Identifying TMS Trajectory & Needed Resources

Pete Marshall
HDR

Session 1 Presentations:

1 | Opportunities to Plan for Next Generation TMSs

2 | Setting a Strategic Direction for TMSs

3 | Planning and Plans to Support TMS Improvements

4 | Identifying Needed TMS Improvements and Resources

Identifying Needed TMSs Improvement and Resource

Are the proposed plans, projects, and resources available to incorporate TMS improvements into agency or regional planning activities and plans?

Red text = opportunities to incorporate TMSs into agency planning processes and plans

Stakeholder and Community Involvement

State/Regional Level Long Range Planning (20 years) — TIER 1
- Long Range Transportation Plan (LRTP) for states
- LRTP for Regions (developed by MPOs)
- TMSs integrated as a TSMO element in these plans

System Planning (5–10 years) — TIER 2
- DOT Strategic Plans
- TSMO Plans (Agency, Regional, or State level)
- TMS Self-Assessment
- TMS Strategic Plans (e.g., 5–10-year Plans for NextGen TMS & resource needs)

Program Planning (3-5 years) — TIER 3
- State Transportation Improvement Program (STIP)
- Transportation Improvement Program (Regional level)
- TMS Feasibility Study (e.g., NextGen TMS)
- Planning for New or Improved TMS (e.g., con ops, requirements)

Planning & Preparing for Day-to-Day Operations (1-3 years) — TIER 4
- Feasibility/Planning studies for sub-systems (e.g., database, ramp metering)
- TMS operations and maintenance budget (annual or biennial)
- TMS Procurement, Project Development & Implementation
- Implementation of operational strategies (e.g., TIM)

Day-to-Day Operations (Real-time to 1 year) — TIER 5
- Planning and programming resources needed for TMS day-to-day operation
- Allocating resources for TMS day-to-day operation (e.g., operators, maintenance, repairs)
- Monitoring, evaluating and reporting on TMS performance

Source: FHWA

2

Identifying Needed TMSs Improvement and Resource

Tier 2: System Planning (5 - 10 years)

- Focuses on strategic planning for transportation system

- *How does a TMS Multi-year Plan or study identifying proposed improvements fit into system plans?*

  - Strategic goals and objectives of a TSMO Plan

  "Reduce traffic congestion through improved traffic management"

  ➡ TSMO Plan goal may identify how a TMS may improve detection, response, and coordination to mitigate incidents

  - TSMO services, projects, and activities

  "Implement or upgrade traffic management center"

  ➡ Include list of proposed projects, costs, and resources needed to include TMSs in TSMO Plan, annual programs, and budgets

  - Conducting TMS Assessment and include needs in TSMO Plan
  - Developing TMS Plan identifying needed improvements to or prepare for the next generation of TMS (e.g., 5-10-year Plan)

1. **Strategic Foundations – See Chapter 5 on Strategic Elements**
   a. Why Transportation Systems Management and Operations (TSMO) Matters
   b. TSMO Plan Purpose
   c. TSMO Vision and Mission
   d. Strategic Goals and Objectives

2. **The TSMO Program – See Chapter 6 on Programmatic Elements**
   a. TSMO Program Objectives
   b. Organizational Structure
      i. Program Structure
      ii. Inter- and Intra-agency Integration
   c. Business Processes
      i. Budgeting and Accounting
      ii. Procurement and Contract Management
      iii. Administrative Processes
      iv. Quality Management and Continuous Improvement
      v. Systems Engineering
      vi. Performance Management, including Data Management and Decision Support
   d. Resources
      i. Staffing and Workforce Development
      ii. Resource Inventories and Asset Management
      iii. Financial
      iv. Research and Development
   e. Communication and Collaboration
      i. Internal Collaboration
      ii. Collaboration with External Partners
      iii. Communications, Marketing, and Outreach with Users

3. **Implementation and Deployment – See Chapter 7 on Tactical Elements**
   a. TSMO Services, Projects, and Activities
   b. Annualized Actions and Deployment
   c. Implementation Policies and Guidelines
   d. Performance Assessment

Sample TSMO Plan Outline
(Source: FHWA-HOP-17-017)

Identifying Needed TMSs Improvement and Resource

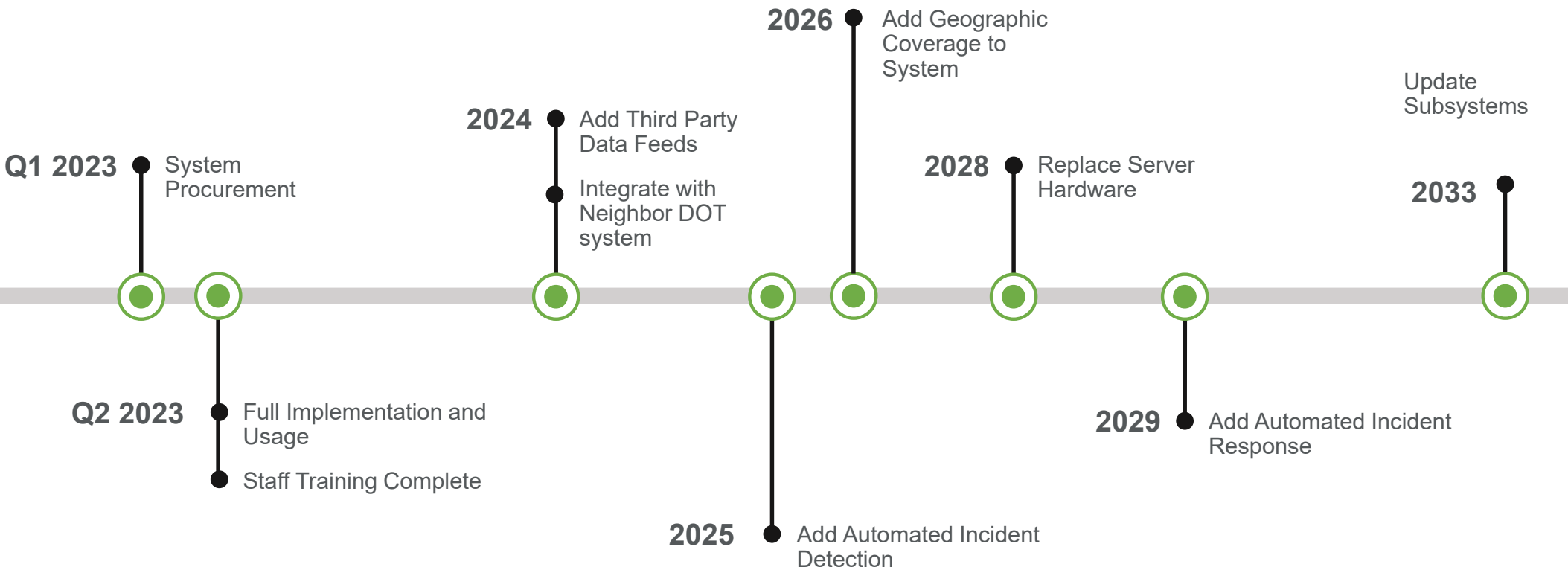## Tier 3: Program Planning (3 - 5 years)

- Focus on developing improvement programs

- Key processes and plans are Transportation Improvement Program (TIP/STIP) or specific agency plans (e.g., TSMO):

  -Shortlist of improvement projects to be deployed in 3-5 years (costs, schedule) in region and for each agency

- *How does a TMS Multi-year Plan or study identifying proposed improvements fit into program planning*?

  -TMS feasibility study identifying needed projects to improve or replace a TMS

  -Proposed TMS projects in TIP, STIP or budgets for funding

  ➡ TMS project to replace system software, adding new operational strategy, or enhancements (e.g., new service area)

FY 2021–2024 TRANSPORTATION IMPROVEMENT PROGRAM
for the National Capital Region

MARCH 2020

National Capital Region
Transportation Planning Board

Example: TMS Road Map of Planned Improvements (or trajectory)

Q1 2023 — System Procurement

Q2 2023 — Full Implementation and Usage

Staff Training Complete

2024 — Add Third Party Data Feeds

Integrate with Neighbor DOT system

2025 — Add Automated Incident Detection

2026 — Add Geographic Coverage to System

2028 — Replace Server Hardware

2029 — Add Automated Incident Response

Update Subsystems

2033

Planning for TMS Improvements

Scoping proposed improvement projects – issues to consider:

- Identify physical changes needed to TMS (Physical and technology dimension):
  - Devices and other technologies to add
  - Functions, services, and capabilities to add
  - Software interfaces and APIs to add or needed changes
  - Modifications to accommodate new sources of data
- Other enhancements needed to TMS to support proposed changes
- Actions and conditions to include in project to facilitate implementing project
- Items to include in project (e.g., design, plans, specifications, procurement documents)
- Funding for improvement project
- Funding and resources to support project

Planning for TMS Improvements

Changes and resources to support new projects – issues to consider:

- Adjustments to agency or TMS operating policies and procedures
- Changes to TMS operations procedures, operator tasks, or support services (e.g., IT)
- Updates to TMS inventory, documentation, and information to include in configuration management process (e.g., software, designs, specifications, contracts, warranties, product manuals, testing and acceptance results)
- Changes to asset management, maintenance, or repair actions (e.g., spares, new equipment, new data collected)
- Implementation coordination, resources, and support (e.g., stakeholder coordination, public outreach, and information to share (e.g., internal and external to agency)

Identifying Needed TMS Improvements & Resources:

Managing TMS improvement projects – issues to consider:
- Project management support:
  -Staff and technical expertise and services (e.g., review software, test plans)
  -Perform specific tasks (e.g., reviews, verify updates, coordinate with stakeholders)
  -Develop products (e.g., project updates, briefing material)
- Project development, procurement, implementation, and initiation actions:
  -Design and development of plans
  -Procurement documents, specifications, and estimates
  -Development, implementation, testing, and acceptance
  -Start up and transition operation to include new improvements
  -Add project information into TMS inventory and configuration management process
- Stakeholder coordination (e.g., meetings, reviews, status reports or updates)
- Public involvement or outreach (e.g., notices, updates, webpage)
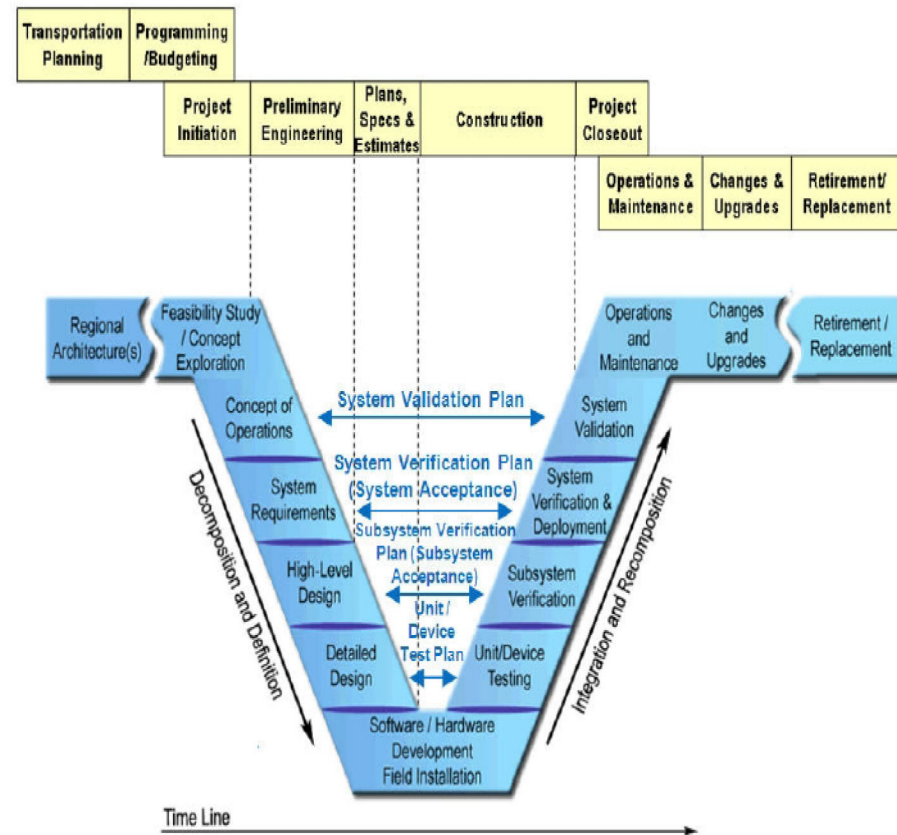
Identifying Needed TMS Improvements & Resources:

TMS *physical and technical requirements* - issues to consider:

- Identify concept of operations, use cases, and requirements established in planning and plans previously completed as inputs into project scope and design

- Develop requirements and performance measures unique to each element of project

- Develop designs, plans, documents, requirements, and specifications to support specific elements of TMS impacted by project (e.g., software, data, communication)

- Prepare plans to develop, test, verify, and accept elements of project

- Identify documentation, performance expectations, roles, and responsibilities of contractor and agency for each element and phase of project

- Develop plans, procedures, requirements, roles and responsibilities, and support resources to support the transition to TMS operation using new project elements

Identifying Needed TMS Improvements & Resources:

Project development – issues to consider:

- Reach a consensus among stakeholders
- Continually refine project scope, cost estimate, support resources needed, and schedule
- Involve stakeholders throughout project (e.g., initia scope development, design, implementation)
- Trace feasibility or planning study to scope development and requirements identified for TMS
- Identify analyses to be conducted and products produced (e.g., design, plans, implementation plan, testing and acceptance plans, procurement resources, cost estimate, needed support services)
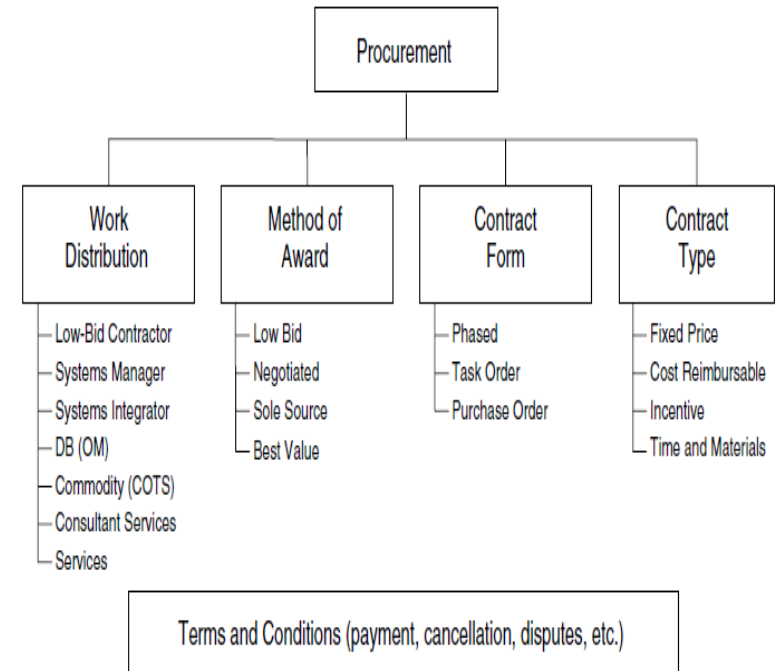- Approach to developing improvements (i.e., systems engineering or agile process)

Example Project Development Process (Source Tennessee DOT)

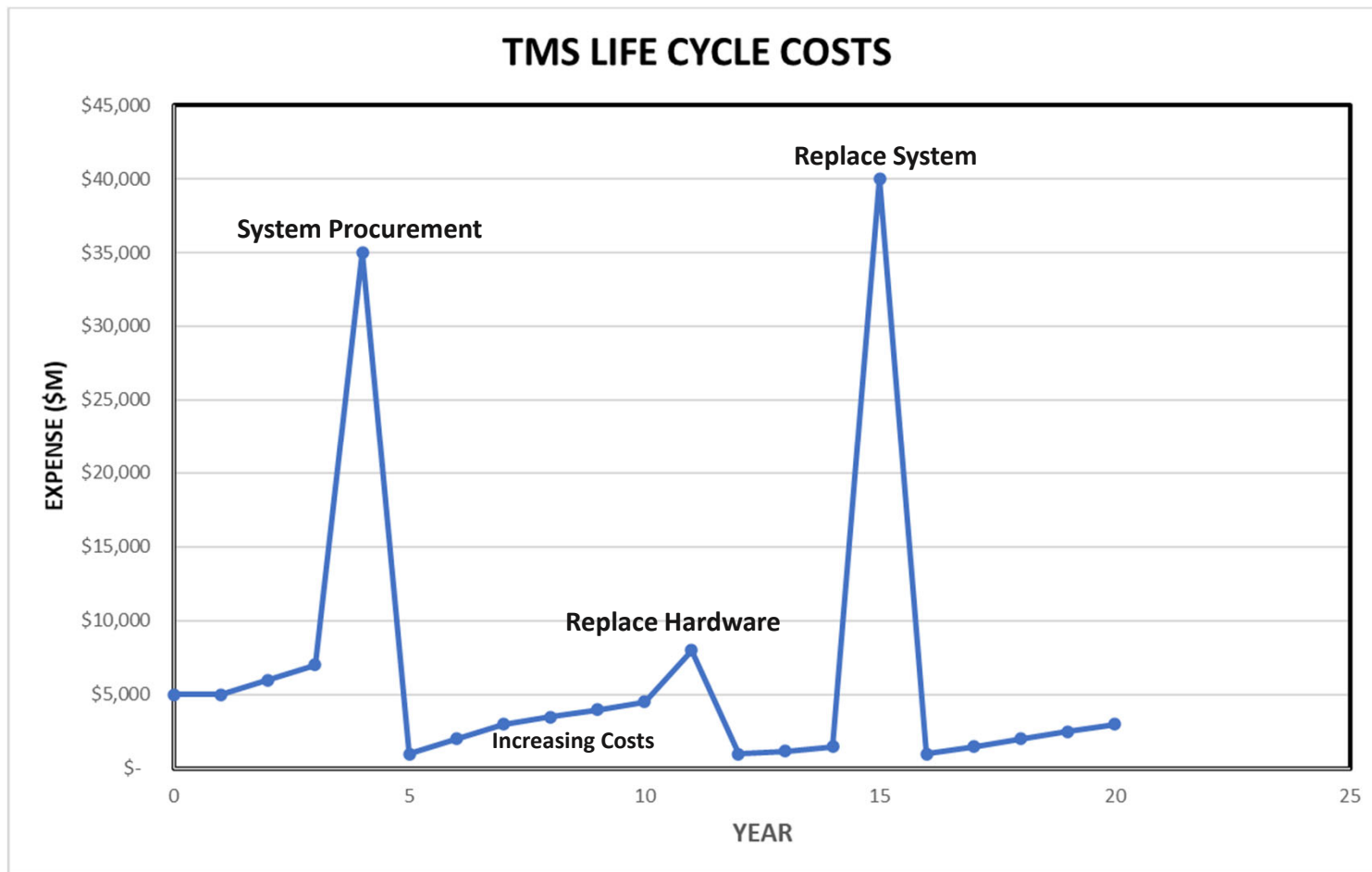## Identifying Needed TMS Improvements & Resources:

Procurement – issues to consider:
- Develop procurement strategy for project which may include multiple procurements and contracts
- Identify issues unique to each aspect or phase of project that may require separate procurement
- Select method, contract type, and issues to consider based on needs unique to each procurement (e.g., software, telecom, leasing vs purchase)
- Identify issues to include in procurement documents and contract (e.g., payment methods, procurement documents (e.g., advertisement, instructions to bidders, evaluation and selection criteria), plans and specifications, warranties or performance)


Procurement

| Work Distribution | Method of Award | Contract Form | Contract Type |

- Work Distribution: Low-Bid Contractor, Systems Manager, Systems Integrator, DB (OM), Commodity (COTS), Consultant Services, Services
- Method of Award: Low Bid, Negotiated, Sole Source, Best Value
- Contract Form: Phased, Task Order, Purchase Order
- Contract Type: Fixed Price, Cost Reimbursable, Incentive, Time and Materials

Terms and Conditions (payment, cancellation, disputes, etc.)

(Source: NCHRP Report 560)

Example: Cycle and Magnitude of Expenses for TMS Improvements

TMS LIFE CYCLE COSTS

Example: Management and Maintenance During Pavement Life Cycle to Minimize Overall Agency Costs and Improve Performance
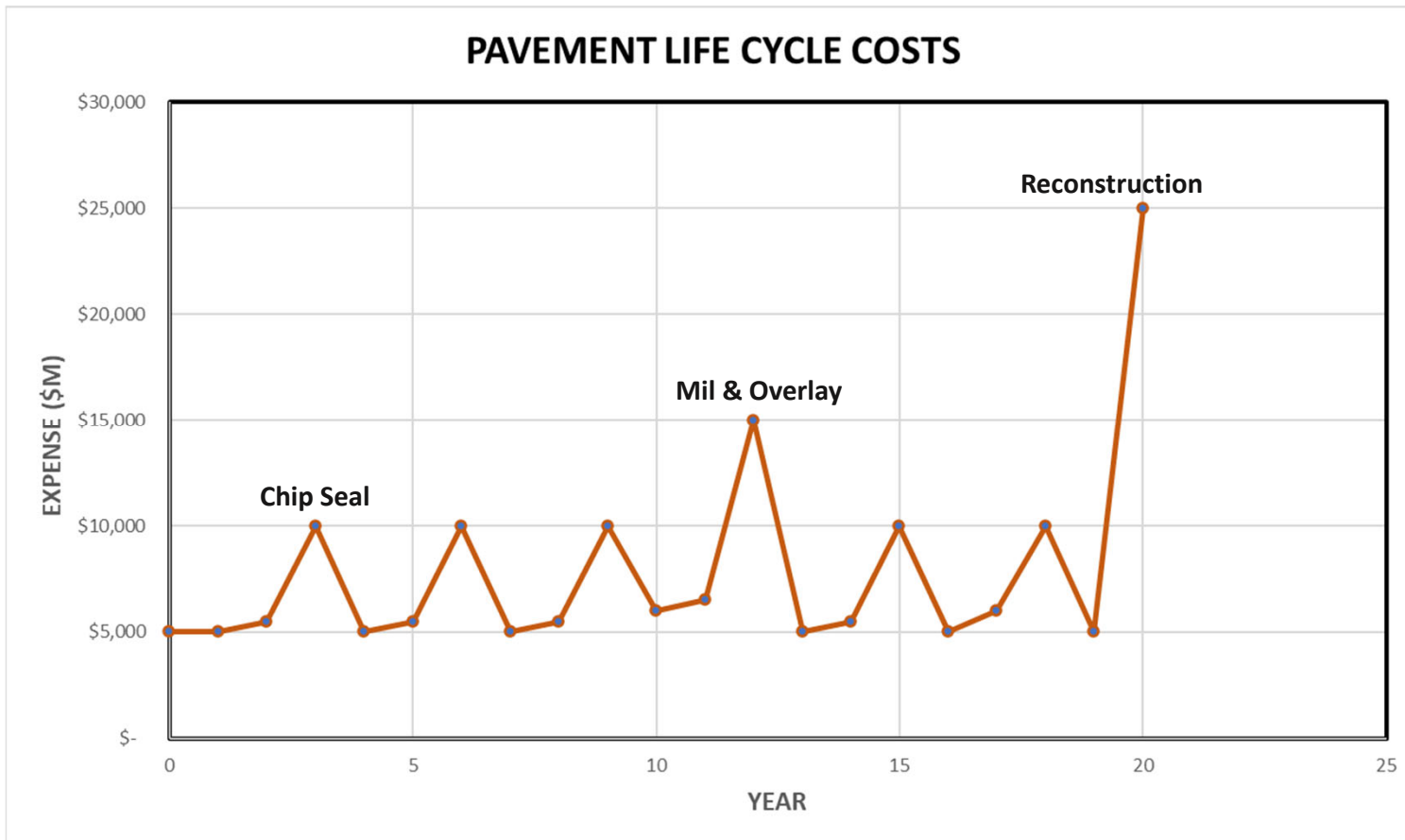
Identifying Needed TMS Improvements and Resources

Questions?

Thank you!