Exploring Midwest City: Adventures in Stormwater Master Planning

OFMA Annual Conference

9/23/2025

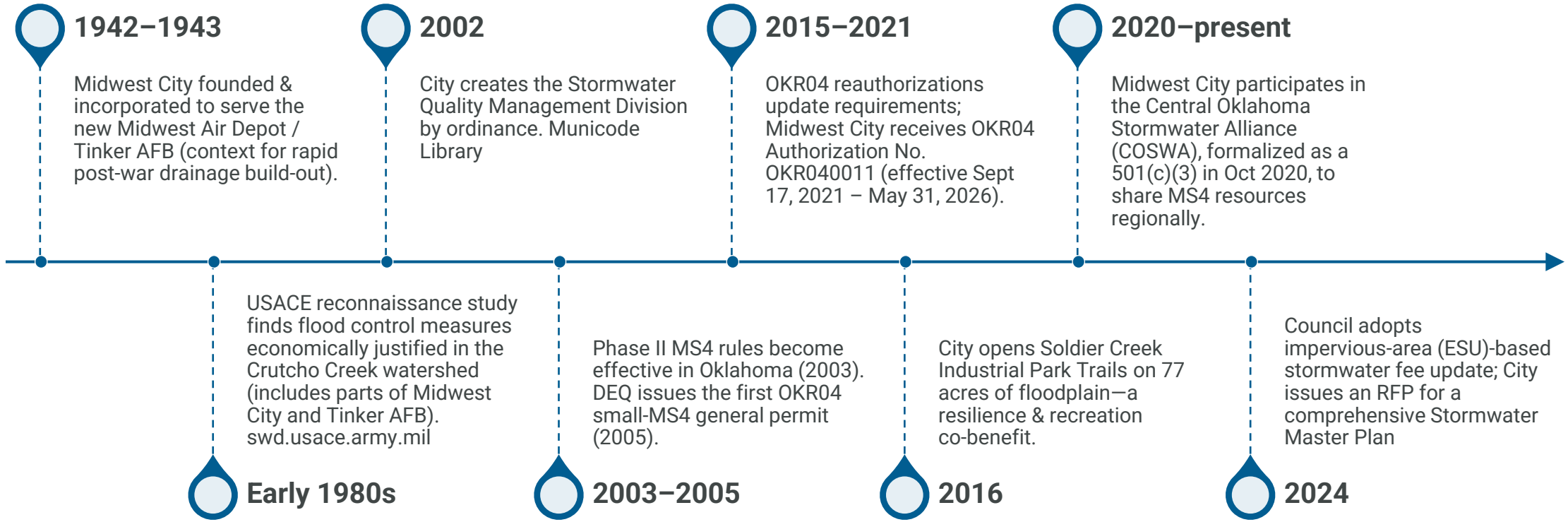
MIDWEST CITY
Where the Spirit Flies High

FREESE AND NICHOLS

Stormwater History

- Growth eras and annexations
- Legacy materials and major flood events
- Shifts in policy and standards (MS4)
  - Council updated the stormwater utility fee to an ESU
- Watershed focus
  - Soldier, Crutcho, Silver, Kuhlman, Choctaw

Timeline


1942–1943
Midwest City founded & incorporated to serve the new Midwest Air Depot / Tinker AFB (context for rapid post-war drainage build-out).
Early 1980s
USACE reconnaissance study finds flood control measures economically justified in the Crutcho Creek watershed (includes parts of Midwest City and Tinker AFB). swd.usace.army.mil
2002
City creates the Stormwater Quality Management Division by ordinance. Municode Library
2003–2005
Phase II MS4 rules become effective in Oklahoma (2003). DEQ issues the first OKR04 small-MS4 general permit (2005).
2015–2021
OKR04 reauthorizations update requirements; Midwest City receives OKR04 Authorization No. OKR040011 (effective Sept 17, 2021 – May 31, 2026).
2016
City opens Soldier Creek Industrial Park Trails on 77 acres of floodplain—a resilience & recreation co-benefit.
2020–present
Midwest City participates in the Central Oklahoma Stormwater Alliance (COSWA), formalized as a 501(c)(3) in Oct 2020, to share MS4 resources regionally.
2024
Council adopts impervious-area (ESU)-based stormwater fee update; City issues an RFP for a comprehensive Stormwater Master Plan

Known Issues and Recent Failures

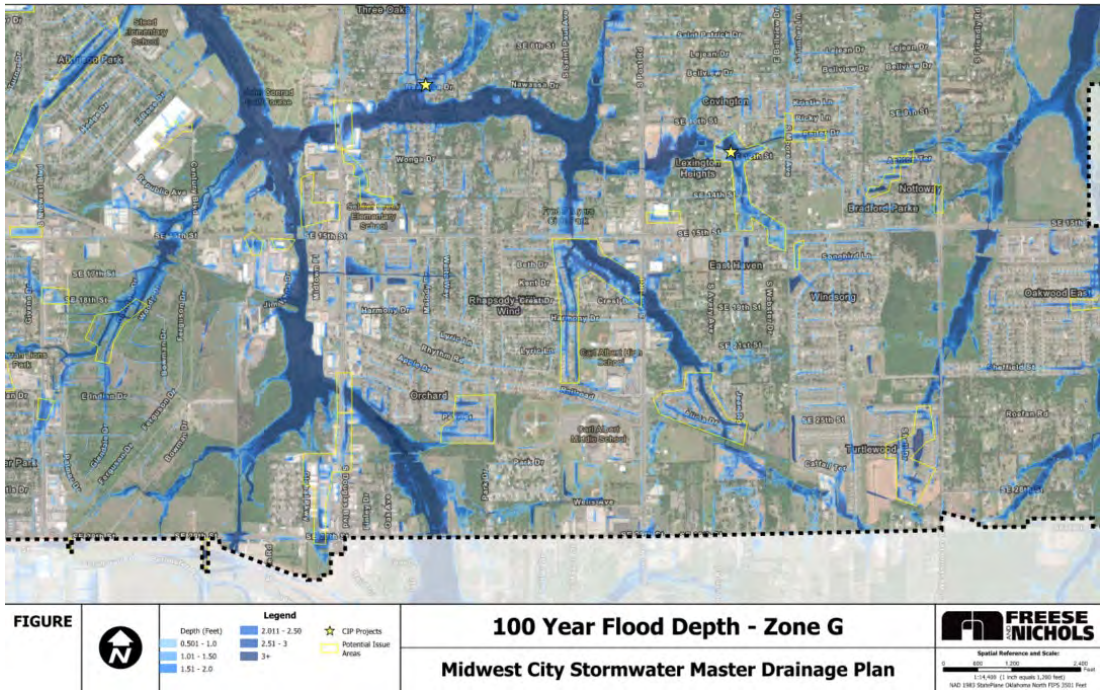
- Aging Infrastructure: CMP/RCP
- Recurring sinkholes and localized flooding

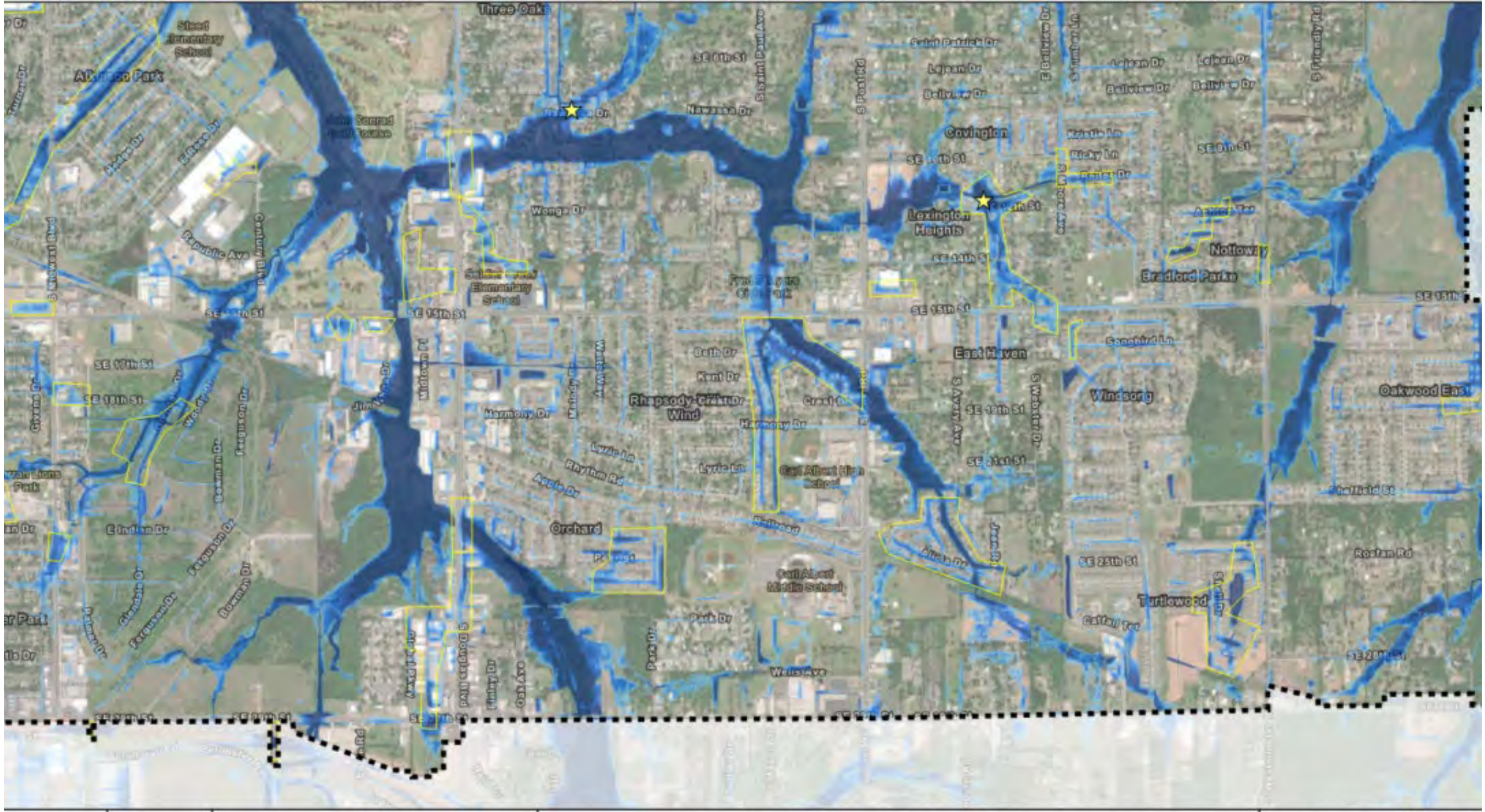
LOCAL

Broken storm drain in Midwest City neighborhood causing sinkholes in backyards

Public Concerns → Plan Inputs

- Reports: flooding, blockages, subsidence
- Complaints → inspection → work orders
  - CityWorks
- Community intel improves prioritization
  - Localized street flooding
  - Suspected blockages & slow drains
  - Sinkhole indications near pipes





FIGURE

Legend

Depth (Feet)		
0.501 - 1.0	2.011 - 2.50	CIP Projects
1.01 - 1.50	2.51 - 3	Potential Issue Areas
1.51 - 2.0	3+	

100 Year Flood Depth - Zone G

Midwest City Stormwater Master Drainage Plan

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Spatial Reference and Scale:

0 600 1,200 2,400 Feet

1:14,400 (1 inch equals 1,200 feet)

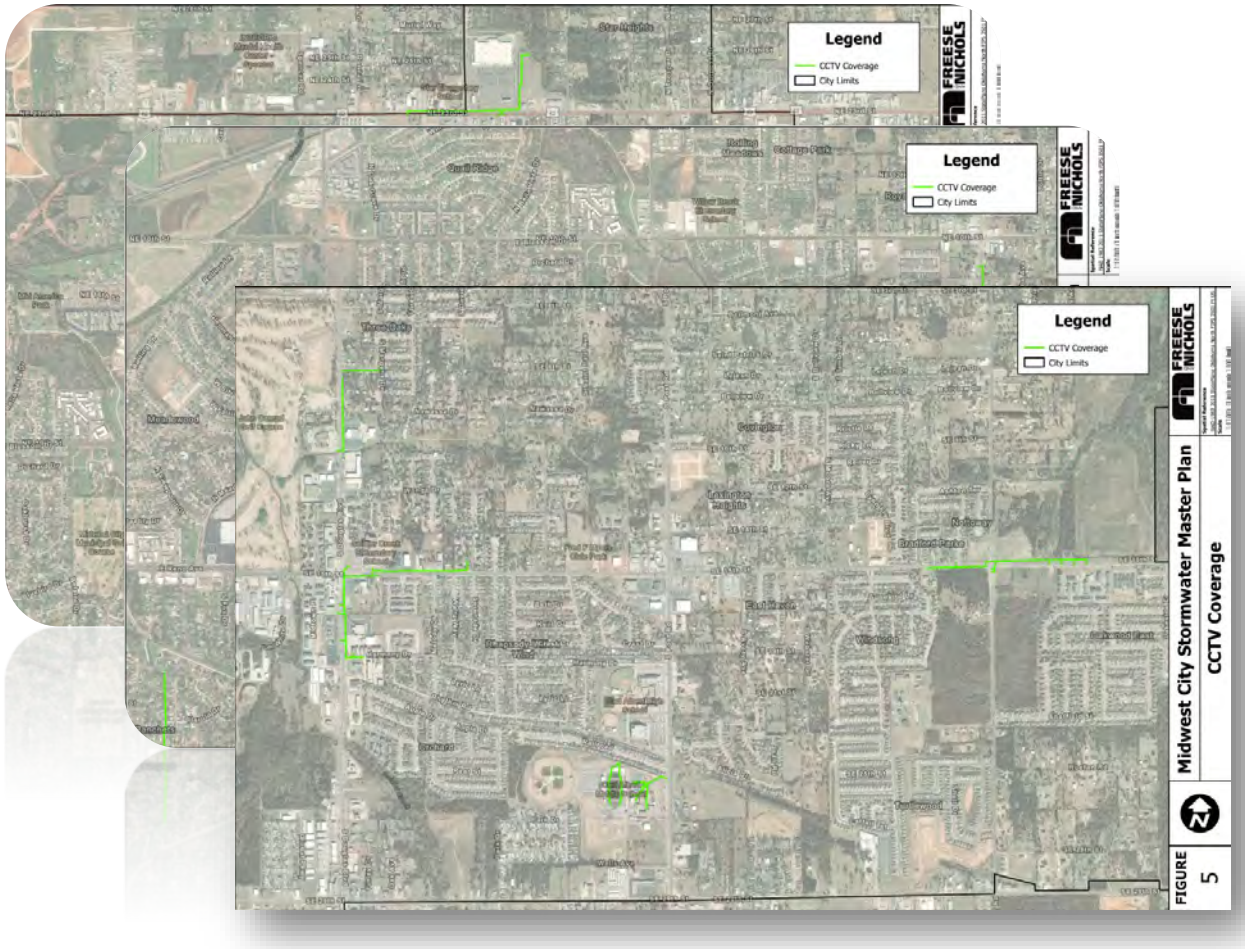
NAD 1983 StatePlane Oklahoma North FIPS 3501 Feet

Why a Master Plan

- SWMP Approach
- MDP goals: inventory, assess, rank, deliver
- Challenges: visibility, prioritization
- Funding

Inspection Approach & Budget Guardrails

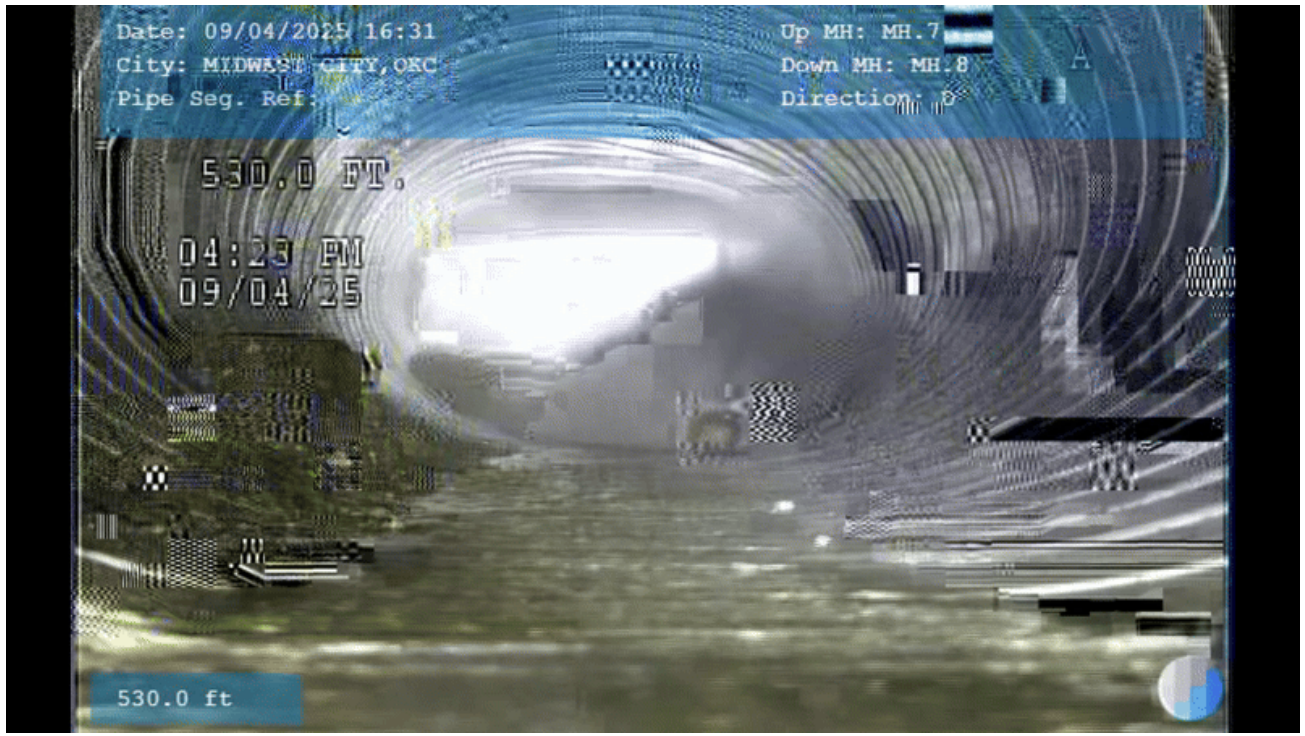
- Inputs: GIS, as-builts, CCTV, models
- Workflow: screen → inspect → score → program
- Extrapolate Results
  - 32,000 LF cctv
  - 28 miles Developed Channels
- 8–10-year plan for inspection



Data Coverage & CCTV Snapshot

- % network with condition data
- Miles inspected; NASSCO coding
  - Important notes
- SewerAI partnership
- Common defects: cracks, corrosion, sediment

SewerAI



Asset Number: 661

Take Action on 1 Asset | Change Risk Re

Total Risk Score: 4.50 This has been identified as high risk by the PIONEER - Decision Tree risk recipe

Total Risk Score

4.50

Recommendations

Inspect Soon (9-18 Months)

Most Recent Important Observations

No inspection data available for this asset

Risk Scores

Likelihood of Failure
4.00

Consequence of Failure
5.00

Structural Benchmark™
0.00

NASSCO LoF
0.00

CoF Analysis

Proximity to Waterbody
377.26 ft

Proximity to Schools
1296.33 ft

Proximity to Hospitals
3284.18 ft

GIS Attributes

Pipe Segment Reference 661	Diameter (in) 60	Upstream MH N/A
Shape N/A	Age N/A	Up MH Depth (ft) 7
Width (in.) N/A	Downstream MH N/A	Material Corrugated Metal Pipe

Inspection Header Values

Pipe Segment Reference N/A	Height (in) N/A	Upstream MH N/A
Shape N/A	Pipe Use N/A	Up Rim To Invert (ft) N/A
Width (in) N/A	Downstream MH N/A	Material N/A

Approach

PHASE 1 (Current)

Review videos of inspected storm drains

Document the damage and any functional issues

Prioritize repairs based on collaborated criteria

SewerAI

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Create GIS features of observed defects and repair prioritization

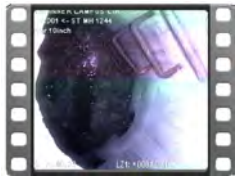
PHASE 2 (future)

Identify repair alternatives for drains requiring repairs

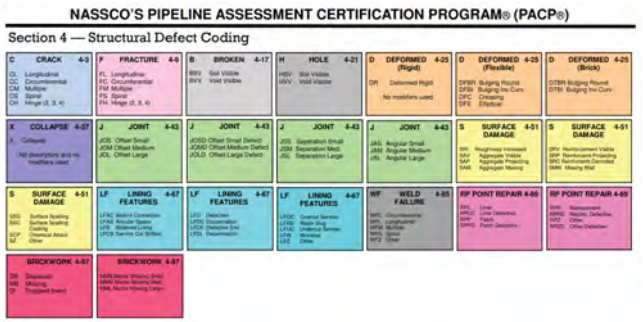
Provide high-level cost estimates for various repair alternatives

SewerAI Workflow

Dozens of CCTV videos



SewerAI Pioneer reviews CCTV footage and auto-codes defects according to NASSCO's Pipeline Assesment Certification Program (PACP)

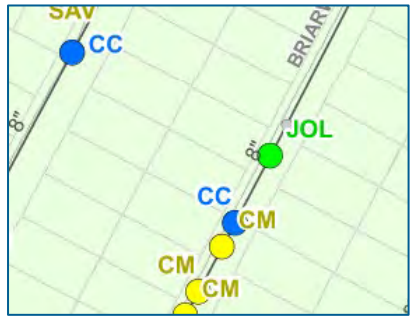


Defect PACP Score

- 5
- 4
- 3
- 2
- 1

PACP standard rating scores based on defects observed are assigned to assets

Defects and scores are geo-coded and accessible within GIS



FNI develops and executes prioritization with Midwest City

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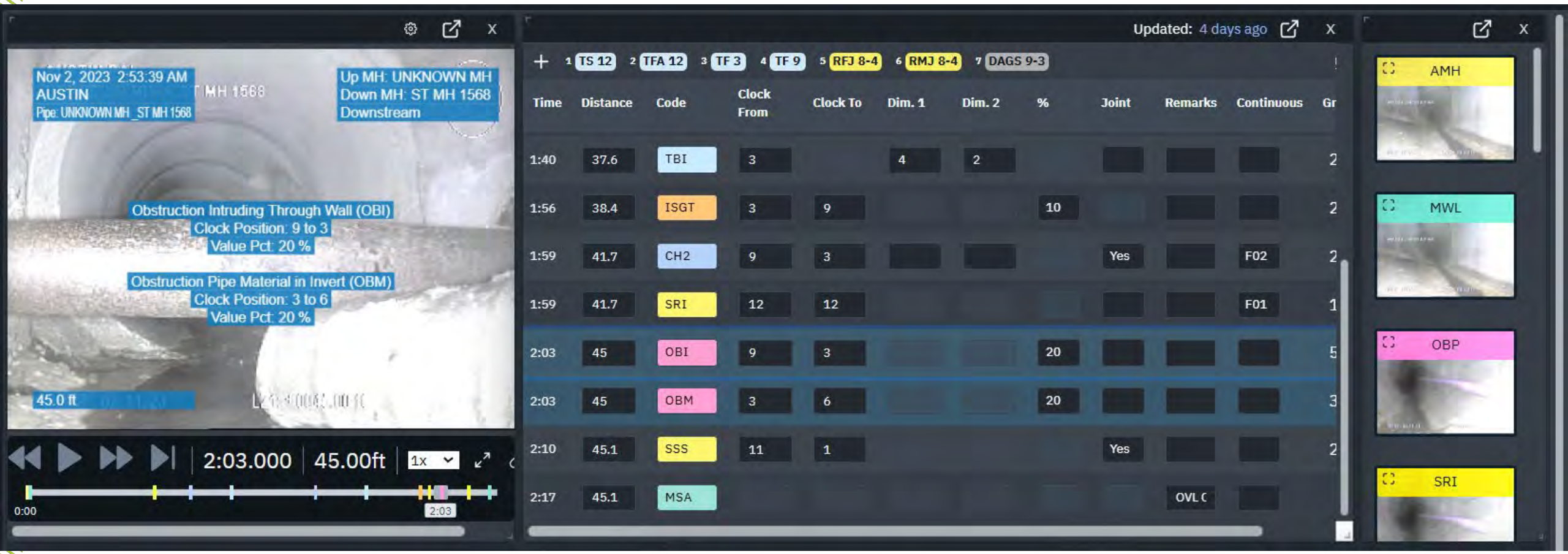
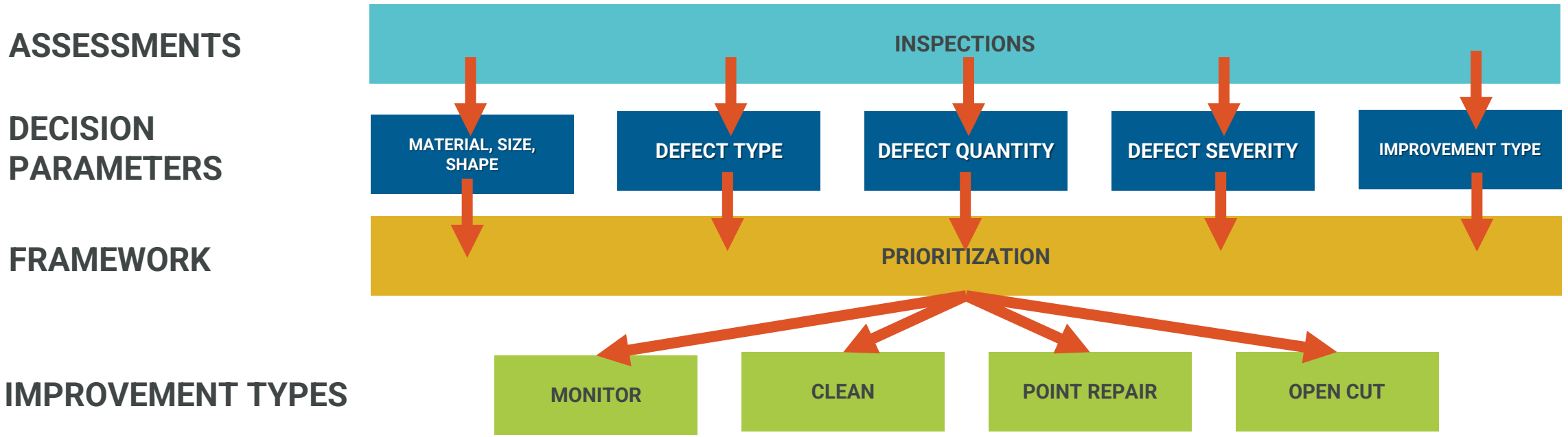
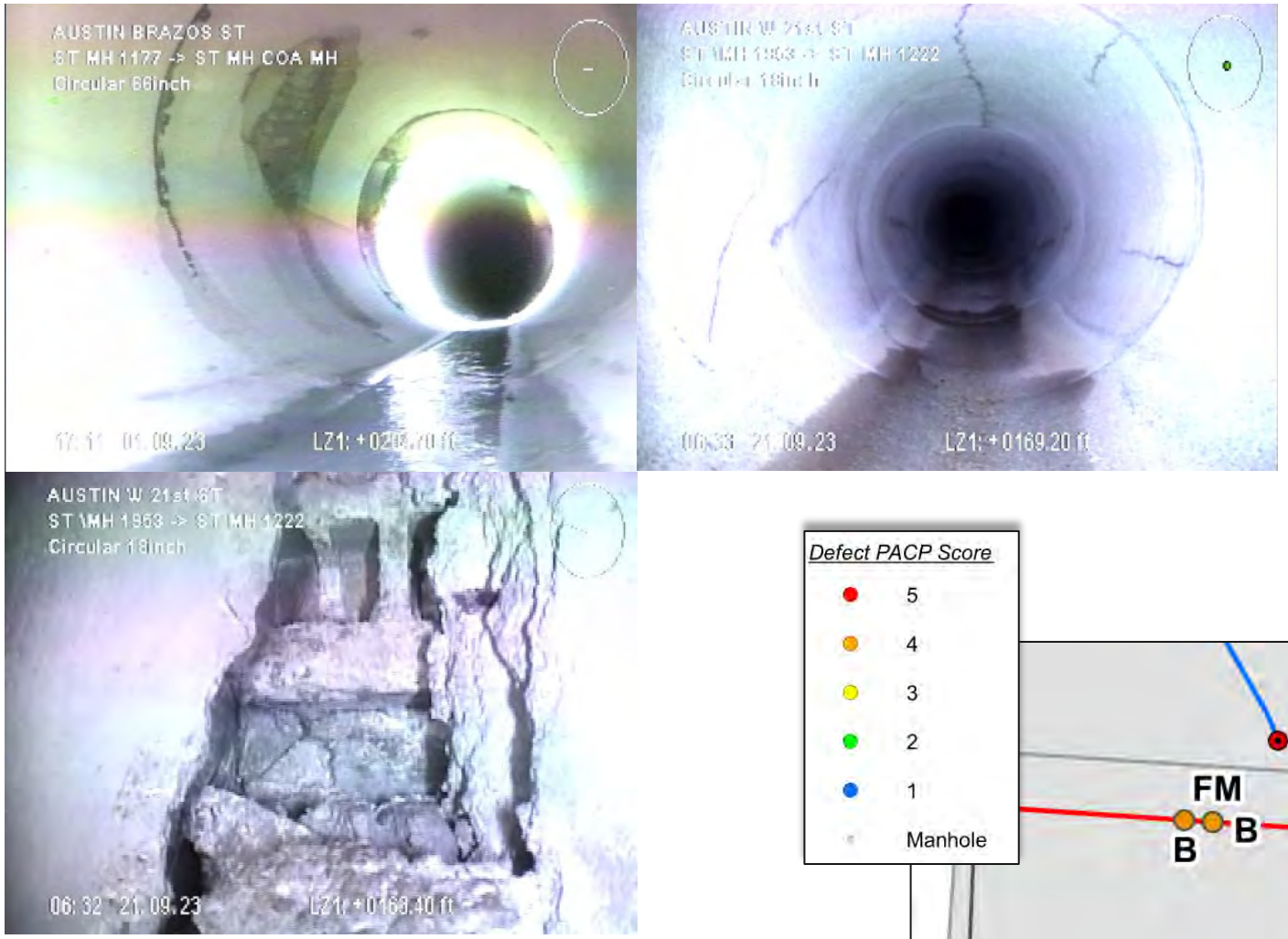
SewerAI AutoCoding of Footage



Prioritization Logic and Methodology



Decision Parameters



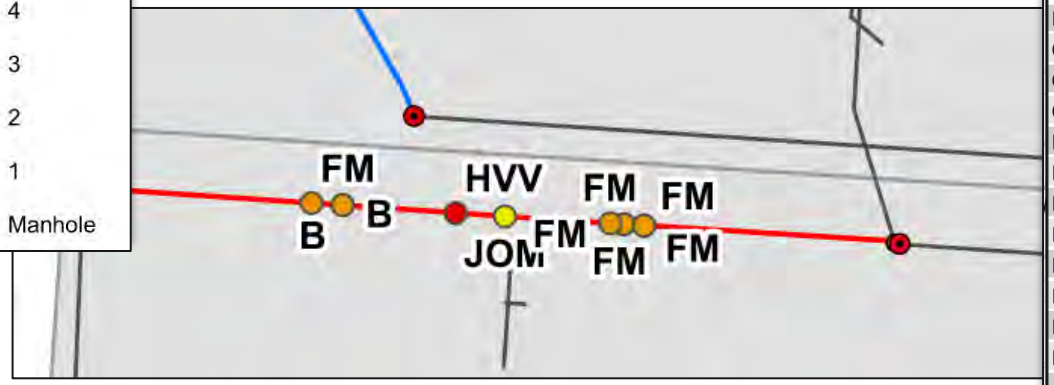
1) Base storm drain data

(material, size, shape)

2) PACP defect inspection results

(types, severity, quantity/frequency)

3) Improvement/repair types



Definition	Code
Broken	B
Crack Circumferential	CC
Crack Longitudinal	CL
Crack Multiple	CM
Deformed	D
Fracture Circumferential	FC
Hole	H
Hole Soil Visible	HSV
Infiltration Gusher	IG
Infiltration Runner	IR
Infiltration Stain	IS
Intruding Sealing Ring	ISSR
Joint Separated Medium	JSM

PACP Defects Grading

PACP broadly categorizes defects into two categories:
Structural
Operational

Grade	Definition
5	The most significant defect grade
4	Significant defect grade
3	Moderate defect grade
2	Minor to moderate defect grade
1	Minor defect grade
No Grade	Not a defect or just an observation

Very High and High Severity Structural or Operational Defects

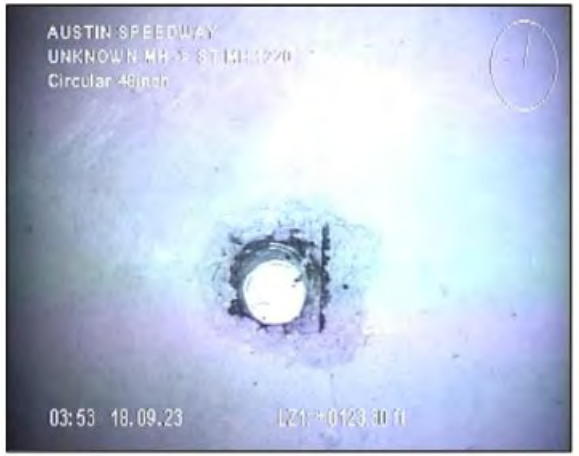
Medium and Low Severity Structural or Operational Defects

Grade 4 & 5 Defects

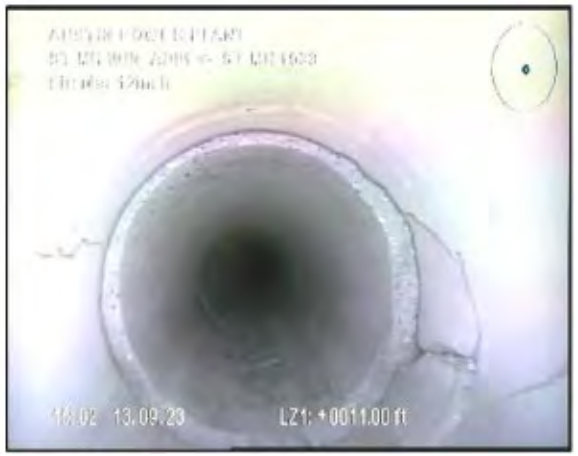
Structural Defects

Surface Damage Reinforcement Projecting (SRP)

Fracture Multiple (FM)

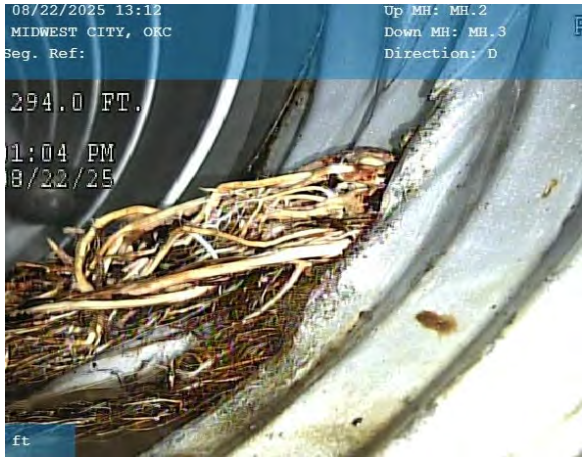


Surface Damage Reinforcement Visible (SRV)

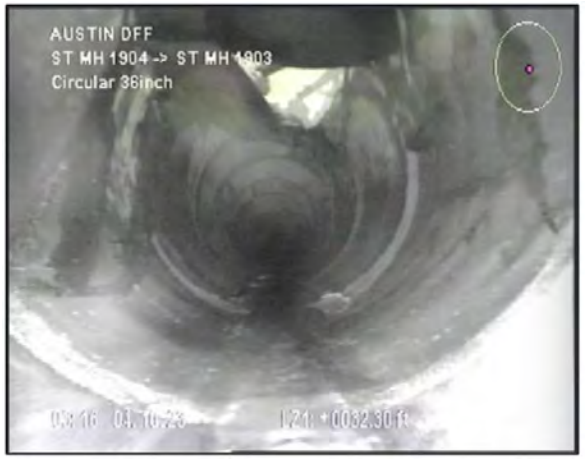


Broken (B)

Operational Defects



Root Ball Joint (RBJ)



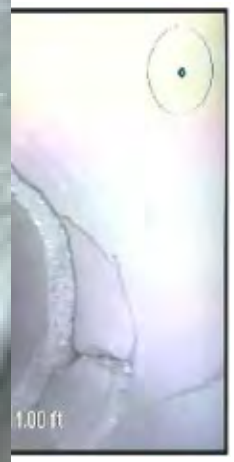
POINT REPAIR PATCH PATCH DEFECTIVE (RPPD)

OBSTRUCTION INTRUDING THROUGH WALL (OBI)

DEFORMED RIGID (DR)

Grade

Surface Damage R
Projecting



Root Ball Joi

D (DR)

Grade 4 & 5 Defects

Structural Defects

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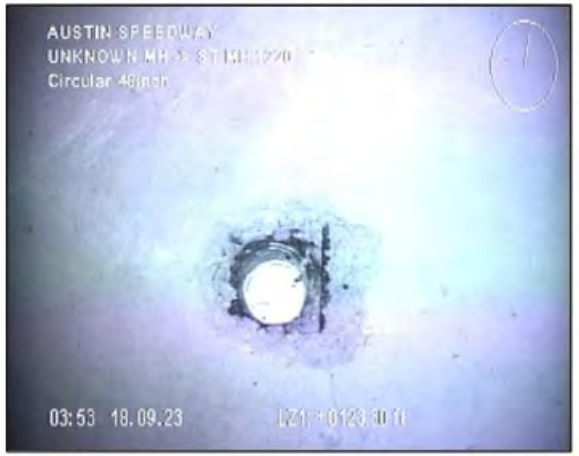

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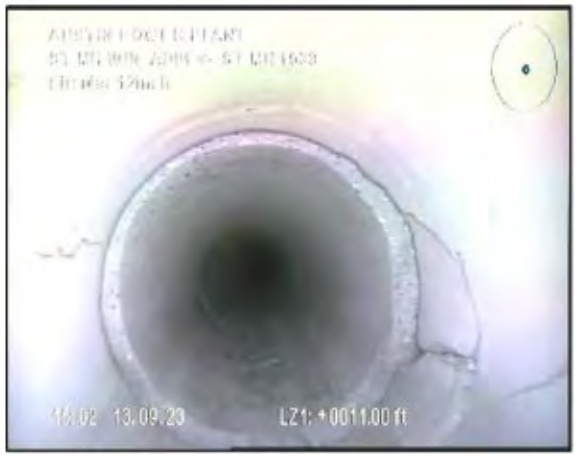

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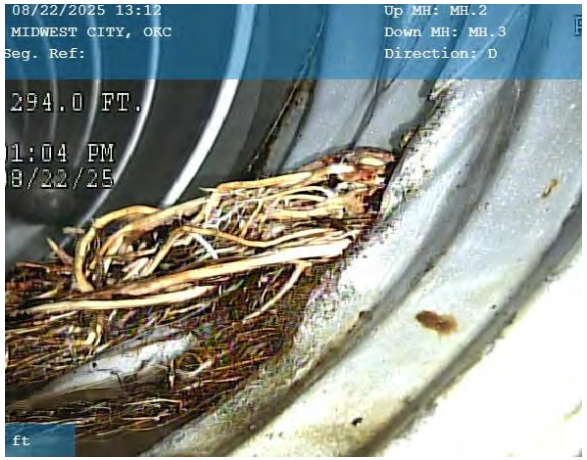

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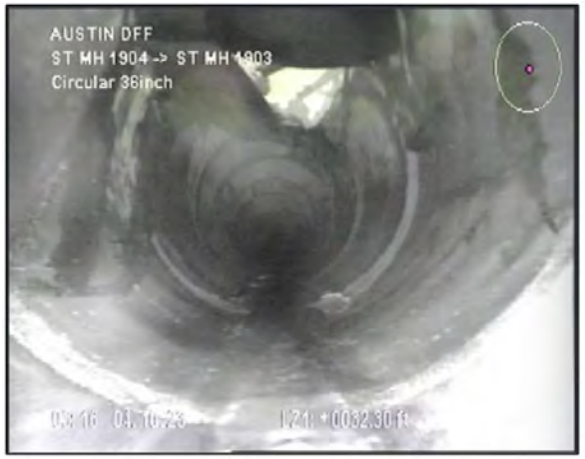

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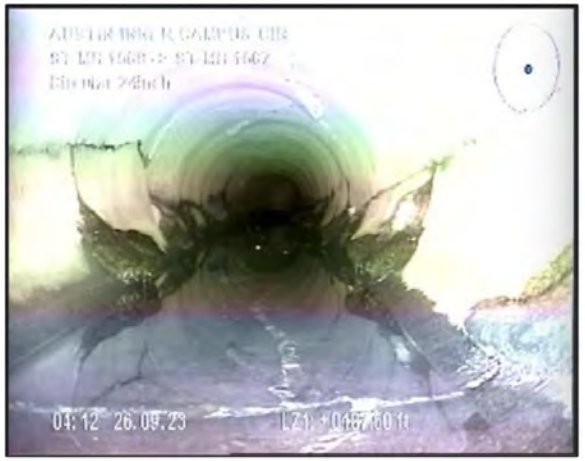


DEFORMED RIGID (DR)

Grad

Surface Damag
Project

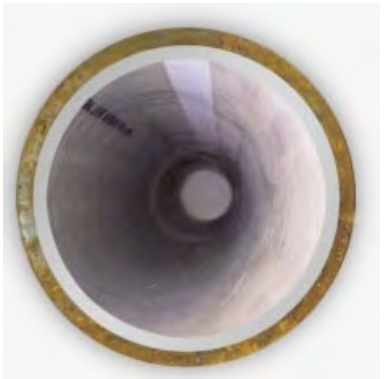
Broken (B)

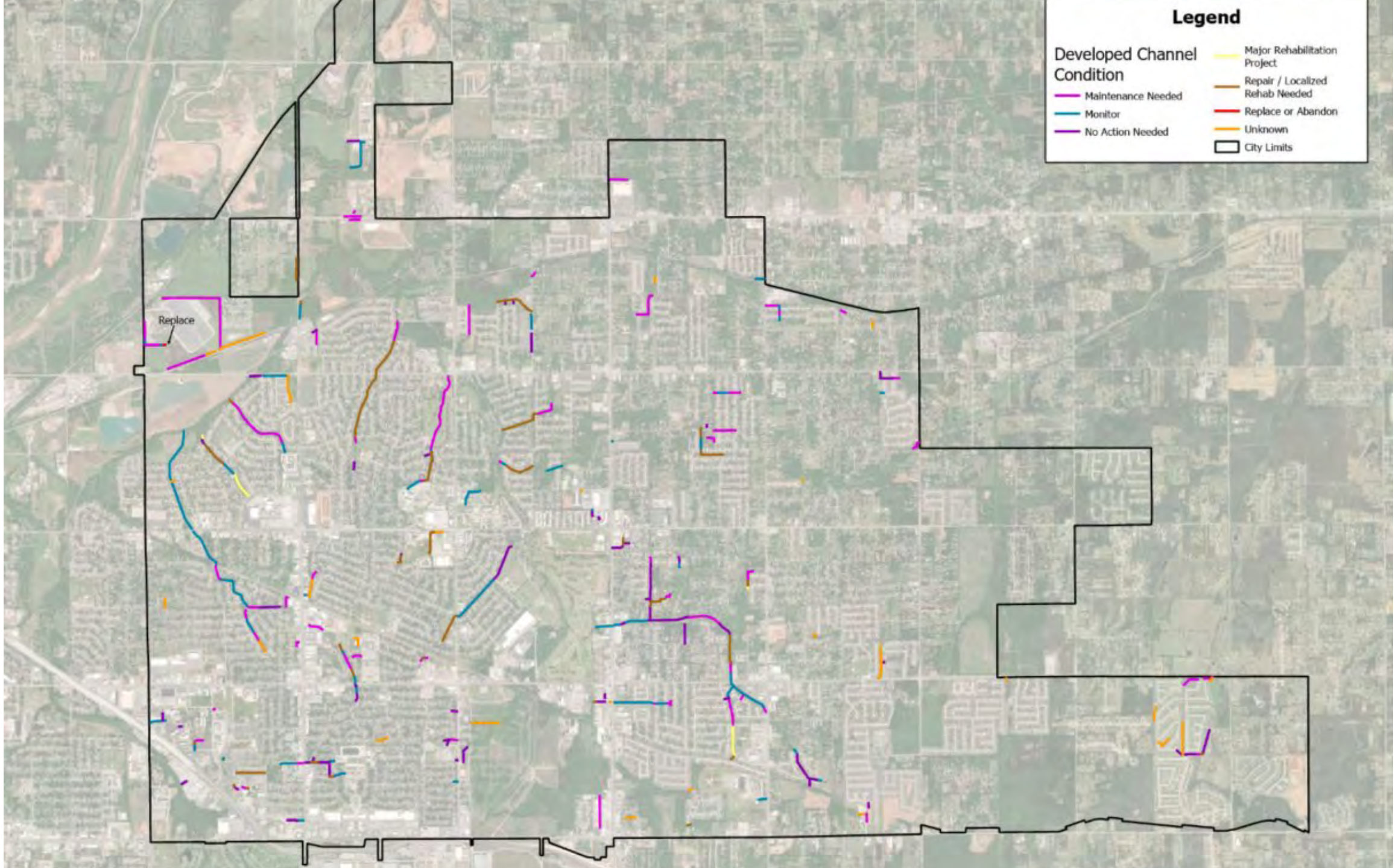
Root Ball

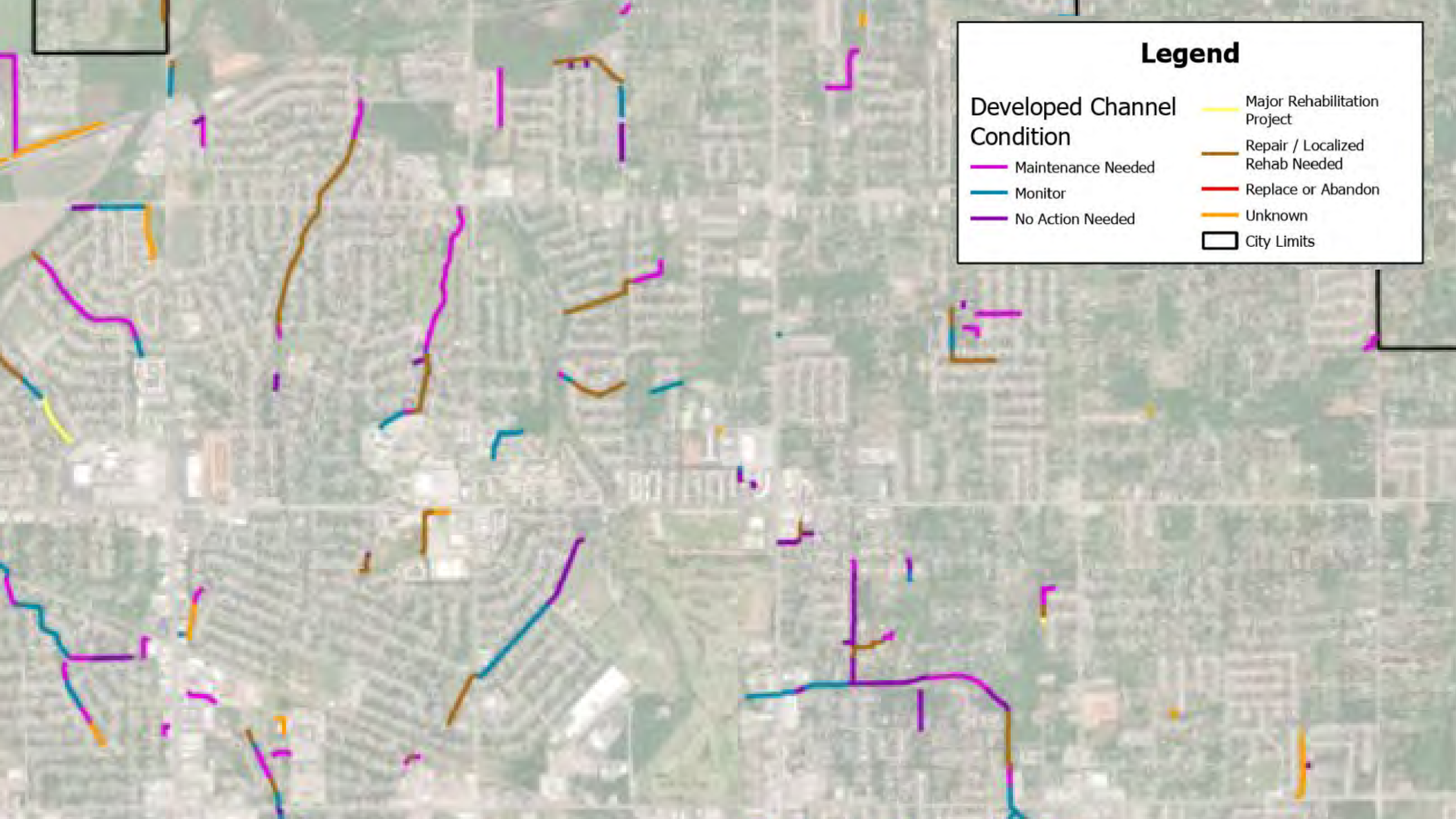
ORMED RIGID (DR)

Improvement Types

Improvement Type	Action
Monitoring	Reinspect per normal frequency
Clean	Jetting, mechanical cleaning, or vacuuming
Point Repair	Sectional liner, chemical grouting at joints, or a concrete patch
Open Cut Replacement	Full excavation and partial replacement of a short section of pipe
Cure-in-place Pipe (CIPP)	Inversion or pull-in-place lining using resin-impregnated tube (trenchless construction)




Legend
Developed Channel Condition
Maintenance Needed
Monitor
No Action Needed
Major Rehabilitation Project
Repair / Localized Rehab Needed
Replace or Abandon
Unknown
City Limits
Replace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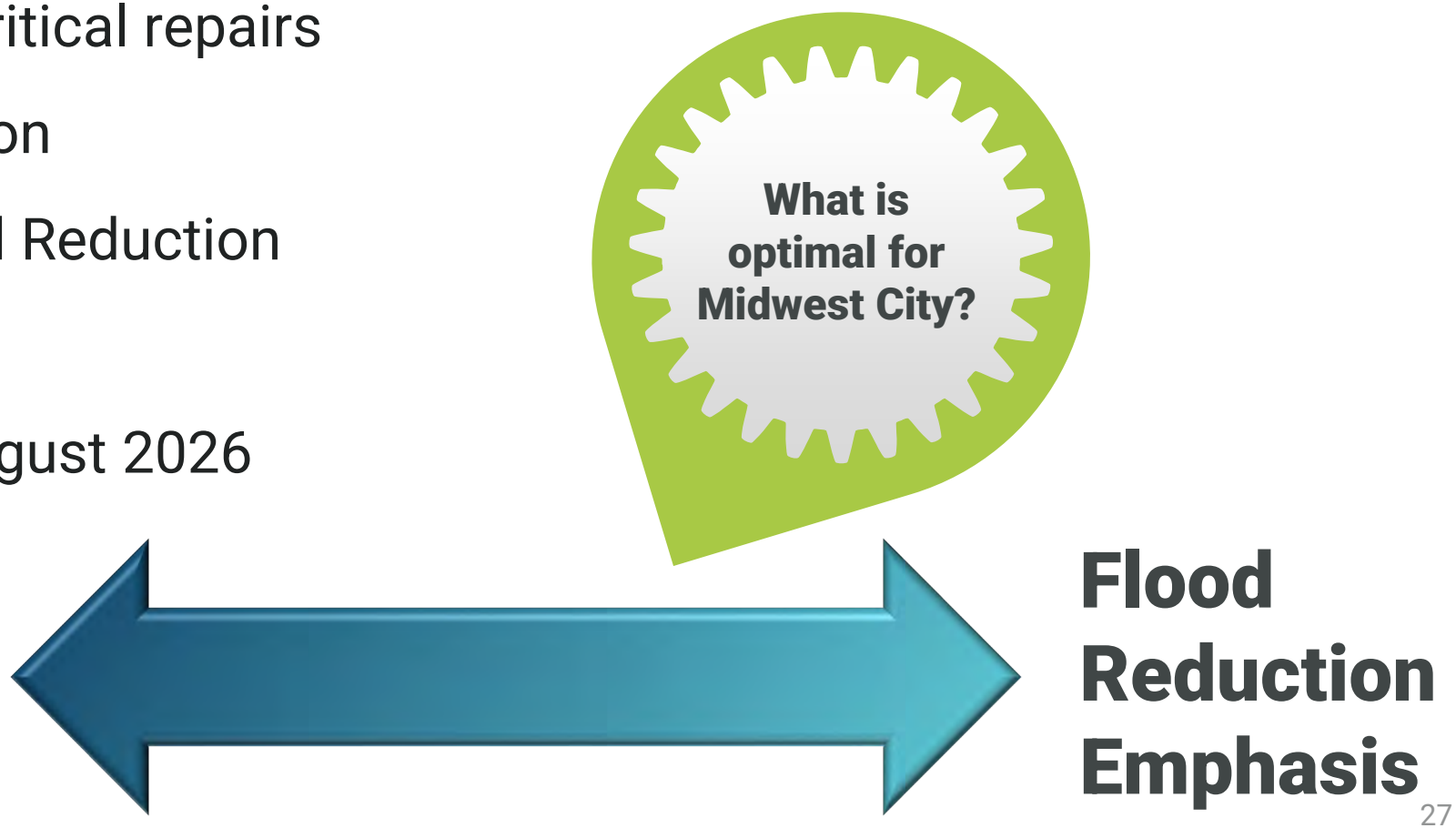
Priorities, Near-Term Actions

- Risk = Likelihood × Consequence → ranked inspection list
- Cleaning routes, critical repairs
- Project Prioritization
  - Rehab vs Flood Reduction
- SWMP finalization
  - Completion August 2026



Thank You

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