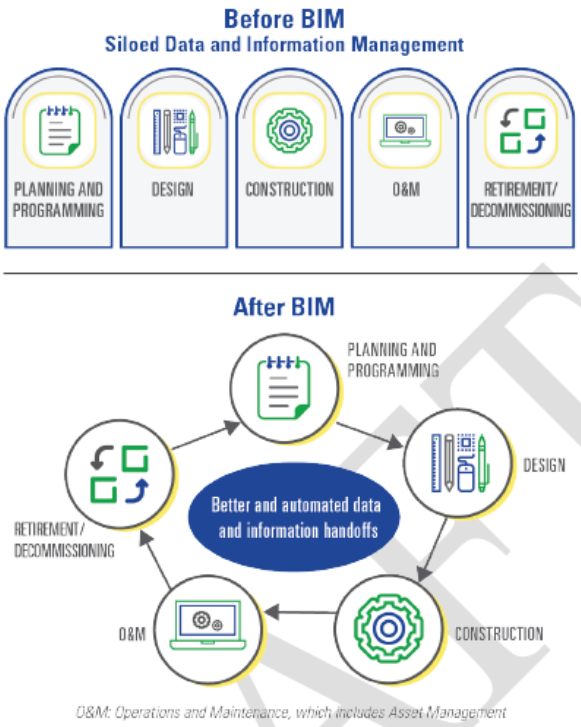
BIM for Infrastructure Pooled Fund Proposal

Background:

Building Information Modeling (BIM) for Infrastructure is moving transportation into the 21st century.

BIM for Infrastructure is a collaborative work method for structuring, managing, and using an agency's enterprise-wide data and information for transportation assets throughout their life cycles. BIM integrates and leverages digital information found in lidar/UAS surveys, 3D design models, eConstruction data, georeferenced assets and eventually GIS, to bring profound improvements for project delivery and lifecycle data management. The data capabilities are envisioned to better connect the silos within our agencies towards greater collaboration and real-time, fact-based decision-making in managing our highway assets. BIM is about "liberating" data from siloed systems and making it available in an automated way to anyone who needs it when they need it.



Various studies indicate the tangible benefits from BIM's 'digitalization' of our highway program delivery and performance management are substantial. The way we plan, design, construct and manage the highway system can harness the power of data and information to increase efficiency. A European Union (EU) study has suggested savings and other economic benefits in the order of billions,

which is why many countries have adopted BIM standards and are working more aggressively to deploy BIM practices.

FHWA has invested over $35M on initial BIM-related studies and deployment via research and Every Day Counts. FHWA is currently collaborating with AASHTO and other stakeholders to adopt a national data standard that will provide for more seamless data exchange across the many digital applications used in delivering and managing our highway assets.

BIM deployment is at a tipping point in the U.S. and now requires a more concerted and strategic approach among the stakeholders to realize its full potential faster and keep U.S. productivity and competitiveness strong. With that in mind, FHWA has developed a National Strategic Work Plan (NSWP) for BIM implementation to assist in the advancement of a more concerted and effective U.S.-wide deployment by all stakeholders. The NSWP proposes key implementation activities that could be carried out over the next 10 years to guide FHWA, State DOTs, and their industry partners toward the goal of increasing BIM for Infrastructure maturity and growth nationwide, while maximizing returns on investment. This pooled fund serves as a mechanism for stakeholders to work collaboratively to advance the activities that were charted out in the NSWP as well as to collectively address needs as they arise.

At the end of 10 years, the NSWP envisions that:

- State DOTs, in cooperation with their external partners, will have mature BIM processes and trained and skilled personnel who use open data standards; information exchange specifications; and digital workflows to collaborate with each other to create, collect, store, process, share, analyze and autonomously exchange data and information across a large number of key systems of record including planning, programming, survey, design, engineering analysis, construction management, asset/maintenance management, GIS, and linear referencing.
- The data created and/or updated in these systems of record will be used in enterprise-level information models that are designed using open standards and managed in a centralized common data environment.
- State DOTs and their external partners can deploy people, processes, policies, tools, and technology systems to: (a) ensure that the enterprise information models grow incrementally as additional data becomes available with each subsequent asset life-cycle phase, (b) minimize data loss to the enterprise information models by federating internal and external systems of record with the common data environment, and (c) maximize efficiency and productivity across all capital improvement, asset operations, and maintenance projects.

BIM promises big rewards in terms of lower costs for design and construction, fewer cost and schedule overruns and change orders in construction, lower data collection costs, and better quality information to support decisions in asset management. However, BIM is not without its share of challenges, including organizational change management to consider data as a shared responsibility, lack of standards for information modelling and exchange, lack of funding to overhaul Information Technology (IT) processes, workforce training to upskill personnel to handle data, and performance and reputation risks for implementing organizations from unmet expectations. Therefore, a carefully coordinated sequence of "Crawl, Walk, Run, Fly" activities should be followed to attain the desired benefits in a consistent manner.

The NSWP articulates an incremental set of foundational, developmental, and deployment these activities under three distinct phases of work—short-term or "early pilot projects" phase (Year 0 to Year 2), medium-term or "extended pilot" phase (Year 2 to Year 5), and long-term or "mainstreaming" phase (Year 5 to Year 10). Each phase looks to grow the maturity of BIM, and the activities outline a pathway to defray risks and maximize benefits. As the program of activities is carried out, the NSWP and the recommended activities will need to be reviewed, updated, and enhanced periodically based on lessons learned and other BIM-enabling activities in the industry, such as standards, tools and technology development. Members of the pooled fund will update the strategic activities to meet their collective needs.

Objectives:

The pooled fund serves as the mechanism for stakeholders to work collaboratively to advance BIM for Infrastructure. This will involve building off the foundational work that was charted out in the BIM National Strategic Work Plan, with emphasis on increasing coordination and awareness of BIM technologies and activities.

Note: This pooled fund will be coordinated with the efforts of TPF-5(372), "Building Information Modeling (BIM) for Bridges and Structures." TPF-5(372) is focused on advancing bridge data standards and building consensus to advance the use of digital bridge models based on open standards. This BIM for Infrastructure pooled fund is focused on the broader BIM vision of integrating data across various highway assets and business processes. Rather than expanding participation in TPF-5(372) to other disciplines and dilute its bridge focus, this cross-cutting pooled fund is being established and it will be coordinated with TPF-5(372).

Scope of Work:

Activities that advance the short and medium term goals of the BIM National Strategic Work Plan will be prioritized and carried out by the pooled fund participants. Meetings will serve as a forum to facilitate knowledge sharing among participants. Proposed activities include:

- **Develop BIM foundational use cases and workflows.** Highlight more effective digital exchange of information (e.g. survey to design, design to construction, construction to asset management, etc.). This kind of exchange will increase collaboration and automation, reduce duplication of effort and avoid errors.
- **Establish BIM Processes** (e.g. Develop contract model language to guide BIM procurements.)
- **Identify and Execute Capacity-Building Activities** (e.g. Establish project selection criteria for BIM implementation; Identify project types and use cases for early pilot projects phase).
- **Enhance Skills and Collaboration** (e.g. Establish workforce training curriculum to set expectations about required BIM qualifications. Understand organizational roles and responsibilities to connect data silos).
- **Deploy Standards-Based Data Management Tools and Techniques** (e.g. Develop catalog of information model requirements to define what data should be created and why. Develop standard information delivery specifications for data exchange between systems).
- **Lessons Learned -** Identify issues with current implementation efforts and share potential solutions to help move toward to greater BIM maturity.
- **Research Priorities** - Identify short-term and long-term research needs and strategically prioritize the needs so the most urgent and impactful opportunities are addressed first.
- **Information Exchange** - Establish a forum/expert hub for practitioners in the highway industry to understand the various tools and technologies being used, promote the common modeling formats and share experiences.