



Traffic Operations Section Discovery Review Findings Summary

November 2, 2021

Prepared by:



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November 2, 2021

Montana Department of Transportation
Traffic Operations Section
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Thank you for taking the time to complete the U.S. CAD Discovery Review Process. During this journey your team has helped us gain a deeper understanding about the Traffic Operations Section. By reviewing the Autodesk's Discovery Documentation and the information you provided during our Discovery Review Session, we've compiled the information and summarized the findings within this document.

Our goal through this process is to help the Traffic Operations Section achieve more. We understand the challenges that exist within the industry and your significant investments to make your Department of Transportation great. Through this process we trust that you will have also gained more insight into your organization.

Herein you will find our findings and recommendations. We trust that you will find this information useful in your pursuit to achieve more as an organization.

We look forward to strengthening our partnership with MDT and the Traffic Operations Section.

Best Regards,

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EXECUTIVE SUMMARY

Montana Department of Transportation (MDT) enlisted U.S. CAD to gather information about your section and provide recommendations based on our experience and knowledge. Prior to U.S. CAD's Discovery Review Session, the Traffic Operations Section participated in a thorough discovery process performed by Autodesk. Through our Discovery Process, U.S. CAD was able to verify existing workflows and uncover insights about how the Traffic Operations Section performs business, technologies currently used, required deliverables, existing pain points, the Traffic Operations Section objectives, and goals. The information gathered from the completed Autodesk's Discovery Documentation and U.S. CAD Discovery Review Session was used to help us better understand these areas of your organization and to prepare this document.

During our review of your Autodesk Discovery Documents, and while performing the Discovery Review Session we identified/noted the following items:

- The lack of real-time data collaboration
- The need for improved internal communication and collaboration
- Updated field equipment used for collecting data
- The ability to consume data from various sources through one platform

This report highlights our understanding of the items listed above and our proposed recommendations as a part of the MDT CADD Implementation process.

U.S. CAD observed several immediate opportunities that would allow the Traffic Operations Section to utilize the AEC Collection. Note, in the future, once other bureaus have completed their migration to the Autodesk AEC Collections, there could be potential opportunities for increased cross collaboration.

This report is broken out into the following sections:

Department Profile	The organizational structure of the division and interactions with internal and external teams.
Recommendations	In this section we provide our specific recommendations on process and solutions based on our findings during the Discovery Process.
Training Program	This section identifies the potential training opportunities based on the team's wish list items, pain points, goals, and objectives.
Next Steps	In this section we provide our specific recommendations on process and solutions utilizing a Production Project where additional "Fit Gaps" may be exposed requiring additional training.

DEPARTMENT PROFILE

The Department Profile section provides our understanding of the organizational structure, key staff within the organization, departmental relationships, and how the Traffic Operations Section interacts with other internal MDT bureau’s/departments.

The Traffic Operations Section primarily focuses on Speed and Traffic Studies mainly consisting of researching, acquiring, analyzing, and reporting speed and traffic findings. Reports and exhibit diagrams outlining findings and recommendations are provided to the design functional areas within MDT. The Traffic Operations Section also participates by answering questions and making comments and recommendations for design projects.

During the Discovery process, U.S. CAD was introduced to several staff members who are integral components of the MDT the Traffic Operations Section. These employees have immense knowledge and skills working within the Traffic Operations Section ecosystem. Their knowledge of the inner workings of MDT’s Traffic Operations Section and outside entities, provided us with the needed details for a thorough understanding of day-to-day operations.

The key staff members, along with the additional Traffic Operations Section staff create, consume, and share data with the MDT design functional areas.

Some of the tools used by the Traffic Operations Section include:

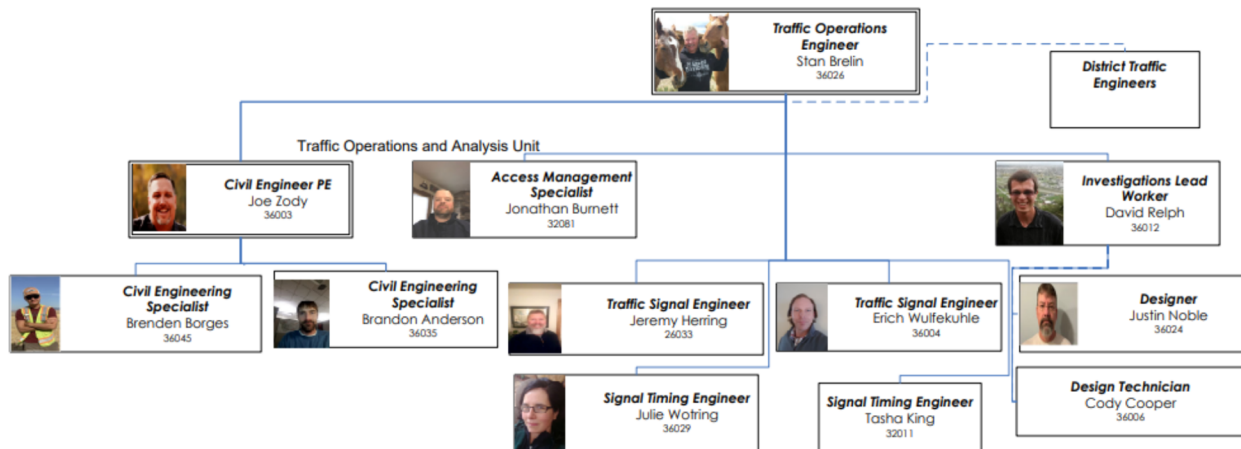
Activity	Solutions	Additional Solutions(s)
Preliminary Investigation	Google Earth	GIS
Preliminary Straight-Line Diagram (2D)	MicroStation	
Vehicle Turning Movements	Transoft AutoTURN	
Traffic Counts	Pneumatic Tube Counters	
Traffic Data and Pedestrian Counts	Miovision and cameras	
Site Distance	Measuring Wheel	Electronic Measuring Devices
Speed Study	Houston Radar	
Traffic Capacity – Intersections	Sidra	HCS 2010, PT VISSM, Syncro 10
Deliverables – Print to PDF/Paper	Adobe	

Internal MDT maps and plans are also frequently leveraged for data as well in paper and digital form.

While performing the Discovery Workshop staff members voiced several concerns, challenges, and fears they have for the software migration as shown:

- Will the migration to the Autodesk applications be too slow or too fast?
- Will this migration provide real-time collaboration between MDT Bureaus and Sections?
- Are the applications more user friendly?
- Will the training be thorough so projects can be completed in a timely manner?
- Will there be documented processes?
- Will each district continue to have a different process?
- How are older projects, still active, going to be handled?
- Can data easily be retrieved if deleted?

Below is the Organizational Chart of the MDT Traffic Operations Section supplied by MDT.



RECOMMENDATIONS

Based on the information shared by the Traffic Operations Section through the Discovery Workbook and Discovery Workshop, U.S. CAD has prepared a summary of our recommendations. This information is prepared for you to consider as you make investments in moving forward toward your goals and objectives. We look forward to the discussions around these recommendations and next steps.

U.S. CAD believes that by integrating the use of Civil 3D in all relevant bureaus and having one localized set of standards for all MDT Civil 3D data would provide easy access to all MDT bureaus and external entities if shared. The true intent of the Civil 3D standardization would be to provide accurate and consistent data/plans for users to access and reduce errors and omissions. The capabilities of Civil 3D would improve collaboration by providing access to maps, specific project site data, current/past projects, as-built plans, etc. Incorporating this information into the existing projects and utilizing automated processes in Civil 3D would reduce rework and provide for faster project turnaround. Inherently improving the workflow for the Traffic Operations Section.

The current process of 2D-only designing limits project analysis capabilities compared to the abundant analyzation potential offered in 3D modeling. Currently, the Traffic Operations Section does not utilize Civil 3D or other applications available in the Autodesk AEC Collection for analyzing and reporting quantity data and calculations. The Traffic Operations Section could, however, benefit from being made aware of the automated and collaboration tools available within the Autodesk AEC software collection. Having knowledge of the available tools and how they are being leveraged within other MDT bureaus will help bridge the data gap and improve efficiencies between functional areas. U.S. CAD believes the software that will be leveraged most often by the Traffic Operations Section would be Civil 3D, Infracore, Autodesk Vehicle Tracking and BIM 360. Specific capabilities for each software recommendation are listed below.

In addition, the capabilities and use of a centralized MDT GIS database would provide access to maps, specific project site data, current/past projects, as-built plans, etc. By incorporating the Traffic Operations data/information into the existing GIS foundation already in place and being used, the MDT GIS database would become an invaluable resource for all MDT departments. Inherently improving the workflow for the Traffic Operations Section.

The Autodesk cloud collaboration tool, BIM 360, will be a crucial piece to the Traffic Operations Section future workflow. Being able to share, review, and manage data in one centralized location will be a huge benefit. Autodesk's BIM 360 provides access to data anywhere and anytime as well as design collaboration, project management and document management tools.

Civil 3D

Civil 3D allows designers to apply AASHTO criteria to their designs using onboard settings installed with the software. Additionally, Civil 3D takes the process of designing in a 2D environment and instantly turns elements into intelligent 3D model components that are dynamic in nature. As a result of this dynamic capability, designers can make a change in one area of the project, and several other connected areas will be updated as a result. Civil 3D's dynamic capability will assist in the use of tables which currently are static and must be updated manually when the design changes. This can save a tremendous amount of time by reducing the editing process as well as eliminating potential errors. Civil 3D also automates the process of reporting by utilizing intelligent Civil objects that not only are inter-connected but also possess a rich collection of data.

Infracore

Infracore also contains the ability to apply AASHTO criteria to models like Civil 3D. Infracore can be used for preliminary research, importing, and exporting data from Civil 3D, Map 3D, GIS applications and additional software platforms. This makes Infracore an excellent resource for starting projects that do not have survey data to begin with. Various data sources can be integrated into the Infracore model

during the life cycle of the model as well. As a result, Infracore can create intelligent 3D project models that can be shared with design functional areas to create collaboration between MDT bureaus.

Autodesk Vehicle Tracking

The existing Swept Path Analysis software may be a redundant expense for MDT. Autodesk Vehicle Tracking will be a vital piece to the Traffic Operations Section future workflow. Not only does Autodesk Vehicle Tracking provide the ability to generate Swept Path Analysis in a user-friendly environment, built into Civil 3D, but it also has a vast library of vehicles included in it. Additionally, Autodesk Vehicle Tracking provides the ability to create custom vehicles and then allows those custom vehicles to be shared amongst the design team. Autodesk Vehicle Tracking also automates the process of roundabout design in a 3D environment and incorporates signing and striping standards as well.

BIM 360

The current data management system and procedures limit collaboration between design teams. The Autodesk cloud collaboration tool, BIM 360, will be a crucial piece to the Traffic Operations Section future workflow. Being able to share, review, and manage data in one centralized location will be a huge benefit. As part of the AEC Collection workflow, BIM 360 can consume Civil 3D data from the cloud in the same manner as if the data were stored locally, thereby improving collaboration between team members. Autodesk's BIM 360 provides access to data anywhere and anytime as well as design collaboration, project management and document management tools.

The following table outlines the Traffic Operations Section discipline's current activities, recommended Autodesk solutions, as well as additional solutions to be implemented.

Activity	Solutions	Additional Solutions(s)
Preliminary Investigation	InfraWorks	GIS, Google Earth
Preliminary Straight-Line Diagram (2D)	Civil 3D / AutoCAD	
Vehicle Turning Movements	Autodesk Vehicle Tracking	Transoft AutoTURN*
Traffic Counts	Pneumatic Tube Counters	
Traffic Data and Pedestrian Counts	Miovision and cameras	
Site Distance	Measuring Wheel	Electronic Measuring Devices
Speed Study	Houston Radar	
Traffic Capacity – Intersections	Sidra	HCS 2010, PT VISSM, Syncro 10
Print to PDF/Paper	Adobe	
Deliverables	BIM 360	

*Transoft solutions may not be needed. Workflow with Autodesk AEC solutions will need to be validated.

These solutions are the basis for the proposed training outlined in the Training Program section below.

TRAINING PROGRAM

U.S. CAD recommends the following training courses for the Traffic Operations Section staff.

- **101 AutoCAD Fundamentals for Bentley Users** – This course, intended to assist those who have utilized Bentley products and have limited or no Autodesk AutoCAD experience, is focused on basic interface and functions within the AutoCAD product.
- **201 Civil 3D Fundamentals I** – This course will introduce the Civil 3D user interface and terminology and provide an understanding of Parcels, Surfaces and Survey.
- **202 Civil 3D Fundamentals II** – This course continues creating the knowledge of Civil 3D features and their functions.
- **203 Civil 3D Fundamentals III** – This course delivers insight into Sections, Section Views, Templates, Styles, Data Shortcuts, Printing, Sheet Setup, Sheet Set Manager and Quantities.
- **601 InfraWorks I** – This course covers the steps on how to import and configure data from within InfraWorks and utilize available tools to create, leverage, and analyze design alternatives for 3D design concepts and visualizations.
- **301 BIM360 Collaborate Pro for Infrastructure I** - This course provides an overview of what the web- based collaboration tool has to offer and how it can be leveraged to collaborate with internal divisions, field personnel and consultants.

By exposing the Traffic Operations Section to the Autodesk software tools included in the list above, staff will have the knowledge needed for making informed decisions on what data is available and how to access it. Providing the Traffic Operations Section with tools to import, utilize and share data in their current workflows is key to removing existing inefficiencies and frustrations within the Section. It is equally important for the Traffic Operations Section to export data capable of being consumed by other MDT Bureaus.

NEXT STEPS

A Production Project will be identified by the MDT CAD Implementation Executive Team. A Production Project provides opportunity for MDT to refine proposed future MDT workflows, identify gaps, and give insight into configuration needs. This process has already led to the creation (and implementation) of the MDT State Kit. The State Kit was utilized on prior Pilot Projects giving deeper insight into how best to update and configure the solution. The Production Project will also provide insight into the requirements for additional content that needs to be included in MDT's State Kit as well as other key configuration elements that will help with production efficiencies.

The MDT CAD Implementation Executive Team have identified early adopters within each functional design area. U.S. CAD will work closely with the early adopters to develop workflow processes and procedures, as mentioned in our recommendations, to ensure their portion of the project can be completed utilizing Autodesk's AEC Collection. U.S. CAD will provide support and mentoring throughout the production project.

- During this phase additional "Fit Gaps" may be uncovered. If there are, additional training may be recommended.
- U.S. CAD and Autodesk will remain engaged with MDT to ensure successful implementation and Production Project completion.
- U.S. CAD and Autodesk will arrange regular meetings with MDT staff to assist them in attaining their goals and objectives.
- Upon completion of the Production Project, MDT to meet with U.S. CAD and Autodesk to explore expanded implementation options and identify the most effective path forward and to meet MDT's larger BIM goals.

In addition to the Production Project, Workflow Road Maps will be developed and presented to MDT. With several MDT Pilot Projects already completed, (or currently being executed) the process of refining the workflows based on MDT feedback can begin. The goal is to confirm workflows that will be included in the initial stages of the broader implementation and training at MDT. The Workflow Road Maps are important to gain clarity of the scope and schedule of the Training and Implementation requirements, as well as the configuration needs for MDT's state-wide rollout of the AEC Collection solution.