RICHARDSON CAPITAL PROJECTS & ENGINEERING | halff

Infrastructure Management Leadership – City of Richardson Renews North TX Storm Drain System with Proactive Rehabilitation and Advanced Technology

NCTCOG Public Works Roundup 2025 | September 4, 2025

Yogesh Patel, PE | Matt Stahl, PE, CFM

SPEAKERS

YOGESH PATEL, PE
PROGRAM MANAGER
SENIOR PROJECT ENGINEER
CITY OF RICHARDSON

MATT STAHL, PE, CFM
PROGRAM ADVISOR
TEAM LEADER
HALFF

Agenda

- Richardson – Leading By Example
- Storm Drain Resiliency Enhancements
- Program Advantages

RICHARDSON – LEADING BY EXAMPLE (2019-2025)

RICHARDSON – LEADING BY EXAMPLE

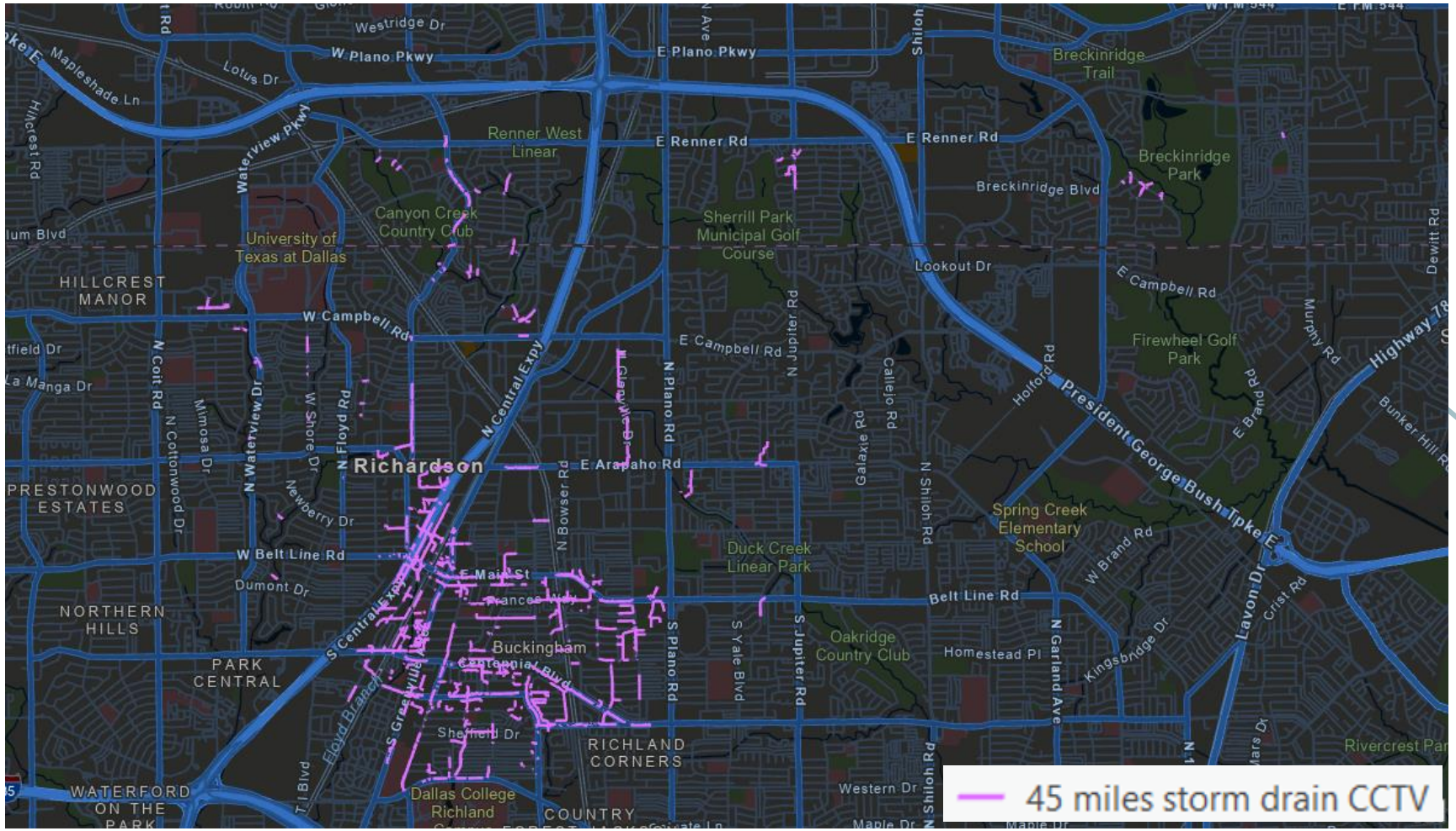
Program Genesis

- City growth, development, storm drain deterioration, utility corridor congestion
- Needed programmatic, proactive approach

Leading by Example

- Initial efforts 2016-2018
- Formal program development 2019-2020
- Benchmarking review
- Utility ownership procedures
- Advanced tech 2024-2025

Storm Drain System Evaluation (2019-2025)



RICHARDSON – LEADING BY EXAMPLE

Overview

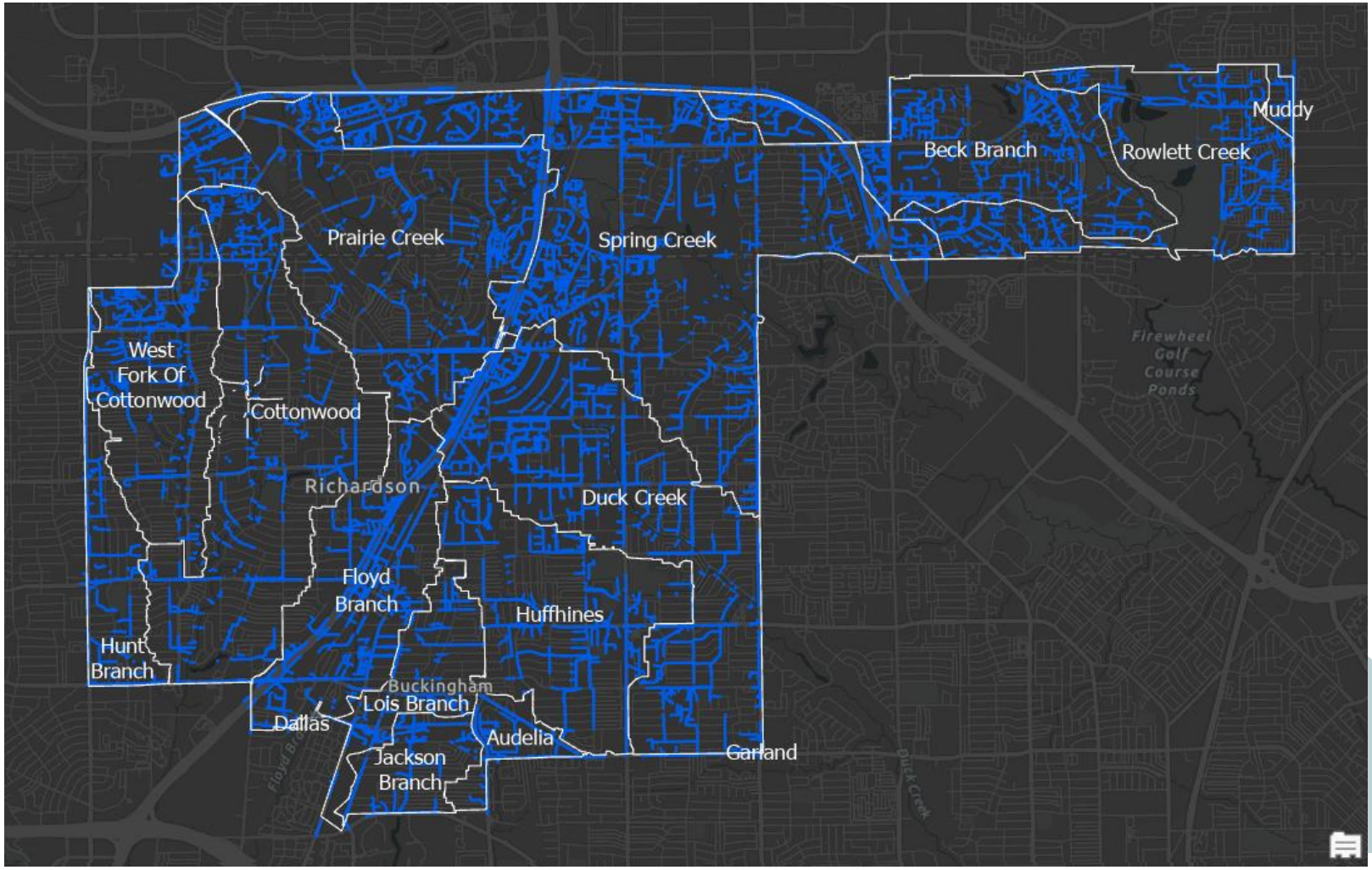
- Proactive storm drain inspection, priority areas, NASSCO PACP
- Benchmarked against similar utilities for procedures, approach, data needs
- Condition scored by pipe segment

Goals

- Evaluate 6 to 8 miles per year
- Improve staff data access and tracking via real-time map services/data access
- Resolve utility intrusions and other structural + O&M issues

RICHARDSON – LEADING BY EXAMPLE

Richardson Storm Drain System - 393 miles and 16 drainage basins

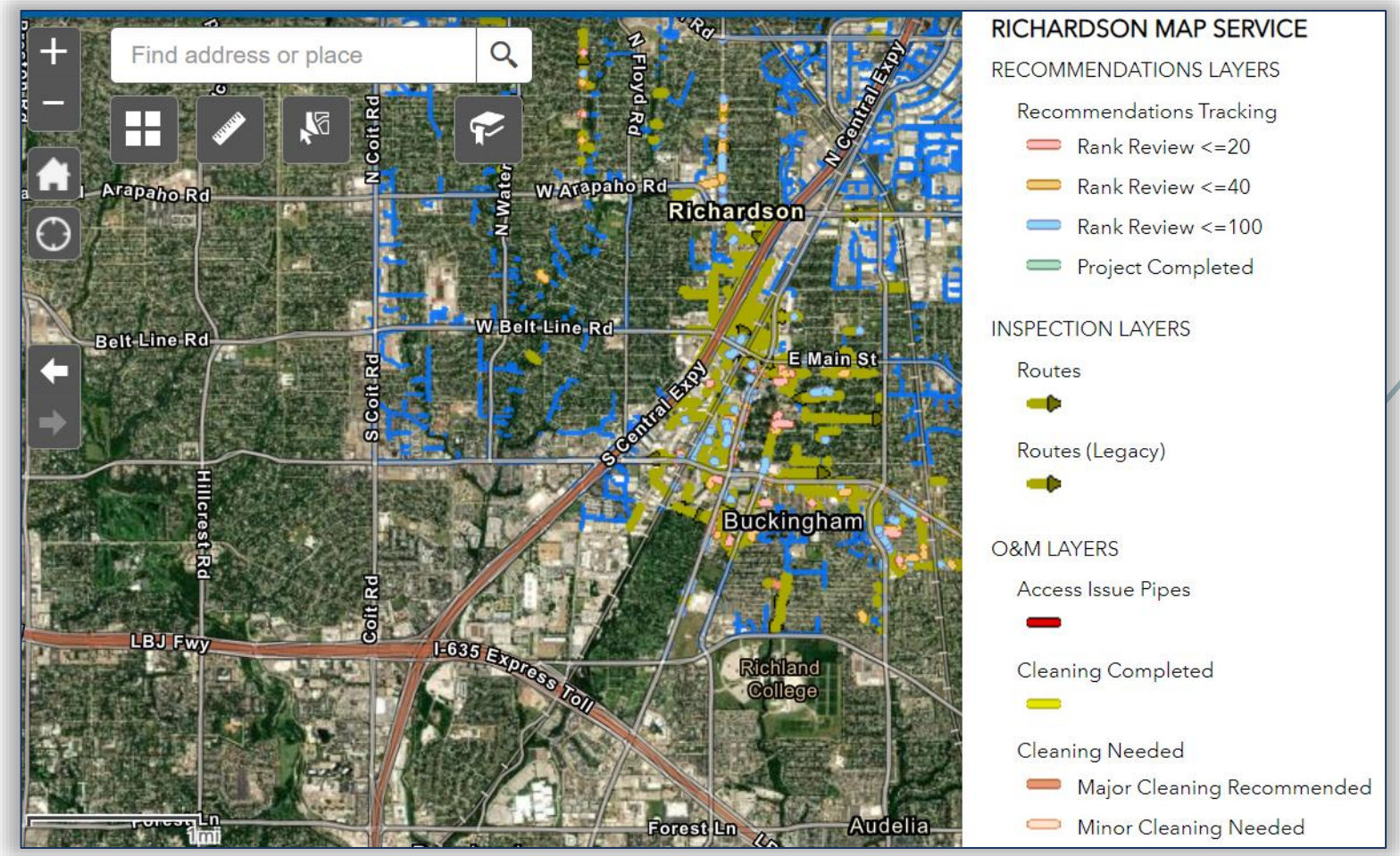


RICHARDSON – LEADING BY EXAMPLE

Accomplishments – Storm Drain Inspection, Cleaning, and Rehabilitation Program (2019-2025)

- CCTV = 45+ miles
- Corrective action identified = 12+ miles (400 pipes)
- Cleaned = 2 mile (35 pipes)
- Utility intrusions = 60+
- Designed/bid = 50+ repair packages
- Average annual budget ~ $300K

GIS Master Database



STORM DRAIN RESILIENCY ENHANCEMENTS

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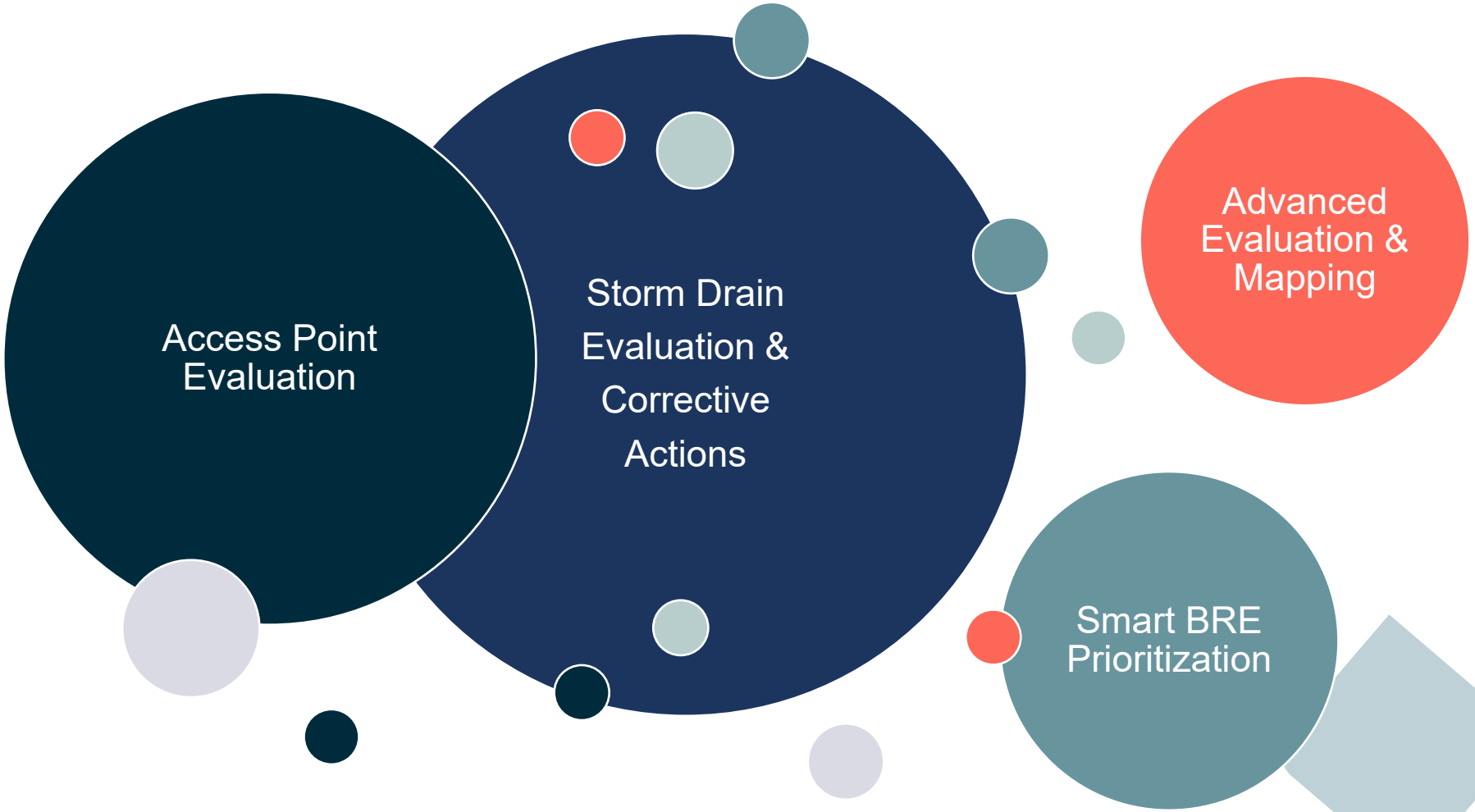
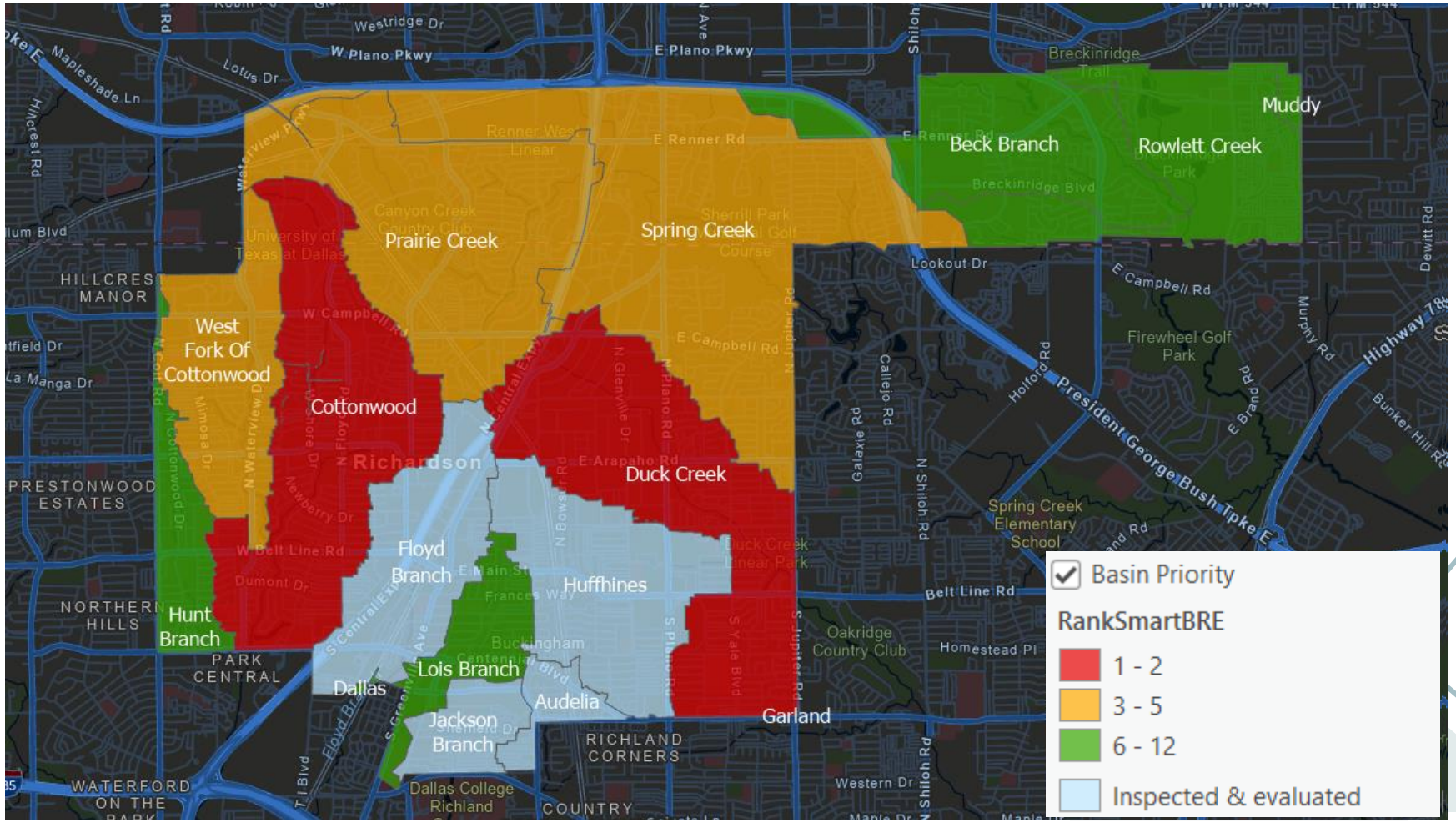


STORM DRAIN RESILIENCY ENHANCEMENTS

Smart BRE Prioritization



STORM DRAIN RESILIENCY ENHANCEMENTS

Smart BRE Prioritization

- Leverages field-verified data
- Identifies high-priority assets likely to fail
- Proactive inspection & rehabilitation

Type of Predictive Modeling

- Structured (tabular) machine learning

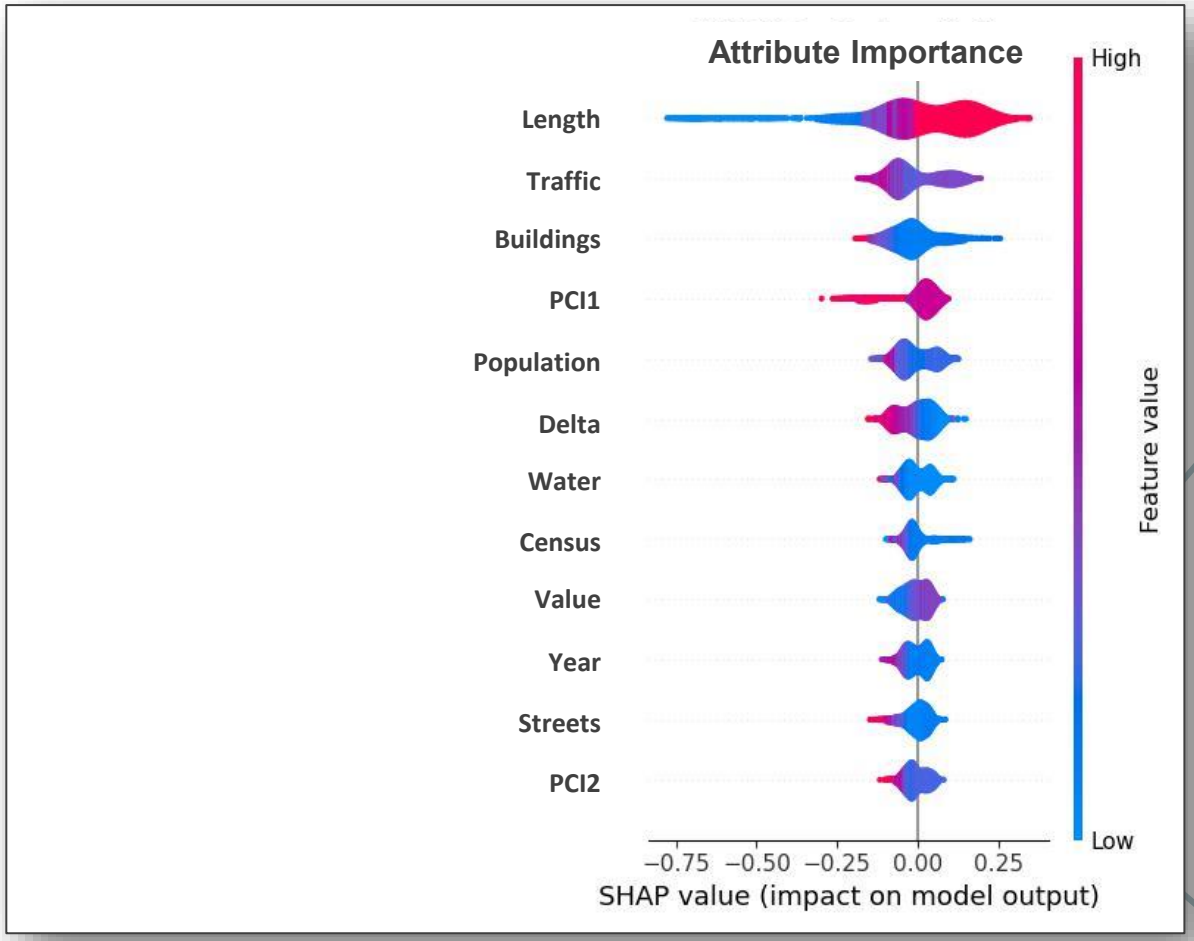
Data required

- X1, X2, etc. = Physical, spatial, demographic
- Y = Failure history

Processing resources

- ArcGIS Pro, Python, Jupyter – fast training

Key Predictive Features

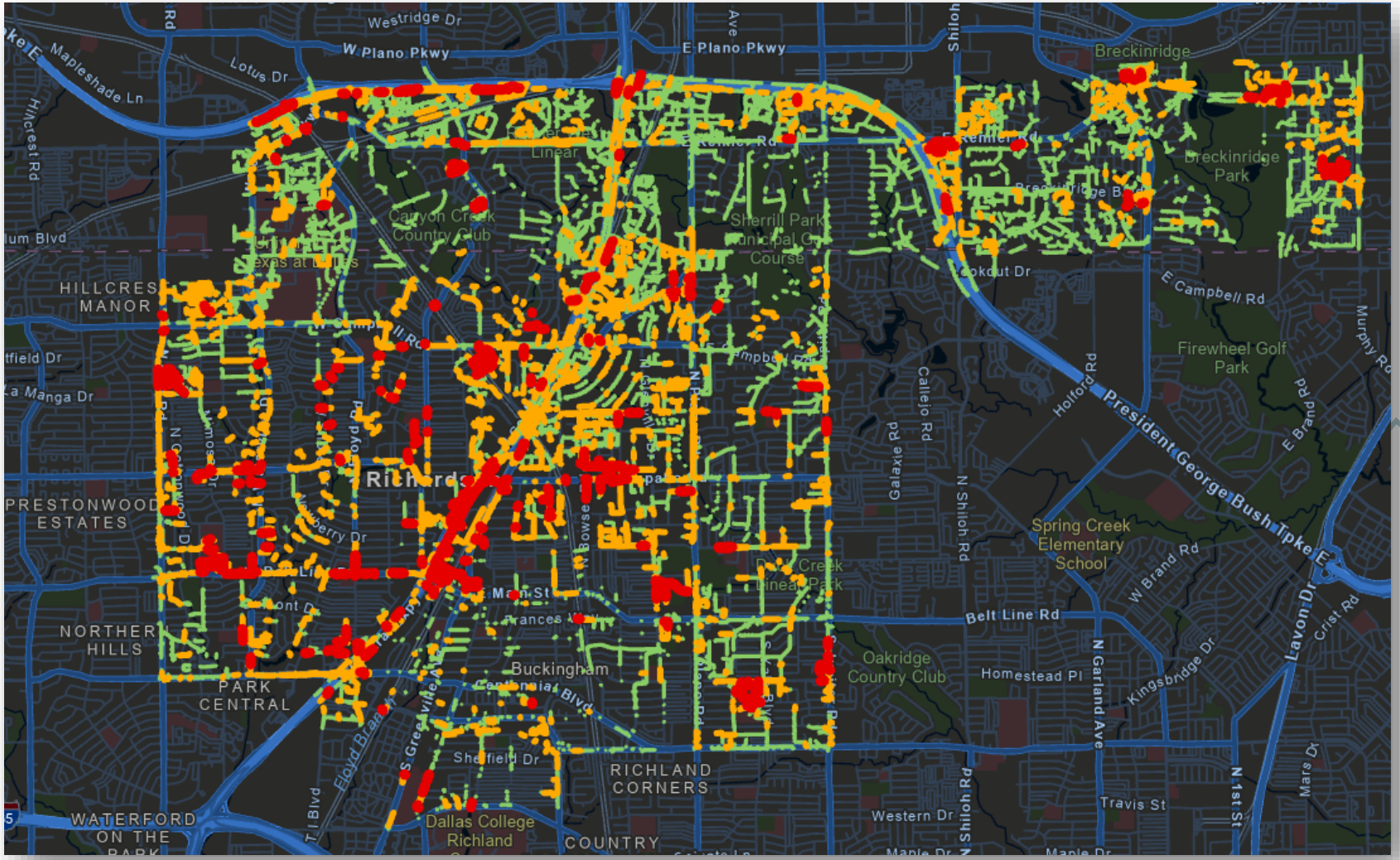


STORM DRAIN RESILIENCY ENHANCEMENTS

Smart BRE Prioritization

- Trained model focuses inspection efforts
- Storm drains in poor condition predicted = 7 of every 10 (test data)
- Cross validation, K-folds = 10
- Recall (median) = 70%
- Predictive results will improve as program data grows

High-Risk Storm Drains



STORM DRAIN RESILIENCY ENHANCEMENTS

Storm Drain - Computer Vision QA/QC

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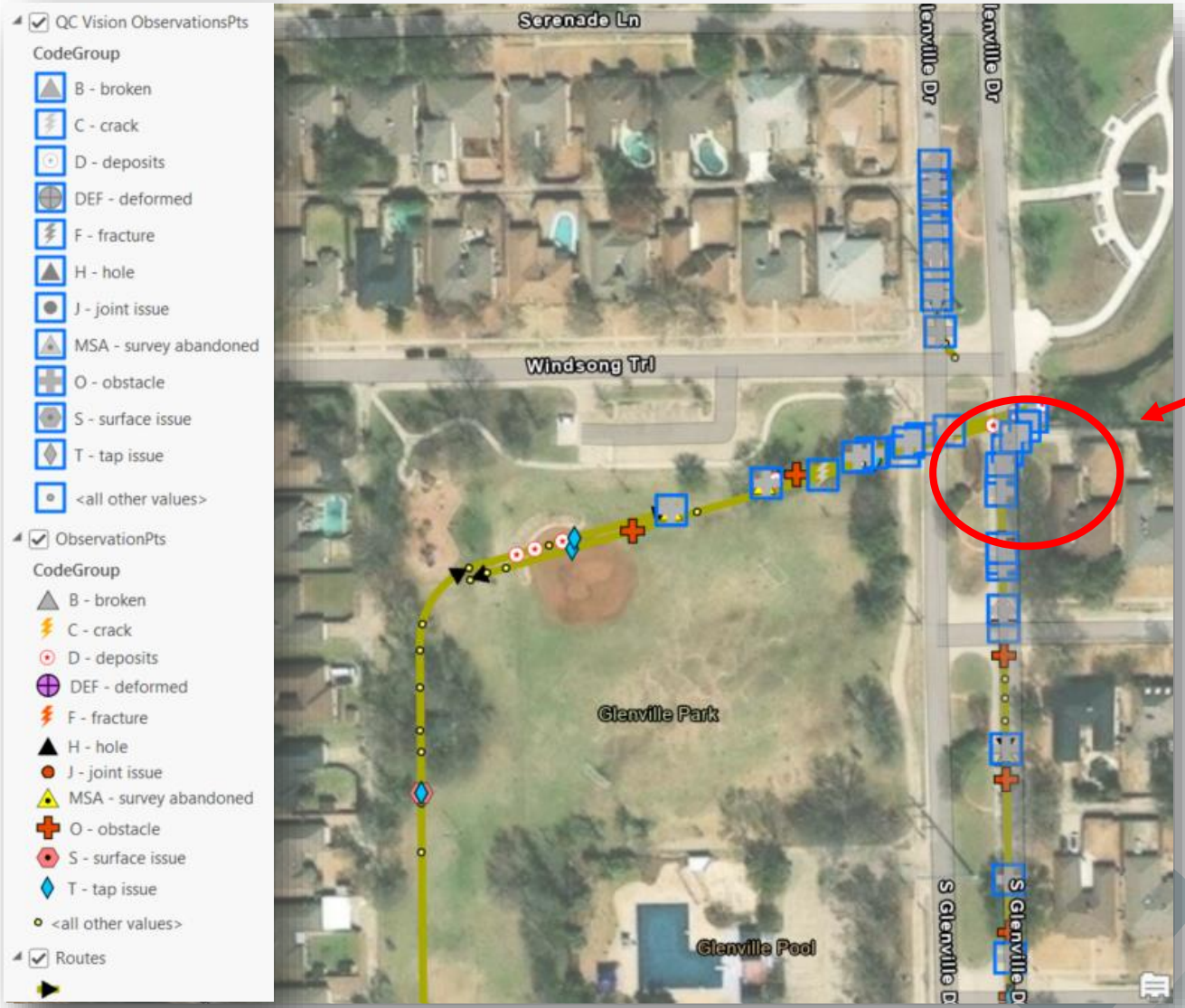
STORM DRAIN RESILIENCY

Storm Drain - Computer Vision Spatial Location

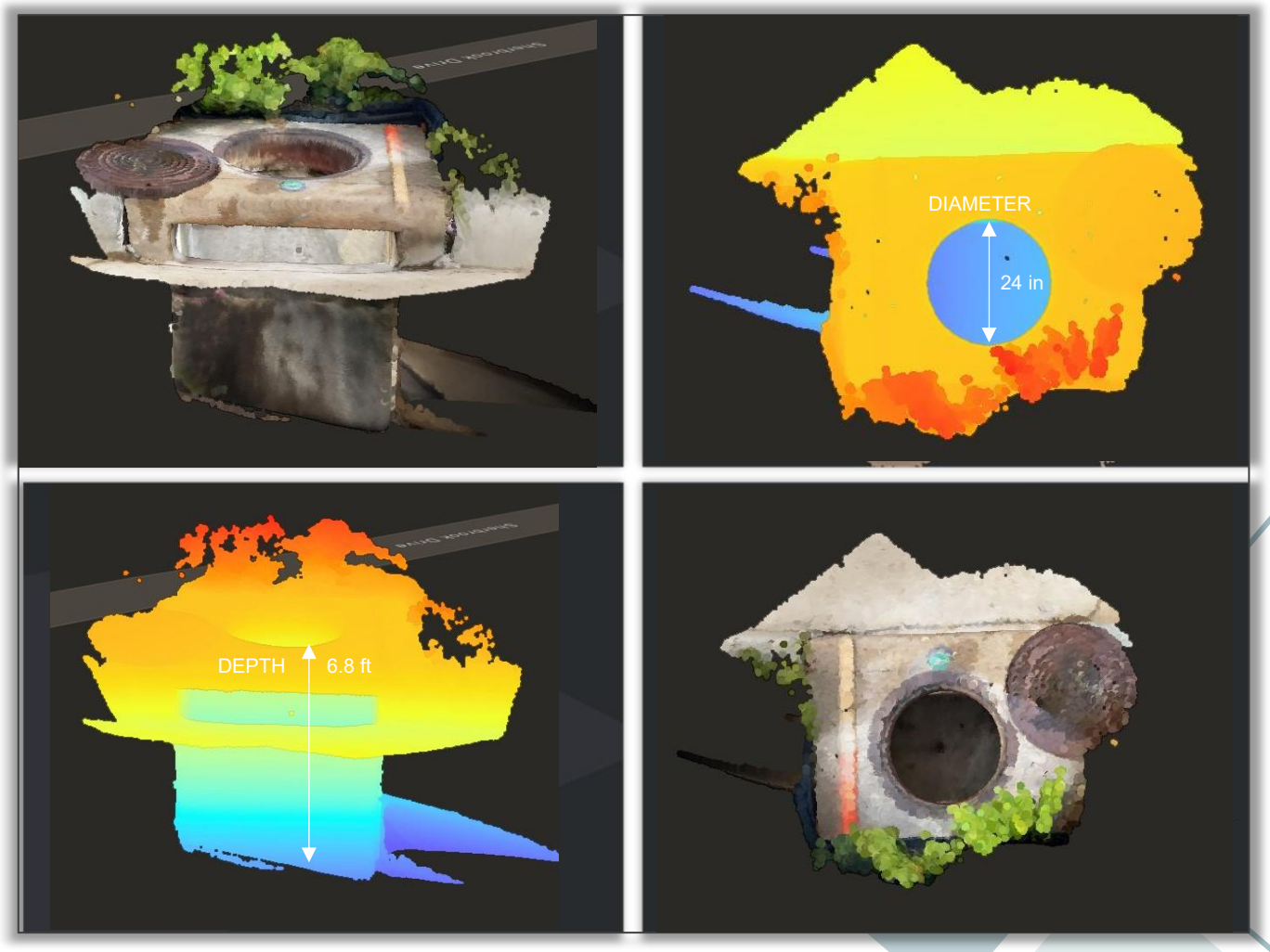
- 3-level process: completeness, AI computer vision review, manual review
- Leverages Halff's computer vision model
- Observations spatially referenced to GIS
- Discrepancies reviewed
- Benefits - risk mitigation, cost savings



STORM DRAIN RESILIENCY ENHANCEMENTS

Advanced Access Point Evaluation

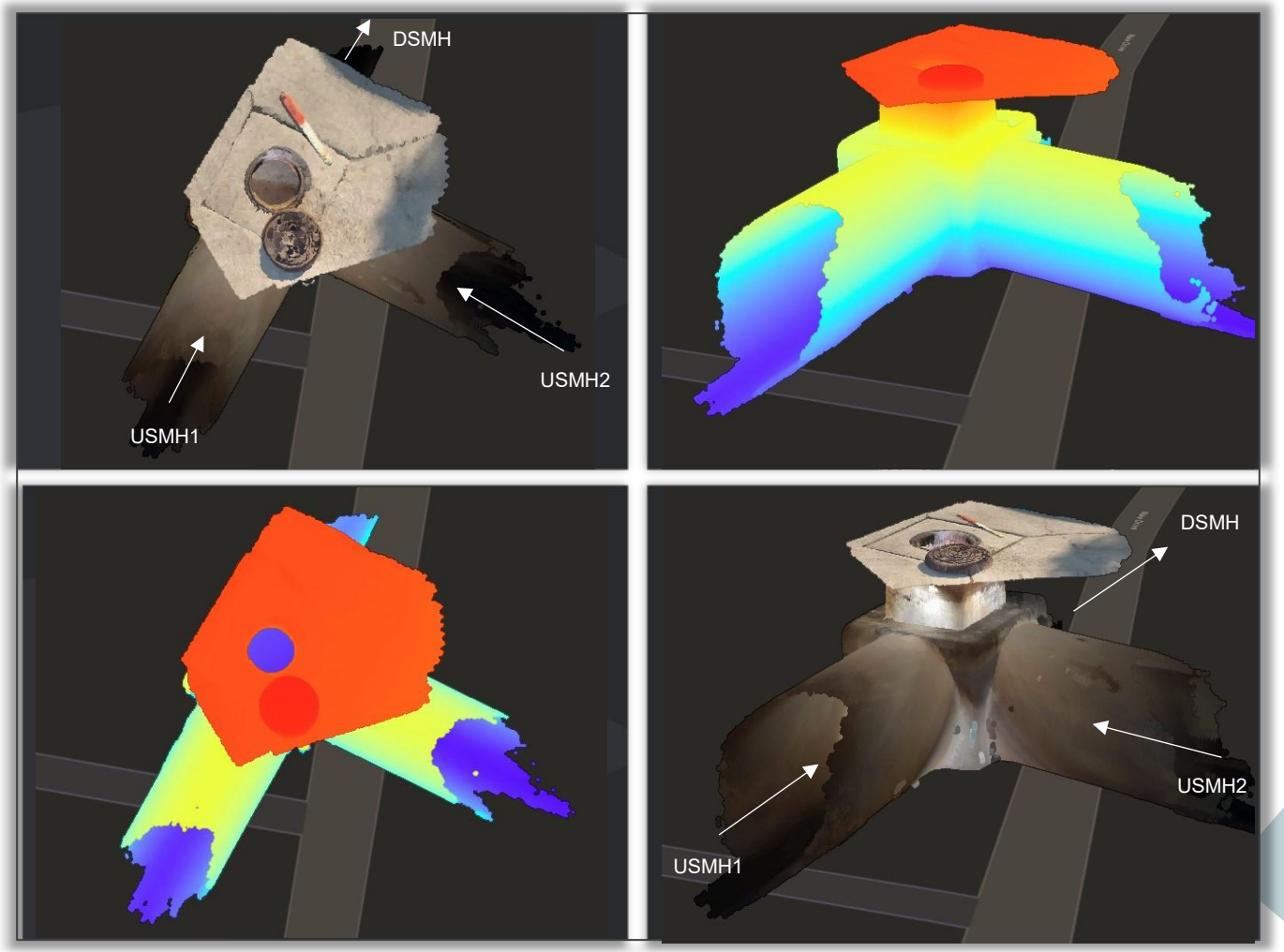
- LIDAR and 360-degree photographic scans
- Detailed and accurate depictions of assets and their connections within manholes and inlets
- Benefits – measure/verify asset dimensions (pipe diameter, manhole size, depth)



STORM DRAIN RESILIENCY ENHANCEMENTS

Advanced Access Point Evaluations

- Confirm pipe connectivity, topology
- Informs drainage modeling, GIS refinement



STORM DRAIN RESILIENCY ENHANCEMENTS

Advanced Pipe Evaluation

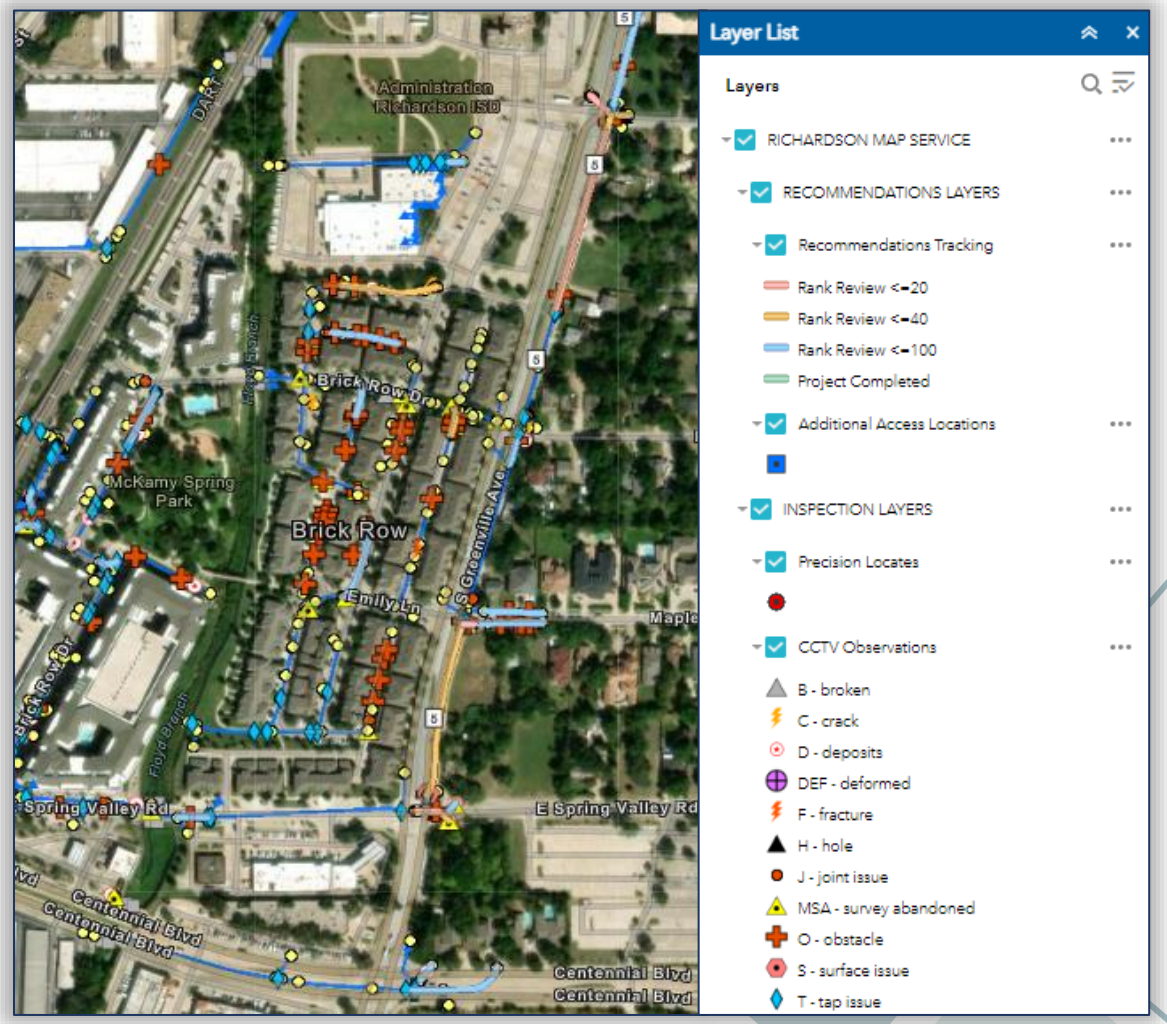
- Detailed and accurate 3D scan of storm drain assets
- Pipe dimensions, roundness, void volume
- Centerline mapping

PIPE FORCE AI

STORM DRAIN RESILIENCY ENHANCEMENTS

Evaluation & Recommendations

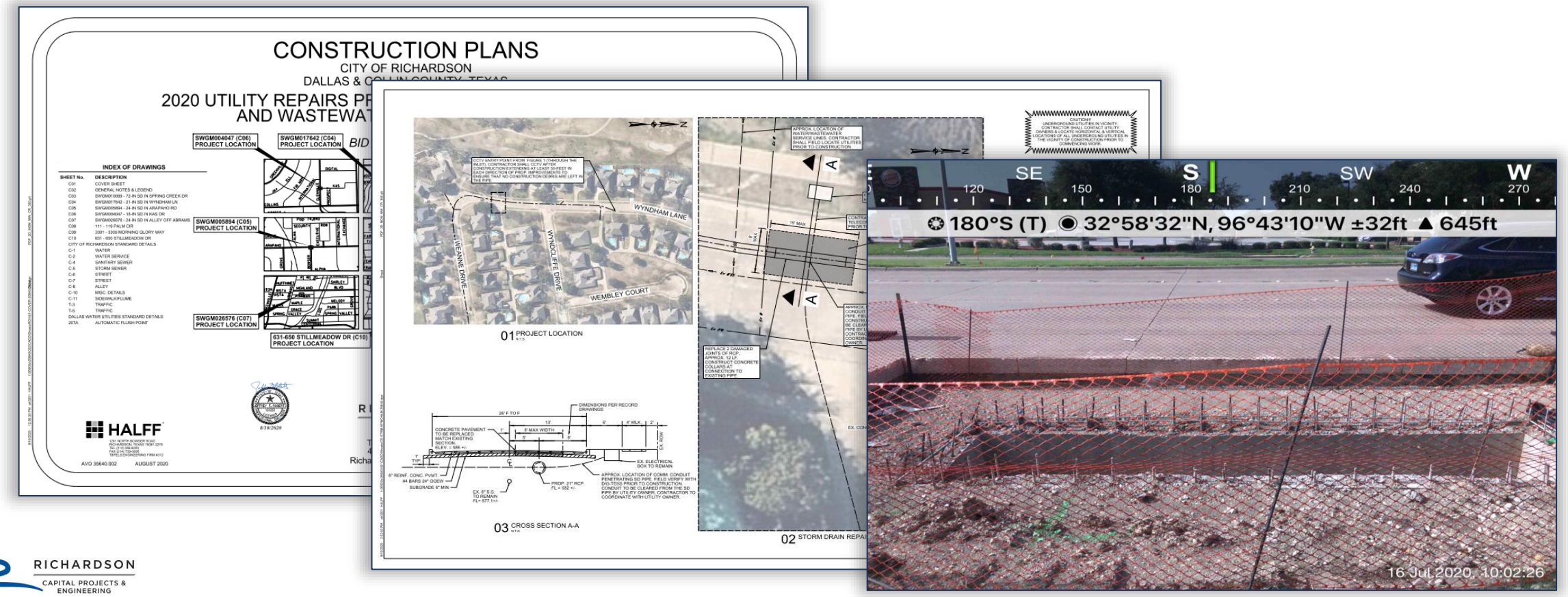
- Priority pipes (Grade 3, 4, 5) evaluated in detail - corrective action, responsible group, response time
- Logic rules in SDE - consistent assignment
  - Repair Type
  - Responsible Group
  - OM Responsible Group
  - Action Type Planned
  - Misc Calcs
- Data-driven using Enterprise SDE database and GIS map services - data quality, domains for consistency/standardization



STORM DRAIN RESILIENCY ENHANCEMENTS

Corrective Actions

- Design & bid repairs; collaboration across teams (Water Resources, Public Works, Infrastructure Management, GIS, SUE)
- Proactive, strategic, and planned!



PROGRAM ADVANTAGES

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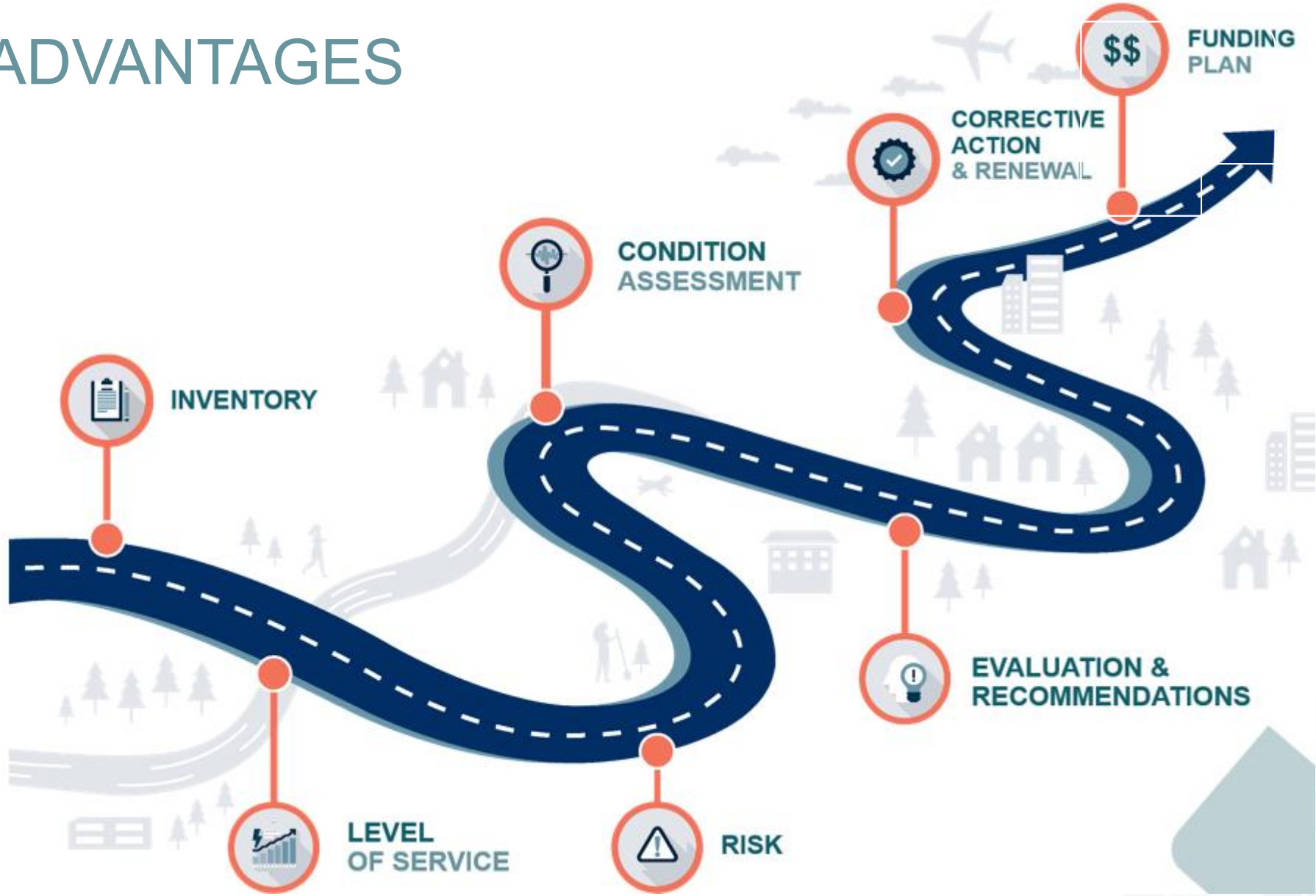
Asset Management Framework

- Proactive storm drain management
- Near-term plan with prioritized action items
- Catch problems before they become emergencies!
- Storm drain system renewal - extends asset life, restores level of service



Questions?

Yogesh Patel, PE
yogesh.patel@cor.gov
(972) 744-4278

Matt Stahl, PE, CFM
mstahl@halff.com
(817) 764-7516