3D Models as Legal Documents and Open Data Standards: Paving the Way Forward to Digital Delivery

Thursday, December 2, 2021

1 Transportation Industry Drivers

2 AASHTO Updates

3 Moving to Digital Delivery and Model as the Legal Document

4 Other Considerations

5 Key Takeaways
Benefits of BIM

• Stakeholder Benefits
  • Improved collaboration through visualization
  • Better assessment of concept alternatives

• Project Benefits
  • Increased quality
  • Decreased change orders

• Agency Benefits
  • Better access to the right information
  • Improved staff recruitment and retention

AASHTO Updates —

• Joint Technical Committee on Electronic Engineering Standards

• IFC Adoption

• Transportation Pooled Funds

12/02/2021 3D Models as Legal Documents and Open Data Standards: Paving the Way Forward to Digital Delivery (IHEEP)
Joint Technical Committee on Electronic Engineering Standards (JCTEES)

STATE / FEDERAL TRANSPORTATION AGENCIES
- FHWA
- AASHTO
- Iowa DOT
- Tennessee DOT
- Arizona DOT
- Connecticut DOT
- Florida DOT
- Georgia DOT
- Maine DOT
- Michigan DOT
- Nebraska DOT
- New Hampshire DOT
- North Carolina DOT
- Pennsylvania DOT
- Texas DOT
- Utah DOT
- Vermont DOT
- Virginia DOT

OTHER STAKEHOLDERS
- ACEC
- AGC

CONSULTANTS
- HDR
- Mead & Hunt

VENDORS
- Autodesk
- Bentley Systems
- Trimble Inc.

Focus Areas - JTCEES

Maturity Model
Level of Development
Model as the Legal Document
Asset Management
Webinars
Level of Development (LOD)

- LOD Definitions
- Level of Accuracy
- Level of Information
- Use Cases

Digital Delivery Requirements including LOD

Model Element Breakdown (MEB) Framework

Incorporate New Ideas

ACEC Coordination

- LOD
- Authorized Uses
- Limitations
- Contractual Deliverable or FIO

- States
- FHWA
- Research
- bSI and ISO
- NIBS
- Other

AASHTO Updates -

- Joint Technical Committee on Electronic Engineering Standards
- **IFC Adoption**
- Transportation Pooled Funds
AASHTO Adoption of IFC

• In October 2019, the Joint Technical Committee on Electronic Engineering Standards introduced a resolution to adopt IFC as the standard for State Departments of Transportation.
• The resolution passed unanimously with the following provisions;
  • Resolved, That the AASHTO Board of Directors recommends the adoption of IFC Schema as the national standard for AASHTO States;
  • Resolved, That an internal, cross-committee, multi-disciplined group within AASHTO should be formed to coordinate schema development, identify gaps, resolve any conflicts, and avoid duplication of efforts; and
  • Resolved, That possible AASHTO membership in buildingSMART International should be investigated to provide representation and participation for the state DOTs in schema development.

AASHTO Data Standardization for Infrastructure Committee

• Bridges and Structures
• Design
• Construction
• Data Management and Analytics
• AASHTOWare
• Stakeholders
AASHTO Updates -
- Joint Technical Committee on Electronic Engineering Standards
- IFC Adoption
- Transportation Pooled Funds

BIM for Bridges and Structures Pooled Fund
- National initiative to establish a software standard that will allow stakeholders in the US bridge industry to share 3D models and other data in an open, non-proprietary format
- Timeframe 2018-2023
BIM for Infrastructure Pooled Fund – TPF-5(480)

AGENCIES COMMITTED TO DATE
- Iowa DOT (Lead State)
- FHWA
- Arizona DOT
- Caltrans
- Florida DOT
- Indiana DOT
- Kentucky Transportation Cabinet
- Michigan DOT
- Montana DOT
- Nebraska DOT
- New York State DOT
- Pennsylvania DOT
- South Carolina DOT
- Texas DOT
- Utah DOT

PRELIMINARY SCOPE OF WORK
- Develop BIM use case and workflows
- Establish BIM processes
- Enhance skills and collaboration
- Deploy data management tool and technique
- Information exchange

Other National & International BIM Efforts

FHWA
- Research Projects
- EDC-6: e-Ticketing and Digital As-Builts
- Advancing BIM for Infrastructure – National Strategic Roadmap
- Global Benchmarking Program Report
- Lifecycle BIM for Infrastructure: Making the Business Case

buildingSMART International
- IFC Infra Extensions Projects (Road, Ports, Bridges)

American Road and Transportation Builders Association (ARTBA)
- Innovation and Technology Forum
- Digital Construction Policy Statement

National Institute of Building Sciences (NIBS)
- U.S. National BIM Program Steering Committee
- AASHTO, FHWA, and several consultants are part of 13 committee members
- Goal - Enable digital processes that will streamline industry practices and procedures on a national scale
Moving to Digital Delivery and Model as the Legal Document

Model Based Digital Delivery

Bridge and Roadway Pilot Projects

Legend
- Bridge and Roadway Pilots
Model Based Digital Delivery

Model as the Legal Document

How did we get here?

• Engineers Drafting => Professional Drafters
• 1st Generation CADD => CAD in paper format
• 2nd Generation CAD with .pdf delivery
• Contractors building models with plan sets => provided files
• EConstruction
• The beginning of the Data Revolution
DATA REVOLUTION AND MALD
Where are we going?

- Building a repeatable digital process from design to construction that replaces the traditional plan set and using the MALD
- Developing a digital as-built workflow
- And building a Digital Twin as a repository as the ultimate vision
- BUT
- Today is about using model-based delivery in design and construction

Q&A: Are you doing Model as the Legal Document?

a. Yes, we are doing this today
b. We are planning to do this within 2 years
c. Not sure
d. No, we have no plans to do this
Partners and National Interest

- **AID Grant**: Large team of consultants & contractors
  - Kimley-Horn, Horrocks, HDR, Avenue, Lochner, Michael Baker, WW Clyde, Wadsworth
- **DD of MBDC Committee**: UDOT, Consultants and Contractors
- **Vendor Involvement**: Bentley, Autodesk, Esri, Trimble, Bluebeam
- Model Development Standards Manual (MDSM) and Research Report produced by HDR and Fair Cape Consulting
- **EDC-6 Involvement/DABs workflow established**
Resources for Repeatability

digitaldelivery.udot.utah.gov

Vision for the Future
CONSTRUCTION & REVIEW TOOLS: Current Pilots

Bentley Synchro

Bentley iTwin Review

CONSTRUCTION & REVIEW TOOLS: Current Pilots

Esri: Uplan

Esri: Collector
CONSTRUCTION & REVIEW TOOLS: 2021 Pilots

- www.autodesk.com/bim-360
- sitevision.trimble.com/urban-transporation-planning

CONSTRUCTION & REVIEW TOOLS: Challenges

- Tools are still in their infancy, even at 2nd generation
- Do not meet all needs
  - 3D & Disconnected
  - Volume calculations
  - Data integration
- Crew are being asked to test multiple tools
- Cost and Licensing for new tools is unclear
FOR MORE INFORMATION:

digitaldelivery.UDOT.Utah.gov

04 Other Considerations
Digital Construction is defined as commercially proven digital technologies and processes for management of construction and engineering activities, including systems for infrastructure project procurement, planning and coordination, construction, digital as-builts, e-Ticketing, operations and maintenance, modernization and management, asset management systems for machines, site equipment, and personnel.

Digital construction technologies will provide mechanisms and processes to decrease and more properly allocate project risk, reduce schedule uncertainty, increase productivity and efficiency, lower cost, and deliver safer, higher quality, and environmentally sustainable infrastructure projects.

In order to accelerate innovation in the U.S. transportation design and construction industry, ARTBA supports the adoption of open data standards, the model as the legal document (MALD), and modern, commercially-proven, and competitively acquired digital construction technologies and processes for infrastructure projects.

Digital Construction Policy Statement – May 2021

ACEC – AASHTO JTCEES Involvement

ACTIVE PARTICIPATION
- JTCEES – Actively Engaged – Meetings / Calls

ACEC MEMO TO JTCEES – CONCERNS / INPUT
- ACEC Foundational Principles / Key Concerns
- Digital Delivery Requirements including LOD
  - LOD Definitions
  - Level of Accuracy
  - Use Cases
- Model Element Breakdown Framework
  - LOD
  - Authorized Uses
  - Limitations
  - Contractual Deliverable or FIO
05 Key Takeaways

- Assess your current status
- Set a goal with your leadership
- Plan your next steps
- Identify your champions
- Learn from others
- Ask for help
- Embrace open data standards
Questions & Answers

More Information

GEORGE LUKES
UTAH DOT
State Design and Standards Engineer
glukes@utah.gov

WILL SHARP
HDR
Director of Highways
Will.Sharp@hdrinc.com
Get Involved

- National BIM for Infrastructure Webinars - [www.heep.org/BIMis.html](http://www.heep.org/BIMis.html)
- JTC EES Webinars - [https://design.transportation.org/technical-committees/electronic-engineering-data/](https://design.transportation.org/technical-committees/electronic-engineering-data/)
- BIM for Infrastructure Pooled Fund - [https://www.pooledfund.org/Details/Solicitation/1547](https://www.pooledfund.org/Details/Solicitation/1547)
- TPF BIM for Bridges and Structures Pooled Fund - [https://www.bimforbridgesus.com/](https://www.bimforbridgesus.com/)
- buildingSMART USA - [www.buildingSMARTusa.org](http://www.buildingSMARTusa.org)
- TRB AED80(1) – BIM for Infrastructure Sub-Committee - [www.trbviz.org](http://www.trbviz.org)
JTCEES Webinar Series

FUTURE WEBINARS (PLANNED SOON – CHECK LINK BELOW)

- Preparing Your Agency for Digital Delivery
- Lifecycle BIM for Infrastructure - A Business Case for Project Delivery and Asset Management
- BIM Global Benchmarking Scan Trip
- US National BIM Program Steering Committee

Link - https://design.transportation.org/technical-committees/electronic-engineering-data/

BIM for Infrastructure Webinar Series

- Quarterly Webinars Planned
- Webinars to Date
  - Using Model Based Delivery in Design & Construction
  - Moving Your Agency to Digital Delivery
  - National Updates and Model Development Standards

Link - http://www.leep.org/BIMis.html
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