

**Changing Project Delivery**

**S.A.M.E. Infrastructure Forum**

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Senior Corridor Manager**

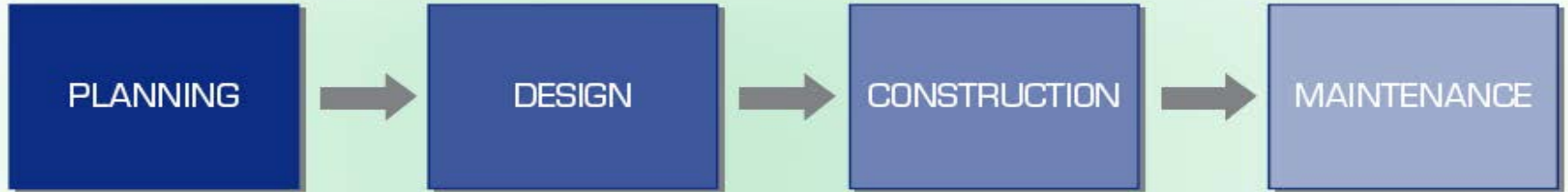
**February 2, 2018**

A photograph of a complex multi-level highway interchange during sunset. The sky is a vibrant orange and yellow, with the sun low on the horizon. The concrete structure of the highway is silhouetted against the bright sky. A tall light pole stands on the upper level of the interchange. In the foreground, there is a field of dry, brown grass. A large, semi-transparent orange rectangle with a white border is positioned in the lower-left area of the image, containing the text 'Sustainable Design Process'.

# Sustainable Design Process

# Standard Project Process

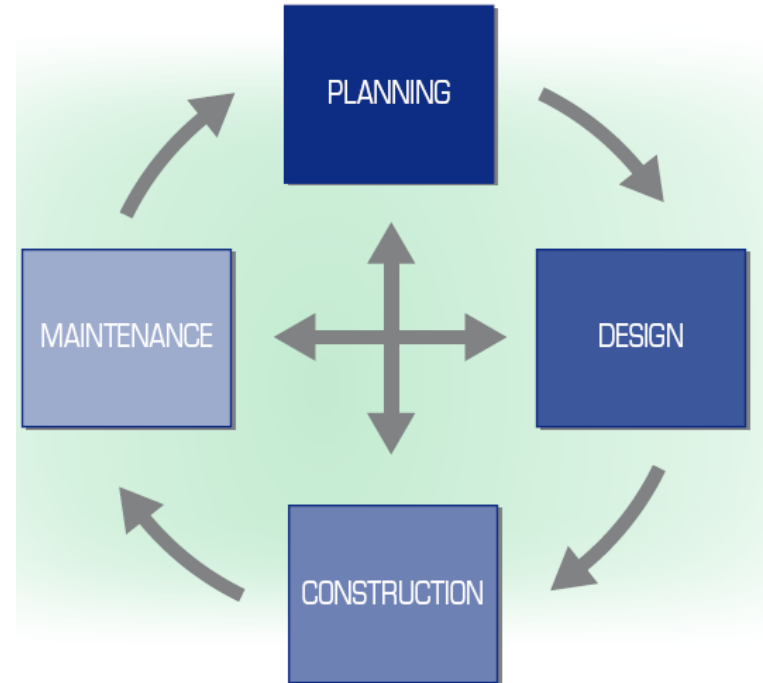
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# Total Project Process

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

## New Sustainable Process



# Planning Process

## Schematic development

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





# Sustainable Design

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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

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- 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

**ASSET MANAGEMENT**  
     

**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.”



 • World Class Asset Management • 

**ASSET MANAGEMENT**  
     

**CRITICAL SUCCESS FACTORS:**

We must be extremely good at...

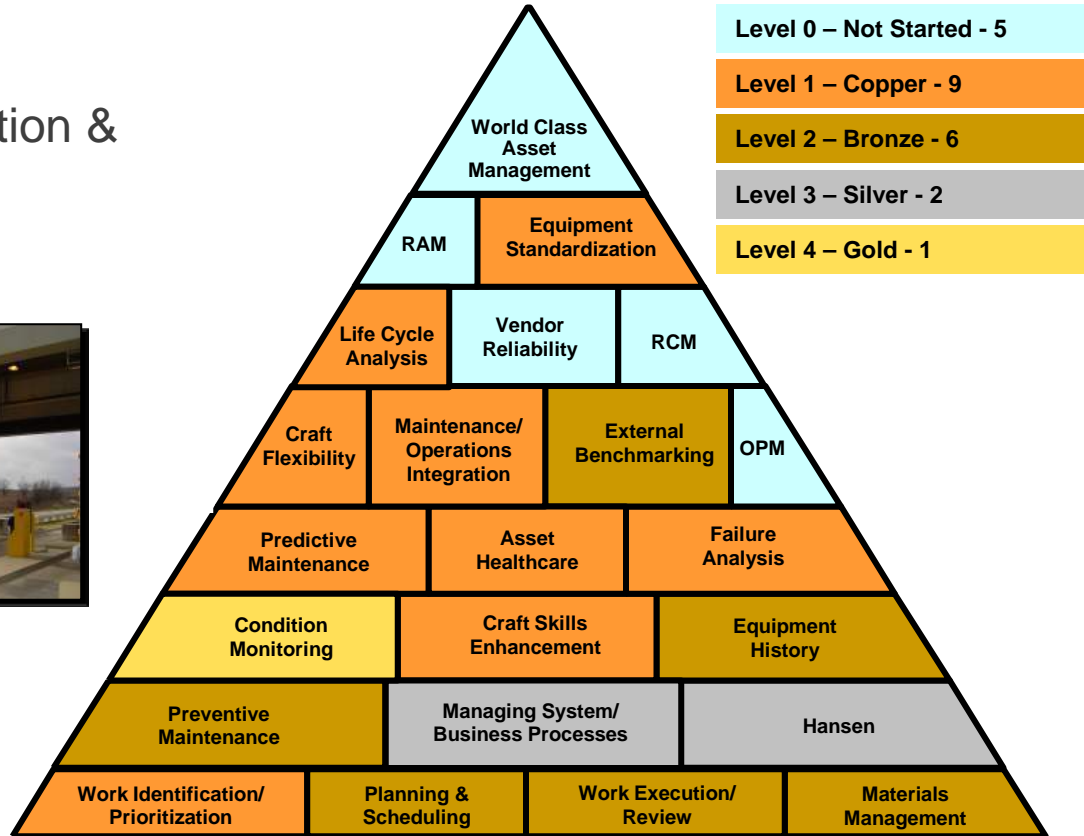
- Anticipating and responding to our customer's needs.
- The stewardship of our assets.
- Continuously improving our operations. Doing things in new and better ways.
- Providing a safe environment by recognizing and responding to safety issues.

 • World Class Asset Management • 



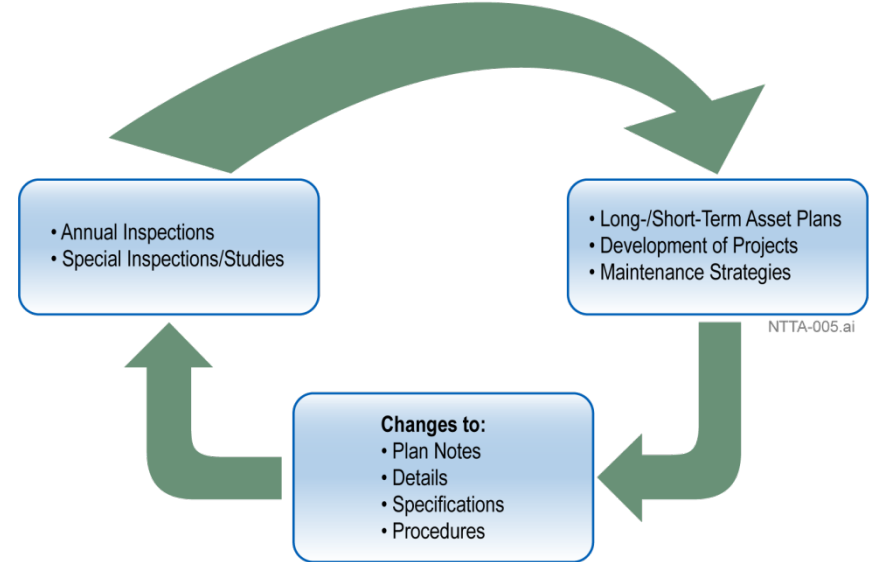
# Asset Management Approach

- Annual inspection of assets
- Multi-year plan for rehabilitation & improvements

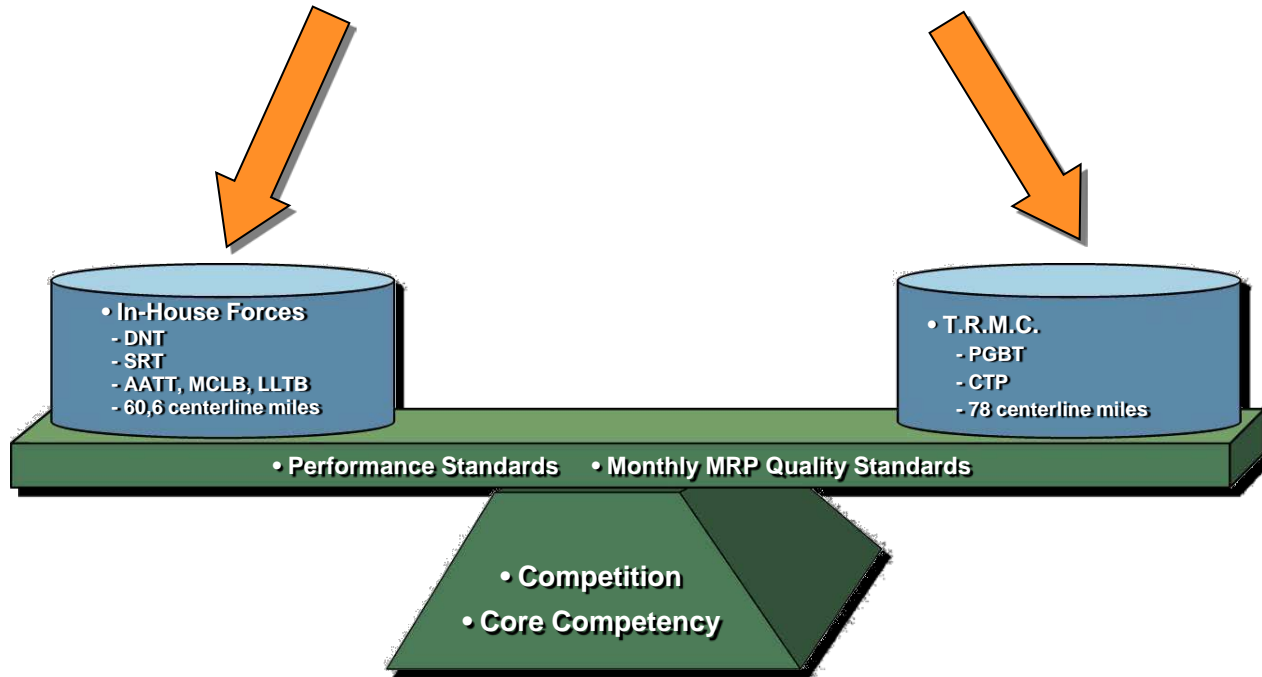


# Continuous Improvement - Maintenance Rating Program

- 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



# Expanding the Tool Box



# NTTA Information Technology

Lane Level  
Toll  
Collection



ITS



Dedicated  
Fiber  
Network



Data  
Center



Call  
Center



Back Office  
Toll  
Collection



User  
Environment



Physical  
Security



Primary  
Business  
Applications





# Enterprise Project Delivery System (EPDS)

EPDS Used by Project Delivery & Maintenance Departments



# Enterprise Project Delivery System (EPDS)

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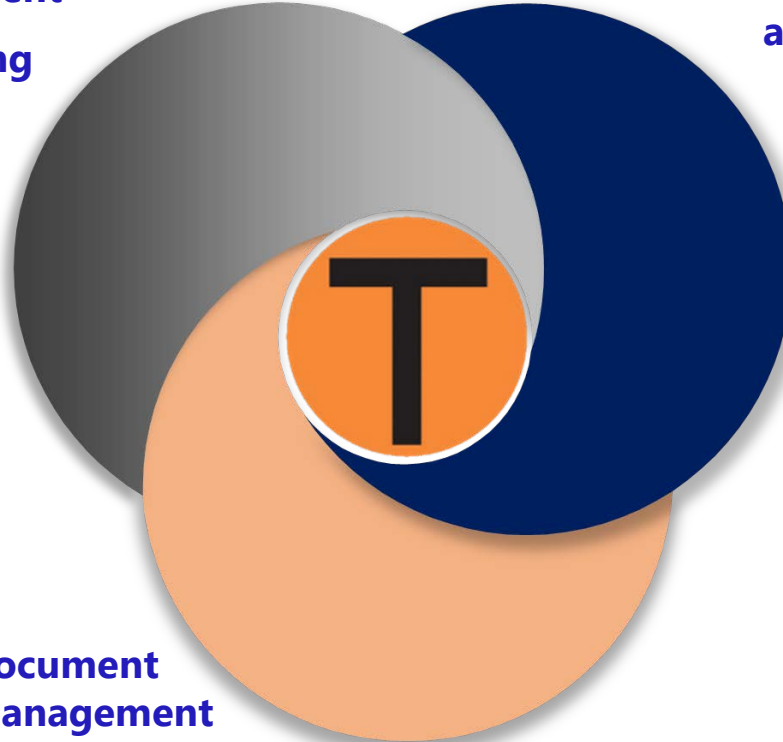
## Financial Management

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)

Exit Edit Mode Workflow Close Save Options Forward Sharing Attach

Home Projects PGBT 4th Lane Widening - Segment 1

Home Projects PGBT Retaining Wall Stabilization Segment 3, 4, 5

Meridian  
Trimble

Home Projects

Print Export Refresh Help

Logged On: Pamela Paul (NTTA) PROLIANCE

Items 1 to 80 of 80

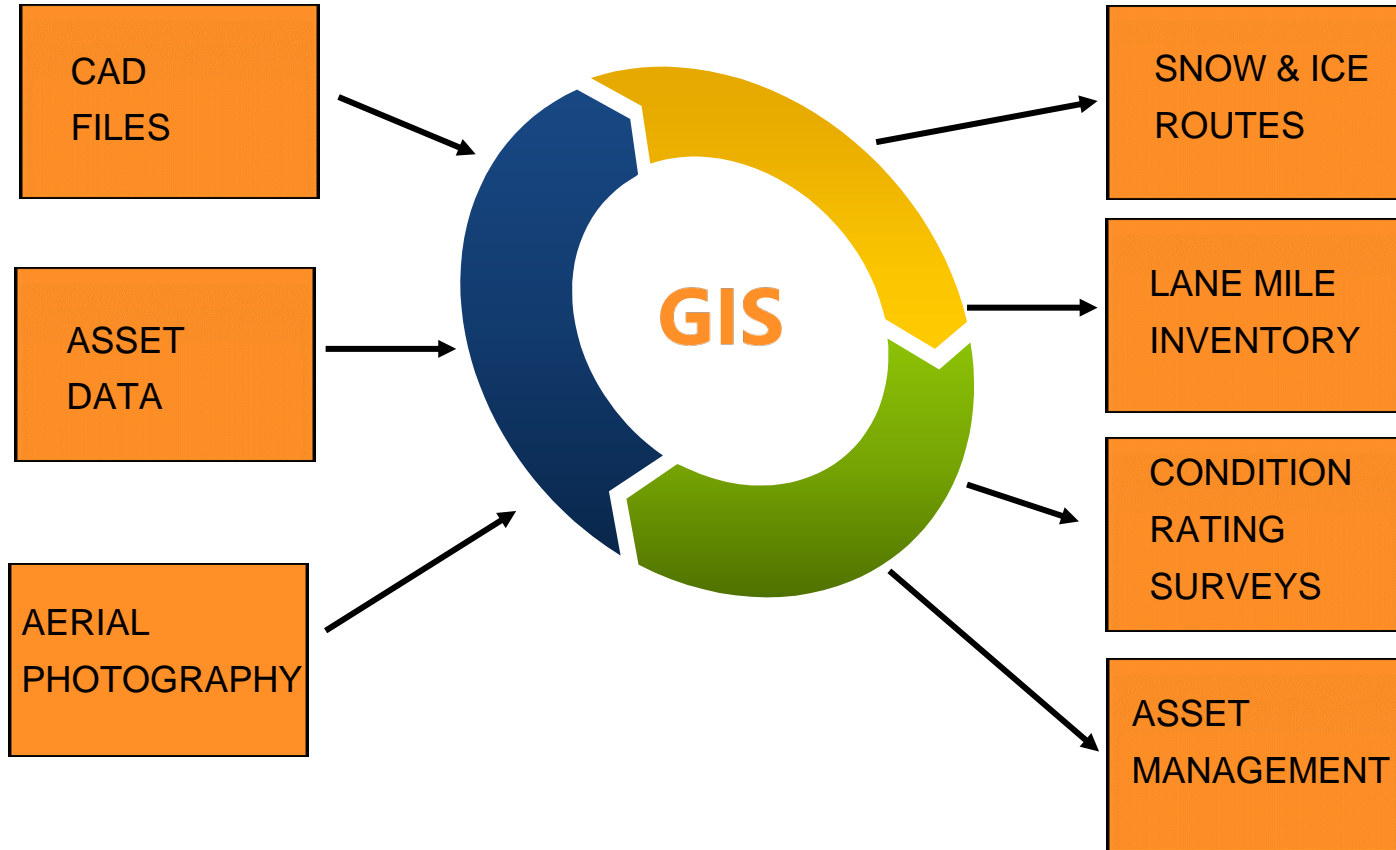
View Project Delivery Corridor and Section Projects

Project Works...	Project Document	Project No.	Project Name	Program	Current State	Flag as Tem...	Manage
<a href="#">Enter Project</a>	<a href="#">Open document</a>	24	Addison Airport Toll Tunnel ETC - Corridor Wide	PMO - Project Delivery	Active	x	
<a href="#">Enter Project</a>	<a href="#">Open document</a>	10001	Addison Road Intersection Improvements - Corridor Wide	PMO - Project Delivery	Active	x	
<a href="#">Enter Project</a>	<a href="#">Open document</a>	6	Chisholm Trail Parkway - Corridor Wide	PMO - Project Delivery	Active	x	
<a href="#">Enter Project</a>	<a href="#">Open document</a>	10041	Chisholm Trail Parkway - IT	PMO - Project Delivery	Active	x	
<a href="#">Enter Project</a>	<a href="#">Open document</a>	02087	Chisholm Trail Parkway - Landscape	PMO - Project Delivery	Active	x	
<a href="#">Enter Project</a>	<a href="#">Open document</a>	02075	Chisholm Trail Parkway - Section 1	PMO - Project Delivery	Active	x	
<a href="#">Enter Project</a>	<a href="#">Open document</a>	02077	Chisholm Trail Parkway - Section 2	PMO - Project Delivery	Active	x	
<a href="#">Enter Project</a>	<a href="#">Open document</a>	02079	Chisholm Trail Parkway - Section 2B	PMO - Project Delivery	Active	x	
<a href="#">Enter Project</a>	<a href="#">Open document</a>	02789	Chisholm Trail Parkway - Section 2C	PMO - Project Delivery	Active	x	
<a href="#">Enter Project</a>	<a href="#">Open document</a>	10042	Chisholm Trail Parkway - Section 3 Sand Stockpile Facility	PMO - Project Delivery	Active	x	
<a href="#">Enter Project</a>	<a href="#">Open document</a>	02082	Chisholm Trail Parkway - Section 3A	PMO - Project Delivery	Active	x	
<a href="#">Enter Project</a>	<a href="#">Open document</a>	02081	Chisholm Trail Parkway - Section 3B	PMO - Project Delivery	Active	x	
<a href="#">Enter Project</a>	<a href="#">Open document</a>	030831	Chisholm Trail Parkway - Section 3C	PMO - Project Delivery	Active	x	
<a href="#">Enter Project</a>	<a href="#">Open document</a>	02083	Chisholm Trail Parkway - Section 4	PMO - Project Delivery	Active	x	
<a href="#">Enter Project</a>	<a href="#">Open document</a>	05SWP	Chisholm Trail Parkway - Section 5	PMO - Project Delivery	Active	x	
<a href="#">Enter Project</a>	<a href="#">Open document</a>	06SWP	Chisholm Trail Parkway - Section 6	PMO - Project Delivery	Active	x	
<a href="#">Enter Project</a>	<a href="#">Open document</a>	100461	Chisholm Trail Parkway - Section 6 - US 67 Signs	PMO - Project Delivery	Active	x	
<a href="#">Enter Project</a>	<a href="#">Open document</a>	10016	Collin County Outer Loop - Corridor Wide	PMO - Project Delivery	Active	x	
<a href="#">Enter Project</a>	<a href="#">Open document</a>	9	Dallas North Tollway - Corridor Wide	PMO - Project Delivery	Active	x	
<a href="#">Enter Project</a>	<a href="#">Open document</a>	02597	Dallas North Tollway ETC - Corridor Wide	PMO - Project Delivery	Active	x	

NTTA  
NORTH TEXAS TOLLWAY AUTHORITY

ADDRESS BOOK

# Graphical Information Systems



# Lane Mile Inventory

The screenshot displays the 'Lane Mile Inventory' application. The interface includes a map on the left with a search bar labeled 'Esri World Geocoder'. A central popup window, titled '(1 of 2)', displays the following information:

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

At the bottom of the popup is a 'Zoom to' link and a three-dot menu icon. To the right of the map is a 'Legend' panel titled 'Lane Mile Inventory'. It lists various roadway types and their corresponding colors and line styles:

- Dallas North Tollway**
  - DNT - Direct Connect
    - Direct Connect, Shoulder
    - Direct Connect, Travel
  - DNT - Mainlane
    - Mainlane, Auxiliary
    - Mainlane, Shoulder
    - Mainlane, Travel
  - DNT - Off-Ramp
    - Off-Ramp, Shoulder
    - Off-Ramp, Travel
  - DNT - On-Ramp
    - On-Ramp, Shoulder
    - On-Ramp, Travel
- President George Bush Turnpike**
  - PGBT - Direct Connect
    - Direct Connect, Shoulder
    - Direct Connect, Travel
  - PGBT - Frontage
    - Frontage, Auxiliary
    - Frontage, Shoulder
    - Frontage, Travel
  - PGBT - Mainlane
    - Mainlane, Auxiliary
    - Mainlane, Shoulder
    - Mainlane, Travel
  - PGBT - Off-Ramp
    - Off-Ramp, Shoulder
    - Off-Ramp, Travel
  - PGBT - On-Ramp
    - On-Ramp, Shoulder
    - On-Ramp, Travel



# Asset Management

The screenshot displays the 'Maintenance Interactive Map' application interface. The top navigation bar is blue with the Esri logo and the text 'Maintenance Interactive Map' and 'NTTA IT \ GIS'. Below the navigation bar is a search bar with the text 'Esri World Geocoder' and a search icon. A dropdown menu is open, showing 'signs' as the selected category. The map shows a street grid in Dallas, with a blue line representing a highway (DNT) running vertically. A green square marker labeled 'MLP1' is placed on the highway. A pop-up window titled 'Sign Structure' is open, displaying the following information:

Sign Structure	
UNIT ID:	SB-DNT0083 9AL
ROADWAY DESCRIPTION:	DALLAS NORTH TOLLWAY
Asset Category ID	SIGN STRUCTURE
Equipment Type	SB-CANTILEVERED SIGN
Document/Photo	<a href="#">More info</a>
GoogleLink	<a href="#">More info</a>
<a href="#">Zoom to</a>	

The right side of the interface features a 'Layer List' panel with the title 'Operational layers'. Under the 'Maintenance Layers' section, the following layers are listed with checkboxes:

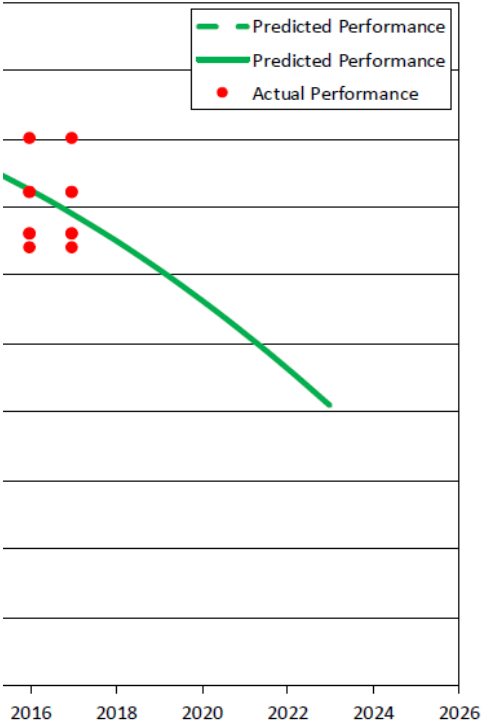
- ☐ Attenuator
- ☐ Bridge
- ☐ CCTV
- ☐ DMS Board
- ☐ Fence
- ☐ Gantry
- ☐ Guardrail
- ☐ Landmark
- ☐ Landscape
- ☐ Light
- ☐ Sign
- ☒ Sign Structure
- ☐ Water Buoy
- ☐ Wall
- ☐ Storm Water Assets
- ☒ NTTA Road System

The bottom left corner of the image shows the NTTA logo and the text 'NORTH TEXAS TOLLWAY AUTHORITY'.

# Condition Rating Surveys



is DNT-2A, -2B, and -2C from Table A.1)



CRS	General Condition
> 7.5	Excellent
7.1 to 7.5	Good
6.6 to 7.0	Fair
6.0 to 6.5	Fair
< 6.0	Poor
See Appendix B for specific condition ratings	

# Future Improvements in Asset Management

**Use of LIDAR  
data for 3D  
asset  
management**

**e-Construction  
reprocurement**

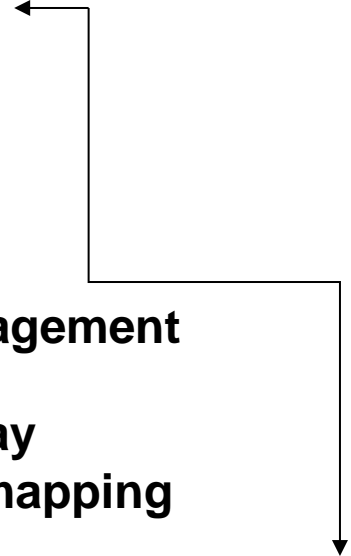


**GIS  
enhancements**

**Utility  
database**

**Fiber management**

**Right-of-way  
inventory/mapping**



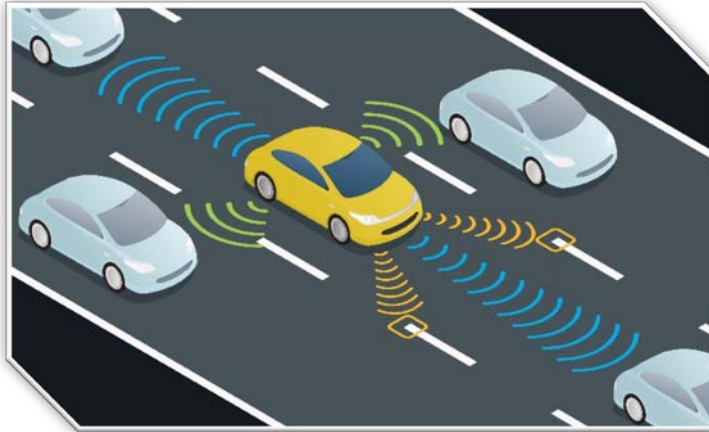


# Future of Project Delivery



# Safety and Autonomous Vehicles

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# Pilot Project with 3M

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

Visibility for drivers.  
Guidance for vehicles.  
Safer roads for everyone.

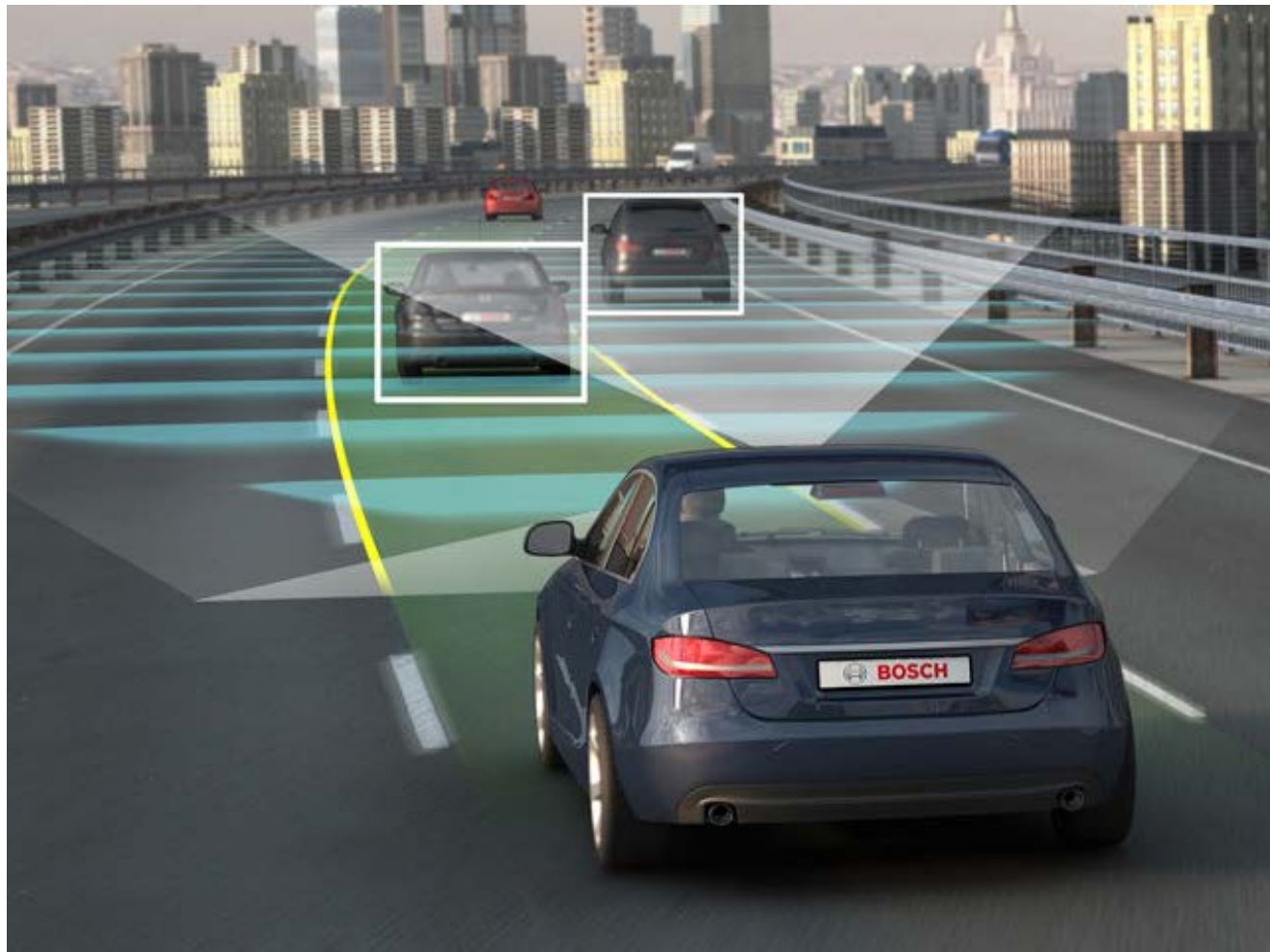


Image Credit: 3M

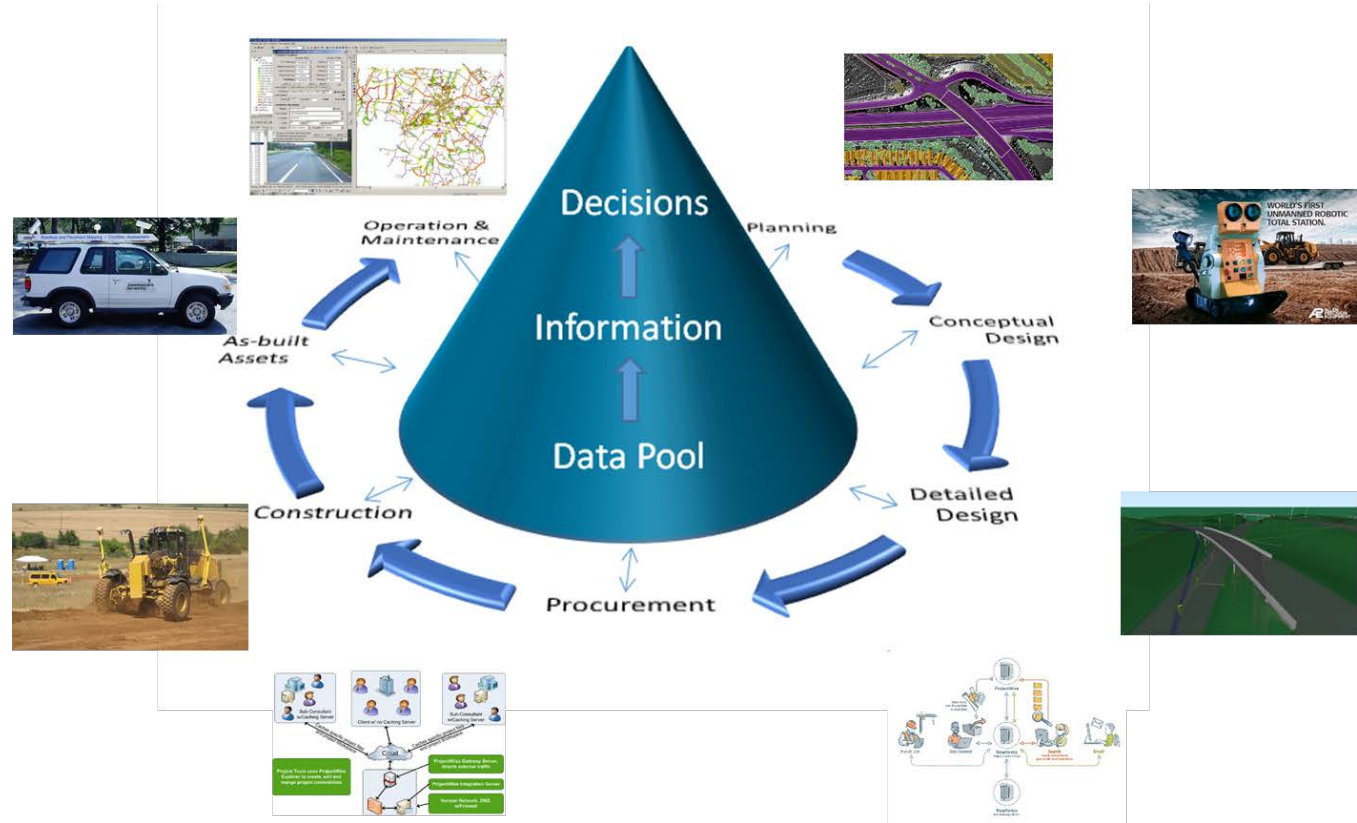
# Civil Integrated Management (aka BIM for Infrastructure)

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

# MAP-21 – 23 USC 106 (j)

## Use of Advanced Modeling Technologies

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(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.

# MAP-21 – 23 USC 106 (j)

## Use of Advanced Modeling Technologies

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(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).

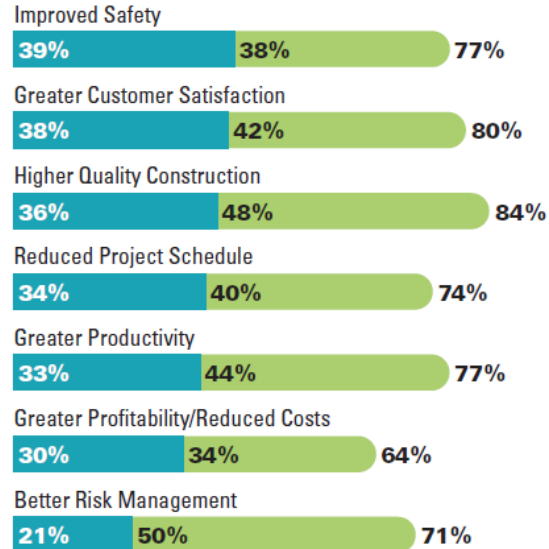


# The Digital Transformation of the Construction Industry

- Lean Design and Construction: *Generating meaningful benefits*



■ High Level of Achievement ■ MediumLevel of Achievement



# 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



## BIM Impact on Design (According to Owners)

Dodge Data & Analytics, 2015

Very High High Medium

Improved Quality/Function of Final Design

Owners



# CIM Related Research

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## 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

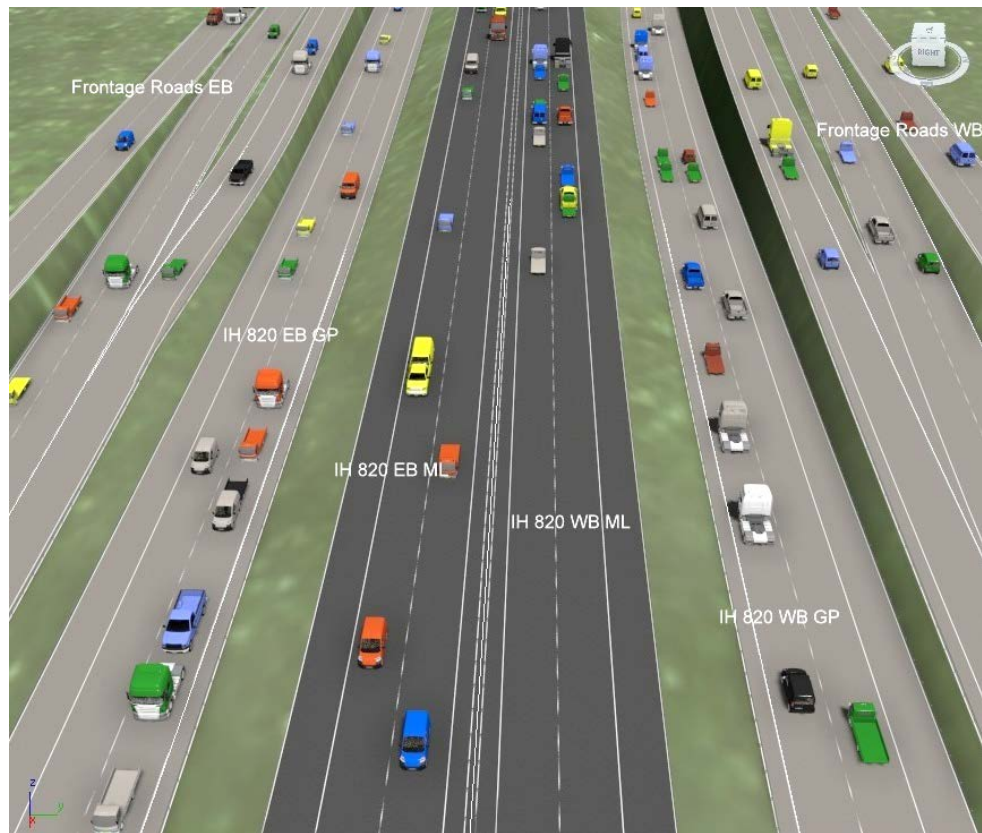


# Implementation Guide for CIM in DOTs

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

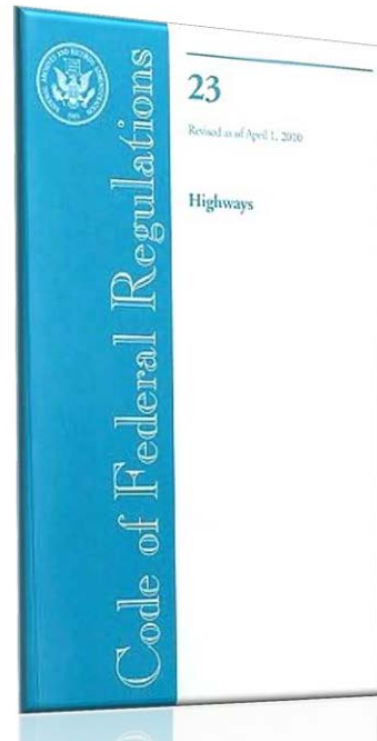
Contact: Katherine Petros, FHRC





# Available FHWA Innovation Deployment Funding

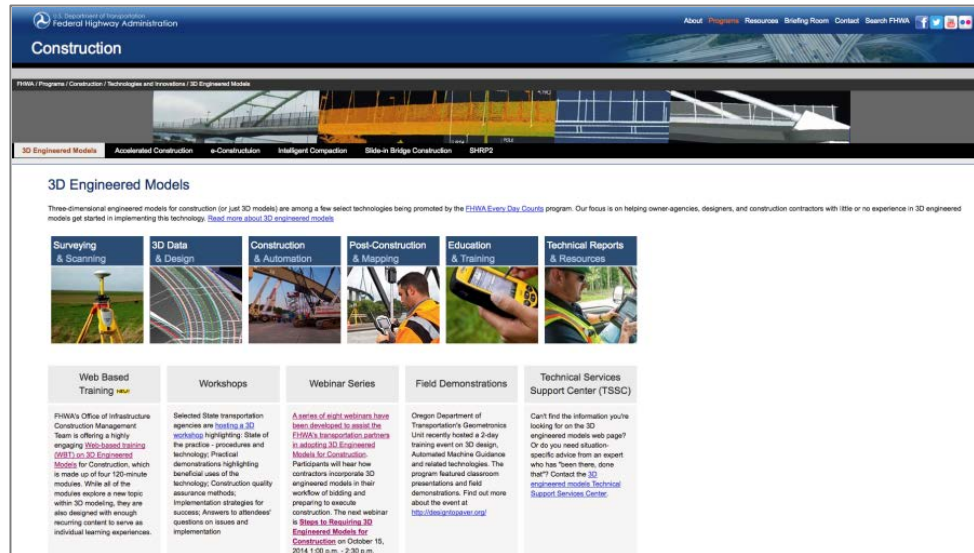
- Accelerated Innovation Deployment (AID) Funding
  - Up to \$1m per award
  - Project initiates within 6 months
  - <http://www.fhwa.dot.gov/accelerating/grants/index.cfm>
- State Transportation Innovation Council (STIC) Incentive Funds
  - Up to \$100,000 per year
  - Contact your FHWA state office and [Mary.Huie@dot.gov](mailto: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>



# 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

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## 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