DSD INTERNATIONAL CONFERENCE 2014 (DSDIC 2014)

Utilizing Asset Management to Achieve Sustainable Stormwater Systems

Professor Tom Iseley, Ph. D., P.E.

Presenter: Dr. Tom Iseley

- Professor, Louisiana Tech University
- Director, Trenchless Technology Center (TTC)
- Chair, Buried Asset Management Institute-International (BAMI-I)

Contributors

- **Ken Eyre, PE, PACP**
  - Senior Associate, Greeley and Hansen, USA
- **Paul D. Huston, PACP**
  - Project Manager, Greeley and Hansen, USA
- **Urso Campos**
  - MST Student, Purdue School of Engineering & Technology, IUPUI, USA
- **Hamed Zamenian**
  - Ph.D. Student, Lyles School of Civil Engineering, Purdue University, USA
- **Seyed Saleh Behbahani**
  - Ph.D. Student, Department of Civil Engineering, Louisiana Tech University, Ruston LA, USA

Outline

- Introduction
- Literature Review Analysis
  - ✓ City of Grand Rapids, United States
  - ✓ City of San Diego, United States
- Pipe Condition Assessment (PCA) Objectives
- Pipe Condition Methodology: History and Application
- Differences between Storm and Sanitary Systems
- Example Pipe Condition Rating Practices - Virginia Phase I MS4 Communities and District of Columbia
- Lessons Learned
- Questions

4

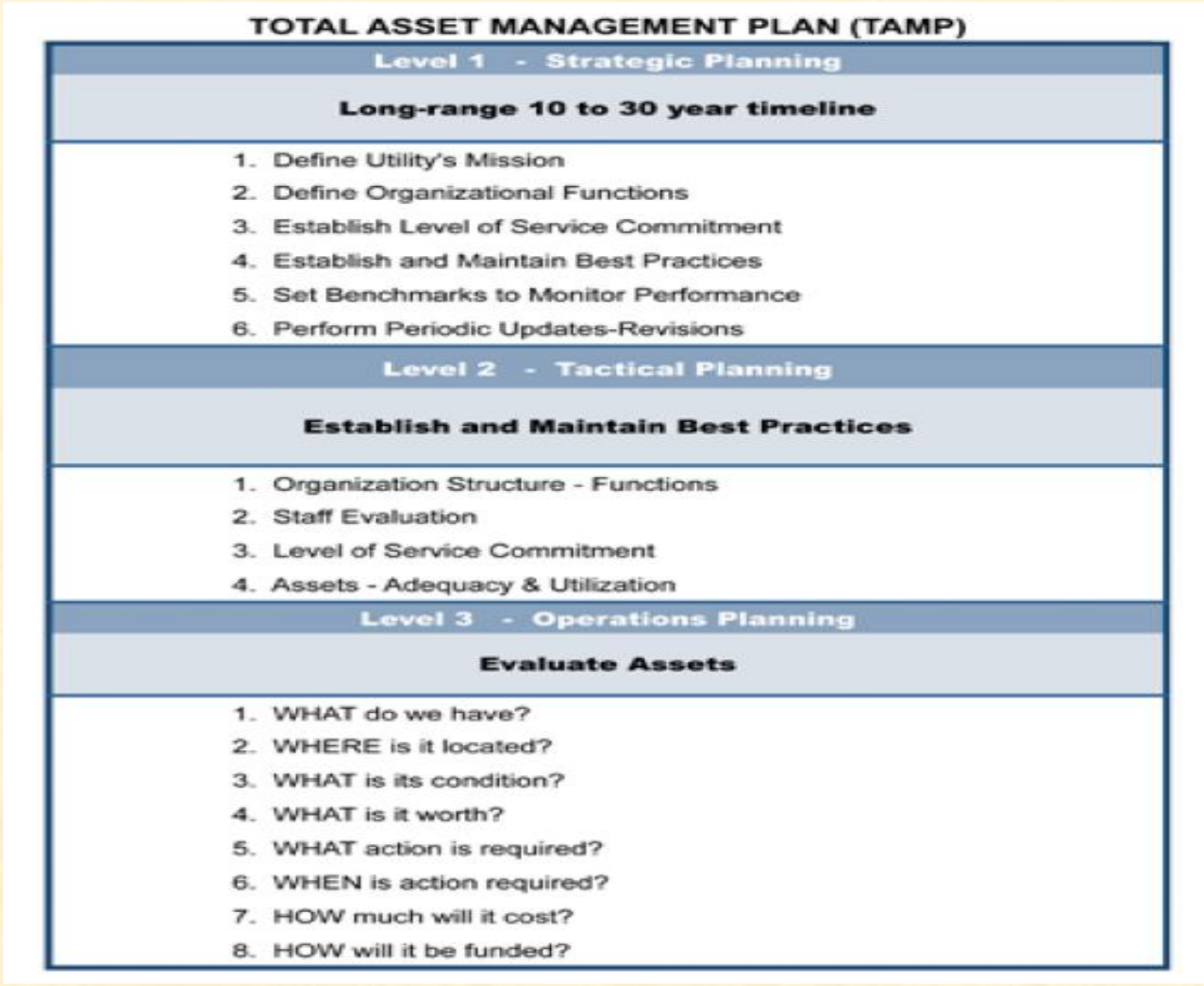
Introduction

In the United States, the majority of the underground infrastructure pipeline network system was built more than 100 years ago. The D rating of drinking water, wastewater & stormwater infrastructure in the American Society of Civil Engineering (ASCE) report card of 2013 demonstrates the fact that the majority of this complex infrastructure is deteriorated and needs emergency response. “Capital investment needs for the nation’s wastewater and stormwater systems are estimated to total $298 billion over the next twenty years”.

Introduction

The Certification of Training in Asset Management (CTAM)-200 manual on Developing Buried Asset Management Programs (BAMI-I, 2013) envisions a "Total Asset Management Plan" (TAMP) consisting of three levels:

- ✓ strategic plan,
- ✓ tactical plan,
- ✓ operational plan.



Key elements for each level of a TAMP (CTAM-200)

Literature Review Analysis

❑ City of Grand Rapids, United States

The general scope established that an asset management plan consists of three major items:

- Assessment of the existing stormwater assets;
- Evaluation of levels of service the stormwater asset will meet; and
- Summary of efforts necessary to meet the desired level of service.

Literature Review Analysis

❑ City of Grand Rapids, United States

City of Grand Rapids has defined a process approach toward stormwater asset management through identifying the following points:

- What are the assets? (Inventory)
- What are the assets worth? (Valuation)
- Where are the assets located? (Geographic Information System)
- How is the system operated? (Level of Service)
- What is the condition? (Probability and Consequence of Failure)
- What is needed to be done? (Construct, Maintain or Replace)
- How much will it cost? (Financial Plan)

Literature Review Analysis

Definitions of COF categories (City of San Diego 2013)

Category	Subcategory	Description
Social	Public Perception	Public perception of City's performance declines. This includes external or non-quantifiable potential economic costs associated with a decline in public perception of City performance.
	Public Health and Safety	Injuries, death, or property damage occurs. This includes external or non-quantifiable potential economic costs associated with increased health or safety risks to citizens.
Environmental	Regulatory	Regulators take action. This includes external or non-quantifiable economic costs associated with deterioration in trust of the regulators for which the City is taking appropriate actions to achieve compliance with a permit that is not explicit.
	Environmental Quality	Measurements of environmental quality show declines (e.g. ecosystem health declines, standards are no longer met). This includes external or non-quantifiable economic costs associated with a degrading or degraded environmental quality or condition. Such economic costs could include reduction in property values, reductions in tourism, loss of jobs, and resulting reductions in tax revenues.
Economic	Short-term Financial	Fines, settlements.
	Long-term Financial	Increased regulatory compliance costs, increased City of San Diego Storm Water Division requirements, increased costs to rebuild public trust, capital outlays, and for other reasons.

Literature Review Analysis

Consequence of Failure Categories and Weight (City of San Diego, 2013)

Category	Sub-Category	Weight		% Overall Weight
Social	Public Perception	1	0.2	6.67
	Public Health and Safety		0.8	26.67
Environment	Regulatory	1	0.7	23.33
	Environmental Quality		0.3	10.0
Economic	Short-term Financial	1	0.6	20.0
	Long-term Financial		0.4	13.33
Sum of Weight		3	3	100

Literature Review Analysis

- **City of San Diego, United States**

Seven Core Elements of Asset Management (City of San Diego, 2013)

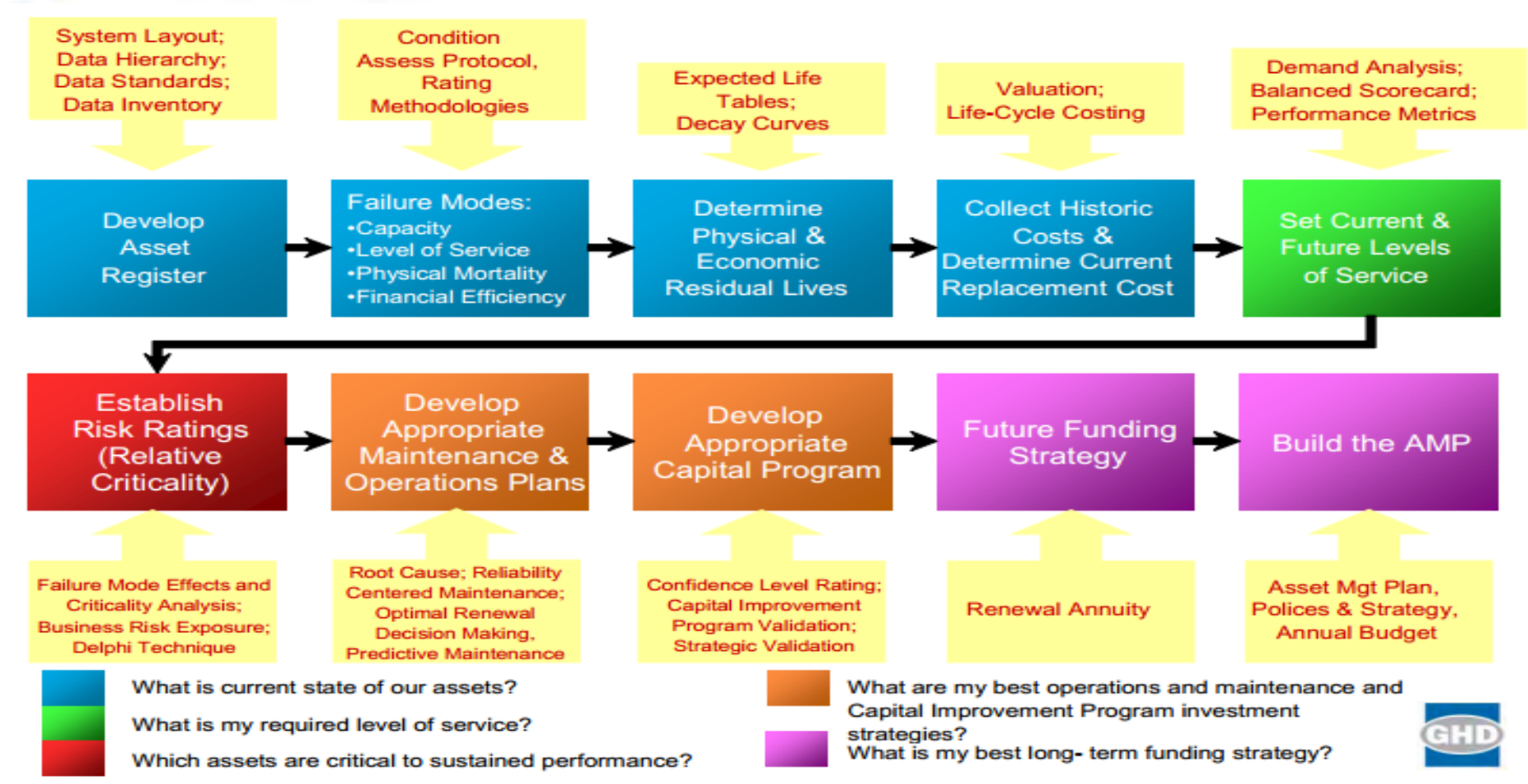
Literature Review Analysis

❑ City of San Diego, United States

Core Elements and Goals of Asset Management (City of San Diego, 2013)

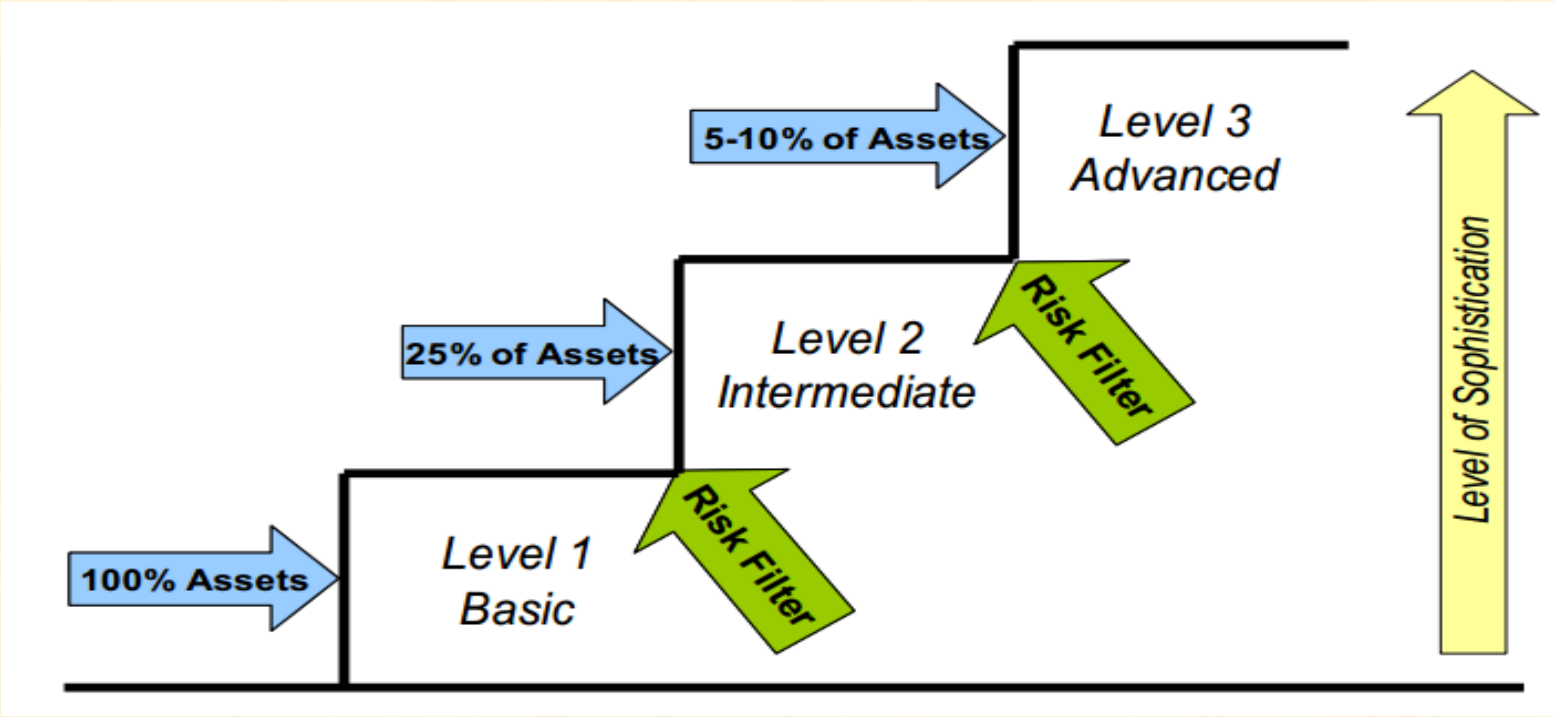
Core Asset Management Elements	Goals
Lifecycle Processes and Practices	Enhance the efficiency, transparency, and consistency of the business decision-making process.
Information Systems	Increase the system integration, functionality, and support capabilities.
Data and Knowledge	Capture, organize, and document asset information.
People	Provide a platform for managing and sharing information and knowledge.
Commercial Tactics	Focus on effective delivery of projects and services.
Organization	Establish sound, strategic support for asset management practices.
Asset Management Plan	Document the current state of the City of San Diego Storm Water Division's assets and future requirements.

Literature Review Analysis



10 Steps process to reach stormwater asset management program (City of San Diego, 2013)

Literature Review Analysis

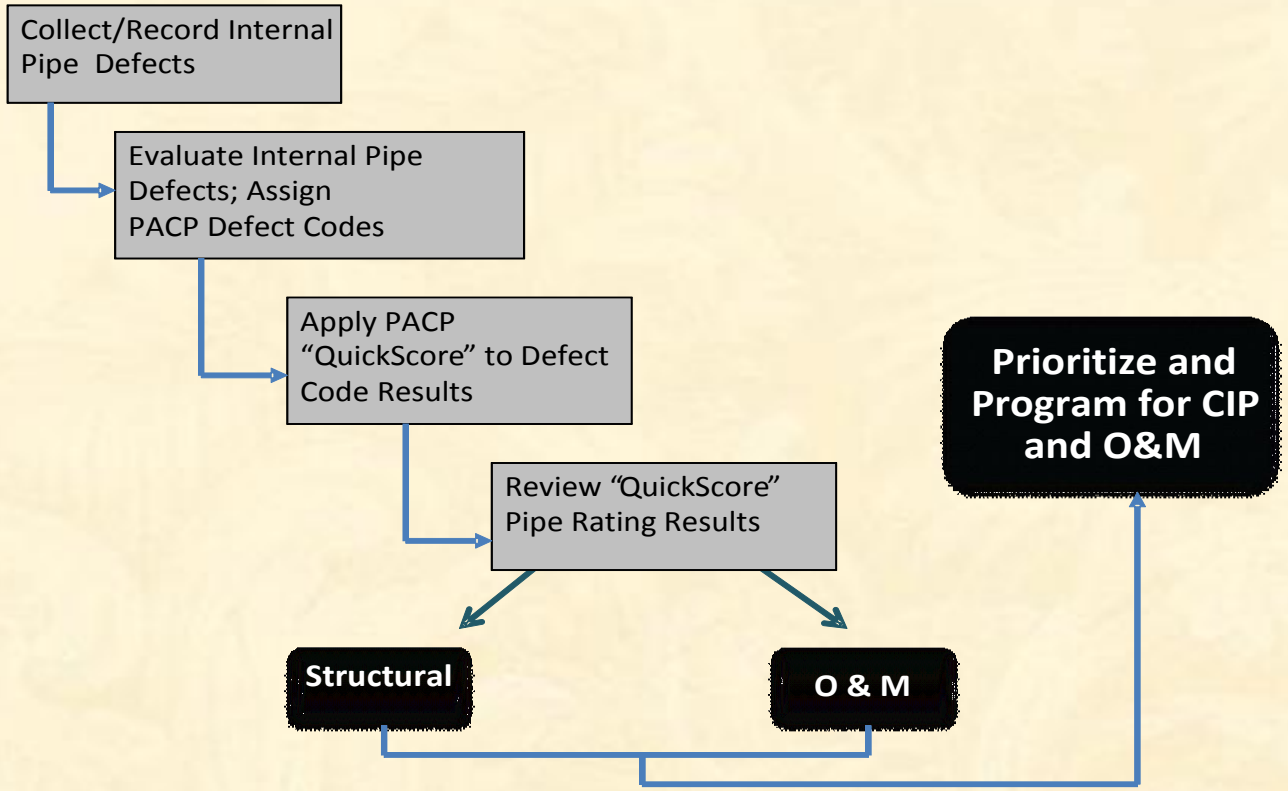


Risk-Based Condition Assessment Approach (City of San Diego, 2013)

PIPE CONDITION ASSESSMENT (PCA) OBJECTIVES

Municipal stormwater management programs in the U.S. are essentially the same and differ by their extent and magnitude. In the U.S., the Federal Environmental Protection Agency (US EPA) uses the 1972 Clean Water Act (CWA) and its amendments to impose regulatory controls on wet weather programs.

PIPE CONDITION METHODOLOGY: History and Application



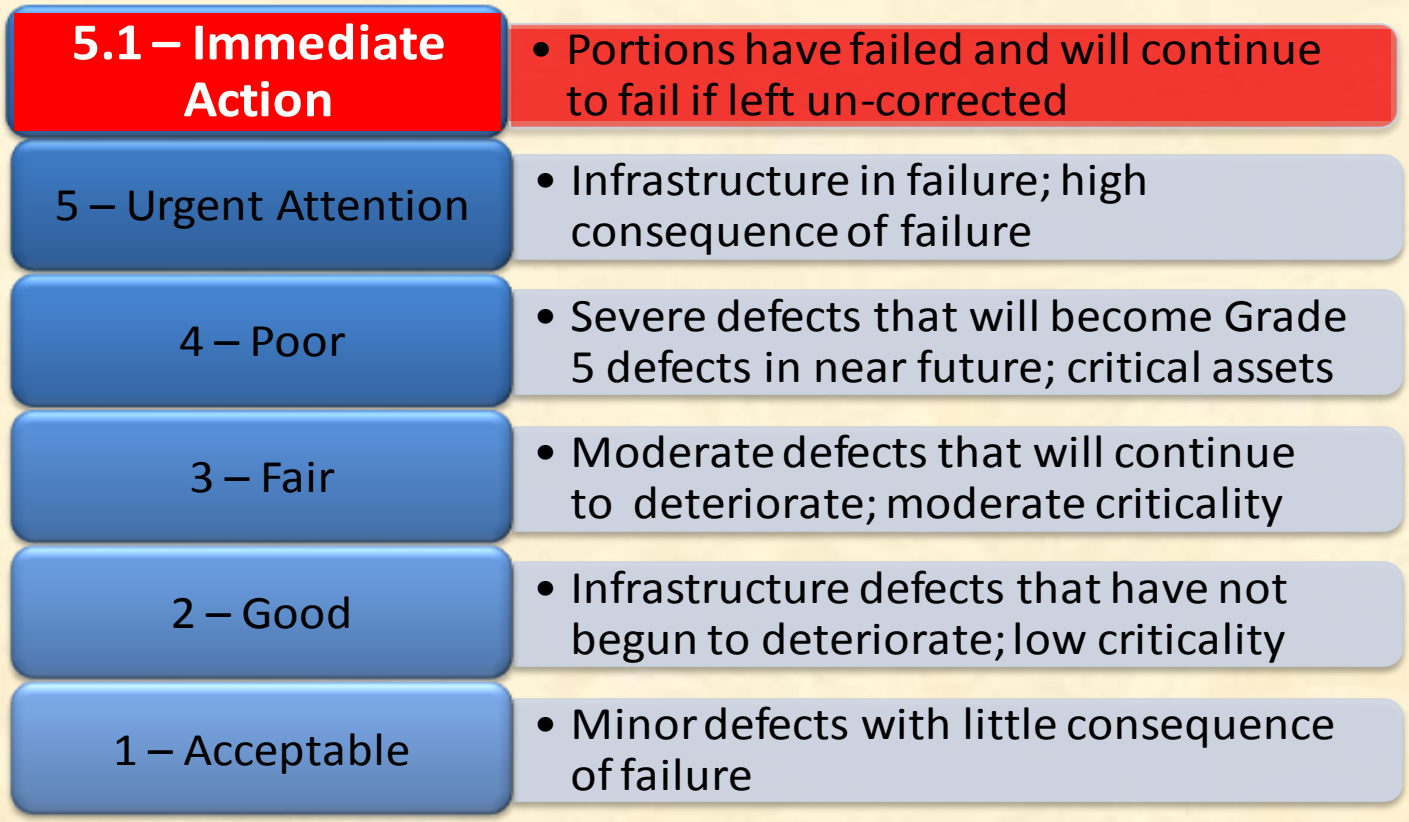
Simple Flow Path

Differences between Storm and Sanitary Systems

Trenchless Technology (Pipe Rehabilitation) Differences between Storm and Sanitary Pipe Systems (Eyre, Fortin, 2014)

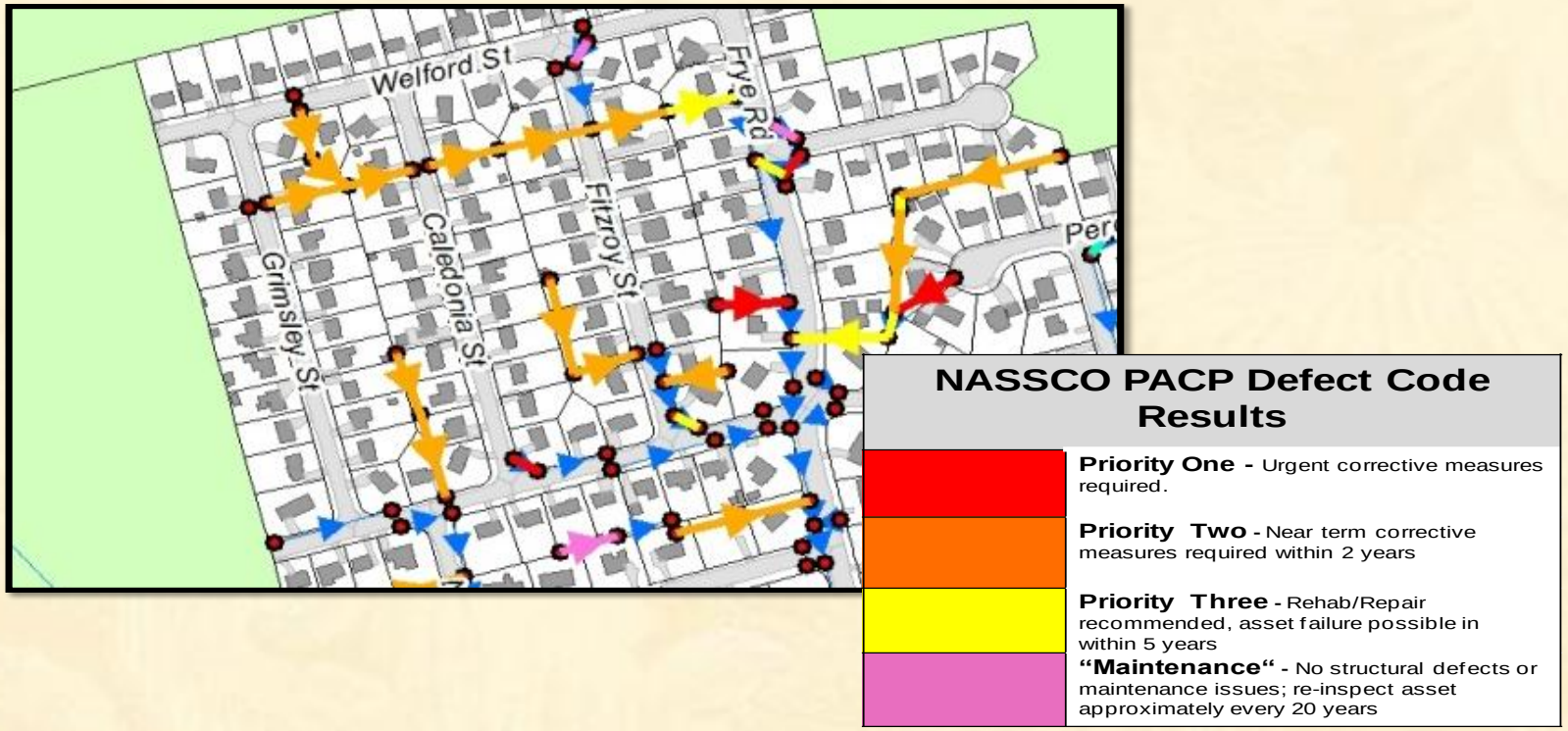
Feature	Wastewater Collection System	Stormwater Conveyance System
Lateral connections	Many	None to few
Bypass flows	Requires on-site pump operations during installation; may need a pipe de-commissioning and sanitizing step prior to disassembly	Rehab installation can be scheduled during 'dry' days, eliminating need for pump and bypass

Example Pipe Condition Rating Practices - Virginia Phase I MS4 Communities and District of Columbia



DC Water pipe defect condition rating - based on NASSCO PACP Defect Coding and Rating Approach (Eyre, Fortin, 2014)

Example Pipe Condition Rating Practices - Virginia Phase I MS4 Communities and District of Columbia



Example of Spatial Distribution of Priority Pipes (based on NASSCO PACP "QuickScore" (Eyre, Fortin, 2014)

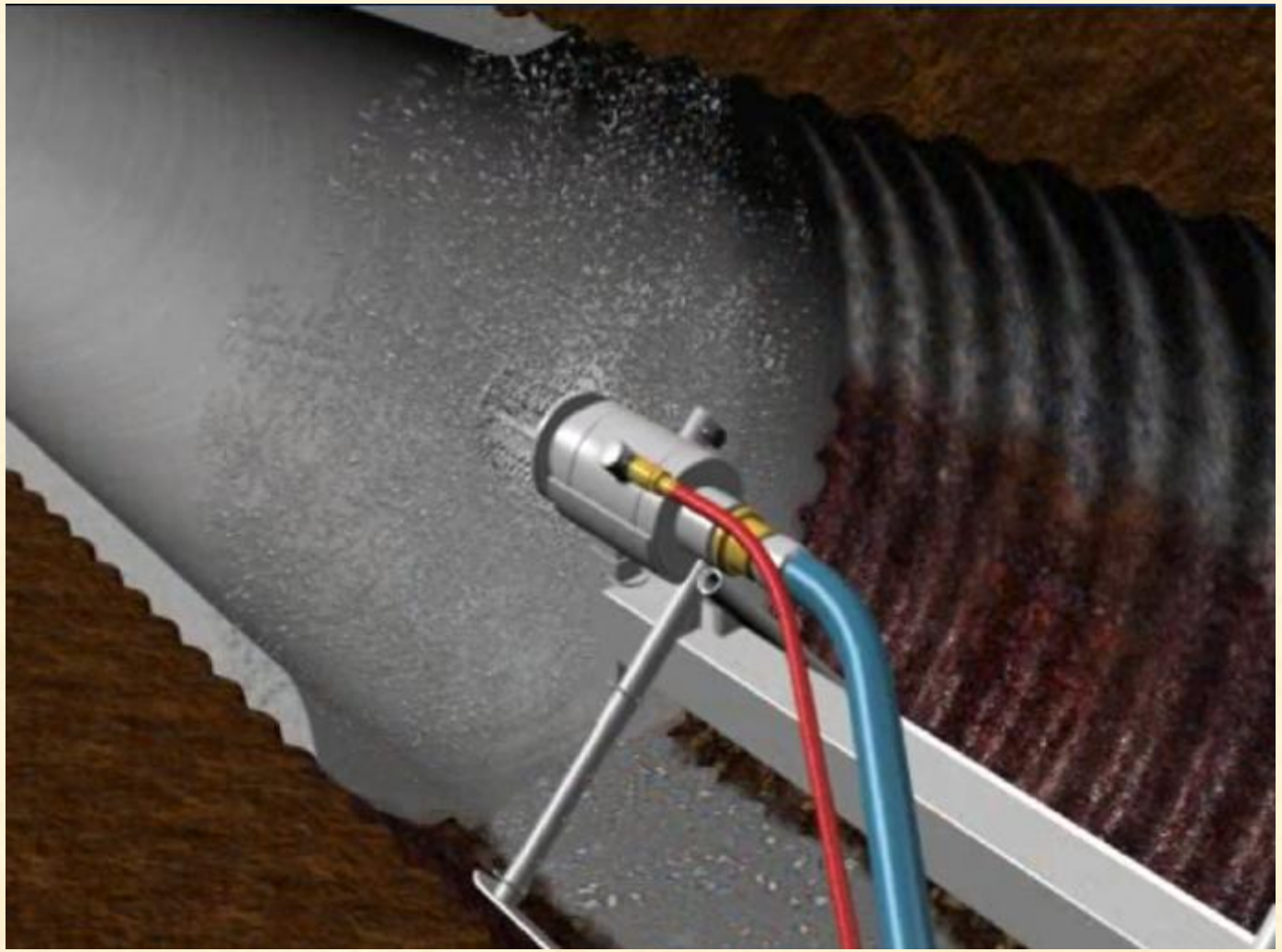
Lessons Learned

The Roadmap to accomplishing the needs for storm water asset management must seek sustainable & resilient technical solutions. This requires a commitment to:

- Innovation
- Validation
- Education

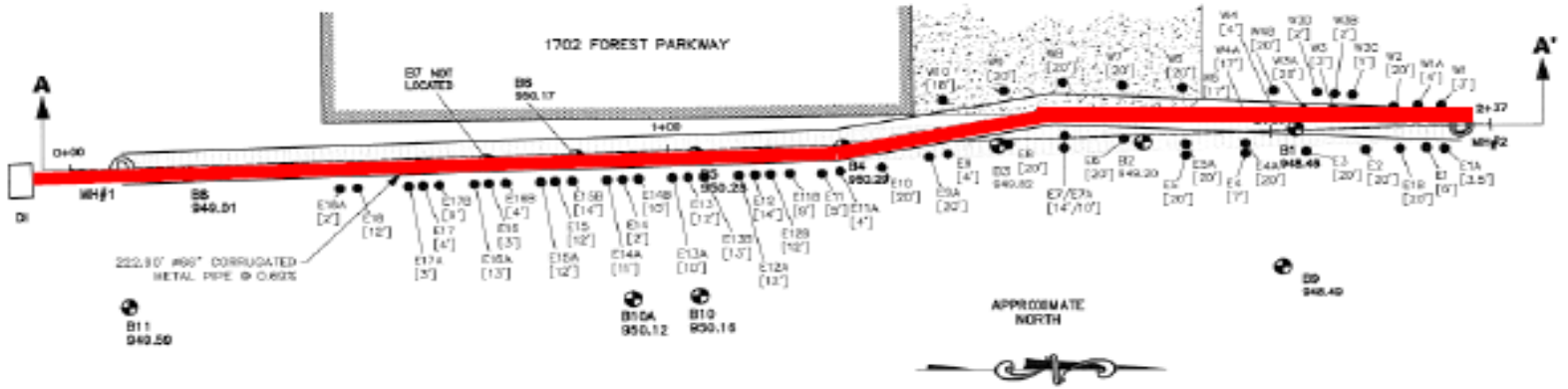
Forest Parkway Culvert Rehabilitation

“Quality Water, Quality Service”



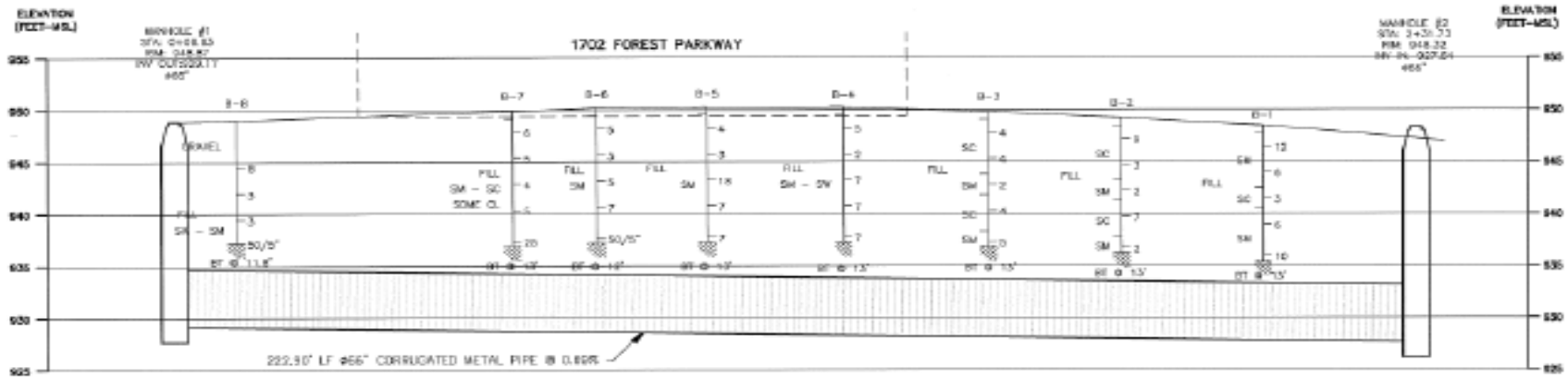

66" existing CMP
Grouted Annular Space
Steel Tunnel Liner Plates


Bobcat



GROUT INJECTION POINT PLAN

SCALE: 1" = 20' (HORIZONTAL)



CULVERT PROFILE A-A'

SCALE: 1" = 10' (VERTICAL) 1" = 20' (HORIZONTAL)

0 10 20
GRAPHIC SCALE (FEET)

- INJECTION POINT LOCATION (APPROXIMATE)
- SOIL TEST BORING

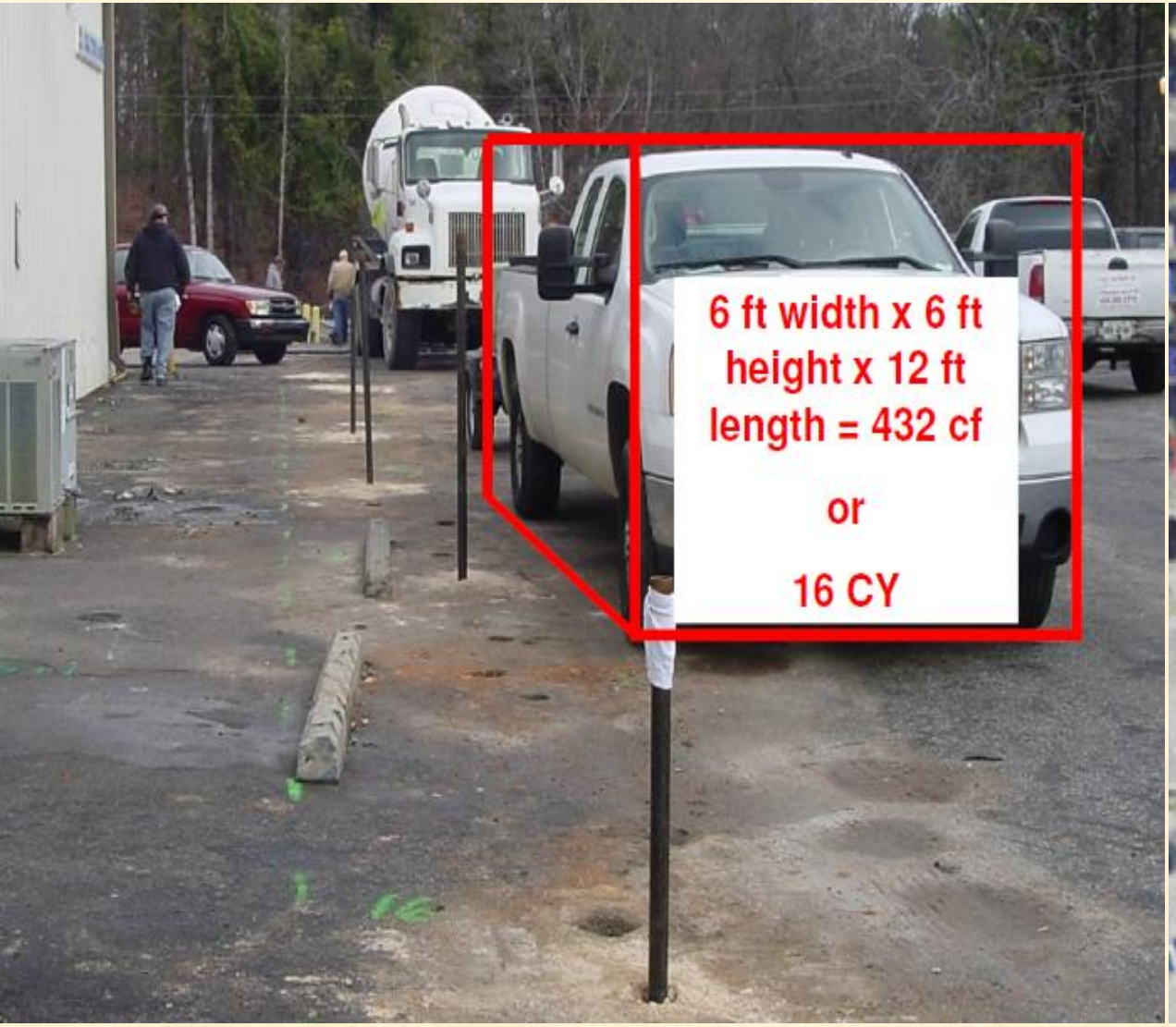
NO ELEVATIONS AND LOCATIONS BASED ON CORE SURVEY

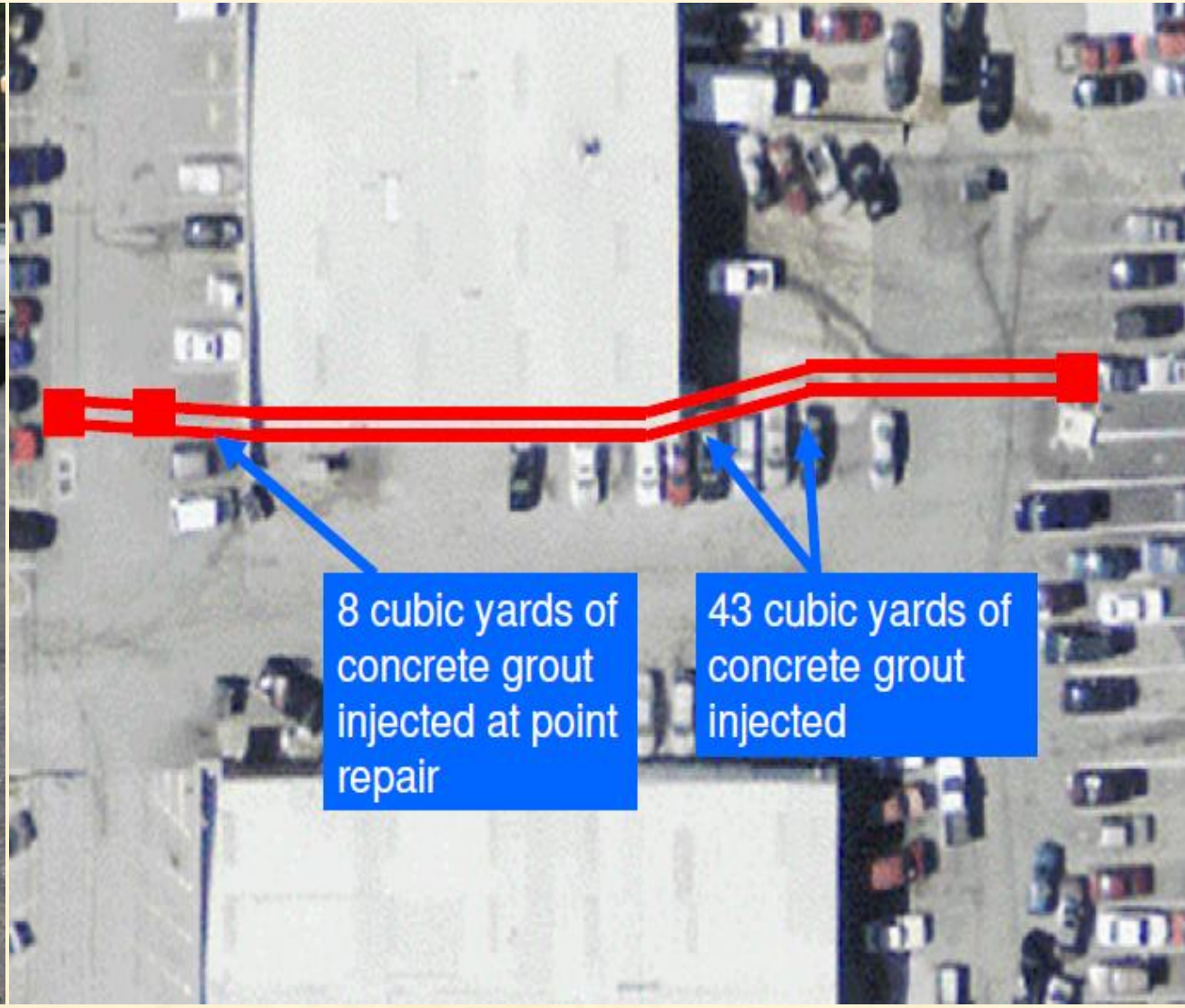
SCALE: 1" = 10' (VERT); 1" = 20' (HORIZ)

GEOSYSTEMS ENGINEERING, INC.

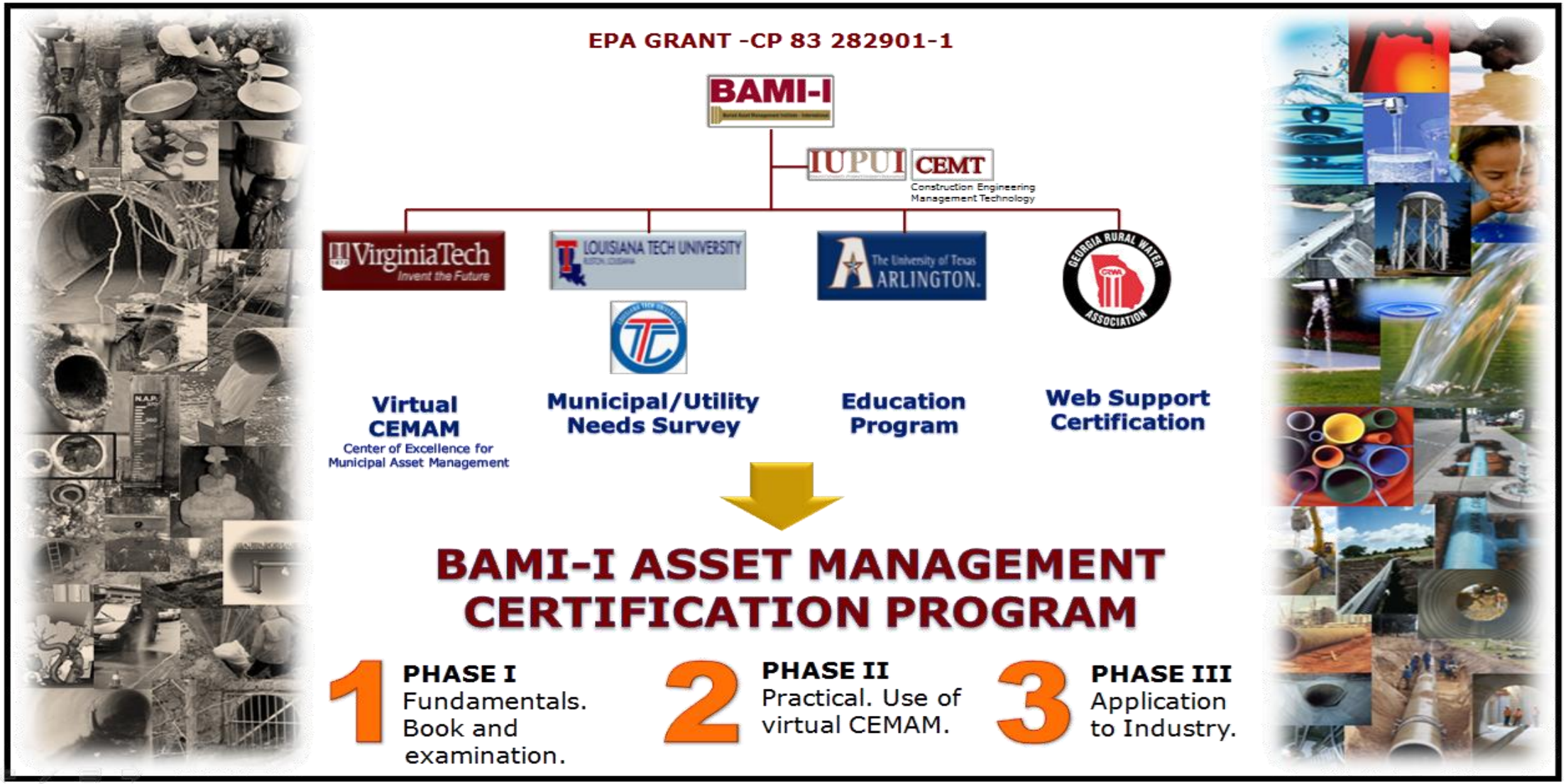
GROUTING SKETCH

PROJECT: STORM SEWER FAILURE AT T&D AUTO REPAIR
1702 FOREST PARKWAY
MORROW, CLAYTON COUNTY, GEORGIA
GEOSYSTEMS PROJECT NUMBER: 11-2263


6 ft width x 6 ft height x 12 ft length = 432 cf
or
16 CY


8 cubic yards of concrete grout injected at point repair
43 cubic yards of concrete grout injected

EPA Grant for Developing Water Utility Infrastructure Management Best Practice



CTAM Program

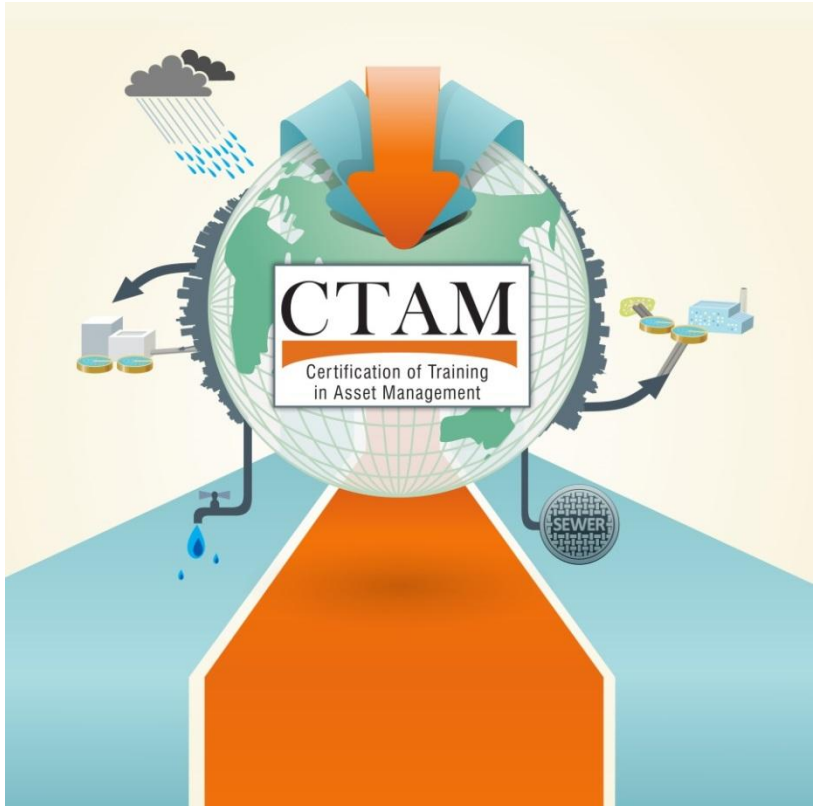
- **Online Asset Management Training for Water Utility Professionals**

CTAM Courses

- **Exclusive Four-Part Series in Asset Management Certification:**
- **CTAM-100** – Overview of Asset Management
- **CTAM-200** – Developing an Asset Management Program
- **CTAM-300 – Managing an Asset Management Program** ***(Launching in April 2015)***
- **CTAM-400 – Funding an Asset Management Program**

(Launching April 2015)

- **Why offer courses in Asset Management?**
  - To increase awareness and train utility personnel on the best way to implement and use asset management principles & practices
- **Levels of Certification**
  - **Certificate of Completion** – after the completion of each of the four courses
  - **Associate Water Asset Manager (AWAM)** – requires completion of CTAM 100-400 and an application submitted to BAMI-I Asset Management Certification Board
  - **Professional Water Asset Manager (PWAM)** – requires completion of CTAM 100-400, four years of relevant asset management experience and an application submitted to BAMI-I Asset Management Certification Board

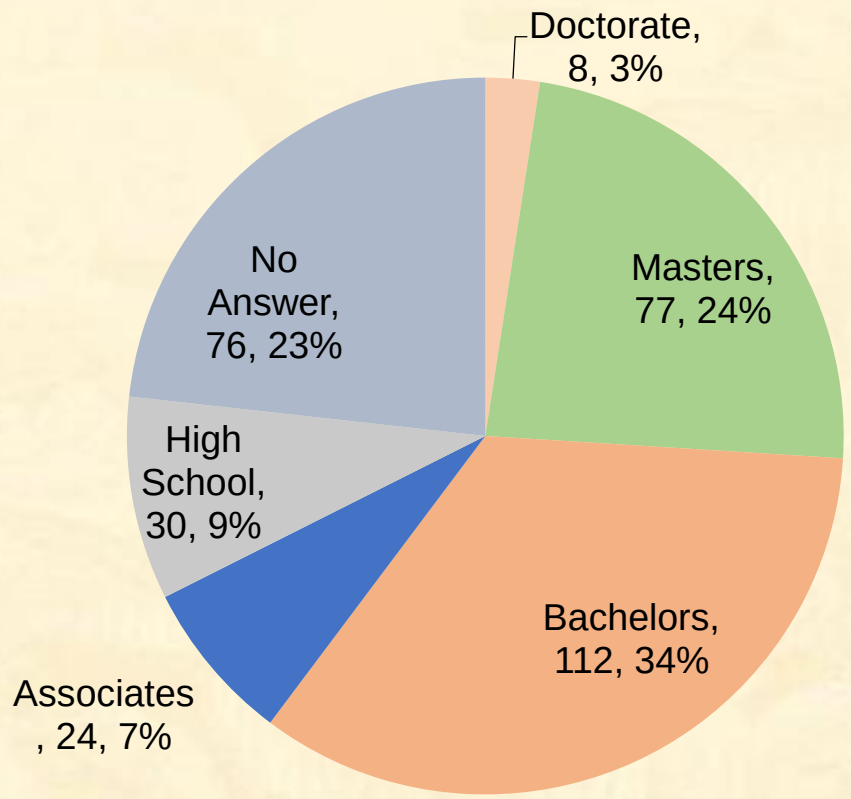


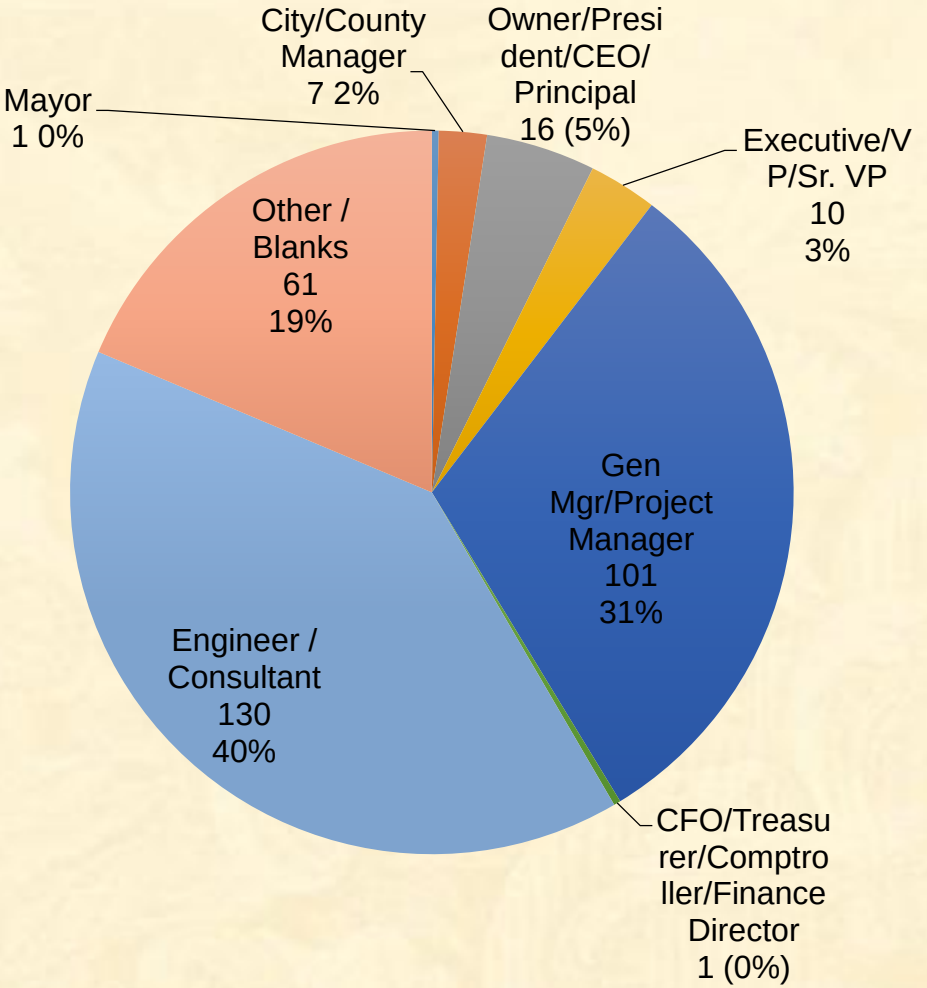
CTAM Highlights

- CTAM-100 & CTAM-200 registrations have exceeded 400 from 12 countries

- Is reaching the target market

CTAM Participants: Level of Education, Job Titles






Thanks for your attention!
Questions?
Contact information
Tom Iseley, LA Tech / TTC
Tel.: (318) 257- 4072
E-mail: dtiseley@latech.edu