Changing Project Delivery

S.A.M.E. Infrastructure Forum

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Sustainable Design Process
Standard Project Process

PLANNING → DESIGN → CONSTRUCTION → MAINTENANCE
Total Project Process

- No longer a linear process
- At each stage of the process, previous and future stages are involved
- Always looking at lessons learned
Planning Process

Schematic development

• Includes lessons learned from previous design and construction projects
• Interdisciplinary team
• Encourage innovation and/or cost savings
Sustainable Design

Design with the future in mind

Examples

• Pavement design
  • Historical performance
  • Adapt new techniques
• Landscape design
  • Native plantings
• Concrete & steel finishes
  • Uncoated concrete
  • Weathering steel girders
Sustainable Construction

• Form partnerships
  – Meetings with Association of General Contractors (AGC)
  – Talking with suppliers
• Include performance standards in contract and specifications
• Value construction management oversight
  – Identify potential construction issues
  – Transferability of lessons learned to other projects
• Maintain open dialog and value input
  – Ask contractors for lessons learned
Sustainable Maintenance – Asset Management Practice

NTTA Mission
“To improve the quality of life, mobility, and the regional economy of North Texas by providing fiscally sound toll facilities.”

Maintenance Department Vision
“To provide the best possible experience for our customers through world class asset management of our facilities.”

Maintenance Department Mission
“The NTTA Maintenance Organization will manage the resources and create the business processes to continuously develop and implement asset management practices that will improve the quality of life, mobility and regional economy of North Texas.”

CRITICAL SUCCESS FACTORS:
We must be extremely good at...

- Anticipating and responding to our customer’s needs.
- The stewardship of our assets.
- Continuously improving our operations. Doing things in new and better ways.
- Providing a safe environment by recognizing and responding to safety issues.
Asset Management Approach

- Annual inspection of assets
- Multi-year plan for rehabilitation & improvements
Continuous Improvement - Maintenance Rating Program

- Stewardship of Assets
  - Increases accountability
  - Provides assurance that assets are being maintained adequately

- Overall Asset Management
  - Monitors current operations
  - Identifies recurring problems
  - Identifies maintenance issues EARLY
Balanced Maintenance Delivery Approach

- In-House Forces:
  - DNT
  - SRT
  - AATT, MCLB, LLTB
  - 60,6 centerline miles

- T.R.M.C.:
  - PGBT
  - CTP
  - 78 centerline miles

- Performance Standards
- Monthly MRP Quality Standards
- Competition
- Core Competency
Expanding the Tool Box
NTTA Information Technology

Lane Level Toll Collection

Data Center

User Environment

ITS

Call Center

Physical Security

Dedicated Fiber Network

Back Office Toll Collection

Primary Business Applications
Enterprise Project Delivery System (EPDS)

EPDS Used by Project Delivery & Maintenance Departments

Management
Planning
Budget & Schedule

Procurement
Design
Construction
Enterprise Project Delivery System (EPDS)

Financial Management
- Budget Tracking
- Schedules
- Invoicing

Construction Record-keeping and Process Management
- RFIs
- Submittal
- Quantity Records
- Daily Reporting
- Contractor Payment

Document Management
Enterprise Project Delivery System (EPDS)
Graphical Information Systems

- CAD FILES
- ASSET DATA
- AERIAL PHOTOGRAPHY
- SNOW & ICE ROUTES
- LANE MILE INVENTORY
- CONDITION RATING SURVEYS
- ASSET MANAGEMENT

GIS
Lane Mile Inventory

DNT - Mainlane

- NTTA Corridor: Dallas North Tollway
- Roadway Description: DALLAS NORTH TOLLWAY
- LMI Type: Mainlane
- LMI Subtype: Travel
- Miles: 29.57
- Lane Type By Corridor: DNT Mainlane Travel
- Lane Type Length By Corridor: 178.33
Condition Rating Surveys
Future Improvements in Asset Management

- Use of LIDAR data for 3D asset management
- GIS enhancements
  - Utility database
  - Fiber management
  - Right-of-way inventory/mapping
- e-Construction reprocurement
Safety and Autonomous Vehicles
Pilot Project with 3M

- Wider contrast striping
- Enhanced wet weather performance
- Compatible with current lane departure warning systems


Image Credit: 3M
Civil Integrated Management (aka BIM for Infrastructure)

Where are we headed with digital program and project delivery?

Source: David Unkefer, FHWA
Civil Integrated Management (CIM)/BIM for Infrastructure

Source: Dr. David Jeong, Iowa State University
(1) **Definition of advanced modeling technology.**— … an available or developing technology, including 3-dimensional digital modeling, that can—

- accelerate and improve the environmental review process;
- increase effective public participation;
- enhance the detail and accuracy of project designs;
- increase safety;
- accelerate construction, and reduce construction costs; or
- otherwise expedite project delivery with respect to transportation projects that receive Federal funding.
(2) **Program.**— ... the Secretary shall encourage the use of advanced modeling technologies during environmental, planning, financial management, design, simulation, and construction processes of the projects.

(3) **Activities.** — ... the Secretary shall ... compile information/best practices ... disseminate ... and promote use

(4) **Comprehensive plan.**— ... the Secretary shall develop and publish on the public website ... a detailed and comprehensive plan for the implementation of paragraph (2).
The Digital Transformation of the Construction Industry

• Lean Design and Construction: *Generating meaningful benefits*

Data source & image: Dodge Data and Analytics
The Digital Transformation of the Construction Industry

• Design Teams: *Delivering better projects to Owners*

**Owners’ Ratings of BIM Benefit Statements**

BIM Analysis and Simulation Capabilities Produce a More Well-Reasoned Design

- **68%**

**BIM Impact on Design** (According to Owners)

- Dodge Data & Analytics, 2015

  - **Very High**: 30%
  - **High**: 33%
  - **Medium**: 30%

  *Improved Quality/Function of Final Design*

  - **Owners**: 93%

Data source & image: Dodge Data and Analytics
CIM Related Research

FHWA’s Ongoing/Completed Projects:

• e-Construction ROI
• Utilizing 3D Digital Design Data in Highway Construction: A Case Study
• Integrating 3D Models into Asset Management (Digital As-builts and O&M Plans)
• Impact of AMG on Meeting Smoothness Specs
• Robotic Utility Mapping and Installation System (RUMI)
• Effective Use of Geospatial Tools in Highway Construction
• Addressing Challenges in Highway Construction Automation
• Digital Project Inspection
• Data Governance and Exchange Standards

NCHRP 10-96, Guide for CIM in DOTs
Addressing Challenges In Automation In Highway Construction

Part 1: Technology Areas & Benefits

Part 2: Design Guidance & Guide Specifications

Contact: Richard Duval, TFHRC
Implementation Guide for CIM in DOTs

Project #: NCHRP 10-96

**Objective:** Investigate the wide spectrum of CIM technologies and practices being deployed by DOTs on their projects and develop an implementation guide

Contact: Katherine Petros, FHRC
Available FHWA Innovation Deployment Funding

• Accelerated Innovation Deployment (AID) Funding
  • Up to $1m per award
  • Project initiates within 6 months

• State Transportation Innovation Council (STIC) Incentive Funds
  • Up to $100,000 per year
  • Contact your FHWA state office and Mary.Huie@dot.gov in the FHWA CAI office

• MAP-21 Section 1304 Innovative Project Delivery Funding
  • Up to 5% increased federal share
  • [http://www.fhwa.dot.gov/map21/qandas/qaipd.cfm](http://www.fhwa.dot.gov/map21/qandas/qaipd.cfm)
National FHWA Website

Web page

• Specs, Standards, Details, Tech Briefs, Case Studies, etc.

New web page viewable at [www.fhwa.dot.gov/3d](http://www.fhwa.dot.gov/3d) (search “fhwa 3D”)
QUESTIONS?
North Texas Tollway Authority

Our Mission

❖ Provide a safe and reliable toll road system ❖ Increase value and mobility options for customers ❖ Operate the Authority in a businesslike manner ❖ Protect our bondholders ❖ Partner to meet our region’s growing need for transportation infrastructure