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Introducing the APWA Asset Management Road Map




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The slide features the same central graphic as the first slide, but with a yellow banner overlaid at the bottom containing the title "Introducing the APWA Asset Management Road Map". Below the banner, the name and title of Toby Rickman, P.E. are listed in white text.


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## LEARNING OBJECTIVES

-  Objective 1 – Understand the steps to establish an asset management program.
-  Objective 2 – Educate officials on the benefits of an asset management program.
-  Objective 3 - Collaborate with staff from other disciplines to achieve the action items for each stop.


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## Agenda

- What is the APWA Asset Management Roadmap
- Navigating the Roadmap
- Roll Out and Enhancement


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## APWA Asset Management Committee

**Mission:**  
To support APWA members that operate, improve and maintain public works and infrastructure through advocacy, education, resource development, and member engagement in the field of asset management.


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## What is the APWA Asset Management Road Map?

- An **interactive** tool
- **Thirteen** key asset management themes called **Road Map Stops**

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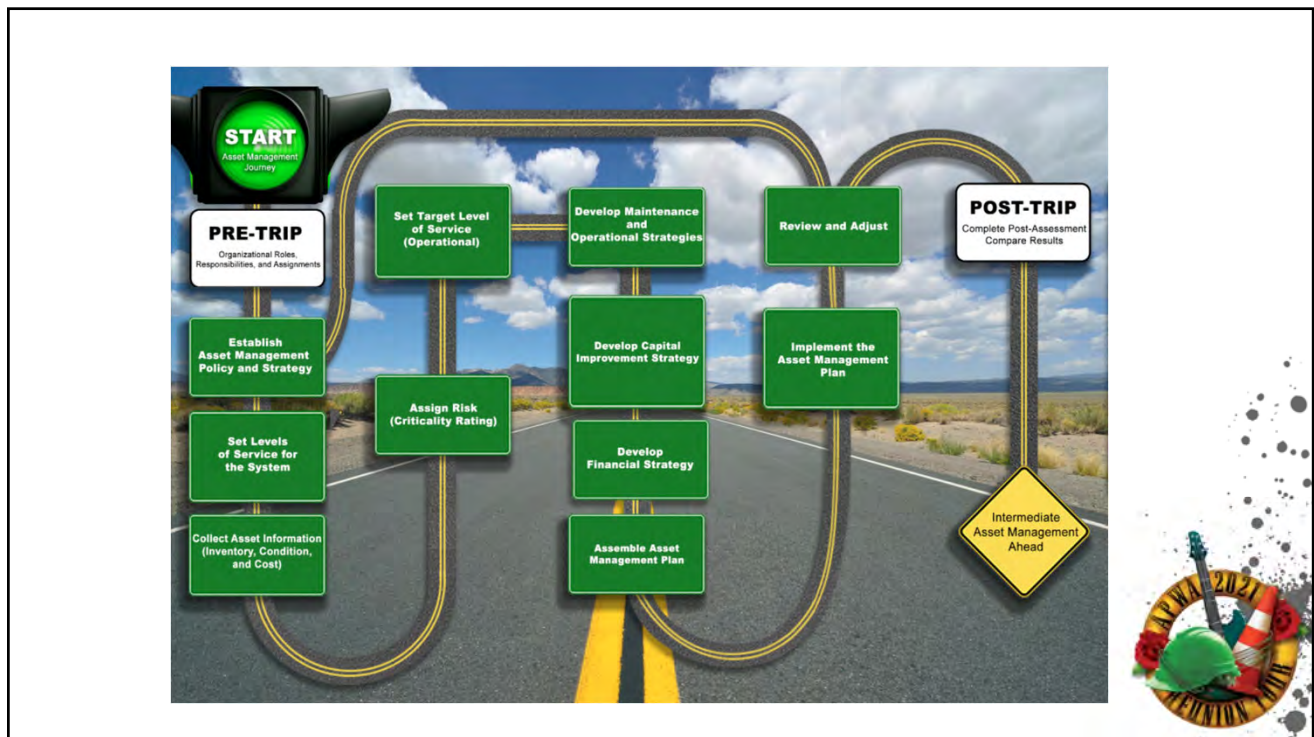


## What is the APWA Asset Management Road Map?

Each road map stop will have libraries of **resource materials** that communities can access and contribute to:

- **Definitions**
- **Examples**
- **Templates**
- A **living platform** where layers and libraries will be added

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## The Asset Management Road Map Stops

1. Pre-Trip: Organizational Roles, Responsibilities, and Assignments
2. Establish Asset Management Policy and Strategy
3. Set Levels of Service for the System
4. Collect Asset Information (Inventory, Condition, and Cost)
5. Assign Risk (Criticality Rating)
6. Set Target Level of Service (Operational)

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## The Asset Management Road Map Stops

7. Develop Maintenance and Operational Strategies
8. Develop Capital Improvement Strategy
9. Develop Financial Strategy
10. Assemble Asset Management Plan
11. Implement the Asset Management Plan
12. Review and Adjust
13. Post-Trip: Complete Post-Assessment Compare Results

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## Road Map Stop: Pre-Trip Organizational Roles, Responsibilities and Assignment

- Building an Asset Management Team
- Deliver the Asset Management policy and program.
- Ensure the successful implementation of the Asset Management improvement program and ongoing evaluation.
- Operationalize asset management and embed practice into annual planning and delivery activities.
- Identify positions and competencies.
- Provide for consistency in applying asset management concepts and practice across all asset classes while allowing the flexibility to address asset specific needs.

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## Road Map Stop: Establish Asset Management (AM) Policy and Strategy


### **Why AM Policy?**

- Enable Asset Management as a business system to set a vision for asset management within an organization.

### **What is AM Policy?**

- High level statement of an organization's approach to asset management
- Link to the agency's mission, vision, and goals
- Written in clear, concise, and simple language
- Meets current regulations, laws and best practices
- Appropriate to the purpose, scale and complexity of the organization

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# Road Map Stop: Establish Asset Management Policy and Strategy


**Why AM Strategy?**

- Build organizational asset management business capability by defining the actions through which the policy will be achieved.

**What is AM Strategy?**


- High level action plan that gives effect to the AM policy.
- Establish AM objectives.
- Connects decision makers with the day-to-day operations.
- Identify resources, responsibilities and timelines.
- Determine audit review and updating procedures.

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# Road Map Stop: Establish Asset Management Policy and Strategy


**Definitions**



**Examples**



**Templates**



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# Road Map Stop: Set Levels of Service for the System

**I UNDERSTANDING SERVICE**

Level of service is a measure of the quality, quantity, and/or reliability of a service from the perspective of residents, businesses, and customers in the community.

Infrastructure needs to support service delivery. What level of service does your community want and what are they willing to pay for? Understanding service means having a clear and consistent understanding of:

1. The types of services you provide.
2. The goals of residents, businesses, and customers that you provide them to.
3. The level of service being delivered, given your performance goals.
4. The level of service you're aiming to provide (your target).

Understanding service through a community lens

Infrastructure is not inherently equitable. If it isn't, or if you're not, it's important to start with starting the service in ways that residents and customers could understand in the same service package. In doing so, you have to ensure the policies for service are clear and consistent with the community vision.

Thinking critically about service levels

Sometimes we provide a certain level of service (e.g., respond to the community that involves a response to them, but without because it's not what they want). When you're not the right time, you should be clear.

How often the garbage should be collected?

1. How often the water should be collected?
2. How often the water should be collected?
3. How often the water should be collected?
4. How often the water should be collected?

MIT is taking it. As they said, "what a magic light!"

**TOOLS AVAILABLE IN THE GETTING STARTED TOOLKIT:** SECTION 2.1 How to define levels of service.

## Levels of service:

- Define what the community should expect from their assets, both in terms of their condition and availability.
- A quantifiable measure of the level of service the community should expect from its assets, and may be comprised of an asset's condition, availability, or both.
- Should reflect the policy mission, vision and goals.

### Benefits of understanding service

- 1. Staff can seek efficiencies with clear performance target established.
- 2. Members of the Community know what to expect and what they are paying for.
- 3. You need to be clear about what the community is asking for before you can figure out if you can afford it.
- 4. Staff and board can communicate clearly and consistently with the public about what service levels will be provided and why, and make aligned decisions.
- 5. Knowing where you're at and where you need to be makes it easy to find gaps and correct them.
- 6. Projects can be prioritized based on their impact to providing or sustaining service.
- 7. Actions such as cutting costs, making investments can be evaluated in terms of their impact on services.
- 8. The significance of risks can be evaluated in terms of their impacts on services.



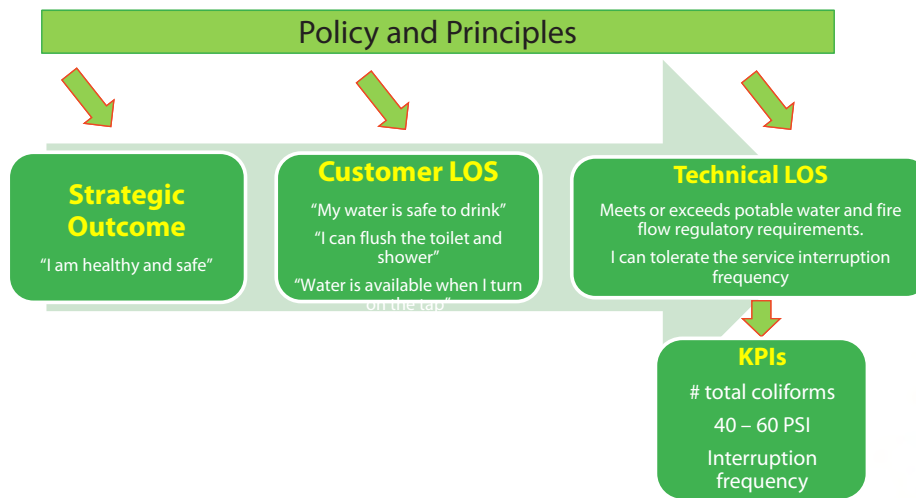
### LESSONS FROM THE TRAVEL AND HOSPITALITY INDUSTRY

If you've ever stayed in a hotel room, eaten at a restaurant, or taken a flight, you're probably familiar with the concept of level of service. As consumers of these services, we understand that a four star hotel will usually cost more than a two star hotel in the same city. We know to expect better service at a five star restaurant than at a food court in a shopping mall. And it's not unique to a first class sitting in the first class seats on the flight get a piping hot meal with champagne, while the rest of the passengers are served water and pretzels.

These clear level of service standards are powerful. They help the customer to make decisions based on what they value. "Would I rather save the money? Or sleep on a bed that feels like a cloud?" They align the expectations of the people delivering the service and the people receiving the service. And the focus of the business is on making investments that deliver services that the customer craves about.



# Road Map Stop: Set Levels of Service for the System





## Road Map Stop: Set Levels of Service for the System

Roads					
Level of Service/Performance Measures					
Level of Service				Performance Targets	
Attribute	Customer	Technical	Performance Indicators		
					2020 2025
<b>Objective: Safe, affordable, reliable road transportation system meeting the community needs.</b>					
<b>Description</b>					
Road Services includes provision for movement of vehicle, bikes and pedestrians within the roadway. The transportation infrastructure included under the road infrastructure includes the traveled surface, traffic control and calming devices, and shared surfaces for bikes and pedestrians that are an integral part of the road surface. Separate bike and pedestrian pathways and sidewalks are managed as a separate service.					
<b>Operations: Snow and Ice Control</b>					
<b>Make roads passable and safe during winter conditions</b>	Make the road passable and safe by reducing the hazards caused by snow and ice accumulations.	Respond to snow and ice accumulation in a timely manner on all City roads, in accordance to road class winter snow and ice control standards.	Snow and ice control includes blading to bare pavement, snow packing, snow removal, and application of de-icing agents based on a road-priority system, with high-use roads and emergency and transit routes cleared first.		
			<ol style="list-style-type: none"> <li>1. Percentage of snow bladed to bare pavement, packed and removed in accordance to the time frame outlined in the winter snow and ice control standards following a snow accumulation event.</li> <li>2. Percentage of time ice control product are applied in accordance to the time frame outlined in the winter snow and ice control standards.</li> </ol>		



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## Road Map Stop: Collect Asset Information (Inventory, Condition, & Cost)



- **Inventory**

- **Asset type**
  - **Name or Identification number**
  - **Age/Install Date**
  - **X/Y location**
  - **Material**
  - **Condition**
  - **Manufacturer**
  - **Work History**
  - **Warranty**
  - **Owner**
- **Lifecycle Status**
  - **Last Editor/Update**
  - **Install or replacement cost**

Street Details			
BRW05EC	Name	Section Begin	Section End
R7603	76TH STREET	E SIDE LOWELL	W SIDE FLOYD
Subdivision	Culdesacs	Age	Date Annexed
NP078000		18	05/20/1960
Rank ID	Surface Type	No Samples	Curbs
Residential	AC	23	Yes
Construction Class	Last Construction	Maintenance	MapNo
RO8 - Willie Marshall on AB3 (RSP)	04/13/2003	City	06
Length (ft)	CL Length (ft)	Width (ft)	Lanes
2293	2293	22	2
Lane Miles	Curb Length (ft)	Area (SF)	Excavation Fee
0.87	4586	50446	\$48,96/SY
<input checked="" type="checkbox"/> Improved <input type="checkbox"/> Divided <input type="checkbox"/> HDPL Lts <input type="checkbox"/> No SWs			

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## Road Map Stop: Collect Asset Information (Inventory, Condition, & Cost)

### Determining where the data will be stored

- Can be as simple as a spreadsheet.
- Geographic Information System (GIS) - a computer system capable of capturing, storing, analyzing and displaying geographically referenced data.
- Your inventory is not the program you use but the data that is being stored.

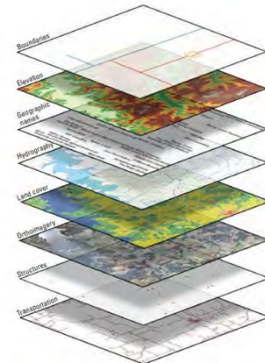


Figure 1. Eight base layers of The National Map.

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## Road Map Stop: Assign Risk (Criticality)

### Criticality:

Asset criticality is the relative risk of failure of that asset. So criticality is the relative risk of an asset from a financial, environment and social cost, calculated in order to understand which assets deserve attention and money to achieve AM Objectives.

### Level of Risk:

The level of risk is its magnitude. It is estimated by considering and combining consequences and likelihoods. A level of risk can be assigned to a single risk or to a combination of risks. A consequence is the outcome of an event and has an effect on objectives. Likelihood is the chance that something might happen.

**Main Goal = Optimization**



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# Road Map Stop: Assign Risk (Criticality)

## Definition



## Template



## Examples



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# Road Map Stop: Set Target Level of Service (Operational)

## Value and Level of Service

- Differing Value Illustration



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## Road Map Stop: Set Target Level of Service (Operational)

### Road Map Stop: Set Target Level of Service (Operational)


Service Standard for Snow and Ice Control on Roads						
Winter Maintenance Service Class		Minimum Depth of snow Accumulation for Deployment of Resources	Time to Clear Snow Accumulation from the End of Snow Event or Time to Treat Icy Conditions	Bare Pavement	Center Bare	Snow Packed
Road Class	Service Class					
Freeway - Highway	A	As accumulation begins	2 h	✓		
Arterial	A		3 h	✓		
	B			✓		
Collectors	C	5 cm	4 h 6 h	✓		
	A				✓	
	B				✓	
Local & Lanes	A	7 cm	10			✓
	B					✓
	C			10 cm	16	

**Bare Pavement:** requires that snow and ice be controlled, cleared and/or prevented for the full travelled road pavement width, including flush medians of 2 m width or less, paved shoulders and/or adjacent cycling lanes. It does not include parking lanes.

**Centre-Bare:** requires that snow and ice be controlled, cleared and/or prevented in a strip down the middle of the road pavement width for a minimum width of 2.5 m on each side of centreline.

**Snow-Packed:** requires that snow and ice be cleared and that ruts and/or potholes that may cause poor vehicle control be levelled off. Abrasive or de-icing materials are applied at intersections, hills and sharp curves.

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## Road Map Stop: Develop Maintenance and Operational Strategies


Determining an operational level of services involves understanding the service needs of the customers, managing the methods used to deliver the services, and ensuring objectives are met through regular evaluations., and ensuring objectives are met through regular evaluations.

*Critical Assets*

Critical Asset(s)	Failure Mode	Impact
Salt Truck	Out of Service	Treacherous road conditions
Snow Plow Truck	Out of Service	Inaccessible roads/streets

By identifying critical assets and failure modes investigative activities, condition inspection programs, maintenance and capital expenditure plans can be targeted at the critical areas.

**SNOW PLAN**  
**TOWN OF GANDER**  
Revised: October 2019



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## Road Map Stop: Develop Capital Improvement Strategy

- A component of asset management is determining the funding or long-term investment strategy. This is the plan on how the infrastructure assets will be funded.
- Key elements include what needs to be done and why, what is the cost, what is the impact on the level of service, what is the duration, and how will it be funded.
- Answering these questions provides a solid foundation for creating a capital improvement strategy.



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## Road Map Stop: Develop Capital Improvement Strategy

### Likelihood of Failure (LoF)

- Probability of failure of based upon an asset's physical condition
- Condition rating systems (i.e. NASSCO, FHWA)

### Consequence of Failure (CoF)


- Combination of direct and indirect impacts on the vicinity and community due to asset failure
- Direct impact = repair costs, emergency response costs, property damage, etc.
- Indirect impact = environmental, quality of life

**Risk = LoF x CoF**


Likelihood ↑	Medium	High	High	Extreme
	Low	Medium	High	Extreme
	Low	Medium	High	High
	Low	Low	Medium	Medium
	Low	Low	Low	Medium
	Consequence →			



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## Road Map Stop: Develop Financial Strategy



**Financial Strategy:**

- A strategy for budgeting available resources to provide the highest possible level of service across the full lifecycle of all managed assets, typically through the funding and implementation of a long-range plan that emphasizes cost-effective periodic maintenance activities.


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## Key Concept: Asset Capability & Strategy

Customer

GOOD
FAIR
POOR



Condition

Time

Threshold 12

Community

Asset Strategy	
2021	2051
60%	75%
15%	5%
25%	20%

LoS Forecast

Tactics?

- Condition
- Capacity
- Utilization
- Responsiveness
- Customer Experience

The purpose of spending money is to achieve a measurable result in asset level of service

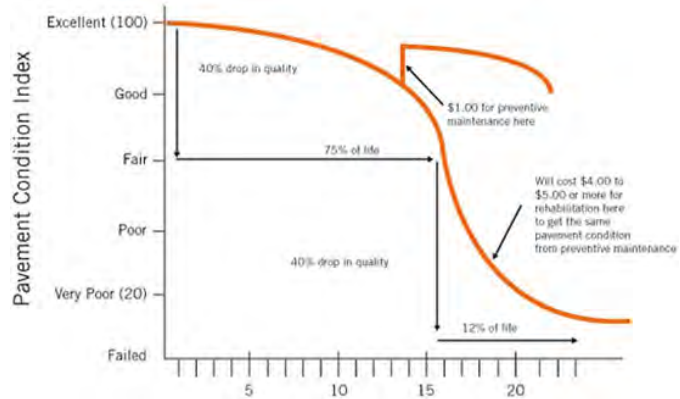
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An integrated capital and operating budget

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## Putting Theory to Practice: The need to integrate capital and operating budgets



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## Road Map Stop: Assemble Asset Management Plan

### What is it?

Long-term plans (usually 10-20 years or more for infrastructure assets) that outline the asset activities and programs for each service area and resources applied to provide a defined level of service in the most cost-effective way.

### Typical Content

- Summary of the strategic goals and key AM policies
- Level of Service Performance Standards
- Description of asset activities and programs for each service area/ asset class
- Life cycle and needs forecasting
- Long term cash-flow forecast
- Key asset management Improvements including resource and timelines



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# Road Map Stop: Assemble Asset Management Plan

Definition

Asset Management Planning is the link that ensures that the organisation's strategic business goals translate into 'on the ground' operational activities. As highlighted by ISO 55000, "Integration of an organisation's strategic asset management plan with its long term financial plans can enable the balancing of short term financial needs with the needs of medium term activity plans, and with the much longer term plans that some assets require."

**Requirements for AM Plans**

An AM Plan is a written representation of intended AM programmes for management of infrastructure assets based on the organisation's understanding of service level requirements and the network's capability to meet those requirements. The AM Plan is often considered as the business case for the long term financial forecasts. A key purpose of AM Plans is to drive longer term thinking and planning and ensure the organisation is operating in a financially sustainable manner.

AM Plans can help an organisation meet its goals and objectives in a way that best serves customers. They can also act as a vehicle for communication with customers and other parties on different funding scenarios and impacts on service levels and risk.

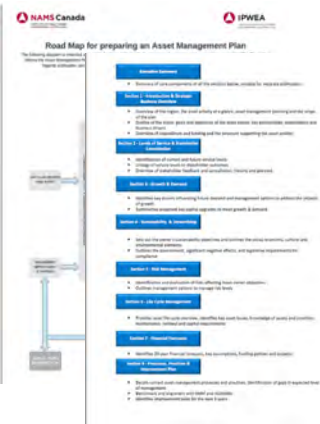
ISO 55003 contains specific requirements for a Strategic AM Plan (referred to also as AM Strategy), an important one being the translation of the organisational objectives into AM objectives. The Strategic AM Plan is typically prepared at an organisational level while AM Plans are prepared at an asset portfolio level - though in some situations they may be combined into a single document.

**Preparing and Communicating the AM Plan**

A general process for developing AM Plans is:

1. Establish Scope and Objectives: Consider the audience, key corporate parameters and level of advancement.
2. Develop the AM Plan Template: This will help guide different section authors, and, where there are multiple AM Plans, ensure a consistent corporate approach.
3. Write the Plan: Use the best available information and clearly state assumptions and confidence in underlying information.

Template



Example



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# Road Map Stop: Implement the Asset Management Plan

Using the information laid out in the asset management plan, the individual steps are placed into action.




## Strategic Asset Management Plan



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## Road Map Stop: Review and Adjust

After the Asset Management plan is implemented, the effectiveness of the steps needs to be evaluated. Are there changing parameters, new practices, improvements, etc., that can be adopted to increase the value of the steps and overall plan?

### Can you report on your assets in a meaningful way?


#### The Asset

- Inventory
- Level of Service
- Performance
- Condition
- Remaining Life
- Cost of Service
- Environmental Footprint


#### The Organization

- Productivity
- Value for Money
- Effectiveness
- Efficiency
- Economy

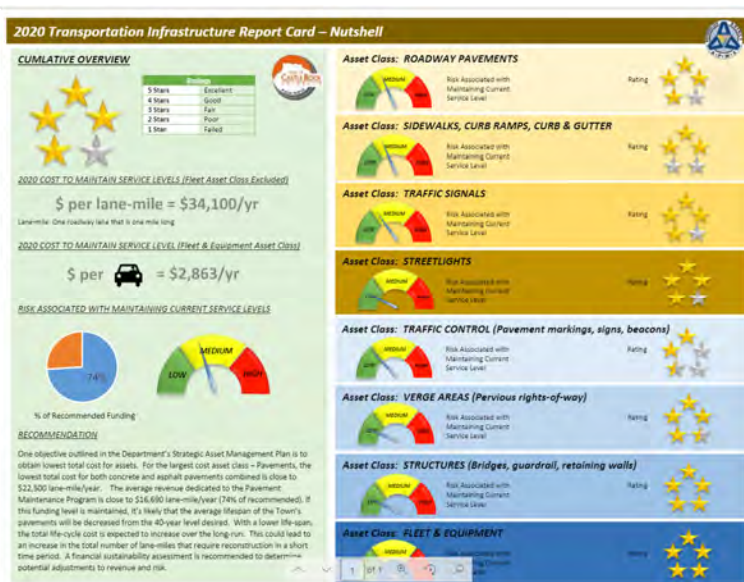
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## Road Map Stop: Review and Adjust



**2020**  
Transportation Infrastructure  
Report Card



**2020 Transportation Infrastructure Report Card – Nutshell**

**CUMULATIVE OVERVIEW**

5 Stars	Excellent
4 Stars	Good
3 Stars	Fair
2 Stars	Poor
1 Star	Failed

2020 COST TO MAINTAIN SERVICE LEVELS (Fleet Asset Class Excluded)  
\$ per lane-mile = \$34,100/yr  
Lane-mile: One roadway lane that is one mile long

2020 COST TO MAINTAIN SERVICE LEVEL (Fleet & Equipment Asset Class)  
\$ per = \$2,863/yr

RISK ASSOCIATED WITH MAINTAINING CURRENT SERVICE LEVELS

74% **LOW**

**RECOMMENDATION**

One objective outlined in the Department's Strategic Asset Management Plan is to obtain lowest total cost for assets. For the largest cost asset class – Pavements, the lowest total cost for both concrete and asphalt pavements combined is close to \$22,500 lane-mile/year. The average revenue dedicated to the Pavement Maintenance Program is close to \$14,600 lane-mile/year (74% of recommended). If this funding level is maintained, it's likely that the average lifespan of the Town's pavements will be decreased from the 40-year level desired. With a lower lifespan, the total life-cycle cost is expected to increase over the long-run. This could lead to an increase in the total number of lane-miles that require reconstruction in a short time period. A financial sustainability assessment is recommended to determine potential adjustments to revenue and risk.

**Asset Class: ROADWAY PAVEMENTS**  
Risk Associated with Maintaining Current Service Level: Rating:

**Asset Class: SIDEWALKS, CURB RAMPS, CURB & GUTTER**  
Risk Associated with Maintaining Current Service Level: Rating:

**Asset Class: TRAFFIC SIGNALS**  
Risk Associated with Maintaining Current Service Level: Rating:

**Asset Class: STREETLIGHTS**  
Risk Associated with Maintaining Current Service Level: Rating:

**Asset Class: TRAFFIC CONTROL (Pavement markings, signs, beacons)**  
Risk Associated with Maintaining Current Service Level: Rating:

**Asset Class: VERGE AREAS (Pervious rights-of-way)**  
Risk Associated with Maintaining Current Service Level: Rating:

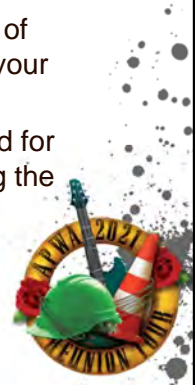
**Asset Class: STRUCTURES (Bridges, guardrail, retaining walls)**  
Risk Associated with Maintaining Current Service Level: Rating:

**Asset Class: FLEET & EQUIPMENT**  
Risk Associated with Maintaining Current Service Level: Rating:

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## Post Trip: Complete Post-Assessment Compare Results

- Review:
  - The roles, responsibilities, and assignments accomplished by those in your organization and compare it to what was planned in your Pre-Trip.
  - The level of Service Targets. Are they meeting your community's needs and expectations?
  - The asset information. Do you have the information to manage to the level of service your community set? Does the information appropriately measure your asset risk?
  - The way you developed your strategies for maintenance and operations and for capital improvements. Do the methods you used lead you to accomplishing the level of service your community set?
  - The completeness of your Asset Management plan. If you implement this plan, will your community achieve the long-term (sustainable) value desired from your assets.



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## Post Trip: Complete Post-Assessment Compare Results

- Determine what areas of your Asset Management system need to be improved.
- Celebrate what progress has been accomplished toward making your community a better place to live and work!



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## Intermediate Asset Management Ahead: What's Next with the Asset Management Road Map?

- Get it out and test – it can be found on the APWA Asset Management Committee's page.
- Continue populating the libraries
- Not a static tool – it will grow with the growing body of AM knowledge
- It will drill down deeper where there needs to be more detail

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## Questions?

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