A Presentation of the Environmental Issues Associated with the Re-Construction of the Elysian Street Bridge, Houston, TX.

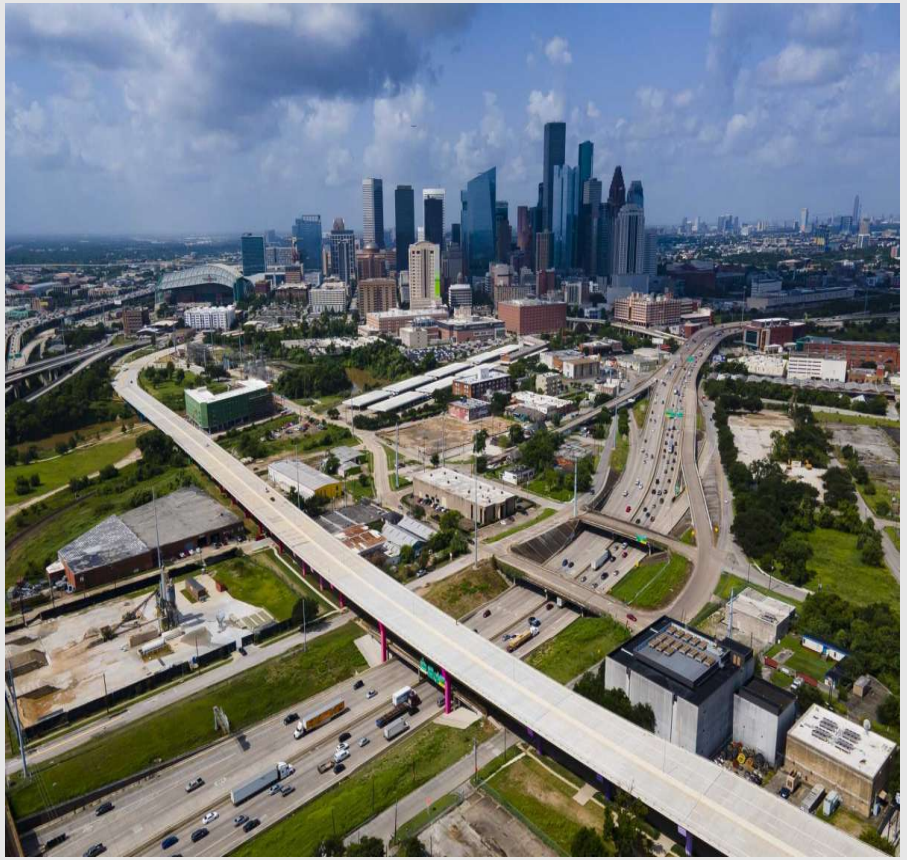
Enhancing Quality of Life for All Texans

January 3, 2022

Welcome and Presentation Overview

- Discuss TxDOT NEPA Clearance Process focusing on Hazardous Materials
- NEPA Hazardous Materials Initial Site Assessment
- Plan, Specifications and Estimate – Bid package provided to contactors
- Development and Implementation of Hazardous Materials
- Soil and Groundwater Management Plan
- Brief History and Archeology within Project Limits
- Project Time Frame – 2017 to 2021
- Conclusions
- Questions

Elysian Street Viaduct Bridge 1955 to Present
Houston, Texas

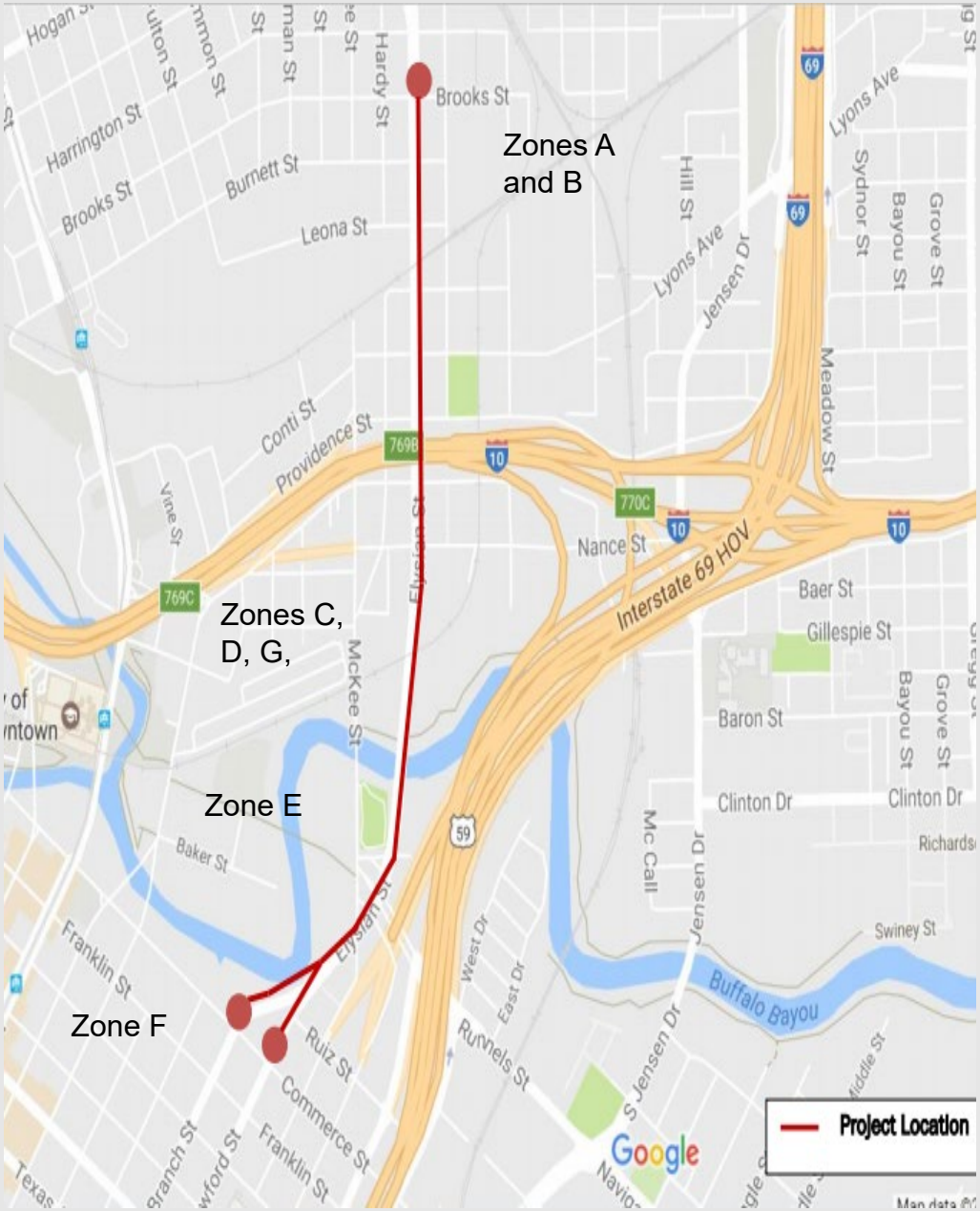


Viaduct Location and History

The viaduct sits in what some consider the cradle of the region's prosperity. The history of the area tucked along Buffalo Bayou north of the central business district goes back nearly 200 years, when the Wilkins and Frost families settled in the area before Houston was becoming a city.

The demolition of the old bridge began in 2017 and the new bridge from Near Northside to downtown Houston opened on Friday, July 16, 2021. The $35.6 million bridge crossing Interstate 10 and the Buffalo Bayou replaced the previous bridge built in 1955.

SGMP Zone Overview.



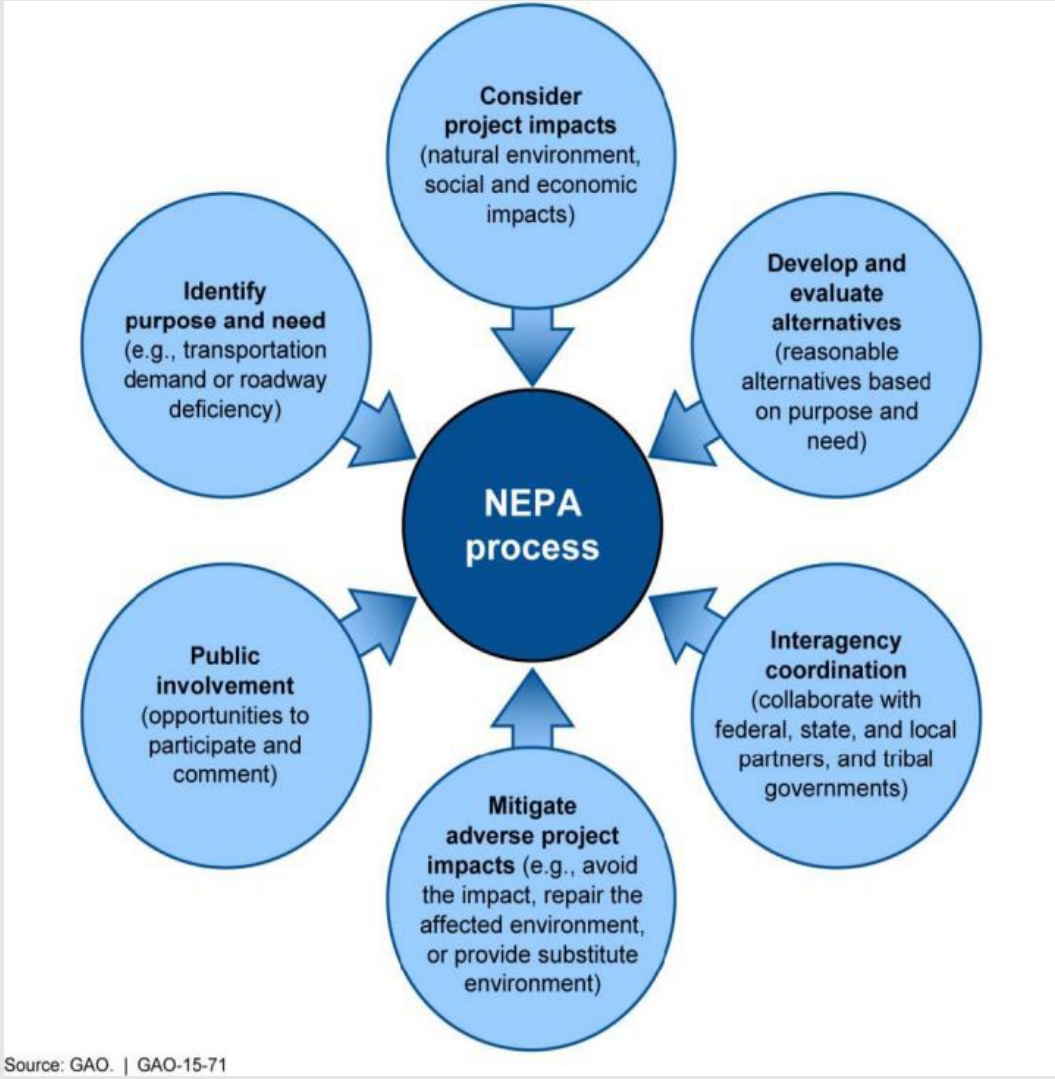
It All Begins with NEPA

"NEPA" is the acronym for the National Environmental Policy Act, which was signed into law on January 1, 1970. NEPA requires federal agencies to assess the environmental impacts of any "major federal action" prior to deciding to proceed with the project. It has been described by courts as requiring a "hard look" at environmental impacts.

If TxDOT is receiving federal funds for a project, NEPA requires the preparation of various environmental impact documents depending on the complexity of the project and the impact on the environment and community.

NEPA Clearance involves multiple disciplines including interagency coordination, public involvement, biology, history, archeology, social and economic impacts, noise assessment and hazardous materials to name a few.

A TxDOT project must be NEPA Cleared prior to letting and construction.



Source: GAO. | GAO-15-71

Focus on NEPA Hazardous Materials Initial Site Assessment (ISA)

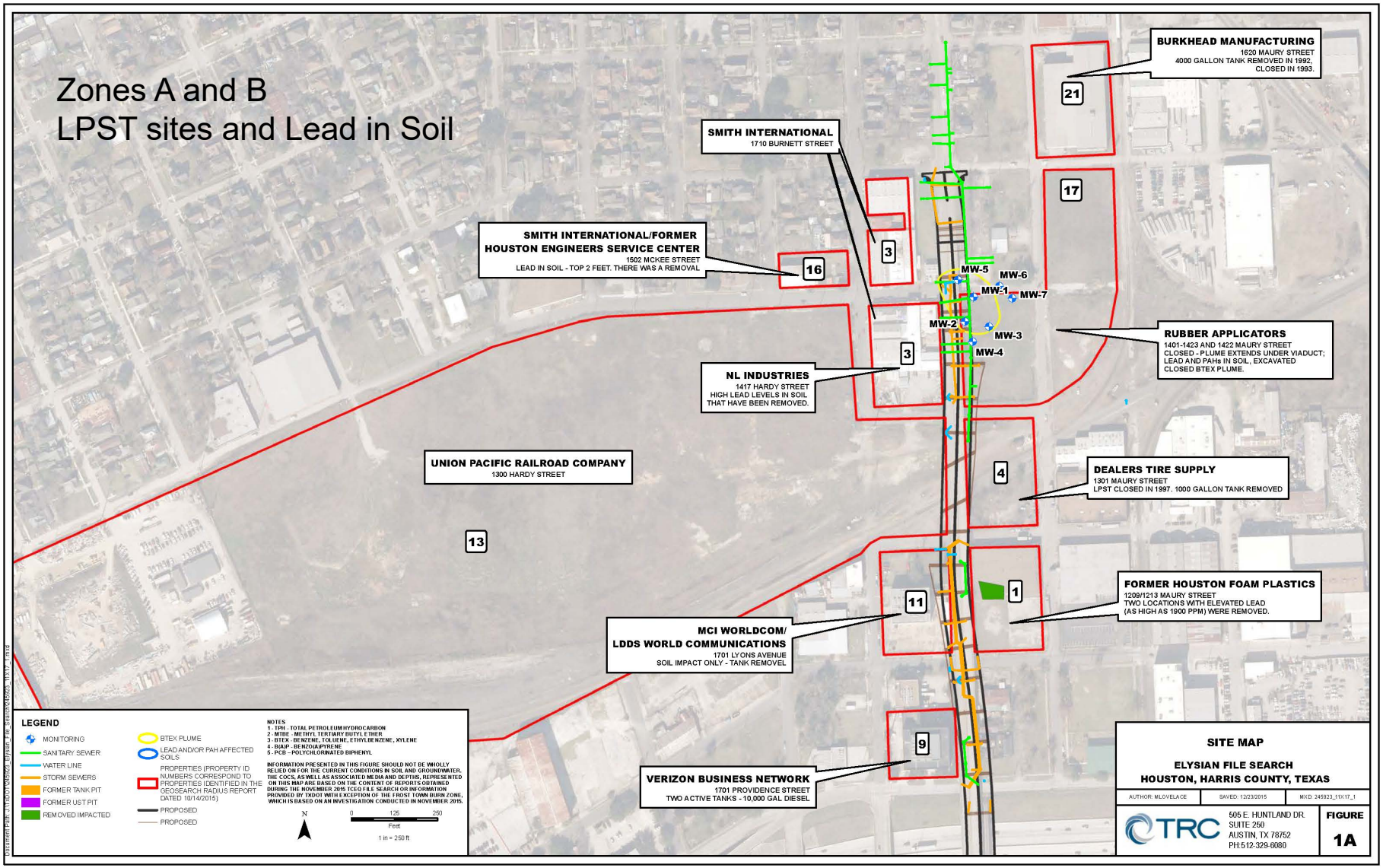
- The ISA is the primary tool used by the ENV-ERM Project Managers for investigating TxDOT projects for the possible presence of hazardous materials. The ISA is used during the advanced planning phase and NEPA clearance.
- The ISA process is form which mirrors an ASTM Phase I ESA, with the primary difference being that the ISA typically covers multiple parcels of land for a project corridor, as opposed to the single parcel or business development typical for an ASTM Phase I ESA.
- The purpose of an ISA is to assess thoroughly the possible presence of hazardous materials within the proposed project limits. The project limits include the existing or proposed ROW and surrounding or adjacent properties that may that may be purchased and their potential impact on the project.
- The ISA is a non-intrusive assessment, meaning the information is gathered without collecting and analyzing soil, groundwater, or other types of samples. The ISA does include a database search like a Phase I ESA for the project corridor.
- ISA finding are then compared to the construction plans to identify potential project impacts and the need for additional assessment (Phase II Investigations) if necessary.

Hazardous Materials ISA File Review Findings

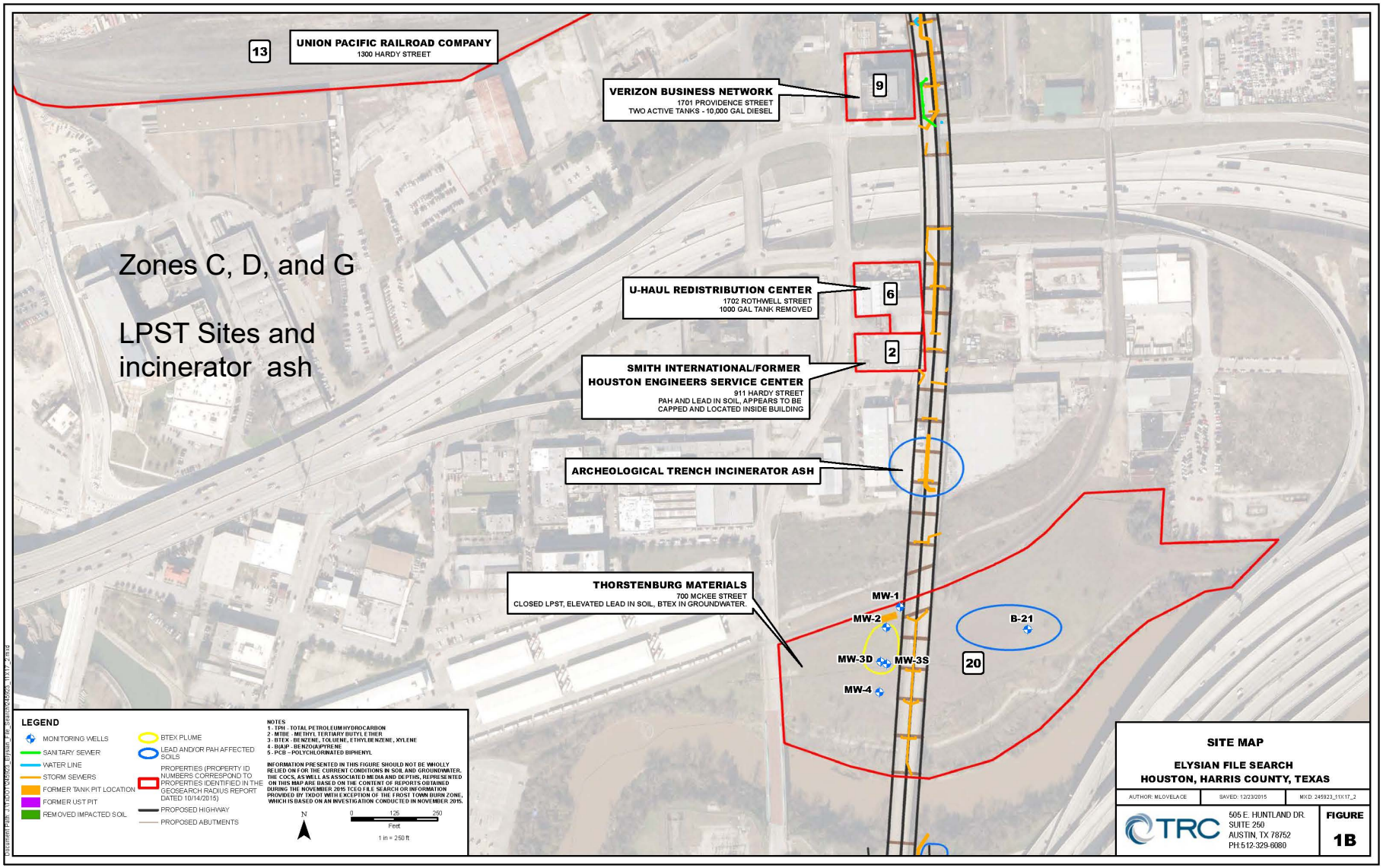
- Based on the sites identified in the ISA database search, TRC reviewed the files from the TCEQ to assess if soil and/or groundwater contamination was likely present within the project area and could potentially impact project work. The finding of the file review are presented on the following three slides
- Four additional areas of concern were identified based on prior knowledge of Buffalo Bayou fill material and archeological survey information:

  - Storm Sewer Construction near Buffalo Bayou
  - Burn material from the former Frost Town Settlement.
  - Historical Arsenal Block
  - Historical Gasification Plants

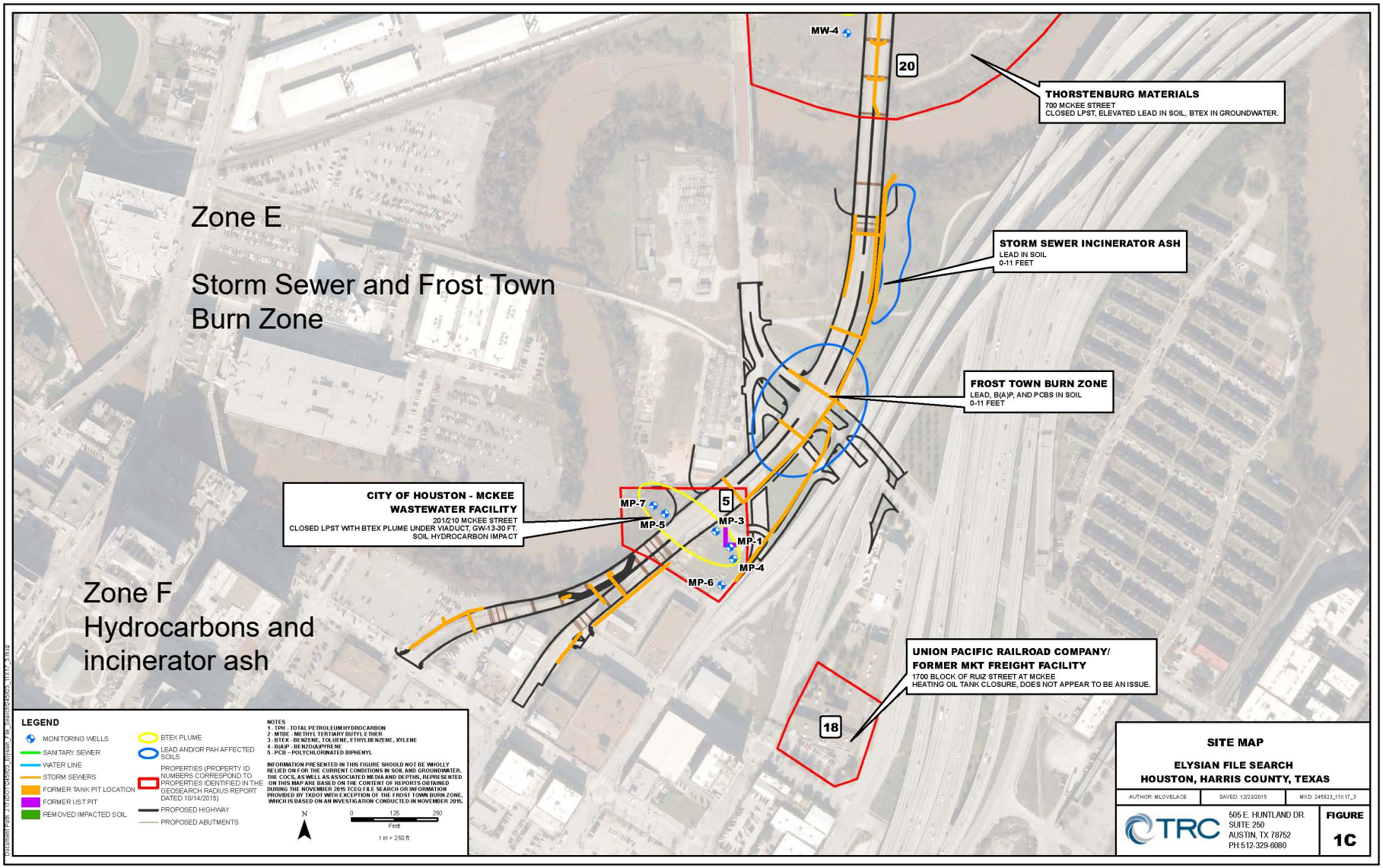
Hazardous Materials Sites Identified in the ISA and File Review (Map 1)



Hazardous Materials Sites Identified in the ISA and File Review (Map 2)



Hazardous Materials Sites Identified in the ISA and File Review (Map 3)



SGMP Zones A through F

Based on the ISA findings and the TCEQ file review, TRC and TxDOT ENV–ERM prepared a Soil and Groundwater Management Plan (SGMP) dated March 2016. The SGMP was a comprehensive plan to provide instructions on how to manage and dispose of contaminated soil and/or groundwater encountered within the affected areas of the bridge reconstruction project. This work was conducted as needed from March 2017, through August 2021. As shown on the previous slides, the SGMP divided the project corridor into SGMP Zones A through F as follows:

Zone A – Brooks to Leona St., North of IH 10 – Drill shafts, storm sewer, water line replacement.
Zone B – Opelousas St. to Lyons Ave., North of IH 10 – Drill shafts, storm sewer, water line replacement.
Zones C, D, and G – South of Lyons Ave. to the north side of Buffalo Bayou – Drill shafts.
Zone E – South of Buffalo Bayou - Storm sewer, Frost Town burn zone and archeology
Zone F – La Branch and Crawford Streets – Hydrocarbons and incinerator ash.

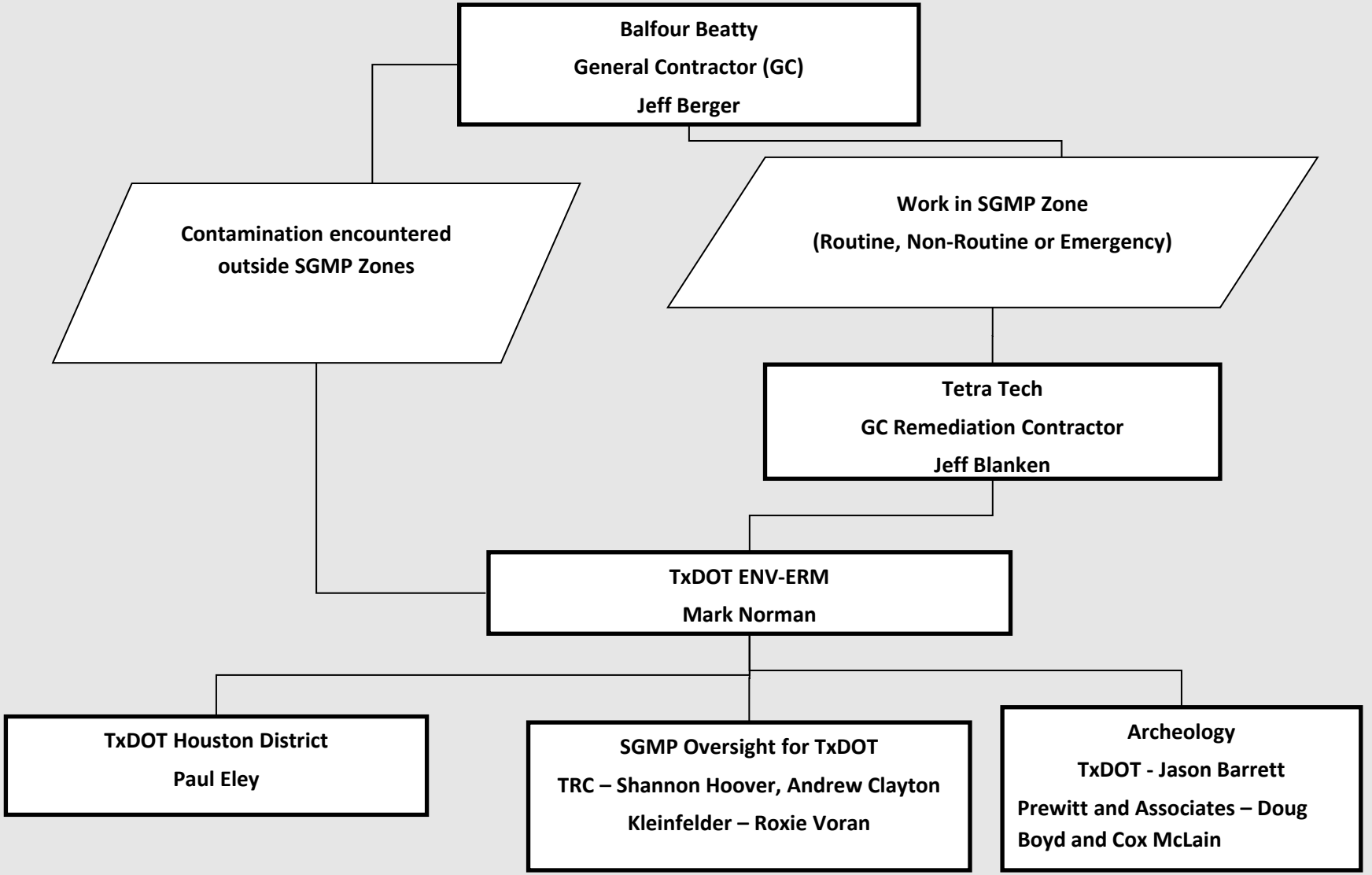
Implementation of SGMP and WHY

The SGMP is referenced in the Hazardous Materials Section of the Plans, Specifications and Estimate (PS&E) General Notes and is normally implemented in 1 of 2 ways.

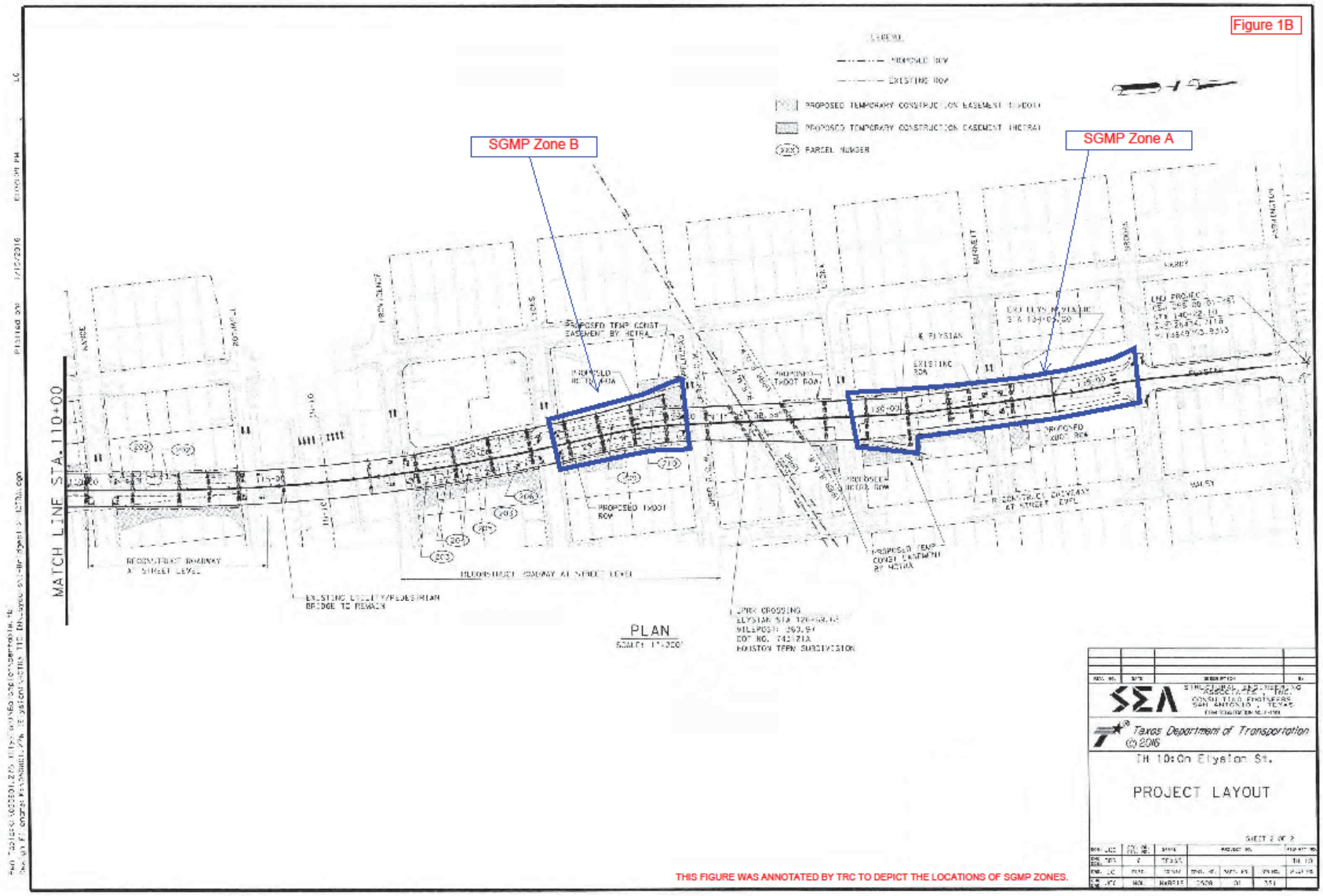
1. In the PS&E the General Contractor's (GC) attention is directed to the fact that there is a SGMP associated with the referenced project. TxDOT ENV-ERM will be responsible for providing a specialty contractor to implement the SGMP in coordination with the GC and the construction schedule.

2. In the PS&E the GC's attention is directed to the fact that there is a SGMP associated with the referenced project. The GC is directed to subcontract an environmental consulting firm to implement the SGMP in coordination with the GC. A TxDOT force account is set up to reimburse the GC for costs related to hazardous materials abatement, laboratory sampling, waste transportation and disposal. Force account rates will be negotiated between the GC and TxDOT prior to commencement of work on the project. The GC will invoice TxDOT on a monthly basis for force account work in a format prescribed by TxDOT. TxDOT ENV-ERM retains on of their Scientific Services consultants to provide oversight of the SGMP implementation. ***This is how the Elysian SGMP was implemented.***

Communication Plan for SGMP Implementation



SGMP Zone A and B Location Map



SGMP Zone A and B Phase II Investigation

On March 27 and April 5 through 7, 2017, twenty-one (21) soil borings (SB-01 through SB-21) were installed via direct-push technology focusing on areas identified in the ISA file review where drill shafts, storm sewer and a fire hydrant water line tie in would be located during construction.

Soil borings were advanced to a maximum depth of 16 feet below ground surface (ft-bgs). In general, the sample exhibiting the highest PID reading or other indication of contamination as well as the sample from the boring terminus, were submitted for laboratory analysis. Soil samples collected from borings installed in SGMP Zone A were analyzed for: VOCs, TPH, SVOCs and RCRA) 8 metals.

Soil samples collected from borings installed in SGMP Zone B were analyzed for: VOCs, TPH and total lead.

SGMP Zone A Phase II Map

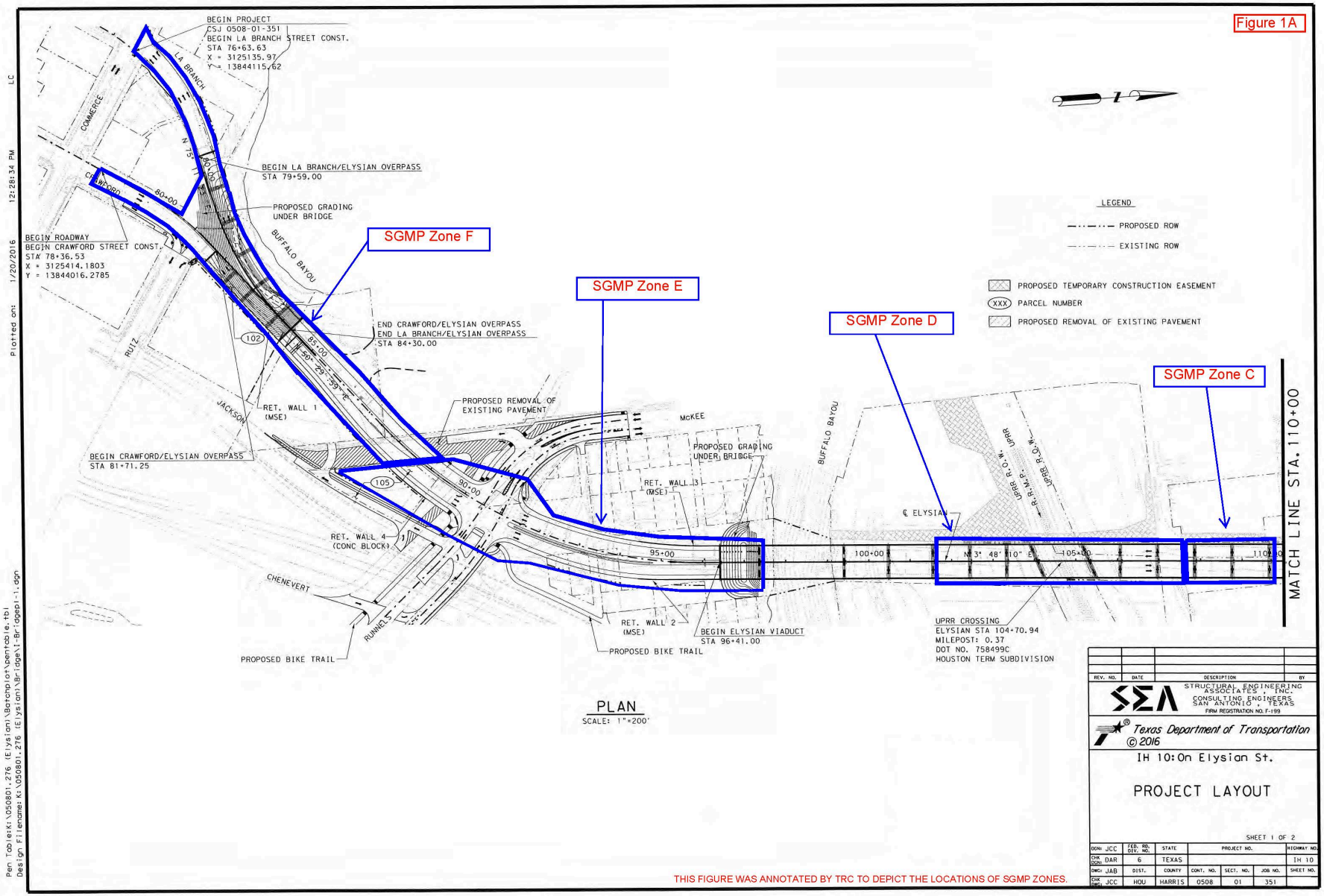
SGMP Zone B Phase II Map

Zone A and B Phase II Soil Analytical Results

Multiple soil samples from the soil boring locations exhibited TPH C12-C28, TPH C6-C12, benzo(a)pyrene, and lead at concentrations exceeding the TRRP Commercial Total-Soil-Combined PCLs.

Shallow affected soils in these areas were addressed by excavation and removal for the drill shaft locations, a section of storm sewer and fire hydrant water line tie in.

SGMP Zone C and D Drill Shafts



SGMP Zones C and D Drill Shaft Pothole Excavations

Since the bridge was elevated through Zones C and D the only construction activities which could encounter potentially contaminated soil were the drill shafts and footers for the bridge bents.

After encountering incinerator ash and debris at initial drill shaft locations, Balfour Beatty requested pothole excavations at the bents in Zones C and D.

One pothole excavation at each footer location was dug to determine the presence and depth of ash/debris. One grab sample would be collected at 2 feet below the ash layer, and at the total depth of the excavation (approximately 18 feet below ground surface). In addition, a composite sample collected from 0-7 feet below grade on a frequency of one sample per bent to check potential contaminant levels for worker protection. All samples were analyzed for Total 8 RCRA Metals and PAHs. The bent excavations were then backfilled with stabilized sand in preparation for subsequent drill shafts and footer construction.

Drill Shaft and Footer Pothole Excavation Under Old Bridge

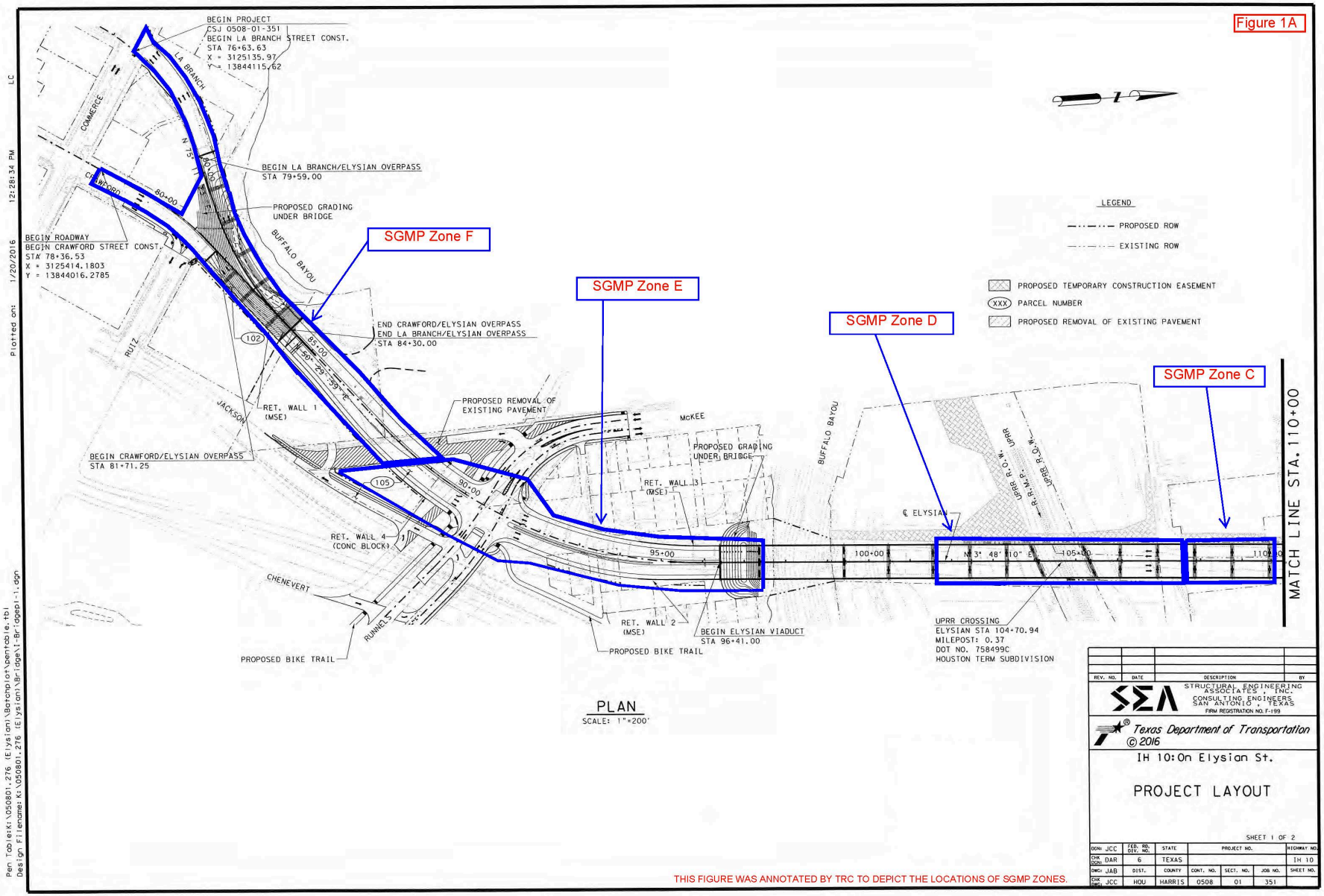
Zone C and D Drill Shaft Obstructions due to Historical Railway and Spurs

SGMP Zone C and D Incinerator Ash at Drill Shaft and Footer Pothole Excavation

SGMP Zone C and D Drill Shaft Pothole Backfilled with Stabilized Sand

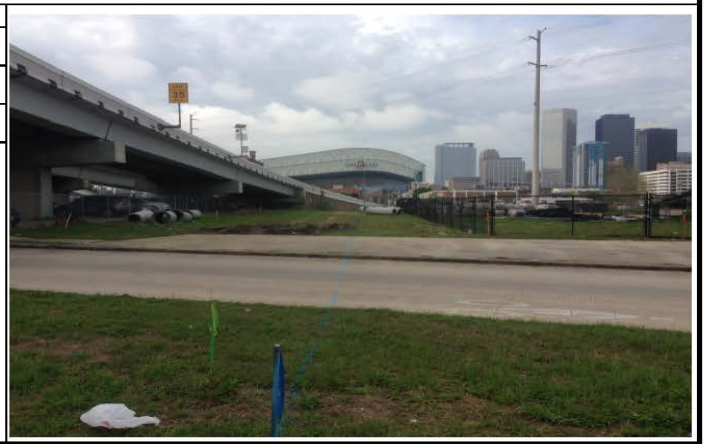
SGMP Zone C and D Bent Footer Location Benched after Stabilized Sand

SGMP Zone E Storm Sewer and Frost Town



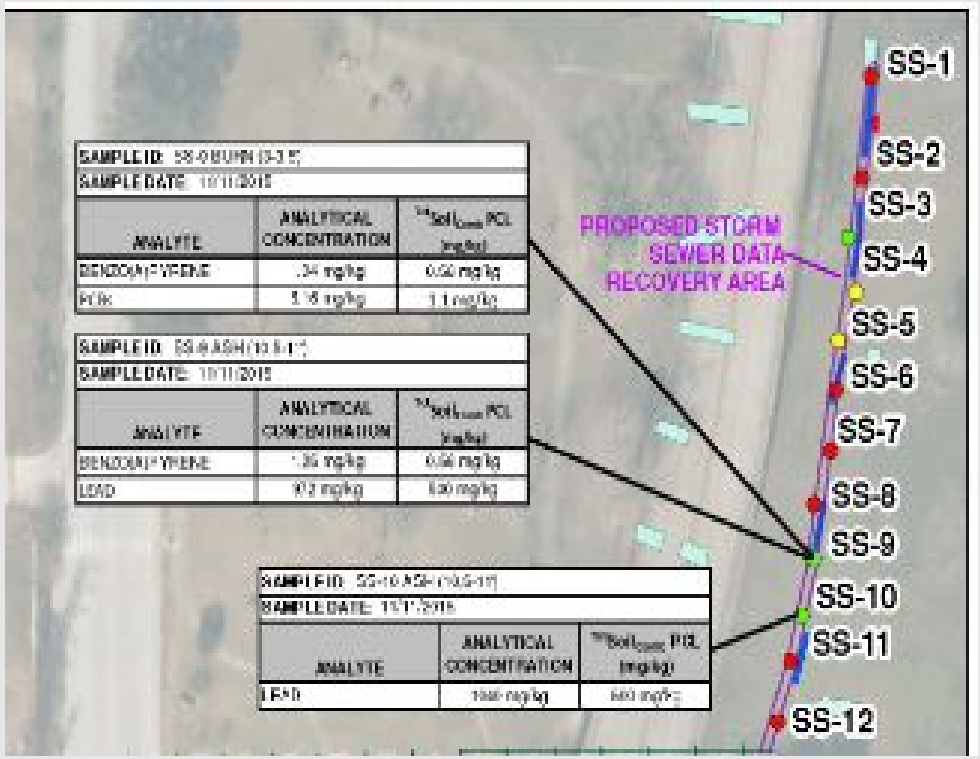
Future Location of SGMP Zone E Storm Sewer

Texas Department of Transportation
Elysian Bridge Reconstruction
Soil and Groundwater Management
Elysian Bridge
Houston, Harris County, Texas

PHOTO 1 **DATE:** 03/10/2017 **DIRECTION:** South **TAKEN BY:** Jeff Blanken **DESCRIPTION:** View of future storm sewer location.	
PHOTO 2 **DATE:** 03/10/2017 **DIRECTION:** North **TAKEN BY:** Jeff Blanken **DESCRIPTION:** View of future storm sewer location.	

Zone E Storm Sewer Soil Sample Locations and Analytical Results

Construction Plans called for the installation of a storm sewer section to the east of the new bridge location. Based on previous archeological trenches it was determined that there was a high potential for incinerator to be present at the storm sewer location. Therefore, TRC advanced 12 soil borings to evaluate the soil conditions at the storm sewer location. Significant exceedances were identified in SS9 and SS10. These exceedances are summarized on the next slide.



Zone E Storm Sewer Exceedance Summary Table

$^{Tot}Soil_{Comb}$ Exceedance Summary Table

TxDOT Elysian Street

Sample ID and Depth	Sample Date	Analyte	Result (mg/kg)	$^{Tot}Soil_{Comb}$ PCL (mg/kg)
Storm Sewer Area				
SS-9 BURN (3-3.5')	11/11/2015	Benzo(a)pyrene	1.04	0.56
	11/11/2015	PCBs	6.16	1.1
SS-9 ASH (10.5-11')	11/11/2015	Benzo(a)pyrene	1.25	0.56
	11/11/2015	Lead	972	500
SS-10 ASH (10.5-11')	11/11/2015	Lead	1040	500

Zone E Storm Sewer Location Incinerator Ash

Based on the SS9 and SS10 analytical results, Tetra Tech potholed the storm sewer location and found significant amounts of the incinerator ash. Therefore, it was determined to excavate portions of the storm sewer location and backfill the locations with clean fill to enhance worker safety.

Storm Sewer Excavation of Impacted Soil

Texas Department of Transportation
Elysian Bridge Reconstruction
Soil and Groundwater Management
Elysian Bridge
Houston, Harris County, Texas

PHOTO 1	
DATE: 04/07/2017	
DIRECTION: North	
TAKEN BY: Danny Amerson	
DESCRIPTION: Excavating bench at the SS-9 trench.	

PHOTO 2	
DATE: 04/07/2017	
DIRECTION: Northwest	
TAKEN BY: Danny Amerson	
DESCRIPTION: Loading soil from Zone E.	

Storm Sewer Location Backfilled with Clean Soil

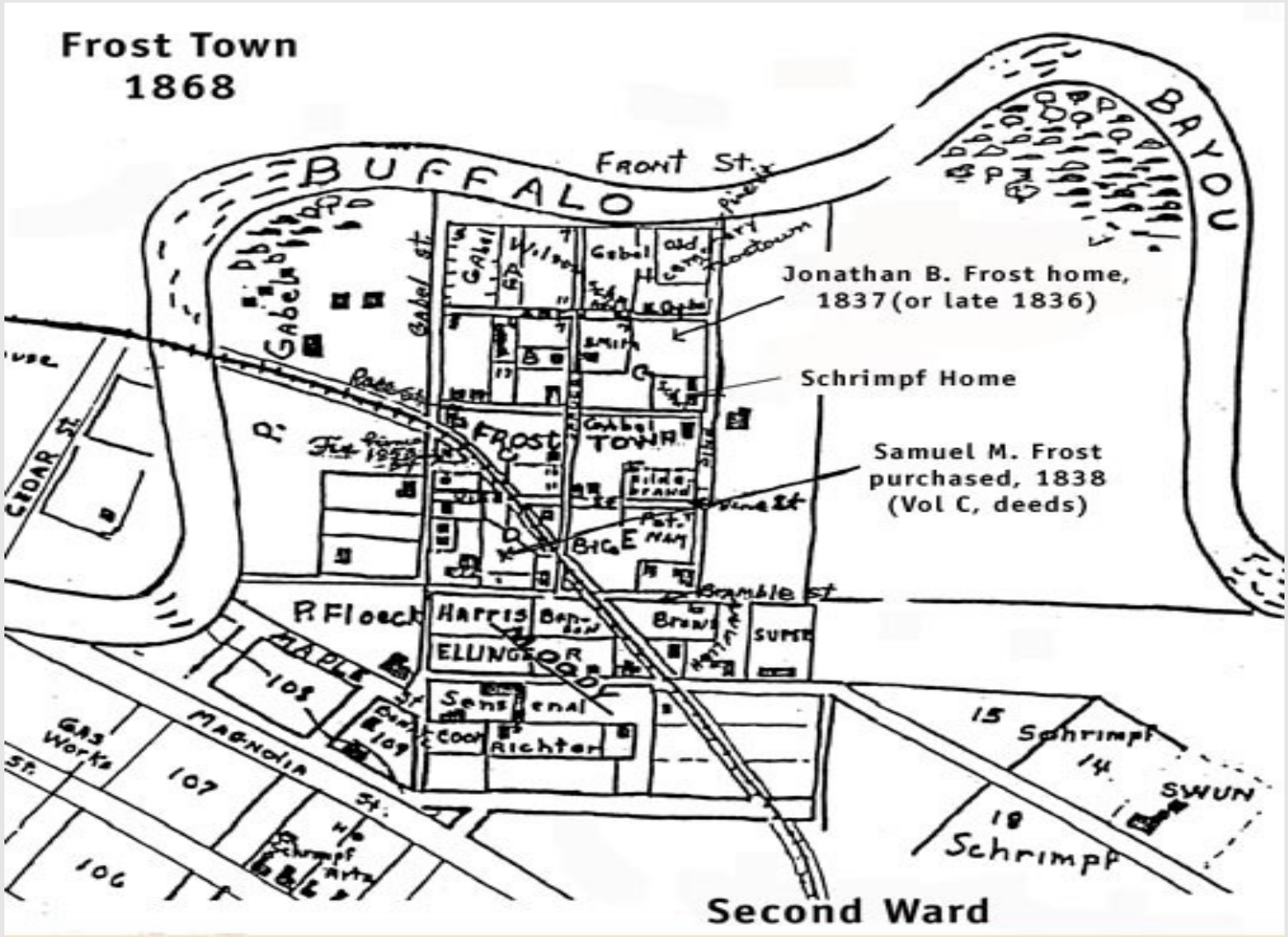
SGMP Zone E Brief Frost Town History and Burn Zone

Frost Town is generally acknowledged as the first residential addition to the newly created City of Houston. Frost Town existed more like a small town near Houston or as an early suburb despite its very close proximity to downtown Houston.

The neighborhood, established by German and Irish immigrants beginning in the 1830s and 1840s, African American freedmen after emancipation, and Mexican Americans after the 1910 Mexican Revolution, who called it El Barrio del Alacrán (the Scorpion). As Frost Town declined, most residences were destroyed during the 1950s, after construction of the first Elysian Street Viaduct bridge from 1956 to 1957 and the start of US-59.

The state bought out all the properties in Frost Town, then after people left, bulldozed the houses, and burned the debris. The burning of the Frost Town settlement created the Frost Town burn zone.

Frost Town Historical Photo



Frost Town Burn Zone Limited Site Investigation

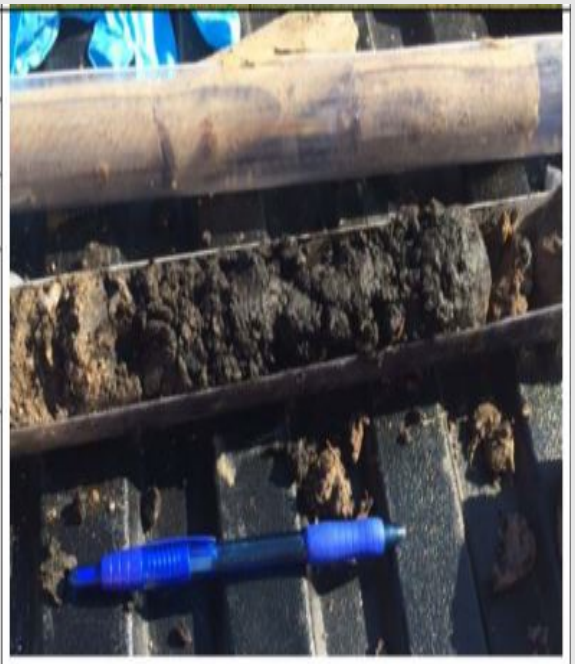
In 2004 and 2015, prior to the bridge replacement, Prewitt and Associates, archeologists were performing subsurface trenching at the former Frost Town Settlement area and encountered the Frost Town burn material in many locations.

On July 22, 2015, TxDOT directed Tetra Tech to collect one sample of burn zone material identified at the Site and submit it for laboratory analyses for RCRA 8 metals.

The analytical results indicated levels of lead at 2,100 milligrams per kilogram (mg/kg) which exceeded the TRRP Commercial/Industrial Total-Soil-Combined Protective Concentration Level (PCL) of 1,600 mg/kg.

Due to the elevated lead levels in the initial soil sample, TxDOT contracted TRC to conduct a Limited Site Investigation (LSI) which consisted of advancing a total of 117 soil borings across the Frost Town area to determine the nature and extent of the burn zone prior to the archeology data recovery efforts.

Typical Soil Boring Core Showing Frost Town Burn Zone

Photo 2	
Date: 11/9/2015	
Direction: N/A	
Taken By: J. Wimberley	
Description: View of typical ash material. The ash was located in SB-B7.	

Frost Town Burn Zone Soil Observations and Analytical Results

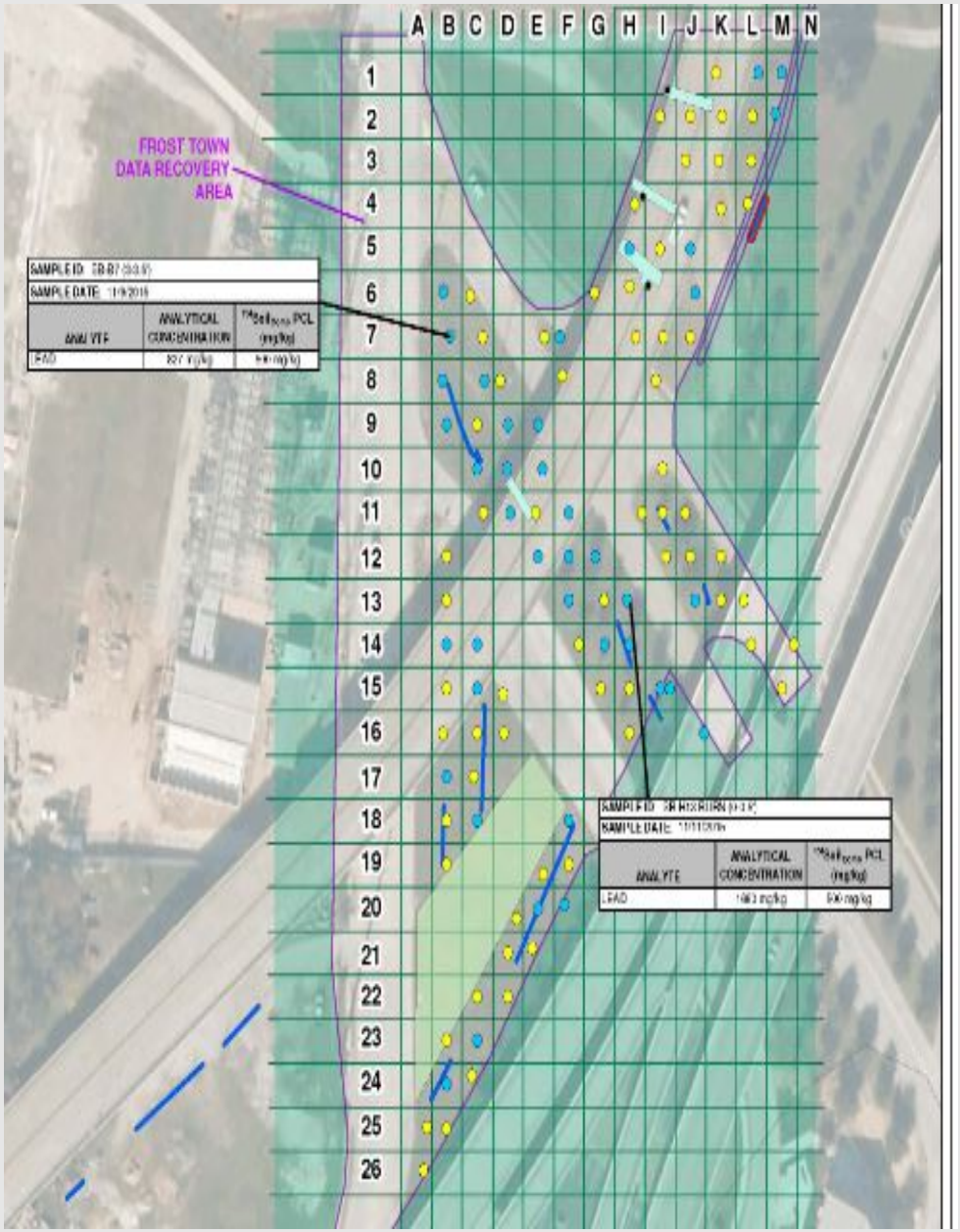
Blue Dots represent locations where the burn zone was observed in the soil core.

Blue Lines represent proposed archeological trench locations.

Results

SB-B7 (0-3') – Lead 827 mg/Kg

SB-H13 (0-0.5') – Lead 500 mg/Kg



Frost Town Archeological Data Recovery (Cisterns)

Ghost Tanks found in Archeological Data Recovery

Ghost Tanks found in Archeological Data Recovery

The removal of the ghost tanks was delayed until the archeological efforts were completed to ensure no artifacts were damaged or removed during the tank excavation. After the archeological activities were completed, the tanks were removed, a Release Determination Investigation Report was prepared and submitted to TCEQ and a no further action letter from TCEQ was issued.

SGMP Zone F Arsenal Block and Historical Coal Gas Production

Prior archeological trenching identified Haz Mat deposits found in a large ravine located in the Arsenal Block and the Houston Gas Light and Power properties. Coal ash and heavy hydrocarbon (petroleum-based) liquids were documented as by products of the historical coal gas manufacturing. Historically the gas producers would transport their waste products the least distance possible before dumping them. Construction activities for the new Elysian Bridge encountered these heavily hydrocarbon and metals impacted areas during construction on N. Crawford and N. La Branch Street as the bridge progressed back to grade near the downtown area.

Zone F Crawford and La Branch Street

SGMP Zone F Arsenal Block and Gasification Plants

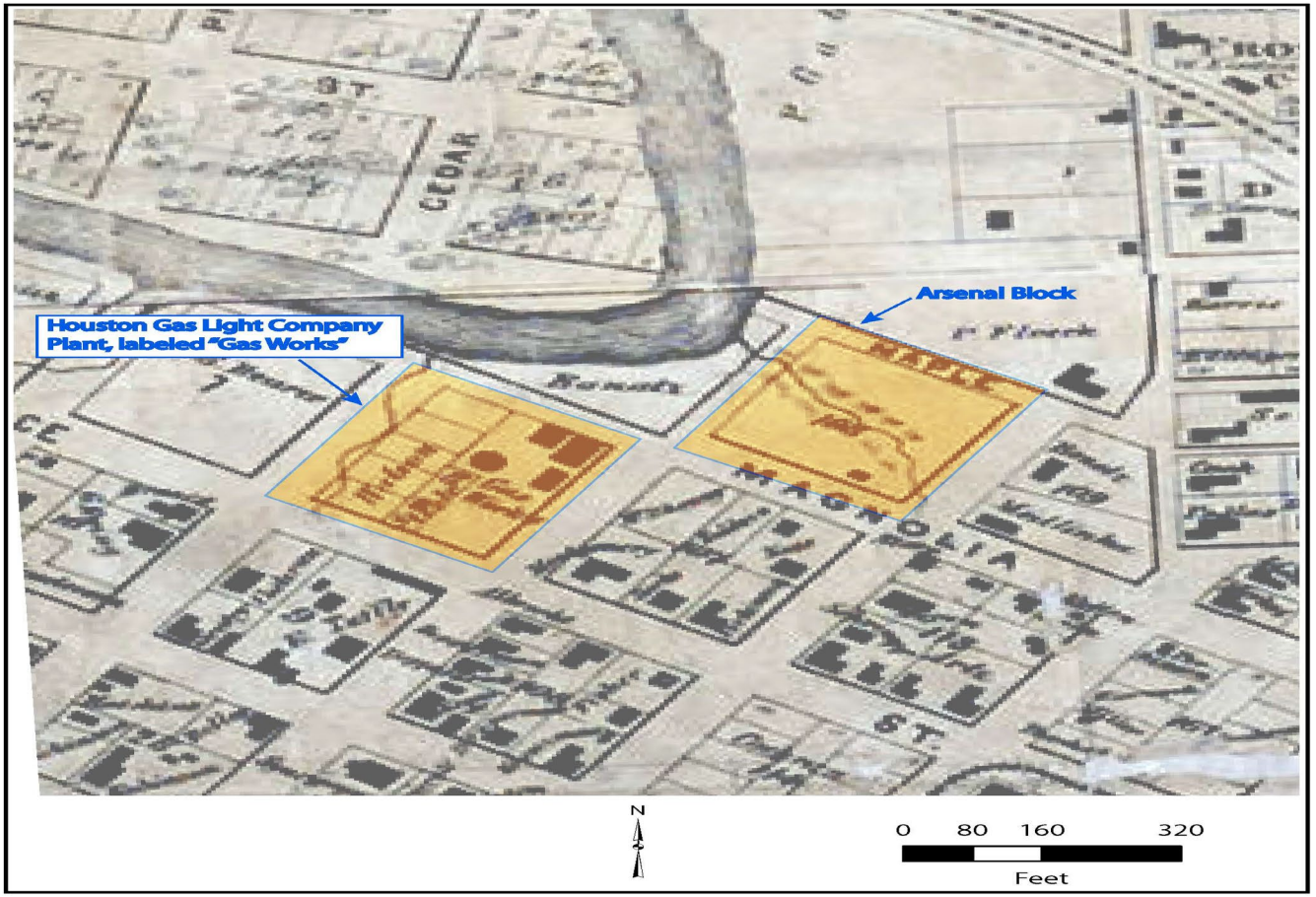
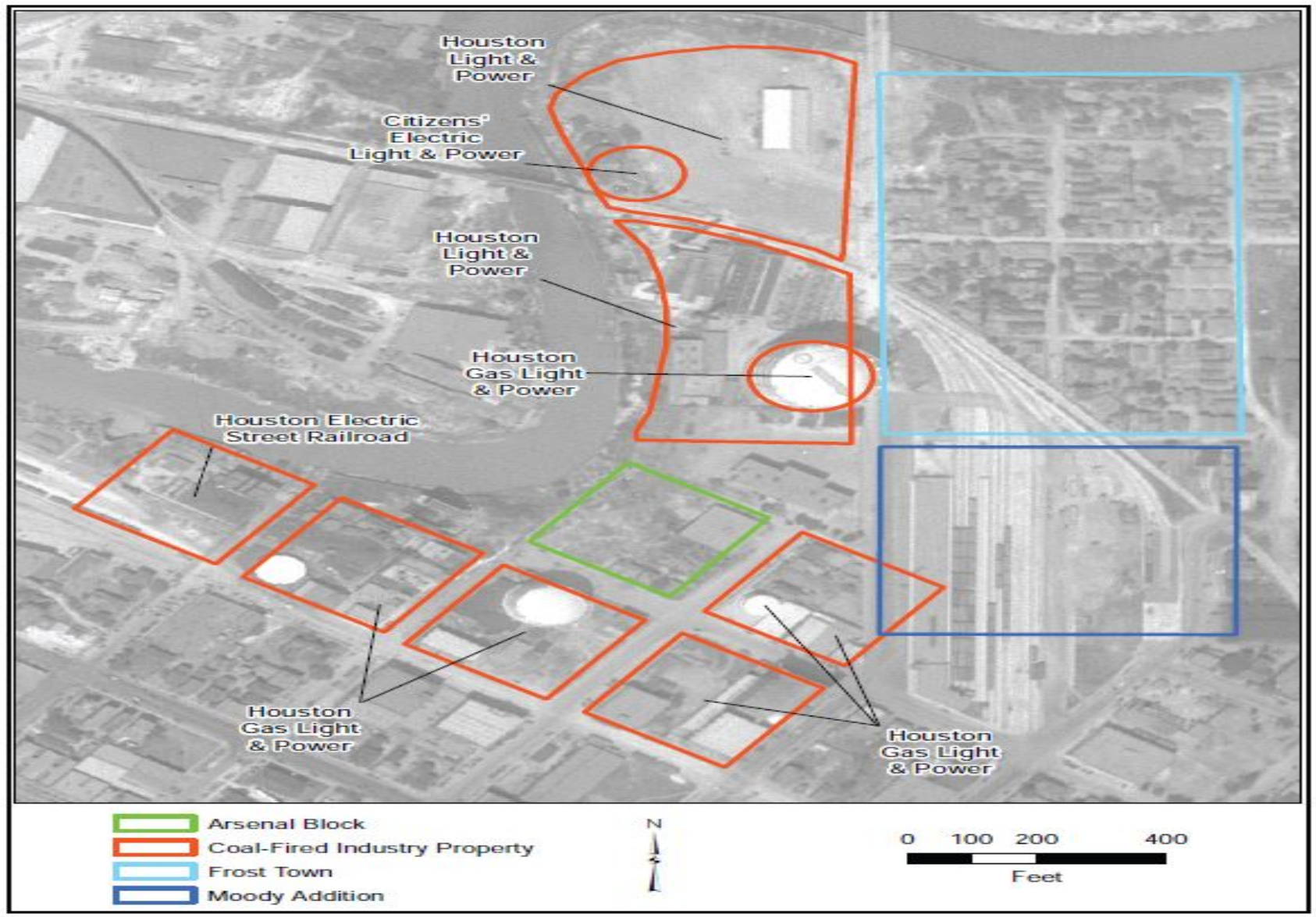


Figure 2. Section of W. E. Wood's 1869 Map of the City of Houston showing Block 108. Note that the improvements on Block 8, located catty-corner to the west, are labeled as "Gas Works."

Zone F Historically Impacted Area



Map of Trench Locations Along N Crawford St.

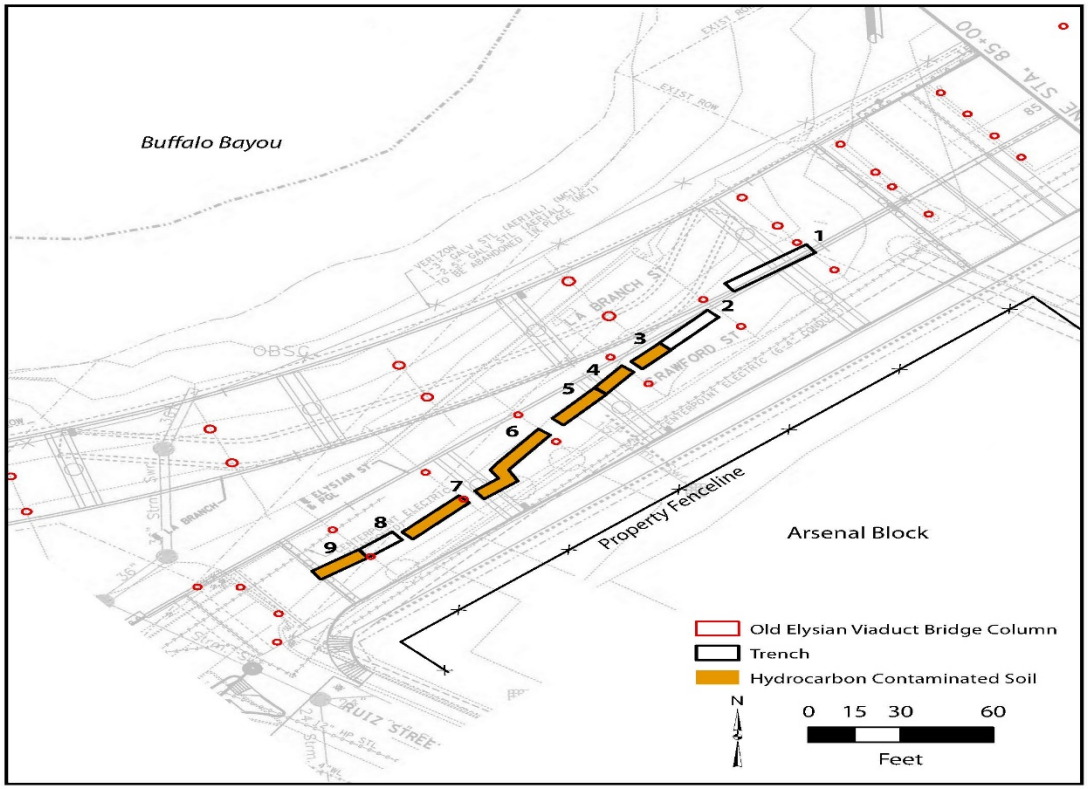


Figure 1. Map of trackhoe trenches excavated in the Arsenal Block site by Prewitt and Associates archeologists in June 2018.

Coal Ash and Hydrocarbon at Arsenal Block N Crawford St.

Zone F Crawford Street Impacted Soil Excavation

Summary of Removal of Impacted Excavated Soil

Work Area	Date Range	Work Description / Comments
Zone A	March 02, 2018 – February 05, 2020	• 12,576-CY Class II Soil
Zone B	April 22, 2017 – August 10, 2021	• 9,270-CY Class II Soil
Zone C	March 29 – 28, 2017	• 4,056-CY Class II Soil
Zone D	March 22, 2017 – April 23, 2020	• 17,701-CY Class II Soil
Zone E	March 10, 2017 – March 30, 2020	• 20,322-CY Class II Soil
Zone F	May 31, 2017 – January 21, 2020	• 9,740-CY Class I Soil • 21,024-CY Class II Soil
Zone G	May 16 – August 14, 2018	• 2,604-CY Class I Soil • 1,440-CY Class II Soil

Communication is the Key and a Thanks to Everyone Involved

The re-construction of the Elysian Street Viaduct Bridge was a four year-plus project and had a significant number of people involved (as most TxDOT projects do) from NEPA clearance to the General Contractor for construction, the remediation contractor for hazardous materials, TxDOT consultants for SGMP oversight and TxDOT and consultants for archeology. Effective and timely communication is the key to the successful completion of any project. With that being said, I would like to close by thanking the following people involved.

- Balfour Beatty, General Contractor, Jeff Berger PM.
- Tetra Tech, Inc., Remediation Contractor, Jeff Blanken PM, Danny Amerson, On-Site Supervisor and staff.
- TRC, SGMP Preparation and Oversight. Shannon Hoover PM, Andrew Clayton, On-Site Supervisor, (Arsin Sabha and Chris Mansuri, SGMP Preparation) and staff.
- Kleinfelder, Roxie Voran PM, SGMP Oversight and staff.
- Prewitt and Assoc./Cox McLain, Doug Prewitt, PM, Archeology and staff.
- TxDOT Archeology, Jason Barrett PM
- TxDOT ENV-ERM, Jay Carsten
- TxDOT Houston District, Paul Ely, PM

Questions or Comments