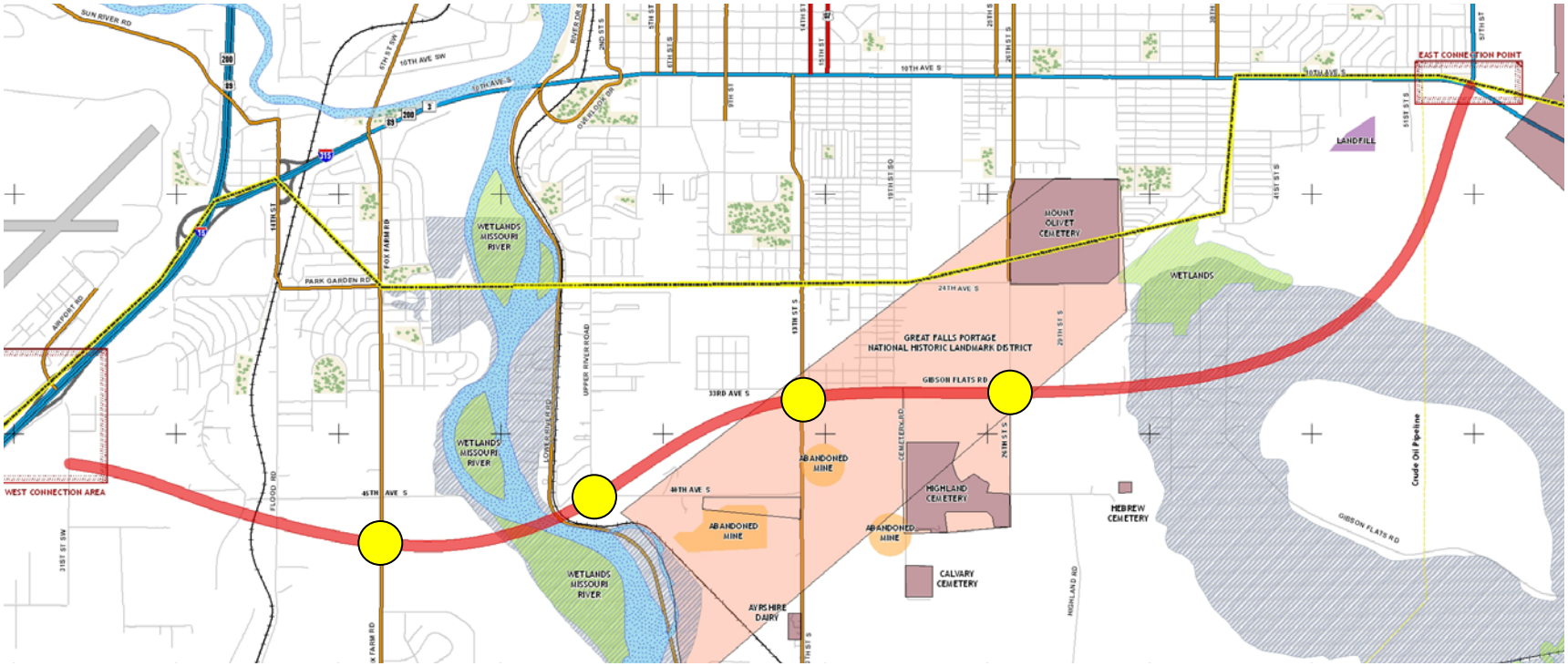
Alignment Options*						
Comparison Categories	1(Red)	2(Yellow)	3(Green)	4(Aqua)	5(Blue)	6(Purple)
Route Length	40,713 ft	41,507 ft	39,965 ft	39,688 ft	39,632 ft	47,331 ft
Bridge Length	1,939 ft	3,092 ft	2,038 ft	2,384 ft	2,504 ft	**3,114 ft
Parcels with a Structure	28 - 34	24 - 30	23 - 29	49 - 55	35 - 41	53 - 59
ROW - Improved Acres	27 acres	33 acres	29 acres	39 acres	44 acres	56 acres
ROW - Unimproved Areas	191 acres	199 acres	185 acres	176 acres	197 acres	226 acres
ROW - Portage Area	34 acres	63 acres	48 acres	37 acres	40 acres	0 acres
Wetland Impacts	11 acres	9 acres	11 acres	16 acres	16 acres	12 acres
Floodplain Impacts	55 acres	56 acres	46 acres	54 acres	54 acres	**91 acres
Earthwork (Cut)	2,182,000 cu yd	2,271,000 cu yd	3,852,000 cu yd	2,577,000 cu yd	2,353,000 cu yd	2,820,000 cu yd
Earthwork (Fill)	2,298,000 cu yd	2,726,000 cu yd	1,993,000 cu yd	2,615,000 cu yd	3,006,000 cu yd	3,858,000 cu yd
Cost (4 lanes)	$137 million	$161 million	$150 million	$155 million	$161 million	$269 million

Preferred Alignment



- Four-lane Rural Principal Arterial
- 60 mph design speed
- Begin near Gore Hill interchange / End at 57th Street South

Proposed Access Points



- Fox Farm Road
- Upper River Road
- 13th Street South
- 26th Street South

Traffic Modeling (1)

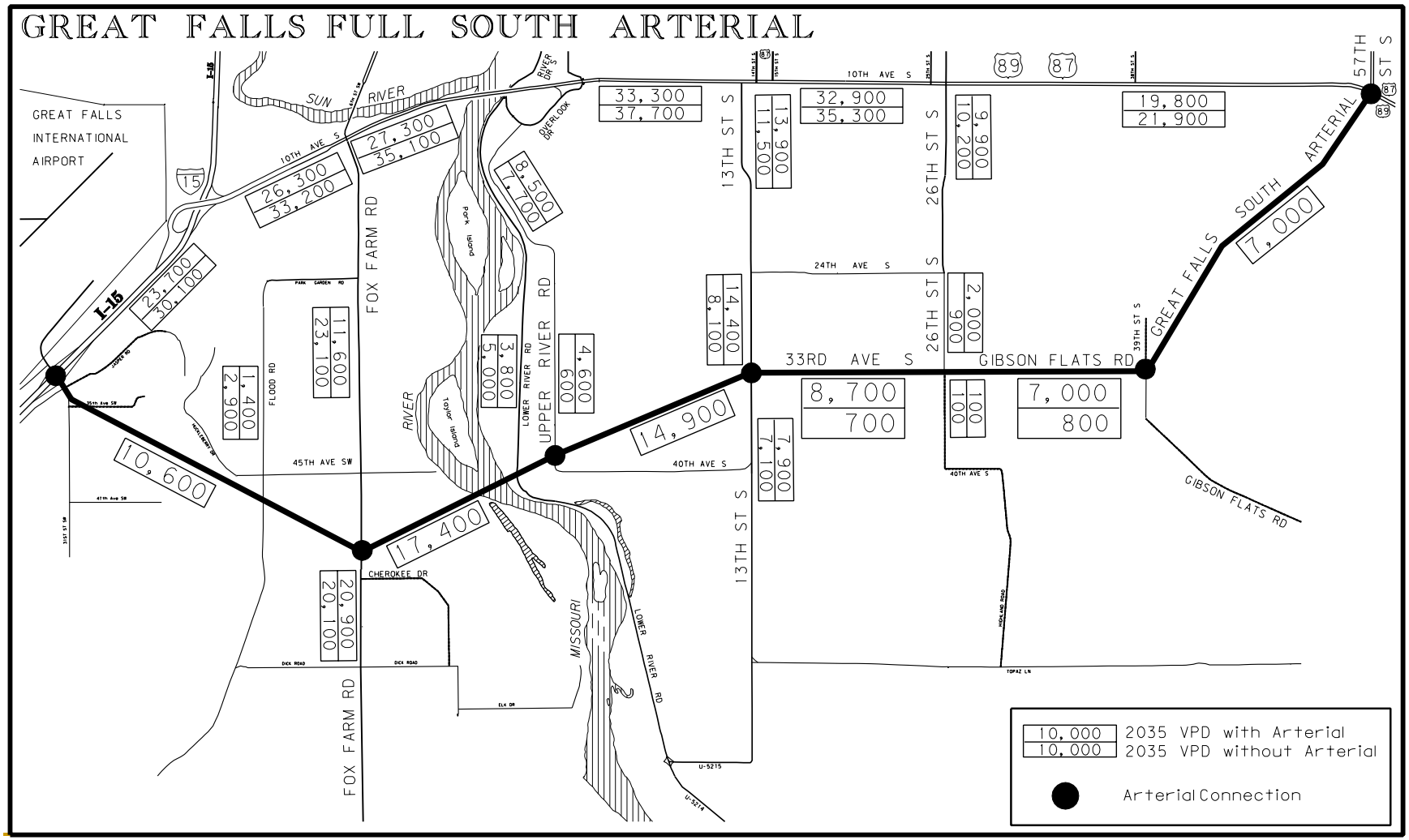


DIAGRAM 1

Traffic Modeling (2)

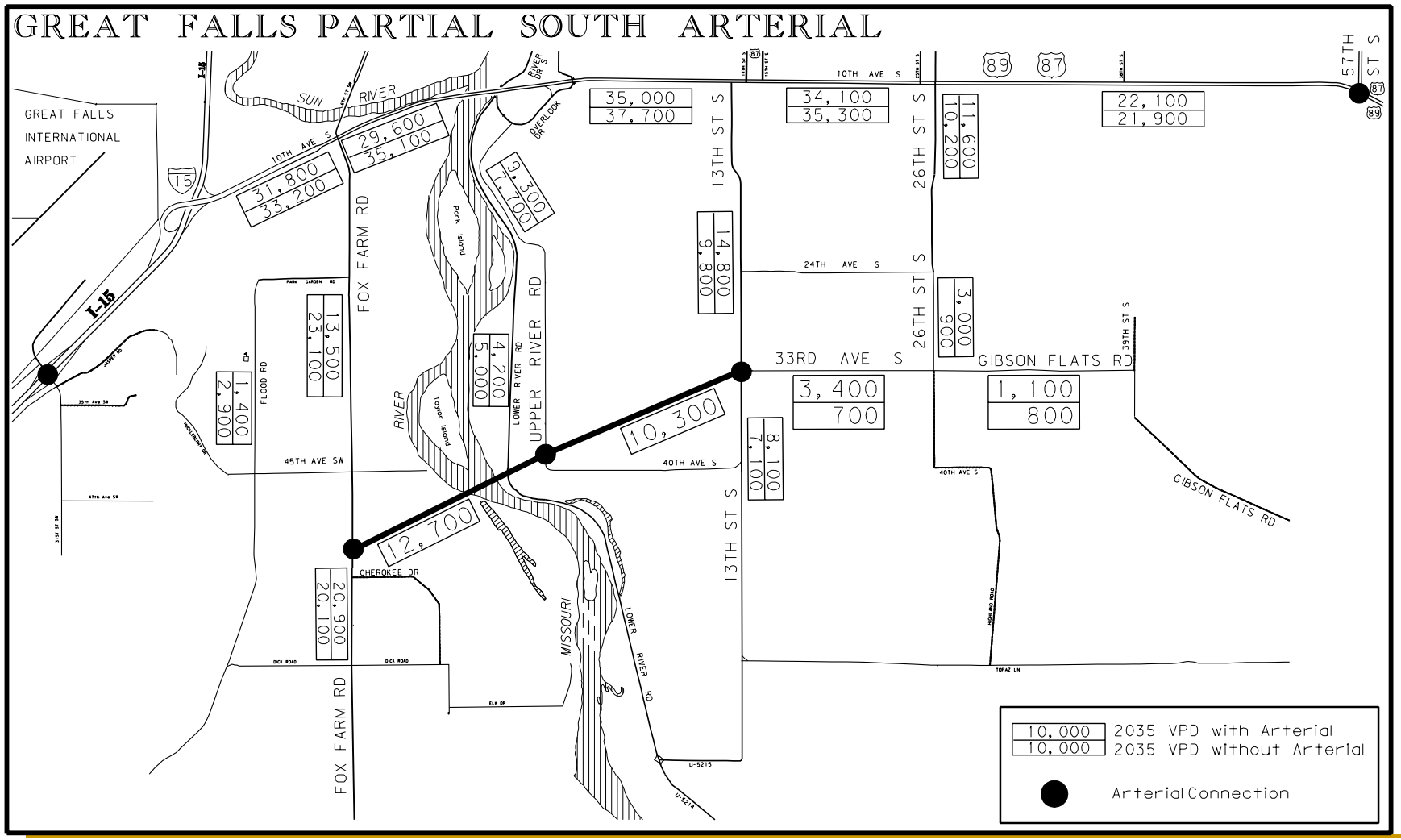
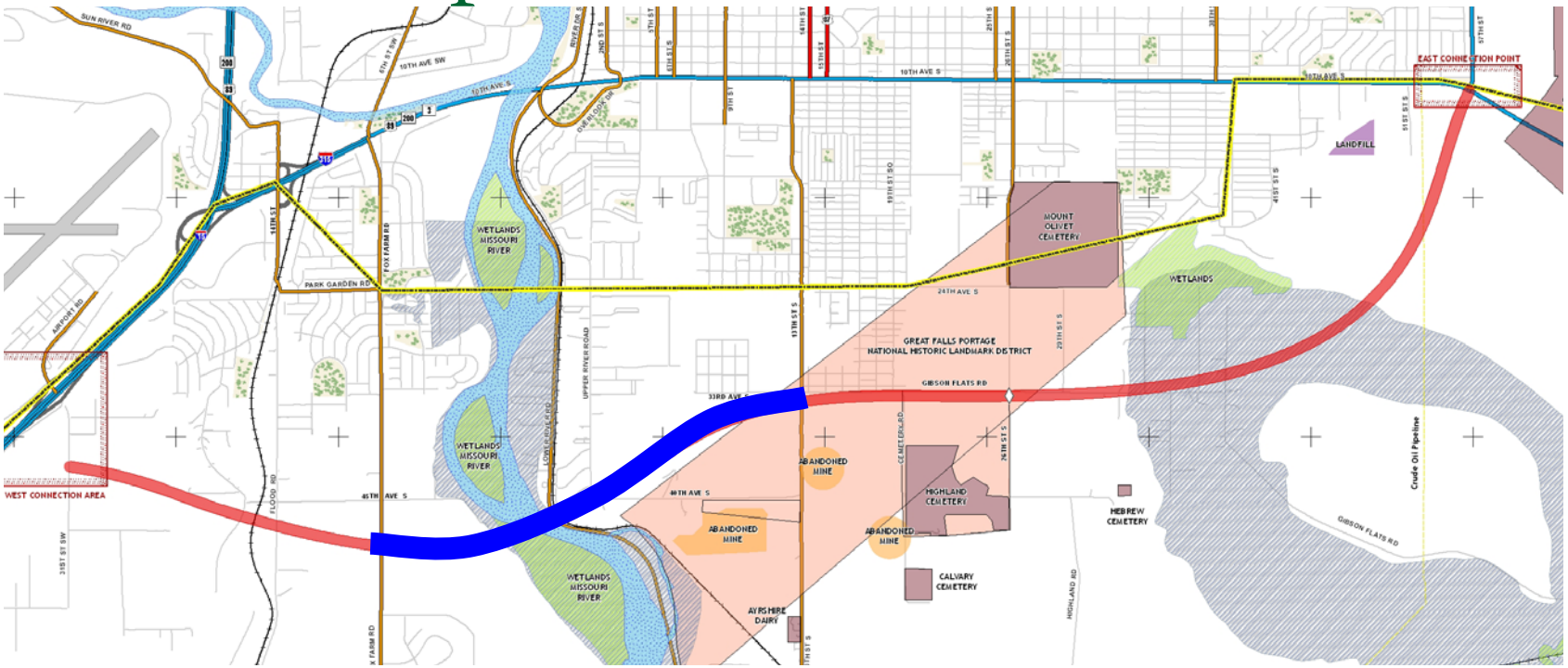


DIAGRAM 2

Phased Implementation



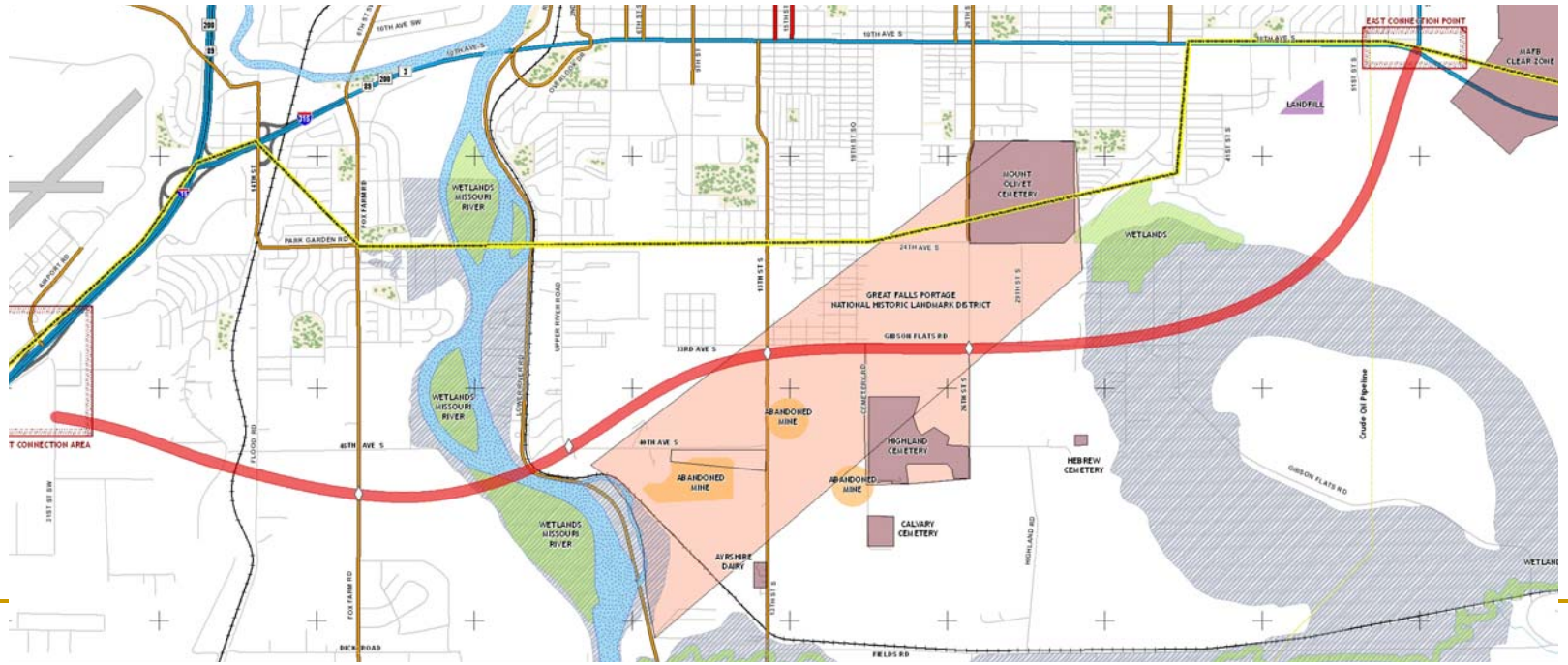
- Initial Phase from Fox Farm Road to 13th Street South
- Shortest segment with “independent utility” and “logical termini”
- Shorter segment in this area would be difficult to construct

Concurrence on:

- Purpose and Need Statement

  Reduce congestion and improve safety along 10th Avenue South; Improve street network mobility; and; Provide additional Missouri River crossing south of 10th Avenue South.

- Preferred Alignment



Funding Picture

- Estimated cost:
- $208 to $285 million for full arterial
- $83 to $93 million for initial phase (Fox Farm to 13th)

- Current funding available:
- $4.9 million

Potential Federal Funding Sources

- CMAQ – for projects that improve air quality in “non-attainment” or “maintenance” areas.

- TCSP – for projects that improve the efficiency of the transportation system, reduce impacts, and reduce future need for infrastructure improvements through more efficient access. Recent trends have directed grants to six largest cities nationwide.

- Congressional Appropriations – Note that a January EO pledged to veto any appropriations bill that does not cut the number and cost of “earmarks” in half.

Potential State/Local Funding Sources

- State Fuel Tax – annual allocation to local governments based on formulas provided through state statute. Must be used on construction, reconstruction, maintenance, and repair of rural roads or city streets and alleys.
- State Sales Tax – establishment of a State Sales Tax could provide a valuable source of additional funding.
- City/County General Fund – includes property taxes, development fees, and other sources of general fund revenue.
- Local Fees – includes impact fees, permits, vehicle license fees, etc.
- Local Option Taxes – approved by a local referendum and can include a gas tax, motor vehicle tax, and resort tax.

Next Steps

There are sufficient funds to develop a NEPA/MEPA compliance document

- Need to demonstrate reasonably available revenues to cover estimated cost of initial segment ($83 to 93 million), and reflect this in the ongoing Great Falls Transportation Plan Update.

- Need to identify available funding for subsequent phase and update the MPO TIP and MDT STIP to include funding for this project.

Further Opportunities for Involvement

- Website – www.mdt.mt.gov/pubinvolve/greatfalls/
- Review the draft report
- Comments due by _____

Appendix 6a

SOURCES FOR DATA ELEMENTS

1. Avoid Zones
    a. Identified and digitized by MDT using Ortho Imagery*
        i. Calvary Cemetery
        ii. Mount Olivet Cemetery
        iii. Portage National Historical Landmark
        iv. Hebrew Cemetery
    b. Received from city of Great Falls
        i. Malmstrom Air Force Base
        ii. Highland Cemetery
    c. Identified by city of Great Falls and digitized based on that information by MDT using Ortho Imagery*
        i. Ayrshire Dairy
    d. Identified by Brent Roeder from MSU and digitized based on that information by MDT using Ortho Imagery*
        i. Ayrshire Dairy Undaunted Site
2. Area Constraint – Identified by feasibility study and digitized based on that information by MDT using Ortho Imagery*
3. Cadastral – Received from city of Great Falls
    a. Structures – Received from city of Great Falls
        i. Parcels with structures
        ii. Parcels without structures
4. Drainage – Identified and digitized by MDT using Ortho Imagery*
5. Environmental
    a. Abandoned Mines - Identified and digitized by MDT using Ortho Imagery*
    b. Crude Oil Pipeline – Data received from NRIS Database
    c. Landfill – Identified and digitized by MDT using Ortho Imagery*
    d. Public Water Supplies – Data received from NRIS Database
    e. Underground Storage Tanks – Data received from NRIS Database
        i. Leaking
        ii. Not Leaking
6. Floodplains – Identified and designed using CAD then converted to a GIS layer, all by MDT
7. Parks – Received from City of Great Falls
8. Rail – Layer created by MDT
9. Ramps – Created by MDT using GPS
10. Routes – Created by MDT using GPS
11. Digital Elevation Model – Flown and Created by MDT in 2006

* Ortho Imagery used was from the 2005 National Agriculture Imagery Program (NAIP)

Appendix 6b

COST DOCUMENTATION

Interchange Costs

Option #1 - New Interchange

Need Additional Data For Backup

Estimated cost = $35 million - 4 lane & $28 million - 2 lane

Option #2 - Gore Hill Interchange Modification

Modification would consist of adding one additional structure along with frontage road improvements between the two structures. Obliteration of the southern ramps of the existing interchange would be necessary. Traffic flow issues, such as lane configurations and signals, would need to be investigated.

Need Additional Data For Backup

Estimated cost = $17 To 20 million

Backup Data

Custer Interchange - Cost = $45 million

Quantm Data - 4 Lane - Rural Principal Arterial
MT 5299(70) - South Arterial - Great Falls

Section	Subject		Result
1.1	Start Point		TBD
1.2	End Point		TBD
1.3	Maximum Design Grade	Downhill	-4% - Rolling Terrain w/ 60 mph design speed (-7% - Mountainous)
		Uphill	+4% - Rolling Terrain w/ 60 mph design speed (+7% - Mountainous)
1.4	Maximum Sustained Grade	Downhill	N/A
		Uphill	N/A
		Sustained Distance	N/A
1.5	Formation Width (ft) in Cut		154ft
1.6	Formation Width (ft) in Fill		114ft
1.7	Minimum Vertical Radii	Crests (k value)	151 (60 mph)
		Sags (k value)	136 (60 mph)
1.8	Minimum Horizontal Radii		1200ft @ 8.0%
1.9	Road Coordination	Sight Dist	570ft - level ; 610ft - downhill ; 530ft - uphill
		Eye Level	3.5ft
		Object Level	2.0ft
1.10	Rail Curve Compensation		N/A
2.1	Haul	$/y^3/mile	~~$0.50/yd^3/mile~~
2.2	Borrow	$/y^3	$12/yd^3
2.3	Dump	$/y^3	~~$5/yd^3~~

2.4.1.A	Geotype 1 = Rock Plateau		
2.4.2.A	Fill Cost	$4.00/yd^3	
2.4.3.A	Batter Slope	16.67% (6:1)	
2.4.4.A	Strata #		2
2.4.5.A	Useable Material	Yes to both	
2.4.6.A	Cut Cost	$12.00/yd^3 - for Rock & $3.00/yd^3 for Dirt	
2.4.7.A	Stratum Thickness	N/A	
2.4.8.A	Batter Slope	33.33% (3:1)	
2.4.9.A	Width of shoulder @ Interface	N/A	
2.4.1.B	Geotype 2 = Floodplain Areas		
2.4.2.B	Fill Cost	$12.00/yd^3	
2.4.3.B	Batter Slope	16.67% (6:1)	
2.4.4.B	Strata #		1
2.4.5.B	Useable Material	Yes	
2.4.6.B	Cut Cost	$3.00/yd^3	
2.4.7.B	Stratum Thickness	N/A	
2.4.8.B	Batter Slope	33.33% (3:1)	
2.4.9.B	Width of shoulder @ Interface	N/A	
2.4.1.C	Geotype 3 = Valley Floor & Ridges		
2.4.2.C	Fill Cost	$4.00/yd^3	
2.4.3.C	Batter Slope	16.67% (6:1)	
2.4.4.C	Strata #		1
2.4.5.C	Useable Material	Yes	
2.4.6.C	Cut Cost	$3.00/yd^3	
2.4.7.C	Stratum Thickness	N/A	
2.4.8.C	Batter Slope	33.33% (3:1)	
2.4.9.C	Width of shoulder @ Interface	N/A	

3.1.1 Thru 3.1.4 - No major culverts identified but culverts will be required throughout the project

3.2.1	Retaining Walls	$400/ft^2
3.2.2	Bridges	$150/ft^2 - (84' wide bridge = $12600/ft)
3.2.3	Tunnel	$50000/ft
3.2.4	Pavement	$440/ft

Unit Price Worksheet - 4 Lane

Item	Cost	
Excavation - Unclassified	$7.00/yd^3	
Excavation - Unclassified Borrow	$12.00/yd^3	
Excavation - Muck	$15.00/yd^3	
Special Borrow	$20.00/yd^3	
Retaining Wall	$400/ft^2	
Bridge	$150/ft^2	(84' wide bridge = $12600/ft)

Haul (not paid for separately)	$0.50/yd^3/mile	(assumes average distance = 1 mile within the project limits)
Borrow	$12.00/yd^3	
Dump (not paid for separately)	$5.00/yd^3	(assume average distance = 5 miles)

Geotype 1 = Rock Plateau		
Cut	$12.00/yd^3 - for Rock & $3.00/yd^3 for Dirt	
Fill	$4.00/yd^3	
Geotype 2 = Floodplain Areas		
Cut	$3.00/yd^3	(muck excavation situation)
Fill	$12.00/yd^3	(includes a combination of borrow material, excavated material, and stabilization methods)
Geotype 3 = Valley Floor & Ridges		
Cut	$3.00/yd^3	
Fill	$4.00/yd^3	

Pavement - Section	
Grade S Plant Mix	$20/ton
PG 70-28 Oil (5.5%)	$500/ton
Hydrated Lime (1.4%)	$150/ton
CRS-2P Seal Oil	$500/ton
Cover Material	$0.60/yd^2
Gravel	$38/yd^3

Plant Mix Cost = $20(.931)+$500(0.055)+$150(0.014) = $48/ton = $93/yd^3

Plant Mix X-Section area = ((80+86)/2)ft wide * 0.5ft thick = 41.5ft^2 = 4.61yd^2

Plant Mix Cost = 93*4.61 = $429/yd = $143/ft for an 80ft wide roadway : estimate $155.00/ft with seal & cover operations and striping

Gravel Cost = $38/yd^3 = $1.41/ft^3

Gravel X-Section area = ((114+86)/2)ft wide *2.0ft thick = 200ft^2

Gravel Cost = $1.41/ft^3 * 200ft^2 = $282/ft (cost includes some project incidental cost)

Total Section Cost = $155/ft + $282/ft = $437/ft - Use $440/ft

Quantm Data - 2 Lane - Rural Principal Arterial
MT 5299(70) - South Arterial - Great Falls

Section	Subject		Result
1.1	Start Point		TBD
1.2	End Point		TBD
1.3	Maximum Design Grade	Downhill	-4% - Rolling Terrain w/ 60 mph design speed (-7% - Mountainous)
		Uphill	+4% - Rolling Terrain w/ 60 mph design speed (+7% - Mountainous)
1.4	Maximum Sustained Grade	Downhill	N/A
		Uphill	N/A
		Sustained Distance	N/A
1.5	Formation Width (ft) in Cut		110ft
1.6	Formation Width (ft) in Fill		70ft
1.7	Minimum Vertical Radii	Crests (k value)	151 (60 mph)
		Sags (k value)	136 (60 mph)
1.8	Minimum Horizontal Radii		1200ft @ 8.0%
1.9	Road Coordination	Sight Dist	570ft - level ; 610ft - downhill ; 530ft - uphill
		Eye Level	3.5ft
		Object Level	2.0ft
1.10	Rail Curve Compensation		N/A
2.1	Haul	$/y^3/mile	~~$0.50/yd^3/mile~~
2.2	Borrow	$/y^3	$12/yd^3
2.3	Dump	$/y^3	~~$5/yd^3~~

2.4.1.A	Geotype 1 = Rock Plateau		
2.4.2.A	Fill Cost	$4.00/yd^3	
2.4.3.A	Batter Slope	16.67% (6:1)	
2.4.4.A	Strata #		2
2.4.5.A	Useable Material	Yes to both	
2.4.6.A	Cut Cost	$12.00/yd^3 - for Rock & $3.00/yd^3 for Dirt	
2.4.7.A	Stratum Thickness	N/A	
2.4.8.A	Batter Slope	33.33% (3:1)	
2.4.9.A	Width of shoulder @ Interface	N/A	
2.4.1.B	Geotype 2 = Floodplain Areas		
2.4.2.B	Fill Cost	$12.00/yd^3	
2.4.3.B	Batter Slope	16.67% (6:1)	
2.4.4.B	Strata #		1
2.4.5.B	Useable Material	Yes	
2.4.6.B	Cut Cost	$3.00/yd^3	
2.4.7.B	Stratum Thickness	N/A	
2.4.8.B	Batter Slope	33.33% (3:1)	
2.4.9.B	Width of shoulder @ Interface	N/A	
2.4.1.C	Geotype 3 = Valley Floor & Ridges		
2.4.2.C	Fill Cost	$4.00/yd^3	
2.4.3.C	Batter Slope	16.67% (6:1)	
2.4.4.C	Strata #		1
2.4.5.C	Useable Material	Yes	
2.4.6.C	Cut Cost	$3.00/yd^3	
2.4.7.C	Stratum Thickness	N/A	
2.4.8.C	Batter Slope	33.33% (3:1)	
2.4.9.C	Width of shoulder @ Interface	N/A	

3.1.1 Thru 3.1.4 - No major culverts identified but culverts will be required throughout the project

3.2.1	Retaining Walls	$400/ft^2
3.2.2	Bridges	$150/ft^2 - (42' wide bridge = $6300/ft)
3.2.3	Tunnel	$50000/ft
3.2.4	Pavement	$246/ft

Environmental Costs

Joe Radonich from MDT Environmental estimated $30K to $40K for investigation per LUST site and $10K to $15K per UST site. The only site impacted by any of the proposed alignments has been the crude oil pipeline and based on $100K per acre a single crossing was $10,000.

Environmental justice parcels in the Gibson Flat area were examined by comparing run 24C1 to a run called 24BASE2. 24BASE2 was an improved land vs unimproved land with a $10k/acre value for all unimproved land and a $500k/acre value for all improved land. The alignment results when compared to 24C1 in the area in question were nearly identical.

Wetlands = $40,000/acre

Justification of Project Costs

Materials

Unclassified Excavation

NE Bypass - $11.25/yd
Cut Bank - West - $7.85/yd
South Helena Interchange - $7.20/yd

Use - $5.00/yd - * This project involves a very large amount of excavation which may result in a lower unit cost.

Special Borrow

10th Ave South - $24.20/yd
Cut Bank - West - $18.30/yd
Use - $20.00/yd

Unclassified Borrow

Cut Bank - West - $9.16/yd
South Helena Interchange - $8.24/yd
NE Bypass - $33.22/yd
Use - $12.00/yd

Crushed Aggregate Course

Cut Bank - West - $32.70/yd
US 2 - Havre - $51.01/yd
Great Falls N&S - $37.93/yd
Use $38.00/yd

Plant Mix Items

Used Great Falls N&S as the basis

Right-of-Way Project Costs

Cadastral appraisal values were used a base value which was multiplied by three for more realistic R/W values. This method was spot checked in many areas and worked well. However, there are exceptions and they are listed below;

Unimproved land greater than 6 acres and east of the Missouri River was given a value of $10k/acre
All improved land with lots smaller than 0.5 acres were given a value of $1 million/acre
Infrastructure damage to the Fox Farm area was given a value of $5 million/acre
Infrastructure damage to various subdivisions in the study area was given a values from $500k/acre to $3 million/acre

Unit Price Worksheet - 2 Lane

Item	Cost	
Excavation - Unclassified	$8.00/yd^3	
Excavation - Unclassified Borrow	$12.00/yd^3	
Excavation - Muck	$15.00/yd^3	
Special Borrow	$20.00/yd^3	
Retaining Wall	$400/ft^2	
Bridge	$150/ft^2	(42' wide bridge = $6300/ft)

Haul - use 0 - MDT doesn't pay for haul	~~$0.50/yd^3/mile~~	(assumes average distance = 1 mile within the project limits)
Borrow	$12.00/yd^3	
Dump	~~$5.00/yd^3~~	(assume average distance = 5 miles)

Geotype 1 = Rock Plateau		
Cut	$12.00/yd^3 - for Rock & $3.00/yd^3 for Dirt	
Fill	$4.00/yd^3	
Geotype 2 = Floodplain Areas		
Cut	$3.00/yd^3	(muck excavation situation)
Fill	$12.00/yd^3	(includes special borrow material and stabilization methods)
Geotype 3 = Valley Floor & Ridges		
Cut	$3.00/yd^3	
Fill	$4.00/yd^3	

Pavement - Section	
Grade S Plant Mix	$20/ton
PG 70-28 Oil (5.5%)	$500/ton
Hydrated Lime (1.4%)	$150/ton
CRS-2P Seal Oil	$500/ton
Cover Material	$0.60/yd^2
Gravel	$38/yd^3

Plant Mix Cost = $20(.931)+$500(0.055)+$150(0.014) = $48/ton = $93/yd^3

Plant Mix X-Section area = ((40+46)/2)ft wide * 0.5ft thick = 21.5ft^2 = 2.39yd^2

Plant Mix Cost = 93*2.39 = $222/yd = $74/ft for a 40ft wide roadway : estimate $82.00/ft with seal & cover operations and striping

Gravel Cost = $38/yd^3 = $1.41/ft^3

Gravel X-Section area = ((70+46)/2)ft wide *2.0ft thick = 116ft^2

Gravel Cost = $1.41/ft^3 * 116ft^2 = $164/ft (cost includes some project incedental cost)

Total Section Cost = $82/ft + $164/ft = $246/ft - Use $246/ft

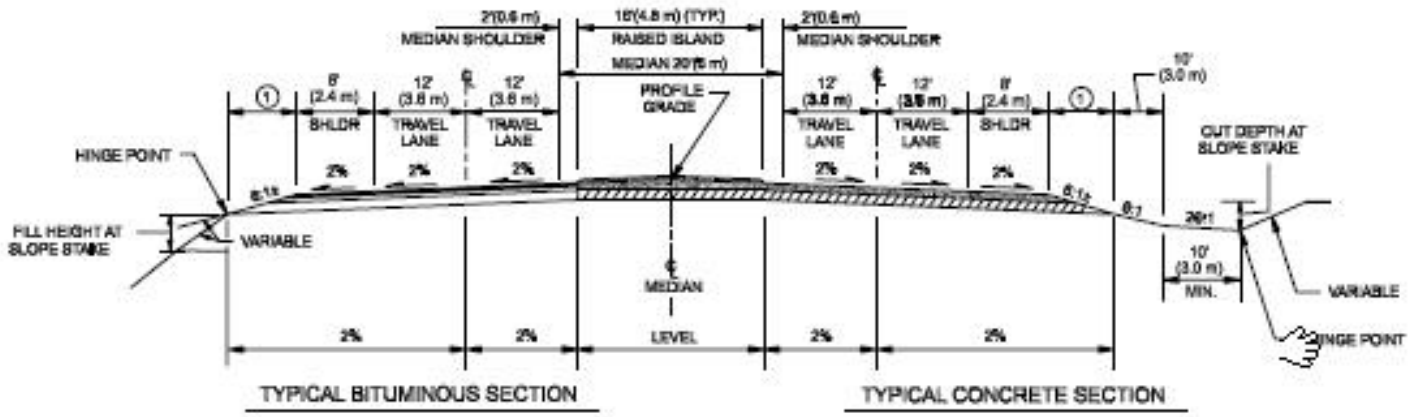
Appendix 6c

MDT Road Design Criteria & Typical Sections

GEOMETRIC DESIGN CRITERIA FOR RURAL PRINCIPAL ARTERIALS
(National Highway System — Non Interstate) U.S. Customary

	Design Element		Manual Section	Design Criteria		
Design Controls	Design Forecast Year (Geometrics)		8.4	20 Years (1)		
	*Design Speed	Level	8.3	70 mph		
		Rolling		60 mph		
		Mountainous		50 mph		
	Level of Service		8.4	Level/Rolling: B Mountainous: C		
Roadway Elements	*Travel Lane Width		11.2	12' (2)		
	*Shoulder Width		11.2	Varies (2)		
	Cross Slope	*Travel Lane	11.2	2%		
		Shoulder		2%		
	Median Width		11.3	Varies (3)		
Earth Cut Sections	Inslope		11.4	6:1 (Width: 10')		
	Ditch	Width	11.4	10' Min.		
		Slope		20:1 towards back slope		
	Back Slope; Cut Depth at SlopeStake (4)	0' – 5'	11.4	5:1		
		5' – 10'		Level/Rolling: 4:1; Mountainous: 3:1		
		10' – 15'		Level/Rolling: 3:1; Mountainous: 2:1		
		15' – 20'		Level/Rolling: 2:1; Mountainous: 1.5:1		
		> 20'		1.5:1		
Earth Fill Slopes	Fill Height at Slope Stake (5)	0' – 10'	11.4	6:1		
		10' – 20'		4:1		
		20' – 30'		3:1		
		> 30'		2:1		
Alignment Elements	DESIGN SPEED		N/A	50 mph	60 mph	70 mph
	*Stopping Sight Distance		8.6	425'	570'	730'
	Passing Sight Distance		8.6	1835'	2135'	2480'
	*Minimum Radius (e=8.0%)		9.2	760'	1200'	1620'
	*Superelevation Rate (6)		9.3	emax = 8.0%		
	*Vertical Curvature (K-value)	Crest	10.5	84	151	247
		Sag		96	136	181
	*Maximum Grade	Level	10.3	3%		
		Rolling		4%		
		Mountainous		7%		
	Minimum Vertical Clearance (7)		10.6	17.0'		

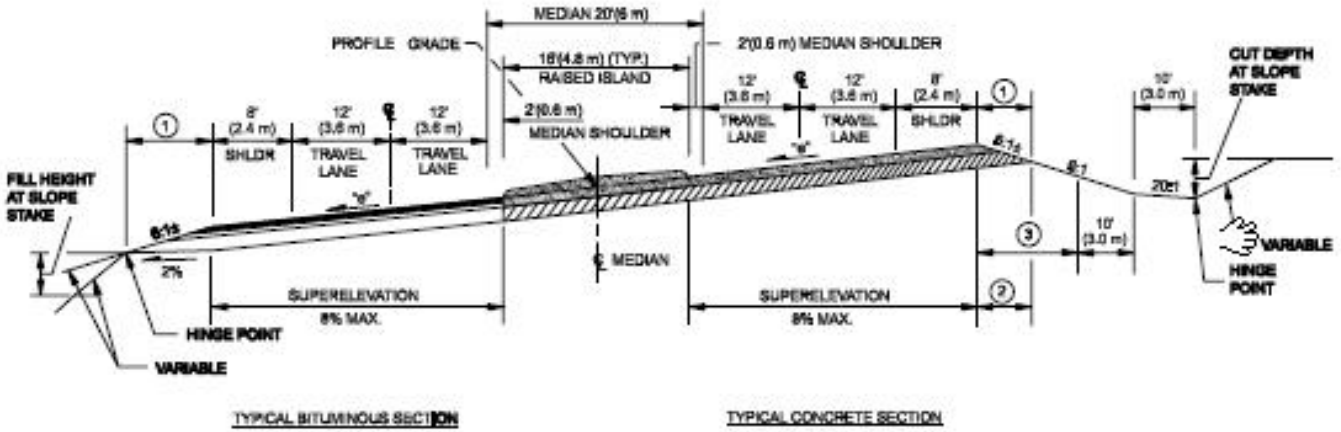
* Controlling design criteria (see Section 8.8).



GENERAL NOTE: Dimensions in figure will typically apply. See applicable figure in Chapter Twelve for specific cross section criteria for various conditions (e.g., for cut and fill slopes).

① Compute total width to nearest foot(0.01 meter). Compute intermediate surfacing widths to nearest 0.1 foot (0.01 meter).

TYPICAL RAISED MEDIAN SECTION (Tangent Section)
Figure 11.7K



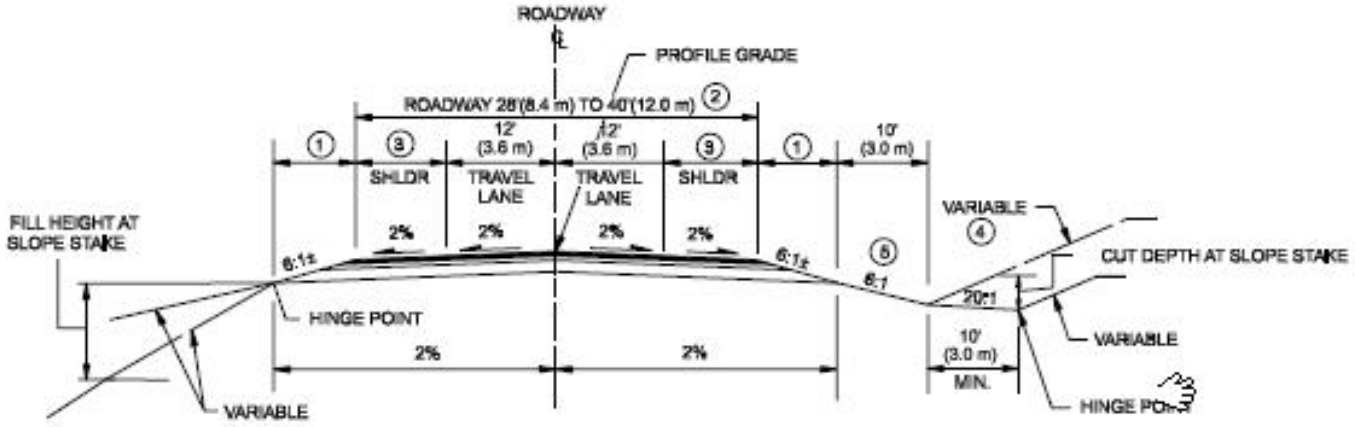
GENERAL NOTE: Dimensions in figure will typically apply. See applicable figure in Chapter Twelve for specific cross section criteria for various conditions (e.g., for cut and fill slopes). See Chapter Nine for details on superelevation.

① Compute total width to nearest foot (0.01 meter). Compute intermediate surfacing widths to nearest 0.1 foot (0.01 meter).

② Compute distance for each superelevation on the project.

③ This distance will be equal to the ① distance on the tangent section (Figure 11.7K).

TYPICAL RAISED MEDIAN SECTION (Superelevated Section)
Figure 11.7L



GENERAL NOTE: Dimensions in figure will typically apply. See applicable figure in Chapter Twelve for specific cross section criteria for various conditions (e.g., for cut and fill slopes).

① Compute total width to nearest foot (0.01 meter). Compute intermediate surfacing widths to nearest 0.1 foot (0.01 meter).

② Roadway width will vary. See Chapter Twelve for specific criteria.

③ Shoulder width will vary. See Chapter Twelve for specific criteria. New projects should include full-depth shoulders.

④ V-ditches may be used in special cases. Check Chapter Fourteen for traversability criteria for roadside ditches.

⑤ The inslope may be 4:1 for some major collectors; see Chapter Twelve for specific criteria.

TYPICAL TWO-LANE RURAL HIGHWAY (Tangent Section)
Figure 11.7M

Appendix 6d

GREAT FALLS SOUTH ARTERIAL ENVIRONMENTAL SCAN

Montana Department of Transportation

Great Falls South Arterial
MT 5299(70)
CN 4566

Environmental Scan

March 2008

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Table 10. Utilities in the Great Falls South Arterial Corridor

List of Acronyms

CO	Carbon Monoxide
DNRC	Department Of Natural Resource And Conservation
ESA	Endangered Species Act
ESB	East Side Bypass
EIS	Environmental Impact Statement
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
FIRM	Flood Insurance Rate Maps
GIS	Geographic Information System
LUST	Leaking Underground Storage Tank
LWQD	Local Water Quality District
LUST	Leaking Underground Storage Tank
LWQD	Local Water Quality District
MSAT	Mobile Source Air Toxics
MEPA	Montana Environmental Policy Act
MDEQ	Montana Department Of Environmental Quality
MDT	Montana Department Of Transportation
MFWP	Montana Department Of Fish, Wildlife, And Parks
MP	Milepost
NEPA	National Environmental Policy Act
NFIP	National Flood Insurance Program
NHP	Natural Heritage Program
NAC	Noise Abatement Criteria
NPL	National Priority List
NPS	National Park Service
NRC	National Response Center
NRHP	National Register Of Historic Places
NRIS	Natural Resource Information System
NWI	National Wetlands Inventory
NWR	National Wildlife Refuge
RCRA	Resource Conservation And Recovery Act
TMDL	Total Maximum Daily Load
TRI	Toxics Release Inventory
UST	Underground Storage Tank
USACE	U.S. Army Corps Of Engineers
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish And Wildlife Service

1 Introduction

1.1 Background

The Great Falls South Arterial Alignment Study (Study) is part of a long term planning process that carries forward recommendations from a recently completed Great Falls Arterial Feasibility Study (2004), the current Great Falls Area Transportation Plan (2003), and the Great Falls Growth Policy (2005), all of which recommend further study of the South Arterial. The planning level analysis, being conducted under this Study, allows for the identification, selection and elimination of potential alignments, but lacks the precision to identify the specific properties or other features impacted. After the currently proposed alignments are reduced to one or more alignments, additional detailed and specific environmental analysis and design will then be conducted, including the identification of specifically impacted properties and possible mitigation measures. The reader should also be advised that even after completion of these types of environmental analyses, major roadway improvement projects can typically take from seven to ten years to reach the construction phase. This project development process is also highly dependent on funding availability, which can add to the timeline.

The primary objective of this Environmental Scan Report is to determine the potential impacts or constraints for the Great Falls South Arterial Alignment Study.

1.2 Organization of Report

This report goes on to describe the geographic setting of the existing Great Falls South Arterial Corridor. The document continues with descriptions of environmental scan methodologies and results for the geographic area for physical resources (Section 3), biological resources (Section 4), cultural resources (Section 5), and utilities (Section 6). A list of tables and appendices is on page 1. A list of acronyms is defined on page 2.

2 Geographic Setting

The Great Falls South Arterial Corridor as described in the Great Falls Arterial Feasibility Study is generally located south of the urbanized area of Great Falls, beginning at Interstate 15 at or near the Airport Interchange and south of the Granda Vista residential area. The corridor precedes easterly towards the Gibson Flats area and to an intersection with 10th Avenue South at or near 57th Street South, and including US 87/89 (MT Highway 3). The endpoints will be refined during the engineering phase rather than the location study phase that is currently underway. The corridor is generally 3 miles wide, approximately 8.1 miles long, and contains one Missouri River crossing located near or south of Taylor Island. The upper boundary of the corridor is generally delineated by 24th Avenue South. Multiple existing east-west transportation corridors currently exist within the corridor. Land use within the corridor is predominantly agricultural and residential with some pockets of commercial development, typically near either end of the corridor. The majority of the land within the corridor is undeveloped.

The following sections will describe the Great Falls South Arterial Corridor for the purpose of environmental discussions in this document. They are not necessarily indicative of proposed

alternatives, but rather a collection of geographic areas by which environmental discussions can be grouped.

3 Physical Resources

3.1 Land Ownership

Geographic Information System (GIS)-based information was reviewed to assess the amount of area in the study corridor that is public versus privately owned.

Reviews were also conducted to determine the presence of Section 4(f) and Section 6(f) properties along the corridor. Section 4(f) refers to the original section within the Department of Transportation Act of 1966 (49 U.S.C. 303), which set the requirement for consideration of park and recreational lands, wildlife and waterfowl refuges, and historic sites in transportation project development. Prior to approving a project that "uses" a Section 4(f) resource, FHWA must find that there is no prudent or feasible alternative that completely avoids 4(f) resources. "Use" can occur when land is permanently incorporated into a transportation facility or when there is a temporary occupancy of the land that is adverse to a 4(f) resource. Constructive "use" can also occur when a project's proximity impacts are so severe that the protected activities, features, or attributes that qualify a resource for protection under 4(f) are "substantially impacted". Section 4(f) resource information was gathered by field observation and review of the National Register of Historic Places (NRHP) list for Cascade County.

Section 6(f) of the Land and Water Conservation Funds Act applies to all projects that impact recreational lands purchased or improved with land and water conservation funds. The Secretary of the Interior must approve any conversion of property acquired or developed with assistance under this act to other than public, outdoor recreation use. At this time, there are no 6(f) resources identified in the study corridor.

3.1.1 Cascade County

The land within the project boundary in Cascade County is predominantly agricultural and residential with some pockets of commercial development, typically near either end of the corridor. The majority of the land within the corridor is undeveloped.

4(f) resources within the corridor segment are summarized in Table 1.

Table 1. 4(f) Resources within the Cascade County Portion of the Project Area

Name	Type of 4(f) Resource	Town (Specific Location Relative to Corridor)
Great Falls Portage National Historic Landmark	Historic Site	

Great Northern Railway's Stockett Spur	Historic Site	
Ayrshire Dairy	Historic Site	4510 13th Street South
Highland Cemetery	Historic Site	2010 33rd Avenue South
Calvary Cemetery	Historic Site	SW of Highland Cemetery
Mount Olivet Cemetery	Historic Site	2101 26th Street South
Hebrew Cemetery	Historic Site	40th Avenue South & Eaton Avenue

3.2 Geology and Soils

Information was obtained on geology and soils to determine the presence of prime and unique farmland, geologic faults, and potential geologic hazard areas with regard to road-building in the corridor study areas.

The Farmland Protection Policy Act of 1981 (Title 7 United States Code, Chapter 73, Sections 4201-4209) has as its purpose "to minimize the extent to which federal programs contribute to the unnecessary and irreversible conversion of farmland to nonagricultural uses, and to assure that federal programs are administered in a manner that, to the extent practicable, will be compatible with State, unit of local government, and private programs and policies to protect farmland."

Farmland is defined by the act in Section 4201 as including prime 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 land, in addition to prime and unique farmlands, that is of statewide importance for the production of food, feed, fiber, forage, and oilseed crops.

Seismic information was reviewed for fault lines and seismic hazard areas. This geologic information can help determine any potential design and construction issues related to

embankments and bridge design. The following paragraphs describe the geology and history behind the seismicity present in Montana and also the farmland soils findings for the corridor.

3.2.1 Existing Great Falls South Arterial Corridor

A soil survey is available for the Great Falls South Arterial Corridor area. Information regarding areas of prime farmland in the corridor area was compiled from the US Department of Agriculture, Natural Resource Conservation Service (NRCS).

The AD-1006 Farmland Conversion Impact Rating Form is a way for the NRCS to keep inventory of the Prime and Important farmlands within the state. Soil map units found within the project area have been classified as prime and important farmlands. Project activities associated with the construction of the Great Falls South Arterial Alignment will create impacts to the soil map units with prime and important farmland status, thus it is required that a AD-1006 Farmland Conversion Impact Rating Form be completed. The process for completing this form requires mapping of the prime and important farmlands to be converted to non-farmable land, coordination with the NRCS, and final completion of the conversion form.

Appendix A contains a map and a description of the farmland classification types found in the Great Falls South Arterial Corridor area.

Appendix B contains a map showing a belt of seismicity known as the Intermountain Seismic Belt that extends through western Montana, from the Flathead Lake region in the northwest corner of the state through Idaho, Wyoming, Utah, and into southern Nevada. In western Montana, the Intermountain Seismic Belt is up to 100 kilometers (62 miles) wide and parallels the Rocky Mountains. The Centennial Tectonic Belt, a branch of the Intermountain Seismic Belt, includes at least eight major active faults. The Great Falls South Arterial Corridor area appears to be located outside of the Intermountain Seismic Belt and the Centennial Tectonic Belt. To mitigate seismic impacts to structures under MDT's jurisdiction, all transportation structures constructed will be designed in accordance with the appropriate AASHTO seismic design standards.

When shaken by an earthquake, certain soils are susceptible to liquefaction; that is, they lose strength and temporarily behave like liquids. The seismically induced loss of strength can result in failure of the ground surface, most typically expressed as lateral spreads, surface cracks, settlement, or sand boils. Structures, including roadways, can sustain substantial damage during a large seismic event if they are supported in or on a soil susceptible to liquefaction. Seismically induced liquefaction typically occurs in loose, saturated, sandy material commonly associated with recent river, lake, and beach sedimentation. In addition, seismically induced liquefaction can be associated with areas of loose, saturated fill (USGS 1992). Several areas along the project corridor are underlain by alluvium and consequently susceptible to liquefaction (See Appendix C for an alluvium geologic map).

3.3 Surface Water and Groundwater

The Great Falls South Arterial Corridor contains many public water supplies with sources from both surface water and groundwater. Protection of these water supplies is important. In addition to providing public drinking water, water resources provide water for agricultural and industrial

purposes, serve important habitat functions, and provide for recreational use. The following sections give descriptions of the surface water and groundwater present in the Great Falls South Arterial Corridor.

3.3.1 Surface Water

The Missouri River flows through the western portion of the study area. Sand Coulee Creek is the only tributary to the Missouri River within the Great Falls South Arterial Corridor. The Sand Coulee Creek channel is typically dry except for spring runoff and large precipitation events. However, Sand Coulee Creek has a wide floodplain which includes the low lying area of Gibson Flats during significant flood events. Available GIS data were reviewed and field observations made to identify the location of surface water bodies within the corridor study area, including rivers, streams, lakes, or reservoirs.

All water used by the residents of Great Falls, Malmstrom Air Force Base and Black Eagle is water that was pumped from the Missouri River and treated to make it safe to drink. The water treatment facility is located just upstream from the Missouri's confluence with the Sun River in Great Falls. The drinking water currently meets all federal and state drinking water standards. Appendix D contains the 2007 Consumer Confidence Report released by the city of Great Falls that discusses the drinking water supply.

Montana's Department of Environmental Quality (MDEQ) recently completed the Great Falls source water delineation and assessment report. This report delineates a source water protection area for Great Falls (an area of surface water and land that contributes water to the Great Falls Public Water Supply). The report also identifies locations or regions within this area where contaminants might be generated, stored or transported and addresses their relative potential for contaminating Great Falls drinking water.

The Great Falls South Arterial Corridor travels through the Missouri-Sun-Smith Watershed (Hydrologic Unit Code: 10030102). Information on the Missouri River and its tributaries within the study area was obtained from MDEQ's website. Section 303, subsection "d" of the Clean Water Act requires the State of Montana to develop a list, subject to USEPA approval, of water bodies that do not meet water quality standards. When water quality fails to meet state water quality standards, MDEQ determines the causes and sources of pollutants in a sub-basin assessment and sets maximum pollutant levels, called total maximum daily loads (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 to be undertaken (such as best management practices), the mechanisms by which the selected measures would be put into action, and the individuals and entities responsible for implementation projects.

The Missouri-Sun-Smith watershed is listed in the 2006 Integrated 303(d)/305(b) Water Quality Report for Montana by MDEQ. The water bodies within the Missouri-Sun-Smith Watershed that are located in the study area are all Category 5 water bodies. Category 5 water bodies are waters where one or more applicable beneficial use has been assessed as being impaired or threatened, and a TMDL is required to address the factors causing the impairment or threat. TMDLs have

not yet been written for water bodies in this watershed. According to Appendix F of the Water Quality Report, the Missouri-Sun-Smith Watershed TMDLs are under development and expected completion is 2007 – 2009. When TMDLs are prepared and implementation plans are in place, any construction practices would have to comply with the requirements set forth in the plan.

303(d) listed water bodies within the Missouri-Sun-Smith Watershed that are located in the study area are summarized in Table 2.

Table 2. 303(d) Listed Water Bodies in Study Area

Water Body	Beneficial Use	Probable Cause of Impairment	Probable Source of Impairment
Missouri River (Sheep Creek to the Sun River)	Aquatic Life Cold Water Fishery	Sedimentation/Siltation	Agriculture
			Dam Construction (other than upstream flood control projects)
			Highway/Road/Bridge Runoff (non-construction related)
			Impacts from Hydrostructure Flow Regulation/modification
			Natural Sources
			Streambank Modifications/destabilization
Missouri River (Sun River to Rainbow Dam)	Aquatic Life and Coldwater Fishery	Chromium	Contaminated sediments, Industrial Point Source Discharge, Industrial/Commercial Site Stormwater Discharge (permitted)
		Mercury	Contaminated sediments, Industrial Point Source Discharge, Industrial/Commercial Site Stormwater Discharge (permitted)
		Pentachlorobenzene	Contaminated sediments, Industrial Point Source Discharge, Industrial/Commercial Site Stormwater Discharge (permitted)
		Physical substrate habitat alterations	Dam Construction (other than Upstream Flood Control Projects), Industrial/Commercial Site Stormwater Discharge (permitted), Irrigated Crop Production
		Sedimentation/Siltation	Contaminated sediments, Industrial/Commercial Site Stormwater Discharge (Permitted)
		Selenium	Contaminated sediments, Industrial Point Source Discharge, Industrial/Commercial Site Stormwater Discharge (permitted)

Water Body	Beneficial Use	Probable Cause of Impairment	Probable Source of Impairment
		Solids (Suspended/Bedload)	Contaminated sediments, Industrial Point Source Discharge, Industrial/Commercial Site Stormwater Discharge (permitted)
		Turbidity	Contaminated Sediments, Dam Construction (Other than Upstream Flood Control Projects), Industrial Point Source Discharge, Industrial/Commercial Site Stormwater Discharge (Permitted), Irrigated Crop Production
	Drinking Water	Chromium	Contaminated sediments, Industrial Point Source Discharge, Industrial/Commercial Site Stormwater Discharge (permitted)
	Industrial	Turbidity	Contaminated Sediments, Dam Construction (Other than Upstream Flood Control Projects), Industrial Point Source Discharge, Industrial/Commercial Site Stormwater Discharge (Permitted), Irrigated Crop Production
Sand Coulee Creek (from headwaters to mouth of the Sand Coulee Creek-Missouri River)	Aquatic Life Cold Water Fishery	Aluminum/Nickel/Zinc	Impacts from Abandoned Mine Lands (Inactive), Subsurface (Hardrock) Mining
	Drinking Water	Cadmium/Nickel/Zinc	Impacts from Abandoned Mine Lands (Inactive), Subsurface (Hardrock) Mining
	Agricultural/Industrial	Salinity	Impacts from Abandoned Mine Lands (Inactive), Subsurface (Hardrock) Mining

Water Body	Beneficial Use	Probable Cause of Impairment	Probable Source of Impairment
Sand Coulee Creek (from number five coulee to the mouth of the Missouri River)	Drinking Water	Lead/Zinc	Impacts from Abandoned Mine Lands (Inactive), Subsurface (Hardrock) Mining
	Agricultural/Industrial	Salinity	Agriculture
	Cold Water Fishery	Zinc	Impacts from Abandoned Mine Lands (Inactive), Subsurface (Hardrock) Mining

3.3.1.1 Wild and Scenic Rivers

The river systems were also reviewed to determine 'Wild and Scenic' designation. The Wild and Scenic Rivers Act, created by Congress in 1968, provided for the protection of certain selected rivers, and their immediate environments, that possess outstandingly remarkable scenic, recreational, geologic, fish and wildlife, historic, cultural, or other similar values. The U.S. National Park Service (NPS) website was accessed for information on river segments that may be located within the study area with wild and scenic designation. The designated National Wild and Scenic River systems in Montana are the Middle Fork of the Flathead River (headwaters to South Fork confluence), North Fork of the Flathead River (Canadian border to Middle Fork confluence), South Fork of the Flathead River (headwaters to Hungry Horse Reservoir), and the Missouri River (Fort Benton to Charles M. Russell National Wildlife Refuge). No Wild and Scenic Rivers have been designated within the study corridor.

3.3.2 Groundwater

The project area overlies the Madison Aquifer, which is the largest artesian aquifer in the United States. All proposed projects receiving federal funds are subject to review to ensure they do not endanger the water source. (USEPA, 2006b)

The Madison Aquifer consists of limestone and dolomite of the Lodgepole and Mission Canyon formations of the Mississippian age Madison Group. Water infiltrates the Madison Aquifer from streams where they cross the Madison Aquifer outcrops in the Little Belt Mountains and where limestone has been dissolved to form solution openings and caverns. Within the Madison Aquifer, water flows generally northward from the Little Belt Mountains and discharges, in part, from springs including Giant Springs near Great Falls.

Cascade County does not have a Local Water Quality District (LWQD). LWQD's are established to protect, preserve, and improve the quality of surface water and groundwater within the district. Currently there are four in Montana. LWQD's are formed pursuant to 701304501 et. Seq., MCA by county governments. MDEQ provides support to LWQD programs, but does not have an active management role in their activities. LWQD serve as local government districts with a governing board of directors, and funding obtained from fees collected annually with county taxes. A significant component of selected district programs is the ability to participate in the enforcement of the Montana Water Quality Act and related rules.

In addition to consulting with USEPA regarding the Madison Aquifer during project development, it is recommended that Cascade County also be consulted. As stated above, Cascade County currently does not have a LWQD. However, Cascade County may have a LWQD in the future. If a LWQD is developed for Cascade County, water quality protection measures may have to be addressed at the local level, in addition to the federal level and state level.

3.4 Floodplains

Floodways and floodplains associated with the Missouri River and Sand Coulee Creek are located within the project corridor. The following FEMA floodplain maps for Cascade County delineate the floodways and floodplains within the project corridor:

Community-Panel Number	Map Revised
300008406B	December 8 , 1981
300008407C	February 15, 2002
300008426C	February 15, 2002
300008427C	February 15, 2002
300008408B	December 8 , 1981
300008409B	December 8 , 1981
300008428C	February 15, 2002
300008429C	February 15, 2002

These areas were mapped and made a part of the Quantm model. The Quantm model required bridges across floodways. Costs in floodplain areas were increased to account for minimum elevation requirements and hydraulic conveyance. This cost represents the extra requirements needed for approval to build in the floodplain.

3.5 Wetlands

The US Army Corps of Engineers (USACE) defines wetlands as those areas that are inundated or saturated by surface or ground water 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.

National Wetland Inventory (NWI) Mapping is available for this area, and the maps for the area were reviewed for general wetland locations; however, they were not used in the preparation of this report. NWI maps are generated by the USFWS, and are based on the USFWS definition of wetlands, which does not follow the USACE definition that MDT uses in wetland determination

and delineation. NWI maps are typically generated based on aerial and satellite imagery, and are not accurate or detailed enough for MDT project wetland determination and/or delineation.

The study area encompasses portions of the Missouri River, Sand Coulee Creek, and several irrigation ditches, which have wetland areas associated with them. Wetland areas were identified east of Mount Olivet Cemetery, at the base of bluffs approximately one mile south of 10th Avenue South. This is not intended to be a complete determination and/or delineation of wetlands in the Great Falls South Arterial Corridor. Potential wetlands were identified using maps and windshield observations. Formal wetland delineations will be conducted according to standard USACE defined procedures during project design. Wetland jurisdictional determinations will also be done during project design.

Wetland impacts should be avoided to the greatest extent practicable. All unavoidable wetland impacts will be mitigated in accordance with USACE requirements.

3.6 Hazardous Waste Areas

The Montana Natural Resource Information System (NRIS) 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 (NPL) sites, and toxic release inventory sites in the vicinity of the Great Falls South Arterial project corridor. This database search is summarized in the following sections.

UST Sites

Twenty-four (24) UST sites were identified in the vicinity of the project corridor and are summarized in Table 3 below.

Table 3 – UST Sites

Number	Site Name/Address	Facility ID	Active	Inactive
1.	Flying J Travel Plaza 3715 31st St SW	56-14148	X	
2.	Town Pump 3100 Tri Hill Frontage Rd	07-03463	X	
3.	Wilbur Kitterman 3928 Tri Hill Frontage Rd	07-12283		X
4.	Andersen & Hovland Ranch 2807 Huckleberry Dr	07-00011		X
5.	Orlan Sorensen 3800 Huckleberry Dr	07-10205		X
6.	Karen Gillespie 4301 Flood Rd	07-12057		X
7.	Milt Feltch 5301 Huckleberry Dr	07-11677		X

8.	Great Falls Lift Station 23 3100 Lower River Rd	07- 10198		X
9.	Rapley Property 205 31st Ave S	07- 04772		X
10.	White Bear Island Marine 4250 Lower River Rd	07- 06744		X
11.	Outback Country Store 5435 Lower River Rd	07- 02719		X
12.	Doris Shell 10 Sandra Lane	07- 11959		X
13.	Ralph Ward & Sons Auto Parts 1020 Franklin Ave	07- 02019		X
14.	Ayrshire Dairy Farm 4510 13th St. South	07- 05512		X
15.	Fergus Mitchell 4780 13th St South	07- 13331		X
16.	Richard Dahlberg 162 Fields Rd	07- 12995		X
17.	Great Falls Cemetery Assoc. Highland Cemetery 2010 33rd Ave S	07- 10123		X
18.	Northwest Equipment 54 Gibson Flats Rd	56- 13773		X
19.	Raymond Quamen 62 Eaton Ave	07- 10682		X
20.	L Johnson Inc. 123 Gibson Flats Rd	07- 04587		X
21.	Dave Dickman 130 Gibson Flats Rd.	07- 11867		X
22.	Taylor Bros Inc. 4800 10th Ave South	07- 04091		X
23.	Sinclair No. 25001 620 57th Street South	07- 02087	X	
24.	Harvest Hills Conoco 5600 7th Avenue South	07- 03461		X

LUST Sites

Eleven (11) of the UST sites listed in the previous section have leaked. These sites are identified as LUST sites and are summarized in Table 4 below.

Table 4 - LUST Sites

Number	Site Name/Address	Facility ID	Release ID	Release Date	Date Resolved

1.	Town Pump 3100 Tri Hill Frontage Rd	07- 03463	4164 4572	03/27/2003 04/26/2007	N/A N/A
2.	Andersen & Hovland Ranch 2807 Huckleberry Dr	07- 00011	3680	03/04/1999	07/08/1999
3.	Rapley Property 205 31st Ave S	07- 04772	4325	5/1/1995	N/A
4.	White Bear Island Marine 4250 Lower River Rd	07- 06744	2550	03/29/1995	05/22/1995
5.	Outback Country Store 5435 Lower River Rd	07- 02719	3958	6/19/2000	11/13/2000
6.	Ayrshire Dairy Farm 4510 13th St South	07- 05512	3191	06/27/1997	08/01/2003
7.	Northwest Equipment 54 Gibson Flats Rd	56- 13773	3279	11/05/1997	N/A
8.	L Johnson Inc. 123 Gibson Flats Rd	07- 04587	2358	10/05/1994	02/08/1995
9.	Taylor Bros Inc. 4800 10th Ave South	07- 04091	3580	11/11/1998	N/A
10.	Sinclair No. 25001 620 57th Street South	07- 02087	3403	04/10/1998	N/A
11.	Harvest Hills Conoco 5600 7th Avenue South	07- 03461	3675	02/24/1999	N/A

Abandoned Mine Sites

Three (3) abandoned mine sites were identified in the vicinity of the project corridor. All three of these sites were located in the vicinity of 13th Street South and 40th Avenue South, east of the Missouri River. According to the Montana Department of Environmental Quality's (DEQ) Abandoned Mines Inventory Database, these abandoned mines are identified as coal inventory sites. The extent of the prospects and/or mines associated with these three sites is unknown.

Remediation Response Sites

Three (3) remediation response sites were identified in the vicinity of the project corridor. A brief description of these sites is included below:

- The *Trailer Terrace Park* and *Pearson Addition* are located east of the Missouri river in the vicinity of Upper and Lower River Road. Elevated levels of nitrates have been detected in the aquifer in the vicinity of these two developments. DEQ attributed the elevated nitrates to two wastewater lagoons and several private wastewater systems (septic tanks and drainfields) located in the area. The Pearson Addition created a water and sewer district to evaluate alternatives for addressing the groundwater contamination. The water and sewer district recommended connecting to the City of Great Falls water and sewer systems. However, it may be several years before these connections are completed. The Trailer Terrace Park is located too far from the City of Great Falls to easily

connect to their water and sewer systems. Cascade County may limit future development in the vicinity of Trailer Terrace Park and Pearson Addition until the wastewater issues are resolved.

- The *Johnson Property* is located at 130 Lower River Road. A subsurface investigation at this property indicated that the drainfield has been impacted by petroleum hydrocarbons. Additional sampling may be needed to fully characterize the site.

- The *Great Falls City-County Barrel Site* is located at approximately 13th Street South and 33rd Ave South. The City of Great Falls, Cascade County, and the Department of Defense utilized this site for storing drums. In 1991 DEQ determined that the drums were leaking. Therefore, the responsible parties removed the drums and contaminated soils. Following cleanup activities, DEQ issued a "No Further Action" and the site was delisted from the CECRA database in December 1996.

Landfills
One (1) landfill was identified in the vicinity of the project corridor. This landfill was located at approximately 14th Avenue South and 48th Street South, which is approximately six to nine blocks west of the proposed east connection point for the Great Falls South Arterial project. The NRIS database indicated that this landfill was operated by United Materials of Great Falls and closed on December 31, 1989. Apparently, this landfill was utilized for disposing of construction and demolition debris.

National Priority List Sites (Superfund Sites)
There were no National Priority List (NPL) sites identified in the vicinity of the project corridor.

Toxic Release Inventory Sites
There were no Toxic Release Inventory (TRI) sites identified in the vicinity of the project corridor.

After the alignment has been selected and the conceptual design has been completed for the Great Falls South Arterial project, further evaluation may be needed at specific sites to determine if contamination will be encountered during construction. This may include reviewing DEQ files and conducting subsurface investigation activities to determine the extent of soil and groundwater contamination. If it appears that contaminated soils or groundwater may be encountered during construction, handling/disposing of the contaminated material will be in accordance with State, Federal, and local laws and rules.

3.7 Air Quality

A portion of the City of Great Falls was *previously* designated non-attainment for carbon monoxide (CO). The non-attainment area was a linear corridor along 10th Avenue South between 2nd Street South and 54th Street South and was bound by 9th Avenue South (to the north) and 11th Avenue South (to the south). According to the DEQ, this non-attainment area was re-designated a maintenance area (i.e. attainment) in May 2002.

Each of the alignments of the Great Falls South Arterial project that are currently being considered are located south of the previously designated non-attainment area. Therefore, it is unlikely that further analyses related to CO (or a CO hot-spot analysis) will be required for this project.

An evaluation of mobile source air toxics (MSATs) will be required for the Great Falls South Arterial project. MSATs are compounds emitted from highway vehicles and off-road equipment which are known or suspected to cause cancer or other serious health and environmental effects.

3.8 Noise

The City of Great Falls and Cascade County should encourage land owners to develop projects that are compatible with the future highway. Noise compatible land use planning by the City of Great Falls and Cascade County would minimize noise impacts along the project corridor and save thousands of dollars in abatement costs.

The Great Falls South Arterial would be considered a Type I project since it is a new highway construction project at a new location. Therefore, if a federally funded project is forwarded a detailed noise analysis will be required. The detailed noise analysis will include measuring ambient noise levels at selected receivers and modeling design year noise levels using projected traffic volumes for each of the alignments being considered. Noise abatement measures will be considered for the project if noise levels *approach* or *substantially exceed* the noise abatement criteria (NAC) listed below in Table 5.

TABLE 5 – NOISE ABATEMENT CRITERIA (NAC)

ACTIVITY CATEGORY	Leq(h) dBA	DESCRIPTION OF ACTIVITY CATEGORY
A	57 Exterior	Lands on which serenity and quiet are of extraordinary significance and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose.
B	67 Exterior	Picnic areas, recreation areas, playgrounds, active sports areas, parks, residences, motels, hotels, schools, churches, libraries, and hospitals.
C	72 Exterior	Developed lands, properties, or activities not included in Categories A or B above.
D	----------	Undeveloped lands.
E	52 Interior	Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals, and auditoriums.

If traffic noise impacts are shown to exist on the project, a number of possible abatement measures may be considered, including but not limited to the following:

- Altering the horizontal or vertical alignment;

- Constructing noise barriers such as sound walls or earthen berms; and/or
- Decreasing traffic speed limits.

The noise abatement measures must be considered *reasonable* and *feasible* prior to implementation. In addition, greater than 50% of the affected residents must agree with the proposed noise abatement measures.

Lastly, construction of the Great Falls South Arterial may cause localized, short-duration noise impacts. These impacts can be minimized by using standard MDT specifications for the control of noise sources during construction.

4 Biological Resources

Biological resources in the study area were identified using maps, aerial photographs, the endangered, threatened, proposed, and candidate species list for Montana counties (November 2007) from the USFWS, Montana Natural Heritage Program data, and windshield surveys of the project site. This limited survey is in no way intended to be a complete and accurate biological survey of the study area. A complete biological survey should be completed during project design. If projects are federally funded the biological survey of the study area will be done in accordance with accepted MDT practices during the NEPA/MEPA process.

4.1 Fish and Wildlife

The Missouri River riparian and river habitats should be avoided to the greatest extent practicable. Fish and wildlife species use the Missouri River corridor during all life stages. Encroachment into the wetted width of the river and the associated riparian habitat should be limited to the absolute minimum necessary for the construction of the proposed project. A riparian corridor should remain on both sides of the river to facilitate wildlife movement along the river corridor. During project design, general fish and wildlife resources in the project area should be surveyed. FWP should be contacted for local expertise of the study area.

4.1.1 Threatened and Endangered Species

The federal list of endangered and threatened species is maintained by the USFWS. Species on this list receive protection under the Endangered Species Act (ESA). 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. The USFWS also maintains a list of species that are candidates or proposed for possible addition to the federal list.

The endangered, threatened, proposed, and candidate species list for Montana counties (November 2007) was downloaded from the USFWS website on November 8, 2007. This list generally identifies the counties where one would reasonably expect the species to occur, not necessarily every county where the species is listed.

There are no endangered, threatened, proposed, or candidate animal species listed for Cascade County, and none are currently expected to occur in the project area. If federal aid projects are

forwarded from this study, an evaluation of potential impacts to all endangered, threatened, proposed, or candidate species will be done during the NEPA/MEPA process.

4.1.2 Species of Concern

Montana Species of Concern 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 a Montana Animal Species of Concern 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 address conservation needs proactively. Each species is assigned a state rank that ranges from S1 (greatest concern) to S5 (least concern). Other state ranks include SU (unrankable due to insufficient information), SH (historically occurred), and SX (believed to be extinct). State ranks may be followed by modifiers, such as B (breeding) or N (non-breeding).

Table 6 lists the animal species of concern that the Montana Heritage Program has records of in Cascade County. The results of a data search by the Montana Natural Heritage Program reflect the current status of their data collection efforts. These results are not intended as a final statement on sensitive species within a given area, or as a substitute for on-site surveys. On-site surveys should be completed during project design.

Table 6. Montana Animal Species of Concern Noted in Cascade County

Scientific Name	Common Name	State Rank
Bufo cognatus	Great Plains Toad	S2
Spea bombifrons	Plains Spadefoot	S3
Nycticorax nycticorax	Black-crowned Night-heron	S3B
Plegadis chihi	White-faced Ibis	S1B
Haliaeetus leucocephalus	Bald Eagle	S3
Buteo swainsoni	Swainson's Hawk	S3B
Buteo regalis	Ferruginous Hawk	S2B
Falco peregrinus	Peregrine Falcon	S2B
Numenius americanus	Long-billed Curlew	S2B
Larus pipixcan	Franklin's Gull	S3B
Sterna hirundo	Common Tern	S3B
Chlidonias niger	Black Tern	S3B
Athene cunicularia	Burrowing Owl	S2B
Contopus cooperi	Olive-sided Flycatcher	S3B
Sialia sialis	Eastern Bluebird	S2B
Anthus spragueii	Sprague's Pipit	S2B
Spizella breweri	Brewer's Sparrow	S2B
Calamospiza melanocorys	Lark Bunting	S3B
Ammodramus bairdii	Baird's Sparrow	S2B
Ammodramus savannarum	Grasshopper Sparrow	S3B
Calcarius mccownii	McCown's Longspur	S2B

Calcarius ornatus	Chestnut-collared Longspur	S3B
Dolichonyx oryzivorus	Bobolink	S2B
Leucosticte atrata	Black Rosy-finch	S2
Oncorhynchus clarkii lewisi	Westslope Cutthroat Trout	S2
Cycleptus elongatus	Blue Sucker	S2S3
Sander canadensis	Sauger	S2
Sorex merriami	Merriam's Shrew	S3
Myotis thysanodes	Fringed Myotis	S3
Corynorhinus townsendii	Townsend's Big-eared Bat	S2
Cynomys ludovicianus	Black-tailed Prairie Dog	S3
Canis lupus	Gray Wolf	S3
Gulo gulo	Wolverine	S3
Lynx canadensis	Canada Lynx	S3
Phrynosoma hernandesi	Greater Short-horned Lizard	S3
Heterodon nasicus	Western Hog-nosed Snake	S2

Data from the Natural Heritage Program shows two animal species of concern in the study area, the Sprague's pipit and the plains spadefoot.

4.1.3 Wildlife and Traffic Concerns

Coordination with the FWP Wildlife Biologist for the area should be completed during project design.

4.2 Vegetation

Native vegetation in the study area generally consists of wetlands and riparian forests along the Missouri River and Sand Coulee Creek. The remaining vegetation consists of cultivated crop land.

4.2.1 Threatened and Endangered Species

The federal list of endangered and threatened species is maintained by the USFWS. Species on this list receive protection under the ESA. 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. The USFWS also maintains a list of species that are candidates or proposed for possible addition to the federal list.

The endangered, threatened, proposed, and candidate plant species list for Montana counties (November 2007) was downloaded from the USFWS website on November 8, 2007. This list generally identifies the counties where one would reasonably expect the species to occur, not necessarily every county where the species is listed.

There are no endangered, threatened, proposed, or candidate plant species listed for Cascade County, and none are currently expected to occur in the project area. For federal aid projects forwarded from this study, an evaluation of potential impacts to all endangered, threatened, proposed, or candidate species will be done during the NEPA/MEPA process.

4.2.2 Species of Concern

Montana Species of Concern are native plants 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 a Montana Plant Species of Concern 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 address conservation needs proactively. Each species is assigned a state rank that ranges from S1 (greatest concern) to S5 (least concern). Other state ranks include SU (unrankable due to insufficient information), SH (historically occurred), and SX (believed to be extinct). State ranks may be followed by modifiers, such as B (breeding) or N (non-breeding).

Table 7 lists the plant species of concern that the Montana Heritage Program has records of in Cascade County. The results of a data search by the Montana Natural Heritage Program reflect the current status of their data collection efforts. These results are not intended as a final statement on sensitive species within a given area, or as a substitute for on-site surveys. On-site surveys should be completed during project design.

Table 7. Montana Plant Species of Concern Noted in Cascade County

Scientific Name	Common Name	State Rank
Entosthodon rubiginosus	---	SH
Funaria americana	---	SH
Cirsium longistylum	Long-styled Thistle	S3
Psilocarphus brevissimus	Dwarf Woolly-heads	S1
Chenopodium subglabrum	Smooth Goosefoot	S1
Elatine californica	California Waterwort	SU
Psoralea hypogaea	Little Indian Breadroot	S2S3
Phlox kelseyi var. missoulensis	Missoula Phlox	S2
Centunculus minimus	Chaffweed	S2
Bacopa rotundifolia	Roundleaf Water-hyssop	S1
Mimulus ringens	Square-stem Monkeyflower	S1
Carex crawei	Crawe's Sedge	S2
Carex sychnocephala	Many-headed Sedge	S1
Cyperus schweinitzii	Schweinitz' Flatsedge	S2
Eleocharis rostellata	Beaked Spikerush	S2
Juncus hallii	Hall's Rush	S2
Najas guadalupensis	Guadalupe Water-nymph	S1
Goodyera repens	Northern Rattlesnake-plantain	S2S3
Elymus innovatus	Northern Wild-rye	S1

Data from the Natural Heritage Program shows several species of concern in the study area, including California waterwort, roundleaf water-hyssop, many-headed sedge, Guadalupe water-nymph, little Indian breadroot, chaffweed, and dwarf woolly-heads.

4.2.3 Noxious Weeds

Noxious weeds degrade habitat, choke streams, crowd native plants, create fire hazards, poison and injure livestock and humans, and foul recreation sites. Areas with a history of disturbance are at particular risk of weed encroachment. There are 27 noxious weeds in Montana, as designated by the Montana Statewide Noxious Weed List. For projects forwarded from this study, the project area should be surveyed for noxious weeds.

To reduce the spread and establishment of noxious weeds and to re-establish permanent vegetation, disturbed areas should be seeded with desirable plant species.

For projects forwarded from this study, construction methods must prevent the spread of noxious weeds. County Weed Control Supervisors should be contacted prior to any construction activities regarding specific measures for weed control.

5 Cultural Resources

If projects forwarded from the study are federally-funded, MDT would need to 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 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.

MDT staff conducted a windshield survey and Cultural Resources Information System (CRIS) file search of the general area encompassing the Great Falls South Arterial in the Spring of 2007. The survey revealed the presence of seven historic properties within the South Arterial corridor. Two of the properties are listed in or eligible for listing on the National Register of Historic Places: the Great Falls Portage National Historic Landmark (24CA238) and the Great Northern Railway's Stockett Spur (24CA632). The remaining five properties have not been evaluated in regards to National Register of Historic Places eligibility. The criteria for eligibility and/or listing on the National Register are as follows:

"The quality of significance in American history, architecture, archaeology, engineering, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association, and

A. That are associated with events that have made a significant contribution to the broad patterns of our history; or
B. That are associated with the lives of significant persons in our past; or

C. That embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or

D. That have yielded or may be likely to yield, information important in history prehistory."

In addition to the above criteria, there are seven Criteria Considerations under which an historic property can evaluated for the National Register. In this case of the four of the unrecorded sites, they would need to be evaluated under Criteria Consideration D: Cemeteries, which states:

> "A cemetery is eligible if it derives its primary significance from graves of persons of transcendent importance, from age, from distinctive design features, or from association with historic events."

The five unrecorded historic properties are: the Ayrshire Dairy, Highland Cemetery, Calvary Cemetery, Mount Olivet Cemetery, and the Hebrew Cemetery (Table 9).

5.1 Great Falls Portage National Historic Landmark (24CA238)

Great Falls Portage National Historic Landmark (NHL) was listed in the National Register of Historic Places on May 23, 1966. The NHL is undeveloped and is roughly located between US Highway 89/Tenth Avenue South on the north and the Missouri River along Lower River Drive to the southwest. Other than a few physical features mentioned by Meriwether Lewis and William Clark in 1805, the boundary for the NHL delineated for the NHL in 1966 is somewhat vague, but there is an on-going project by the Montana Preservation Alliance and local interest groups to define the boundaries.

5.2 Existing Great Falls South Arterial Corridor

Table 8 indentifies properties listed on or previously identified as eligible for the NRHP in previous studies.

Table 8. NRHP Eligible Historic Properties Within or Adjacent to the Corridor

Name	NRHP Status
Great Northern Railway's Stockett Spur (24CA632)	Eligible under Criterion A

Table 9 shows the results of a windshield survey conducted in the spring of 2007 that identified the following historic properties within the Great Falls South Arterial corridor. They have not yet been recorded and evaluated for the NRHP.

Table 9. Historic Properties Observed in the Project Corridor

Location	Name
4510 13th Street South	Ayrshire Dairy
2010 33rd Avenue South	Highland Cemetery

2101 26th Street South	Mount Olivet Cemetery
SW of Highland Cemetery	Calvary Cemetery
40th Avenue South & Eaton Avenue	Hebrew Cemetery

Once the project corridor is better defined, the MDT will conduct a cultural resource survey for unrecorded historic properties within the Area of Potential Effect.

6 Utilities

The following GIS-based utility information was reviewed in the study corridor:

- Electricity;
- Public water supplies;
- Wastewater; and
- Telecommunications.

6.1 Existing Great Falls South Arterial Corridor

Utilities in the Great Falls South Arterial Corridor area include electricty, public water supplies, wastewater, and telecommunications. A summary of utilities identified from GIS-based information in the existing Great Falls South Arterial Corridor is presented in Table 10. Because of their abundance, public water supplies were not summarized individually in the table. Numerous public water supplies exist in the project area. See Appendix E for a list of public water supplies located in Cascade County. Petroleum pipelines and mine sites also exist in the Great Falls South Arterial Corridor project area.

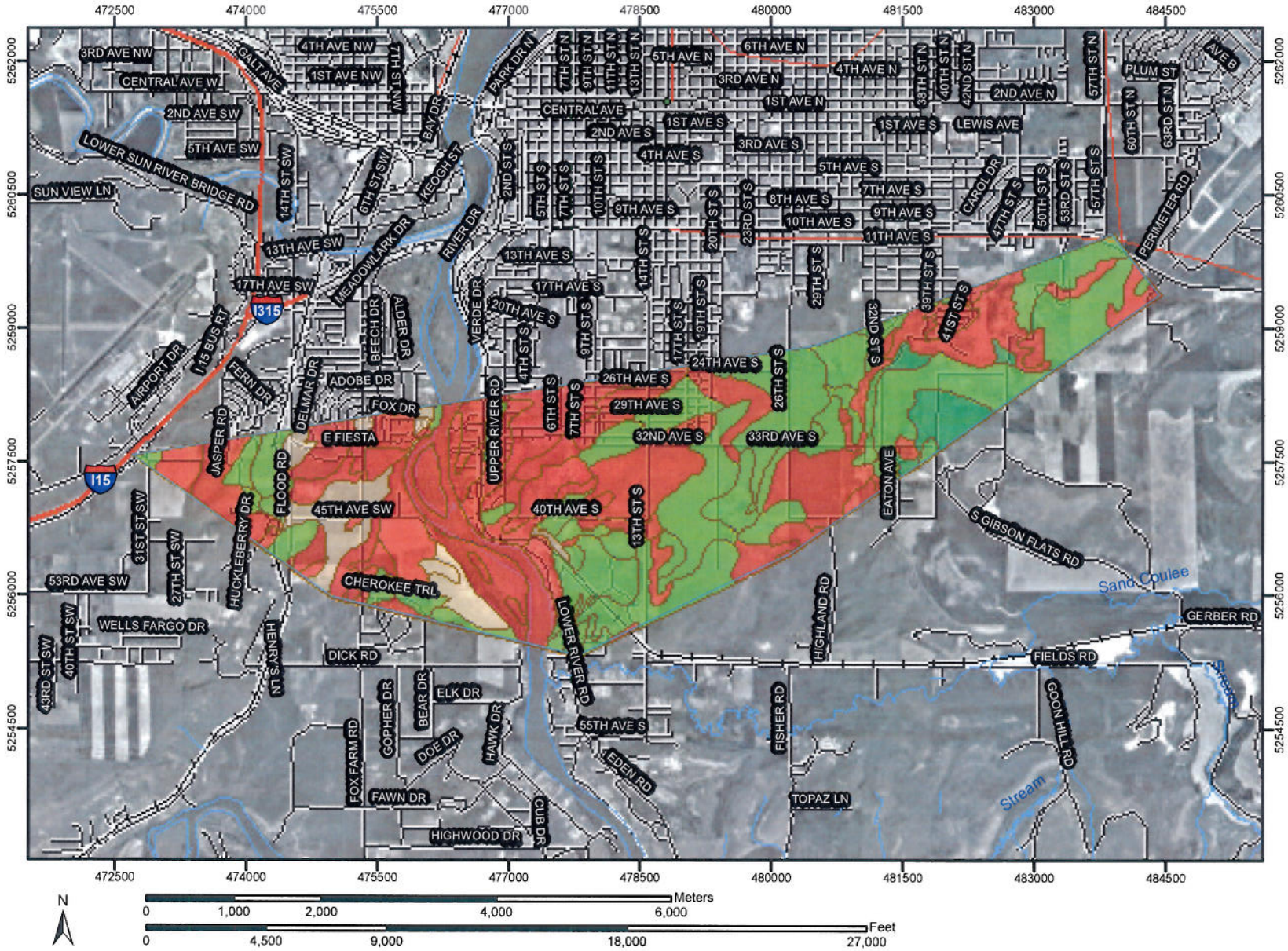
Table 10. Utilities in the Great Falls South Arterial Corridor

Utility	Location
Electricity	Electrical utility services are provided throughout the project area.
Wastewater	Wastewater services are provided throughout the project area.
Telecommunications	Service in the project area is provided by a network of aerial and buried cables.

Appendix 6d-a

MAP AND DESCRIPTION OF FARMLAND CLASSIFICATION TYPES

Farmland Classification–Cascade County Area, Montana
(Great Falls South Arterial)



MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

- Soil Map Units

Soil Ratings

- Not prime farmland
- All areas are prime farmland
- Prime farmland if drained
- Prime farmland if protected from flooding or not frequently flooded during the growing season
- Prime farmland if irrigated
- Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season
- Prime farmland if irrigated and drained
- Prime farmland if irrigated and either protected from flooding or not frequently flooded during the growing season
- Prime farmland if subsoiled, completely removing the root inhibiting soil layer
- Prime farmland if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60
- Prime farmland if irrigated and reclaimed of excess salts and sodium
- Farmland of statewide importance
- Farmland of local importance
- Farmland of unique importance
- Not rated or not available

Political Features

Municipalities

- Cities
- Urban Areas

Water Features

- Oceans
- Streams and Canals

Transportation

- Rails

Roads

- Interstate Highways
- US Routes
- State Highways
- Local Roads
- Other Roads

MAP INFORMATION

Original soil survey map sheets were prepared at publication scale. Viewing scale and printing scale, however, may vary from the original. Please rely on the bar scale on each map sheet for proper map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: UTM Zone 12N

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Cascade County Area, Montana
Survey Area Data: Version 7, May 2, 2007

Date(s) aerial images were photographed: 7/8/1995; 8/9/1995

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Farmland Classification

Farmland Classification— Summary by Map Unit — Cascade County Area, Montana				
Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
2	Abor-Yawdim clay loams, 4 to 8 percent slopes	Not prime farmland	45.1	0.8%
5	Absarokee clay loam, 4 to 8 percent slopes	Farmland of statewide importance	9.2	0.2%
15	Assinniboine fine sandy loam, 0 to 4 percent slopes	Farmland of statewide importance	27.9	0.5%
16	Assinniboine fine sandy loam, 4 to 8 percent slopes	Farmland of statewide importance	44.3	0.8%
18	Azaar fine sandy loam	Farmland of statewide importance	9.0	0.2%
21	Big Timber-Castner complex, 8 to 30 percent slopes	Not prime farmland	124.4	2.3%
22	Big Timber-Castner complex, 30 to 70 percent slopes	Not prime farmland	37.7	0.7%
28	Bitton and Roy soils, 10 to 65 percent slopes	Not prime farmland	196.5	3.6%
38	Castner-Sinnigam complex, 2 to 15 percent slopes	Not prime farmland	82.4	1.5%
46	Crago-Yawdim complex, 15 to 45 percent slopes	Not prime farmland	141.3	2.6%
48	Darret silty clay loam, 8 to 20 percent slopes	Not prime farmland	14.6	0.3%
49	Darret-Castner complex, 2 to 8 percent slopes	Not prime farmland	8.2	0.2%
53	Dooley sandy loam, 0 to 4 percent slopes	Farmland of statewide importance	308.1	5.6%
54	Dooley sandy loam, 4 to 8 percent slopes	Farmland of statewide importance	133.0	2.4%
55	Dooley sandy loam, 8 to 15 percent slopes	Not prime farmland	34.2	0.6%
76	Farnuf loam, 2 to 4 percent slopes	Farmland of statewide importance	101.2	1.9%
78	Fergus clay loam, 2 to 4 percent slopes	All areas are prime farmland	33.3	0.6%
80	Fergus silty clay loam, 0 to 2 percent slopes	All areas are prime farmland	122.0	2.2%
85	Gerber silty clay loam, 0 to 4 percent slopes	Farmland of statewide importance	335.8	6.1%

Farmland Classification— Summary by Map Unit — Cascade County Area, Montana				
Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
88	Gerber-Lawther silty clays, 4 to 8 percent slopes	Farmland of statewide importance	175.5	3.2%
94	Harlem silty clay loam	Farmland of statewide importance	49.3	0.9%
96	Havre loam	Prime farmland if irrigated	9.6	0.2%
105	Ipano-Hillon complex, 0 to 4 percent slopes	Farmland of statewide importance	426.1	7.8%
106	Ipano-Hillon complex, 4 to 10 percent slopes	Not prime farmland	310.8	5.7%
114	Kobar silty clay loam, 0 to 2 percent slopes	Prime farmland if irrigated	90.8	1.7%
115	Kobar silty clay loam, 2 to 4 percent slopes	Prime farmland if irrigated	210.9	3.9%
116	Kobar silty clay loam, 4 to 8 percent slopes	Farmland of statewide importance	20.2	0.4%
118	Korent loam	Farmland of statewide importance	6.6	0.1%
119	Lallie silty clay loam	Not prime farmland	1.0	0.0%
124	Lawther-Gerber complex, 8 to 15 percent slopes	Not prime farmland	54.0	1.0%
127	Lihen loamy sand, 2 to 8 percent slopes	Not prime farmland	178.0	3.3%
128	Lihen loamy sand, 8 to 20 percent slopes	Not prime farmland	56.7	1.0%
139	Marias silty clay, 0 to 2 percent slopes	Not prime farmland	196.8	3.6%
140	Marias silty clay, 2 to 4 percent slopes	Not prime farmland	53.7	1.0%
141	Marias silty clay, 4 to 8 percent slopes	Not prime farmland	0.6	0.0%
147	McKenzie clay	Not prime farmland	12.5	0.2%
164	Rentsac-Ethridge complex, 2 to 25 percent slopes	Not prime farmland	8.8	0.2%
165	Rivra gravelly sandy loam	Not prime farmland	48.4	0.9%
172	Ryell-Rivra complex	Not prime farmland	160.6	2.9%
186	Tally fine sandy loam, 0 to 2 percent slopes	Farmland of statewide importance	143.2	2.6%
187	Tally fine sandy loam, 2 to 8 percent slopes	Farmland of statewide importance	310.2	5.7%
188	Tally fine sandy loam, 8 to 15 percent slopes	Farmland of statewide importance	17.4	0.3%

Farmland Classification— Summary by Map Unit — Cascade County Area, Montana				
Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
190	Tally-Castner complex, 15 to 35 percent slopes	Not prime farmland	45.1	0.8%
197	Thebo clay, 0 to 4 percent slopes	Not prime farmland	79.1	1.4%
199	Ticell-Castner complex, 0 to 4 percent slopes	Not prime farmland	49.2	0.9%
205	Torex loamy sand, 0 to 6 percent slopes	Not prime farmland	171.4	3.1%
207	Twin Creek loam, 2 to 8 percent slopes	Farmland of statewide importance	101.7	1.9%
211	Virgelle loamy fine sand, 0 to 2 percent slopes	Not prime farmland	90.6	1.7%
222	Work clay loam, 0 to 2 percent slopes	Prime farmland if irrigated	2.9	0.1%
231	Yawdim-Rentsac-Cabbart complex, 15 to 50 percent slopes	Not prime farmland	45.6	0.8%
232	Yawdim-Rock outcrop complex, 25 to 70 percent slopes	Not prime farmland	2.2	0.0%
233	Yetull loamy sand, 4 to 20 percent slopes	Not prime farmland	245.6	4.5%
236	Gravel pits	Not prime farmland	104.3	1.9%
237	Water	Not prime farmland	181.4	3.3%
Totals for Area of Interest (AOI)			5,469.0	100.0%

Description

Farmland classification identifies map units as prime farmland, farmland of statewide importance, farmland of local importance, or unique farmland. It identifies the location and extent of the soils that are best suited to food, feed, fiber, forage, and oilseed crops. NRCS policy and procedures on prime and unique farmlands are published in the "Federal Register," Vol. 43, No. 21, January 31, 1978.

Rating Options

Aggregation Method: No Aggregation Necessary

Tie-break Rule: Lower

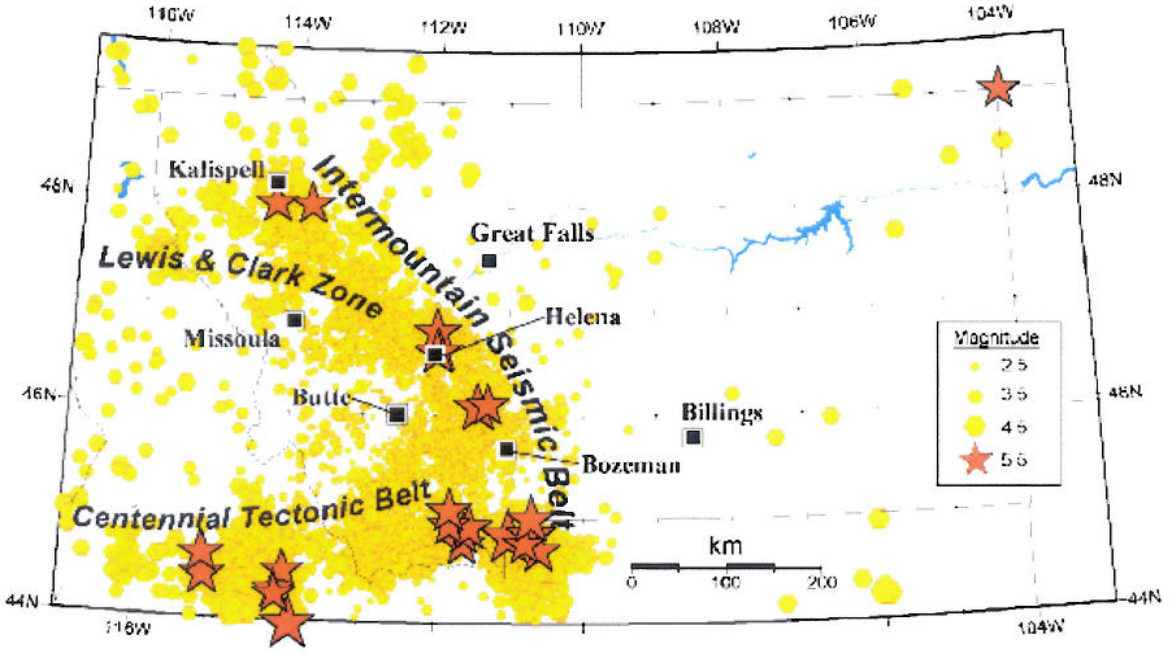
Appendix 6d-b

INTERMOUNTAIN SEISMIC BELT

Seismicity in Montana

Intermountain Seismicity Belt: This section covers the geology and history behind the seismicity present in western Montana.

A belt of seismicity known as the Intermountain Seismic Belt extends through western Montana, from the Flathead Lake region in the northwest corner of the state to the Yellowstone National Park region where the borders of Montana, Idaho, and Wyoming meet. The Intermountain Seismic Belt continues southward through Yellowstone Park, along the Idaho-Wyoming border, through Utah, and into southern Nevada. In western Montana, the Intermountain Seismic Belt is up to 100 km wide. A branch of the Intermountain Seismic Belt extends west from the northwest corner of Yellowstone Park, through southwestern Montana, into central Idaho. This so called Centennial Tectonic Belt includes at least eight major active faults and has been the site of the two largest historic earthquakes in the northern Rocky Mountains, the August 18, 1959 Hebgen Lake, Montana, earthquake (M 7.5), and the October 28, 1983 Borah Peak, Idaho, earthquake (M 7.3). Although it has been over four decades since the last destructive earthquake in Montana, small earthquakes are common in the region, occurring at an average rate of 7-10 earthquakes per day.



Appendix 6d-c

ALLUVIUM GEOLOGIC MAP

MONTANA BUREAU OF MINES AND GEOLOGY
A Department of Montana Tech of The University of Montana



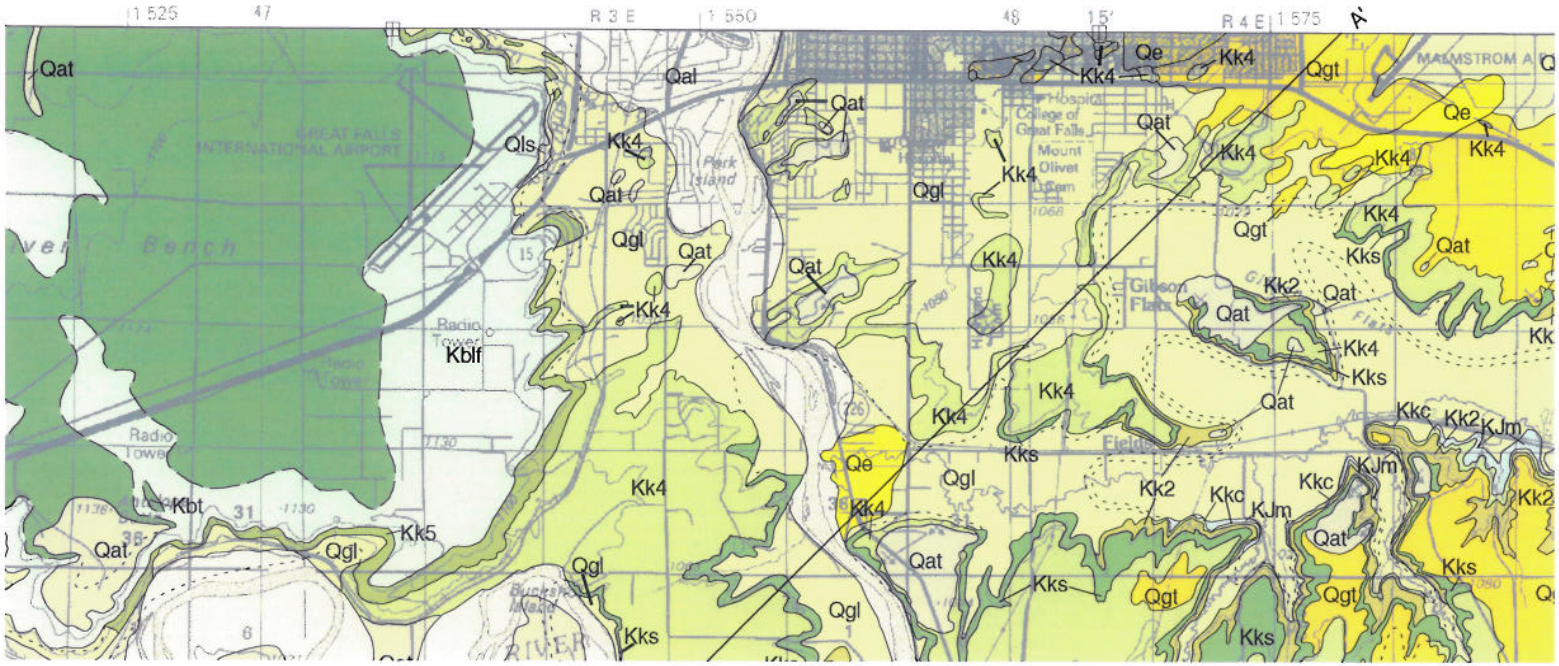


Geologic Map of the Great Falls South 30' x 60' Quadrangle, Central Montana

Susan M. Vuke
2000

Partial support has been provided by the STATEMAP component of the National Cooperative Geologic Mapping Program of the U.S. Geological Survey under Contract Number 99-HQ-AG0130.

Maps may be obtained from:
Publications Office
Montana Bureau of Mines and Geology
1300 West Park Street, Butte, Montana 59701-8997
Phone: (406) 496-4167 Fax: (406) 496-4451
http://www.mbmg.mtech.edu


A'
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Kk4
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Kblf
Kbt
Kk5
Kks
Qe
Qgt
Kk2
Kkc
KJm
Park Island
Gibson Flats
Hospital
College of Great Falls
Mount Olivet
Radio Tower
GREAT FALLS INTERNATIONAL AIRPORT
MALMSTROM A
R 3 E
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Appendix 6d-d

GREAT FALLS 2007 CONSUMER CONFIDENCE REPORT

The 2007 Consumer Confidence Report

City of Great Falls Public Drinking Water Supply

P.O. Box 5021, Great Falls, MT 59403 Phone (406) 727-1325

The City of Great Falls Water Utility is proud to present this report, the purpose of which is to evoke confidence in the quality of our drinking water. Please take a few moments to review it and call us with any questions.

The source of our water

All water used by the residents of Great Falls, Malmstrom Air Force Base and Black Eagle is water that was pumped from the Missouri River and treated to make it safe to drink. The water treatment facility is located just upstream from the Missouri's confluence with the Sun River in Great Falls.

Water treatment and purification

Great Falls utilizes a conventional water treatment process and produces on average 4.5 billion gallons of safe, high quality drinking water per year. The treatment process is monitored continuously. Only after careful scrutiny is the treated water allowed to be pumped through underground water mains to reservoirs for use in homes and businesses.

The City's water treatment and distribution personnel stay abreast of new Federal and State drinking water regulations as they are written so that treatment and/or monitoring changes can be implemented as needed in a timely and cost-effective manner. The City is committed to the goal of providing its citizens a safe and dependable supply of drinking water. This goal was achieved during 2007 by operating without any violations, exemptions or variances regarding water quality.

"I am pleased to report that our drinking water meets all federal and state requirements and is among the safest and best-tasting in the world."

-- John Wandke, City Water Quality Specialist

Why are there contaminants in our source water?

Water that precipitates from the atmosphere flows across the surface of the land or percolates through the soil. Naturally occurring minerals become dissolved and waste substances produced by plants, animals and humans are picked up. The water then either becomes groundwater or makes its way to a stream, river, pond, lake or reservoir. Any of this accumulated water can then be used as a drinking water source.

Contaminants that may need to be removed from a source water before it can be considered safe to drink include:

- microbial contaminants, including viruses, bacteria and protozoa. These can originate from sewage treatment plants, septic systems, agricultural livestock operations and wildlife.
- inorganic contaminants, such as salts and metals. These can be naturally occurring or the result of urban storm water runoff, industrial or domestic wastewater discharges, oil and gas production, mining or farming.
- pesticides and herbicides. These may come from a variety of sources including agriculture, urban storm water runoff and residential uses.
- organic chemical contaminants, including synthetic and volatile organic chemicals. These are by-products of industrial processes and petroleum production and can also come from gas stations, urban storm water runoff and septic systems.
- radioactive contaminants. These can be naturally occurring or the result of oil and gas production or mining activities.

Montana's Department of Environmental Quality (DEQ) recently completed and made available the Great Falls source water delineation and assessment report. This report delineates a source water protection area for Great Falls (an area of surface water and land that contributes water to the Great Falls Public Water Supply). It also identifies locations or regions within this area where contaminants might be generated, stored or transported and addresses their relative potential for contaminating Great Falls drinking water. The report can be used to develop a source water protection plan for Great Falls.

Do I need to take special precautions?

The Environmental Protection Agency diligently establishes regulations setting limits on allowable contaminants in drinking water delivered by public water systems. The Food and Drug Administration regulates allowable contaminants in bottled water, affording equivalent protection of public health. All drinking water may be reasonably expected to contain very small amounts of some allowable contaminants. It's important to remember that the presence of these contaminants does not necessarily mean the water will pose a health risk. Detailed information about contaminants and potential health effects can be obtained by calling the Environmental Protection Agency's Safe Drinking Water Hotline (1-800-426-4791) or the local City-County Health Department (454-6950).

Certain people may be more vulnerable to contaminants in drinking water than the general population. For example, immuno-compromised persons such as persons with cancer undergoing chemotherapy, persons who have undergone organ transplants, persons having HIV/AIDS or other immune system disorders, some elderly, and infants can be particularly at risk from infections caused by certain microbiological contaminants. These people should seek advice about their drinking water from their health care providers. EPA/CDC guidelines on appropriate means to lessen the risk of infection by cryptosporidium and other microbiological contaminants are available from the Safe Drinking Water Hotline (1-800-426-4791).

How can I become involved?

Learn more about your local water utility by attending any of the regularly scheduled City Commission meetings on the first and third Tuesdays of every month at 7:00 p.m. in the Commission Chambers at the Great Falls Civic Center. You may also arrange a tour of the local water treatment plant by calling 727-1325. Regulatory updates and other interesting information can be found by visiting the American Water Works Association web site (http://www.awwa.org).

Questions & Answers

Q: How often is our drinking water tested?

A: The type and frequency of testing required is based on the water's source and the number of people served. Great Falls is classified as a medium-sized (between 50,000 and 100,000 served) surface water (Missouri River) community public water supply. As such, Great Falls is required to monitor the levels of some drinking water constituents, such as disinfectant residual, continuously while other constituents, such as radionuclides, are required to be tested only once every several years. The data presented in the tables contained in this report are the results from the most recent testing done in accordance with the applicable regulations.

Q: Why does the water coming out of my tap look milky sometimes but then clear up in my glass after a few seconds?

A: The water coming into your home may contain harmless dissolved gases (air) held in solution by the pressure of the water system. As the water leaves the tap the pressure rapidly decreases causing millions of tiny air bubbles to be suspended in the water, producing the milky appearance. The water then clears from the bottom of the container as the air bubbles rise and return to the atmosphere.

Q: How hard is Great Falls water?

A: Great Falls water is classified as moderately hard, ranging from 127 to 167 milligrams per liter (7.4 to 9.8 grains per gallon) as calcium carbonate. Some households install water softeners as a matter of personal preference but softening is generally not necessary.

Some Facts About Water

Of the 326 million cubic miles of water on earth, 97% is seawater. Of the remaining 3%, 77% is frozen and 22% is underground. That leaves each person on our planet enough liquid fresh surface water to fill a cube 130 feet on a side. But this water is not evenly distributed and is in constant demand.

One gallon of water weighs about 8⅓ pounds.

Average total water use (both indoor and outdoor) for a typical single-family home is about 100 gallons per person per day.

You can fill an 8-ounce glass with drinking water 15,000 times for the same cost as a six-pack of soda.

You can survive about a month without food, but only 5 to 7 days without water.

Water Analysis Data

The data tables on the next several pages contain terms and abbreviations with which you may be unfamiliar. In order to help you better understand the data we offer the following definitions and explanations:

parts per million (ppm) or milligrams per liter (mg/l) - one part per million is equivalent to one minute in two years or one penny in $10,000.

parts per billion (ppb) or micrograms per liter (µg/l) - one part per billion is equivalent to one minute in 2,000 years or one penny in $10,000,000.

picocuries per liter (pCi/l) - a measure of radioactivity in water.

millirems per year (mrem/yr) - a measure of radiation exposure. In the United States, the average person is exposed to an effective dose equivalent of approximately 360 mrem (whole body exposure) per year from all sources.

Nephelometric Turbidity Unit (NTU) - a measure of the clarity of water. Water having turbidity in excess of 5 NTU would appear noticeably cloudy to the average person.

Maximum Contaminant Level Goal - the "Goal" (MCLG) is the level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs allow for a margin of safety.

Maximum Contaminant Level - the "Maximum Allowed" (MCL) is the highest level of a contaminant that is allowed in drinking water. MCLs are set as close to the MCLGs as feasible using the best available treatment technology.

Maximum Residual Detection Limit Goal or MRDLG - the level of a drinking water disinfectant below which there is no known or expected risk to health. MRDLGs do not reflect the benefits of the use of disinfectants to control microbial contaminants.

Maximum Residual Detection Limit or MRDL - the highest level of a disinfectant allowed in drinking water. There is convincing evidence that addition of a disinfectant is necessary for control of microbial contaminants.

Action Level (AL) - the concentration of a contaminant which, if exceeded, triggers treatment or other requirements which a water system must follow.

Treatment Technique (TT) - a required process intended to reduce the level of a contaminant in drinking water.

The City of Great Falls routinely monitors for contaminants in drinking water according to Federal and State laws. The four data tables included in this report document the test results from monitoring during the period January 1st through December 31st, 2007. The State of Montana requires monitoring for some contaminants less than once per year because the concentrations of these contaminants do not change frequently. Therefore some of the following data, though representative, are more than one year old. The tables are arranged as follows:

Table I. Regulated Contaminants Detected
Table II. Unregulated Contaminants Detected
Table III. Regulated Contaminants Not Detected
Table IV. Unregulated Contaminants Not Detected

Additional copies of this report are available free of charge from the Great Falls Water Treatment Plant. If you have any questions about this report or your water utility contact John Wandke at (406) 727-1325.

Table I. Regulated Contaminants Detected

Contaminant	Likely Source of Contamination	Unit of Measurement	MCL	MCLG	Date Sampled	Level Detected	Violation (yes/no)
Arsenic	erosion of natural deposits; runoff from orchards; runoff from glass and electronics production wastes	ppb	10	0	1/16/07	3	no
Fluoride	erosion of natural deposits; water additive which promotes strong teeth; discharge from fertilizer and aluminum factories	ppm	4	4	1/16/07	0.78 *(all of it naturally-occurring)*	no
Nitrate plus Nitrite (as Nitrogen)	runoff from fertilizer use; leaching from septic tanks, sewage; erosion of natural deposits	ppm	10	10	1/16/07	0.16	no
Lead *Note: In a sample collected 1/16/07, no lead was detected in the treated water as it left the water treatment plant.*	corrosion of household plumbing systems; erosion of natural deposits	ppb	AL = 15 90^{th} percentile level must be less than 15	15	30 tests from high-risk* homes during July, August and September, 2007	6 @ 90^{th} percentile (see below) two sites were ≥ 15 ppb	no
Copper *Note: In a sample collected 1/16/07, no copper was detected in the treated water as it left the water treatment plant.*	corrosion of household plumbing systems; erosion of natural deposits; leaching from wood preservatives	ppm	AL = 1.3 90^{th} percentile level must be less than 1.3	1.3	30 tests from high-risk* homes during July, August and September, 2007	0.31 @ 90^{th} percentile (see below) no site exceeded 1.3 ppm	no

LEAD AND COPPER RULE SAMPLING SUMMARY (triennial samples)

Note:
Each sample collected for lead analysis was also analyzed for copper. In this report the sites are separately numbered 1-30 based on descending levels of lead or copper, that is, the site having the highest level of lead did not necessarily also have the highest level of copper.

Site Ranking	Lead Range high to low	Copper Range high to low
1	26	1.21
2	15	0.78
3	7	0.35
90^{th} percentile levels → 4	6	0.31
5	4	0.31
6	3	0.30
7	3	0.29
8	2	0.20
9	2	0.17
10	2	0.15
11	2	0.13
12	2	0.13
13	2	0.13
14	2	0.13
15	2	0.12
16	1	0.12
17	1	0.12
18	1	0.12
19	< 1	0.11
20	< 1	0.11
21	< 1	0.10
22	< 1	0.10
23	< 1	0.09
24	< 1	0.08
25	< 1	0.07
26	< 1	0.07
27	< 1	0.06
28	< 1	0.05
29	< 1	0.05
30	< 1	0.04

** The 1994 Federal Lead & Copper Rule mandates a household testing program for these substances. Under the provisions of the Lead & Copper Rule high-risk sites include, but are not limited to, single-family residences served by a lead service line, having interior lead piping or having lead-soldered copper pipe installed after 1982 but prior to Montana's ban on lead solder, which began December 31, 1987. According to the Rule, 90% of the samples from high-risk homes must have lead levels less than 15 ppb and copper levels less than 1.3 ppm.*

Samples were collected from water that had remained within the building's interior plumbing for a period of at least six hours. Lead and copper levels below the MCL indicated water that was not corrosive to lead or copper plumbing.

This small table contains additional water quality data that were collected from selected sites around Great Falls during the 2004 Lead & Copper sampling program.

Date	Site	Water Temp. °C	Total Dissolved Solids mg/l	Calcium Hardness mg/l $CaCO_3$	Total Alkalinity mg/l $CaCO_3$	pH	Langelier Index
7/26/04	H57	22.4	198.5	99.2	115	7.31	-0.52
7/26/04	MSS	21.1	199.0	99.6	112	7.35	-0.52
7/26/04	33B	22.7	198.5	96.0	112	7.34	-0.52
7/26/04	WTP	23.1	197.5	94.0	113	7.30	-0.56
8/30/04	SLC	18.1	200.5	96.4	116	7.34	-0.61
8/30/04	FS4	17.8	200.0	97.6	123	7.39	-0.54
8/30/04	MBG	17.8	201.0	99.6	116	7.35	-0.59
8/30/04	WTP	16.5	200.0	96.8	108	7.28	-0.69

Contaminant (Table I. continued)	Likely Source of Contamination	Unit of Measurement	MCL	MCLG	Date Sampled	Level Detected	Violation (yes/no)
Turbidity *Turbidity is a measure of the cloudiness of the water. It is monitored because it is a good indicator of the effectiveness of the water filtration system.*	soil runoff	NTU	TT = 1 NTU maximum	0	throughout the year, every four hours	0.21 maximum for 2007 on 3/10/07	no
		NTU	TT < 0.3 NTU 95% of the time	0	throughout the year, every four hours	< 0.3 100% of the time	no
Radionuclides							
Beta/photon emitters	decay of natural and man-made deposits	mrem/yr	4	0	2/23/99	2.7 (± 2.7) pCi/l gross beta	no
Disinfectants							
Chlorine	water additive used to control microbes	ppm	MRDL = 4	MRDLG=4	continuously	0.04 to 2.00	no
Chloramines†	water additive used to control microbes	ppm	MRDL = 4	MRDLG=4	continuously	0.04 to 2.00	no

† **The primary disinfectant** used in Great Falls is free chlorine, with ammonia being added to form monochloramine just before the water leaves the treatment plant. Monochloramine does not dissipate as readily as free chlorine and thus helps in maintaining disinfection at the far edges of the distribution system without the need for booster chlorinators. Because monochloramine is a weak oxidizer compared with free chlorine, it also minimizes the formation of disinfection by-products. Total chlorine levels were checked at the treatment plant and throughout the distribution system on a daily basis during 2007 and at no time exceeded the MRDL or the MRDLG. The levels found ranged from a low of 0.04 ppm in the distribution system to a high of 2.00 ppm in water leaving the treatment plant.

Disinfection By-Products (DBPs)

TTHMs (total trihalomethanes)	by-product of drinking water disinfection	ppb	80 run. ann. avg.‡	N/A	quarterly	see table below	no
HAA5s (five haloacetic acids)	by-product of drinking water disinfection	ppb	60 run. ann. avg.‡	N/A	quarterly	see table below	no

TTHM Summary **sampling period →**	2nd quarter 2006	3rd quarter 2006	4th quarter 2006	1st quarter 2007	2nd quarter 2007	3rd quarter 2007	4th quarter 2007
site # 1	31.8	44.3	30.3	24.1	33.8	38.1	29.7
site # 2	36.7	44.2	34.3	30.2	37.8	43.2	38.2
site # 3	28.8	43.1	33.1	24.5	33.8	39.1	32.6
site # 4	34.0	51.5	38.8	27.8	36.7	39.1	35.1
quarterly average	32.8	45.8	34.1	26.7	35.5	39.9	33.9
‡running annual average	33.0	34.9	35.3	34.9	35.5	34.1	34.0

highest compliance level for 2007 = 35.5 range = 24.1 to 43.2

Some people who drink water containing trihalomethanes in excess of the MCL over many years may experience problems with their liver, kidneys, or central nervous systems, and may have an increased risk of getting cancer.

HAA5 Summary **sampling period →**	2nd quarter 2006	3rd quarter 2006	4th quarter 2006	1st quarter 2007	2nd quarter 2007	3rd quarter 2007	4th quarter 2007
site # 1	24.0	38.0	35.0	29.0	35.0	27.2	25.7
site # 2	25.4	35.0	14.0	30.0	23.9	21.2	19.1
site # 3	26.0	38.0	20.8	30.0	41.0	31.6	22.0
site # 4	21.9	35.7	14.6	25.0	33.0	27.0	21.6
quarterly average	24.3	36.7	21.1	28.5	33.2	26.8	22.1
‡running annual average	53.7	26.0	25.6	27.7	29.9	27.4	27.7

highest compliance level for 2007 = 29.9 range = 19.1 to 41.0

Some people who drink water containing haloacetic acids in excess of the MCL over many years may have an increased risk of getting cancer.

Total Organic Carbon (TOC) provides a medium for the formation of disinfection by-products, which include TTHMs and HAA5s. Removing TOC at the water treatment plant is important in reducing the potential for the formation of all disinfection by-products, both regulated and unregulated.

Date Sampled	River Water TOC	Treated Water TOC	% Removal Required	% Removal Achieved
1/16/07	2.5 ppm	2.0 ppm	15.0**	20.0
2/20/07	2.5 ppm	1.7 ppm	15.0	32.0
3/13/07	3.2 ppm	2.5 ppm	15.0	21.9
4/16/07	1.8 ppm	1.5 ppm	15.0	16.7
5/14/07	2.0 ppm	1.6 ppm	15.0	20.0
6/18/07	1.8 ppm	1.5 ppm	15.0	16.7
7/16/07	1.9 ppm	1.8 ppm	15.0	5.3
8/13/07	2.0 ppm	1.4 ppm	15.0	30.0
9/10/07	2.0 ppm	1.5 ppm	15.0	25.0
10/15/07	2.2 ppm	1.8 ppm	15.0	18.2
11/13/07	2.5 ppm	2.0 ppm	15.0	20.0
12/17/07	2.3 ppm	1.8 ppm	15.0	21.7

** *minimum removal percentage based on river water total alkalinity and river water TOC level*

Secondary Contaminants (Table I. continued)				
Secondary Parameter	Date Sampled	Level Detected	Unit of Measurement	SMCL***
Calcium	1/16/07	40	ppm	N/A
Magnesium	1/16/07	11	ppm	N/A
Sodium	1/16/07	19	ppm	< 20 recommended
Total Hardness	1/16/07	145	ppm	N/A
Total Alkalinity	1/16/07	120	ppm	N/A
Conductivity	1/16/07	387	micromhos/cm	N/A
pH	1/16/07	7.7	pH units	6.5 - 8.5
**** Secondary Maximum Contaminant Level (SMCL) – a chemical contaminant in excess of this amount may affect aesthetic qualities and public acceptance. SMCLs are non-enforceable standards.*				

Table II. Unregulated Contaminants Detected

Unregulated contaminant monitoring helps EPA to determine where certain contaminants occur and whether it needs to regulate those contaminants.

Radionuclides	Date Sampled	Level Detected	Unit of Measurement	Significance
Radon-222	1/09/95	47 (± 37)	pCi/l	see comments below

About radon: There is currently no federal regulation for radon in drinking water. Radon is a radioactive gas that you can't see, taste or smell. It is found all over the U.S. Radon can move up through the ground and into a home through cracks and holes in the foundation. Radon can build up to high levels in all types of homes. Radon can also get into indoor air when released from tap water from showering, washing dishes, and other household activities. Compared to radon entering the home through soil, radon entering the home through tap water will in most cases be a small source of radon in indoor air. Radon is a known human carcinogen. Breathing air containing radon can lead to lung cancer. Drinking water that contains radon may also cause increased risk of stomach cancer. If you are concerned about radon in your home, test the air in your home. Testing is inexpensive and easy. Fix your home if the level of radon in your air is 4 picocuries per liter of air (4pCi/l) or higher. There are simple ways to fix a radon problem that aren't too costly. For additional information, call your state radon program or call EPA's Radon Hotline (1-800-SOS-RADON).

Inorganic Contaminants	Date Sampled	Level Detected	Unit of Measurement	SMCL
Bicarbonate	1/16/07	147	ppm	N/A
Chloride	1/16/07	13	ppm	250
Potassium	1/16/07	4	ppm	N/A
Silica	1/16/07	18.2	ppm	N/A
Strontium	1/21/03	210	ppb	N/A
Sulfate	1/16/07	47	ppm	500

The following three disinfection by-products are volatile organics that are not regulated individually but are included in total trihalomethanes:

Contaminant	Date Sampled	Level Detected	Unit of Measurement
Bromodichloromethane	5/14/07	10	ppb
Chlorodibromomethane	5/14/07	1.7	ppb
Chloroform	5/14/07	20	ppb

Table III. Regulated Contaminants Not Detected

Radionuclides – tested 10/22/02 (testing for uranium was not required because the gross alpha result did not exceed the MCL of 15 pCi/l)			
Alpha emitters		Combined radium	
Microbiological Contaminants – tested throughout 2007, 70 routine distribution system samples per month			
Total Coliform Bacteria		*Escherichia coli*	
Inorganic Contaminants – all tested 1/16/07 unless otherwise indicated			
Antimony	Cadmium	Iron	Nickel
Asbestos (11/24/03)	Chromium	Lead	Nitrite
Barium	Copper	Manganese	Selenium
Beryllium	Cyanide (1/30/06)	Mercury	Thallium
Volatile Organic Contaminants (VOCs) – all tested 5/14/07 unless otherwise indicated			
Benzene	1,1-Dichloroethene	Styrene	Toluene
Carbon tetrachloride	cis-1,2-Dichloroethene	Tetrachloroethene	Vinyl chloride
Chlorobenzene	trans-1,2-Dichloroethene	1,2,4-Trichlorobenzene	Xylenes (ortho-, meta-, para-)
1,2-Dichlorobenzene	Methylene chloride	1,1,1-Trichloroethane	1,2-Dibromo-3-chloropropane
1,4-Dichlorobenzene	1,2-Dichloropropane	1,1,2-Trichloroethane	Total BTEX
1,2-Dichloroethane	Ethylbenzene	Trichloroethene	

Synthetic Organic Contaminants (SOCs) – all tested 5/23/05 and 8/08/05 unless otherwise indicated (Table III. continued)		
2,4,-D	Dibromochloropropane (DBCP) (6/13/05)	Hexachlorobenzene
2,4,5-TP (Silvex)	Dinoseb	Hexachlorocyclopentadiene (HEX)
Alachlor	Diquat (deferred)	Lindane (g-BHC)
Atrazine	Dioxin (2,3,7,8-TCDD) (deferred)	Methoxychlor
Benzo(a)pyrene (PAH)	Endothall (deferred)	Oxamyl (Vydate)
Carbofuran	Endrin	Polychlorinated biphenyls (PCB's)
Chlordane	Ethylene dibromide (EDB) (6/13/05)	Pentachlorophenol
Dalapon	Glyphosate (6/13/05)	Picloram (Tordon)
Di(2-ethylhexyl)adipate	Heptachlor	Simazine
Di(2-ethylhexyl)phthalate	Heptachlor epoxide	Toxaphene

Table IV. Unregulated Contaminants Not Detected

Unregulated contaminant monitoring helps EPA to determine where certain contaminants occur and whether it needs to regulate those contaminants.

Inorganic Contaminants – all tested 1/16/07 unless otherwise indicated				
Aluminum	Carbonate	Molybdenum (1/21/03)	Silver	Zinc (1/30/06)

Volatile Organic Contaminants (VOCs) – all tested 5/14/07 unless otherwise indicated			
Bromobenzene	1,3-Dichlorobenzene	1,2,3-Trichloropropane	n-Propylbenzene
Bromoform	1,1-Dichloroethane	Bromochloromethane	sec-Butylbenzene
Bromomethane	1,3-Dichloropropane	n-Butylbenzene	tert-Butylbenzene
1,2-Dibromoethane	2,2-Dichloropropane	Dichlorodifluoromethane	1,2,3-Trichlorobenzene
Chloroethane	1,1-Dichloropropene	Trichlorofluoromethane	1,2,4-Trimethylbenzene
Chloromethane	cis-1,3-Dichloropropene	Hexachlorobutadiene	1,3,5-Trimethylbenzene
2-Chlorotoluene	trans-1,3-Dichloropropene	Isopropylbenzene	Methyl tert-Butyl Ether (MTBE)
4-Chlorotoluene	1,1,1,2-Tetrachloroethane	p-Isopropyltoluene	
Dibromomethane	1,1,2,2-Tetrachloroethane	Naphthalene	

Synthetic Organic Contaminants (SOCs) – all tested 5/23/05 and 8/08/05 unless otherwise indicated		
Aldrin	3-Hydroxycarbofuran	Aldicarb (Temik)
Butachlor	Methomyl	Aldicarb Sulfone
Carbaryl	Metolachlor	Aldicarb Sulfoxide
Dicamba	Metribuzin	Acifluorfen
Dieldrin	Propachlor	

Unregulated Contaminant Monitoring Rule (UCMR1) Contaminants – all tested 10/23/01, 1/02/02, 4/08/02 and 7/01/02			
Perchlorate	MTBE	2,4-Dinitrotoluene	EPTC
DCPA mono-acid	Nitrobenzene	2,6-Dinitrotoluene	Molinate
DCPA di-acid	Acetochlor	4-4'-DDE	Terbacil

As the above tables indicate, analysis of Great Falls drinking water revealed no violations during 2007. Although some constituents were detected, the Environmental Protection Agency considers water to be safe at these levels. Furthermore, MCLs are set very stringently. To put this into perspective, for a given regulated contaminant a person would have to drink 2 liters of water every day at the MCL level for a lifetime for there to be a one-in-a-million chance of having a corresponding adverse health effect.

Important additional information regarding source water monitoring:

During 2007 Great Falls collected monthly water samples directly from the Missouri River intake and had them analyzed for *Cryptosporidium*, a microbial pathogen found in surface water throughout the United States. Although the filtration aspect of our water treatment process removes *Cryptosporidium* it cannot guarantee 100% removal. Our monitoring indicated the presence of these organisms in our source water during the months of February, April, July, September, October and December. Current test methods do not allow us to determine whether the organisms are dead or if they are capable of causing disease. Ingestion of *Cryptosporidium* may cause cryptosporidiosis, an abdominal infection. Symptoms of infection include nausea, diarrhea and abdominal cramps. Most healthy individuals can overcome the disease within a few weeks. However, immuno-compromised people are at greater risk of developing life-threatening illness. We encourage immuno-compromised individuals to consult their doctor regarding appropriate precautions to take to avoid infection. *Cryptosporidium* must be ingested to cause disease, and it may be spread through means other than drinking water.

Appendix 6d-e

PUBLIC WATER SUPPLIES IN CASCADE COUNTY

s=active&pop_serv=&wsys_id=&fac_state=MT&last_fac_name=&page=1&query_results=&total_rows_found=

Last Updated on Tuesday, March 4th, 2008.

Safe Drinking Water Information System (SDWIS)

Query Results

Report an Error

Query Selections:
State selected: **MONTANA**
County selected: **CASCADE**
Population Selected: **Very Small (0-500), Small (501-3,300), Medium (3,301-10,000), Large (10,001-100,000), Very Large (100,000+)**
Water System Status: **active**
Query executed on: **MAR-04-2008**
Results are based on data extracted on : **JAN-18-2008**

List of Water Systems in SDWIS

Information about water systems in MONTANA is maintained by Public Water Supply Section .

To obtain additional information about drinking water please call EPA's Safe Drinking Water hotline at 1-800-426-4791.

Community Water Systems: Water Systems that serve the same people year-round (e.g. in homes or businesses).

Water System Name	County (s) Served	Population Served	Primary Water Source Type	System Status	Wa Syst
BELT TOWN OF	CASCADE	700	Groundwater	Active	MT00
BIG BEND RANCH SUBDIVISION	CASCADE	38	Groundwater	Active	MT00
BIG STONE COLONY	CASCADE	110	Groundwater	Active	MT00
BLACK EAGLE CASCADE COUNTY WATER SEWER	CASCADE	1000	Purch_surface_water	Active	MT00
CASCADE TOWN OF	CASCADE	885	Groundwater	Active	MT00

CASCADE COLONY	CASCADE	125	Groundwater_under_infl_of_surface_water	Active	MT00
FAIRHAVEN COLONY	CASCADE	110	Groundwater	Active	MT00
GORE HILL COUNTY WATER DIST	CASCADE	500	Groundwater	Active	MT00
GREAT FALLS CITY OF	CASCADE	60000	Surface_water	Active	MT00
HOMESTEAD ACRES COUNTY WATER AND SEWER	CASCADE	500	Groundwater	Active	MT00
M AND K WATER SERVICE	CASCADE	125	Purch_surface_water	Active	MT00
MALMSTROM AIR FORCE BASE	CASCADE	8000	Purch_surface_water	Active	MT00
NEIHART TOWN OF	CASCADE	267	Surface_water	Active	MT00
OASIS WATER SERVICE	CASCADE	45	Purch_surface_water	Active	MT00
PARK GARDEN ESTATES	CASCADE	64	Groundwater	Active	MT00
PLEASANT PARK MOBILE COURT	CASCADE	92	Groundwater	Active	MT00
PLEASANT VALLEY COLONY	CASCADE	105	Groundwater	Active	MT00
PRAIRIE WATER COMPANY	CASCADE	125	Purch_surface_water	Active	MT00
RIVERSHORE MOBILE HOME PARK	CASCADE	120	Purch_surface_water	Active	MT00
RYAN DAM WATER SYSTEM	CASCADE	334	Groundwater	Active	MT00
SAND COULEE WATER USERS ASSN	CASCADE	161	Groundwater	Active	MT00
SPRING TREE RIDGE	CASCADE	25	Groundwater	Active	MT00
STOCKETT WATER AND SEWER DIST	CASCADE	210	Groundwater	Active	MT00

SUN PRAIRIE VILLAGE COUNTY	CASCADE	1500	Groundwater	Active	MT00
SUN PRAIRIE WATER DISTRICT	CASCADE	350	Groundwater	Active	MT00
TRACY WATER USERS CORP	CASCADE	200	Groundwater	Active	MT00
TRAILER TERRACE	CASCADE	182	Groundwater	Active	MT00
TWO BUTTES WATER USERS ASSN	CASCADE	525	Groundwater	Active	MT00
VAUGHN CASCADE COUNTY WATER AND SEWER DI	CASCADE	450	Groundwater	Active	MT00
WINDY ACRES WUA	CASCADE	75	Groundwater	Active	MT00

Non-Transient Non-Community Water Systems: Water Systems that serve the same people, but not year-round (e.g. schools that have their own water system).

Water System Name	County (s) Served	Population Served	Primary Water Source Type	System Status	Water System ID
CENTERVILLE SCHOOL	CASCADE	292	Groundwater	Active	MT0000771
CULLIGAN WATER CONDITIONING GREAT FALLS	CASCADE	900	Purch_surface_water	Active	MT0002630
HERITAGE BAPTIST CHURCH	CASCADE	100	Purch_surface_water	Active	MT0003956
SIMMS HIGH SCHOOL	CASCADE	200	Groundwater	Active	MT0000715
SOURCE GIANT SPRINGS INC	CASCADE	3009	Groundwater	Active	MT0003704
SUN RIVER MIDDLE SCHOOL	CASCADE	100	Groundwater	Active	MT0000754
TRI HILL WUA GORE HILL	CASCADE	100	Groundwater	Active	MT0002805
ULM SCHOOL DIST 85	CASCADE	100	Groundwater	Active	MT0000765

Transient Non-Community Water Systems: Water Systems that do not consistently serve the same people (e.g. rest stops, campgrounds, gas stations).

Water System Name	County (s) Served	Population Served	Primary Water Source Type	System Status	Water System ID
ALBERTSONS GREAT FALLS 10TH AVE 2037	CASCADE	25	Purch_surface_water	Active	MT0003379
ALBERTSONS GT FLS 3RD AVE NW NO 2035	CASCADE	25	Purch_surface_water	Active	MT0003515
ARMINGTON JCT BELT REST STOP	CASCADE	110	Groundwater	Active	MT0001958
BOOTLEGGER ESPRESSO	CASCADE	31	Purch_surface_water	Active	MT0004402
CABIN SALOON MONARCH	CASCADE	32	Groundwater	Active	MT0002892
CAMP ROTARY CLUB MONARCH	CASCADE	80	Groundwater	Active	MT0000789
CATTLEMENS CUT SUPPER CLUB	CASCADE	165	Purch_surface_water	Active	MT0004430
CENTERVILLE BAR	CASCADE	83	Groundwater	Active	MT0000784
CENTERVILLE WATER USERS ASSN	CASCADE	52	Groundwater	Active	MT0003202
COUNTY MARKET GREAT FALLS EAST	CASCADE	25	Purch_surface_water	Active	MT0003948
CUBS DEN	CASCADE	30	Groundwater	Active	MT0000776
CULLIGAN WALMART NO 2455	CASCADE	40	Purch_surface_water	Active	MT0004372
CURTISS SERVICE CENTER	CASCADE	52	Groundwater	Active	MT0003938
DEARBORN COUNTRY INN CASCADE	CASCADE	81	Groundwater	Active	MT0003007
EMERALD GREEN GOLF CLUB	CASCADE	100	Purch_surface_water	Active	MT0003626
FIRESIDE INN SIMMS	CASCADE	35	Groundwater	Active	MT0001876
FLY FISHERS INN	CASCADE	204	Groundwater	Active	MT0000792
FRONTIER INN	CASCADE	302	Purch_surface_water	Active	MT0000770
GIANT SPRINGS STATE PARK	CASCADE	1014	Groundwater	Active	MT0040745
GORE HILL TOWN PUMP	CASCADE	612	Groundwater	Active	MT0004491
GREAT FALLS KOA KAMPGROUND	CASCADE	124	Groundwater	Active	MT0000763
HANGING A INC.	CASCADE	50	Purch_surface_water	Active	MT0000767
HEADQUARTERS BUILDING REGION 4	CASCADE	74	Groundwater	Active	MT0043637

LAZY DOE INC	CASCADE	40	Groundwater	Active	MT0000716
LDS CHURCH BELT	CASCADE	40	Groundwater	Active	MT0003581
LDS CHURCH SUN RIVER	CASCADE	150	Purch_surface_water	Active	MT0000740
MARYS MIDWAY CASINO AND REST	CASCADE	52	Purch_surface_water	Active	MT0000760
MISSOURI INN TRAILER PARK	CASCADE	34	Groundwater	Active	MT0000051
QUIGLEYS QUICK STOP	CASCADE	153	Purch_surface_water	Active	MT0003966
RAMBLE INN BAR	CASCADE	64	Groundwater	Active	MT0000714
REALLY WINDYS	CASCADE	102	Purch_surface_water	Active	MT0002534
ROSIES MISSOURI INN	CASCADE	103	Groundwater	Active	MT0000713
SMITHS FOOD AND DRUG GT FLS 166	CASCADE	25	Purch_surface_water	Active	MT0003989
THEILTGES SAINT THOMAS CAMP	CASCADE	44	Groundwater	Active	MT0000788
ULM BAR	CASCADE	50	Purch_surface_water	Active	MT0000757
ULM PISHKUN VISITOR CENTER	CASCADE	104	Groundwater	Active	MT0004055
VALLEY COMMUNITY BIBLE CHURCH	CASCADE	53	Purch_surface_water	Active	MT0003992
WESTERN LIVESTOCK AUCTION	CASCADE	58	Purch_surface_water	Active	MT0000717

Appendix 7a

PURPLE ALIGNMENT

111°21'55"W 111°20'55"W 111°19'55"W 111°18'55"W 111°17'55"W 111°16'55"W 111°15'55"W 111°14'55"W 111°13'55"W 111°12'55"W 111°11'55"W 111°10'55"W

47°29'9"N 47°28'9"N 47°27'9"N 47°26'9"N

SUN RIVER RD
10TH AVE SW
10TH AVE S
6TH ST SW
RIVER DR S
2ND ST S
5TH ST
6TH ST S
14TH ST
15TH ST
25TH ST
26TH ST S
38TH ST
57TH ST
EAST CONNECTION POINT
MALMSTROM AFB
MAFB CLEAR ZONE
OVERLOOK DR
9TH ST
19TH ST SO
LANDFILL
51ST ST S
41ST ST S
MOUNT OLIVET CEMETERY
WETLANDS MISSOURI RIVER
14TH ST
FOX FARM RD
PARK GARDEN RD
AIRPORT RD
24TH AVE S
WETLANDS
GREAT FALLS PORTAGE NATIONAL HISTORIC LANDMARK DISTRICT
13TH ST S
29TH ST S
26TH ST S
GIBSON FLATS RD
UPPER RIVER ROAD
LOWER RIVER RD
CEMETERY RD
ABANDONED MINE
HIGHLAND CEMETERY
HEBREW CEMETERY
Crude Oil Pipeline
WEST CONNECTION AREA
45TH AVE S
40TH AVE S
FLOOD RD
31ST ST SW
ABANDONED MINE
ABANDONED MINE
CALVARY CEMETERY
HIGHLAND RD
WETLANDS MISSOURI RIVER
AYRSHIRE DAIRY
13TH ST S
WETLANDS Sand Coulee Creek
DICK ROAD
FIELDS RD
55TH AVE S
LOWER RIVER RD
226

Alignments Produced by Quantm

This Study is part of a long term planning process that carries forward recommendations from a recently completed arterial feasibility study and the current Great Falls Transportation Plan, both of which recommend further study of the South Arterial. The planning level analysis, being conducted under this Study, allows for the identification, selection and elimination of potential alignments, but lacks the precision to identify the specific properties or other features impacted. After the currently proposed alignments are reduced to one or more alignments, additional detailed and specific environmental analysis and design will then be

0 0.1 0.2 0.4 0.6 0.8 1 Miles

AVIOD ZONES
- Arterial Corridor
- Avoid Area

CONSTRAINTS WITH COST
- Sensitive Area
- 100-Year Flood Area
- Potential Wetland Area

OTHER/NO COST
- Park
- Abandoned Mine

CONSTRAINTS WITH COST
- Crude Oil Pipeline
- Drainage
- Landfill

Great Falls South Arterial Alignment Study

PREPARED BY THE
STATE OF MONTANA
DEPARTMENT OF TRANSPORTATION
ROAD INVENTORY AND MAPPING SECTION

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Appendix 8a

CURRENT TRAFFIC COUNTS ON IMPACTED ROADWAYS

Current Traffic Counts

I-15	**Traffic Counts**
Gore Hill Int. - 10th Ave. S. Int. -	14900 vpd
10th Avenue South	
I-15 - Fox Farm Rd. -	26100 vpd
Fox Farm Rd. - River Dr. S. -	30900 vpd
River Dr. S. - 13th St. S. -	35700 vpd
13th St. S. - 26th St. S. -	37300 vpd
26th St. S. - 57th St. S. -	19100 vpd
Flood Road	
N. of 45th Ave. SW -	1400 vpd
Fox Farm Road	
S. of 10th Ave. S. -	13700 vpd
N. of 45th Ave. SW -	2300 vpd
S. of Cherokee Dr. -	1800 vpd
Upper River Road	
S. of Overlook Dr. -	2600 vpd
N. of 40th Ave. S. -	2100 vpd
Lower River Road	
S. of 10th Ave. S. -	2200 vpd
13th Street South	
S. of 10th Ave. S. -	9100 vpd
S. of 24th Ave. S. -	2400 vpd
S. of 33rd Ave. S. -	2200 vpd
26th Street South	
S. of 10th Ave. S. -	9800 vpd
S. of 24th Ave. S. -	1500 vpd
S. of 33rd Ave. S. -	

Appendix 8b

MODEL ANALYSIS FOR RECOMMENDED FULL SOUTH ARTERIAL ALIGNMENT

2025/2035 Traffic Volumes with Full South Arterial
Utilizing 33rd Avenue South and Gibson Flats Road

Great Falls South Arterial (55 mph, controlled access)

	2025 Volumes			2035 Volumes		V/C Ratio	
	4 - Lane	2 - Lane	GR	4-Lane	2 - Lane	4 - Lane	2 - Lane
I-15 - Fox Farm Rd. -	7500 vpd	7300 vpd	3.5	10600 vpd	10300 vpd	0.35	0.69
Fox Farm Rd. - Upper River Rd.-	12700 vpd	12500 vpd	3.2	17400 vpd	17100 vpd	0.58	1.14
Upper River Rd. - 13th St. S. -	11300 vpd	10900 vpd	2.8	14900 vpd	14400 vpd	0.5	0.96
13th St. S. - 26th St. S. -	7000 vpd	6700 vpd	2.2	8700 vpd	8300 vpd	0.29	0.55
26th St. S. - US 87/89 -	5600 vpd	5500 vpd	2.2	7000 vpd	6800 vpd	0.23	0.45

I-15

					2035 Volumes	
	w/arterial	wo/arterial	GR w	GR w/o	w/arterial	wo/arterial
Gore Hill Int. - 10th Ave. S. Int. -	19100 vpd	23300 vpd	2.2	2.6	23700 vpd	30100 vpd

10th Avenue South

							V/C Ratio	
	w/arterial	wo/arterial			w/arterial	wo/arterial	w/arterial	wo/arterial
I-15 - Fox Farm Rd. -	22900 vpd	28000 vpd	1.4	1.7	26300 vpd	33200 vpd	0.88	1.11
Fox Farm Rd. - River Dr. S. -	25700 vpd	32100 vpd	0.6	0.9	27300 vpd	35100 vpd	0.91	1.17
River Dr. S. - 13th St. S. -	31700 vpd	35500 vpd	0.5	0.6	33300 vpd	37700 vpd	0.74	0.84
13th St. S. - 26th St. S. -	31900 vpd	33900 vpd	0.3	0.4	32900 vpd	35300 vpd	0.73	0.78
26th St. S. - 57th St. S. -	18800 vpd	20800 vpd	0.5	0.5	19800 vpd	21900 vpd	0.66	0.73

Flood Road

	w/arterial	wo/arterial			w/arterial	wo/arterial
N. of 45th Ave. SW -	1100 vpd	2300 vpd	2.2	2.2	1400 vpd	2900 vpd

Fox Farm Road

	w/arterial	wo/arterial			w/arterial	wo/arterial
S. of 10th Ave. S. -	15200 vpd	23600 vpd	0.8	1.6	16500 vpd	27700 vpd
N. of 45th Ave. SW -	4500 vpd	12200 vpd	3.9	4.2	6600 vpd	18400 vpd
S. of Cherokee Dr. -	14300 vpd	13100 vpd	4.1	4.4	21400 vpd	20100 vpd

Upper River Road

	w/arterial	wo/arterial			w/arterial	wo/arterial
S. of Overlook Dr. -	6600 vpd	6100 vpd	2.6	2.4	8500 vpd	7700vpd
N. of 40th Ave. S. -	3200 vpd	500 vpd	3.7	1.1	4600 vpd	600 vpd

Lower River Road

	w/arterial	wo/arterial			w/arterial	wo/arterial
S. of 10th Ave. S. -	3600 vpd	4500 vpd	0.5	1.1	3800 vpd	5000 vpd

13th Street South

	w/arterial	wo/arterial			w/arterial	wo/arterial
S. of 10th Ave. S. -	12800 vpd	10800 vpd	0.8	0.6	13900 vpd	11500 vpd
S. of 24th Ave. S. -	11900 vpd	6700 vpd	1.9	1.9	14400 vpd	8100 vpd
S. of 33rd Ave. S. -	6800 vpd	6000 vpd	1.5	1.7	7900 vpd	7100 vpd

26th Street South

	w/arterial	wo/arterial			w/arterial	wo/arterial
S. of 10th Ave. S. -	9100 vpd	9500 vpd	0.8	0.7	9900 vpd	10200 vpd
S. of 24th Ave. S. -	1600 vpd	800 vpd	2.5	0.7	2000 vpd	900 vpd
S. of 33rd Ave. S. -	100 vpd	100 vpd	0	0	100 vpd	100 vpd

Appendix 8c

MODEL ANALYSIS FOR FULL SOUTH ARTERIAL NATIONAL HISTORIC LANDMARK AVOID ALIGNMENT

2025/2035 Traffic Volumes with Full South Arterial
Purple Alignment-Avoids National Historic Landmark District

Great Falls South Arterial (55 mph, controlled access)

	2025 Volumes		2035 Volumes
	2 - Lane	GR	2 - Lane
I-15 - Fox Farm Rd. -	6400 vpd	3.5	9000 vpd
Fox Farm Rd. - 13th St. S. -	5100 vpd	3.2	7000 vpd
13th St. S. - US 87/89 -	2900 vpd	2.8	3800 vpd

I-15

	2025 Volumes				2035 Volumes	
	w/arterial	wo/arterial	GR w	GR w/o	w/arterial	wo/arterial
Gore Hill Int. - 10th Ave. S. Int. -	20800 vpd	23300 vpd	2.2	2.6	25900 vpd	30100 vpd

10th Avenue South

	w/arterial	wo/arterial			w/arterial	wo/arterial
I-15 - Fox Farm Rd. -	25500 vpd	28000 vpd	1.4	1.7	29300 vpd	33200 vpd
Fox Farm Rd. - River Dr. S. -	29700 vpd	32100 vpd	0.6	0.9	31500 vpd	35100 vpd
River Dr. S. - 13th St. S. -	33800 vpd	35500 vpd	0.5	0.6	35500 vpd	37700 vpd
13th St. S. - 26th St. S. -	32900 vpd	33900 vpd	0.3	0.4	33900 vpd	35300 vpd
26th St. S. - 57th St. S. -	20000 vpd	20800 vpd	0.5	0.5	21000 vpd	21900 vpd

Flood Road

	w/arterial	wo/arterial			w/arterial	wo/arterial
N. of 45th Ave. SW -	1700 vpd	2300 vpd	2.2	2.2	2100 vpd	2900 vpd

Fox Farm Road

	w/arterial	wo/arterial			w/arterial	wo/arterial
S. of 10th Ave. S. -	19700 vpd	23600 vpd	0.8	1.6	21300 vpd	27700 vpd
N. of 45th Ave. SW -	7900 vpd	12200 vpd	3.9	4.2	11600 vpd	18400 vpd
S. of Cherokee Dr. -	13700 vpd	13100 vpd	4.1	4.4	20500 vpd	20100 vpd

Upper River Road

	w/arterial	wo/arterial			w/arterial	wo/arterial
S. of Overlook Dr. -	6000 vpd	6100 vpd	2.6	2.4	7800 vpd	7700vpd
N. of 40th Ave. S. -	600 vpd	500 vpd	3.7	1.1	900 vpd	600 vpd

Lower River Road

	w/arterial	wo/arterial			w/arterial	wo/arterial
S. of 10th Ave. S. -	3700 vpd	4500 vpd	0.5	1.1	3900 vpd	5000 vpd

13th Street South

	w/arterial	wo/arterial			w/arterial	wo/arterial
S. of 10th Ave. S. -	11000 vpd	10800 vpd	0.8	0.6	11900 vpd	11500 vpd
S. of 24th Ave. S. -	6800 vpd	6700 vpd	1.9	1.9	8200 vpd	8100 vpd
S. of 33rd Ave. S. -	6300 vpd	6000 vpd	1.5	1.7	7300 vpd	7100 vpd

26th Street South

	w/arterial	wo/arterial			w/arterial	wo/arterial
S. of 10th Ave. S. -	9200 vpd	9500 vpd	0.8	0.7	10000 vpd	10200 vpd
S. of 24th Ave. S. -	700 vpd	800 vpd	2.5	0.7	900 vpd	900 vpd
S. of 33rd Ave. S. -	100 vpd	100 vpd	0	0	100 vpd	100 vpd

Appendix 8d

MODEL ANALYSIS FOR RECOMMENDED PARTIAL ARTERIAL

2025/2035 Traffic Volumes with Partial South Arterial Utilizing 33rd Avenue South

Great Falls South Arterial (55 mph, controlled access)

	2025 Volumes	GR	2035 Volumes	V/C Ratio	
	2/4 - Lane		2/4-Lane	4 - Lane	2 - Lane
Fox Farm Rd. - Upper River Rd.-	8900 vpd	3.6	12700 vpd	0.42	0.85
Upper River Rd. - 13th St. S. -	7500 vpd	3.2	10300 vpd	0.34	0.69
13th St. S. - 26th St. S. -	2600 vpd	2.8	3400 vpd	0.11	0.23

I-15

	2025 Volumes				2035 Volumes	
	w/arterial	wo/arterial	GR w	GR w/o	w/arterial	wo/arterial
Gore Hill Int. - 10th Ave. S. Int. -	21000 vpd	23300 vpd	2.5	2.6	26900 vpd	30100 vpd

10th Avenue South

							V/C Ratio	
	w/arterial	wo/arterial			w/arterial	wo/arterial	w/arterial	wo/arterial
I-15 - Fox Farm Rd. -	26900 vpd	28000 vpd	1.7	1.7	31800 vpd	33200 vpd	1.06	1.11
Fox Farm Rd. - River Dr. S. -	27900 vpd	32100 vpd	0.6	0.9	29600 vpd	35100 vpd	0.99	1.17
River Dr. S. - 13th St. S. -	33300 vpd	35500 vpd	0.5	0.6	35000 vpd	37700 vpd	0.78	0.84
13th St. S. - 26th St. S. -	33100 vpd	33900 vpd	0.3	0.4	34100 vpd	35300 vpd	0.76	0.78
26th St. S. - 57th St. S. -	20800 vpd	20800 vpd	0.6	0.5	22100 vpd	21900 vpd	0.74	0.73

Flood Road

	w/arterial	wo/arterial			w/arterial	wo/arterial
N. of 45th Ave. SW -	1100 vpd	2300 vpd	2.2	2.2	1400 vpd	2900 vpd

Fox Farm Road

	w/arterial	wo/arterial			w/arterial	wo/arterial
S. of 10th Ave. S. -	16100 vpd	23600 vpd	0.9	1.6	17600 vpd	27700 vpd
N. of 45th Ave. SW -	6200 vpd	12200 vpd	4.3	4.2	9400 vpd	18400 vpd
S. of Cherokee Dr. -	14000 vpd	13100 vpd	4.1	4.4	20900 vpd	20100 vpd

Upper River Road

	w/arterial	wo/arterial			w/arterial	wo/arterial
S. of Overlook Dr. -	7100 vpd	6100 vpd	2.7	2.4	9300 vpd	7700vpd
N. of 40th Ave. S. -	2700 vpd	500 vpd	3.3	1.1	3700 vpd	600 vpd

Lower River Road

	w/arterial	wo/arterial			w/arterial	wo/arterial
S. of 10th Ave. S. -	3800 vpd	4500 vpd	1	1.1	4200 vpd	5000 vpd

13th Street South

	w/arterial	wo/arterial			w/arterial	wo/arterial
S. of 10th Ave. S. -	13400 vpd	10800 vpd	0.9	0.6	14700 vpd	11500 vpd
S. of 24th Ave. S. -	12000 vpd	6700 vpd	2.2	1.9	14900 vpd	8100 vpd
S. of 33rd Ave. S. -	6700 vpd	6000 vpd	1.9	1.7	8100 vpd	7100 vpd

26th Street South

	w/arterial	wo/arterial			w/arterial	wo/arterial
S. of 10th Ave. S. -	10500 vpd	9500 vpd	1	0.7	11600 vpd	10200 vpd
S. of 24th Ave. S. -	2300 vpd	800 vpd	2.7	0.7	3000 vpd	900 vpd
S. of 33rd Ave. S. -	100 vpd	100 vpd	0	0	100 vpd	100 vpd