Confidential

Right-of-Way Bureau
Discovery Review Findings Summary

November 3, 2021

Prepared by:

Table of Contents

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Montana Department of Transportation
Right-of-Way Bureau
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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 Right-of-Way Bureau. 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 Right-of-Way Bureau 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 Right-of-Way Bureau.

Best Regards,

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EXECUTIVE SUMMARY

Montana Department of Transportation (MDT) enlisted U.S. CAD to gather information about your bureau and provide recommendations based on our experience and knowledge. Prior to U.S. CAD's Discovery Review Session, the Right-of-Way Bureau 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 Right-of-Way Bureau performs business, technologies currently used, required deliverables, existing pain points, the Right-of-Way Bureau 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:

- Survey deliverable workflow needs refinement.
- Unable to get a single source file of survey data (property corners, sections, right-of-way, etc.)
- Ownership sheet creation is cumbersome if parcel re-work is required.
- Right-of-way ownership sheets use antiquated processes making edits difficult.

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 did observe several immediate opportunities that would allow the Right-of-Way Bureau 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 Right-of-Way Bureau interacts with other internal MDT bureau's/departments, external agencies and consultants.

The Right-of-Way Bureau primarily focuses on acquiring land for highway projects, providing assistance and payments to impacted landowners and businesses, designs the required right-of-way, and arranges for utility relocations within the proposed right of way. The bureau obtains cadastral survey, land ownership records, title commitments, and as-built data for MDT highway projects to identify easement areas, right-of-way lines, and assist with cost estimates for land acquisition. Data sources utilized may include survey data, GIS data, As-Built plans Other sources of data include deeds, existing Certificates of Survey, and other legal documents, Google Earth, and DGN files for other functional design sections.

The Utilities Section of the Right-of-Way Bureau acts as the liaison between MDT and utility companies when these companies wish to locate utilities within the MDT right-of-way or when utilities require relocation or modification because of conflicts with MDT projects. The Utilities Section also provides assistance on issues and works directly with utility companies to determine relocation alignments and create agreements for cost sharing.

During the Discovery process, U.S. CAD was introduced to several staff members who are integral to the MDT Right-of-Way Bureau; David Hoerning, Linda Cline, Kate Lamping, Marla Rogers, and Bruce Masiak. These employees have immense knowledge and skills working within the Right-of-Way ecosystem. Their knowledge of the inner workings of MDT's Right-of-Way Bureau, 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 Right-of-Way Bureau staff create, consume, and share right-of-way related data with internal departments and external consultants, agencies, and the public. Some of the tools used by the Right-of-Way Bureau include: MicroStation, Trimble Business Center (TBC), GIS, Excel, and Google Imagery.

Some of the tools used by the Right-of-Way Bureau include:

Activity	Solution(s)	Additional Solution(s)
Preliminary Planning	MicroStation	Google Earth
Strip Map	MicroStation	GIS
Import Survey Data	MicroStation	
Preliminary Plans	MicroStation	
Ownership Map Information	MS Excel	MicroStation
Property Take Areas	MS Excel	MicroStation
Deliverables / Reports / Exhibits	Adobe (PDF), Microsoft Excel	DMS

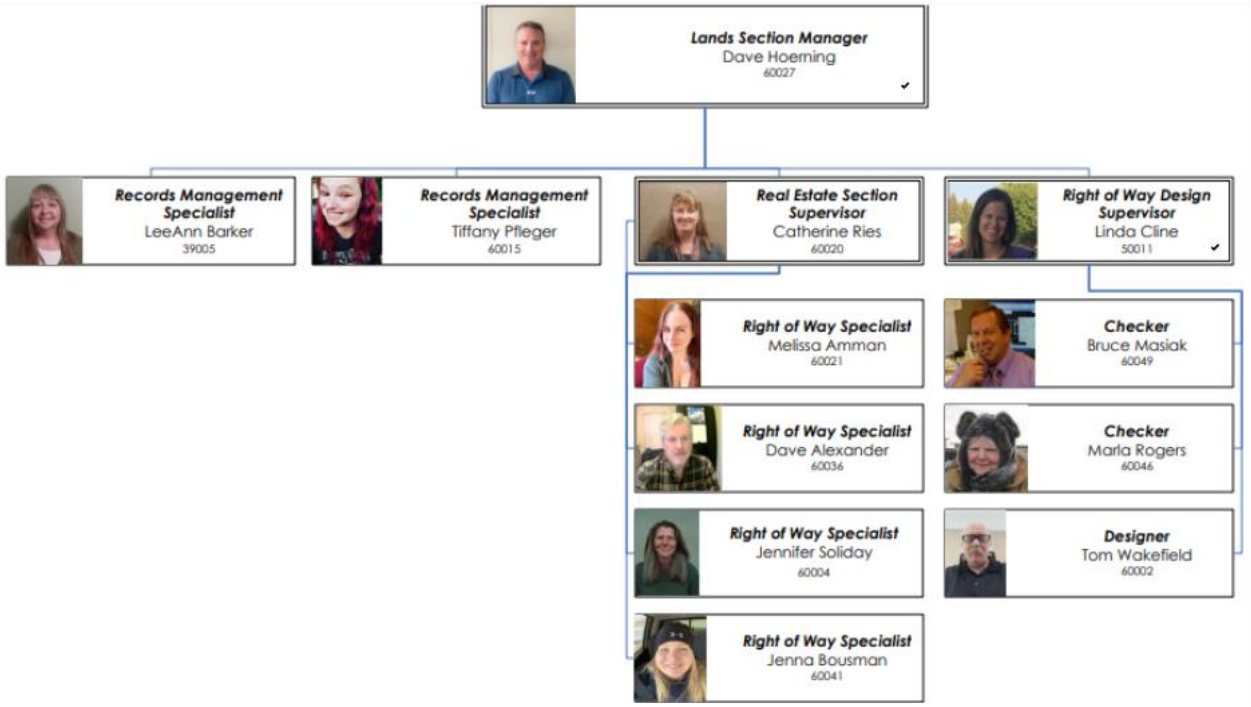
As-Built plans are also leveraged for existing data.

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

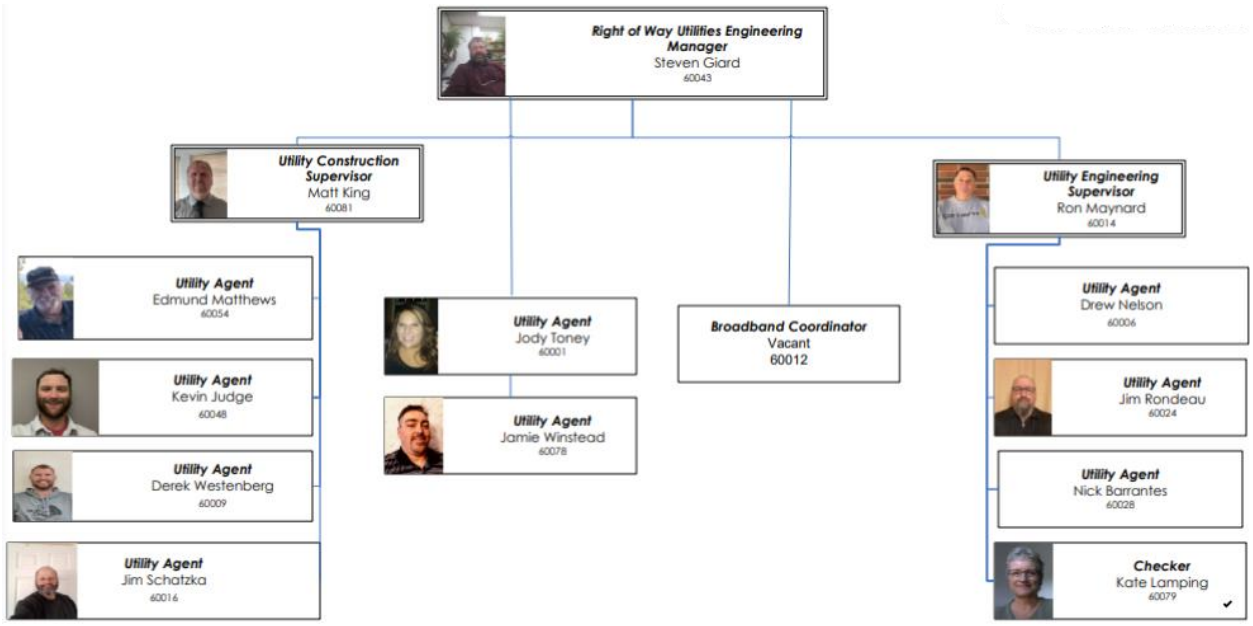
- Will the migration to the Autodesk applications be too slow or too fast?
- Are the applications more user friendly?
- Will the training be thorough so projects can be completed in a timely manner?
- Will there be documented processes and procedures?
- Will workflows involving Title Commitments, Area Files, and Ownership Sheets be improved?
- How are older projects, still active, going to be handled?

- Right-of-Way is an essential phase of projects and is always under a time constraint, will this continue to be the case?

Below is the Organizational Chart of the MDT Helena Right-of-Way Bureau supplied by MDT.



Below is the Organizational Chart of the MDT Helena Right-of-Way Bureau Utilities Section supplied by MDT.



RECOMMENDATIONS

Based on the information shared by the Right-of-Way Bureau through the through the Autodesk's Discovery process and U.S. CAD's Discovery Workshop, we have 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 the products included in the Autodesk AEC Collection in all relevant bureaus and having one localized set of standards for all MDT project data would provide easy access to all MDT sections and external entities if shared. The true intent of standardization would be to provide accurate and consistent data/plans for users to access and reduce the possibility of errors and omissions. The capabilities of the AEC Collection 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 the AEC Collection's products would reduce rework and provide for faster project turnaround, inherently improving the workflow for the Right-of-Way Bureau.

The current process of two dimensional only designing limits project analysis capabilities compared to the abundant analyzation potential offered in 3D modeling. Currently, the Right-of-Way Bureau's Geometric discipline does not utilize applications available in the Autodesk AEC Collection for analyzing and reporting quantity data and calculations. The Right-of-Way Bureau could, however, benefit from being made aware of the automated and collaboration tools available within the Autodesk AEC 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 Right-of-Way Bureau would be Civil 3D, Infraworks, Autodesk Vehicle Tracking and BIM 360. Specific capabilities for each software recommendation are listed below.

Civil 3D

As the crown jewel of the AEC Collection, 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 have to be updated 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 as a result of utilizing intelligent Civil objects that not only are inter-connected but also possess a rich collection of data.

Infraworks

Infraworks can be used for preliminary research, importing, and exporting data from Civil 3D, Map 3D, GIS applications and additional software platforms. This makes Infraworks an excellent resource for starting projects that do not have survey data to begin with. Various data sources can be integrated into the Infraworks model during the life cycle of the model as well. As a result, Infraworks 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 considered a vital piece to the Right-of-Way Bureau future workflow. Not only does Autodesk Vehicle Traffic 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 Right-of-Way Bureau 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 Right-of-Way Bureau current activities and recommended Autodesk (and other) solutions to be implemented. These solutions are the basis for the proposed Training Program outlined below.

Activity	Solution(s)	Additional Solution(s)
Preliminary Planning	Civil 3D	Google Earth, InfraWorks
Strip Map	Civil 3D	ArcGIS, ESRI
Import Survey Data	Civil 3D	
Preliminary Plans	Civil 3D	
Ownership Map Information	MS Excel	Civil 3D
Property Take Areas	MS Excel	Civil 3D
Deliverables / Reports / Exhibits	Adobe (PDF), Microsoft Excel	PCMS, Civil 3D

*Online Map Data – Free service available in Civil 3D and AutoCAD based products to display map imagery.

TRAINING PROGRAM

U.S. CAD recommends performing a high-level demonstration of the tools within the Autodesk products to the Right-of-Way Bureau to give them further insight on what file types can be imported and exported. With this knowledge U.S. CAD feels the Right-of-Way Bureau will have a better understanding of what the design departments' capabilities are. Topics may include consuming, leveraging, and delivering right-of-way and easement data. Topics may also include what types of data will be published to BIM 360 for the Right-of-Way Bureau's use.

By exposing the civil tools included in the Autodesk products, to all MDT bureaus, staff will have the knowledge needed for making informed decisions on what data is available and how to access it. Providing the Right-of-Way Bureau with tools to import survey, GIS, as-built, and other related data and utilize this data in their current workflows is key to removing existing inefficiencies and frustrations within the Bureau. It is equally important for the Bureau to export data capable of being consumed by the other MDT Bureaus.

U.S. CAD recommends the following training courses for the Right-of-Way Bureau 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.
- **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.
- **601 InfraWorks I** - This course covers the steps on how to import and configure data from within InfraWorks and utilize available tools to create and analyze design alternatives for 3D design concepts and visualizations.

Additional AEC collection software we feel MDT staff would benefit from:

- **120 AutoCAD Map 3D** - This course focuses on using GIS mapping functionality to bring together multiple data sources for concepts and design. Map 3D - For GIS data

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.