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CALTRANS DIVISION OF RESEARCH, INNOVATION AND SYSTEM INFORMATION

TRANSFORMING IDEAS INTO SOLUTIONS

Research Notes

Building Information Modeling (BIM) for Bridges and Structures – Phase II [TPF-5(523)]

Advancing OpenBIM standards for enhanced efficiency and collaboration in bridge lifecycle management.

Geotechnical / Structures

November 2025

Project Title:

Building Information Modeling (BIM) for Bridges and Structures – Phase II [TPF-5(523)]

Task Number: 4398

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Completion Date: January 31, 2029

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WHAT IS THE NEED?

Building information modeling (BIM) is a process supported by various tools that generate and manage digital representations of physical and functional characteristics of buildings and other physical assets. It has been widely used in the commercial sector and vertical construction to manage projects from conception through design, fabrication, construction, and future maintenance.

Although some fabricators who perform work on both vertical construction and transportation structures have begun employing BIM tools in the fabrication of bridge components, their use in transportation infrastructure is limited due to the lack of standardization. To take advantage of the efficiencies associated with the use of BIM in transportation structures, a comprehensive strategic plan by The American Association of State Highway Transportation Officials (AASHTO) is needed.

The AASHTO Committee on Bridges and Structures (AASHTO COBS) has been working on a comprehensive plan to advance the use of BIM specific to bridges and structures. In 2017, TPF-5(372) BIM for Bridges and Structures project provided the primary funding mechanism for developing the foundational elements to implement openBIM data standards to support BIM for Bridges and Structures nationwide. While the progress was significant, there are many other needs that still need to be addressed to facilitate the use of model-based data exchanges to support the bridge asset lifecycle.

WHAT ARE WE DOING?

Major tasks in this scope of work include:

- Developing national standards for data definitions, requirements, and validation tools for the bridge life cycle

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for multiple data exchanges for transportation bridges and structures based on the BIM usage as prioritized under TPF-5(372).

- Developing training materials to continue deployment of the outcomes from TPF-5(372) and additional data standards developed under this project.
- Providing technical support, organizing training workshops, and facilitating pilot projects for bridge owners to encourage and accelerate the adoption of BIM for Bridges and Structures.
- Assisting AASHTO members in their collaboration efforts with the AASHTO Joint Subcommittee on Data Standardization, FHWA, the Transportation Research Board, and other transportation pooled funds.
- Collaborating with buildingSMART and software vendors.
- Collecting and quantifying the benefits of using the Industry Foundation Classes (IFC) standard.
- Exploring technology or tools to enable secure mechanisms for signing and sealing model-based deliverables.
- Conducting a literature search on contractual provisions for digital model-based delivery and developing recommendations for a national framework.
- Investigating opportunities to improve existing workflows to leverage model exchanges for the bridge lifecycle.

WHAT IS OUR GOAL?

This pooled fund project will provide the primary mechanism for AASHTO COBS T-19 to expand and refine the outcomes of TPF-5(372) and developing additional guide specifications for openBIM national data standards to support model-based exchanges of workhorse bridges.

WHAT IS THE BENEFIT?

The California Department of Transportation (Caltrans) stands to benefit from this project through the adoption of standardized BIM processes that promise increased efficiency and consistency across transportation infrastructure projects. By participating in the development and deployment of national standards and receiving enhanced training materials, Caltrans can improve its project management and execution. Additionally, the project fosters advanced technology adoption and stronger collaboration with key stakeholders, ultimately leading to more effective planning, reduced costs, and better overall outcomes for infrastructure projects.

WHAT IS THE PROGRESS TO DATE?

The project finalized the Methodology for Open Data Standard Development and the Exchange Prioritization Technical Memorandum and continued coordination with buildingSMART and SBI to maintain alignment with industry standards. OpenBIM development progressed through updates to the US Bridge IFC mapping and data dictionary, and preparation of templates to support additional exchanges. State Department of Transportation (DOT) pilot support advanced with finalized training outlines and ongoing coordination on applying prior outcomes. External collaboration expanded through engagement with the National Concrete Bridge Council and the FHWA Digital Delivery Stakeholder Group and initial formation of an Industry Advisory Group and Technical Working Group. The research team also presented a project update to the AASHTO COBS Technology Committee and contributed to BIM Week planning efforts.