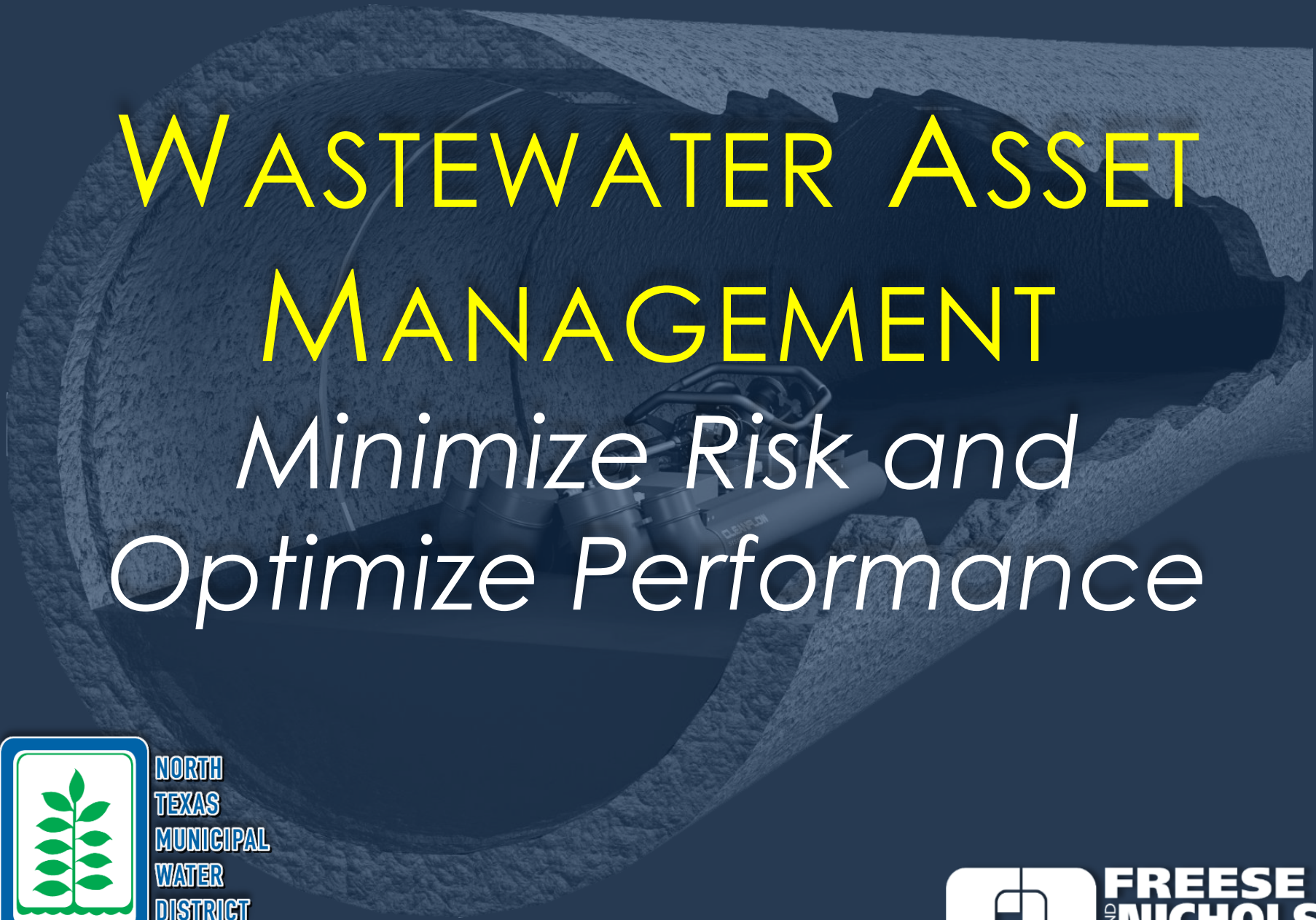


Wastewater Asset Management

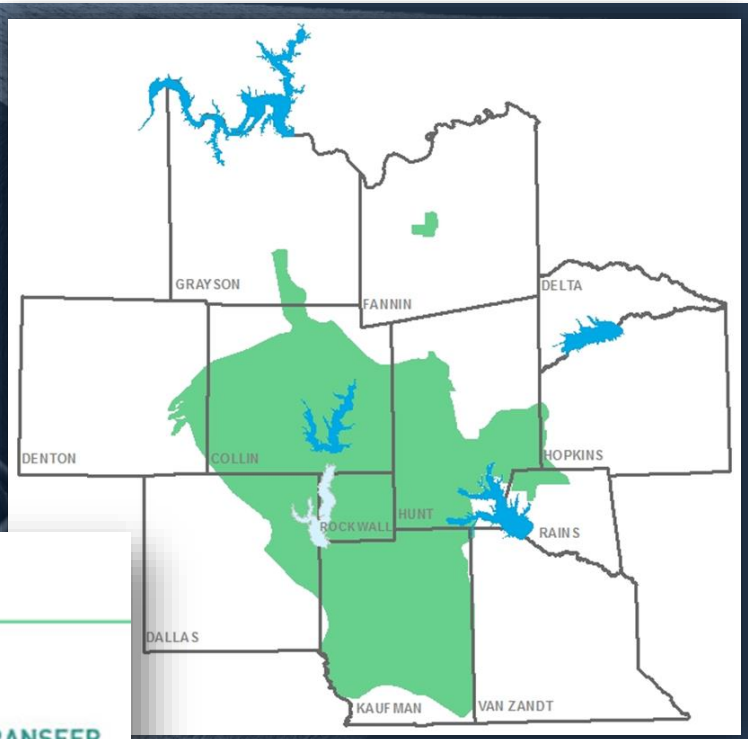
Minimize Risk and Optimize Performance

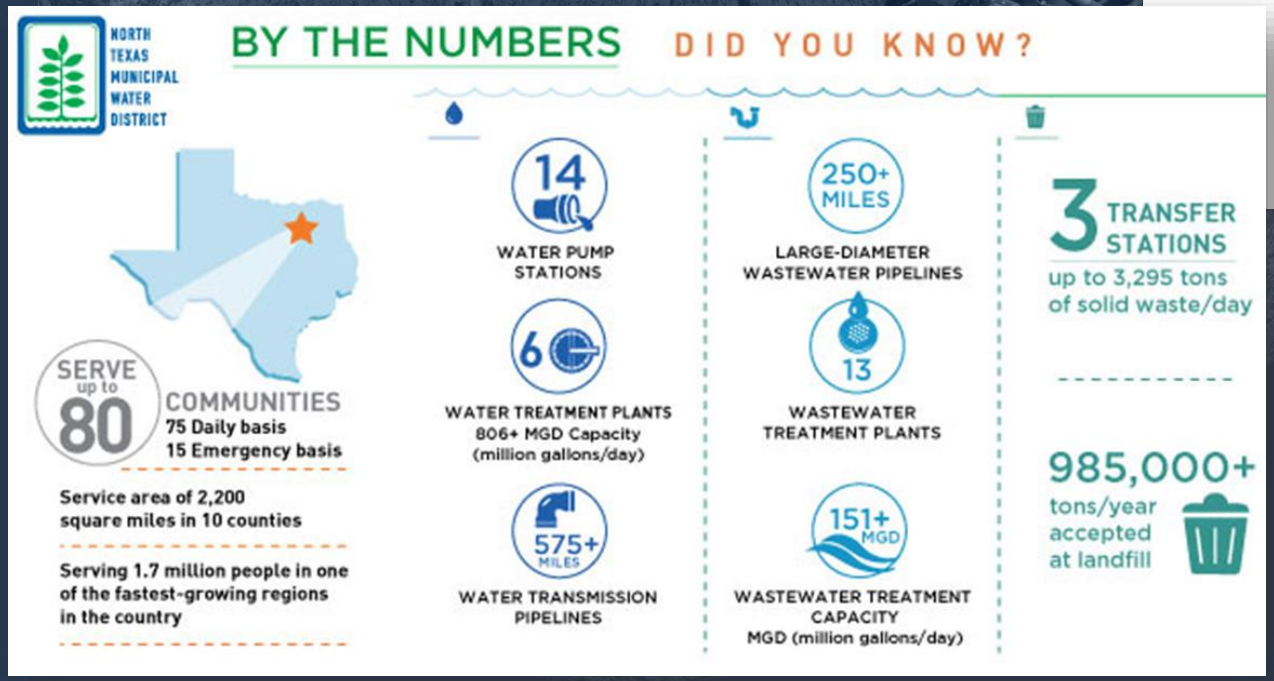
NORTH TEXAS MUNICIPAL WATER DISTRICT

FREESE AND NICHOLS

North Texas Municipal Water District

- 1940s - Community leaders concerned for dwindling groundwater supplies supporting 32,000 people
- 1951 – NTMWD created by Texas Legislature with 10 member cities

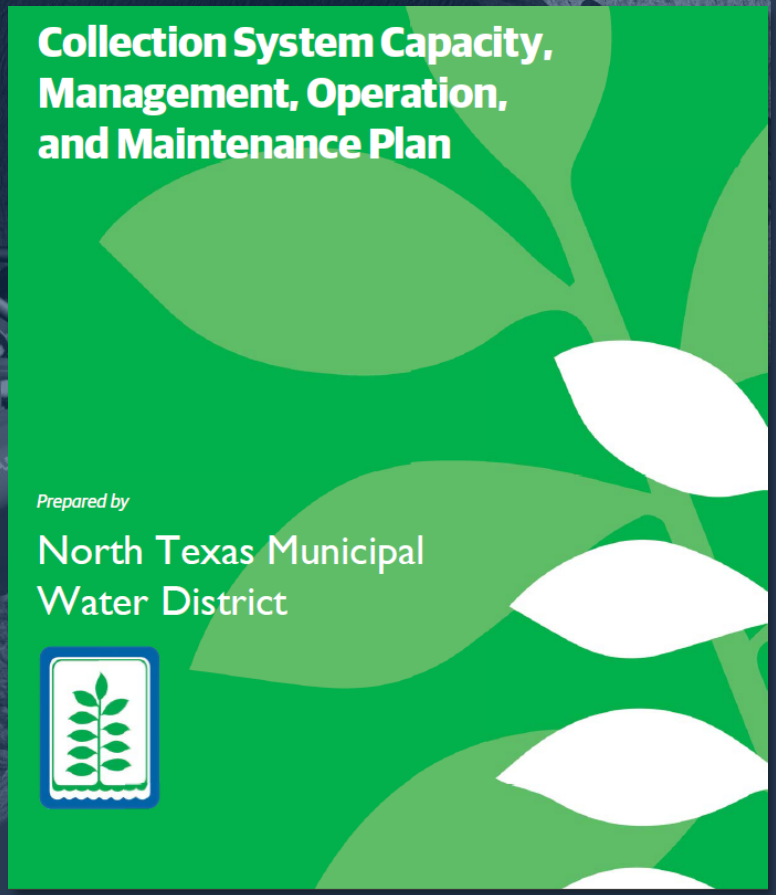




- Provides water, wastewater & solid waste management services to over one million people across 10 counties
- 800+ miles of pipe

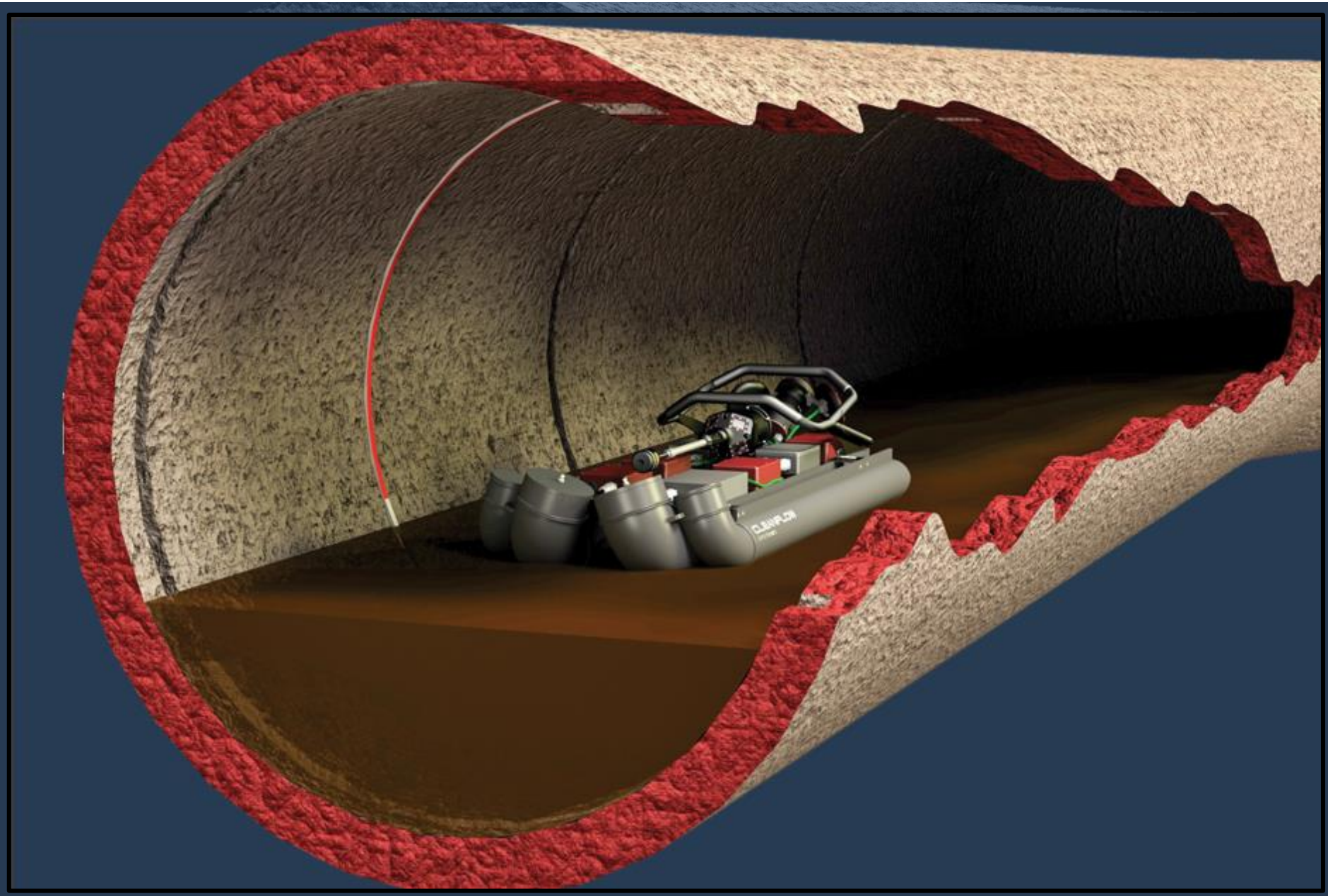
Drivers for CAP

- EPA CMOM and SSOI Commitment
- 10-year Program to inspect the entire Collection System
- Single Data Repository
- Continuous Demand to improve Customer Service
- Maximize Renewal Dollars for Aging Infrastructure



Tools and Technology

Multi-Sensor Inspection



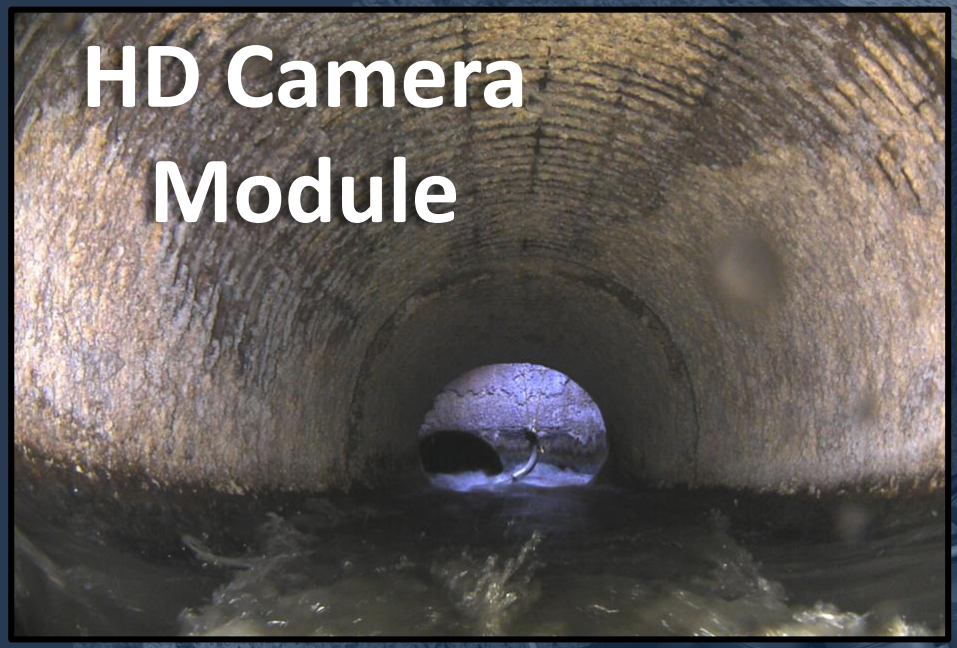
Multi-Sensor Inspection (continued)

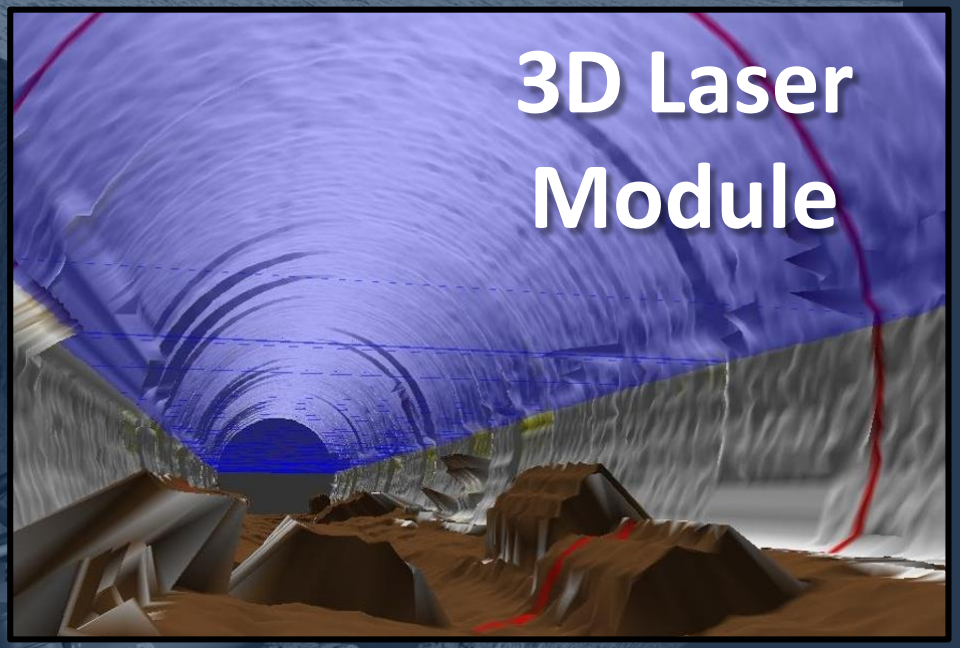
HD Camera Module

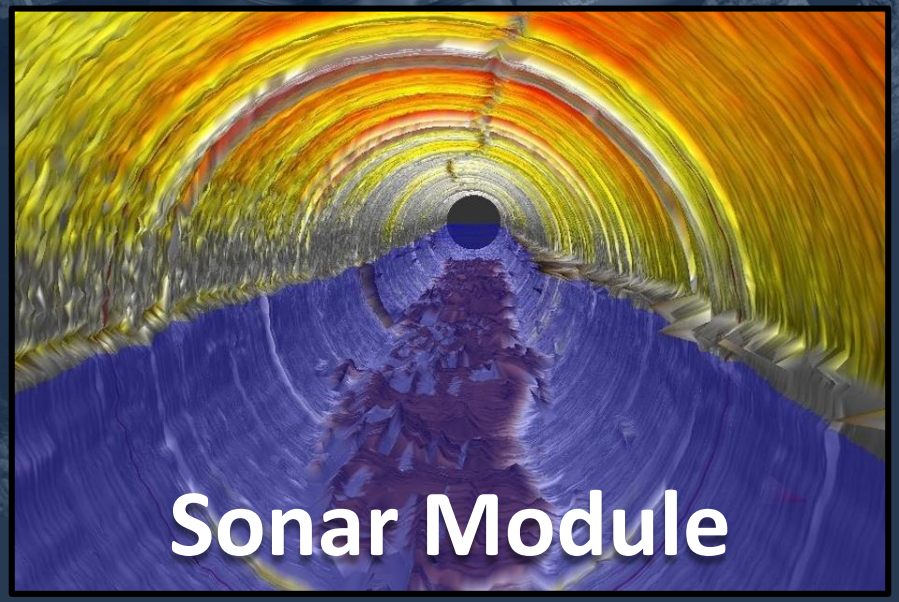
3D Laser Module

Sonar Module

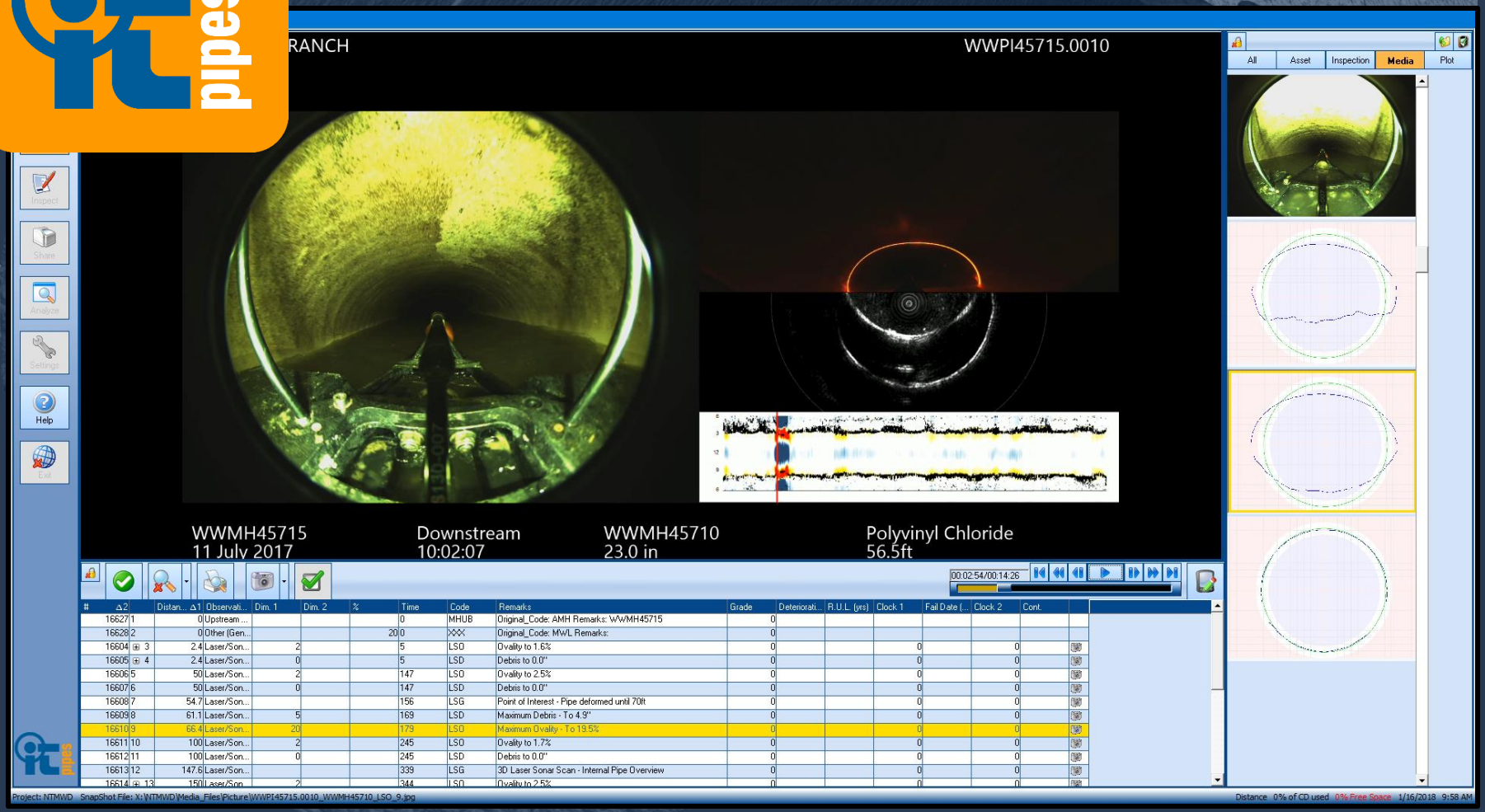
Multi-Sensor Inspection (continued)



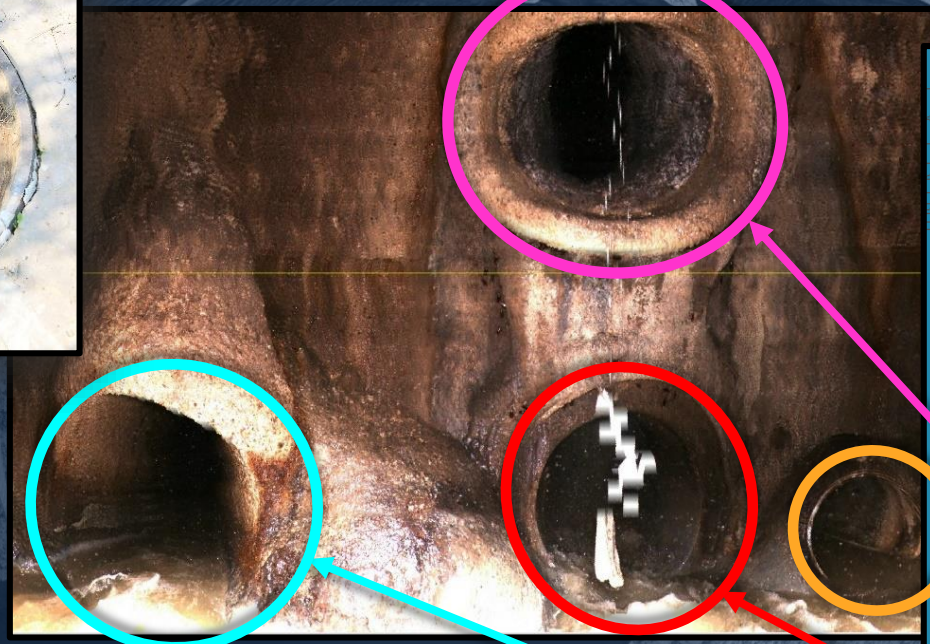


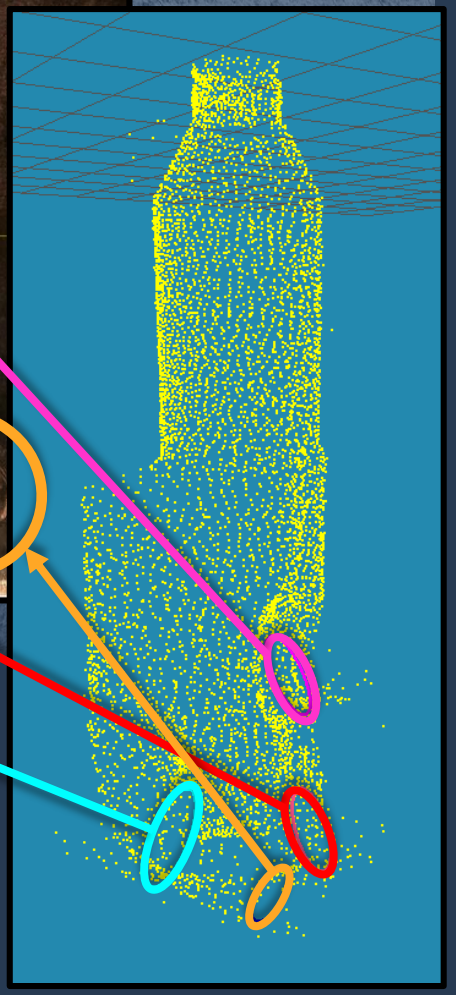


Multi-Sensor Inspection (continued)



Digital Manhole Inspection





- Accurate Point Cloud Measurements
- Identify Defects, Pipeline Locations and Inverts, Manholes, and Lining Materials
- No Manned Entry Required
- MACP Assessments

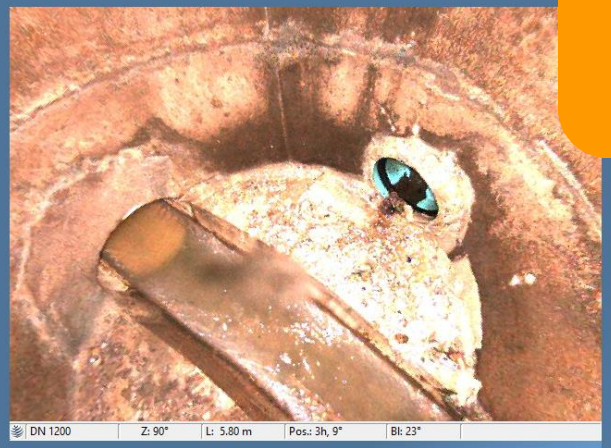
RapidView IBAK North America

Digital Manhole Inspection (continued)

Digital Manhole Inspection (continued)

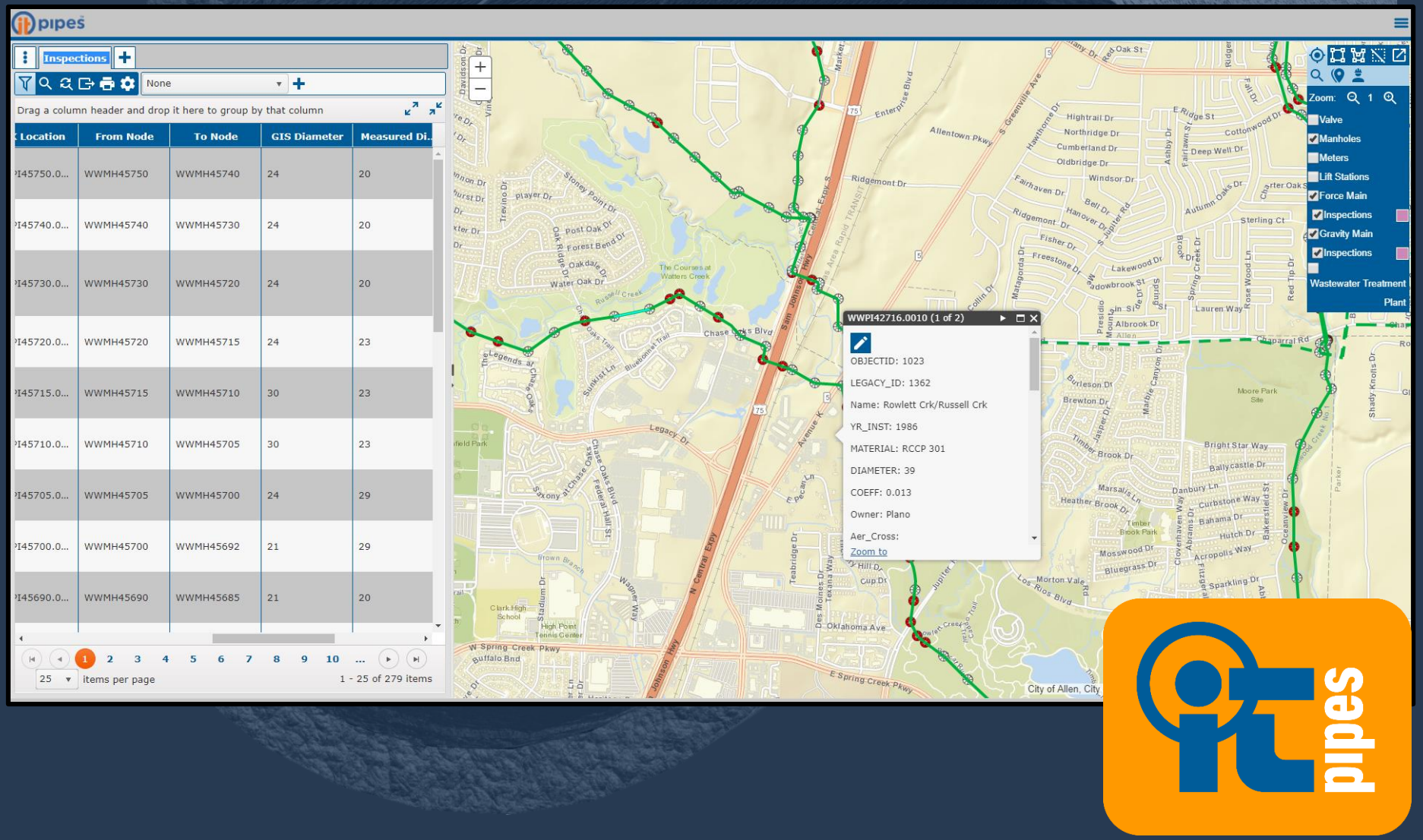
Asset

PO Number	
Weather	Dry
Date Cleaned	
Surveyed By	HECTOR
Certificate Number	U-1213-06015535
Sheet Number	0
Date	6/12/2018 4:16:06 PM
Purpose	Routine Assessment
Additional Info	ONE BOLT MISSING
Pre-cleaning	No pre-cleaning
Customer	NTMWD
Work Order	
Inspection Status	Remote Inspection
Evidence Surcharge	No
Potential for Runoff	None
Manhole Number	WWMH36705
Access Type	Manhole
MH Use	Sanitary



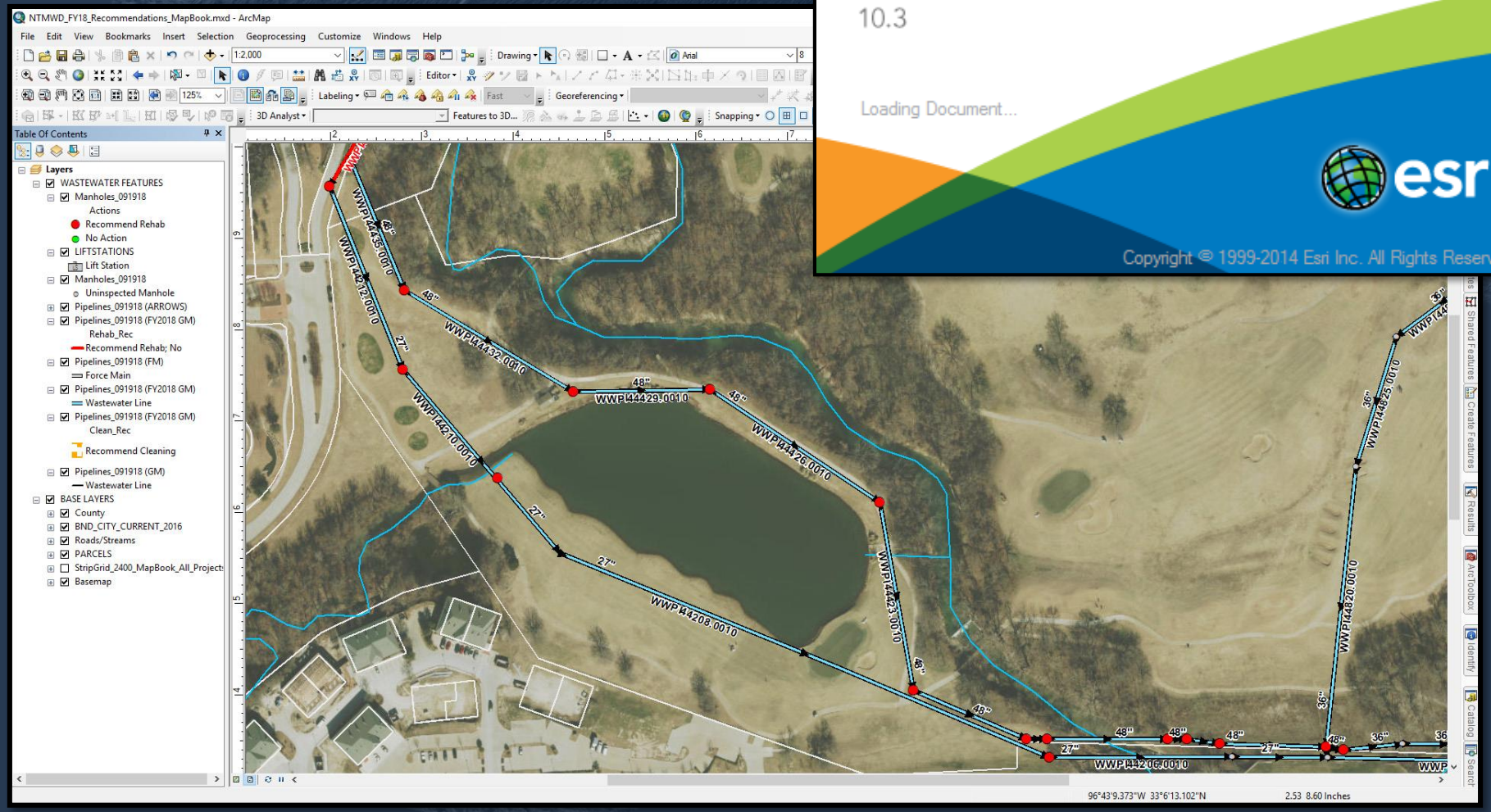
Distance	Observation Text	Dimension 1	Dimension 2	Percent	At Joint	Clock Position 1	Clock Position 2	Remarks	Continuous	Component	Observation
0	General Photo				☐			PICTURES OUTSIDE MH		CME	MGP
0.5	Lining Failure Other				☐	12	12	CEMENTUOUS LINER CRACKED AND BRICKS SHOWING		CMI	LFZ
0.5	Infiltration Stain				☐	12	12			CMI	IS
1.6	Surface Spalling				☐	12	12			COI	SSS
1.6	Surface Aggregate Visible				☐	12	12			COI	SAV
4.6	Surface Aggregate Visible				☐	12	12		S01	WI	SAV
14.6	Shape or Size Change	72			☐			FROM 60 TO 72		WI	MSC
19.7	Infiltration Stain				☐	12				WI	IS
20.9	Surface Aggregate Visible				☐	12	12		F01	WI	SAV
20.9	Surface Aggregate Visible				☐	12	12			B	SAV
21	Surface Reinforcement Visible				☐	10				C	SRV
21.5	Surface Aggregate Visible				☐	12	12			C	SAV
23.8	General Observation	30			☐	6		CONNECTION		WI	MGO
23.8	General Observation	30			☐	10		CONNECTION		WI	MGO

GIS and ITPipes Integration



Surveying and GIS

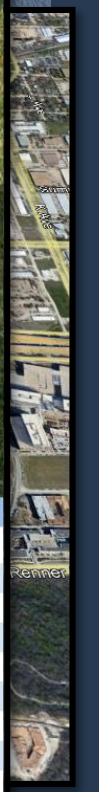
ArcGIS


NTMWD_FY18_Recommendations_MapBook.mxd - ArcMap
File Edit View Bookmarks Insert Selection Geoprocessing Customize Windows Help
Table Of Contents
Layers
WASTEWATER FEATURES
Manholes_091918
Actions
Recommend Rehab
No Action
LIFTSTATIONS
Lift Station
Manholes_091918
Uninspected Manhole
Pipelines_091918 (ARROWS)
Pipelines_091918 (FY2018 GM)
Rehab_Rec
Recommend Rehab; No
Pipelines_091918 (FM)
Force Main
Pipelines_091918 (FY2018 GM)
Wastewater Line
Pipelines_091918 (FY2018 GM)
Clean_Rec
Recommend Cleaning
Pipelines_091918 (GM)
Wastewater Line
BASE LAYERS
County
BND_CITY_CURRENT_2016
Roads/Streams
PARCELS
StripGrid_2400_MapBook_All_Project
Basemap
WWPI44435.0010
WWPI44432.0010
WWPI44429.0010
WWPI44426.0010
WWPI44423.0010
WWPI44420.0010
WWPI44425.0010
WWPI44212.0010
WWPI44210.0010
WWPI44208.0010
WWPI44206.0010
48"
27"
36"
96°43'9.373"W 33°6'13.102"N
2.53 8.60 Inches

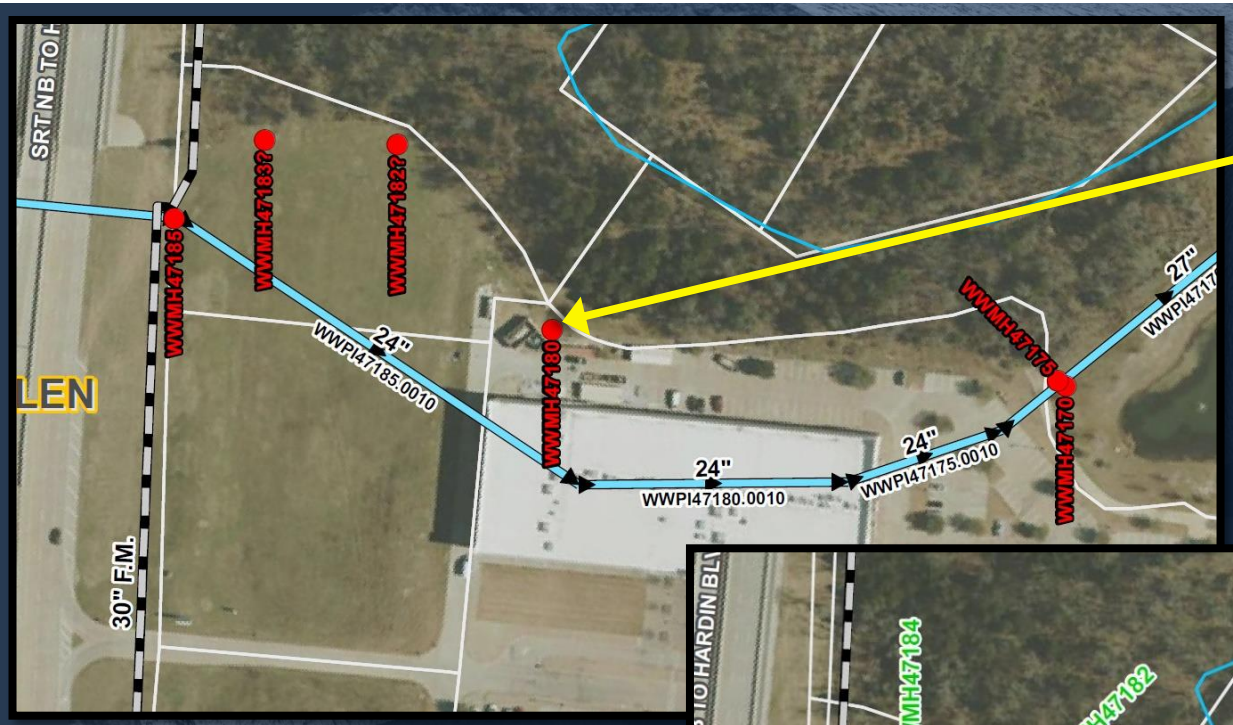
ArcGIS®
ArcMap™
10.3
Loading Document...
esri
Copyright © 1999-2014 Esri Inc. All Rights Reserved

KMZ Surveying and GIS

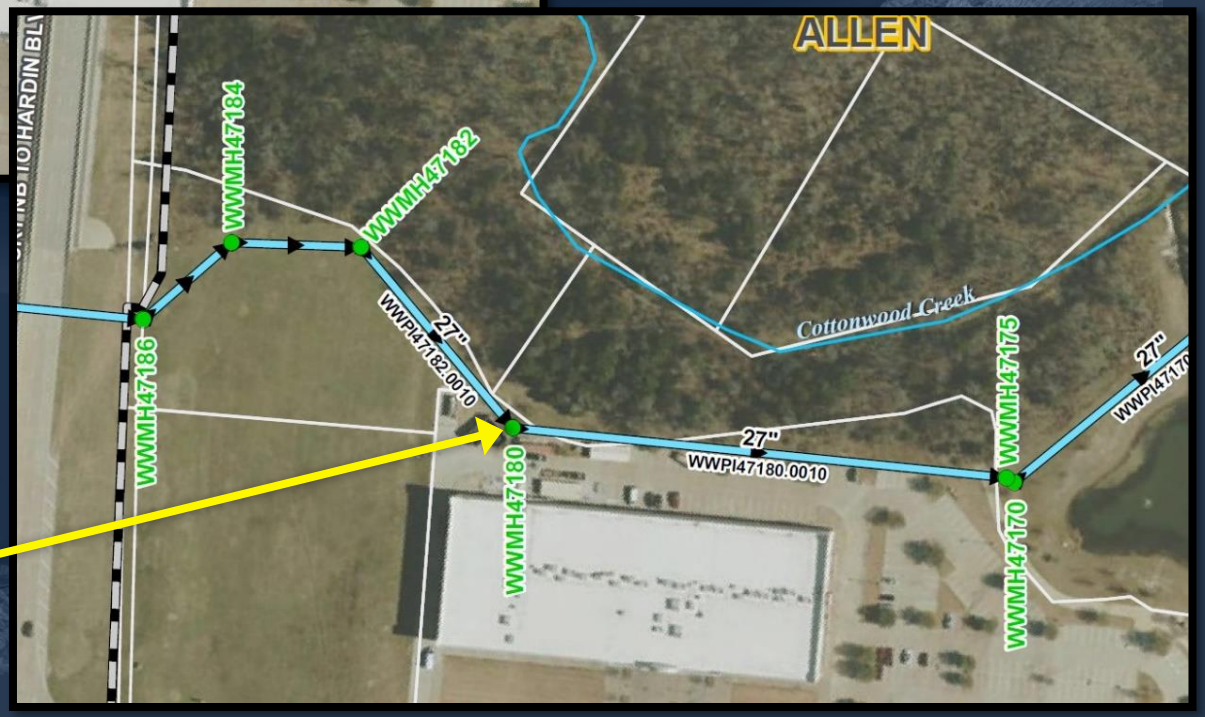
SH190 Trunk Sewer	
Spooner ID	<Null>
Northing	7051738.4708
Easting	2511152.2728
Elevation	654.1968
Fiscal Year	FY18
NTMWD Line Name	SH190 Trunk Sewer
MXLOCATION	WWMH36777
Surveyor	Spooner and Associates, Inc.
SurveyDate	Fri, April 27, 2018
Horizontal	0.02
Vertical_P	0.04
PipeNumber	2
PIPE1_OUT_	E
PIPE1_OUT1	11.15
PIPE2_IN_D	W
PIPE2_IN_I	11.1
PIPE3_IN_D	



Pre- and Post- Inspection/Survey

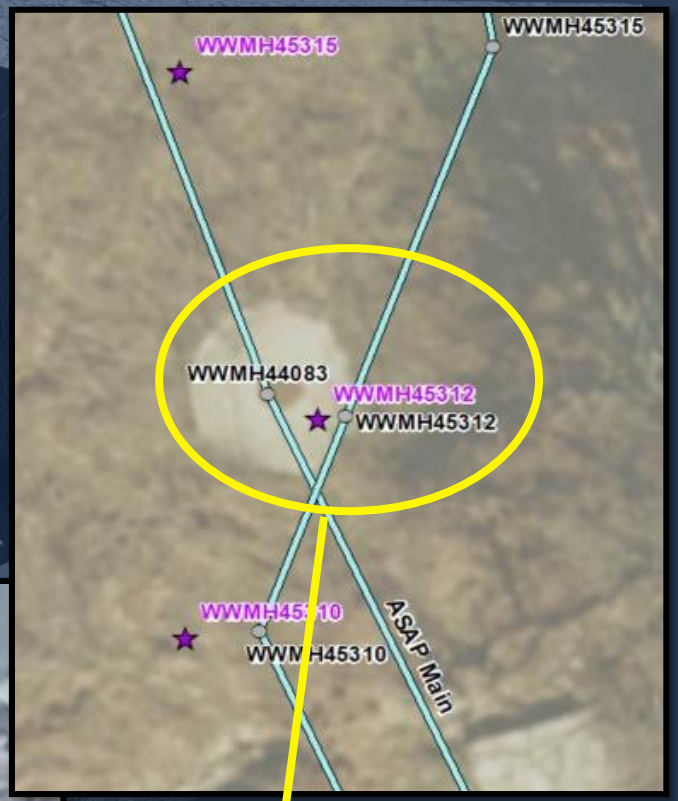


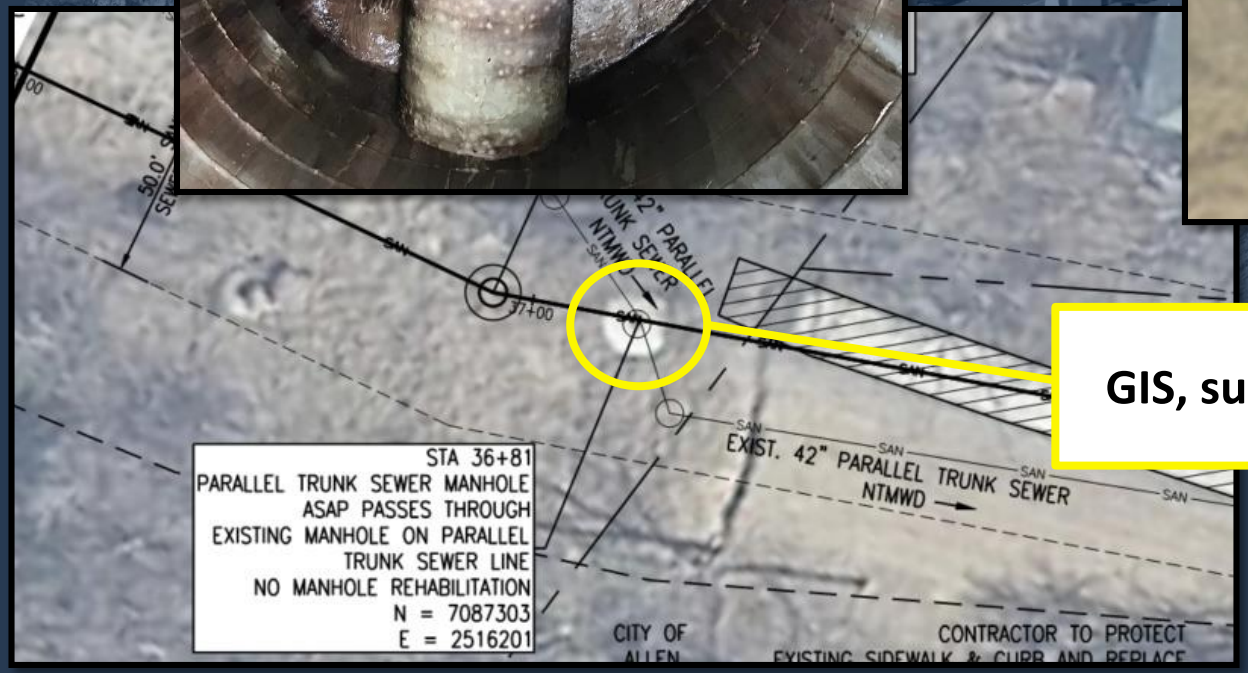
Before Inspection and Survey



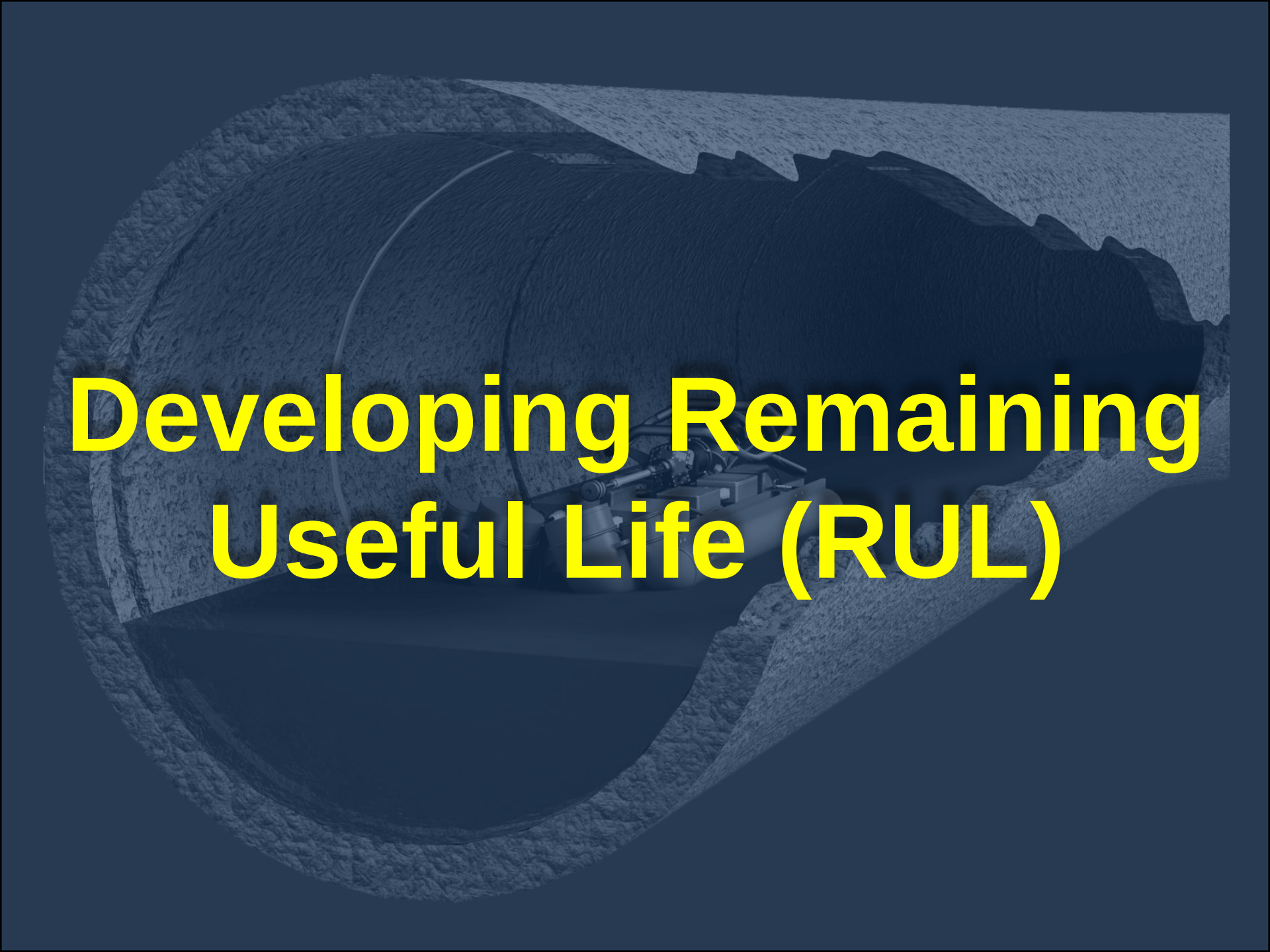
After Inspection and Survey

Surveying and GIS



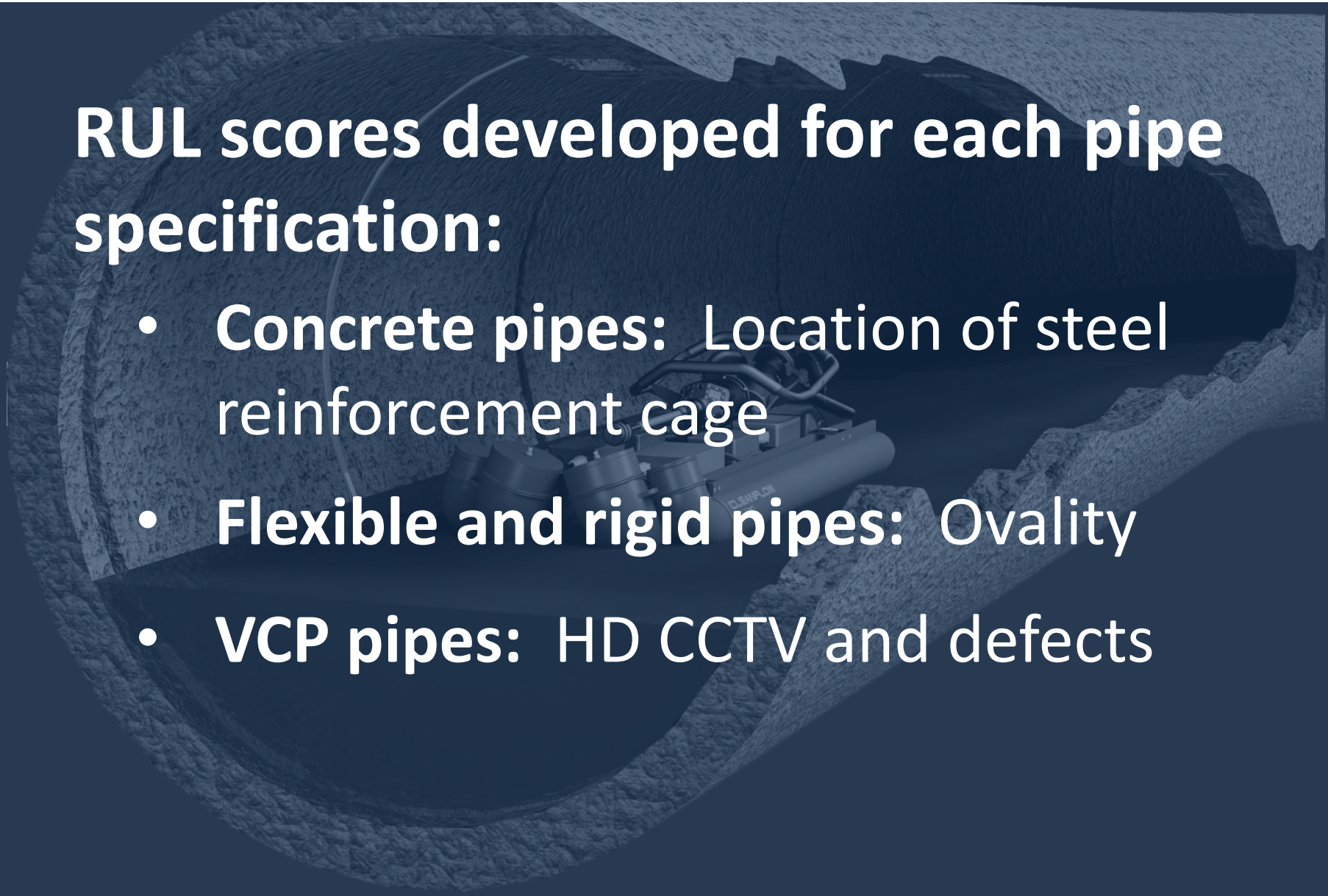


GIS, survey, and as-built review.



Developing Remaining Useful Life (RUL)

Developing RUL

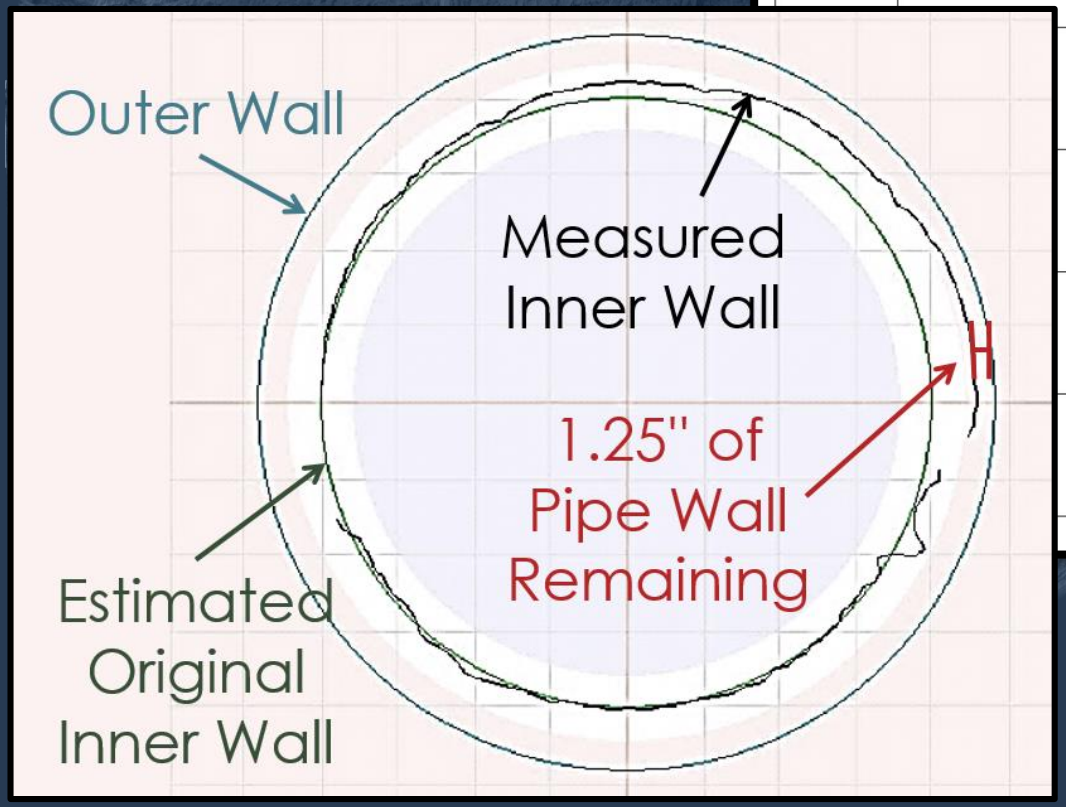


RUL scores developed for each pipe specification:

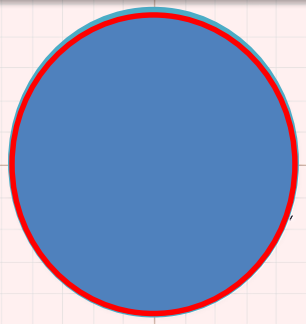
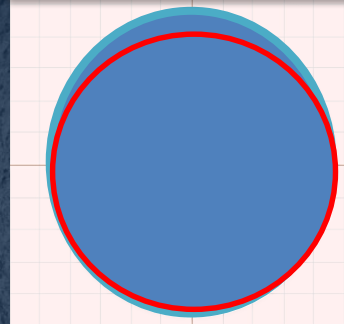
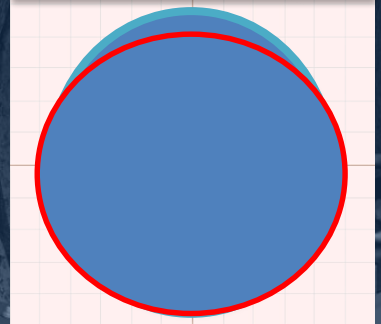
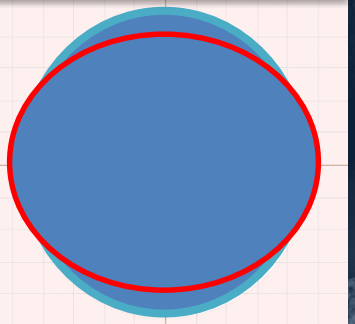
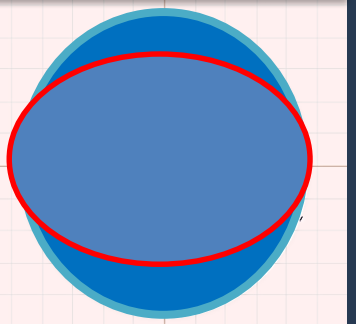
- **Concrete pipes:** Location of steel reinforcement cage
- **Flexible and rigid pipes:** Ovality
- **VCP pipes:** HD CCTV and defects

Determining RUL - Concrete Pipes

Pipe Dia.	Pipe Wall Spec.	Reinforcement	1-inch	2-inch	3-inch	4-inch
15"	Class III, Wall B	Reinforced	0.25 0.50 0.75 1.00	1.25 1.50 1.75 2.00	2.25	
18"	Class III, Wall B	Reinforced	0.25 0.50 0.75 1.00	1.25 1.50 1.75 2.00	2.25 2.50	
24"	Class III, Wall B	Reinforced	0.25 0.50 0.75 1.00	1.25 1.50 1.75 2.00	2.25 2.50 2.75 3.00	
		Reinforced	0.25 0.50 0.75 1.00	1.25 1.50 1.75 2.00	2.25 2.50 2.75 3.00	3.25
		Reinforced	0.25 0.50 0.75 1.00	1.25 1.50 1.75 2.00	2.25 2.50 2.75 3.00	3.25 3.50 3.75
		Reinforced	0.25 0.50 0.75 1.00	1.25 1.50 1.75 2.00	2.25 2.50 2.75 3.00	3.25 3.50 3.75 4.00
		Reinforced	0.25 0.50 0.75 1.00	1.25 1.50 1.75 2.00	2.25 2.50 2.75 3.00	3.25 3.50 3.75 4.00 4.25



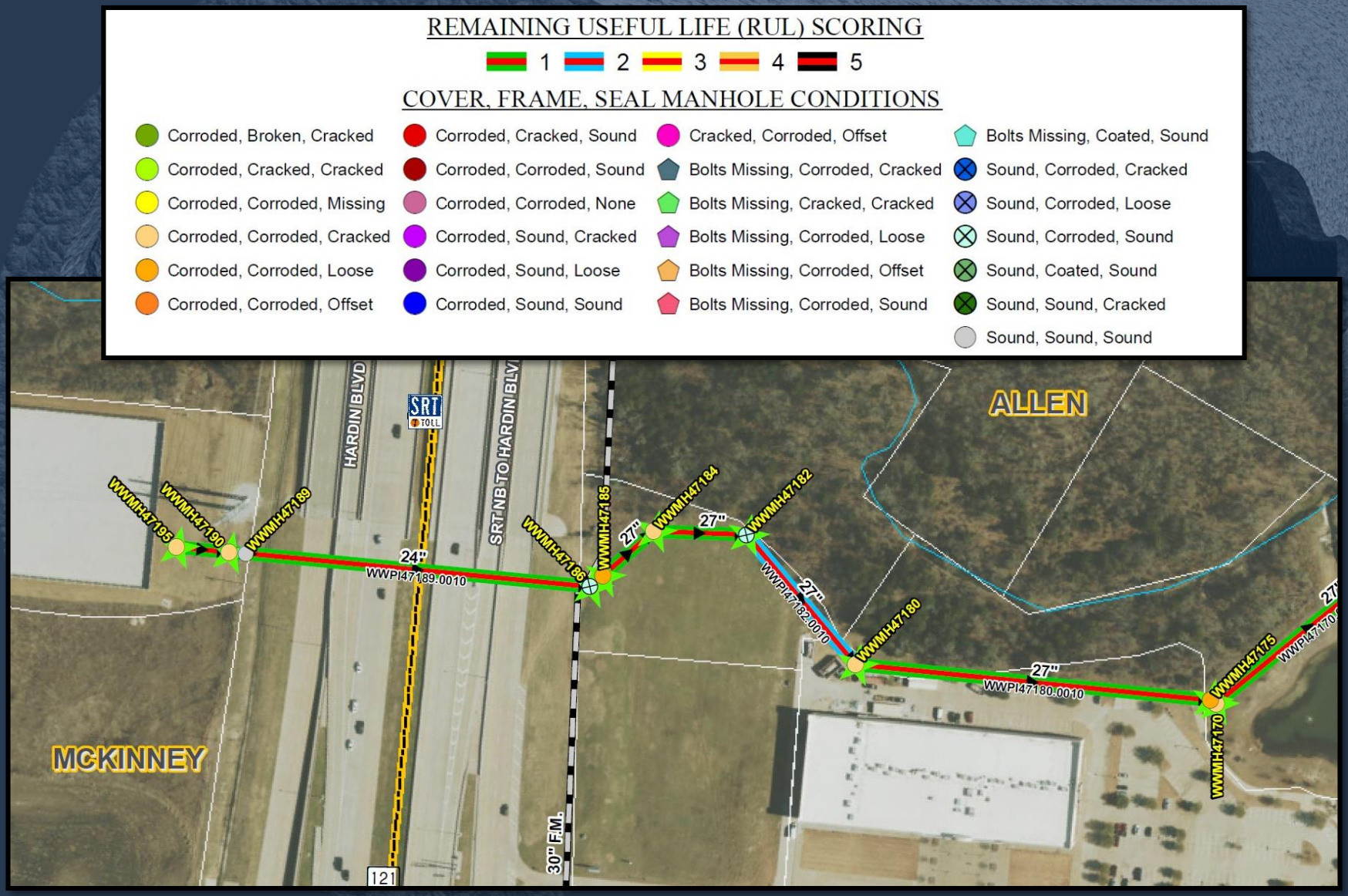
Determining RUL - Flexible Pipes

0.0 - 5.0%	5.0 – 10.0%	10.0 – 12.5%	12.5 – 15.0%	> 15.0%
				
36 - 50 years	21- 35 years	11- 20 years	3 -10 years	0 - 2 years

RUL is automatically calculated for each ovality observation

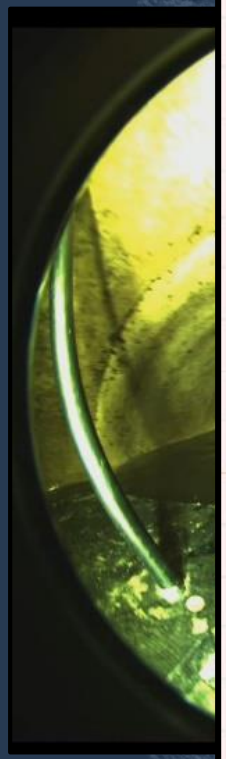
Pipe Manufacturers Specify 5.0 – 7.5% Maximum Initial Deflection

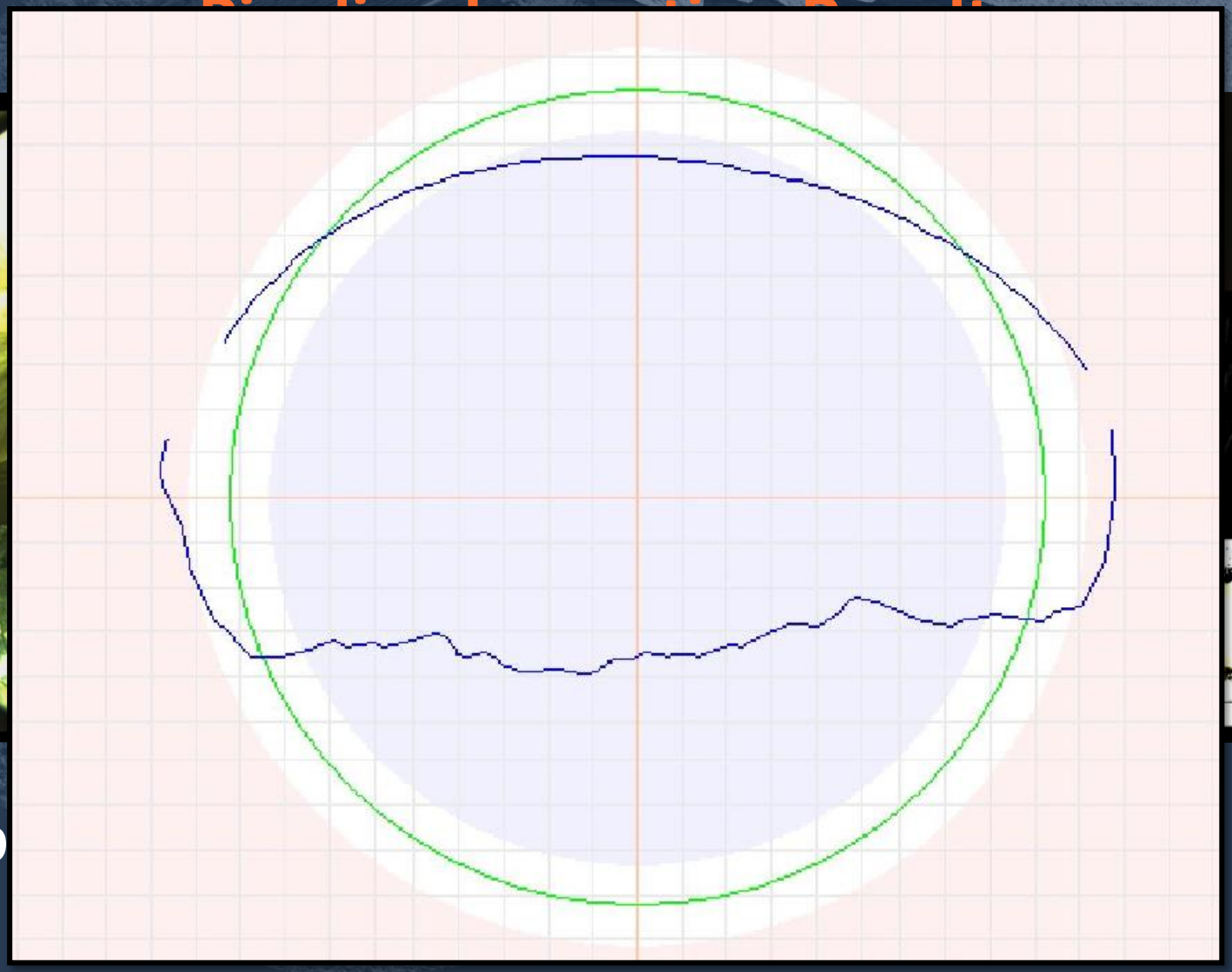
RUL Scoring – Map Book Example

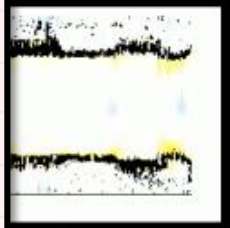


Inspection Results

Inspection Results



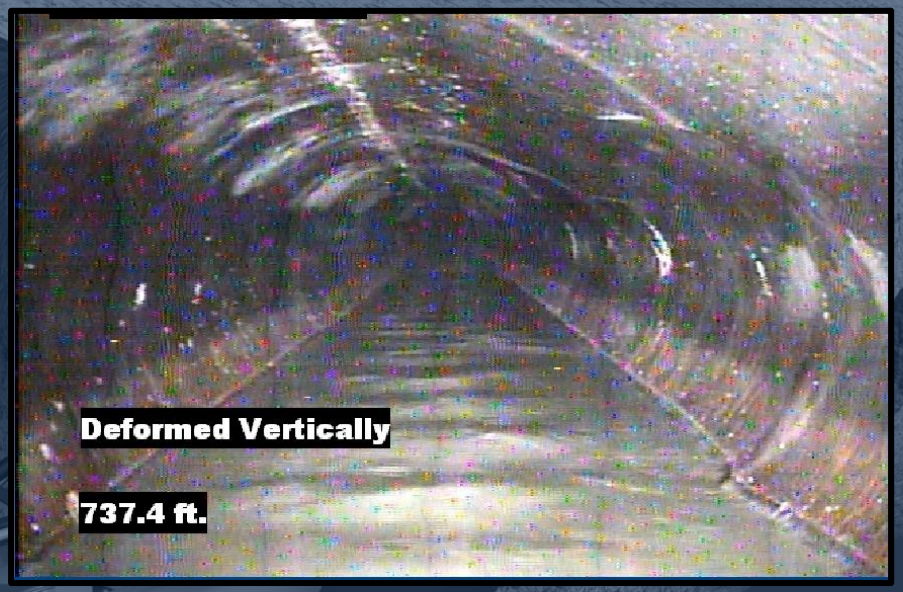


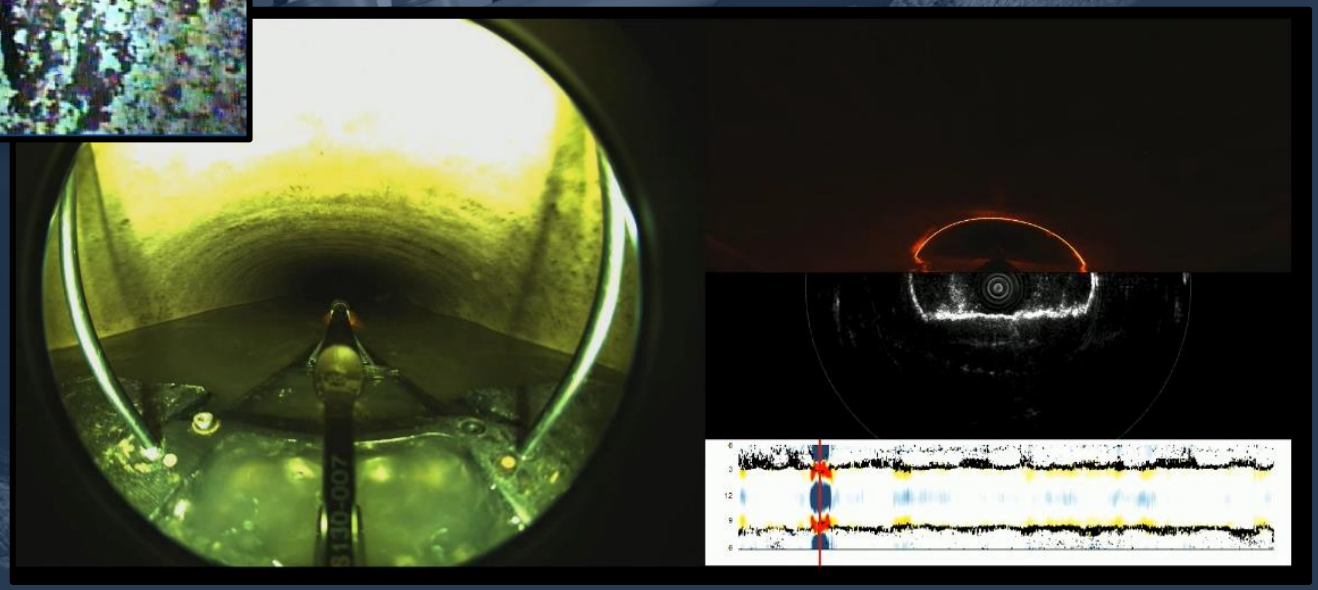


- O

Pipeline Inspection Point Defects

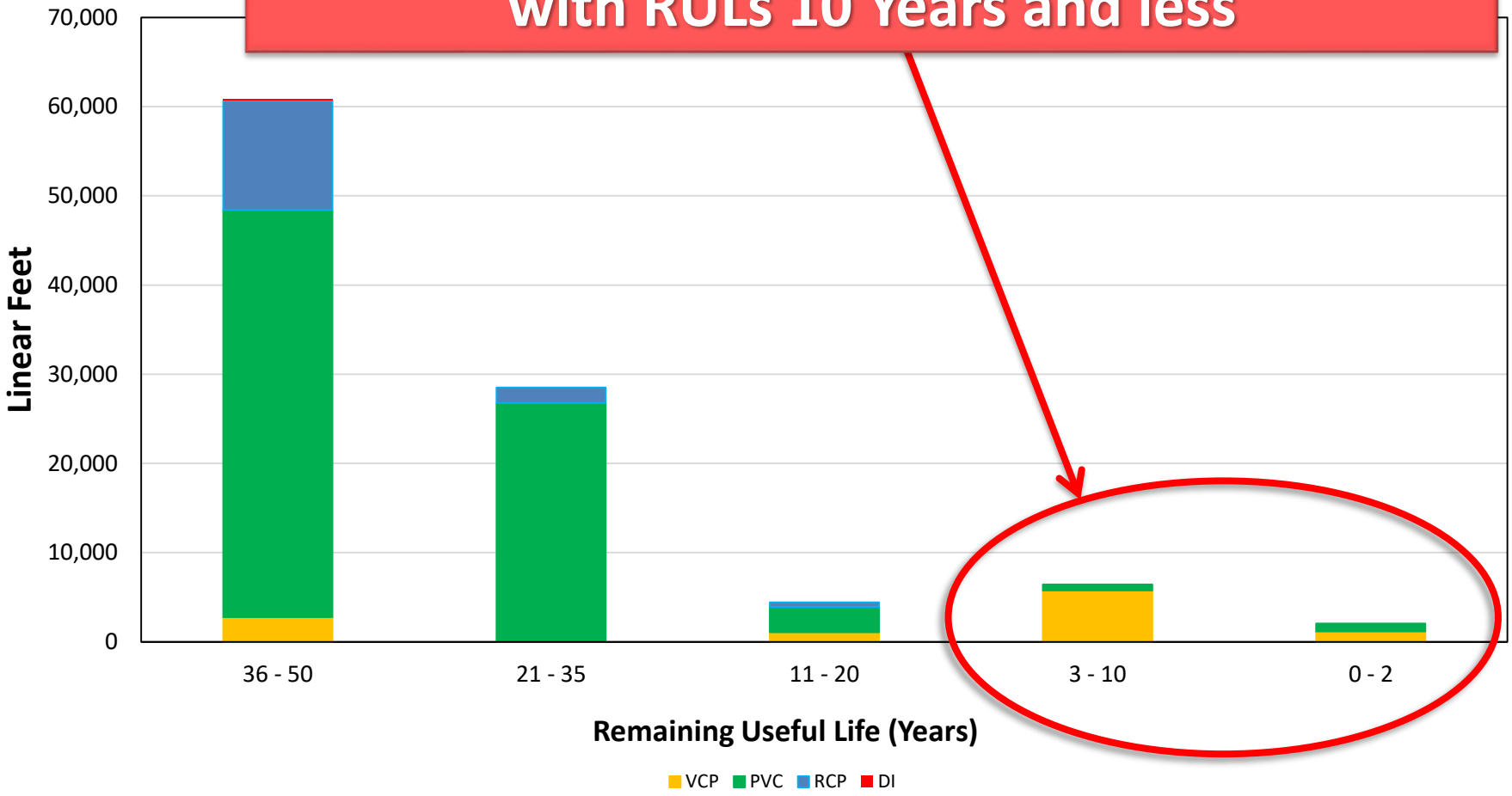
- 5 segments need point repairs to extend RUL



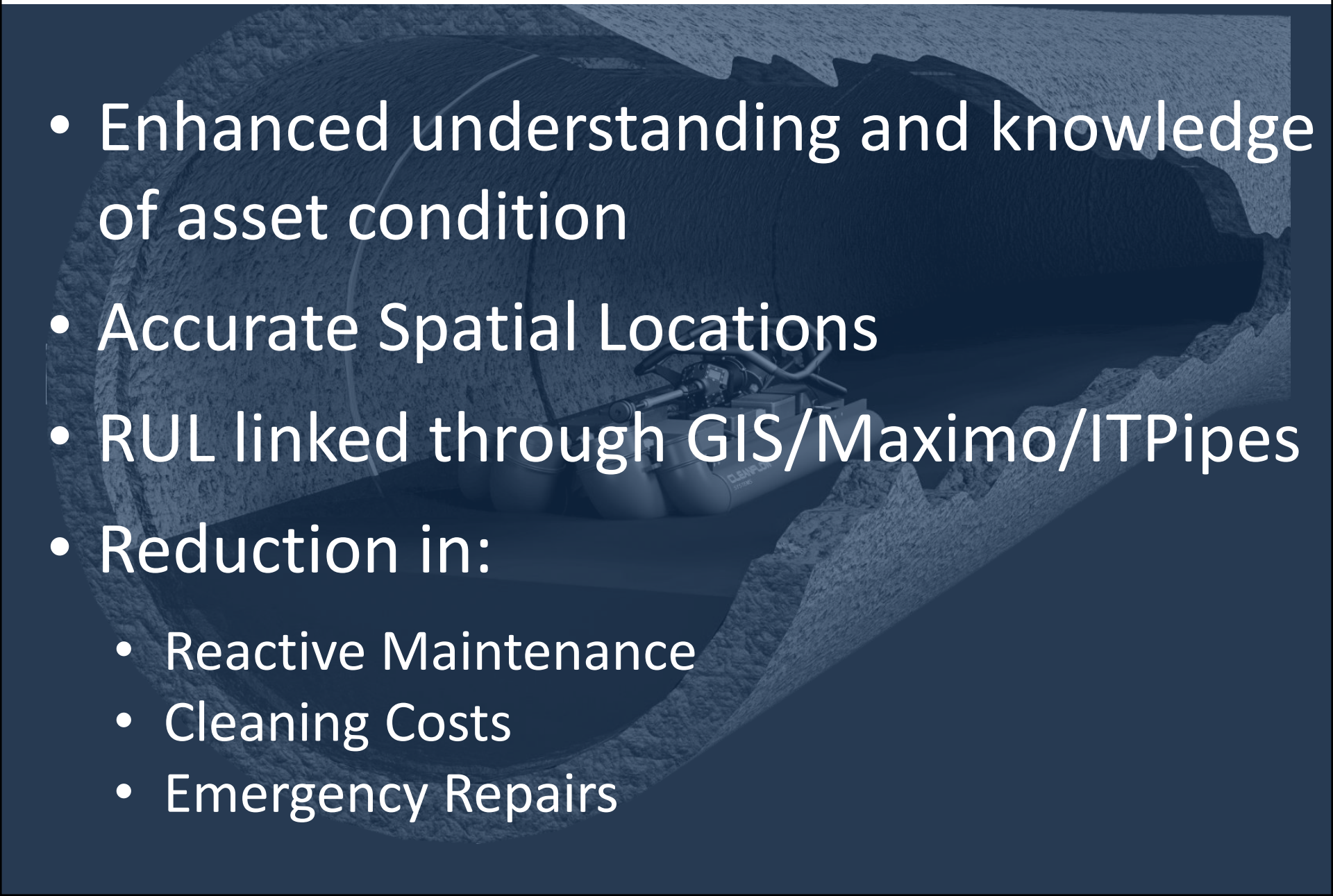


Pipeline Inspection Results

Represents 8,503 out of 102,287 Linear Feet with RULs 10 Years and less



Benefits of CAP



- Enhanced understanding and knowledge of asset condition
- Accurate Spatial Locations
- RUL linked through GIS/Maximo/ITPipes
- Reduction in:
  - Reactive Maintenance
  - Cleaning Costs
  - Emergency Repairs

Acknowledgements

NTMWD

- Jenna Covington
- Scott Hoelzle
- Rodney Hughes
- Shela Chowdhury
- Justin Diviney
- Lauren Kubin

Freese and Nichols

- Jessica Brown
- Stephen Johnson
- Atilana Mercado

Consultants

- Rod Thornhill

Ace Pipe Cleaning

- Bruce Jameson
- Casey Carentine

Questions?

NORTH TEXAS MUNICIPAL WATER DISTRICT

Shannon Knox - sknox@ntmwd.com

FREESE AND NICHOLS

Mazen Kawasmi - mhk@freese.com

Cassie Seabourn – cassie.seabourn@freese.com