

3D Models: Improving road design and construction with 3D

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Challenge	Deliver critical road, highway and bridge infrastructure on time and under budget
Solution	Use of 3D modeling and design technology in the project design and review phases
Benefit	Deliver transportation designs better and faster, and leverage technology for sustainability analysis and stakeholder review



The pending investments in our nation's transportation infrastructure will create jobs, improve our economic competitiveness, and create lasting national assets. However, if we leverage new technology in the design of these assets, these investments can also increase commitment to sustainability and deliver the critical highways, roads and bridges that this nation needs faster, cheaper and better than ever before.

Using 3D modeling and design technology will greatly improve the speed, accuracy and quality of road, highway and bridge projects

The civil engineering required in the transportation design process is inherently a three dimensional (3D) process. However, until now, this work is and has been done with antiquated 2D methods, which started with a drafting board and over the last 20 years moved to the PC, but still largely remained flat 2D files.

Technologies that enable the design of transportation in 3D exist today. 3D offers many advantages for projects. Inherent within the 3D design process is the capability to visualize the project in 3D at any stage in the design. As a result, errors and omissions are found early where they can be quickly corrected, and multiple "what if" design scenarios can be performed rapidly and associated cost impacts can be calculated in real time. By catching and correcting design errors upstream, program budgets can be extended; more construction is completed for the same investment.

3D Models are required to take advantage of automated machine guidance and analyze options that increase sustainability and green initiatives

3D models also supply GPS systems with accurate data to control earth moving equipment. This new approach is proven to reduce costs, improve the quality of construction and reduce potential for injury on transportation construction projects.

3D models are the most effective way to evaluate route planning for environmental impact analysis. Finding optimal alignment of roads in the landscape can minimize environment conflicts and the need for mitigation measures.

Finally, 3D models enable agencies to visually share program information with all stakeholders - greatly improving community relations and feedback, and increasing collaboration, transparency and accountability of the project team.

The U.S. National Institute of Standards and Technology assessment of 3D processes:

"A major benefit of 3D systems is the ability to capture existing conditions more rapidly and completely and with a higher level of detail than most traditional methods."

- *Reduced errors and rework*
- *Schedule reduction*
- *Increased accuracy in construction bids*
 - *Improved responsiveness to project changes*
- *Increased worker safety*
 - *3D is at times essential in understanding complex conditions.*

<http://www2.bfrl.nist.gov/projects/projcontain.asp?cc=8614110000>