

3D Engineered Models Deployment Status

Efficiency through technology and collaboration



Photo credits (L to R): banner- FHWA, Parsons Brinckerhoff, NCHRP, Caltrans



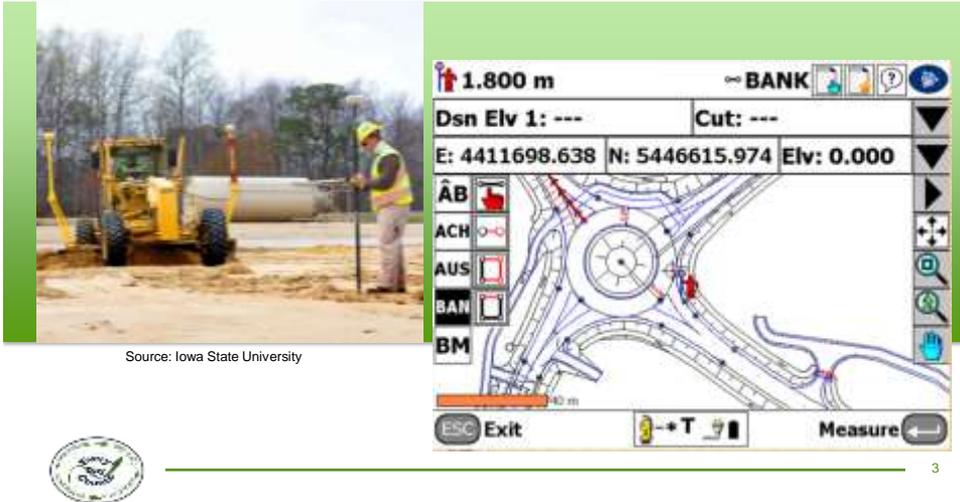
3D Engineered Models for Construction

Summary of EDC-2 3D Modeling Effort Survey



3D Engineered Models for Construction

Using the Model in the Field: Layout



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Using the Model in the Field: AMG



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Using the Model in the Field: Quality Assurance

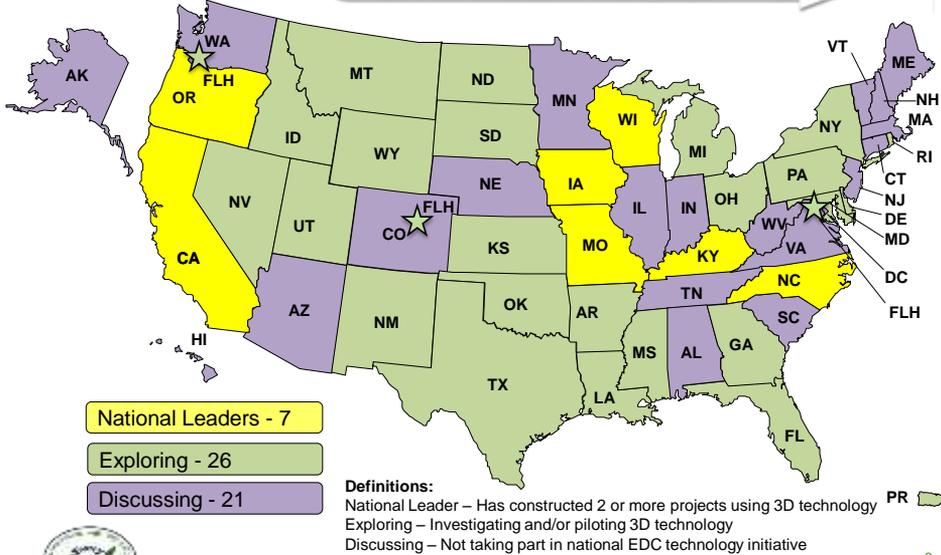


Source: North Carolina DOT

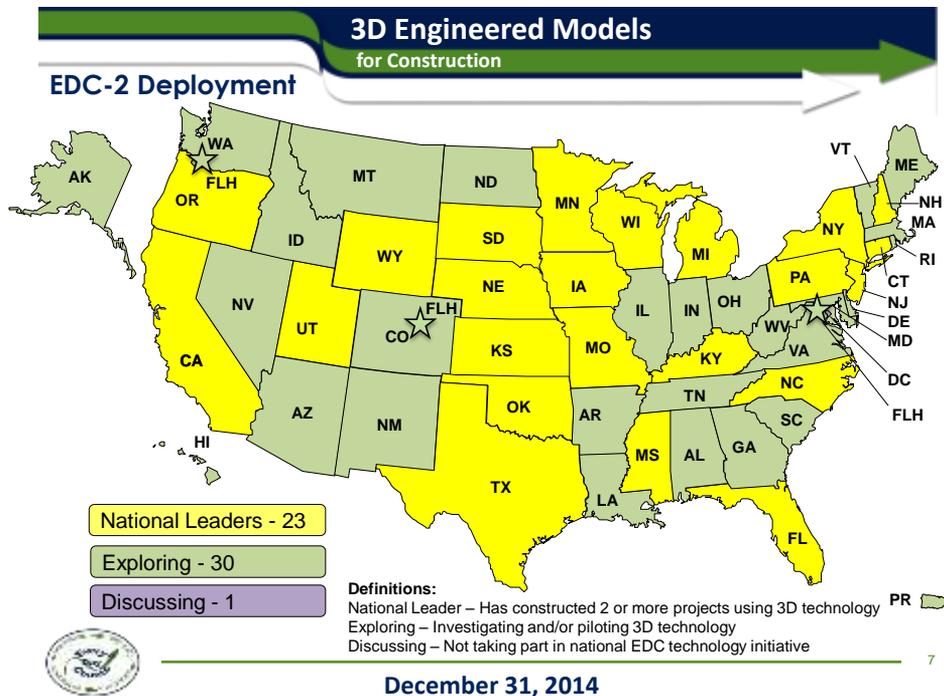


3D Engineered Models for Construction

EDC-2 Deployment



January 1, 2013



3D Engineered Models for Construction

Key Takeaways from EDC2:

- USDOT/FHWA is tasked by MAP-21 to provide national leadership with 'advanced modeling technologies'
- The U.S. Highway Industry is reaching a tipping point with digital project delivery
- Gaps still exist in project delivery implementation procedures and technology, which are rapidly being addressed
- Federal funding is available to advance this type of innovation



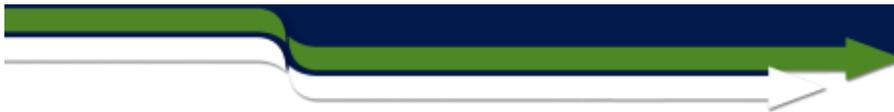


Widespread Successful Practices

- Collection of existing conditions using LiDAR
- State provision of CORS/RTK networks
- Development/use of 3D models as norm in design
- Provision of 3D models to contractors post award
- Contractors development and use of 3D models – AMG and beyond
- Understanding of how 3D modeling affects cost



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Gaps in Implementation

- **Overall implementation planning/change management**
- **Training** – Designers and Inspectors
- **Survey** - Pre-design survey standards that consider downstream/lifecycle needs and accuracy requirements
- **Design** - More effective model development and uses during planning and design. Clarifying design model deliverables. Model QA.
- **Bidding/Contracting** - Effective data exchange with contractors during bidding – 'hand-off package'. Digital sign and seal of 3D models and use of the model as the contract document. Clarifying legal liabilities in providing model data to contractor.
- **Construction** - Development of good construction specifications. Owners ability to perform construction QA. Contractors provision of as-built data, especially for utilities.



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3D Engineered Models:

Schedule, Cost and Post-Construction

Summary of EDC-3 3D Technologies

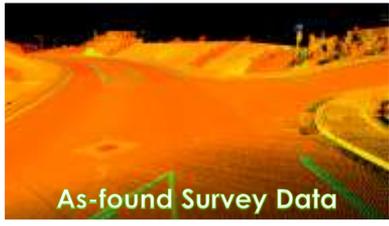


Image Sources: Walsh, Caltrans, FHWA

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3D Engineered Models:

Schedule, Cost and Post-Construction

4D and 5D Modeling



Task Name	Duration	Start	01 May 11							
			T	F	S	M	T	W	T	F
Project	19.47 days	5/6/2011								
Start	0 day	6/6/2011								
Task A	4 days	6/6/2011								
Task B	5.3 days	6/6/2011								
Task C	6.16 days	6/12/2011								
Task D	8.32 days	6/12/2011								
Task E	8.16 days	6/19/2011								
Task F	4.8 days	6/20/2011								
Task G	8.16 days	6/20/2011								
Finish	0 day	6/25/2011								

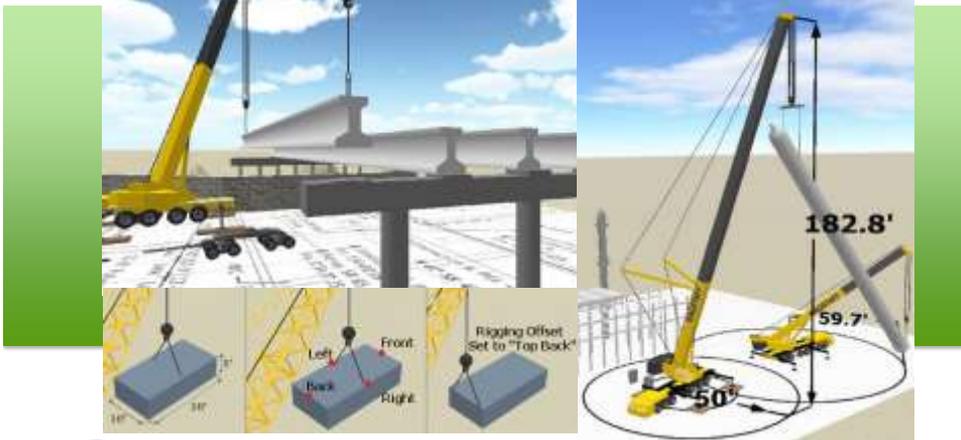


Image Sources: Iowa DOT, Wikimedia Commons, Caltrans

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3D Engineered Models
Schedule, Cost and Post-Construction

Planning Complex Activities



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3D Engineered Models:
Schedule, Cost and Post-Construction

Benefits of 4D Modeling and 5D Modeling



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3D Engineered Models:
Schedule, Cost and Post-Construction

Creating Digital As-Built Records



Construction is the most cost-effective time to capture position information



Image Source: FHWA

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3D Engineered Models:
Schedule, Cost and Post-Construction

Subsurface Utility Engineering



Image Source: Cardno

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3D Engineered Models:

Schedule, Cost and Post-Construction

Benefits of Digital As-Built Records

- More portable data format
- No manual data entry
- No need to manage paper
- Less effort to translate
- Projection and datum information can be embedded



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3D Engineered Models:

Schedule, Cost and Post-Construction

As-found Survey Data for...

Street Sign Inventories

- Locate assets
- Evaluate asset condition
- Determine most economic replacement strategy
- Monitor sign readability for safety

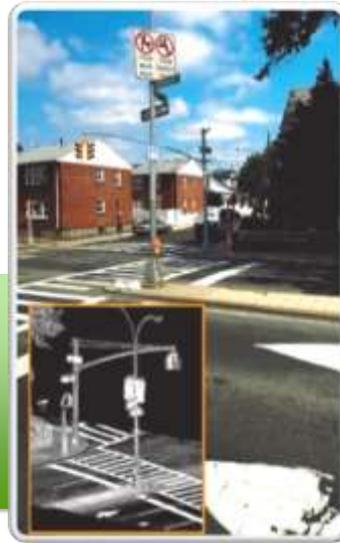


Image Sources: NCHRP, ACA

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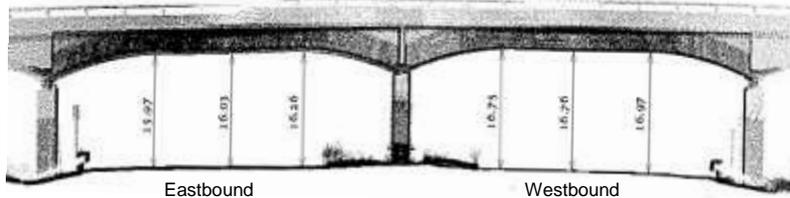
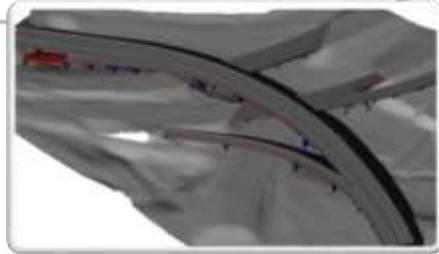
3D Engineered Models:

Schedule, Cost and Post-Construction

As-found Survey Data

Bridge Inventories

- Design
- Clearances
- Condition assessments



Route: KY-222
 Structure ID: 047XXXXX
 Design Construction: Tie-beam
 Length: 62.8 m

Milepoint: 129
 Year Built: 1962
 Material Design: Concrete Continuous
 Scan date: 6/19/2013



Image Sources: Woolpert, Kentucky Transportation Cabinet

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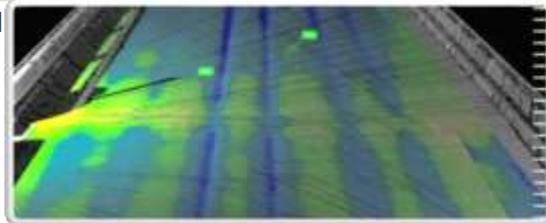
3D Engineered Models:

Schedule, Cost and Post-Construction

As-found Survey Data

Pavement Condition

- Cracking
- Rutting
- Distress
- Potholes



- Low Severity Area/Linear distress
- Medium Severity Area/Linear distress
- High Severity Area/Linear distress

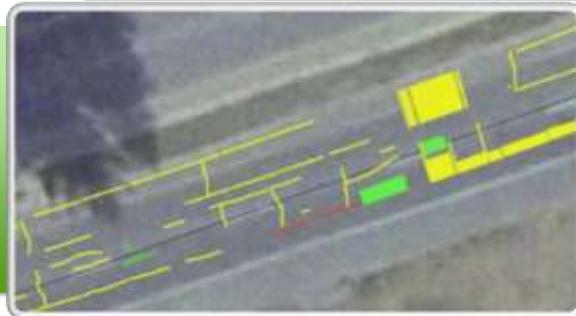
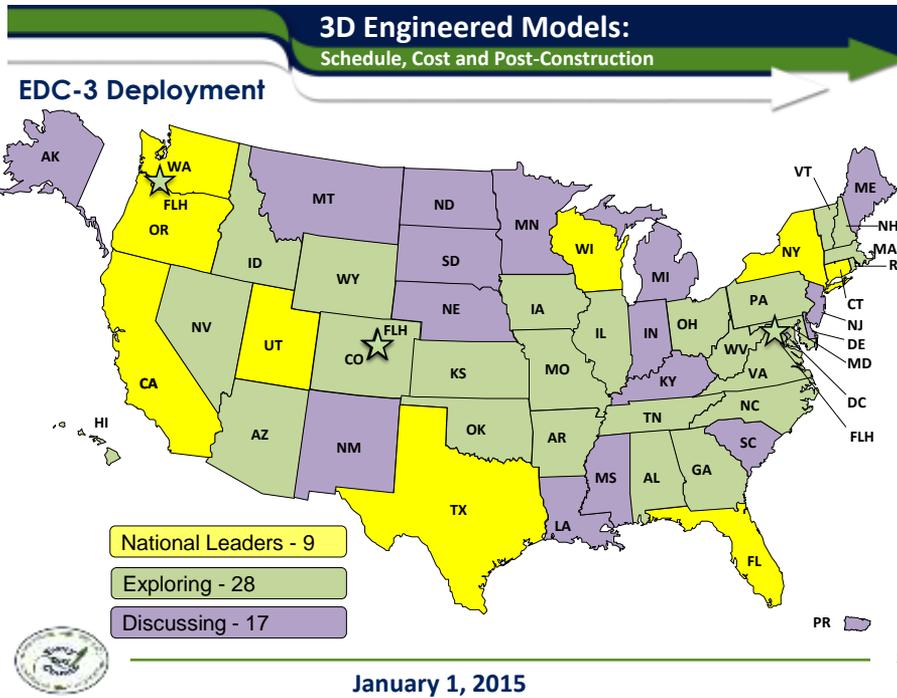
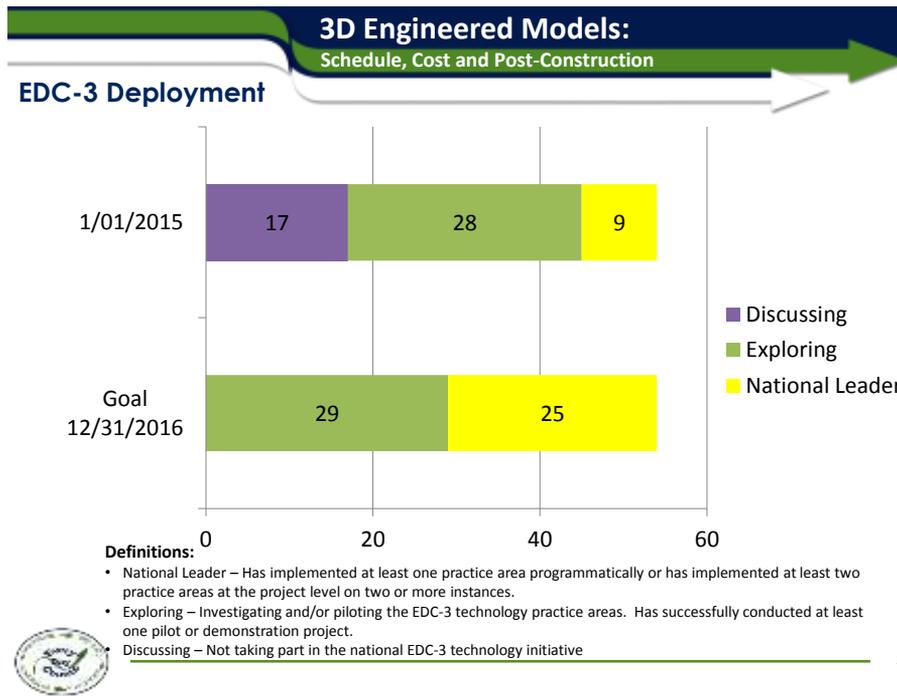


Image Sources: Washington DOT, Jason Amadori

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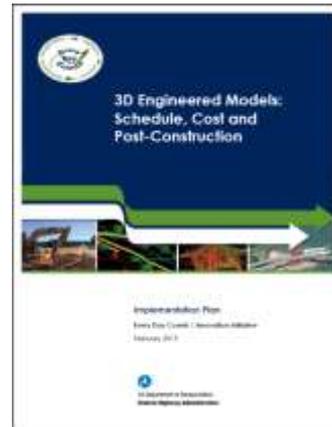


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3D Engineered Models: Schedule, Cost and Post-Construction

Implementation Plan Activities

- Workshops & Peer Exchanges
- Webinar Series
- Case Studies
- Guidance Manuals & Specifications
- Demonstration & Pilot Projects
- Web-based Training



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3D Engineered Models Support & Available Tools

National Website

- New web page
 - Specs, Standards, Details, Tech Briefs, Case Studies, etc.



New web page viewable at www.fhwa.dot.gov/3d (search "fhwa 3D")



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3D Engineered Models

Support & Available Tools

3D Support & Available Tools



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3D Engineered Models

Support & Available Tools

Web-based Training

- Four, 120-minute online modules
- Available 24/7, at users' convenience
- Users can start, stop, and then pick up where they left off
- The focus is on critical topics that support new users' implementation of 3D modeling
- ***AVAILABLE NOW!***

Accessible at: www.fhwa.dot.gov/3d



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3D Engineered Models

Support & Available Tools

Web-based Training

- Module 1:** Introduction to 3D Engineered Models for Highway Transportation

- Module 2:** Surveying and 3D Engineered Models

- Module 3:** 3D Engineered Models in Highway Design

- Module 4:** Applications of 3D Engineered Models in Highway Construction and Quality Assurance



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3D Engineered Models

EDC-3 Deployment Team

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Thank You!



Questions?

