Virtual Modeling for Traffic and Construction Visualization

FM2154 and George Bush Drive Intersection in College Station, Texas

The Project - Introduction

- An intersection of George Bush Drive with Wellborn Road (FM 2154) and the Union Pacific Railroad (UPRR) in College Station, Texas.
- Includes three modes of transportation - automobiles, trains, and pedestrians through the intersection.
- The project objectives are to enhance mobility, safety and reduce delays in this congested zone during peak hours.
- Kyle Field (Texas A&M University’s Football stadium) is in the northeast quadrant of the intersection.
- Construction of the intersection involves excavation of the existing grades to depress the mainlanes of the George Bush Drive and Wellborn road, and the construction of a railroad bridge over the depressed sections of the roadway while maintaining the existing tracks of the UPRR.
- The purpose of developing the virtual model is to visually present two construction sequencing alternatives to the stakeholders.

The Model - Building a Tool

- The 3-D model of the project is based on TxDOT’s preliminary design (schematics); consisting of a project layout, profile data and cross sections.
- The existing conditions were created using aerial photography and terrain data added to enhance visual and analytical performance.
- The 4-D model is built using conceptual schedules of the traffic control plans and construction sequencing of the two scenarios to illustrate the impacts on overall construction duration.
- Temporary work is included between phases to ensure smooth transitions; earthwork, temporary shoring, lane closures and expected traffic conditions.

The Solution - Building the Tool

- Visualization: Virtual model developed using schematics and conceptual phasing and construction sequencing. The virtual model allows for a clear illustration of the challenges.
- Construction Planning: The detailed construction sequencing of the project will benefit from this conceptual visualization. In addition, it allows for easy review of complex staging (bridge construction, earthwork and temporary structures) and identification of potential conflicts by the contractors.
- Communication: If 2-D plans are used to explain the complex phasing and sequencing, it can consume most of the attention span leaving little time for stakeholders to deliberate the benefits and downsides of each alternative. However, the concept-level virtual model allows for a quicker communication of the alternatives leaving more time to discuss the actual issues involved and arriving at a decision.

Project Facts

- Total Project Construction Cost: $25 million
- Total ROW Cost: $3-5 million
- FM 2347: 26,000 vehicles per day
- FM 2154: 23,000 vehicles per day
- UPRR: 25 - 30 trains per day

Perspective views showing traffic and work conditions during two different phases