3D Engineered Modeling Resource Information

Executive Summary

CDOT is now implementing 3D engineered modeling for construction initiative to be used on qualified projects. CDOT reserved the right to determine which projects are qualified and where on qualified projects AMG/AMC can and cannot be used on a project. CDOT retains the right to revert to traditional construction methods at any time, if accuracy or quality issues arise. The following are summary items covers project eligibility, conditions that exclude a project, a Design Bulletin that covers the, 3D modeling design considerations, and electronic deliverables including Data Types and Files Naming Conventions, the Construction Bulletins, and the survey requirements for the preliminary Topo Survey and construction.

Submittals Priority

CDOT will continue to provide the traditional 2D plan Set and Specification package as currently practiced in addition to the electronic data files for the 3D engineered model. Please note that the traditional 2D plan and specifications packages take precedence over the electronic data files for the 3D engineered model.

Project Eligibility/Limitation for 3D Engineered Modeling

If a project is going to include AMG then the decision will need to be made in the planning stage. Several states have evaluated the criteria for AMG to be included in a project. Below is a list of criteria:

1. Project needs to have a large amount of earthwork or paving
2. A new alignment
3. A good Global Navigation Satellite System (GNSS) available
4. and/or a design based on Digital Terrain Modeling (DTM)

Some conditions that limit or exclude the use of AMG are:

1. Widening with narrow strip additions
2. Designs, such as overlays, which are not based on an existing DTM
3. Designs that do not exist in a 3D digital environment. (Overlay, write-up job or projects without survey data needed
4. Structures

5. Intersections
6. Projects that are under a tree canopy, in narrow canyons, or next to tall building that interfere with GNSS signals. (This limitation only applies when GNSS is used to position equipment.)
7. Design difficulties that would prevent the creation of an accurate and complete DTM.

Design Specifications and Guidelines for the Development of 3D Engineered Models

A Design Bulletin has been developed that covers the 3D modeling design considerations, a link to the Quality Assurance document which serves as a guide to be used by the project team to carefully examine and perform quality checking on project data as the data is produced during each stage of the design phase of the project, the electronic deliverables including Data Types and Files Naming Conventions.

The following is the link to Design Bulletin:
https://www.codot.gov/business/designsupport/bulletins_manuals/design-bulletins/db-2016-4/view

Here is the link to the Quality Assurance document:
https://www.codot.gov/business/designsupport/cadd/cadd-workflows/v8i-ss2/wf-ir-18/view

Construction Bulletins

Section 625.11 of the Construction Manual has been added to address changes in construction due to CDOT providing three-dimensional modeling data to Contractors:

https://www.codot.gov/business/designsupport/bulletins_manuals/construction-bulletins/cb-2016-4/view

Here is the link to the Final Notebook and ProjectWise for Construction:

https://www.codot.gov/business/designsupport/bulletins_manuals/construction-bulletins/cb-2016-1/view

In addition, CDOT issued a new standard special provision, the Revision of Section 625, Construction Surveying. This new standard special provision should be used in conjunction with the revised project special provision worksheet, Revision of Section 102, Project Plans and Other Data.

Other Specifications to be considered during Bidding

1. The contractor is responsible for making the delivered files usable for his equipment. The contractor must supply the DOT with modified files prior to construction for review.
2. The contractor is responsible for locating underground utilities and other items so that they are not damaged in construction.
3. The contractor must supply equipment and training so that DOT inspectors/engineers can accurately monitor the progress of construction.
4. The contractor assumes the cost of any rework or time delays resulting from issues with AMG/AMC.
5. Any additional survey data collected by the contractor will be given to the DOT for review prior to use.