UCT The Underground Utilities Event
25 YEARS
Underground Construction Technology | January 28-30, 2020 | Fort Worth, TX

Sinkhole from Hurricane Harvey:

Challenges Before/During Construction

January 28, 2020

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HOUSTON PUBLIC WORKS

IPR South Central

City of Houston Infrastructure

- Population: 2,400,000
- 6,200 miles of sewer
- 39 treatment plants
- 383 Lift stations

- Sanitary Sewers Rehabilitation
  - 2,000 miles in last 15 Years
  - Ramping up from 4 miles to 12 miles per month

Hurricane Harvey

- Category 4 Hurricane
- 27 Trillion Gallons Of Rain
- 50” of total Rainfall
  - 2 feet of rain in first 24 hours
- Extensive flooding
  - 25-30% of Houston under water
- Flood conditions turn gravity sewers in to Force Mains

Texas Medical Center

Largest Medical Complex in the World

- 2 Square Miles
- 60 Medical Institutions
- Bordered by: Brays Bayou, Rice University, and Hermann Park
- 106,000 Employees
- 10,000,000 patients annually

City Challenges & Timely Actions

- **Maintain Safety (Job No. 1)** – Install Traffic Control promptly and maintain
  - Sinkhole 1 - Approximate 80 feet long & 23 feet deep void under the pavement with no signs on the pavement – Out of sight, Out of mind challenge.
- **Identify Specific Major Impacts & Coordinate with Stakeholders** – Conduct multiple meetings, as needed, to minimize impacts.
  - Bikeway blocked for sewage bypass pumping – Hermann Park Conservancy, Houston Parks & Recreation Department and Houston Parks Board.
  - Drainage maintenance & safety challenges due to large sinkhole (Sinkhole 2) adjacent to Brays Bayou – Harris County Flood Control District.
  - Traffic Flow & Safety concerns for busy traffic lanes blockage for construction – Texas Medical Center and Houston Traffic & Drainage Operations.
- **Expedite City Approval of Work for the Site Specific Conditions**
  - Promptly determine/review and approve proposed work that meets long-term needs.

The Sinkholes

Sinkhole 1:

- 60”x 42” Box Culvert Collapse
- 80’ Long & 23’ Deep
- Located beneath N. MacGregor Way

Sinkhole 2:

- 30” Concrete Pipe
- 20’ Long & 15’ Deep
- Located adjacent to the Bayou

The Work

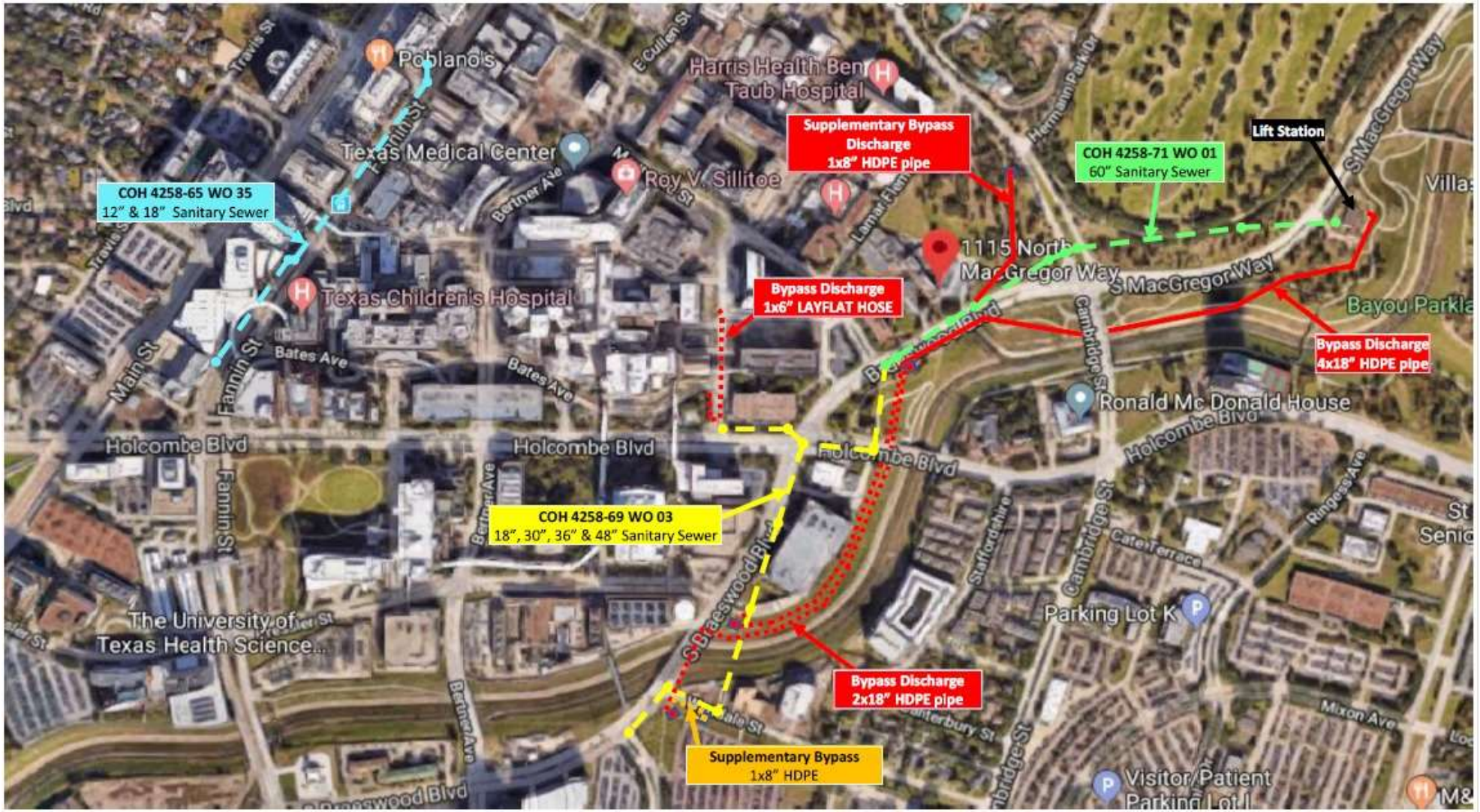
What we thought….

- 1,437’ of 60” RCP
  - Rehab using CIPP
- 3,105’ of 15”- 48” VCP & RCP
  - Rehab using CIPP

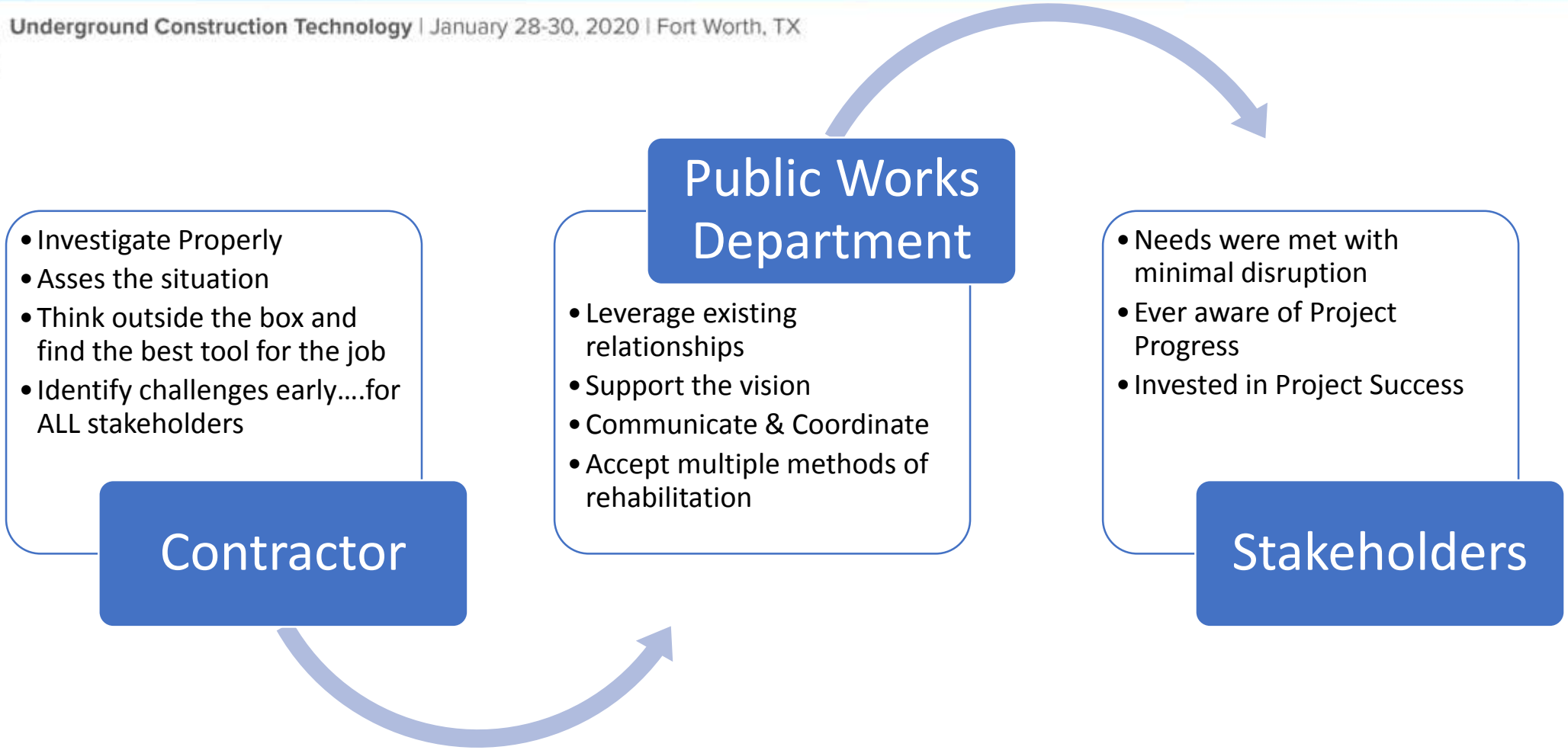
What we found…

- **Two Sinkholes**
- 60”x42” Concrete Box
- Double Barrel Siphon
- Multiple sections of collapsed pipe
- Pipe transition in size, in the middle of the line segment

Solving the Problem….



- **Bypass Pumping**
  - 34 MGD
  - One Mile Long
  - Required to carry flow, even in rain events
- **Traffic Control**
  - Densely trafficked area 24 hours a day
  - Requires approval from multiple parties, including Texas Medical Center
  - Required ample access for Emergency Vehicles
- **Safety**
  - Portions of the project are located in a heavily used Public Park
  - Significant Pedestrian traffic
- **Communication & Coordination**
  - Need excellent data to quickly approve Change Orders
  - Necessary to keep the project “On-Time” and Under Budget
- **Multiple Technologies Required**
  - CIPP
  - Pipe Bursting
  - EcoCast
  - Open Cut



True Partnership + Common Goal = Success

Construction Highlights

Two Phases

Multiple Contracts

Multiple Technologies

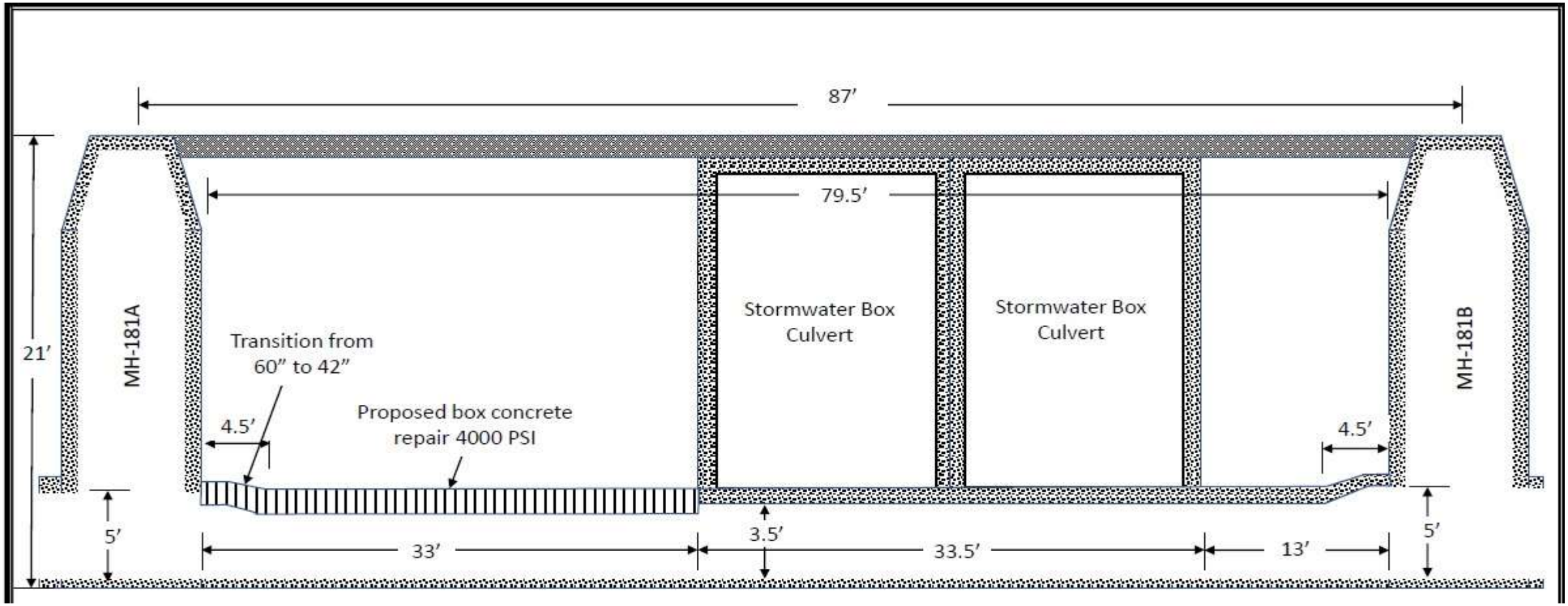
Over 4,500 Linear Feet of Pipe Rehabilitation

Cost: $4M

Time: 14 Months

Phase 1

EcoCast- 80’ of 60” x 42” Concrete Box



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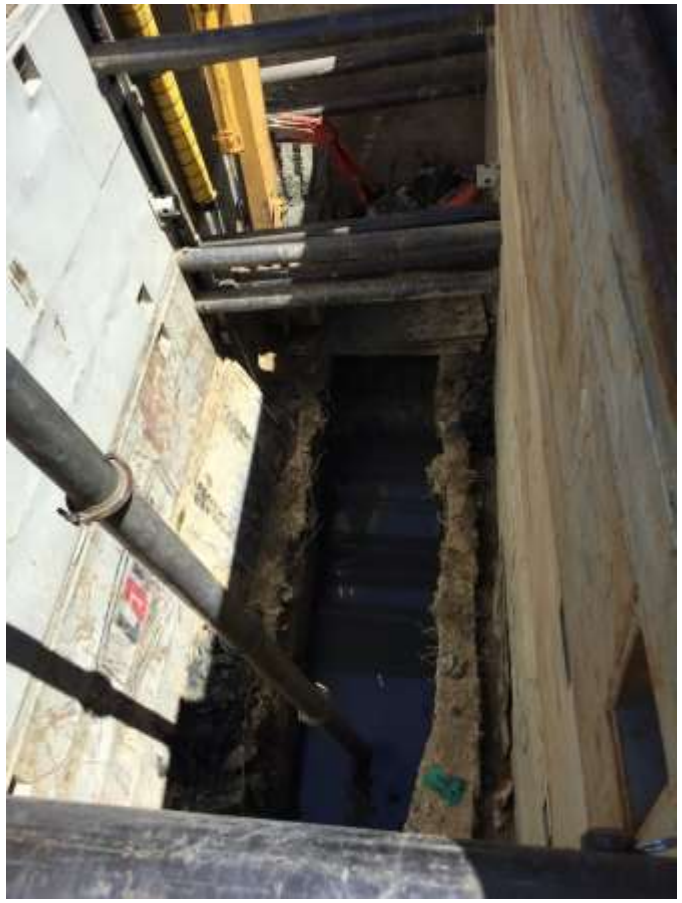

Phase 1

CIPP- 1,357’ of 60” RCP

Phase 1

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Phase 2

Pipe Burst- 135’ of 30”

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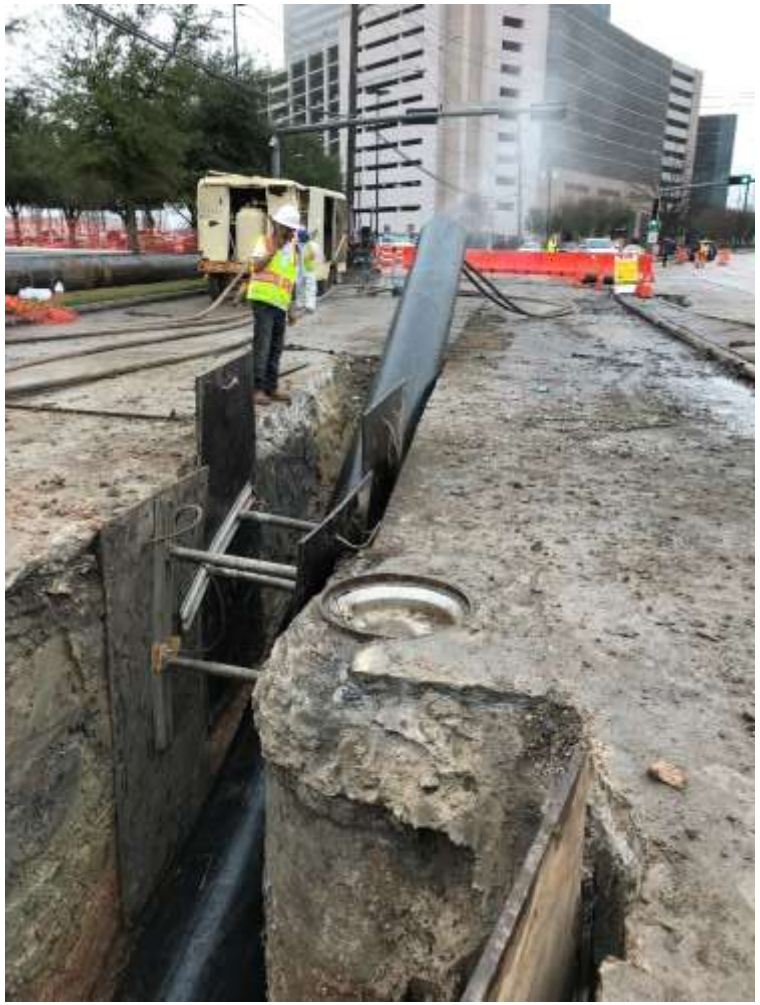
Pipe Burst- 135’ of 30”



Phase 2

EcoCast- Two 8’x8’ Junction Boxes, and 175’ of 48” RCP

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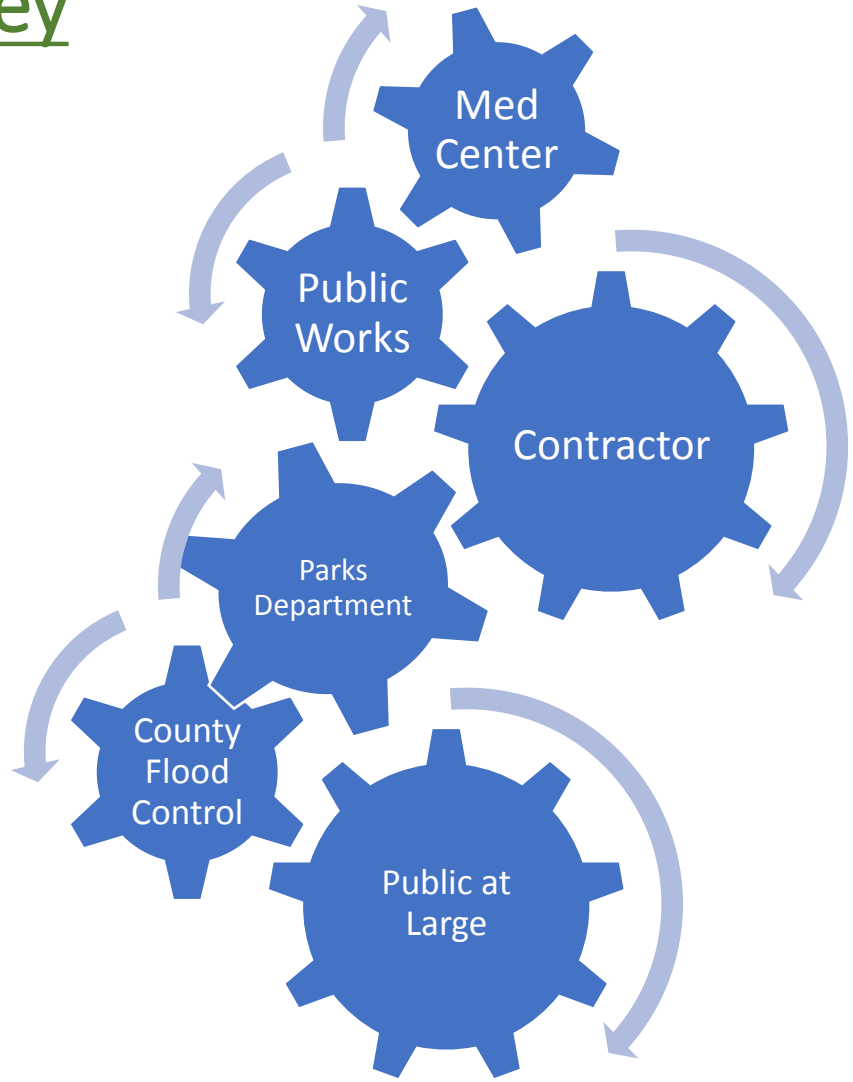
Communication is Key



QUESTIONS

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