Purpose

This guidance describes project types where the use of two-dimensional/three-dimensional (2D/3D) modeling is appropriate and is likely to result in an overall project cost savings.

Background

Three dimensional modeling is the process by which wireframe models are created to represent three dimensional objects using MicroStation and/or InRoads software. These models contain points in space defined by X, Y, and Z coordinates which are interconnected by various geometric elements such as lines or curved surfaces. A combination 2D/3D model contains 2D features such as curbing or guide rail with the 3D portion consisting of the finished grade and original ground surfaces.

The Region has seen an increased use of stakeless survey and GPS controlled construction equipment as a result of providing 2D/3D models. These models can be used by both NYSDOT Construction staff and contractors. 2D/3D models do not replace or supersede the contract bid documents. The contract plans and proposal must continue to contain sufficient information to make clear the designer’s intent. For example, line and grade information must continue to be included in the plans even though constructing the project in accordance with the 2D/3D model would produce the same results. However, the level of detail on certain plan sheets can be significantly reduced when a complete 2D/3D model is provided.

Policy

Reconstruction Projects

2D/3D modeling should be used on all reconstruction projects in both urban and rural environments. Reconstruction projects usually include changes in line and grade, large amounts of earthwork, replacement of public and private utilities, new storm drainage systems and storm water management practices. This type of project can greatly benefit from the creation of a 2D/3D model for survey work performed by the contractor. There are also significant benefits to NYSDOT construction staff such as in locating and/or verifying positions, field quantity measurements and avoiding public/private utility conflicts.
The contractor can also use the 3D model surface with their construction equipment for earthwork and grading operations, which can result in substantially lower construction bids.

**Major Intersection and Roundabout Projects**

2D/3D modeling should be used on major intersection reconstruction and roundabout projects. These types of projects can greatly benefit from the creation of a 2D/3D model for survey layout due to a very tight work area, avoiding public and private utility conflicts and drainage design, which can result in substantially lower construction bids.

**3R Projects**

Consideration should be given for using 2D/3D modeling on 3R projects where the scope of work includes major reconstruction areas and/or major drainage work. 3R projects on the Interstate system are usually constructed by typical section where there are no major changes in the line and grade of the highway, so modeling is not required.

**2R Projects**

Consideration should be given for using 2D/3D modeling on 2R projects where the scope of work includes major reconstruction areas and/or major drainage work. 2R projects on the Interstate system are usually constructed by typical section where there are no major changes in the line and grade of the highway, so modeling is not required.

**1R Projects**

1R projects do not include any reconstruction and normally are not surveyed. 2D/3D modeling is not applicable.

**Bridge Projects**

Bridge projects should follow the guidance contained in the Bridge Manual.

**Work Order, Set-Aside and Element Specific Projects**

2D/3D modeling would not normally be used for Work Order, Set-Aside, or Element Specific project types due to the nature of work involved. These projects normally address very specific needs in isolated locations and are designed in a very short period of time. Therefore they normally don’t lend themselves to survey and mapping, making modeling non-applicable.

**In all cases, the project manager should discuss the benefit and cost of using a 2D/3D model for a particular project at the project scoping meeting.**

**Keywords:** Modeling, Survey, Scoping