

Reaping the Benefits of Civil Integrated Management



Image from NCHRP Report 831

In planning and designing the new Kosciuszko Bridge in New York City, New York State DOT took advantage of many innovative CIM practices, including extensive use of 3-D, 4-D, and 5-D modeling.

REAL-WORLD NEED

Over the past 30 years, transportation agencies have increasingly relied on computers to help design, construct, and manage transportation infrastructure. This includes collecting, organizing, and applying digital data relating to highways, bridges, and other transportation assets. As a group, such practices are referred to as civil integrated management (CIM). (Similar practices are used in vertical construction, where they are referred to as building information modeling, or BIM.) In the past, agencies conducting CIM activities often relied on two-dimensional drawings, printed specifications, traditional surveying methods, and spreadsheets. But with technological advances, practice has evolved toward collecting digital data with more sophisticated tools and using those data in a wide variety of applications. Tools include GPS and lidar; applications include automated machine guidance of construction equipment, 3-D modeling of complex construction strategies, and asset management. However, CIM is not yet widely used in transportation projects, and its benefits and costs are not yet widely understood. Transportation agencies still stand to realize significant benefits by increasing their use of CIM.

RESEARCH SOLUTION

Researchers produced a comprehensive guide to help agencies implement CIM technologies as part of their project delivery processes. Adopting CIM tools can help agencies better estimate and control costs, more efficiently manage job sites, and increase the quality of transportation infrastructure.

NEXT STEPS Put It into Practice

ASSESS

Use the guide's maturity model to assess your agency's state of practice and determine the steps required to move to the next phase of CIM implementation.

PLAN

Develop a CIM implementation plan that balances functional needs and business requirements. Based on the plan, evaluate your agency's investment needs and the potential benefits of implementing CIM.

REVIEW

Review the case studies and lessons learned that are presented in the guide, and document new lessons learned through your agency's implementation efforts.

PARTNER

Apply for NCHRP implementation funding. See trb.org/nchrp.

About the Research

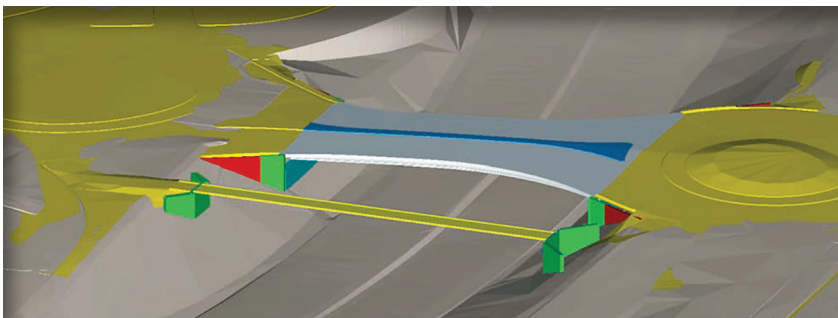
RESEARCH STRATEGY

Researchers began by conducting a detailed literature review and two nationwide surveys to determine the current state of CIM practice within transportation agencies and understand what kinds of CIM tools agencies are using. The researchers also developed seven case studies of transportation projects to provide an in-depth understanding of the steps involved in integrating CIM with project work processes. Finally, they analyzed those case studies for lessons learned and developed guidance for transportation agency staff on effective methods of adopting CIM practices and expanding their use.

WHAT WE LEARNED WHY IT MATTERS

Researchers produced a comprehensive guide that includes a three-stage framework to (1) help agencies assess their current level of CIM practice and their functional needs, (2) prioritize their decisions about future investments in CIM tools, and (3) implement CIM technologies as part of their project delivery processes. The guide is designed to meet the needs of an implementation team with representatives from multiple agency disciplines and levels and can help senior managers, in particular, identify opportunities and strategies for implementing CIM for project delivery and asset management.

The guide is designed to form the basis for widespread implementation of CIM in transportation agencies nationwide. Implementing CIM can help agencies better estimate and control costs, better manage job sites, and increase the quality of their products. Designers and facility managers benefit from the increased ability to avoid conflicts between facility components and ensure that specifications are correct and adhered to in the field. CIM also helps integrate facility design, construction, operation, and maintenance to provide accurate and reliable information throughout an asset's life cycle.



Use of 3-D modeling for the Pecos Bridge in Colorado helped contractors discover during the project's planning phase that the bridge was approximately 3 inches higher than the proposed roadway profile.

Image from NCHRP Report 831

RESOURCES



Image from NCHRP Report 831

NCHRP PROJECT 10-96

FINAL PRODUCTS

NCHRP Report 831: Civil Integrated Management (CIM) for Departments of Transportation

Volume 1: Guidebook

trb.org/Main/Blurbs/174318.aspx

Volume 2: Research Report

trb.org/Main/Blurbs/174321.aspx

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ADDITIONAL RESOURCES

TRB webinar

trb.org/ElectronicSessions/Blurbs/175789.aspx

NCHRP Domestic Scan 13-02, *Advances in Civil Integrated Management*
domesticscan.org/13-02-advances-in-civil-integrated-management-cim

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