



Roadside Infrastructure Life Cycle Planning

“Dontcha know” all asset classes are important?

Trisha Stefanski, PE

How To Talk “Minnesotan”

- “Dontcha know” If you need a random Minnesotan phrase to shove in any sentence and still make complete sense to another Minnesotan, this is the phrase. Honestly, this saying **means absolutely nothing**.
- “Uff-da” You can express any sort of emotion with this **one word**
- “Hotdish” You might call this a **casserole** or something like that, but in the upper midwest, it’s a hotdish.
- “You betcha” Just like it sounds, “you betcha” is a way to **agree with someone** or say yes.
- “Skol” This Norwegian word used by Vikings actually means **cheers and to good health**.

MnDOT TAMP: From Pilot to Draft

MnDOT Timeline

2014 – Pilot TAMP Completed

One of 3 states

2017 – TAMP2 Started

Conducted planning processes

2018 – TAMP2 Completed

Pilot Updated with “TAMP2” Efforts



TAMP Roadside Infrastructure Assets

HYDRAULIC INFRASTRUCTURE – PILOT TAMP

- Deep Stormwater Tunnels
- Highway Culverts

OVERHEAD SIGN STRUCTURES – PILOT TAMP

HIGH-MAST LIGHT TOWERS – PILOT TAMP

NOISE WALLS

- Wood
- Concrete

TRAFFIC SIGNALS

ROADSIDE LIGHTING

PEDESTRIAN INFRASTRUCTURE

- Curb Ramps
- Sidewalk
- Driveway with Sidewalk
- Pedestrian Bridge

TAMP Roadside Assets Cont.

BUILDINGS

- Rest Areas
- Weigh Stations/ Scales
- Class 2 and 3 Truck stations (small and medium)
- Class 1 Truck stations (large)
- Salt sheds
- Storage sheds (heated or partially heated)
- Storage sheds (unheated)
- Office Buildings
- Miscellaneous Buildings

INTELLIGENT TRANSPORTATION SYSTEMS

- Fiber communication network
- Fiber network shelters
- Traffic Management System (TMS) cabinet
- Dynamic Message Signs
- Traffic monitoring cameras
- Traffic Detector Stations/Site-loops and radar
- Communication Equipment
- MnPASS Readers
- Reversible Road Gates
- Ramp meters
- Rural Intersection Conflict Warning Systems (RICWS)
- Road Weather Information Systems Sites (RWIS)
- Automatic Traffic Recorders (ATR)
- Weigh-In-Motion System Sites (WIM)
- Road Closure

Why Add Roadside Infrastructure Assets?

- Valuable Assets = \$4.7B
- Enhance Tradeoff Decisions
- Decrease Agency Risk
- Set Performance Measures
- Lower Life Cycle Costs
- “Uff-da”



STATE HIGHWAY SYSTEM ASSETS	UNIT/COUNT
Pavements Roadway Miles	14,331
Bridges	4,801
Highway Culverts	40,687
Deep Stormwater Tunnels	8
Overhead Sign Structures	1,858
High-Mast Light Towers	478
Noise Walls	434
Signals and Lighting (Signal systems and pole mounted lighting)	28,566
Pedestrian Infrastructure (Curb ramps and pedestrian bridges)	21,273
Buildings	875
Intelligent Transportation Systems	14,310

Life Cycle Planning (LCP)

GOAL:

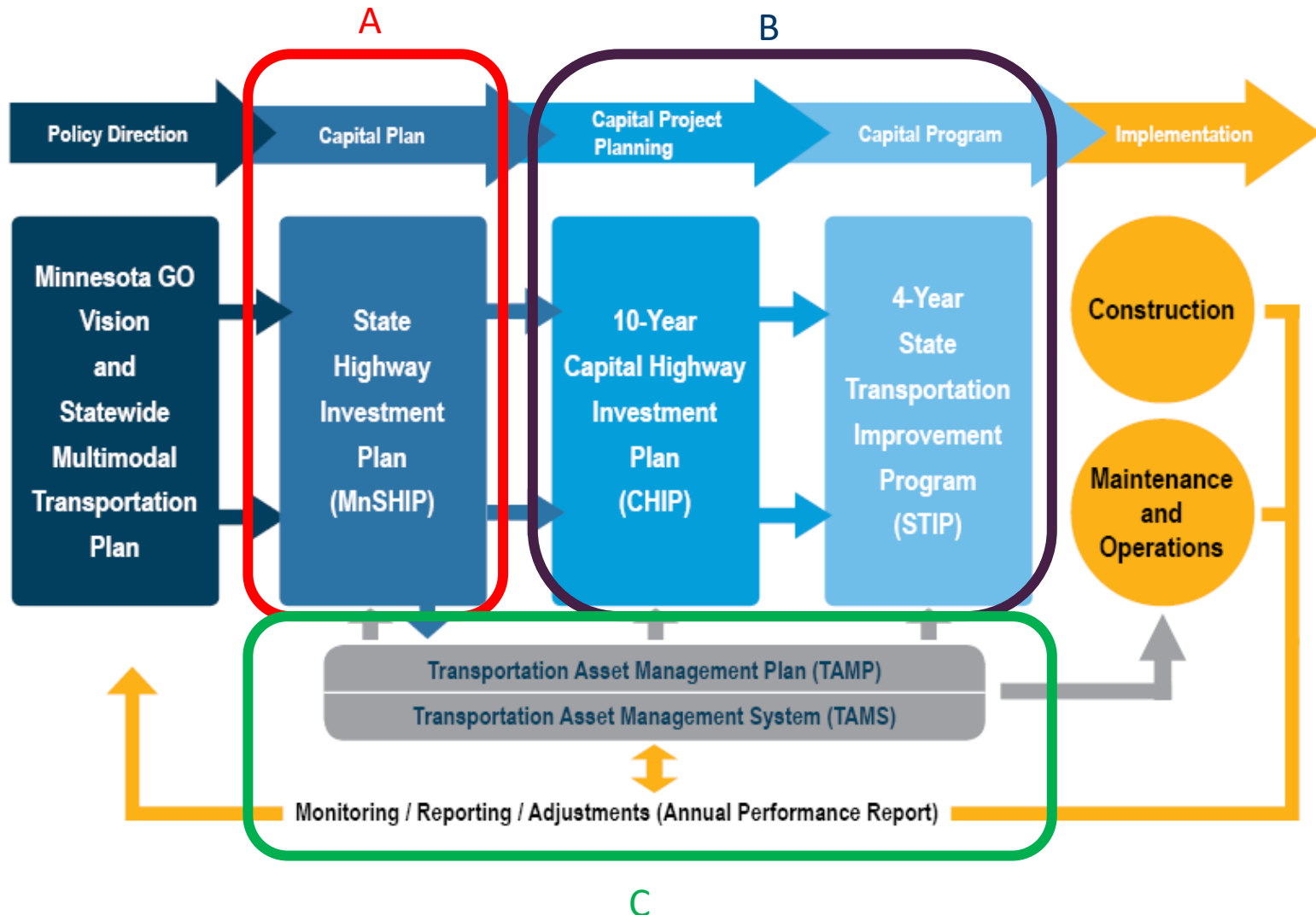
Which investments, made today, are most cost-effective in the long-term to keep the infrastructure in service for as long as feasibly possible?

MnDOT “HOTDISH”:



- A. Performance Based Long Range Planning
- B. Life Cycle Cost Based Project Alternative Selection
- C. Life Cycle Management Strategies for Individual Assets

Applying Life Cycle Planning at MnDOT



Roadside Assets:

(A) Performance Based Long-Range Planning

Figure 6-5: System Stewardship Performance Targets and Outcomes

INVESTMENT CATEGORY	SYSTEM	TARGET	PROJECTED OUTCOMES (2037)
Pavement Condition	Interstate	2.0% poor (or less)	4.0% poor
Pavement Condition	Other NHS	4.0% poor (or less)	8.0% poor
Pavement Condition	Non-NHS	10.0% poor (or less)	18.0% poor
Bridge Condition	NHS	2.0% poor (or less)	5.0% poor
Bridge Condition	Non-NHS	8.0% poor (or less)	7.0-8.0% poor
Roadside Infrastructure Condition	Culverts	10.0% poor (or less)	14.0-15.0% poor
Roadside Infrastructure Condition	Deep Stormwater Tunnels	10.0% poor (or less)	23.0-24.0% poor
Roadside Infrastructure Condition	Overhead Sign Structures	6.0% poor (or less)	25.0% poor



Roadside Assets:

(A) MnSHIP Performance Based Long-Range Planning

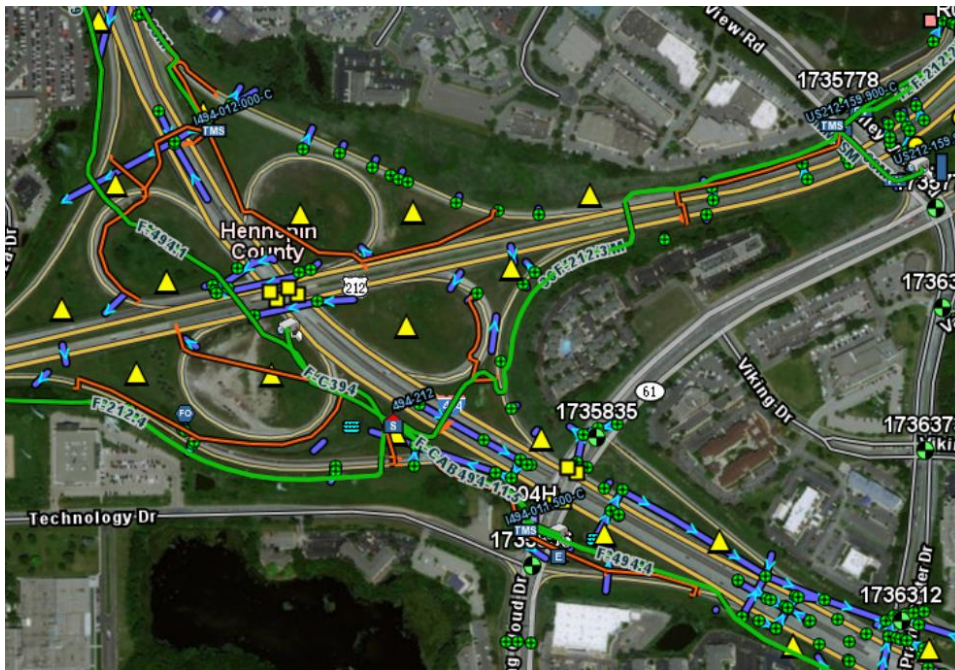
- Performance Levels For Each Investment Category:
 - Minimum maintenance
 - Minimally meet performance requirements
 - Maintain investment
 - Reduce funding scenarios
- Roadside Infrastructure Rationale For Adjusting Existing Direction

Maintain approximate current investment amount. Prioritize investment concurrent with pavement and bridge projects. Proactively address high-risk elements with stand-alone projects.

Figure 6-4: Investment Direction by Time Periods

INVESTMENT CATEGORIES	FY2018-2021	FY2022-2023	FY2024-2037
Pavement Condition	33.5%	47.3%	52.9%
Bridge Condition	15.6%	8.2%	9.7%
Roadside Infrastructure	8.7%	6.9%	7.7%
Jurisdictional Transfer	0.0%	0.5%	0.5%
Facilities	0.0%	0.4%	0.5%
Traveler Safety	4.2%	3.1%	3.1%
Twin Cities Mobility	5.7%	6.8%	0.0%
Greater Minnesota Mobility	0.0%	1.4%	0.0%
Freight	2.8%	2.7%	3.0%
Bicycle Infrastructure	0.8%	0.5%	0.6%
Accessible Pedestrian Infrastructure	1.8%	2.4%	2.7%
RCIP	3.3%	1.2%	1.0%
Project Delivery	14.3%	15.7%	16.0%
Small Programs	6.1%	2.8%	2.3%

Roadside Assets:



- Align Needs With Bridge or Pavement Project
- Utilize Life Expectancy
 - Concrete Noise Walls
- Evaluate Materials
 - Culvert materials can be tailored to local soil acidity in consideration of MnDOT's maintenance costs.

Roadside Assets:

(C) LCP Management Strategies Per Asset

Figure 6-15: Culvert Maintenance and Repair Activities

TREATMENT	UNIT	COST/UNIT
Inspection	Each	\$70
Cleaning	Each	\$380
Reset Ends	Each	\$3,000
Joint Repair	Each	\$3,300
Pave Invert	Linear Foot	\$22
Replace Ends	Each	\$5,800
Slipliner	Each	\$12,000
Cured Inplace Liner	Each	\$25,000
Trench Replacement	Each	\$38,000
Jack Replacement	Linear Foot	\$788



Figure 6-20: Signals Maintenance and Repair Activities

TREATMENT	UNIT	COST/UNIT
Reactive Maintenance	Each	\$399
Operations Check	Each	\$380
Electrical Preventative Maintenance	Each	\$124
Electronic Preventative Maintenance	Each	\$132
Replace LED indicators	Each	\$20,000
Replace Electronics	Each	\$30,000
Structural Inspection	Each	\$1,000

Roadside Assets:

Buildings Workshop

- For lifespan, use inspection data (condition ratings) and treatment costs (20-100 years useful life)
- Tools of life cycle cost worksheet
 - Typical Remaining Useful Life curve
 - Treatment cost charts and activities (Maintenance/Rehab)

[illegible]

Roadside Assets:

(C) LCP Management Strategies Per Asset

Pedestrian Infrastructure Workshop:

Typical Life-Cycle Management Strategy – **Central business district (CBD) sidewalks**

(Unit = block length of 300 ft.)

Typical Age (years)	Age Range (years)	Treatment	Typical Treatment Cycle (years)	Typical Condition When Applied	Typical Cost (\$ /unit)	Cost Range (\$ / unit)
0	0	Initial cost of Sidewalk	50	Reconstruction	\$26,000	-
10	0-10	Major rehabilitation (panel replacement)	40	Varies	\$1,240	-
20	20-40	Preventative Maintenance (grinding)	20 years or as needed	Varies	\$400	-
30	30-40	Major rehabilitation (panel replacement)	40	Poor	\$1,240	-
40+	N/A	End of Analysis Period	N/A	N/A	N/A	N/A

Roadside Assets: (C) LCP Management Strategies Per Asset

LCCA Results

Figure 6-16: Life Cycle Results (Highway Culverts)

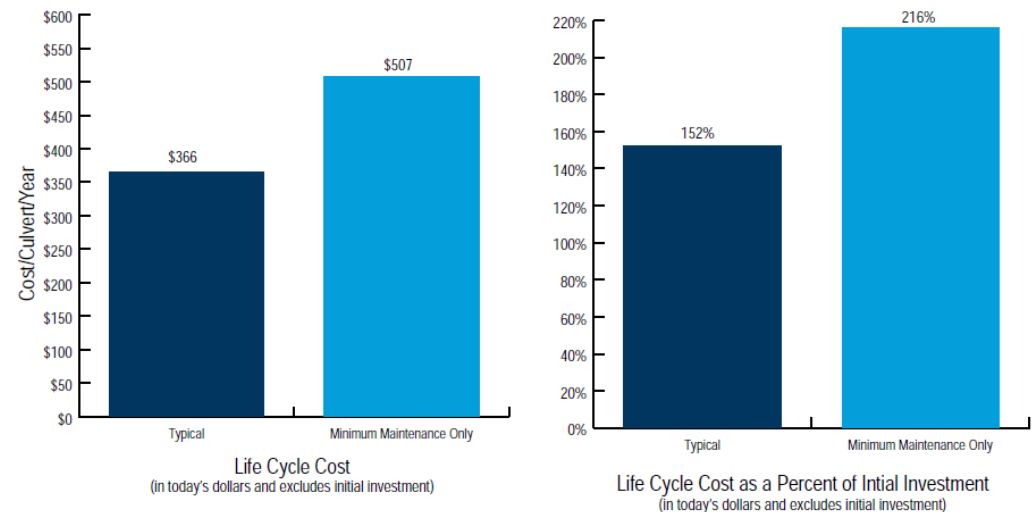
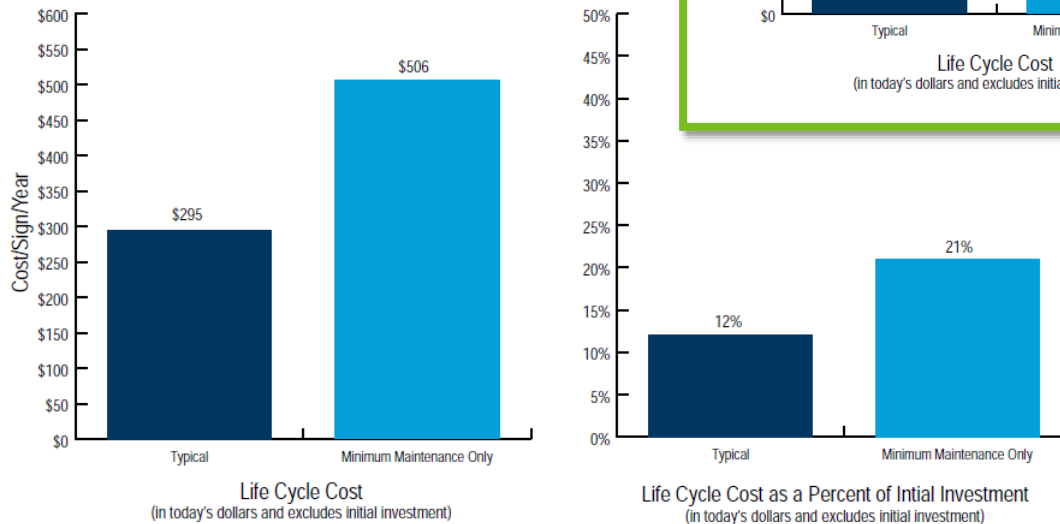
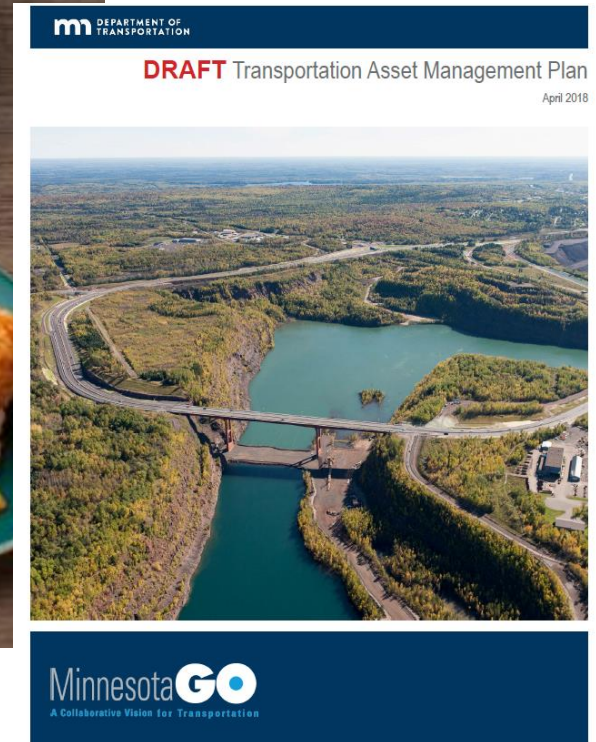


Figure 6-18: Life Cycle Results (Overhead Sign Structures)



Voila “HOT DISH”!!



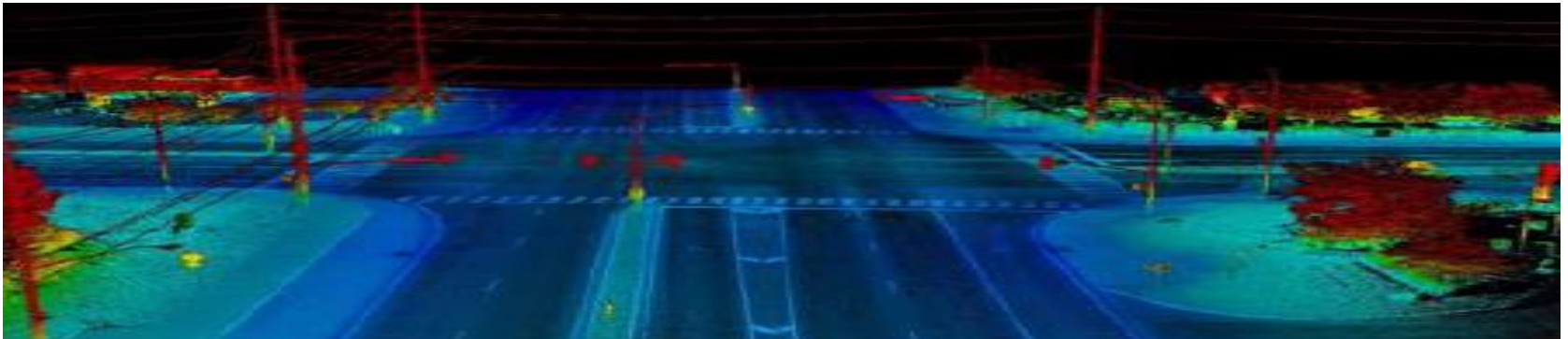
Challenges Encountered and Lessons Learned

- Do We Have The Data and Is The Analysis Accurate?
 - Current Inventory
 - Condition or Age
 - What are Lifespans (Min Maintenance vs Typical)
 - Deterioration Rates
- What Is The Best Approach?
 - Condition, Age (Obsolescence), Compliance, Categories
- Huge Time Commitment for Facilitators and Experts
- Have Worksheets for Asset Experts



Successes..."YOU BETCHA"!!

- Several Groups of Stakeholders and Heavy Involvement
- LiDAR Inventory and Assessment Project
- As-Built Special Provision
- NEW Enterprise Asset Management Software (TAMS)



SKOL and Thank You!



Trisha.Stefanski@state.mn.us

651-234-7993