



FORT WORTH'S STORM DRAIN REHABILITATION PROGRAM -

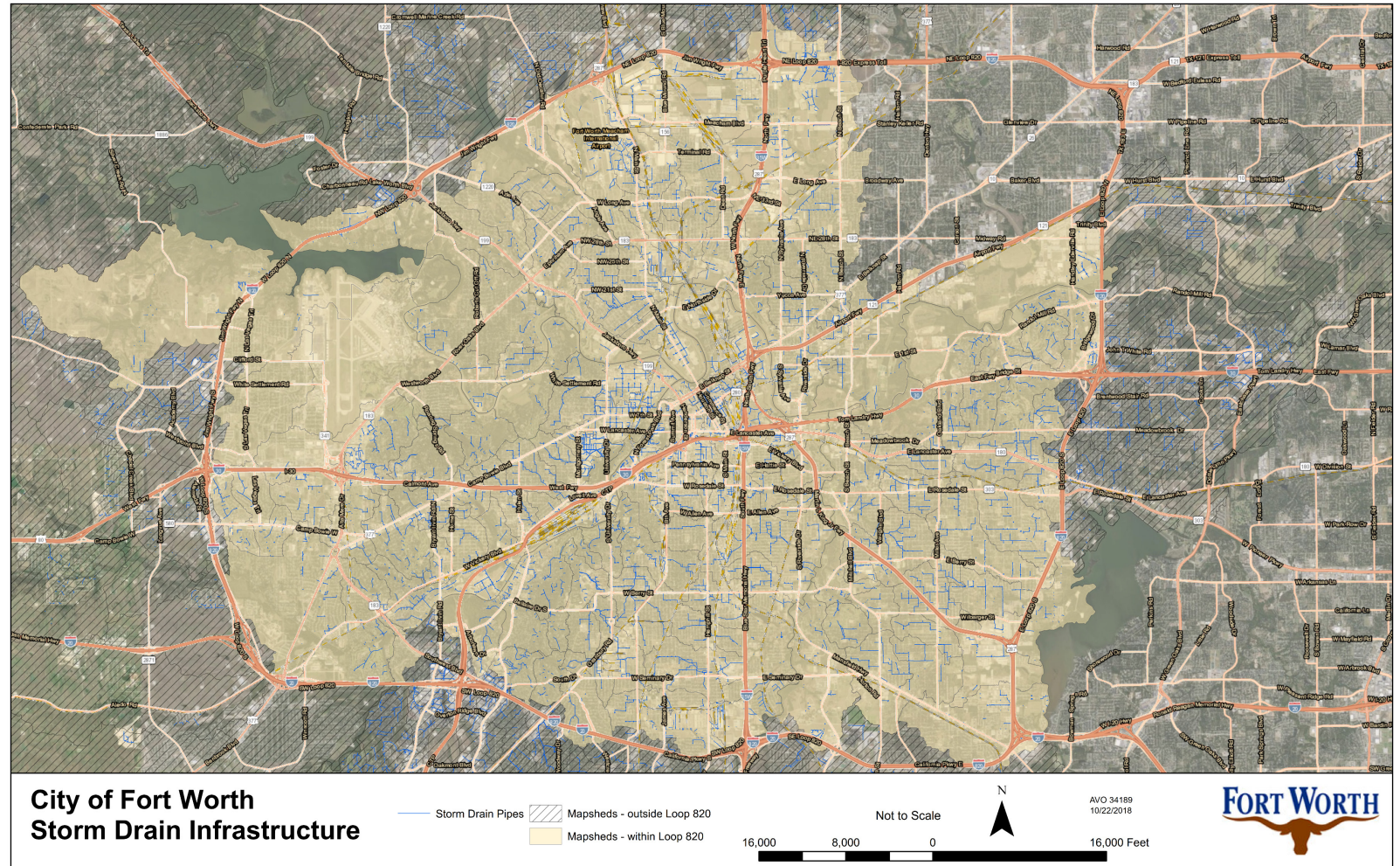
COWTOWN'S APPROACH TO WRANGLING STORM DRAINS

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AGENDA

- Background
- Program framework
- Initial assessment
- Condition assessment
- Prioritize
- Corrective action
- Lessons learned

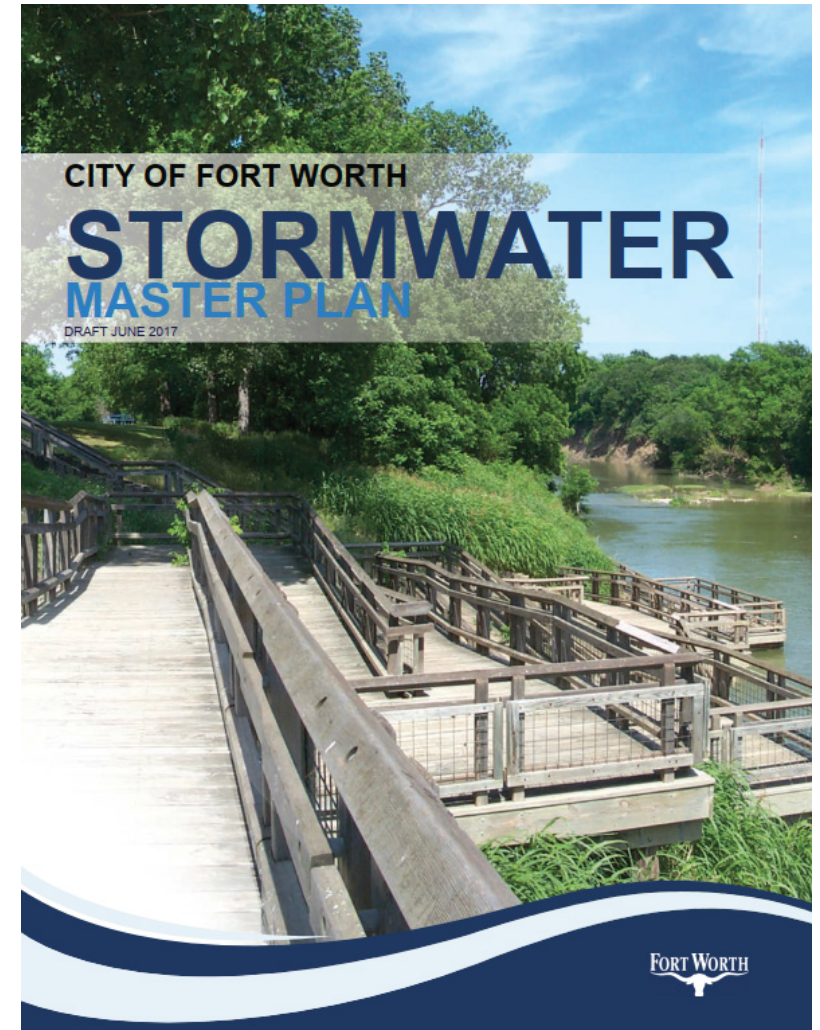


STORM DRAIN REHABILITATION

BACKGROUND

SWMP (2016) AND ACCOMPLISHMENTS SINCE 2006

- Inventory and condition assessment – **PRIORITY 1**
- Flood reduction capital projects
- Maintenance
- Planning
- Development services
- Equipment and technology
- Public communications



BACKGROUND

■ Objective criteria

- Structural flood risk
- Level of service
- Criticality
- Cost efficiency
- Road hazard

■ Subjective criteria

- Public opinion
- Economic development impact
- Aesthetics
- Neighborhood impact

Prioritization Strategy:

Continue to expand the acquisition and effective use of data to inform programming decisions

Stakeholder Comment:

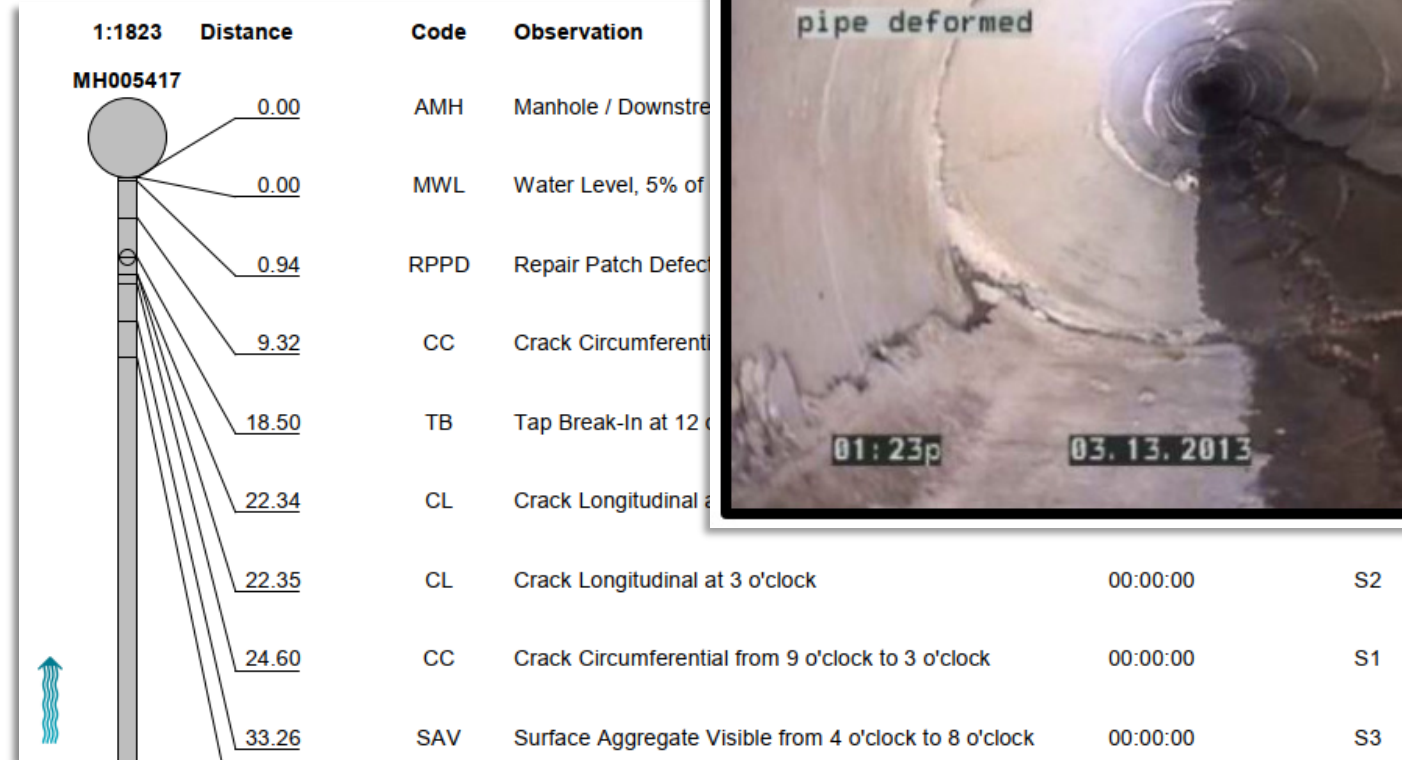
"I think you have to prioritize and achieve results over time without increasing budget/expenditures."

BACKGROUND

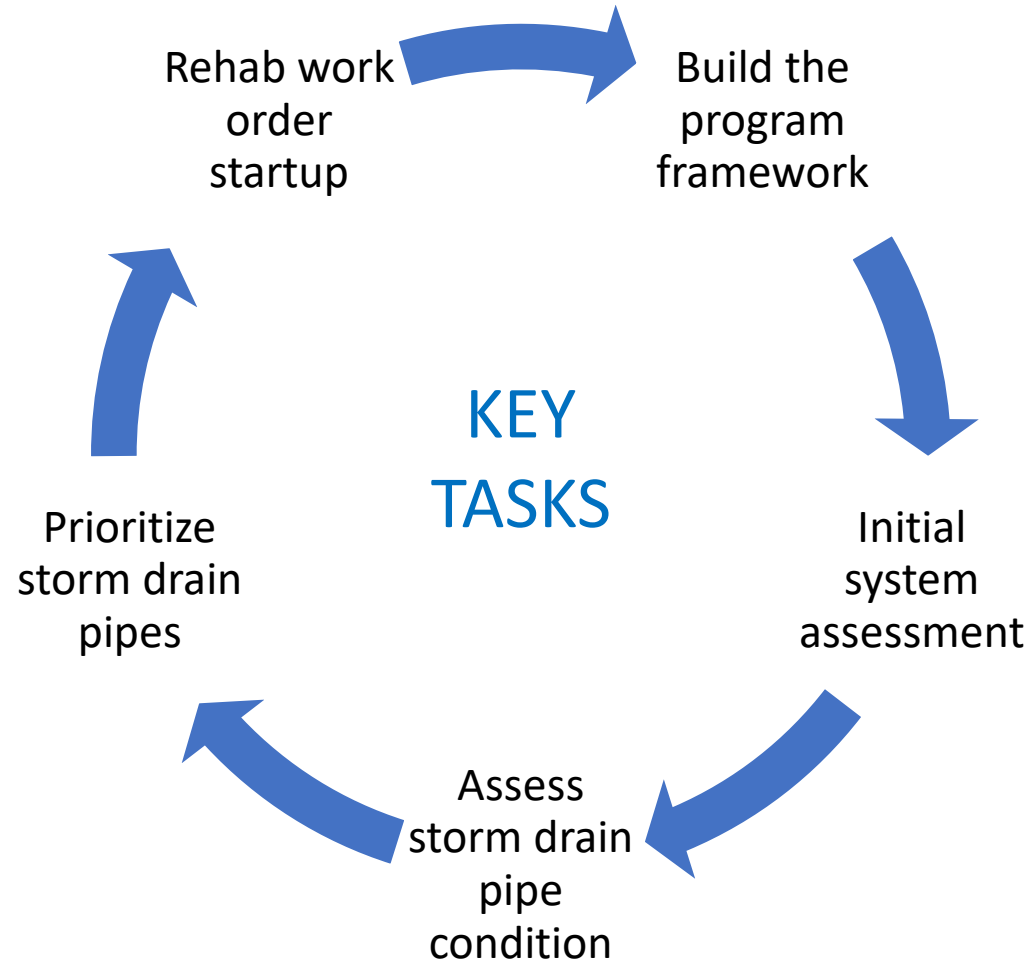
■ SD rehab is a Priority Initiative for TPW

■ Genesis, drivers, goals

- Enhance safety of Fort Worth
- Proactive vs reactive O&M
- Doing more with less
- Improve level of service



BACKGROUND



STORM DRAIN REHABILITATION

PROGRAM FRAMEWORK

PROGRAM FRAMEWORK

- Define Level of Service (LOS) goals and Key performance indicators (KPIs)
- Program tasks
- Manpower

Program Task	Manpower
Cleaning and access	SWFOs
Inspection	Contract initially, then in-house
Assessment, needs identification, prioritization	Consultant
Corrective actions	Contract and supplement with SWFO in opportunistic areas

STORM DRAIN REHABILITATION

INITIAL STORM DRAIN ASSESSMENT

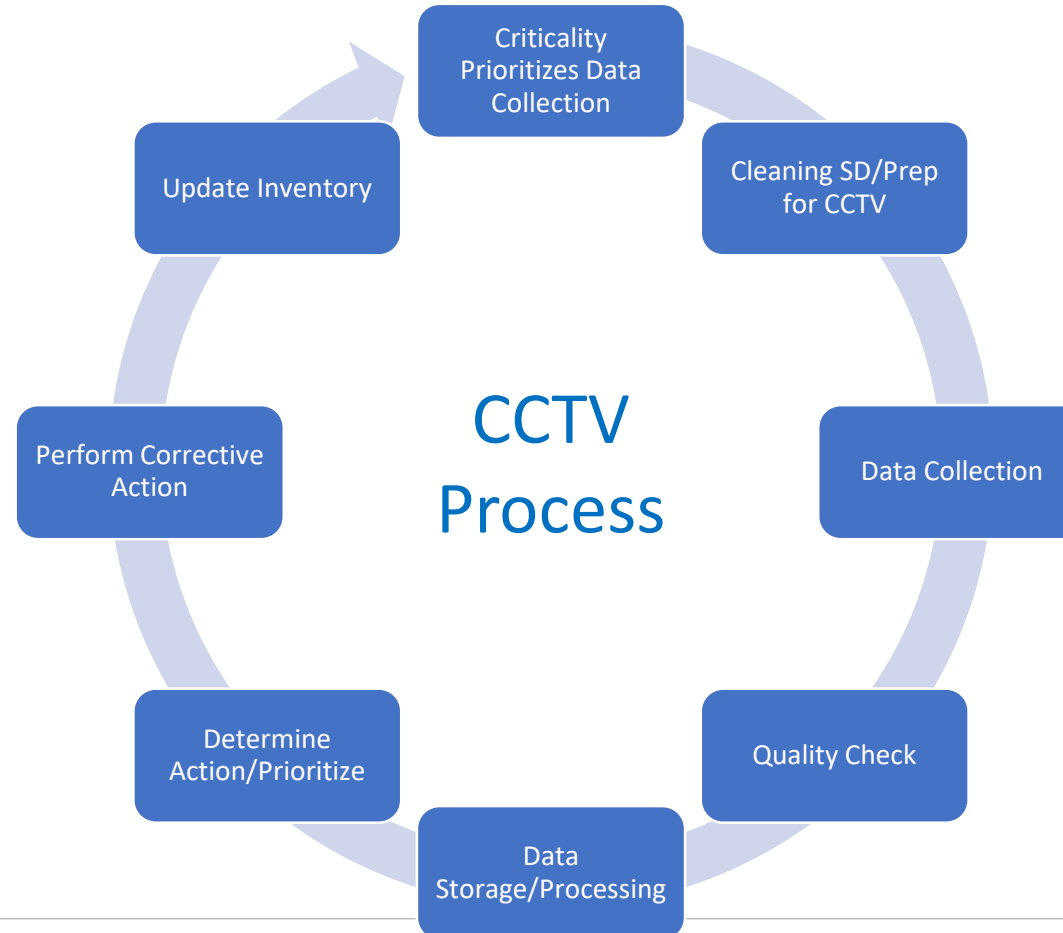
INITIAL STORM DRAIN ASSESSMENT

- Initial project prioritization
 - COF-basis
 - Consideration of proximity to structures
 - Easement status
- Easement research and verification
- Staff knowledge workshop
 - Discussed and gathered institutional knowledge
 - System maintenance, rehab, failure

STORM DRAIN REHABILITATION

HOW TO ASSESS STORM DRAIN CONDITION?

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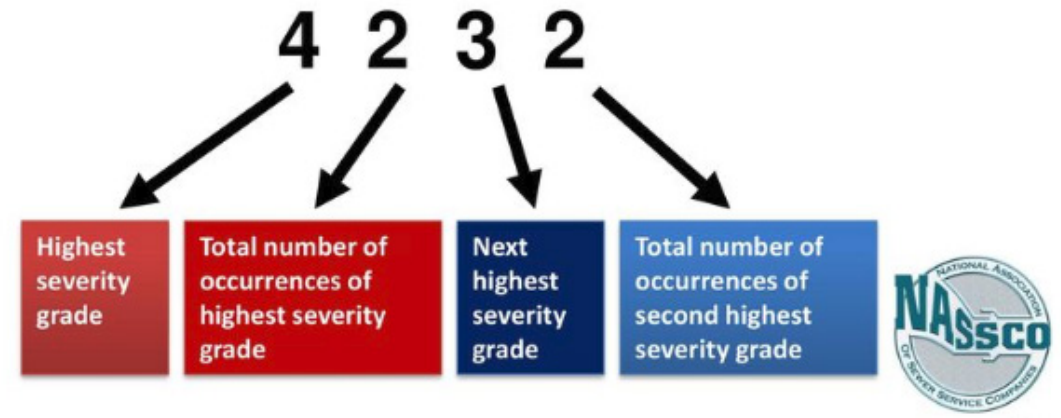


HOW TO ASSESS STORM DRAIN CONDITION?

- Equipment - Options for effective pipe condition assessment
- Staffing - Initially contract CCTV
- Future goal to implement in-house CCTV
- Approaches, benefits, and limitations – PACP, Quick Score, streamlined (4's and 5's)

PACP Quick Rating

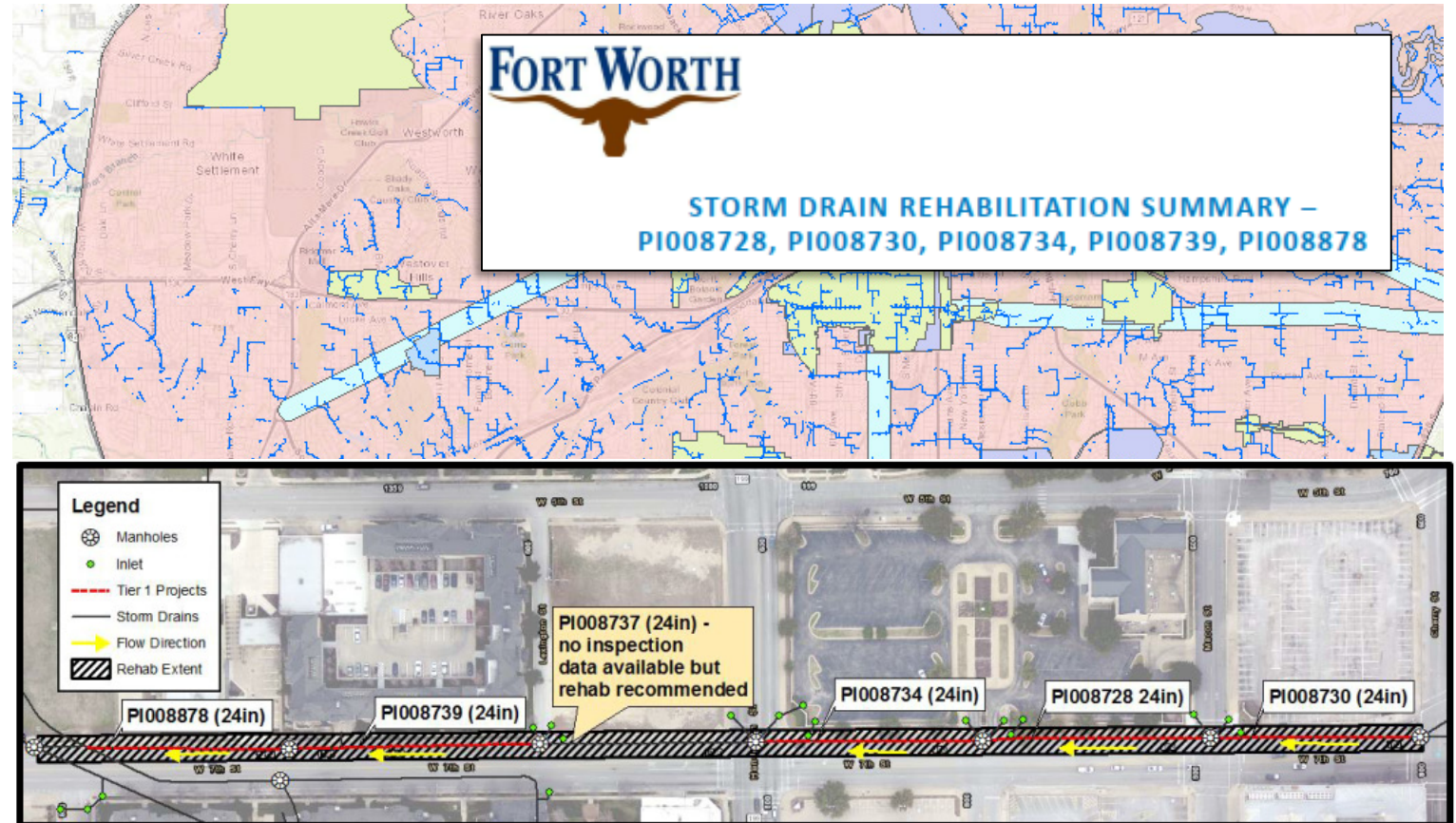
- A shorthand way of expressing the number of occurrences for the two highest severity grades
- A four character score



HOW TO ASSESS STORM DRAIN CONDITION?

■ Project tools

- Summary of defects and specific considerations by pipe
- Recommendations of appropriate rehabilitation methods
- Map with defects referenced; Profile with defect linear referencing based on as-built and CCTV data



STORM DRAIN REHABILITATION

HOW TO PRIORITIZE STORM DRAINS?

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■ Establish strategic, program approach to manage storm drain infrastructure

■ Develop criticality to prioritize

- Condition assessment
- Evaluation
- Corrective action

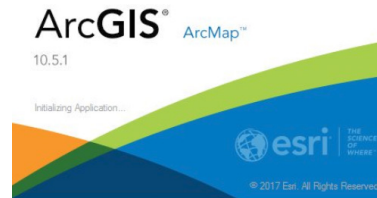
■ Software framework

- ESRI
- Accela
- ITPipes

■ Risk prioritization toolbox

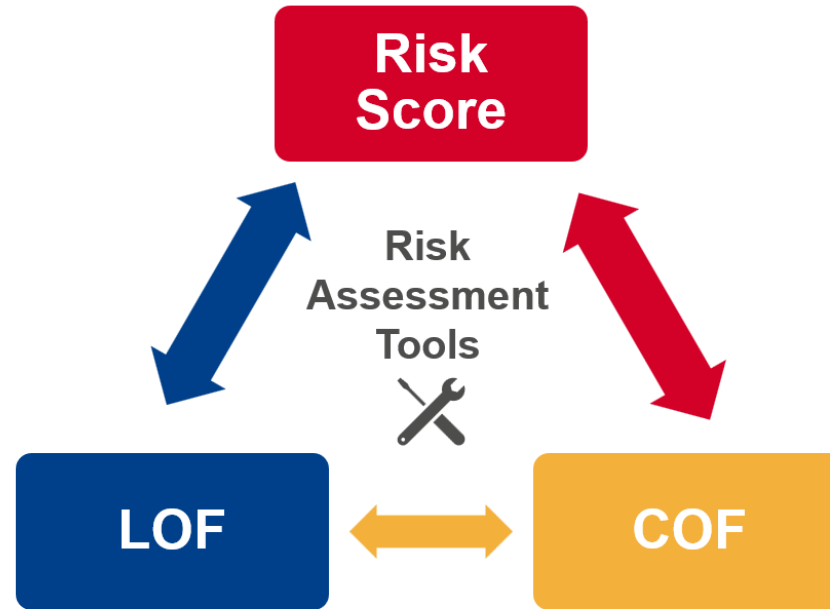
■ Refine prioritization

Probability of Failure	Weight (%)	Consequence of Failure	Weight (%)
Percent Consumed	30%	Size	40%
Capacity	30%	Buildings	20%
Operating Environment	20%	Roads	20%
Material	20%	Critical Service	20%
TOTAL	100%	TOTAL	100%



HOW TO PRIORITIZE STORM DRAINS?

- Develop risk prioritization tools in ArcGIS
- Perform initial/baseline prioritization
- Leverage condition data to refine prioritization approach and assumptions

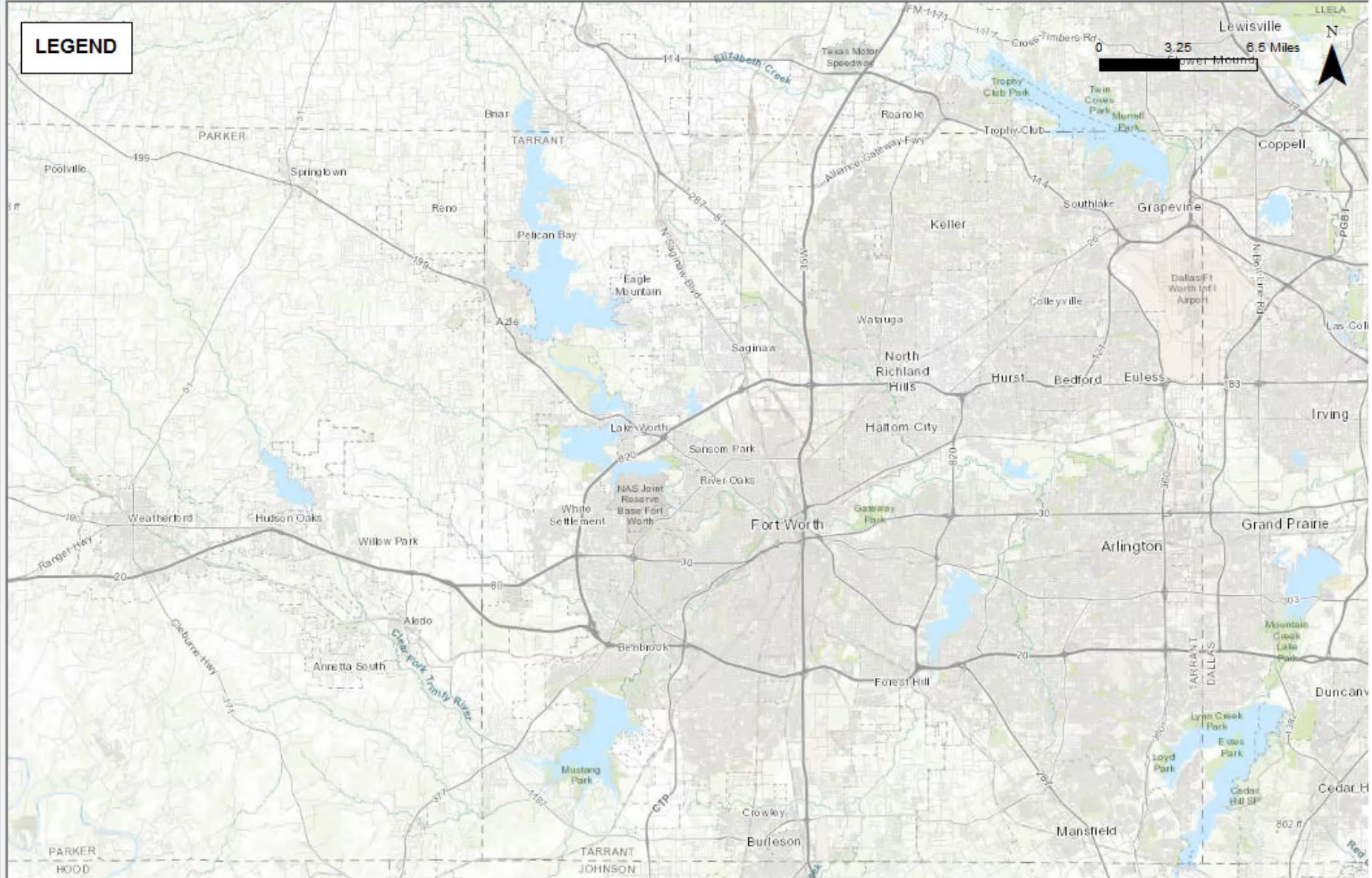


HOW TO PRIORITIZE STORM DRAINS?

- Risk tools demonstration - baseline

- 📦 ArcToolbox
- 📦 3D Analyst Tools
- 📦 Analysis Tools
- 📦 Arc Hydro Tools
- 📦 ArcHydroPartialTerrainUpdate
- 📦 Cartography Tools
- 📦 Conversion Tools
- 📦 Data Interoperability Tools
- 📦 Data Management Tools
- 📦 Editing Tools
- 📦 Geocoding Tools
- 📦 GeoHMS Tools
- 📦 Geostatistical Analyst Tools
- 📦 Linear Referencing Tools
- 📦 Multidimension Tools
- 📦 Network Analyst Tools
- 📦 Parcel Fabric Tools
- 📦 RAPID
- 📦 Schematics Tools
- 📦 Server Tools
- 📦 Space Time Pattern Mining Tools
- 📦 Spatial Analyst Tools
- 📦 Spatial Statistics Tools
- 📦 Tracking Analyst Tools
- 📦 z_Risk Assessment Tools_SD_CFW

LEGEND



STORM DRAIN REHABILITATION

HOW TO IMPLEMENT CORRECTIVE ACTION?

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- Prioritize critical storm drain pipes

Severity per CCTV x Consequence of failure (critical areas) = "Risk"

- Best-value rehabilitation bidder ranking and selection

- Select corrective action - rehab methods matrix* (trenchless preferred)

Methods Matrix					
Spray-on (EPOXY)	Spray-on (CEMENTITIOUS)	CIPP	Slip-lining	Pipe bursting	Spiral-wound
A spray-on or hand troweled lining (epoxy) is applied to a cleaned and dried existing pipe crack, joint or wall.	A spray-on lining (cementitious) is applied to a cleaned and dried existing pipe wall.	An impregnated liner is inserted inside of an existing pipe and cured with water or steam.	A new pipe is inserted inside of the existing pipe and grouted for structural support.	New pipe is inserted while bursting or splitting the existing pipe.	Above ground spool feeds PVC profile to the winding machine, which forms the new pipe by spirally interlocking

STORM DRAIN REHABILITATION

LESSONS LEARNED

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- Strategic, high-level planning builds the program foundation
- Structure the program for measurable success
- Keep in mind stakeholder priorities and metrics
- Evaluate the information you have and get started– asset inventory is the logical Step One
- Detailed condition assessment of all assets is not needed to start
- Storms drains differ from sanitary sewers– defects, failure modes, condition scoring
- Begin to collect the “right” data today for data-driven evaluation tomorrow
- Prioritization should look at risk factors (POF and COF) but also “constructability”

THANK YOU

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