
DEPARTMENT OF TRANSPORTATION

Shannon Foss | Asset Management Planning Director

July 16th, 2018

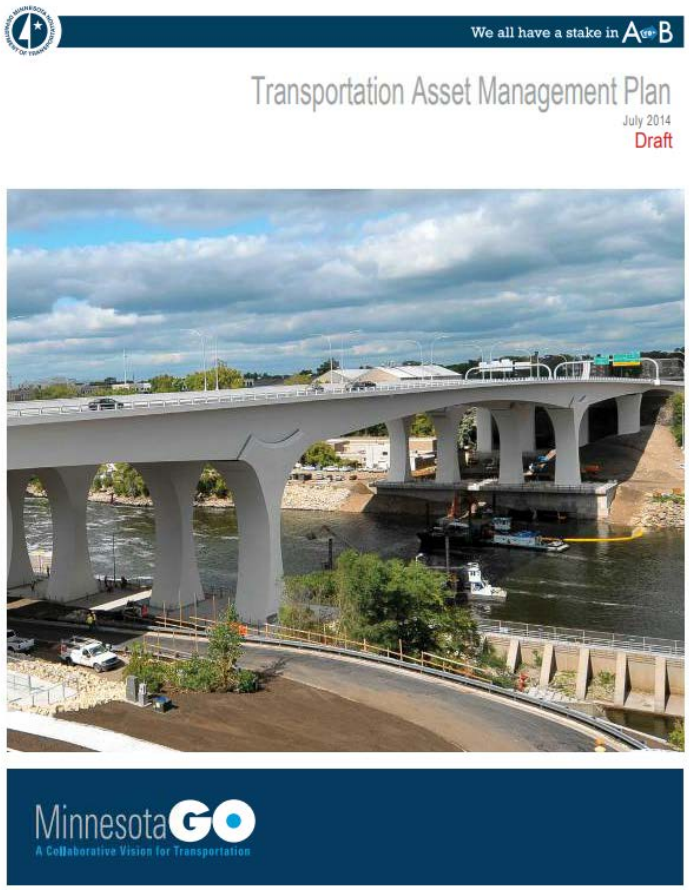
# Developing a Risk-Based Transportation Asset Management Plan

DEPARTMENT OF TRANSPORTATION

# Timeline

- 2012 - MAP-21 TAMP Legislation
- 2014 - Minnesota completed a ***Pilot TAMP***
- 2016 - Final federal rule released
- 2018 - ***TAMP 2018*** - Draft federal submission completed in April
- 2019 - Final federal submission due in June

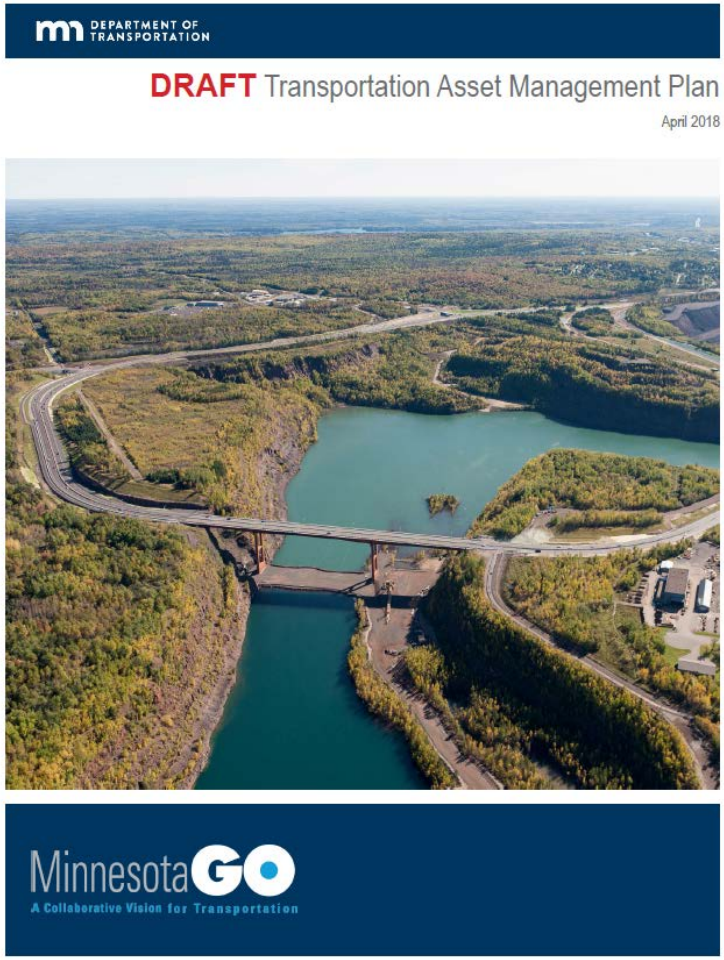
# 2014 Pilot TAMP




- Consultant - Applied Pavement Technology
  - Writing
  - Technical Guide
- Sub consultant - Paul D. Thompson
  - LCCA – Life Cycle Cost Analysis
- 6 assets
  - Pavements, Bridges, Overhead Sign Structures, High-Mast Light Towers, Culverts, Deep Stormwater Tunnels

# TAMP 2018

- Completed in-house
- Updated Pilot TAMP
- Retired Technical Guide
- Added 6 additional assets
  - Noise Walls, Signals, Lighting, ITS (Intelligent Transportation Systems), Pedestrian Infrastructure, Buildings
- 154 Pages



# Example of Asset Folio in TAMP

## BRIDGES (INCLUDING LARGE CULVERTS)

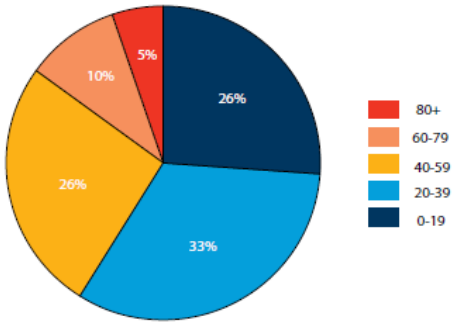
Bridges are large, complex and expensive assets that are custom-designed and built to satisfy a wide variety of requirements. Large culverts 10 feet and greater are also included in the bridge inventory. MnDOT's bridge inventory includes all bridge structures ten feet and greater. There are currently 3,875 bridge structures over 20 feet. The remaining 920 structures are 10 feet or greater but less than 20 feet or are non-automobile bridges.

Figure 4-11: Bridge Inventory and Replacement Value

| SYSTEM / FUNCTIONAL CLASSIFICATION | BRIDGE COUNT | BRIDGE DECK AREA (SQ. FT.) | BRIDGE CURRENT REPLACEMENT VALUE | BRIDGE CULVERTS COUNT | BRIDGE CULVERTS CURRENT REPLACEMENT COST |
|---|---|---|---|---|---|
| NHS | 1,621 | 31,444,986 | $8.8 billion | 745 | $470 million |
| Non-NHS | 1,377 | 18,504,855 | $5 billion | 1,058 | $329 million |
| **TOTAL (State Highway)** | **2,998** | **49,949,841** | **$13.8 billion** | **1803** | **$799 million** |

Notes: NHS do not include locally-owned NHS bridges (23); replacement values range from $50/ sq. ft. to $820/sq. ft. depending on bridge type, size and complexity; MnDOT has initiated a process to collect locally-owned NHS pavement and bridge data (i.e. material type, AADT, construction and treatment history, design details), and will be developing a solicitation process that aligns with the state-owned NHS investment direction

Figure 4-12: Bridge Age Profile (by deck area in sq. ft.)




### Data Collection, Management, and Reporting Practices

**Data Collection:**

- Data collection based on National Bridge Inspection Standards (NBIS), AASHTO and MnDOT requirements
- Most bridges are inspected every other year in Minnesota (some more or less frequently based on inspection results)
- Districts perform/supervise inspections with some centralized management and Quality Assurance/Quality Control of data collected

**Data Management:**

- Structure Information Management System (SIMS) used to enter, submit and manage inspection data
- Bridge Replacement and Improvement Management (BRIM) tools used to analyze data

**Data Reporting:**

Bridge inspection and inventory reports available through MnDOT's website and the SIMS application

Figure 4-13: Bridge Condition Rating Scale (Based on NBIS Rating Scale)


Figure 4-14:Bridge Current Condition, Targets, and Investment to Achieve Targets in 2027 Based on State Performance Measures

| SYSTEM | 2017 CONDITION (% POOR) | TARGETS (% POOR) | INVESTMENT REQUIRED TO ACHIEVE TARGETS |
|---|---|---|---|
| NHS | 4.7% | ≤ 2% | $1.1 billion |
| Non-NHS | 2.1% | ≤ 8% | $430 million |
| **TOTAL** | **4.3%** | **NA** | **$1.5 billion** |

Note: NHS does not include locally-owned NHS bridges (23)

### Federal Bridge Performance Measures and Targets

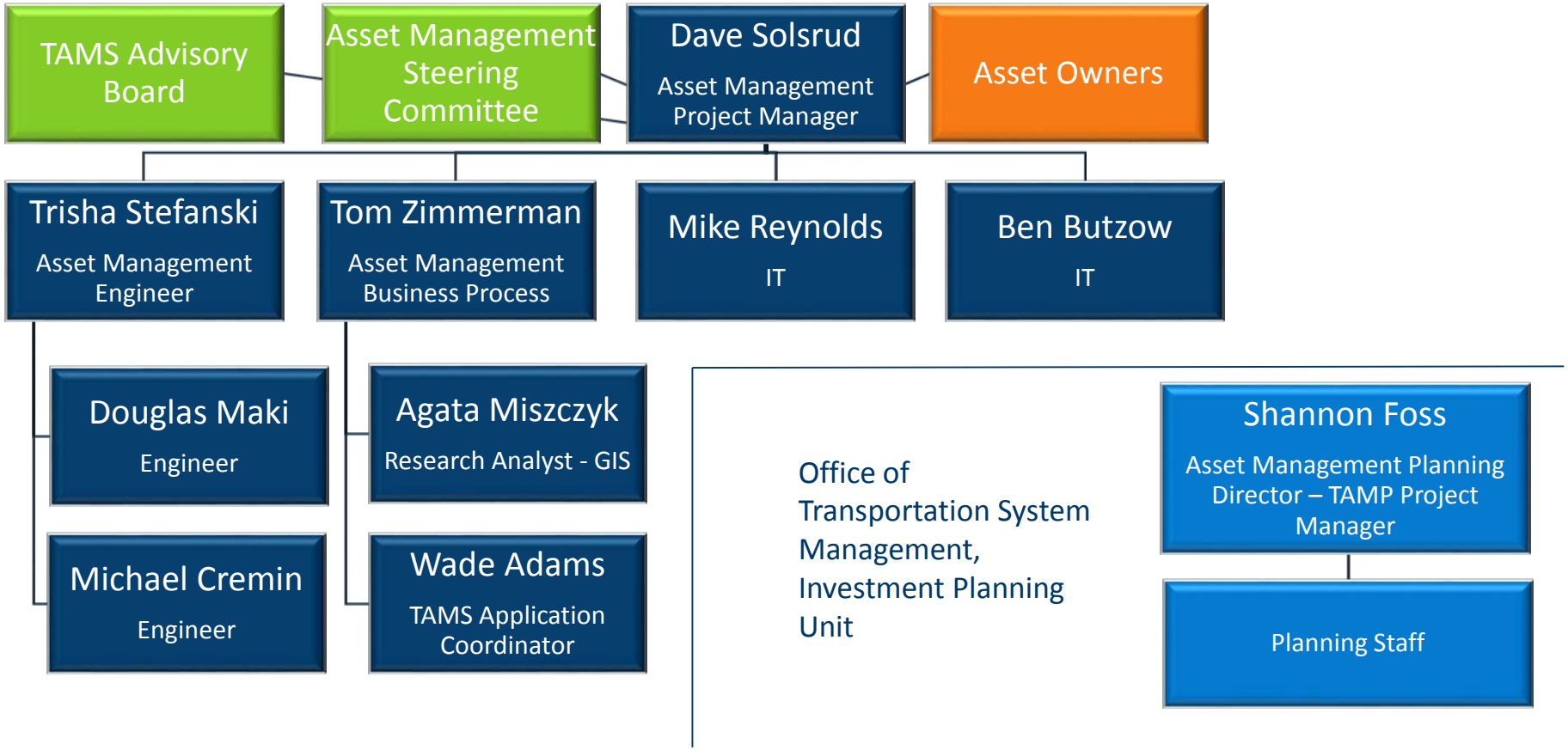
The federal performance bridge measures are based on NBI condition ratings.

Figure 4-15: Bridge Current Condition, Targets, and Investment to Achieve Targets in 2027 Based on Federal Performance Measures

| SYSTEM | 2017 CONDITION (% GOOD) | 2017 CONDITION (% POOR) | TARGET (% GOOD) | TARGET (% POOR) | INVESTMENT REQUIRED TO ACHIEVE TARGETS |
|---|---|---|---|---|---|
| NHS | 47.4% | 1.5% | TBD | TBD | TBD |
| **TOTAL** | **NA** | **NA** | **NA** | **NA** | **TBD** |

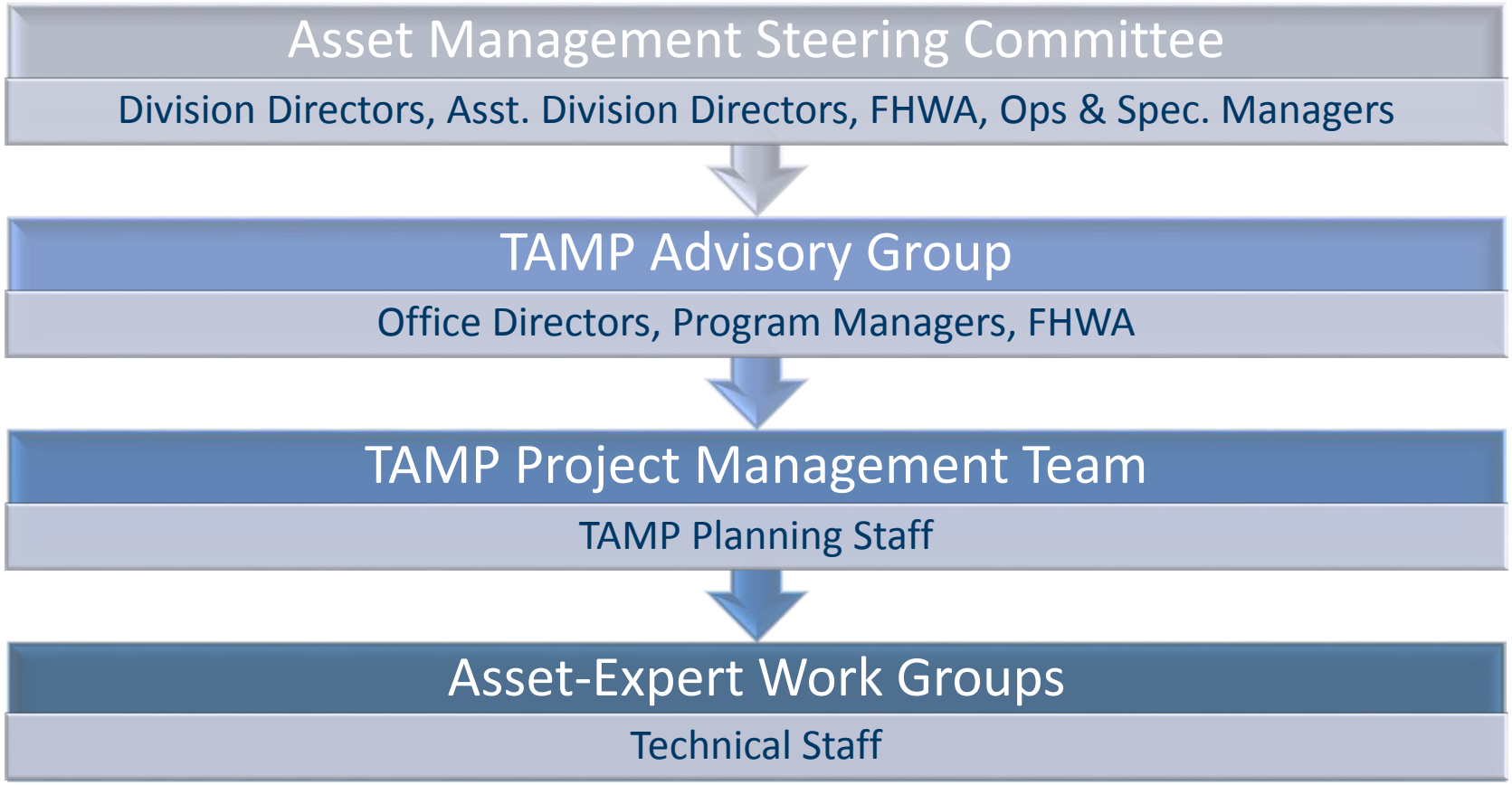
# Asset Management Organization

Tim Henkel – Modal Planning & Programming  Management Division – Assistant Commissioner
Jean Wallace – Assistant Division Director

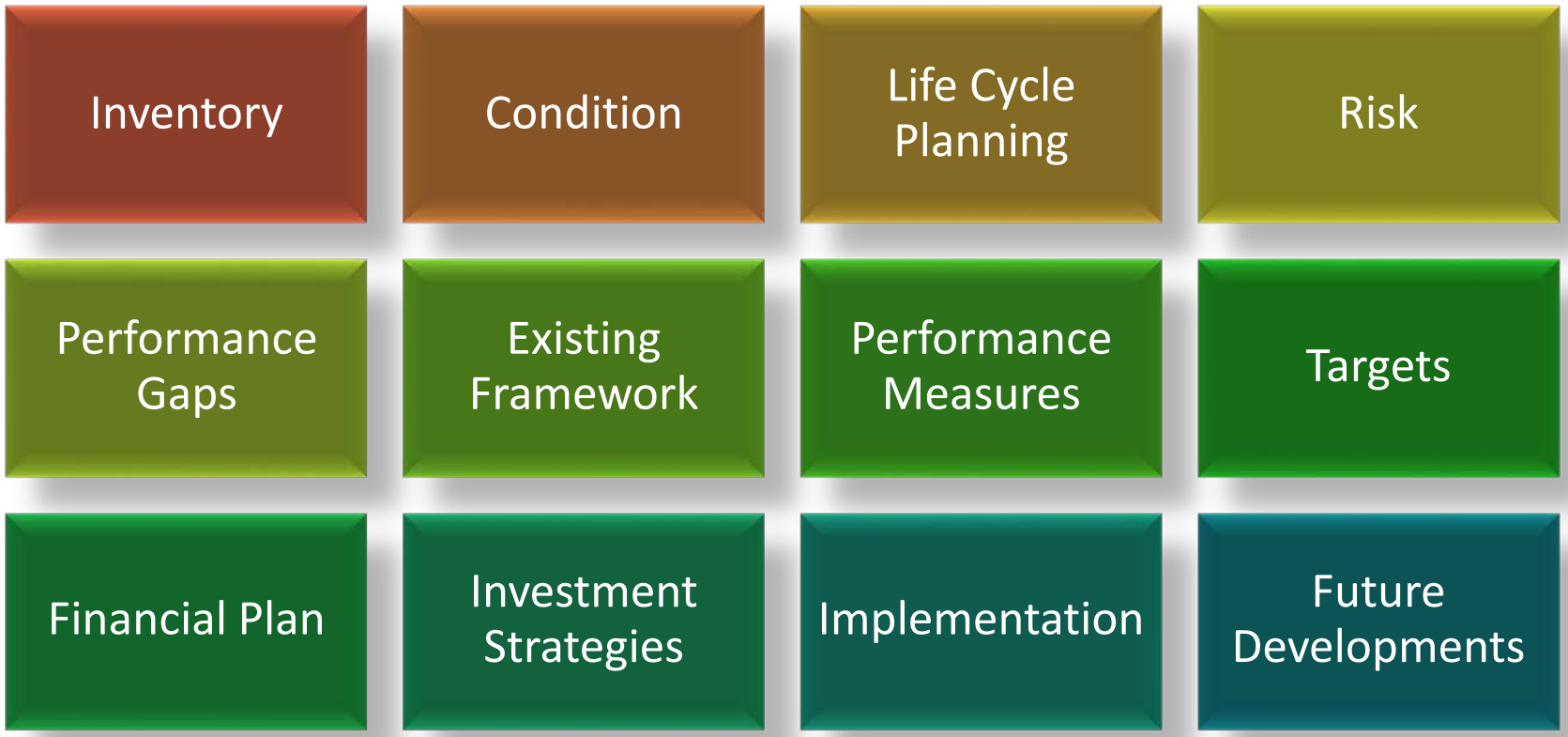


# Teams

**Asset Management Planning Director – TAMP Project Manager**



# TAMP 2018 Development



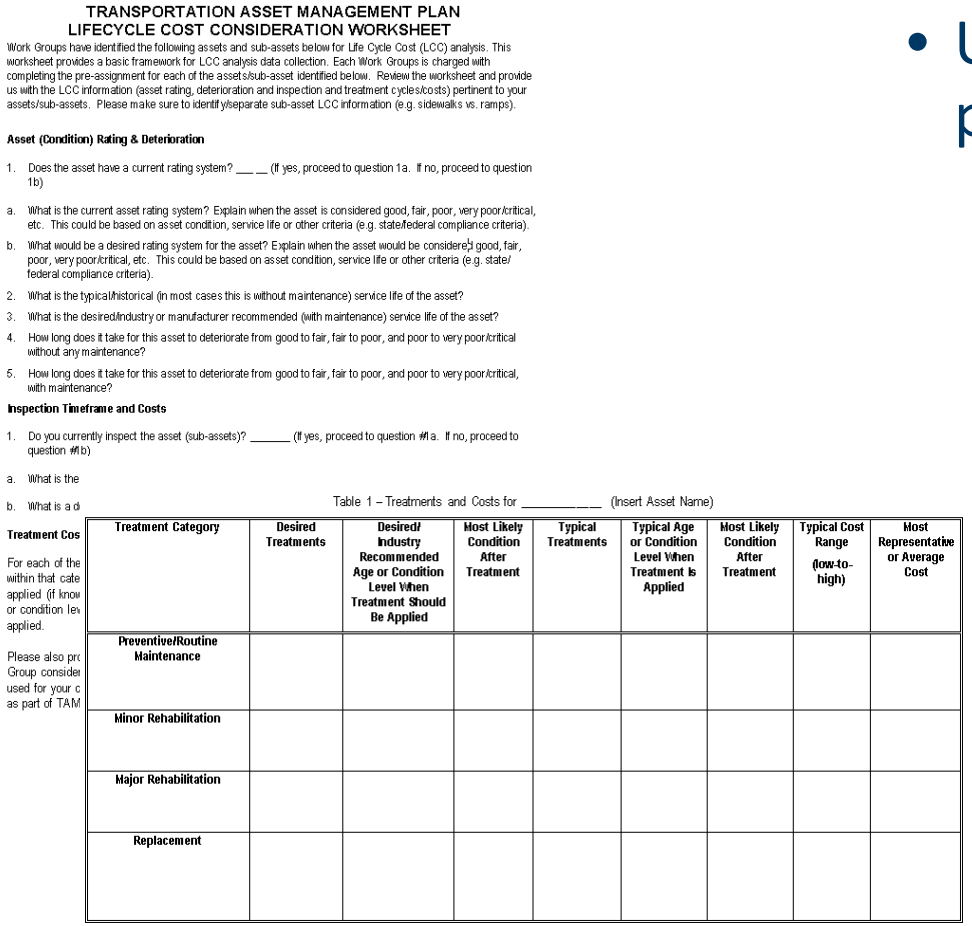
# Assets Included – NHS and non-NHS

| Asset Classes | | | |
|---|---|---|---|
| Pavements | Bridges | Culverts | Deep Stormwater Tunnels |
| High Mast Light Towers | Overhead Sign Structures | Pedestrian Infrastructure | ITS |
| Noise Walls | Traffic Signals | Roadway Lighting | Buildings |

# Assets Included – NHS and non-NHS

| Asset Sub-Classes | | | | |
|---|---|---|---|---|
| Concrete Pavement | Bituminous Pavement | Large Culverts | Small Culverts | Wood Noise Walls |
| Concrete Noise Walls | Curb Ramps | Sidewalks | Driveways with Sidewalk | Pedestrian Bridges |
| Rest Areas | Weigh Stations | Small/Medium Truck Stations | Large Truck Stations | Salt Sheds |
| Heated Storage Sheds | Unheated Storage Sheds | Office Buildings | Miscellaneous Buildings | Fiber Communication Network |
| Fiber Network Shelters | Traffic Management System Cabinets | Dynamic Message Signs | Traffic Monitoring Cameras | Traffic Detector Stations |
| Communication Equipment | MnPASS Readers | Reversible Road Gates | Ramp Meters | Rural Intersection Conflict Warning Systems |
| Road Weather Information System Sites | Automatic Traffic Recorders | Weigh-In-Motion Sites | Road Closures | |

# Worksheets and Tools



**TRANSPORTATION ASSET MANAGEMENT PLAN**
**LIFECYCLE COST CONSIDERATION WORKSHEET**

Work Groups have identified the following assets and sub-assets below for Life Cycle Cost (LCC) analysis. This worksheet provides a basic framework for LCC analysis data collection. Each Work Groups is charged with completing the pre-assignment for each of the assets/sub-asset identified below. Review the worksheet and provide us with the LCC information (asset rating, deterioration and inspection and treatment cycles/costs) pertinent to your assets/sub-assets. Please make sure to identify/separate sub-asset LCC information (e.g. sidewalks vs. ramps).

**Asset (Condition) Rating & Deterioration**

1. Does the asset have a current rating system? ___ __ (If yes, proceed to question 1a. If no, proceed to question 1b)

a. What is the current asset rating system? Explain when the asset is considered good, fair, poor, very poor/critical, etc. This could be based on asset condition, service life or other criteria (e.g. state/federal compliance criteria).

b. What would be a desired rating system for the asset? Explain when the asset would be considered good, fair, poor, very poor/critical, etc. This could be based on asset condition, service life or other criteria (e.g. state/ federal compliance criteria).

2. What is the typical/historical (in most cases this is without maintenance) service life of the asset?

3. What is the desired/industry or manufacturer recommended (with maintenance) service life of the asset?

4. How long does it take for this asset to deteriorate from good to fair, fair to poor, and poor to very poor/critical without any maintenance?

5. How long does it take for this asset to deteriorate from good to fair, fair to poor, and poor to very poor/critical, with maintenance?

**Inspection Timeframe and Costs**

1. Do you currently inspect the asset (sub-assets)? _____ (If yes, proceed to question #1a. If no, proceed to question #1b)

a. What is the

b. What is a di

**Treatment Cos**

For each of the within that cate applied (if know or condition lev applied.

Please also pro Group consider used for your c as part of TAM

Table 1 – Treatments and Costs for _____ (Insert Asset Name)

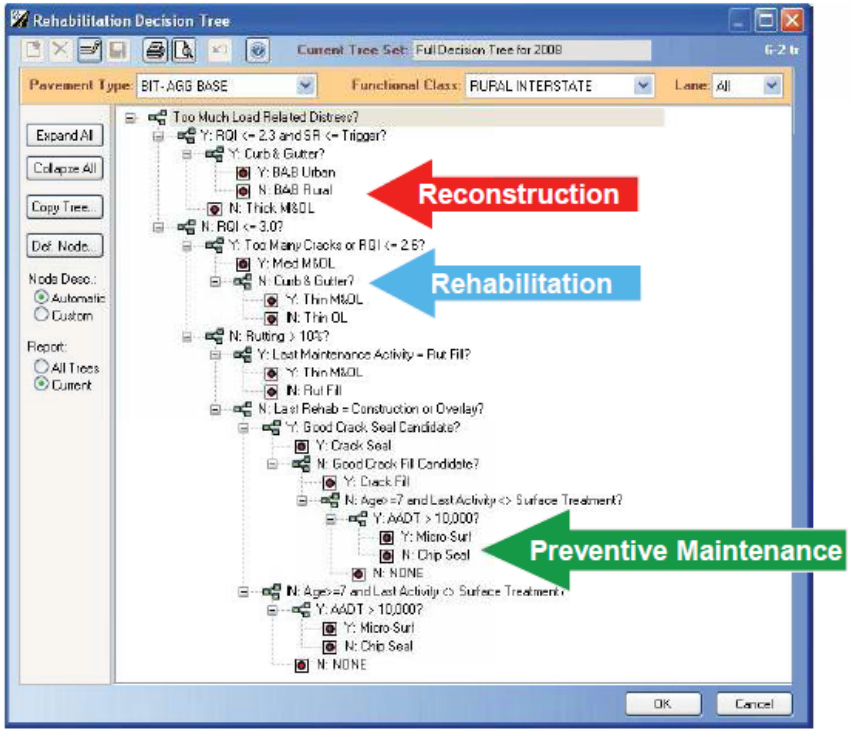
| Treatment Category | Desired Treatments | Desired/ Industry Recommended Age or Condition Level When Treatment Should Be Applied | Most Likely Condition After Treatment | Typical Treatments | Typical Age or Condition Level When Treatment Is Applied | Most Likely Condition After Treatment | Typical Cost Range (low-to-high) | Most Representative or Average Cost |
|---|---|---|---|---|---|---|---|---|
| Preventive/Routine Maintenance | | | | | | | | |
| Minor Rehabilitation | | | | | | | | |
| Major Rehabilitation | | | | | | | | |
| Replacement | | | | | | | | |

- Using worksheets through the planning process, we learned:
  - They ensure consistency
  - They make future updates more efficient
  - It is not a “one size fits all” approach for all 12 asset classes
  - Consistent reporting aides the “cross-asset” decision making process
  - Can easily apply to other assets

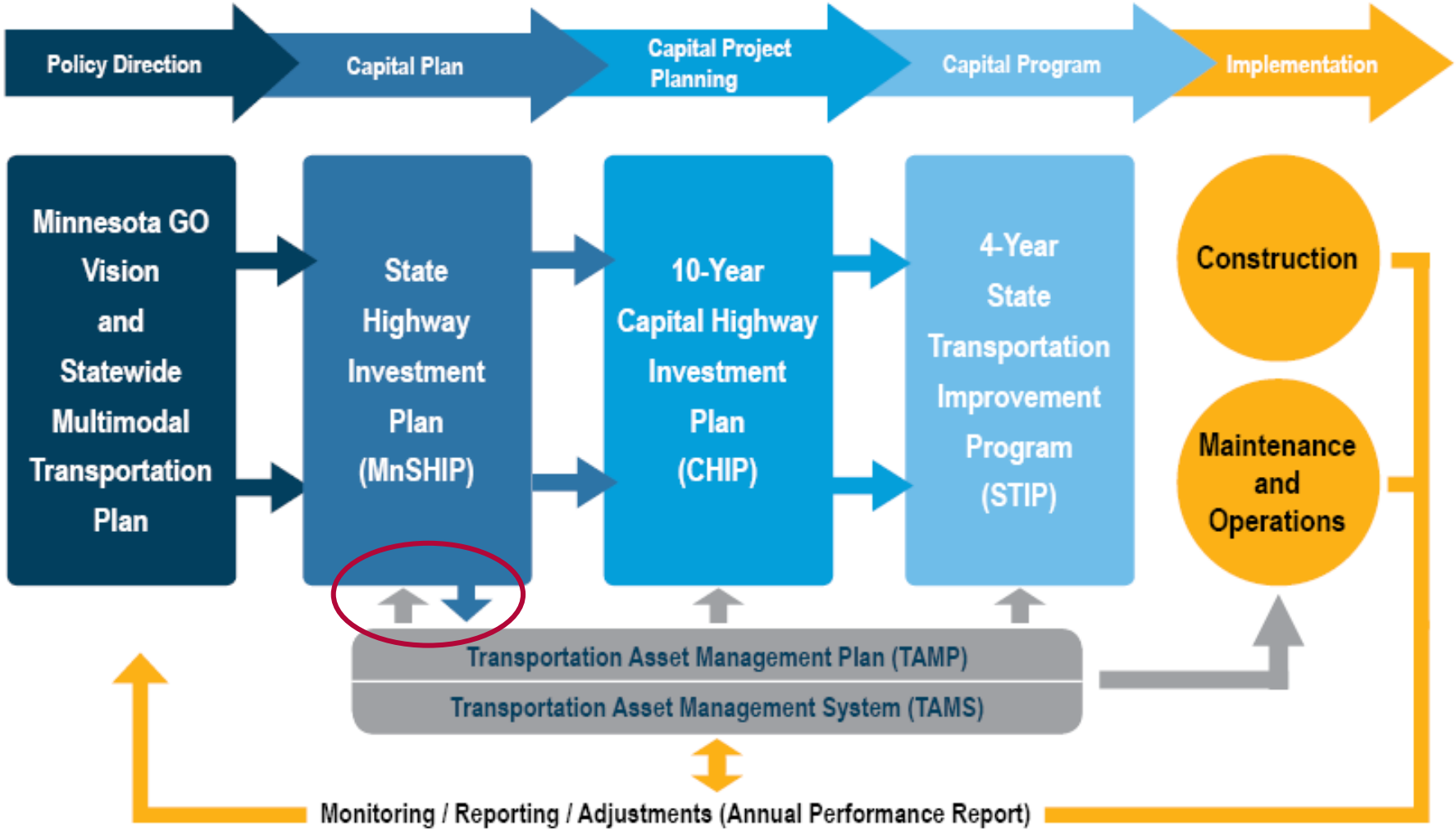
# Asset Management Systems

- TAMS – Transportation Asset Management System
  - Traffic Signals, Lighting, ITS, Hydraulics, and Traffic Barriers
- HPMA – Highway Pavement Management Application
- BRIM – Bridge Replacement and Improvement Management
- Excel Spreadsheets

Figure 5-4: HPMA Decision Tree



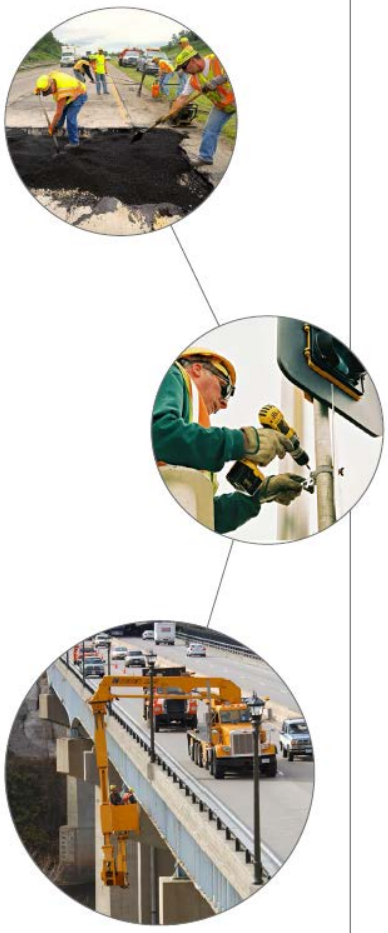
# Planning & Programming Framework



# Lessons Learned

- TAMP development methodology worked well
- Risk-based setting/proposal of targets for “other assets” beneficial
- Rapid response made to asset risk assessed in pilot: inspection and remediation of OSS structures
- Increase in “other asset” funding levels in State Highway Investment Plan (MnSHIP)
- Pilot led to creation of Asset Management Project Office and Asset Management Steering Committee
- Need better understanding of deterioration for many asset classes
- Move from a reactive to proactive approach for managing assets

# Next Steps



- Communications and Implementation Plan
- Complete research needs, risk mitigation strategies, and process improvements identified Chapter 9: Implementation and Future Developments
- Support (decentralized) district decision making
- Advance the culture of asset management

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# Thank you!

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