SEWER CONSTRUCTION & REHABILITATION

BRH Garver Construction L.P.

City of Houston – 54” Gravity Sewer Line

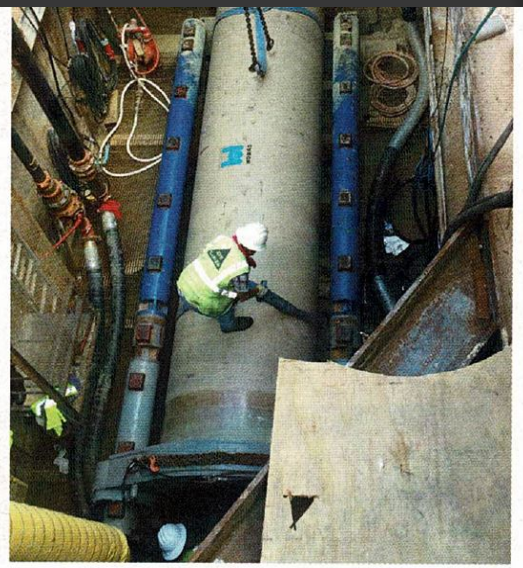
Lift Station Renewal and Replacement Program

BRH GARVER

FAST-TRACKED MICROTUNNELING PROJECT BENEFITS ALL STAKEHOLDERS

Underground Construction

September 2016



By **Jeff Griffin**, Senior Editor

Lengthy Microtunnel Project Beats Schedule By 8 Months

BRH-Garver Uses 2 MTBM To Install Nearly 15,000 Feet Of Force Main

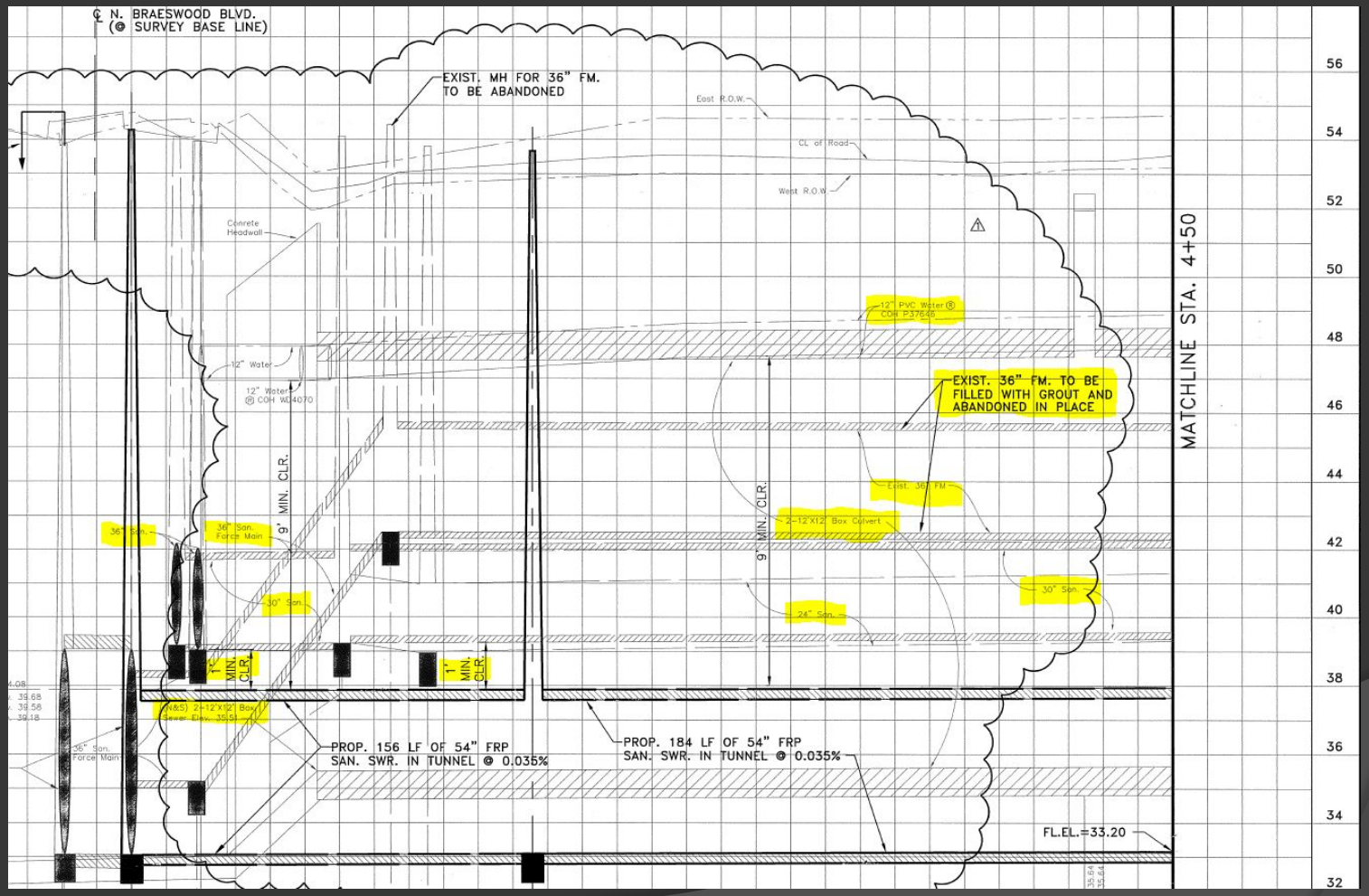
Job Overview

- Google Earth Flyover

Job Overview

- 15,000 linear feet of 54” sanitary sewer
- .035% grade (approximately 5’ of drop in 3 miles)
- Abundance of Existing Utilities
- Crossed 3 Heavily Traveled Major Intersections
- “Must Have/Much Needed” Project for the City of Houston

Existing Utilities



What is Fast Tracking

Fast tracking is a technique where activities that would have been performed sequentially using the original schedule are performed in parallel. In other words, fast tracking a project means the activities are worked on simultaneously instead of waiting for each piece to be completed separately. But fast tracking can only be applied if the activities in question can actually be overlapped.

Why Fast Track a Project

- Compress the Project Schedule (Owner Convenience)
- Reduce the impact to general public
- Reduce Overhead and Management Cost
- Contractor behind schedule

Why Fast Track This Project

- Contractor had resources available and desired to use them
  1. Soltau 250 48” MTBM
  2. Microtunnel Crew
  3. Separation Plant

- A Plan where everyone Benefits

Contract Challenges

- Only allowed:
  - 3 of 27 open shafts
  - 2 of 7 sections of traffic control
- Traffic and mobility only allowed 1 of 4 major intersections to be impacted
- Local (vocal) businesses along the route impacted
- Upscale City of Bellaire

Owners and Stakeholders

- City of Houston Construction Branch
  - The contract needed to be modified to:
    - Allow more open shafts from 5 to 10
    - Allow more open traffic segments
- Waste Water Operations
  - Needed their buy-in to be ready for flows earlier than anticipated

Owners and Stakeholders

- Traffic and Mobility
  - Original constraint group worried about impact to traffic flows
- Engineer of Record
  - EOR on board with shorter duration, no engineering changes needed

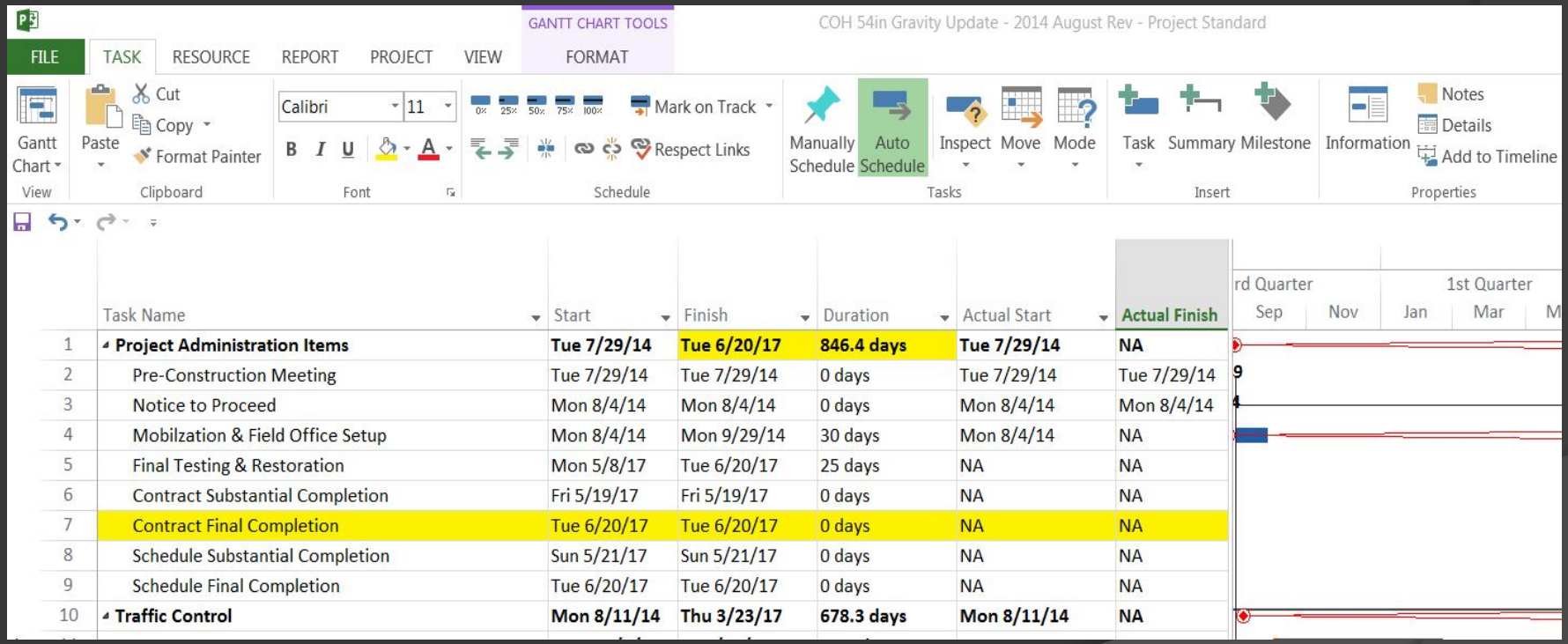
Owners and Stakeholders

- Materials Testing Labs
  - No direct impact to their contract
- Construction Manager
  - Proposal benefitted lump sum contract
- Inspectors
  - On-site full time no impact

Stakeholder approvals

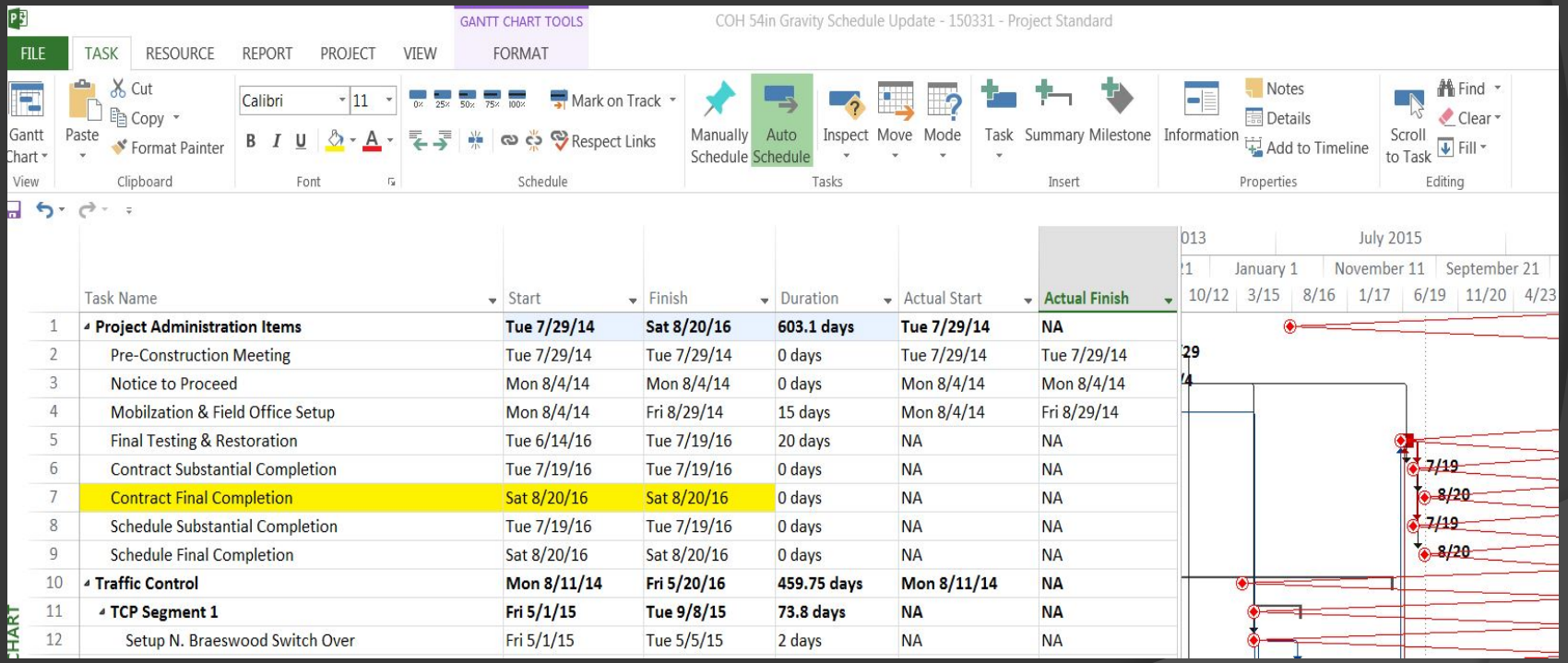
- Presented City of Houston with proposal
  - Allow more open shafts from 3 to 10
  - Allow more traffic segments open
- Waste Water Operations
  - Remove leaking force mains and dated lift stations along route

Baseline Schedule



	Task Name	Start	Finish	Duration	Actual Start	Actual Finish
1	**Project Administration Items**	**Tue 7/29/14**	**Tue 6/20/17**	**846.4 days**	**Tue 7/29/14**	**NA**
2	Pre-Construction Meeting	Tue 7/29/14	Tue 7/29/14	0 days	Tue 7/29/14	Tue 7/29/14
3	Notice to Proceed	Mon 8/4/14	Mon 8/4/14	0 days	Mon 8/4/14	Mon 8/4/14
4	Mobilzation & Field Office Setup	Mon 8/4/14	Mon 9/29/14	30 days	Mon 8/4/14	NA
5	Final Testing & Restoration	Mon 5/8/17	Tue 6/20/17	25 days	NA	NA
6	Contract Substantial Completion	Fri 5/19/17	Fri 5/19/17	0 days	NA	NA
7	Contract Final Completion	Tue 6/20/17	Tue 6/20/17	0 days	NA	NA
8	Schedule Substantial Completion	Sun 5/21/17	Sun 5/21/17	0 days	NA	NA
9	Schedule Final Completion	Tue 6/20/17	Tue 6/20/17	0 days	NA	NA
10	**Traffic Control**	**Mon 8/11/14**	**Thu 3/23/17**	**678.3 days**	**Mon 8/11/14**	**NA**

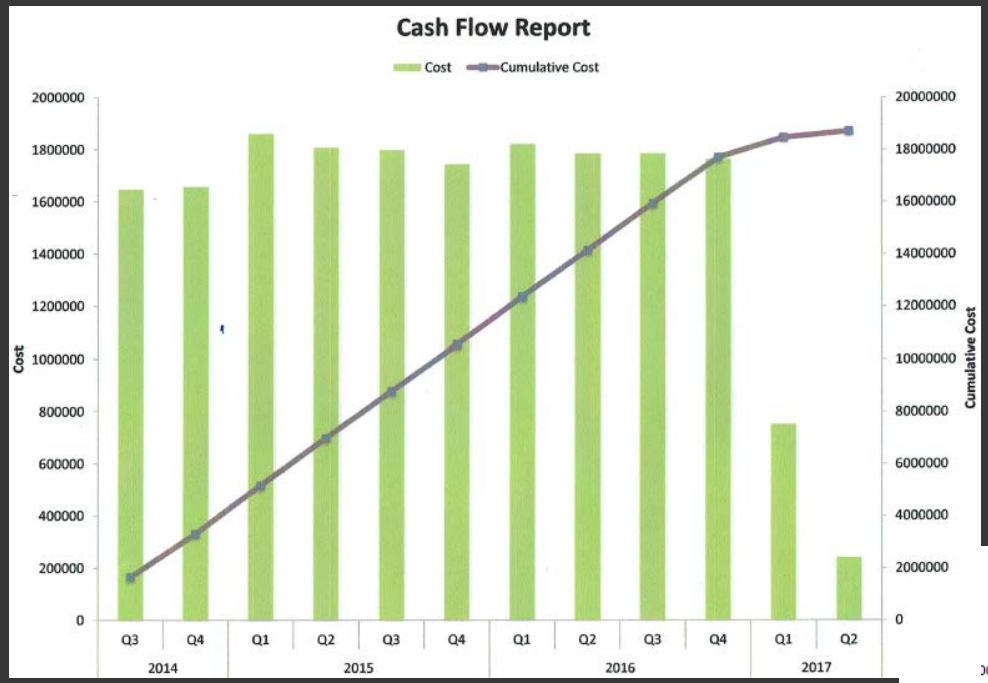
Proposed Fast Track

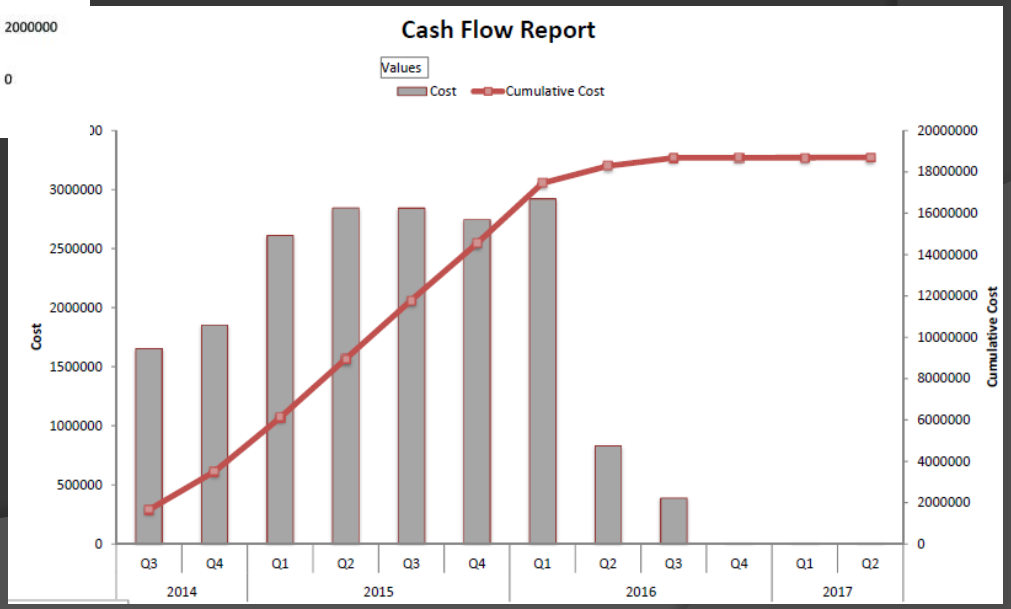


	Task Name	Start	Finish	Duration	Actual Start	Actual Finish
1	**Project Administration Items**	**Tue 7/29/14**	**Sat 8/20/16**	**603.1 days**	**Tue 7/29/14**	**NA**
2	Pre-Construction Meeting	Tue 7/29/14	Tue 7/29/14	0 days	Tue 7/29/14	Tue 7/29/14
3	Notice to Proceed	Mon 8/4/14	Mon 8/4/14	0 days	Mon 8/4/14	Mon 8/4/14
4	Mobilzation & Field Office Setup	Mon 8/4/14	Fri 8/29/14	15 days	Mon 8/4/14	Fri 8/29/14
5	Final Testing & Restoration	Tue 6/14/16	Tue 7/19/16	20 days	NA	NA
6	Contract Substantial Completion	Tue 7/19/16	Tue 7/19/16	0 days	NA	NA
7	Contract Final Completion	Sat 8/20/16	Sat 8/20/16	0 days	NA	NA
8	Schedule Substantial Completion	Tue 7/19/16	Tue 7/19/16	0 days	NA	NA
9	Schedule Final Completion	Sat 8/20/16	Sat 8/20/16	0 days	NA	NA
10	**Traffic Control**	**Mon 8/11/14**	**Fri 5/20/16**	**459.75 days**	**Mon 8/11/14**	**NA**
11	**TCP Segment 1**	**Fri 5/1/15**	**Tue 9/8/15**	**73.8 days**	**NA**	**NA**
12	Setup N. Braeswood Switch Over	Fri 5/1/15	Tue 5/5/15	2 days	NA	NA

- Traffic and Mobility
  - Ok with proposal due to length of project (3 miles)
  - Contractor committed to keep significant distance between tunneling sites

Cash flow challenge





Technical Challenges

- Modification of MTBM and Separation Plant
- Pipe production had to double to meet new schedule
- Traffic Control Set-up
- Shaft Construction

Convert Soltau 250 from 48” to 57”

After 1060 Man Hours at our Fabrication Shop

Hobas Pipe Plant

- Fabricating Jacking Pipe is 2 step Process

- Build the Barrels, then Bells and Spigots

‘Pipe Yard’ Layout

Traffic Control Set-up

- Notify Businesses and home owners
- Coordinate with COH Mobility Department
- Traffic Light Position Modifications
- Meet New Schedule Demands

Renwick at Bellaire Blvd.

Shaft Construction

- Mobilize crew and equipment
- Desired 3 of 5 Shafts to launch (1 Launch shaft, 2 Receiving Shafts)
- Launch Shafts 16X30 (Soldier Pile and Lagging)
- Receiving Shaft 12’ Diameter (Auger Drilled using Corrugated Metal Pipe)

12’ Diameter Receiving Shaft

Mobilization of Separation Plant

Mobilization of Soltau 250

Additional benefits

- Less overhead and resources for City
- CM and EOR expend less of their Lump Sums
- Local businesses impacted shorter time
- Weather
  - Site impacted by 2 separate floods to the area

Additional benefits

- Houston Weather – 3 separate flood events of Braes Bayou
- Minimal damage to project, but no work could commence for multiple days, before streets cleared and pumping operations completed.
- With 2 crews on site, ready for emergencies

Success

- Finished tunneling 300 days ahead of contract
- City and CM saved 300 days of overhead costs
- Contractor able to keep cash flow consistent during tunneling

Final take-away

- Businesses and Home Owner's very Grateful for early finish
- City / CM used less resources because shorter time span and saved Thousands of Dollars on budgeted Overhead
- Contractor lowered Over Head and risk of Liquidated Damages as well as keeping resources earning revenues