

Ayer's Stormwater Asset Management Plan



Department of
Public Works
Town of Ayer

February 2022



What is an Asset?

- Something that has value or potential value
- Is intended to serve a particular purpose for the entity
- Requires management in order to maintain level of service



What is Asset Management in One Slide?



Assets
Service
Criticality
Life Cycle
Funding

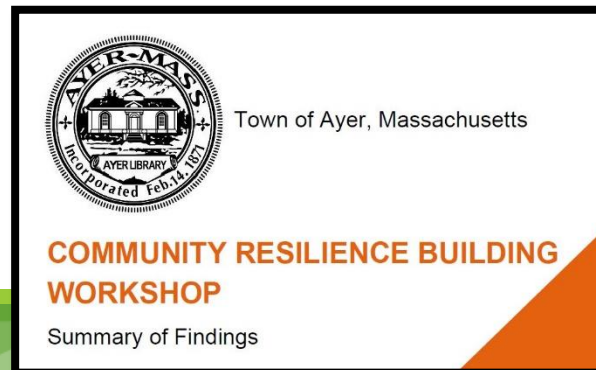
Why Create the Stormwater Asset Management Plan (AMP)?

- Municipal Vulnerability Preparedness (MVP) program:
 - Define climate related hazards
 - Understand how they may be impacted by climate change utilizing the latest science and data
 - Identify existing and future climate vulnerabilities and strengths
 - Identify opportunities to take action to reduce risk and build resilience
 - Implement priority actions identified through the planning process




Why Create the Stormwater AMP?

- **Community Resilience Building Workshop**
 - Community-driven process with various stakeholders
 - Determine and prioritize action for community vulnerabilities (e.g. flooding, hurricane, power outage, wildfires, air quality, etc.)
 - Top Priority Actions
 - High, Medium, and Low Priority Actions
- **Developing a Stormwater Asset Management Plan was a Top Priority**



Why Create the Stormwater AMP?

- Data driven process to maintain stormwater system
 - Expand upon the current asset inventory records
 - Understand the condition of the existing drainage system
 - Move program from Reactive  Proactive
 - Coordinate with water quality programs (MS4, Pond Report, etc.) and MVP
 - Create a risk-based Plan to guide maintenance decisions

Funding for Development of the Stormwater AMP

- Massachusetts Clean Water Trust (MCWT) Asset Management Plan Grant
- 60% Grant, 40% Town
 - Grant \$72,750
 - 2021 ATM Capital \$38,750
 - DPW In-kind services \$9,750



MASSACHUSETTS
CLEAN WATER TRUST



Consultant and Scope

- Tighe and Bond - on the DEP Approved Consultant List for Asset Management Program Development
- Scope of efforts (discussed over the next few slides):
 - Desktop Review
 - Field Inspections
 - Drainage Infrastructure
 - Culverts
 - Asset Management Ranking
 - Probability of Failure (PoF)
 - Consequence of Failure (CoF)
 - Final Report - Asset Management Plan



Desktop Review

- Developed an initial asset inventory, utilizing Ayer DPWs existing stormwater GIS system
 - Identified missing asset information and potential culvert locations
- This information allowed Tighe & Bond to create
 - A map book of all existing and potential asset locations
 - Field assessment forms based on missing data needed to determine criticality



Field Inspections

- Drainage infrastructure

- Focused on areas with old systems, poor drainage areas, poor mapping, and other concerns (e.g. flooding)
- Assessments were completed by Highway Division and Consultant with EnviroSight Zoom Inspection camera
 - size, material, general connectivity, and other aspects of the infrastructure

- Culvert

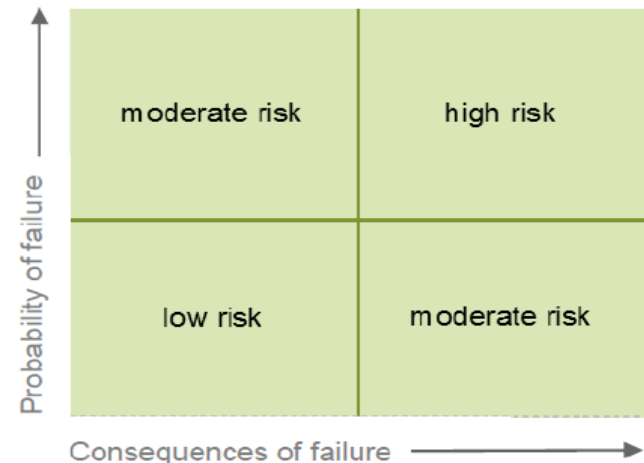
- Assessments obtained size, material, condition, upstream/downstream data, structural and hydraulic deficiencies, and other maintenance concerns (e.g. yard waste, beaver dams, trees, and other obstructions)



Ranking of Assets - POF and COF

- **Probability of Failure (PoF):**

- Age/useful life
- Maintenance/failure history
- Condition from field assessments



- **Consequence of Failure (CoF):**

- Impacts to users and critical locations (e.g. ambulance routes, environmental, detour length, etc.)
- Financial inefficiency, asset is costing more to repair than it would to replace

Ranking of Assets - Overall Criticality (i.e. Risk) Score

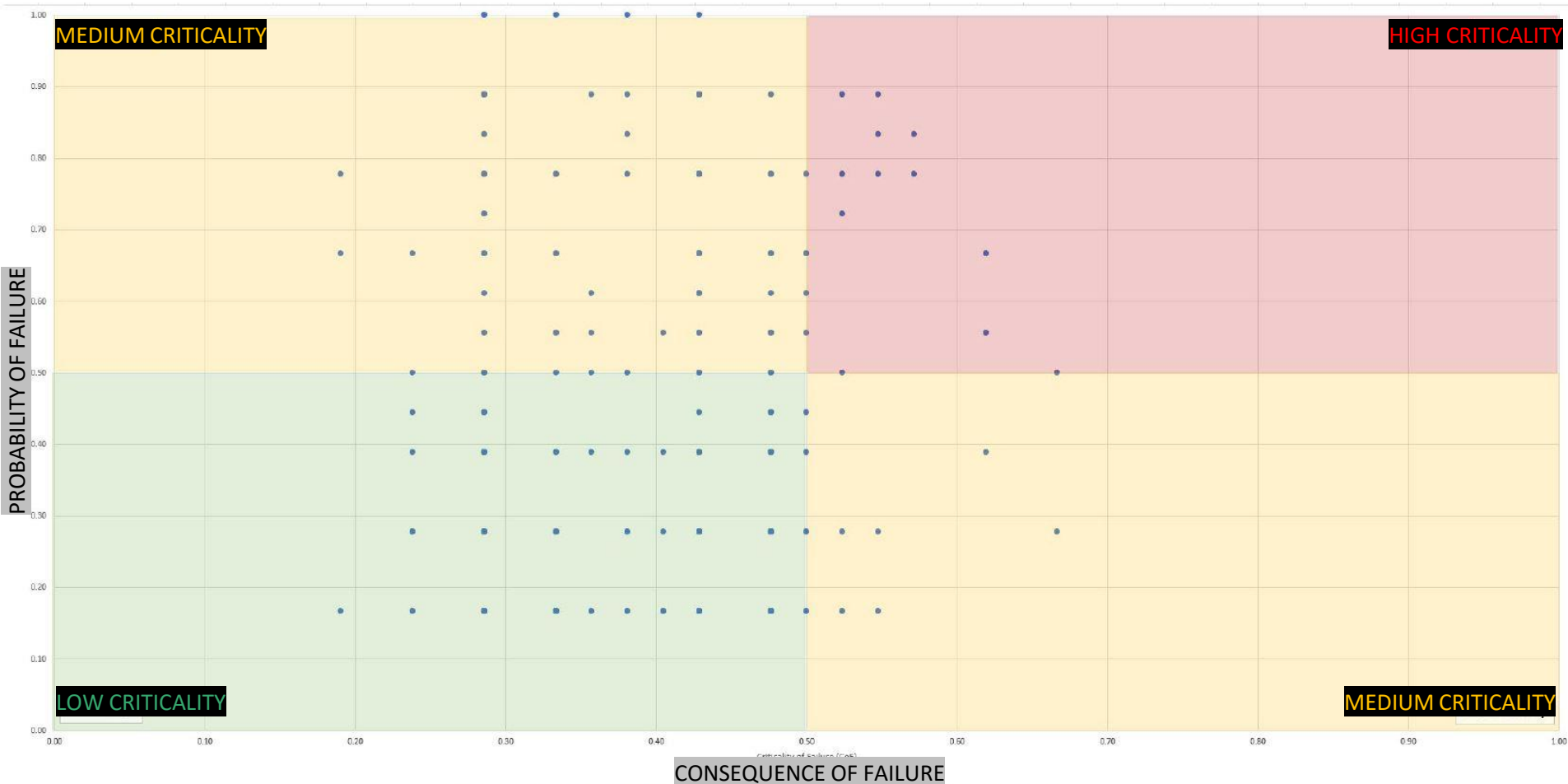


Figure 5-2 Drainage Pipe Risk Matrix

Ranking of Assets - Overall Criticality (i.e. Risk) Score

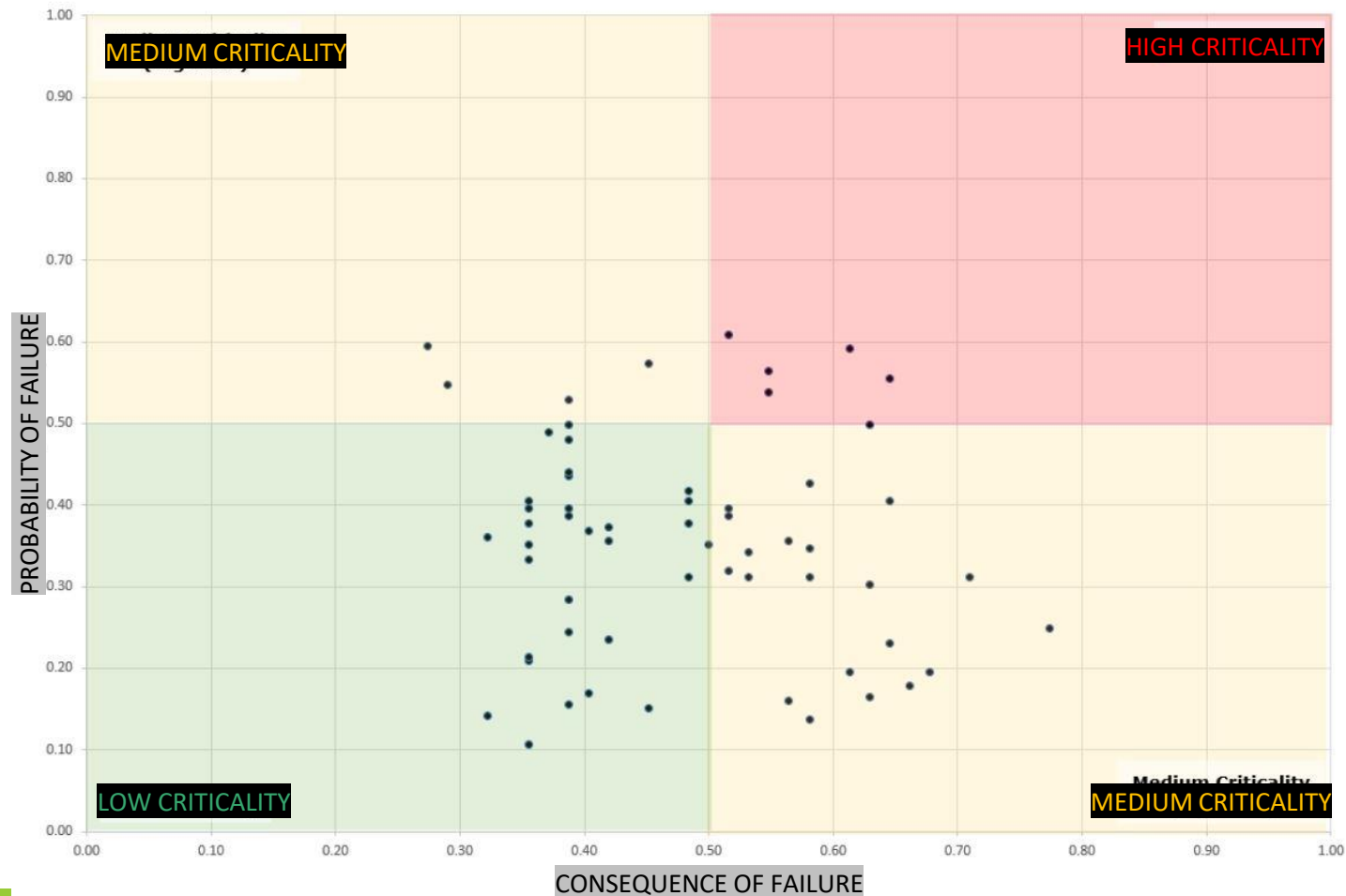


Figure 5-4 Culvert Risk Matrix

Ranking of Assets - Overall Criticality (i.e. Risk) Score

TABLE 5-22

Risk Factor Category Ratings

Risk Category	Value	Action
High	If $\text{CoF} > 0.5$ and $\text{PoF} > 0.5$	Immediate Attention
Medium	If $\text{CoF} \leq 0.5$ and $\text{PoF} \geq 0.5$	Aggressive Maintenance
	Or	
	If $\text{CoF} \geq 0.5$ and $\text{PoF} \leq 0.5$	Aggressive Monitoring
Low	If $\text{CoF} < 0.5$ and $\text{PoF} < 0.5$	Routine Maintenance

Completed Plan – A Living Document

- Final AMP includes:
 - A description of the drainage system and culvert inventories and the results
 - The risk-based prioritization process
 - Recommendations for capital improvements, further investigation, maintenance, and funding
 - A Five-Year Culvert Action Plan
 - Plan for ongoing program updates



Stormwater Asset
Management Plan
Ayer, Massachusetts
November 2022

Results – Drainage Structures

- Drainage Manholes/Catch Basins
 - Structure condition shows approximately 71% are in good or excellent condition
 - Structure Type:
 - 21% Concrete
 - 60% Block
 - 63% Brick

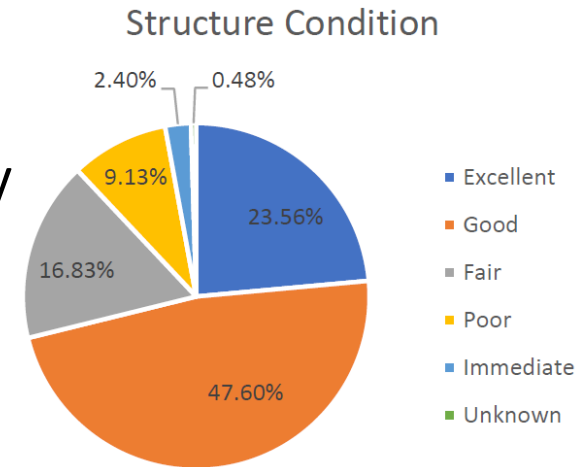


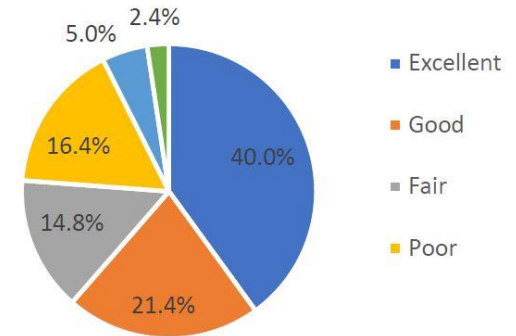
Figure 3-5 Example of a Precast Drain Manhole (Left) and Brick/Block Catch Basin (Right)

Results - Pipes

● Drainage Pipes

- Pipe condition shows approximately 61% are in good or excellent condition
- 60% of RCP and 92% of HDPE pipes inspected were in good or excellent condition
- 70% of CMP inspected were in fair or poor condition

Pipe Condition



Pipe Material

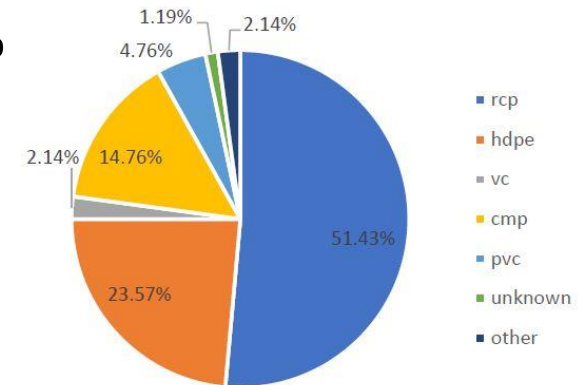


Figure 3-7 Example of a RCP in Excellent Condition (Left) and CMP in Poor Condition (Right)

Results - Culverts

Culverts

- Mostly corrugated metal and reinforced concrete
- Distribution by deterioration severity
 - 33% of culverts demonstrate medium to high deterioration
 - 21% are unknown due to high water or inability to access culvert

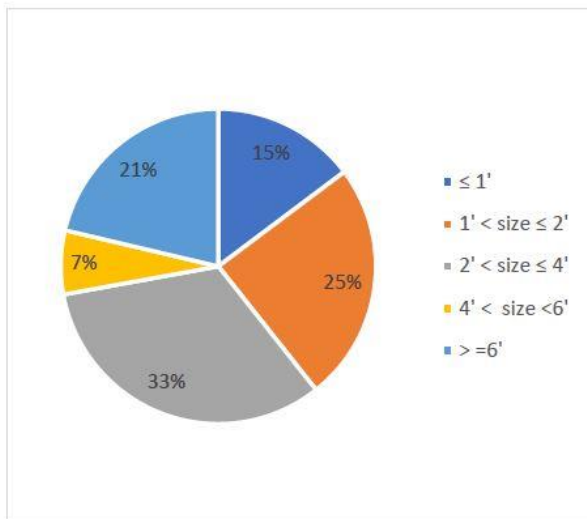


Figure 4-1 Distribution of Culverts by Size

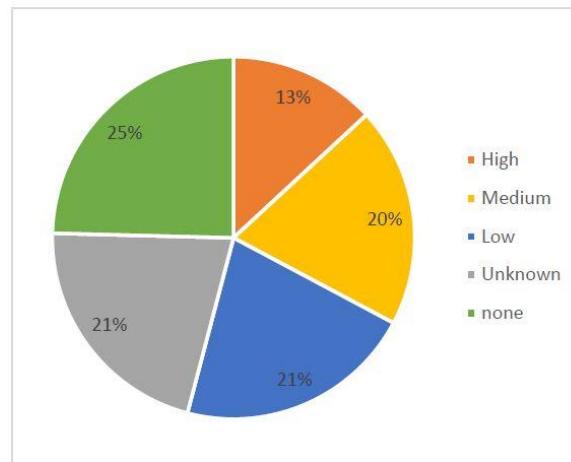


Figure 4-2 Distribution of Culverts by Deterioration Severity

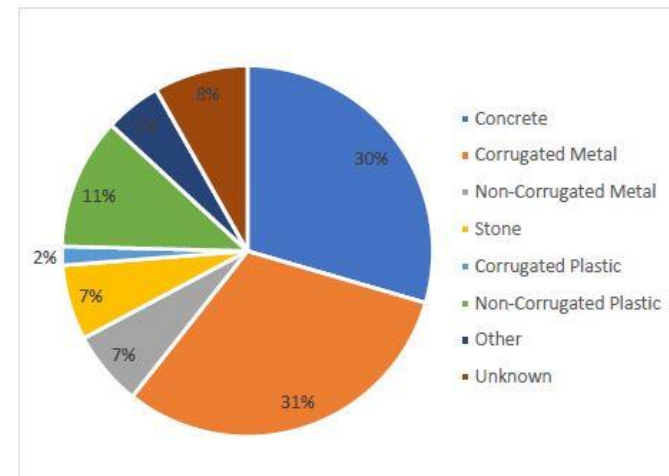


Figure 4-3 Distribution of Culverts by Material

5 – Year Action Plan

			Opinion of Probable Cost				
Asset ID and Address	Summary of Work	Criticality Score	FY24	FY25	FY26	FY27	FY28
Drainage System Improvement Projects¹							
P-1096-Willow Road	culvert replacement	High				\$ 120,000	\$ 853,000
P-1539- Willow Road	culvert replacement	High	\$ 130,000	\$ 1,170,000			
P-550- Oak Ridge Drive	culvert replacement	High	\$ 130,000		\$1,138,000		
Potential 11- Spectacle Road	culvert replacement	High		\$ 130,000		\$ 1,241,000	
P-711 - Madigan Lane	culvert replacement	High			\$ 120,000		\$ 764,000
P-New1 - Willow Road	culvert replacement	Medium				\$ 130,000	
Complete Maintenance and Repair²							
DS-1367 and DS-159	Catch basin and manhole cleaning and further investigation	High	In-house				
Various	Pipe Replacement	High/Medium	\$ 200,000	\$ 200,000	\$ 200,000	\$ 200,000	\$ 200,000
Various	Pipe Cleaning/CCTV	Medium		\$ 30,000	\$ 30,000	\$ 30,000	\$ 30,000
Subtotal			\$ 460,000	\$1,530,000	\$1,488,000	\$1,721,000	\$1,847,000
Further Investigation/Study							
Prices listed below assume only one mobilization is required to CCTV all pipes that year.							
P-590, P-151, P-972, P-224, P-150, P-147, P-1223, P-4, P-17, P-970, P-1226, P-335, P-334, P-1489, P-199	Mobilization, Cleaning and CCTV	High	\$ 30,000				
Programmatic Improvements							
Ongoing Maintenance			\$ 25,000	\$ 25,000	\$ 25,000	\$ 25,000	\$ 25,000
Inspection Program			\$ 8,000	\$ 8,000	\$ 8,000	\$ 8,000	\$ 8,000
GIS Data Maintenance			\$ 5,000	\$ 5,000	\$ 5,000	\$ 5,000	\$ 5,000
Annual Updated PoF, Criticality, and Recommendations			\$ 10,000	\$ 10,000	\$ 10,000	\$ 5,000	\$ 5,000
Total			\$ 780,992	\$1,628,000	\$1,558,992	\$1,764,000	\$1,890,000

1. See attached OPCCs (Opinion of Probable Construction Cost) for each project.

2. See Project Summaries in Appendix F for OPCCs (Opinion of Probable Construction Cost) of PLA drainage pipes in need of replacement.

Color Key:	
\$	= CCTV Cost
\$	= Design and Permitting
\$	= Construction Cost



Next Steps

- Begin Implementation of the Stormwater AMP
- Reexamine Stormwater Utility as a funding source
- Continue updating DPWs stormwater GIS with field investigations
- Update AMP routinely

Thank You



DAN VAN SCHALKWYK, P.E.
DIRECTOR OF PUBLIC WORKS