MDT has begun the process of transitioning to Civil Integrated Management (CIM). The intent of this document is to inform and engage those that are affected.

A Steering Committee within MDT comprised of representatives from Engineering, Maintenance, Planning, and ISD is leading this CIM Initiative within the agency. CIM includes the technologies and methods that facilitate the transition from traditional project delivery (2D paper plans and specifications) to 3D models and digital project delivery. The CIM transition uses high accuracy advanced survey methods, intelligent model-based design and paperless digital project delivery.

The use of Intelligent Models begins with high accuracy surveys. This information is used by design to develop 3D models that not only allow stakeholders to easily visualize our projects, but also allow the design team to identify issues and conflicts early in the design. Ultimately the Intelligent Model will become the binding contract for construction of select projects and the constructed 3D model will be included in MDT's asset management system.

Construction Engineering will incorporate the 3D models into their staking, quality assurance, and measurements. The constructed 3D model will become the "Model of Record" for future projects and asset inventory.

MDT has a long-term goal over the next five years to move the department's design efforts from 2D to 3D design. The driving force in moving to 3D design is the anticipated cost savings during construction and design advantages with visualization. FHWA also emphasized the use of 3D Models in their Every Day Counts (EDC-2 and EDC-3) initiatives.

First things first

MDT licenses its CADD software from Bentley Systems. All CADD users at MDT have received the newest version of Bentley software (SS4). *IMPORTANT: Bentley Systems SS4 release allows design staff to continue designing and reviewing files following our current 2D practices.*

In CADD/Design software terminology, the foundation on which 2D and 3D is built is the workspace. MDT roll out of SS4 will offer two different workspaces, ***Legacy*** and ***Enhanced***:

- The ***Legacy*** workspace is the workspace that MDT has been using for years, allows for design using GEOPAK Criteria design tools and is a lower resolution.
- The ***Enhanced*** workspace is MDT's new workspace, and enables use of OpenRoads 3D tools. This workspace is a higher resolution. Bentley software version SS4 is required to be able to use the Enhanced workspace.

Therefore, MDT's SS4 rollout is a software update that allows all users to access the Enhanced workspace; however, they still have access to the Legacy workspace that we have been using for years.

MDT has already designed several projects using the Enhanced workspace and OpenRoads 3D design tools. These test projects were used to verify that Bentley SS4 was ready for release within MDT. This testing proved Bentley SS4 was stable for both GEOPAK and OpenRoads.

Impact to Existing and Future Projects

A decision will need to be made for all projects (existing and future) regarding which workspace and design tools will be used for the project. MDT is encouraging use of the Enhanced workspace and OpenRoads 3D design tools for all projects. However, we recognize the transition from using traditional GEOPAK Criteria tools to OpenRoads 3D tools is not a transition that can be expected to happen overnight. It is recognized that a design team may not have the knowledge and ability, or the time in the project schedule, to learn new methods to design in OpenRoads 3D without GEOPAK Criteria. In these cases, it may be acceptable to design the project using GEOPAK Criteria; however, this decision should be carefully considered on a case by case basis, and must have approval from the Consultant Design Engineer. Additional guiding parameters in the decision process to use GEOPAK Criteria are that the project must have completed the Alignment & Grade Review (AGR) prior to April 2017, and the project must have a target letting of 2022 or earlier. Again, there may be exceptions, but all exceptions must be approved by the Consultant Design Engineer.

Some other items of note:

- There is high risk that Bentley may stop supporting GEOPAK Criteria by 2022.
- Coordination with the Project Manager, Consultant, FM's, Program Manager, District Preconstruction, and the CIM Roadway Design Team is critical in the workspace decision process.
- Identify the workspace in the next milestone report.
- Ensure all team members use the same workspace.

Projects with design files in both workspaces (for example, road design work is in Enhanced workspace and other functional areas' design work is in the Legacy workspace) must be put into one, consistent workspace (meaning someone will have to convert their files to the other workspace). It is very likely that additional quality controls measures will be needed. The Project Manager, Consultant, FM's, Program Manager, District Preconstruction, CIM Roadway Design Team members, and the MDT Preconstruction Engineer will discuss and determine the file delivery workspace. Because of the need for consistent workspace during design, it will be critical to ensure that the Consultant and all design areas are aware of the design workspace and agree to that workspace.

Design teams utilizing OpenRoads will be requested to share their experiences with CIM team members, so this information can be shared department wide.

Term Contract work

Something to consider in your firm's strategy regarding when you will upgrade to SS4 and when you will train staff in the use of OpenRoads is your involvement with term contracts. If a MDT-designed project is developed in the Enhanced workspace using OpenRoads 3D design tools and you are tasked with developing CADD files under a term assignment, you will be required to use SS4, the Enhanced workspace and OpenRoads 3D design tools for your deliverable.

Long-term impact to Design Consultants

MDT expects to be fully engaged in the Enhanced workspace with OpenRoads 3D tools by 2019. This means that by that time, the Enhanced workspace and use of OpenRoads 3D design tools will be required for all new projects (requiring use of SS4). We are sending this notice today so that your firm can develop a strategy for upgrading your design software to Bentley version SS4 and training of staff in OpenRoads 3D.

OpenRoads 3D Pilot Projects

MDT management will continue to select pilot projects for testing of the 3D workflow from Preconstruction through Construction. This 3D workflow should not be confused with simply developing a project using OpenRoads 3D design tools. Rather, it is a comprehensive workflow that involves all aspects of project development, bidding, and construction. All pilot projects will be selected as part of the CIM initiative. Pilot projects will be kept to a manageable number to reduce risk to overall project delivery. Pilot projects will be monitored to ensure best practices are captured, documented, and distributed. Additionally, pilot projects will identify software, design and production challenges, investigate and determine causes, and implement solutions for the benefit of the CIM initiative.
Pilot projects may be selected based on several considerations:

- Potential for substantial cost savings through Automated Machine Grading
- Inclusion of bridge work
- Benefits of visualizing multiple design features during design
    - For determining conflicts
    - For optimizing designs
    - For public information
- Willingness and ability of all designers on team to use the OpenRoads tools
- Flexible project design schedule that will allow additional time for learning and sharing

Summary

CIM Implementation will be an interactive and intentional process. Workspace selection will be thoroughly discussed with the Design Consultant and MDT staff for each project. It is not the intent of MDT to thrust a Design Consultant into utilizing the Enhanced workspace or 3D design tools prematurely, or before the Consultant has the knowledge or ability. At the same time, MDT is taking intentional steps in this implementation. Therefore, all Design Consultants should begin planning for this implementation, if they have not already.