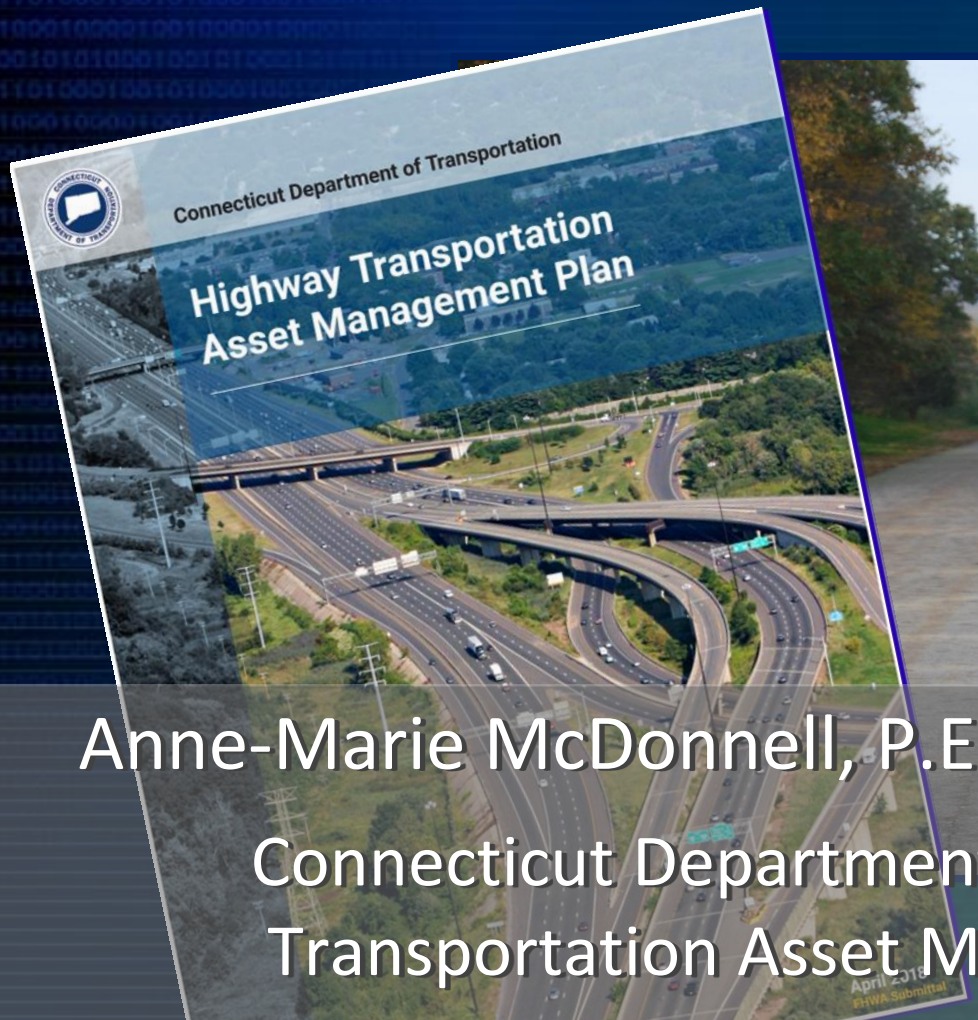
From Paper to Practice: Putting Risk-Based Asset Management to Work



Anne-Marie McDonnell, P.E. & Karen Riemer, P.E.

Connecticut Department of Transportation
Transportation Asset Management Group

Connecticut

STATE MAINTAINED ASSETS INCLUDE:

4,016 Bridges
3,719 CL Miles Pavement
2,783 Traffic Signals…

Connecticut Department of Transportation

Highway Transportation Asset Management Plan

April 2018

FHWA Submittal

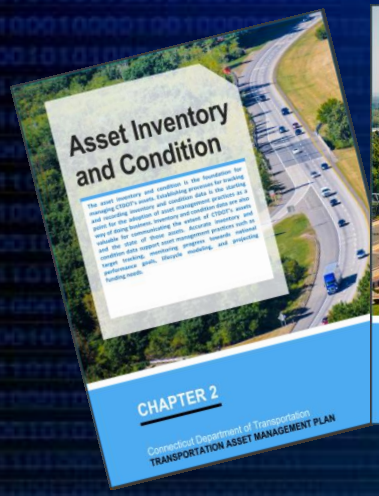
TAMP

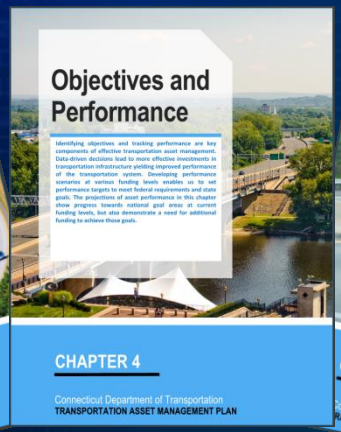
A Transportation Asset Management Plan is not just a document, but a better way of doing business.

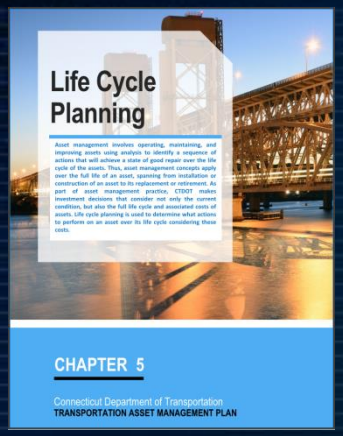
CTDOT TAMP, April 2018
(Chapter 1, Page 7)

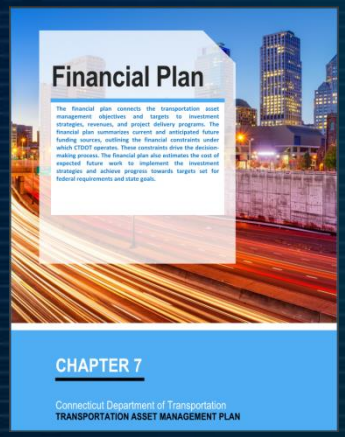
CT TAMP Contents - April 2018

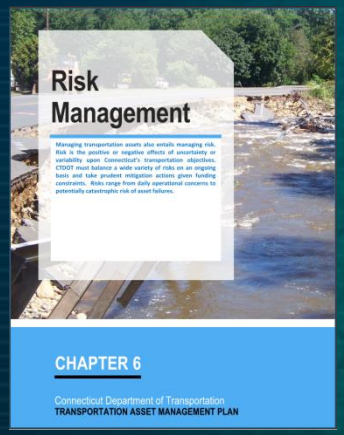
REQUIRED











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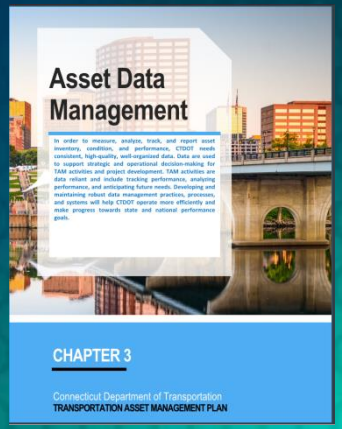
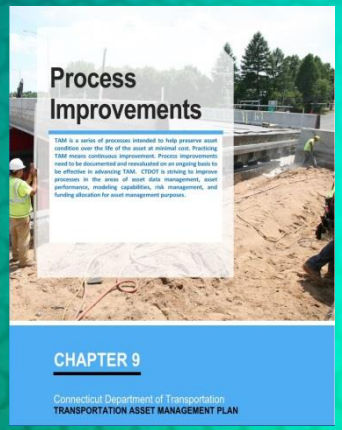
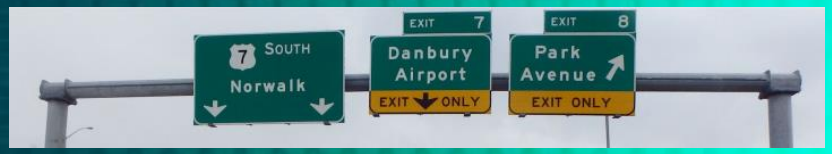




ASSETS – CT TAMP 2018

Includes All NHS and State-Maintained :

- Bridges
- Pavements
- Traffic Signals
- Signs
- Sign Supports
- Pavement Markings



‘Greatest Hits’

- Asset Fact Sheets
- Justification for Budget Requests
- Greater Transparency
- Strengthened Focus On
  - State of Good Repair
  - Data & Data Management
  - Risk Management
- Organizational Framework/ TAM Program Support
  - Leadership
  - Teamwork
  - Asset Management Culture

Asset Fact Sheets

Connecticut Transportation Asset Management Plan

Bridge

Data Confidence: High

Description

- CTDOT inspects 5,306 roadway bridges, 1,785 of which are National Bridge Inventory (NBI) structures on the National Highway System (NHS).
- 4,016 of these bridges are state maintained; the remaining 1,290 are maintained locally or under another jurisdiction
- CTDOT defines a bridge as a crossing of at least six feet in length, including culverts. The Federal Highway Administration (FHWA) defines an NBI bridge as a structure measuring more than 20 feet in length.
- CTDOT has a distinct Major Bridge Program for large or expensive-to-replace bridges. 60 structures are currently categorized as Major Bridges.

State of Good Repair (SOGR)

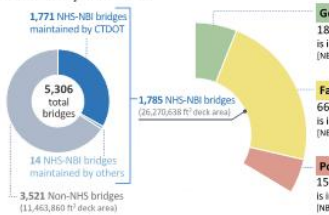
A bridge for which the condition rating for each of the three major components for a span bridge (Substructure, Deck, and Superstructure) or the structural condition of a culvert is rated at least a 5 on a 0-9 condition scale is classified as being in a SOGR.

Bridge Age

The average NHS-NBI bridge in Connecticut is 53 years old, which is 11 years older than the national average of 42 years. The state has a high percentage of Structurally Deficient (SD) bridges (by deck area) compared to the national average.

NHS-NBI Inventory and Condition

Federal Requirements



Good 4,761,084 ft²
18.1% of deck area on NHS-NBI bridges is in good condition (422 bridges).
[NBI condition ratings of 7,8, or 9]

Fair 17,584,485 ft²
66.9% of deck area on NHS-NBI bridges is in fair condition (1,261 bridges).
[NBI condition ratings of 5 or 6]

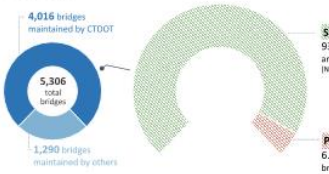
Poor 3,925,069 ft²
15.0% of deck area on NHS-NBI bridges is in poor condition (102 bridges).
[NBI condition ratings of 0, 1, 2, 3, or 4]
As of 1/1/18, Poor=SD

Good-Fair-Poor defined by MAP-21/FAST Act

Based on CTDOT 3/31/17 NBI Submittal

CTDOT-Maintained Inventory and Condition

State Goals



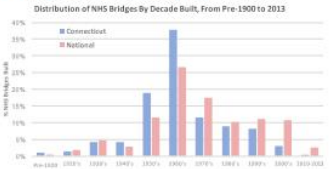
State of Good Repair 3,768 bridges
93.8% of CTDOT-maintained state bridges are in good or fair condition
[NBI condition ratings of 5 or higher]

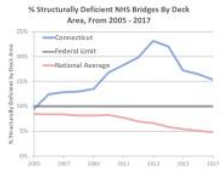
Poor 248 bridges
6.2% of CTDOT-maintained state bridges are in poor condition
[NBI condition ratings of 4 or lower]

SOGR defined by CTDOT

Based on CTDOT 3/31/17 Snapshot

Performance History





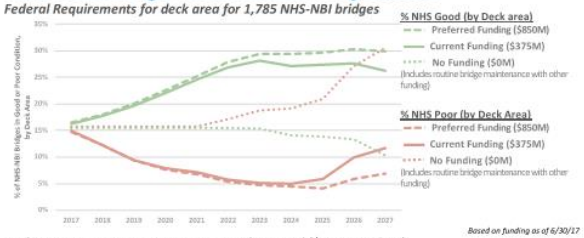
Based on National Data available from FHWA

Connecticut Transportation Asset Management Plan

Bridge

NHS-NBI Bridge Performance Projections

Federal Requirements for deck area for 1,785 NHS-NBI bridges



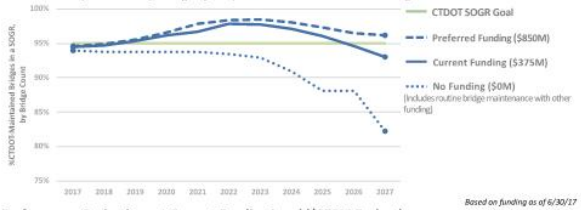
Based on funding as of 6/30/17

Performance Projections at Current Funding Level ($375M Budget)

Year	2017	2018	2019	2020	2021	Goal
NHS Good (by deck area)	16.3%	17.7%	19.7%	22.1%	24.5%	>20%
NHS Poor (by deck area)	14.9%	12.3%	9.4%	7.9%	7.1%	<10%

CTDOT-Maintained Bridge Performance Projections

State Goals by number of bridges for 4,016 CTDOT-maintained bridges



Based on funding as of 6/30/17

Performance Projections at Current Funding Level ($375M Budget)

Year	2017	2018	2019	2020	2021	Goal
SOGR	94.5%	94.7%	95.3%	96.1%	96.7%	95%

Performance Projections

The chart on the left depicts bridge condition for various funding scenarios. These were developed through an analysis program using CTDOT bridge condition data, as of May 2017.

Asset Valuation

$15,850,000,000

Asset value is estimated using the replacement value. For bridges, replacement value is the product of deck area and unit construction cost. For 5,306 bridges: 37,734,498 sqft * $420/sqft = $15.9 billion.

Measures and Targets

Connecticut tracks federal targets and state goals for bridge condition. CTDOT has set the following bridge condition goals:

Federal Requirements:

- 10% or less Structurally Deficient by deck area on NHS-NBI bridges (Federal minimum is less than 10% SD)
- 20% or more Good by deck area on NHS-NBI bridges

State Goal:

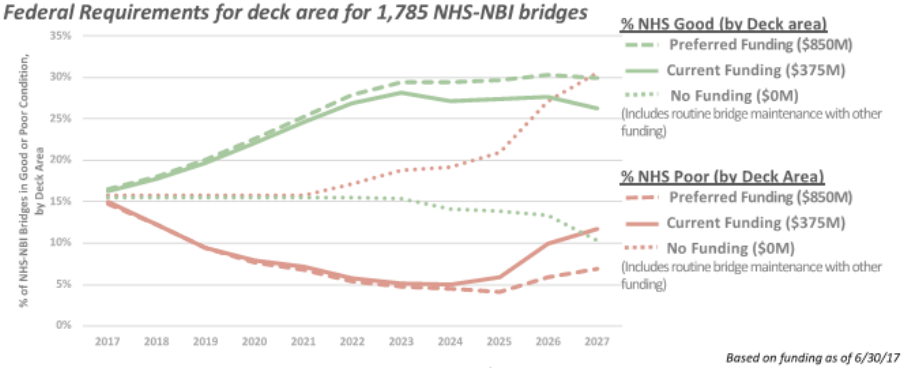
- 95% or more of State-Maintained bridges in a SOGR (State target)

CTDOT Asset Fact Sheet - Bridge

Asset Fact Sheets

NHS-NBI Bridge Performance Projections

Federal Requirements for deck area for 1,785 NHS-NBI bridges



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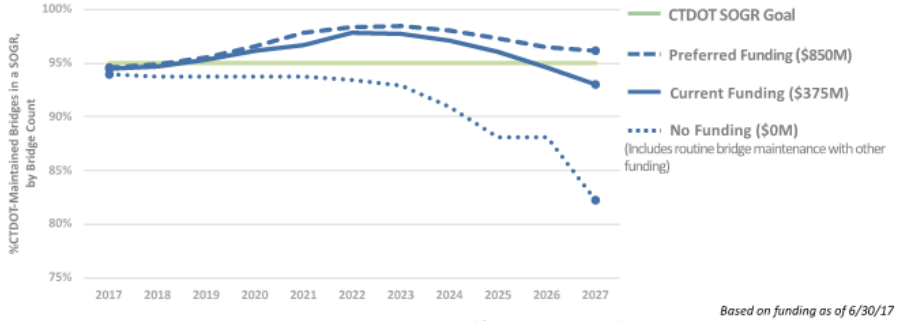
NHS Poor (by deck area)	14.9%	12.3%	9.4%	7.9%	7.1%	<10%

CTDOT-Maintained Bridge Performance Projections

State Goals by number of bridges for 4,016 CTDOT-maintained bridges



Based on funding as of 6/30/17

Performance Projections at Current Funding Level ($375M Budget)

Year	2017	2018	2019	2020	2021	Goal
SOGR	94.5%	94.7%	95.3%	96.1%	96.7%	95%

Measures and Targets

Connecticut tracks federal targets and state goals for bridge condition. CTDOT has set the following bridge condition goals:

Federal Requirements:

- 10% or less Structurally Deficient by deck area on NHS-NBI bridges (Federal minimum is less than 10% SD)
- 20% or more Good by deck area on NHS-NBI bridges

State Goal:

- 95% or more of State-Maintained bridges in a SOGR (State target)

Greater Transparency

Encourages:

- Consistency
- Efficient and Effective Communication
- Improved Coordination & Decision Making
- Leveraging of Data & Information
- Trust

Asset Condition

Table 2-2. Inventory and Conditions for Assets in the TAMP

NHS	Inventory	Good	Fair	Poor
Bridges	26,270,638 Square feet of deck area	18.1%	66.9%	15.0%
Pavement *	5,514 Lane miles	48.4%	45.4%	6.2%
CTDOT-Maintained	**Inventory**	**Good**	**Fair**	**Poor**
Bridges	4,016 Bridges	27.4%	66.4%	6.2%
Pavement **	3,719 Centerline miles	60.6%	32.5%	6.9%
Traffic Signals	2,783 Assets	34.8%	36.8%	28.4%
Signs (approximate inventory)	263,000 Assets	31.1%	9.5%	59.4%
Sign Supports	1,625 Assets	46.2%	52.6%	1.2%
		State of Good Repair		**Poor**
Pavement Markings *** (estimated by assumptions)	163,000,000 Linear feet of pavement lines	29.8%		70.2%
	2,200,000 Square feet of pavement symbols	63.6%		36.4%

Greater Focus on:

STATE OF GOOD REPAIR (SOGR)

A bridge for which the condition rating for each of the three major components for a [illegible] bridge (Substructure, Deck, and Superstructure), or the structural condition of a culvert is rated at least a 5 on a 0-9 condition scale is classified as being in a SOGR.

Condition

A pavement section for which the Pavement Condition Index (PCI) is [illegible] or greater is classified as being in a State of Good Repair (SOGR). The PCI is based on cracking, rutting, drainage disintegration, and ride. FHWA uses a different condition measure for NHS pavements.

Condition

Sign supports with an overall rating of at least a [illegible] 0-9 condition scale are classified as being in a State of Good Repair.

Condition

A sign installed within 17 years is classified as being in a State of Good Repair. This is based on expectations of retroreflectivity life. Retroreflectivity is a measure of the amount of light reflected by a surface back to the source of the light.

Age

The State of Good Repair for traffic signals is determined to be 25 years of age. This is based on expectations of controller and signal head life with interim component replacements that are required at varying intervals.

Age

Epoxy pavement markings installed within 3 years are classified in a State of Good Repair whereas water-based pavement markings installed within 1 year are classified in a State of Good Repair. This is based on expectations of retroreflectivity life and wear. Retroreflectivity is a measure of the amount of light reflected by a surface back to the source of the light.

Age

Greater Focus on:

DATA & DATA MANAGEMENT

Asset Data Systems

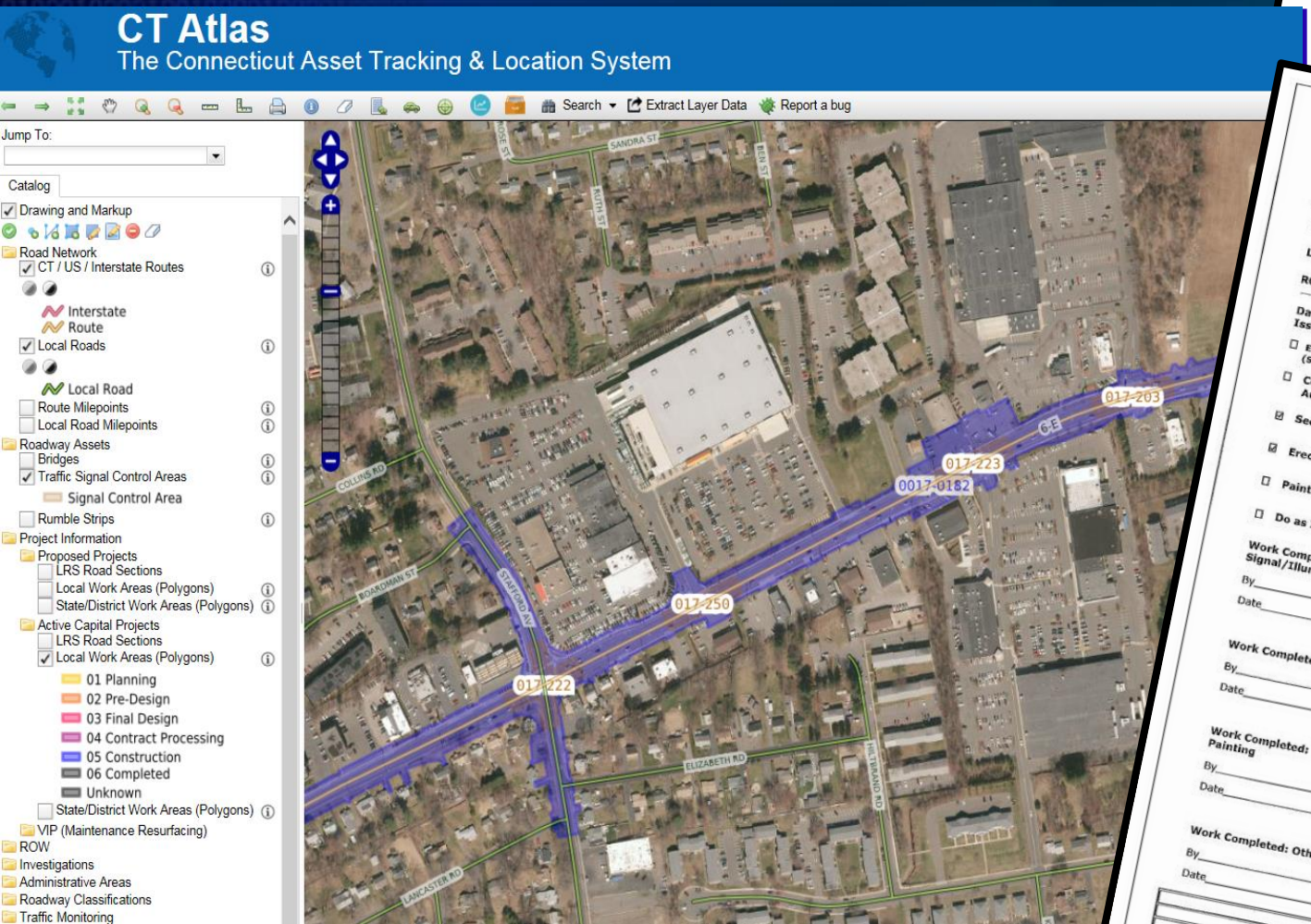
	Bridges	Pavement	Traffic Signals	Signs	Sign Supports	Pavement Markings
InspectTech	•		-		•	
dTims	•	•			-	
EXOR	-	-	-	•	-	-
Traffic Signals Database			•			
Transportation Enterprise Database (TED)	•	-	•	•	-	-
CT ATLAS	•		•			-
ProjectWise (PW)	•	-	•		•	
Composite Project Database (CPD)	•	-	•	-	-	-
DigitalHIWAY	•	•				
Maintenance Management System (MMS)	-	-	-	-	-	-

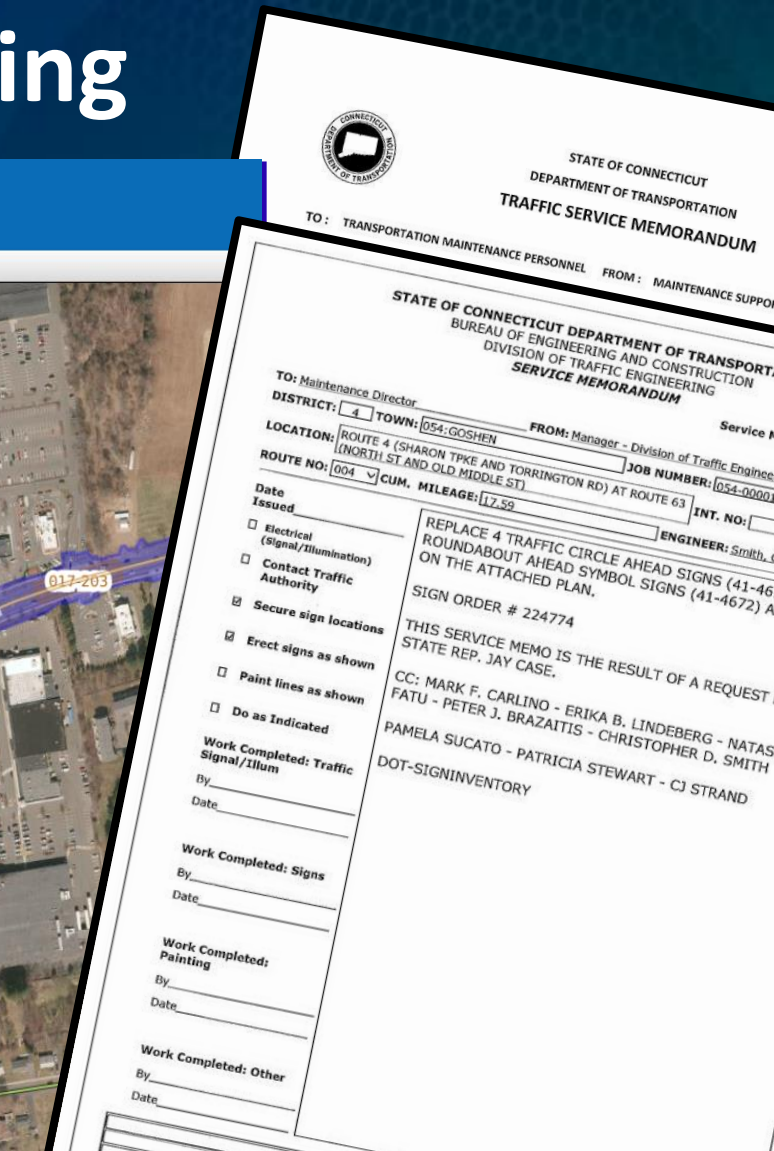
- Considered for future deployment.

Greater Focus on:

DATA & DATA MANAGEMENT

Asset Tracking





STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

TRAFFIC SERVICE MEMORANDUM

TO: TRANSPORTATION MAINTENANCE PERSONNEL FROM: MAINTENANCE SUPPO

STATE OF CONNECTICUT DEPARTMENT OF TRANSPORT
BUREAU OF ENGINEERING AND CONSTRUCTION
DIVISION OF TRAFFIC ENGINEERING
SERVICE MEMORANDUM

TO: Maintenance Director
DISTRICT: 4 TOWN: 054:GOSHEN FROM: Manager - Division of Traffic Enginee
LOCATION: ROUTE 4 (SHARON TPKE AND TORRINGTON RD) AT ROUTE 63 (NORTH ST AND OLD MIDDLE ST) JOB NUMBER: 054-0000
ROUTE NO: 004 CUM. MILEAGE: 17.59 INT. NO:
Date Issued ENGINEER: Smith,

- ☐ Electrical (Signal/Illumination)
- ☐ Contact Traffic Authority
- ☑ Secure sign locations
- ☑ Erect signs as shown
- ☐ Paint lines as shown
- ☐ Do as Indicated

REPLACE 4 TRAFFIC CIRCLE AHEAD SIGNS (41-46
ROUNDABOUT AHEAD SYMBOL SIGNS (41-4672) A
ON THE ATTACHED PLAN.

SIGN ORDER # 224774

THIS SERVICE MEMO IS THE RESULT OF A REQUEST
STATE REP. JAY CASE.

CC: MARK F. CARLINO - ERIKA B. LINDEBERG - NATAS
FATU - PETER J. BRAZAITIS - CHRISTOPHER D. SMITH
PAMELA SUCATO - PATRICIA STEWART - CJ STRAND
DOT-SIGNINVENTORY

Work Completed: Traffic Signal/Illum
By
Date

Work Completed: Signs
By
Date

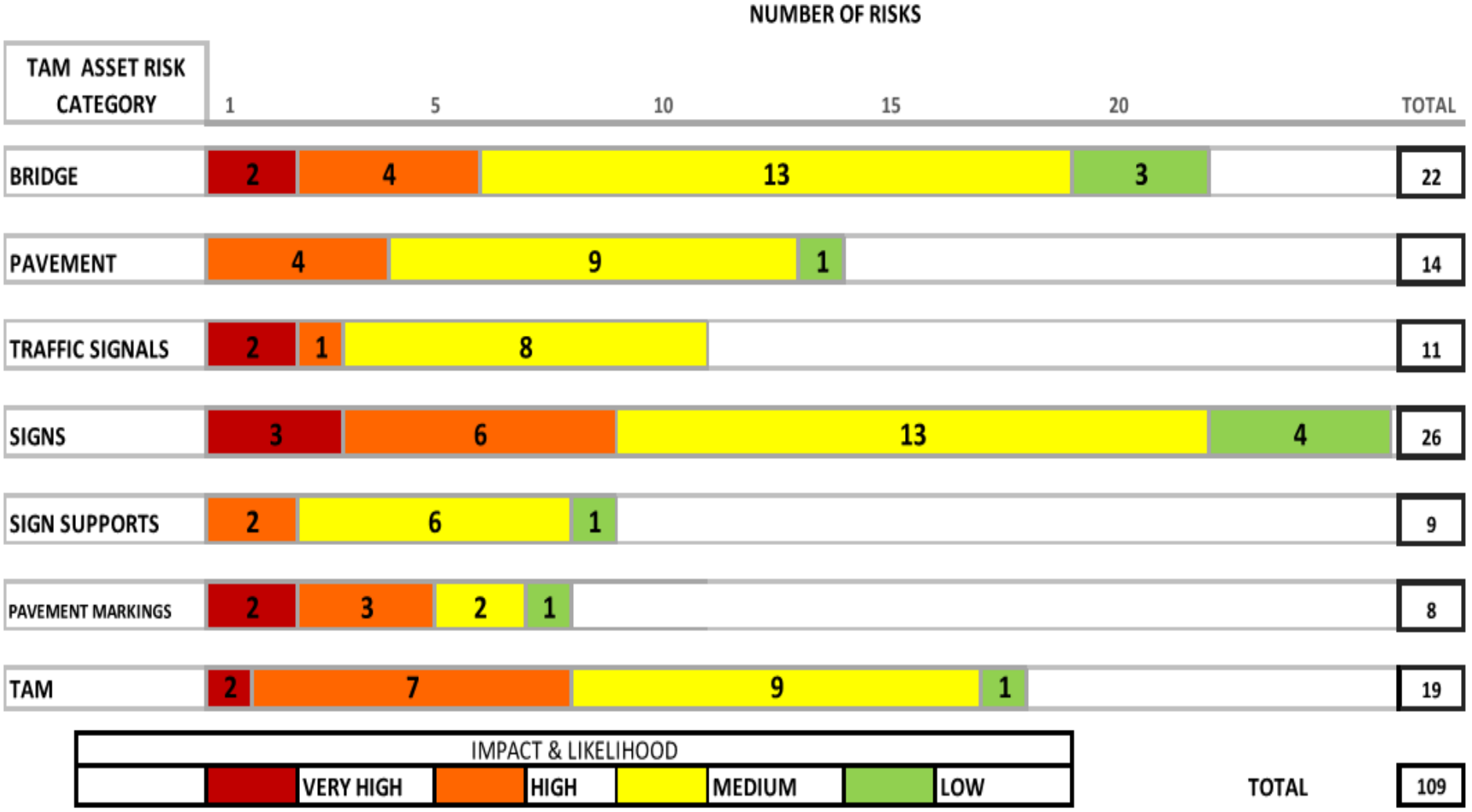
Work Completed: Painting
By
Date

Work Completed: Other
By
Date

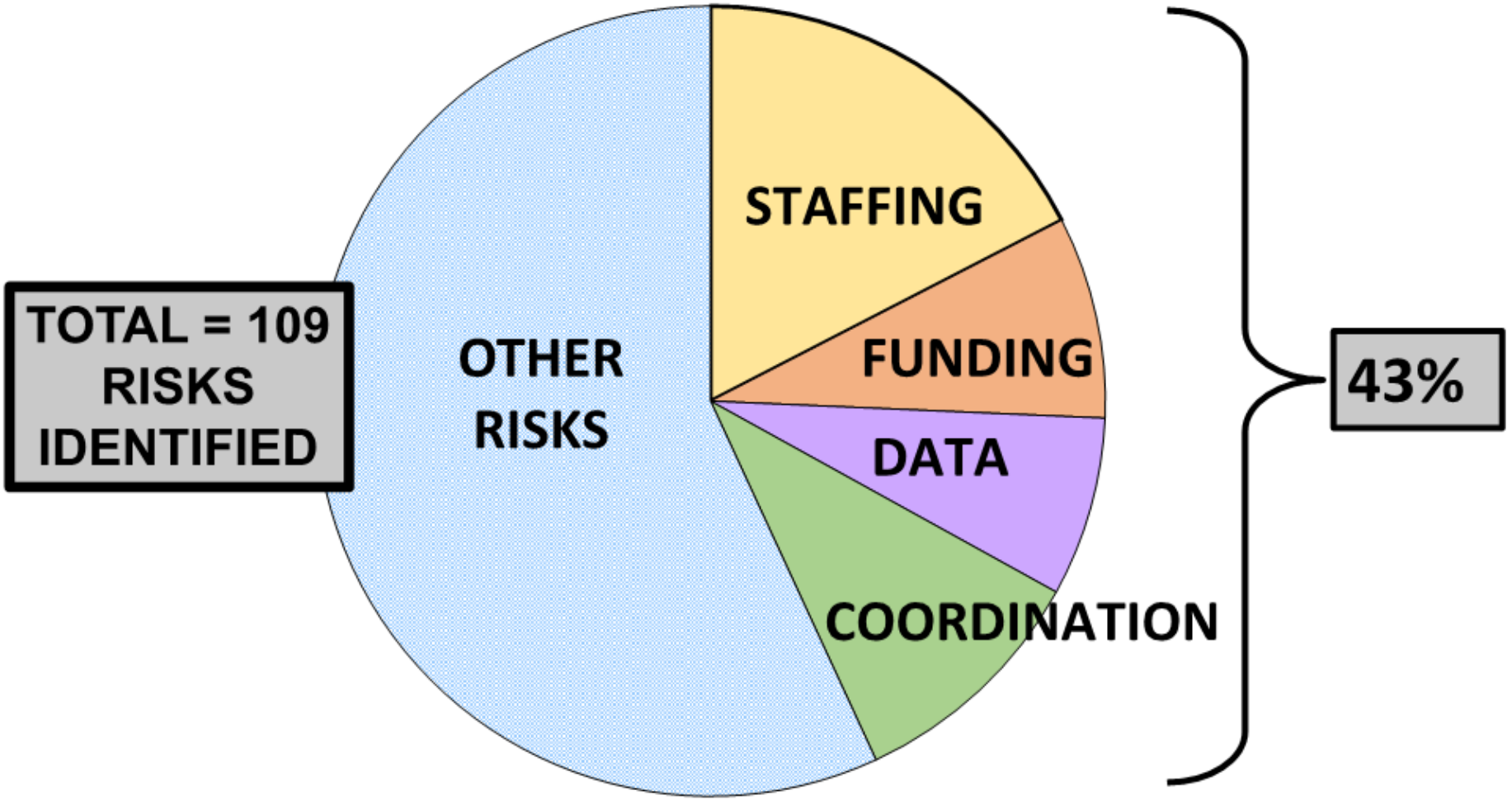
Greater Focus on:

RISK MANAGEMENT

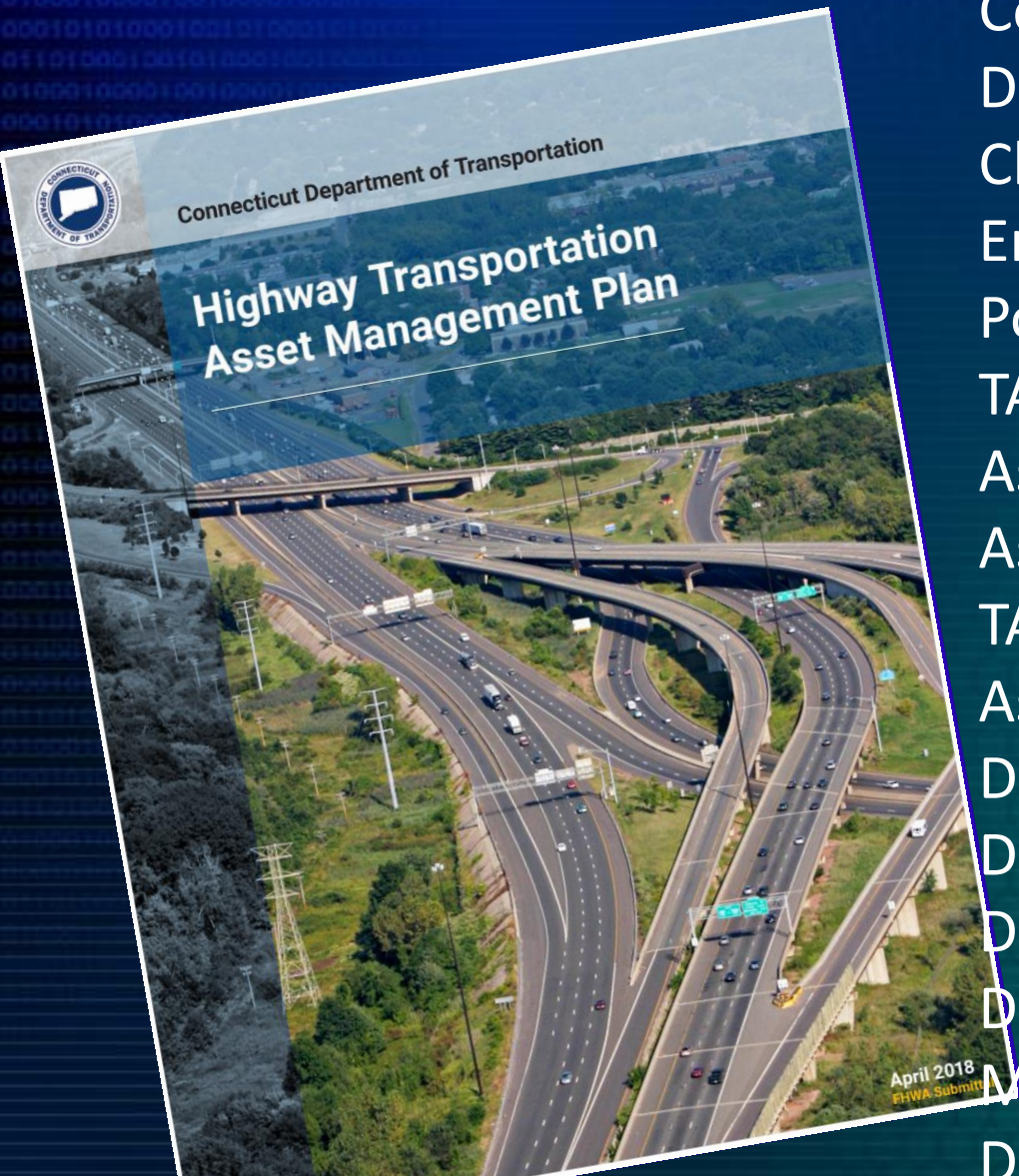
109 Risks Identified



Distribution of Risk Topics



TAM Program Support



Commissioner
Deputy Commissioner
Chief Engineer
Engineering Administer
Policy & Planning Bureau Chief
TAM Engineering Group
Asset Stewards
Asset Working Groups
TAM Consultant
Asset Steering Committee:
Division Chief Facilities & Transit
Division Chief Highway Engineering
Division Chief Bridge Engineering
Division Chief Traffic Engineering
Manager Capitol Services/Finance
Director Maintenance Highway

TAM Teamwork

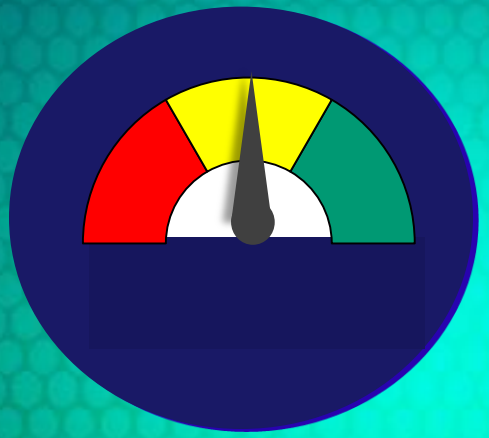
- Leadership
- Key Roles: CT TAM Group, Asset Stewards, Asset Working Groups, FHWA-CT, TAM Consultant
- Collaboration & Cooperation
- Training & Outreach
- Asset Management Culture




TAM Process Improvements

'Moving the Performance Needles'

- **Project Prioritization**
- **Programming Recommended Work**
- **Asset Management Driving the Financial Plan**
- **Refining Investment Strategies**



Incremental Change

5/25/2018

Example:

Instructions: Enter proposed project attribute information in the areas indicated below. This information will be used for preliminary scope review and priority determination as well as completing a funding eligibility determination. This completed form should be submitted to the Engineering Administrator for consideration prior to preparing the

PROPOSED PROJECT INFORMATION

Type: 52 - RECONSTRUCTION - ADD CAPACITY

FHWA Improvement Type: 10 - BR REPLACE - ADDED CAPACITY

Transportation Mode: H - Highway

Adds Capacity: Yes

Project Dev Engineer: Dattilio,Paul F — Phone: — Email: — Employee ID:

Project Manager: Garcia, Alvaro — Phone: 860-594-3353 — Email: alvaro.garcia@ct.gov — Employee ID:

- ✓ **ASSETS IDENTIFIED &**
- ✓ **PROJECTED IMPACT LISTED IN JUSTIFICATION**

Description: NHS - Rehabilitate Bridge ... maintain a State of Good Repair and to add capacity to Bridge No. 00001 carrying I-95 ... the Bridge.

The 10/06/08 Bridge Inspection Report identified Structural Deficiencies to the Superstructure, which made this Bridge Structurally Deficient ...

New York ... Technical Memorandum dated April 2018, *"I-95 Improvements - Feasibility Evaluation Study (Greenwich to New Haven)"*, evaluated the feasibility of adding one ... improvements between Bridgeport and New Haven. Based on this Technical Memorandum and prior meetings within the Department, the widening of Bridge No. 00001 was identified as an "early start" project to accommodate for the "Combined Section" at this bridge.

Justification: ***This project affects one asset type (bridge), as identified in the Department's TAMP, and will help towards improving on the CTDOT Performance Measure of **95% for State Maintained Roadway Bridges in a State of Good Repair (by number)**. This project will improve this metric by 0.02%. Also, for the Federal Performance Measures of under **10% NHS Structurally Deficient (by deck area)** and **% NHS Poor (by deck area)**, this project will improve both of these metrics by 0.5%. The Federal Measure of **%NHS Good (by deck area)** is not affected by this project.***

Proposed Work Areas:

Work Area ID	Total Area	Towns	District	MPO	COG	Urban Area	Population
3459	0.022 Sq.Mi.	Greenwich	3	South Western	Western CT	Bridgeport-Stamford, CT-NY Urbanized Area	877630

Assets

Pavement Treatment: Yes

Bridge Assets:

	Bridge No.	Length (ft)	Suff. Rtg.	Struct. Def.	Func. Obsc.	Work Type	Work Codes
Select	00001	1262	48.3	Yes	Yes	RHB	L
Select							

Traffic Signal Assets:

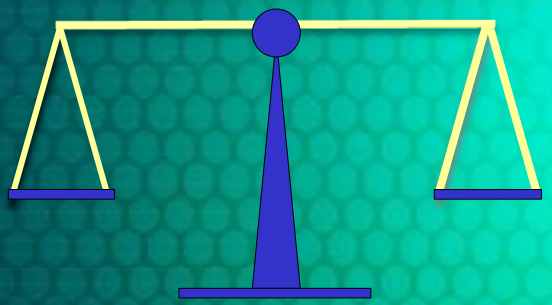
No Signals were found.

Sign Structures:

No Signs were found.

TAM Process Improvements/Challenges

- Verify Performance Expectations
- Standard Operating Procedures for Projections and Asset Valuation
- Objective Quantitative Assessment of Risks & Opportunities
- Prioritizing Next Assets to include in the TAMP
- Balancing the Needs



Assets for CTDOT Future TAMPs

- Geotechnical
- Guiderail
- Curb Ramps
- Sidewalks
- Lighting & Illumination
- Fleet
- Buildings
- ITS
- Drainage
- Rumble Strips
- Noise Walls . . .

Q. How are we going to measure performance?

?

?

Q. Other transition plans: MASH, ADA, CBYD, MS4 ?

Q. How will data be collected and updated?

?

TAM Process Improvements / Challenges

- Aligning with other National Goal Areas and Initiatives such as Freight, Safety & Congestion Mitigation
- Addressing Technology /Asset Management Software Needs

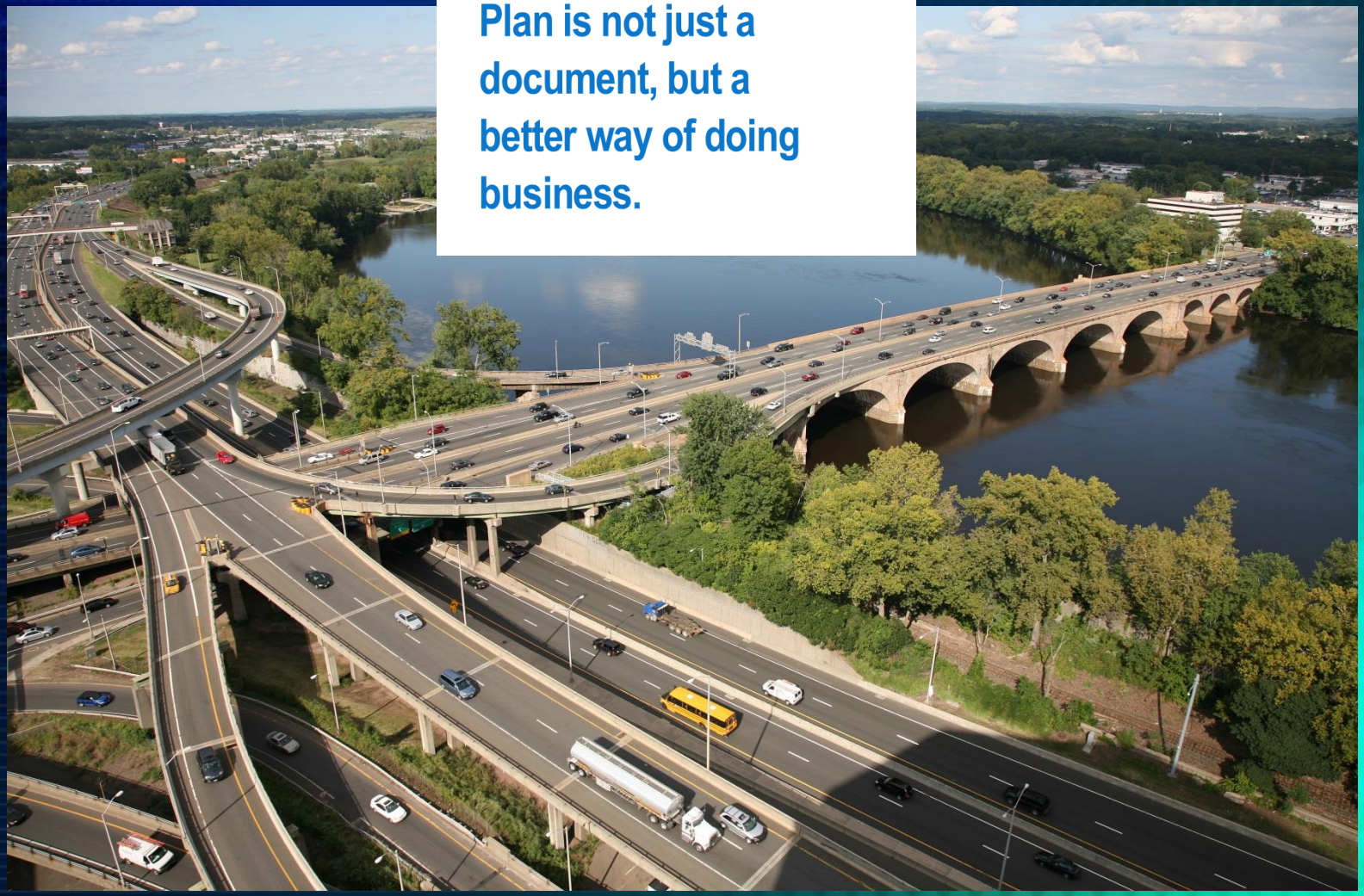
Pioneering Change

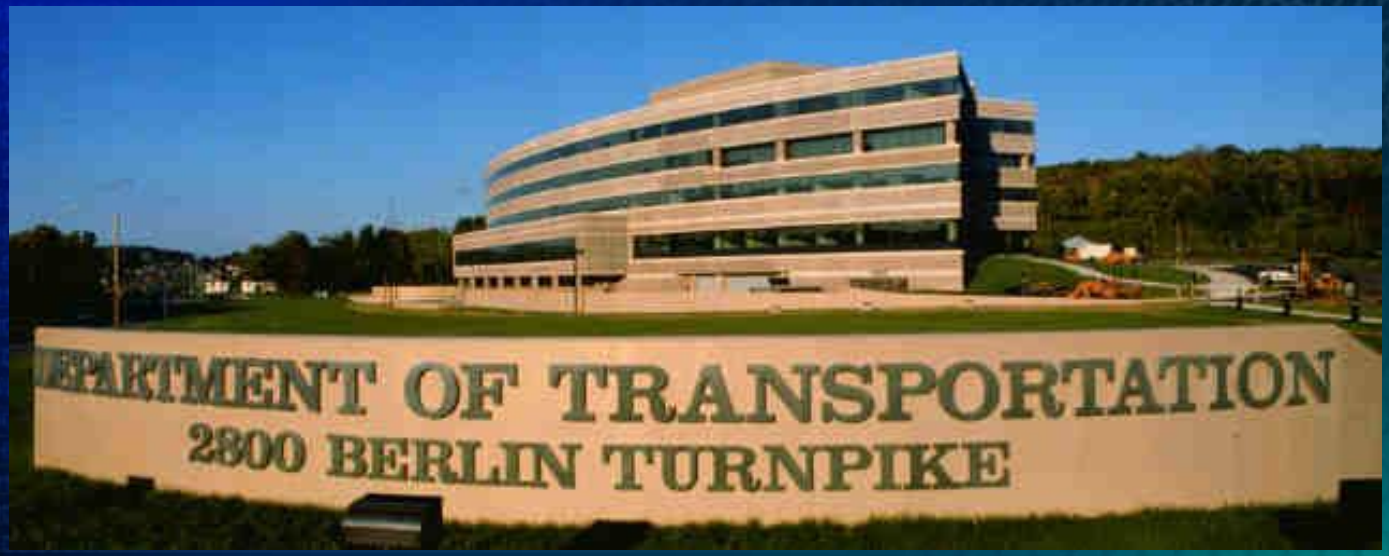
What's Next - 2019 TAMP

- Mitigation Plan for Priority Risks
- Projections for Sign Supports
- Update TAMP with latest inventory & condition data, rerun projections and reassess targets

TAMP

A Transportation Asset Management Plan is not just a document, but a better way of doing business.





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Connecticut Department of Transportation
Transportation Asset Management Group