



GIS Based Asset Management

Managing public works investments
to maintain and enhance our
modern society

What is a Public Works Asset?



- * It is our public built environment

Things such as:

- * Roads
- * Stormwater
- * Bridges
- * Sidewalks and ramps
- * Water systems
- * Sewer systems
- * Storm drain
- * Lighting



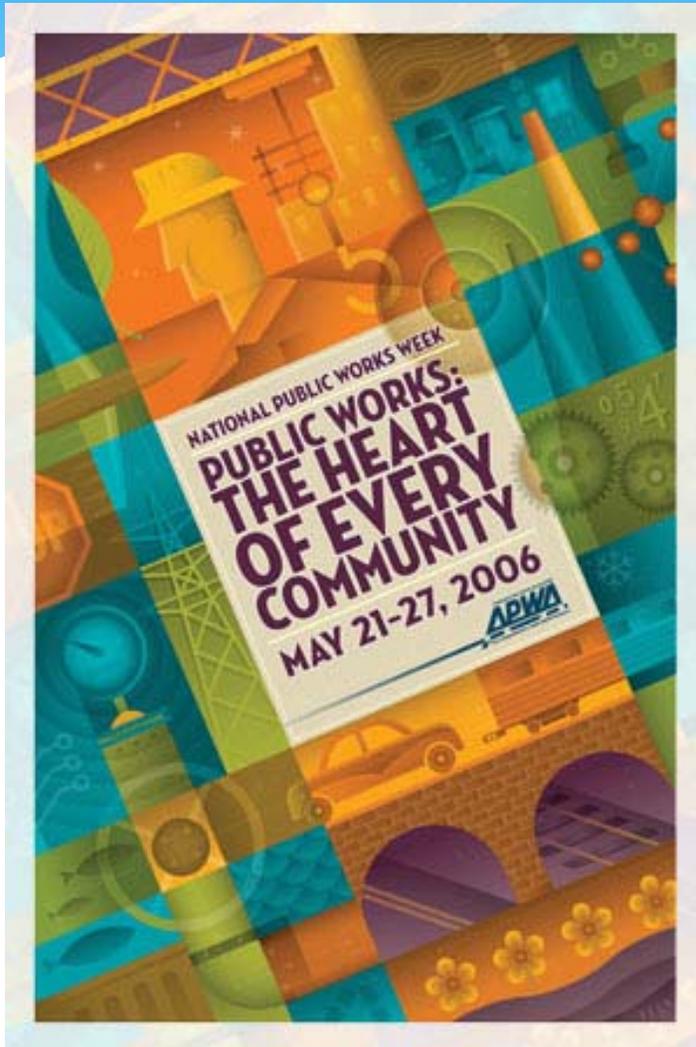
What is Asset Management



“Asset Management involves the balancing of costs, opportunities and risks against the desired performance of assets to achieve the organizational objectives.”

– *The Institute of Asset Management*

Why it Matters



Public works infrastructure (Assets) are the framework of our modern society.

The public works infrastructure allows our families and business to focus on our goals.

We expect the capability to travel, have fresh water, flush the toilet, and be safe.



US Infrastructure Report Card



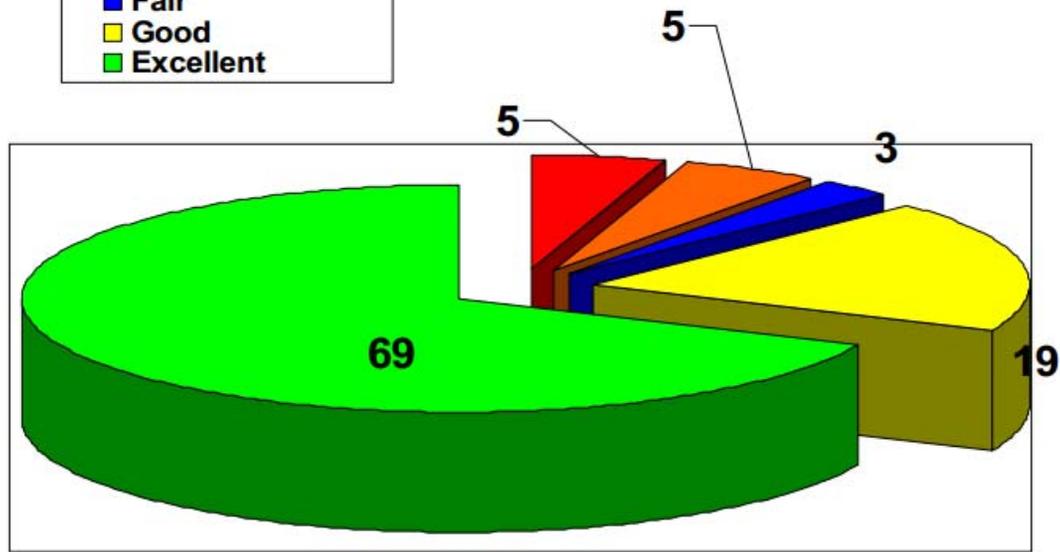
- * Capital investment needs for the nation's wastewater and stormwater systems are estimated to total **\$298 billion** over the next twenty years.
- * Fixing and expanding the pipes will address sanitary sewer overflows, combined sewer overflows, and other pipe-related issues.
- * Since 2007, the federal government has required cities to invest more than **\$15 billion** in new pipes, plants, and equipment to eliminate combined sewer overflows.

<http://www.infrastructurereportcard.org/wastewater/>



Estimated Condition of Sewer Pipes In 1980

- Failure
- Poor/Very Poor
- Fair
- Good
- Excellent

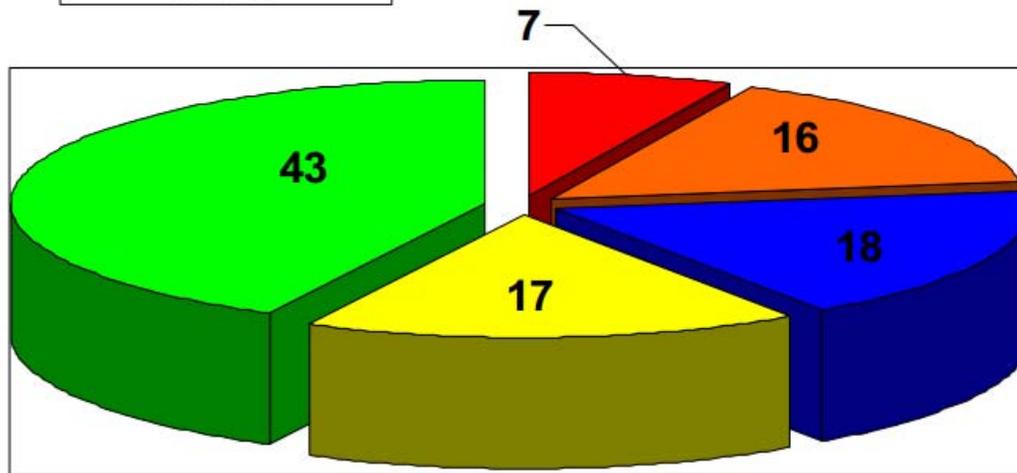


EPA Gap Analysis



Estimated Condition of Sewer Pipes In 2000

- Failure
- Poor/Very Poor
- Fair
- Good
- Excellent

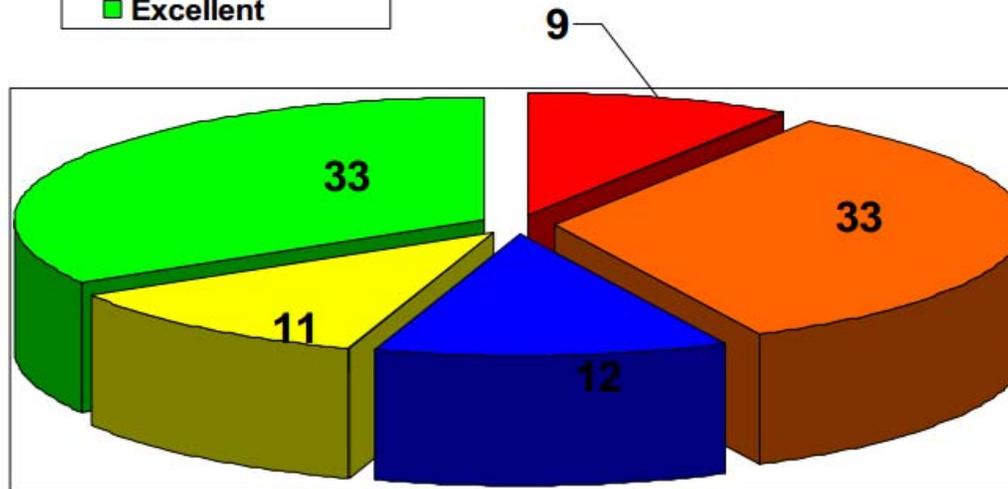


EPA Gap Analysis



Estimated Condition of Sewer Pipes In 2020

- Failure
- Poor/Very Poor
- Fair
- Good
- Excellent

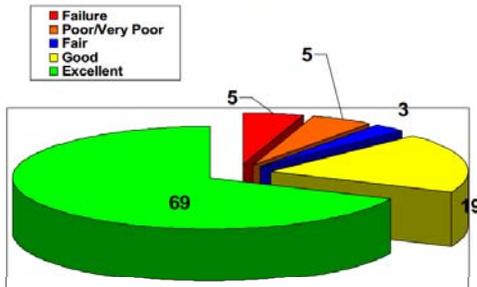


EPA Gap Analysis

We have a Problem

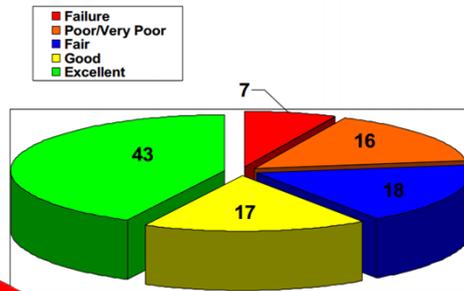


Estimated Condition of Sewer Pipes In 1980



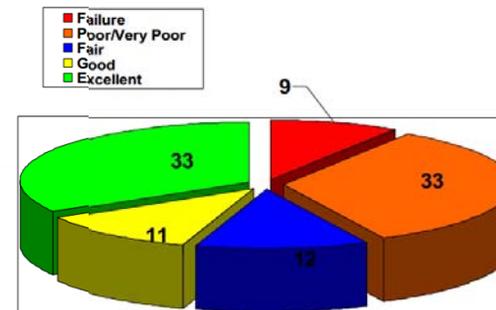
EPA Gap Anal

Estimated Condition of Sewer Pipes In 2000

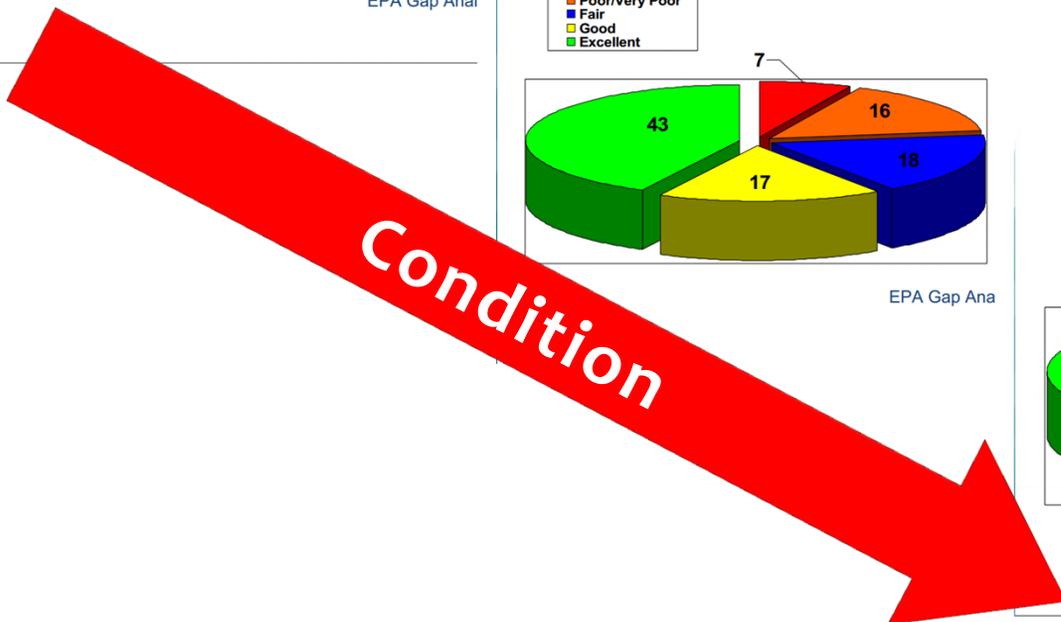


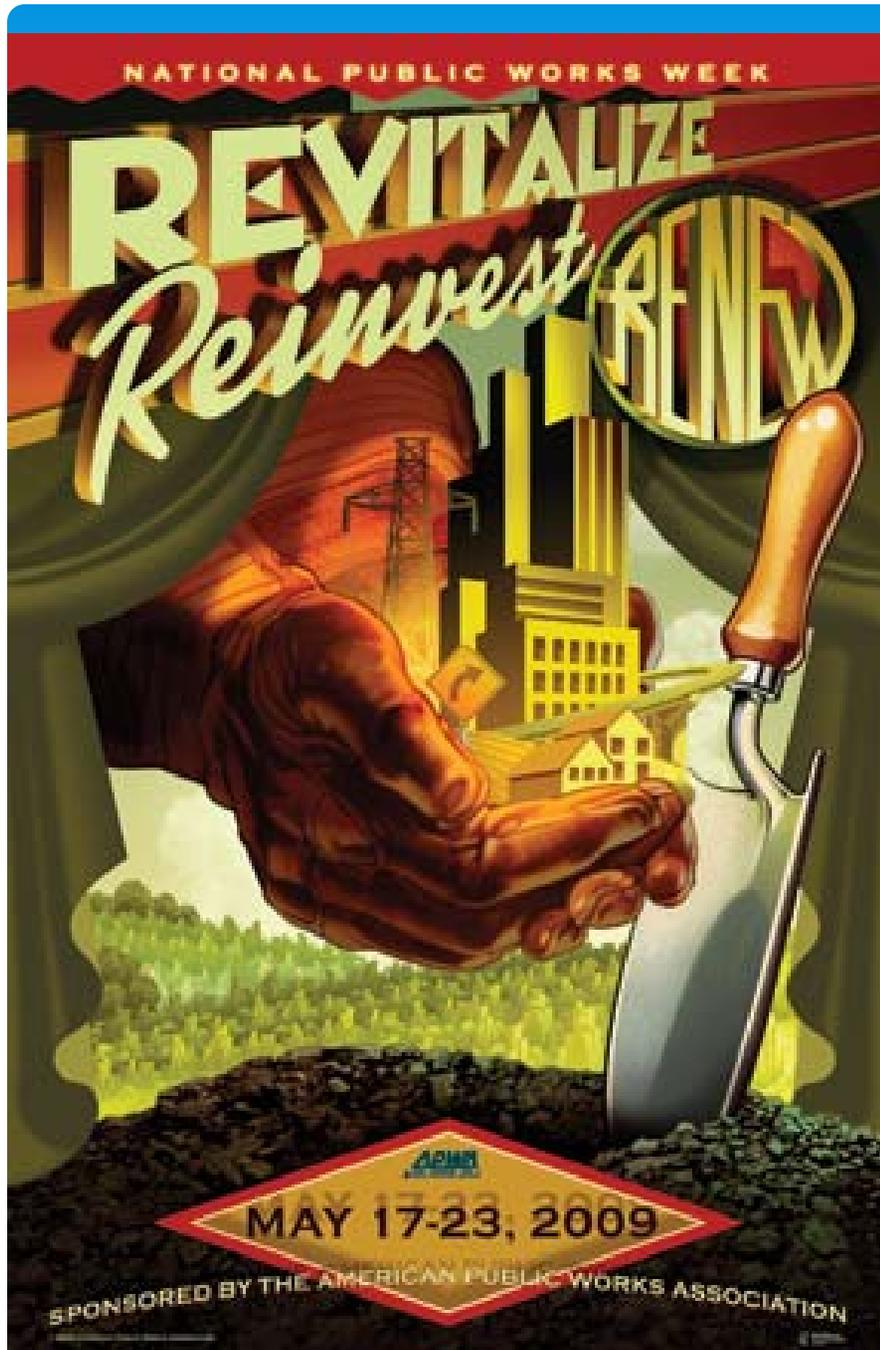
EPA Gap Ana

Estimated Condition of Sewer Pipes In 2020



EPA Gap Analysis





We have work to do!

Asset Management Strategies



Risk = Probability of Failure X Impact

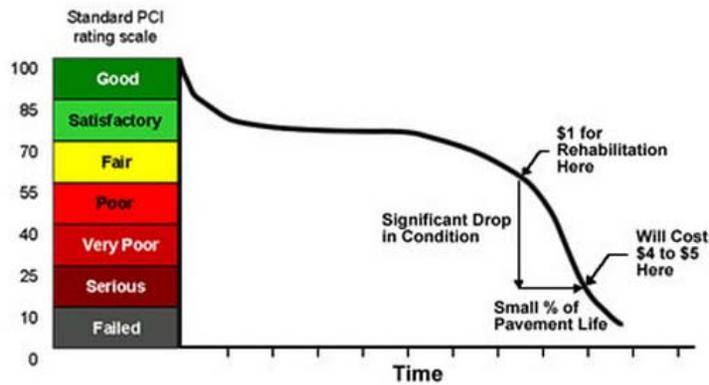
- * Run to Failure
- * Preventative / Planned on Time
- * Preventative / Planned on Usage
- * Condition-based Maintenance
- * Predictive Maintenance
- * Reliability-centered Maintenance

Asset Management Best Practices



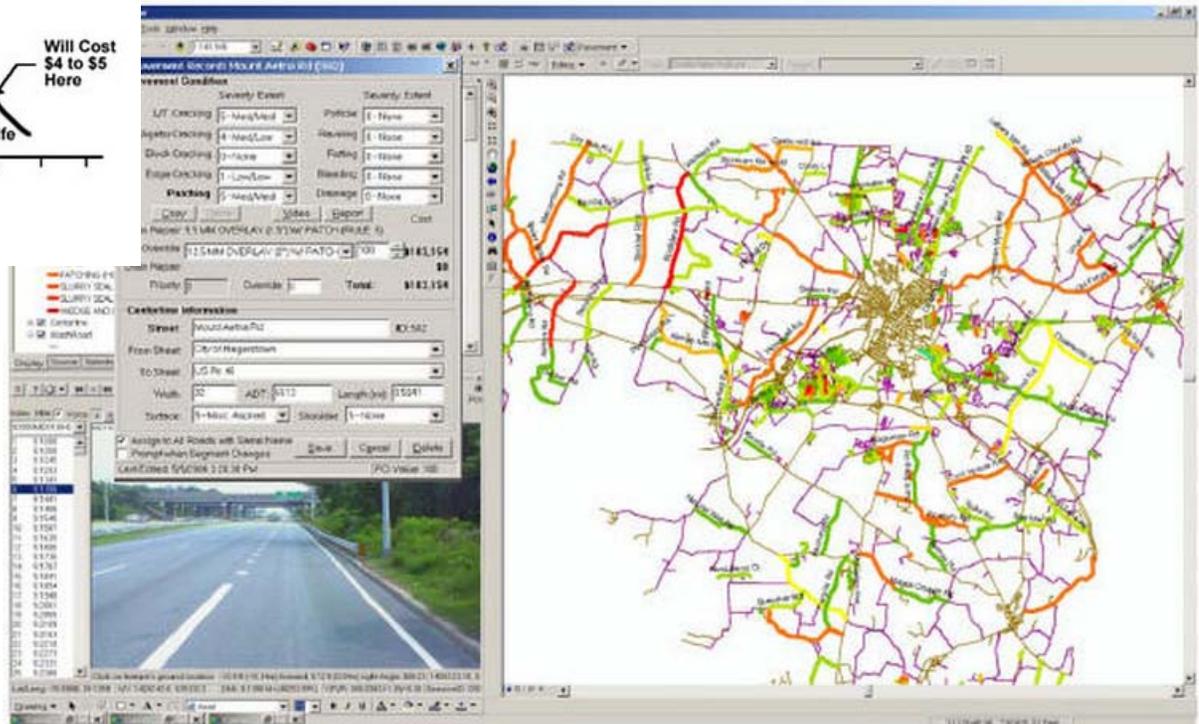
- * Development of an asset management policy
- * Creating an asset register (GIS) to facilitate analysis and planning
- * Implementing a Computerized Maintenance Management System
- * Perform condition assessment and renewal/replacement planning
- * Implementing an asset management master plan and CIP
- * Development of a strategic asset management plan

Pavement Management



Pavements should be managed, not simply maintained!

Automated
Decision Support
System





Sewer Rehabilitation Program Vision



- * **Rehabilitation planning is data driven** – operations, condition, capacity, and interrelated projects (paving)
- * **Necessary planning and reporting data is accessible** through an integrated databases – GIS, Lucity, CCTV, Hydraulic Models
- * **Data management** is built into existing business processes with distributed responsibilities – no excessive burden
- * **Information access** is enabled through online tabular reporting, map visualization, and trend charting



Program Elements



GIS

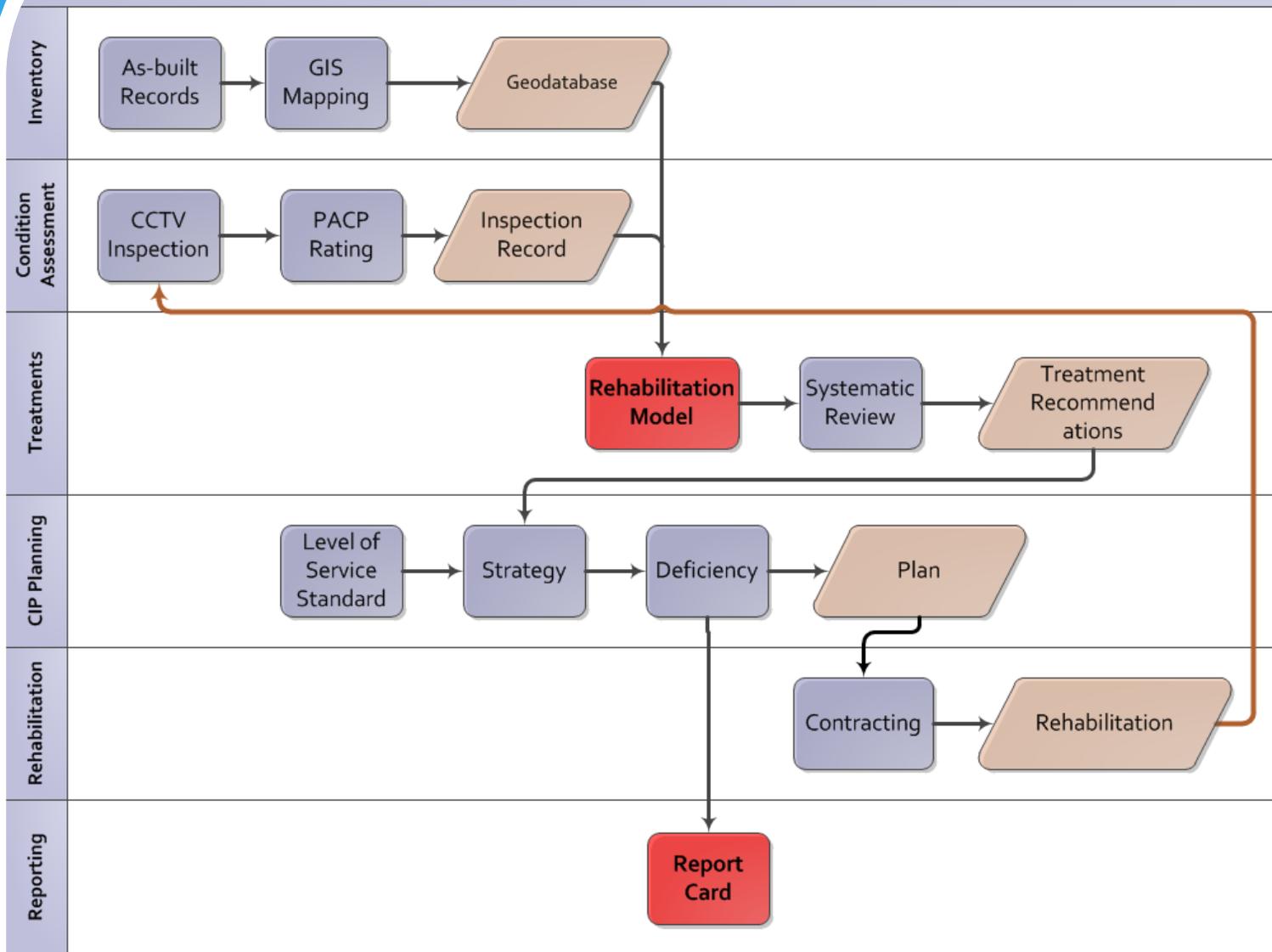
- * Asset Inventory
- * Asset ID Assignment
- * Model Ready
- * Visual
- * Supports Spatial Analysis



Asset Management

- * Inspection Records
- * Work History
- * Work Management
- * Cost Tracking
- * Rehabilitation Modeling

City of Fontana Sewer Rehabilitation Program



Pipe Rehabilitation Analysis Details - Unnamed Filter Set

Analysis No: 1 | All Pipes Model Run | Analysis Type: |

US Structure: M20_13 | DS Structure: M21_1 | Alt Pipe ID: M20_13@M21_1

Main Work Task: | Basin: M21_14

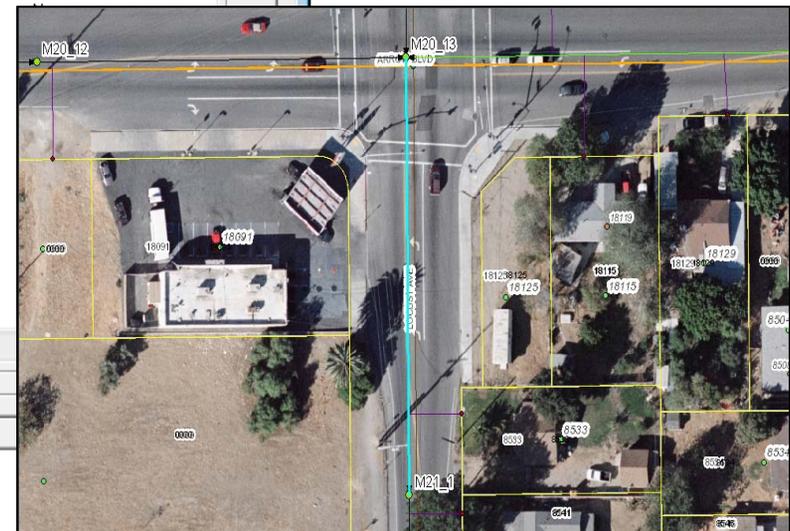
Summary | Details | Linked Rehab Projects

Pipe Defects

Defect # /	Repair #	Selected	Defect Obs Text	Struct Rating	O&M Rating	Distance	Continuous Defect
1		No	Manhole	0	0	0.0	No
2		No	Water Level	0	0	4.6	No
3	1	Yes	Joint Offset Medium	1	0	30.6	
4		No	General Photo	0	0	166.0	
5		No	Tap Factory Capped	0	0	229.1	
6		No	Tap Break-in	0	0	231.6	
7	2	Yes	Crack Multiple	3	0	242.2	
8		No	Manhole	0	0	246.1	

Pipe Work Tasks

Repair # /	Work Task	Work Task Text	Start	Stop	Selected	Cost
1 1		Point Repair 1 LF Dig Out	31	31	Yes	15000
2 4		Point Repair CIPP	238	246	Yes	5400
3 7		Complete Line Repair CIPP	0	244	No	28095
4 8		Complete Line Repair Remove and Replace	0	244	No	48860



Pipe Rehabilitation Analysis Details - Unnamed Filter Set

Analysis No: 1 | All Pipes Model Run | Analysis Type: []

US Structure: M20_13 | DS Structure: M21_1 | Alt Pipe ID: M20_13@M21_1

Main Work Task: [] | Basin: M21_14

Summary | Details | Linked Rehab Projects

Surface Type	Asphalt	Criticality	0	US Depth	8.01
Material Type	VCP	Pipe Length	244.3	DS Depth	10.50
Access Type	Street	Pipe Diameter	10	Average Depth	9.26
Obs Data Source	PACP - US to DS	Pipe Width	0	Structural Rating	0
All Indiv Task Costs	20400	Min Rehab Priority	0	Cleaning Rating	0
Rehab Pipe Cost	28095	Est # of Joints	0	Pipe Rating Struct	4.00
Rehab vs Ind Diff	7695	# of Connections	1	Pipe Rating OM	0.00
Replace Pipe Cost	48860	Unpaved Cover	<input type="checkbox"/>	Pipe Rating Total	4.00
Replace vs Ind Diff	28460	Paved Cover	<input checked="" type="checkbox"/>	Total Flow (gpm)	0.00
		Heavy Traffic	<input type="checkbox"/>	Flow Removed (gpm)	0.00
				Ratio (\$/gpd)	0.000

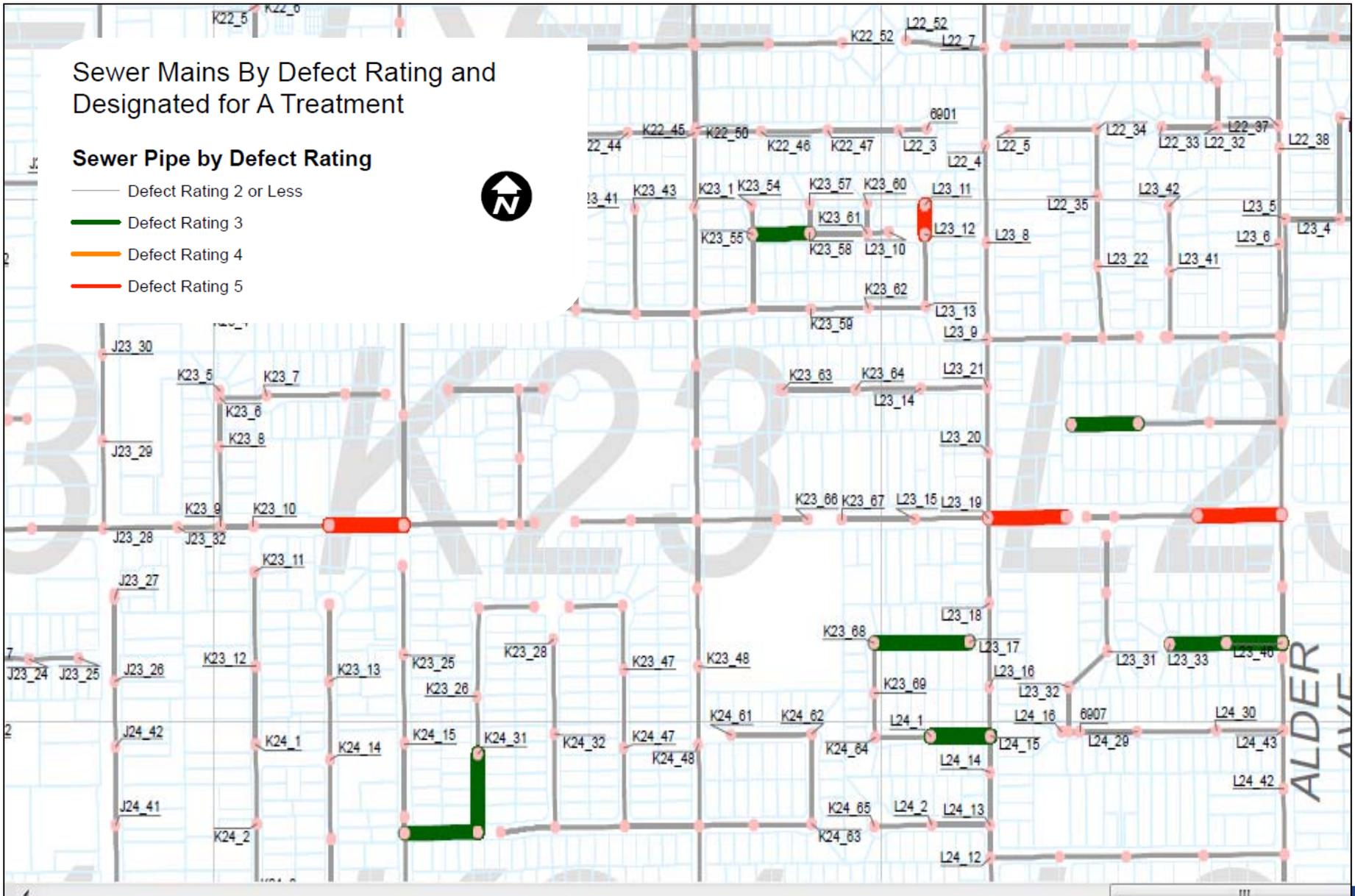
Rigid Pipe
 Flexible Pipe
 Brittle Pipe
 Easy Access
 Difficult Access

Reviewed: 1 | Reviewed
 Expert Review: 1 | Secondary Review Needed
 Approved:
 User 4: []
 User 5: []
 User 7: []
 User 8: []
 User 9: []
 User 10: // [v]
 User 11: // [v]
 User 13:
 User 14:
 User 15:

Sewer Mains By Defect Rating and Designated for A Treatment

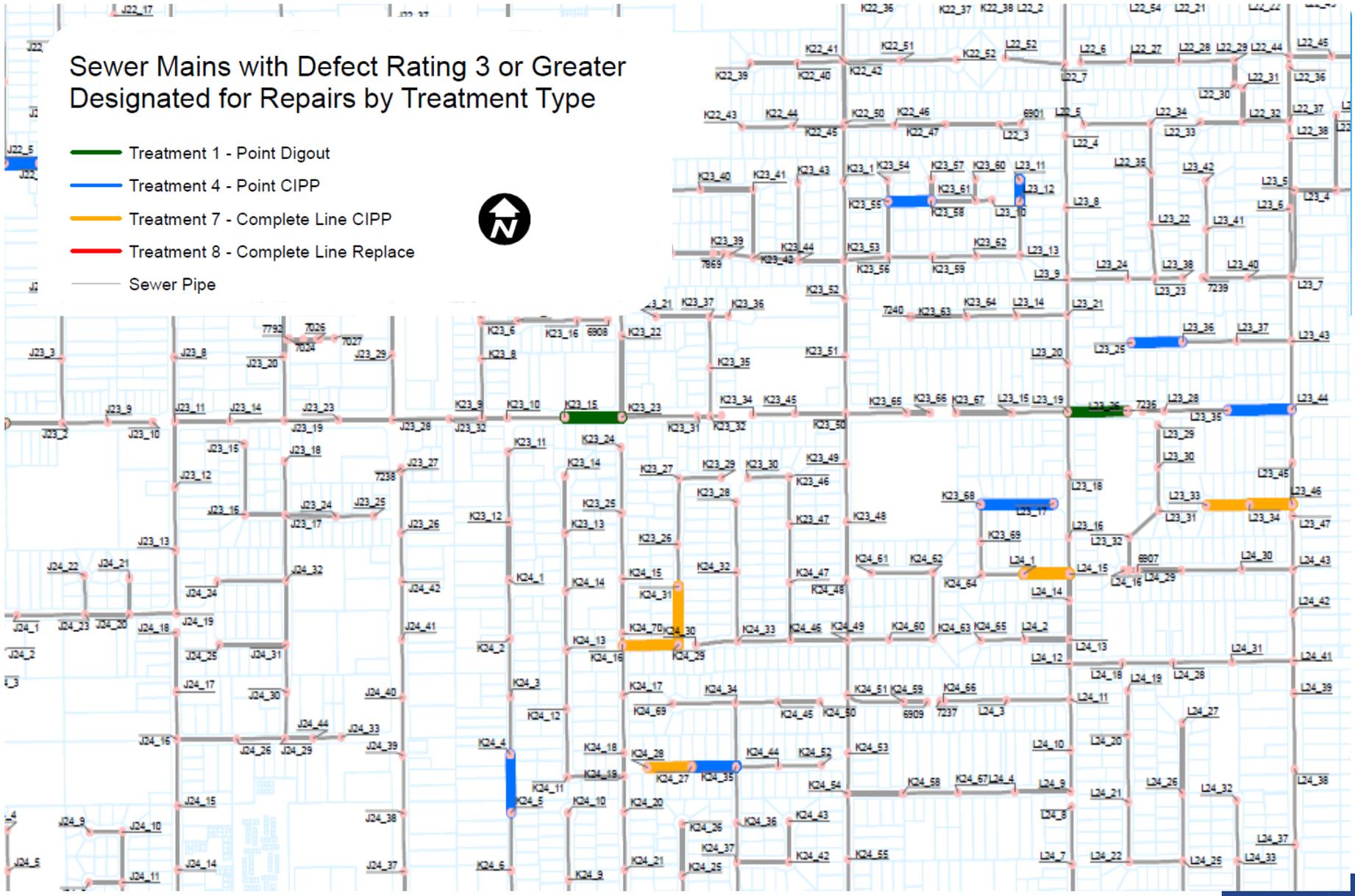
Sewer Pipe by Defect Rating

- Defect Rating 2 or Less
- Defect Rating 3
- Defect Rating 4
- Defect Rating 5

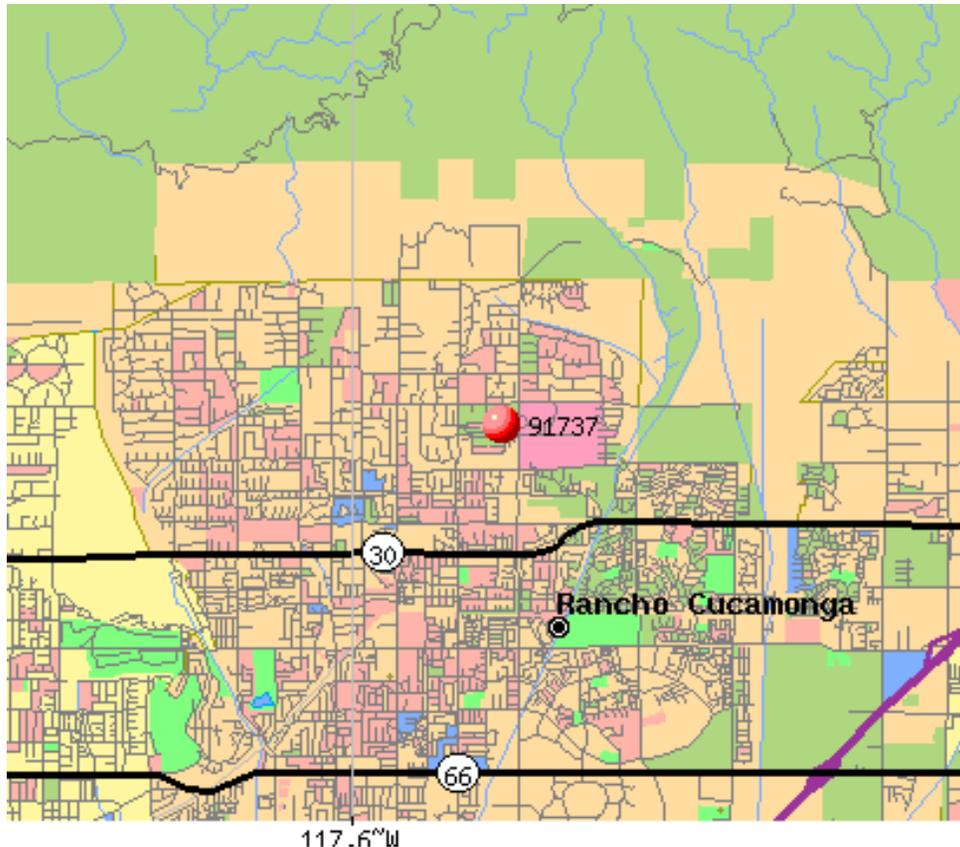


Sewer Mains with Defect Rating 3 or Greater Designated for Repairs by Treatment Type

- Treatment 1 - Point Digout
- Treatment 4 - Point CIPP
- Treatment 7 - Complete Line CIPP
- Treatment 8 - Complete Line Replace
- Sewer Pipe



Assessment District Financing



GIS can be used to design and manage equitable financing and assessment strategies for infrastructure improvement

Public Notification of Defects



Find community resources, report defects





waze

OUTSMARTING TRAFFIC, TOGETHER



Outsmarting
Traffic
Together

What is the Future?



- * Sensors – everywhere
- * Integrated data
- * Predictive maintenance
- * Optimized infrastructure



The logo for TaKaDu, featuring the word "TaKaDu" in a bold, black, sans-serif font. A small blue water droplet is positioned above the letter 'u'. The text is enclosed within a white rounded rectangle with a blue border.

Water Utility Challenges

Infrastructure: Aging Networks

Resource: Water Shortages

Efficiency: Energy and Water Losses

Technology: Insufficient Network Visibility

Converting Data to Decisions

Raw Data

Tactical
Network
Knowledge

Strategic
Insight



TaKaDu



Entire Monitored Area

Category: Leakage ▾ Showing: Suspected leakage events ▾ Time: Current events ▾

Managerial Dashboard

Leakage Events by Status



■ Open 117
■ In Process 74
■ Job Pending 43

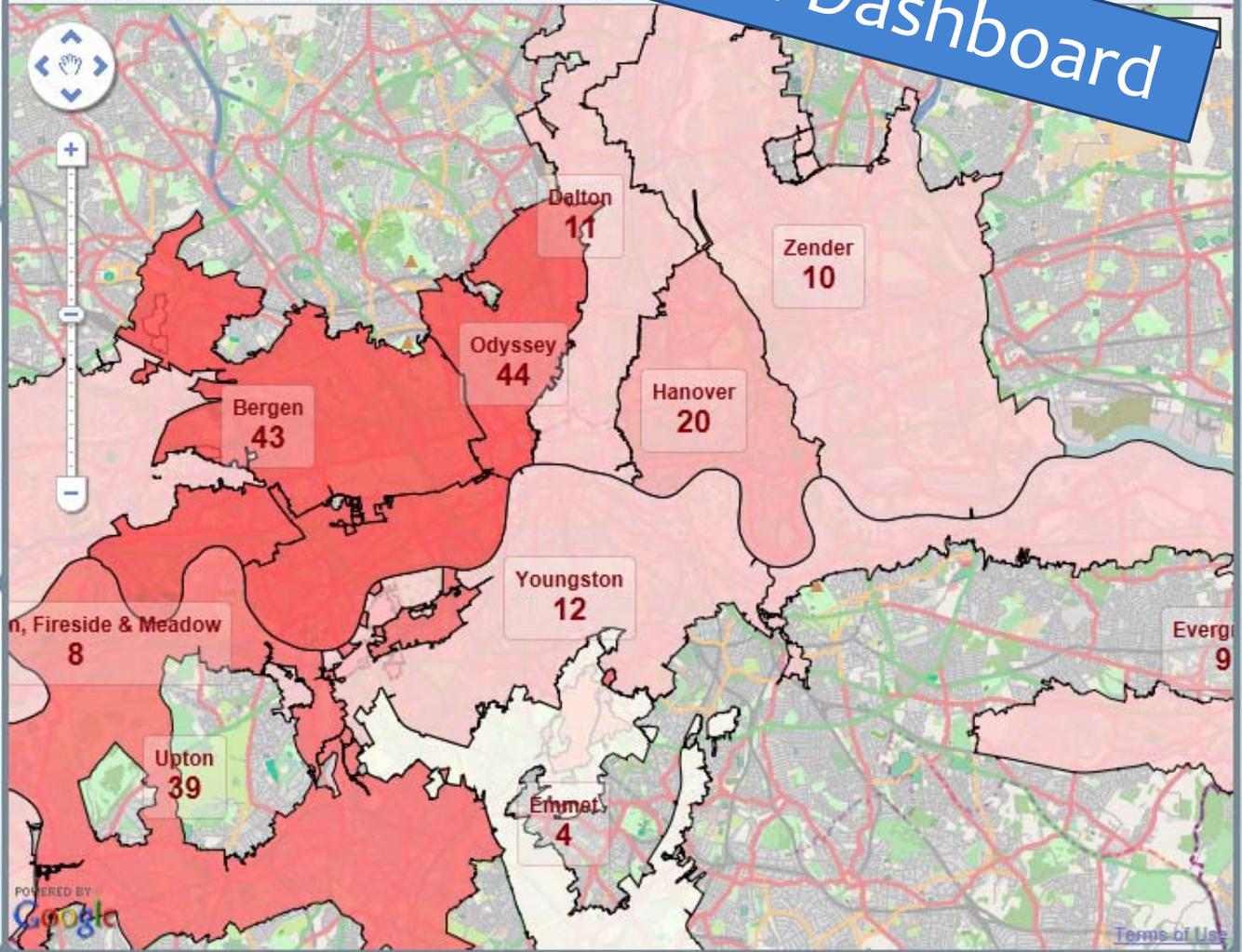
Leakage Events by Area

Location	Events
Odyssey	44
Bergen	43
Upton	39
West	34
Hanover	20
Youngston	12
Dalton	11

Latest Events

Status	Type	Location	Started
■	💧	Dalton 57	07/11/11 21:00
■	💧	Zender 118	07/11/11 21:00
■	💧	Zender 119	07/11/11 20:00
■	🔧	DM04667 Pressure	07/11/11 16:00
■	🔧	DM18787 Pressure	07/11/11 13:00
■	🔧	DM18786 Pressure	07/11/11 13:00
■	🔧	DM10070 Pressure	07/11/11 12:00
■	🔧	DM18898 P	07/11/11 10:00

Number of suspected leakage events (Mar 26, 2012)



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Conclusions



- * Our public works infrastructure is vital
- * We have work to do
- * GIS can help us manage in many ways

Contact



Contact Psomas for more information about integrated GIS and asset management programs.

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