ENVIRONMENTAL SUSTAINABILITY: PLANNING FOR SMART GROWTH

SESSION 2B

TUESDAY, OCTOBER 2 | 1:30 - 2:20 PM

ENVIRONMENTAL SUSTAINABILITY: PLANNING FOR SMART GROWTH

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SESSION OVERVIEW

Introduction | **K. Kyle**

Site Overview

Vision: Smart Growth

Industrial and Manufacturing District | **J. Spergel**

Unique Project Challenges

Historic Use

Environmental Investigations | **G. Iosue**

Soil Investigation/Remediation

Ground Water Investigation/Remediation | **B. Ponticello**

Release of Liability | **J. Spergel**

Conclusion | **K.Kyle**

SITE OVERVIEW

RIGHTERS FERRY ROAD, LOWER MERION TOWNSHIP, MONTGOMERY COUNTY, PENNSYLVANIA

- Former industrial manufacturing facility on Righters Ferry Road
  - 19-acre property
  - 260,000 sq. foot industrial building
- Prime real estate
  - Situated along scenic Schuylkill River
  - Walking distance from downtown Manayunk across private bridge
  - Close proximity to public transportation, major highways

VISION: SMART GROWTH

- Upscale, multi-family apartments
  - Market-rate housing just outside the city
- Significant open space
  - Network of walking trails
  - Parks, leisure areas

VISION: SMART GROWTH

VISION: SMART GROWTH

- Repurposed rail bridge
  - Dilapidated, stone trestle bridge used by manufacturing facility
  - Restored and outfitted with pedestrian walkway
  - Connects residential area to downtown shopping district

MANUFACTURING AND INDUSTRIAL DISTRICT

- New zoning ordinance enacted in 2008, encouraging new, mixed-use development along Schuylkill River
  - Encourage development of floodplain; redevelopment of dilapidated industrial structures
    - Affect height, density of new development
    - Permits blended residential and commercial areas
    - Transit-oriented development, more pedestrian-friendly

UNIQUE PROJECT CHALLENGES

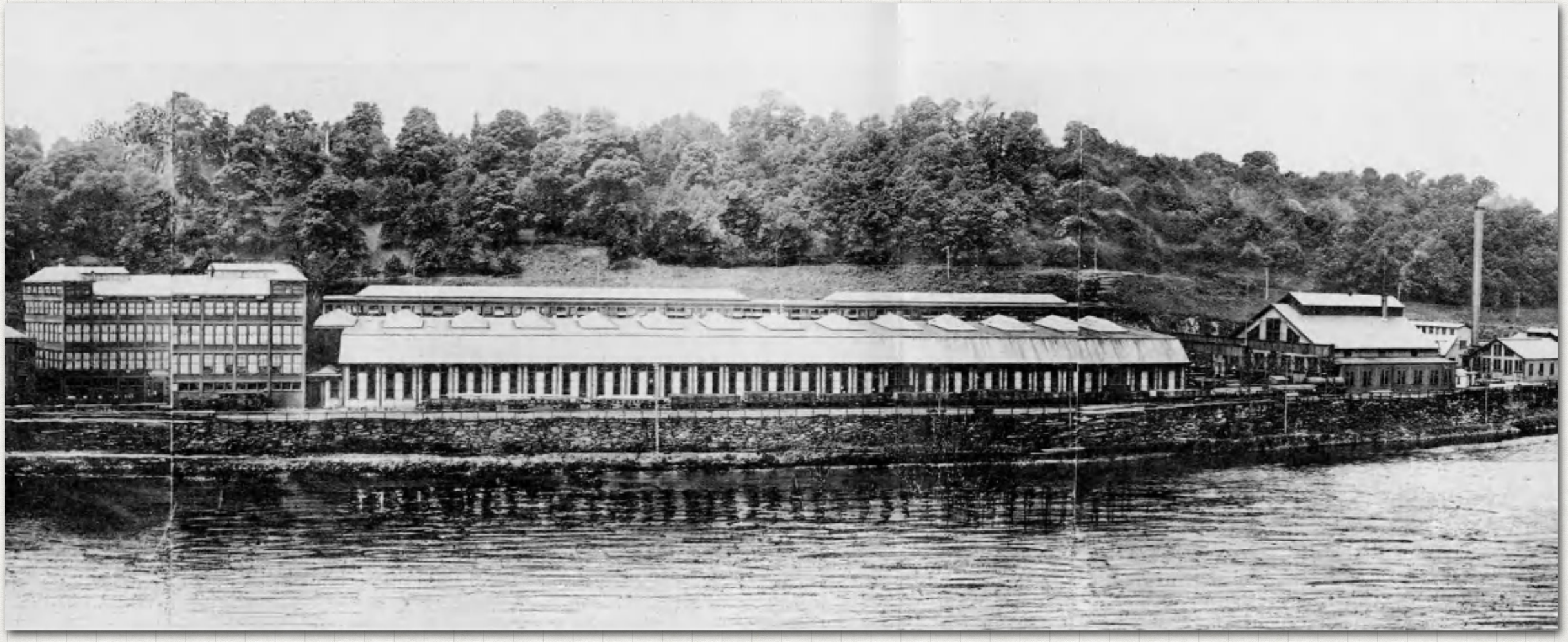
- Environmental issues
- Floodplain
- Site access issues
  - Barriers to entry into township
- Economic recession

HISTORIC USE

- Late 1800s – mid-1940s: Industrial purpose
- Early 1950s: Connelly Container purchased site
- 1999: Georgia Pacific purchased site
- 2005: Righters Ferry Associates, LP (RFA), development affiliate of MLP Ventures, purchased site

HISTORIC USE

AMERICAN BRIDGE COMPANY - PENCOYD IRON WORKS (EARLY 1900S)



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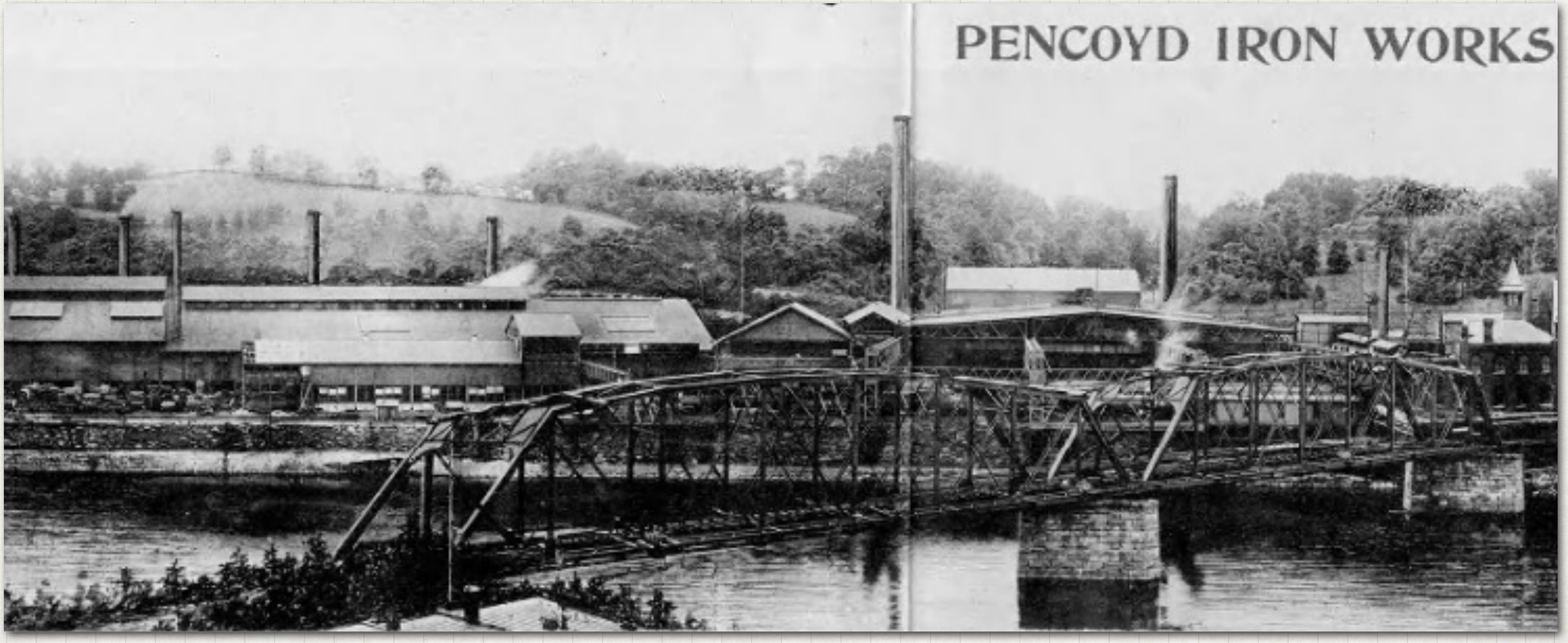

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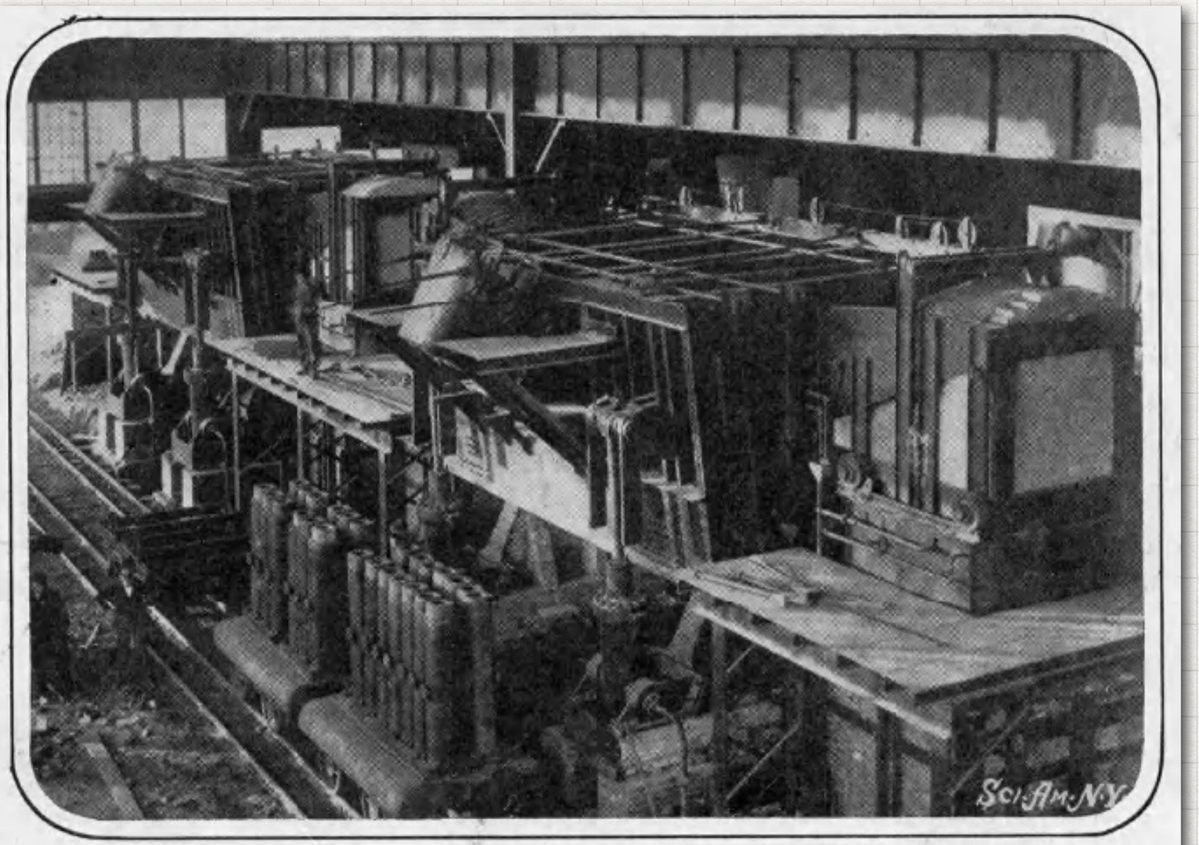
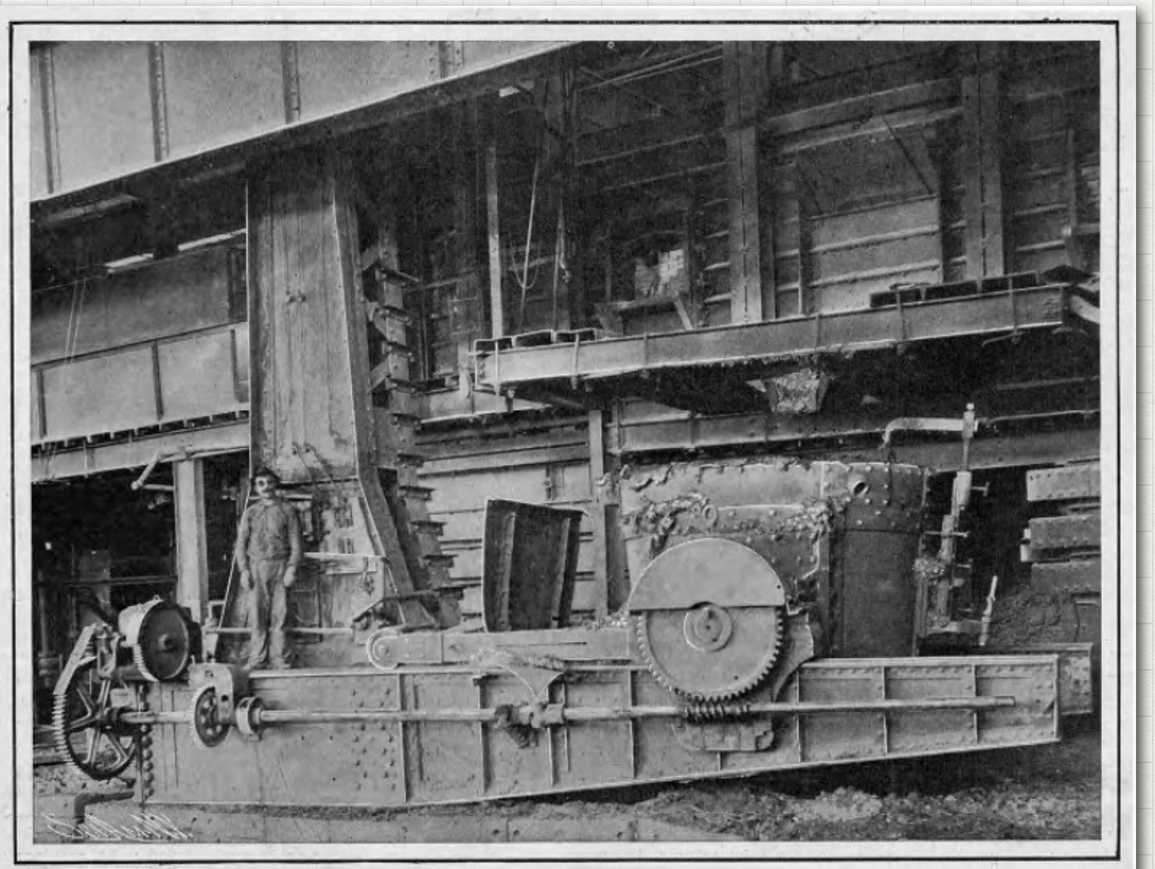


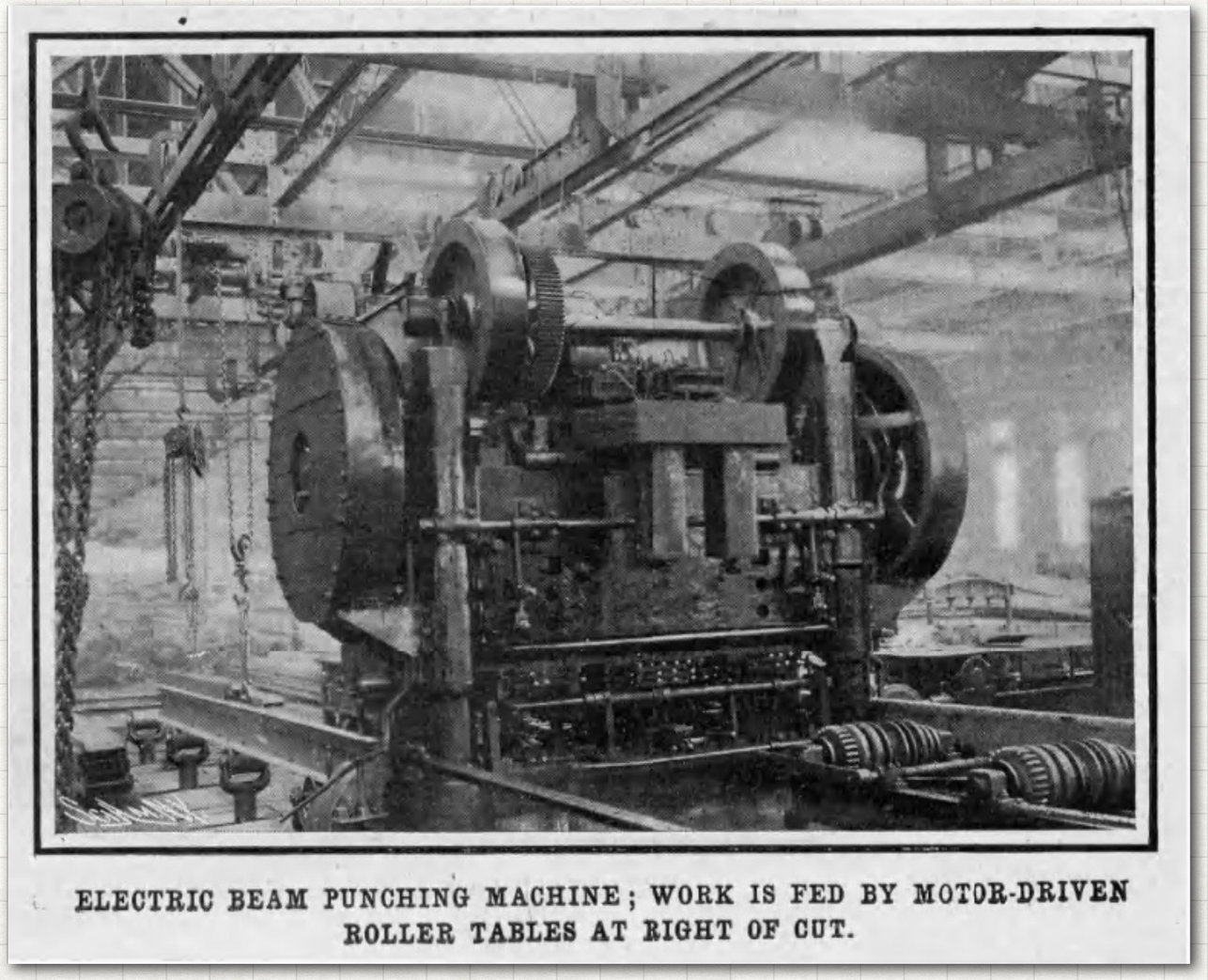
POURING SIDE OF 20-TON OPEN-HEARTH FURNACES, WITH FORE HEARTH IN POSITION.



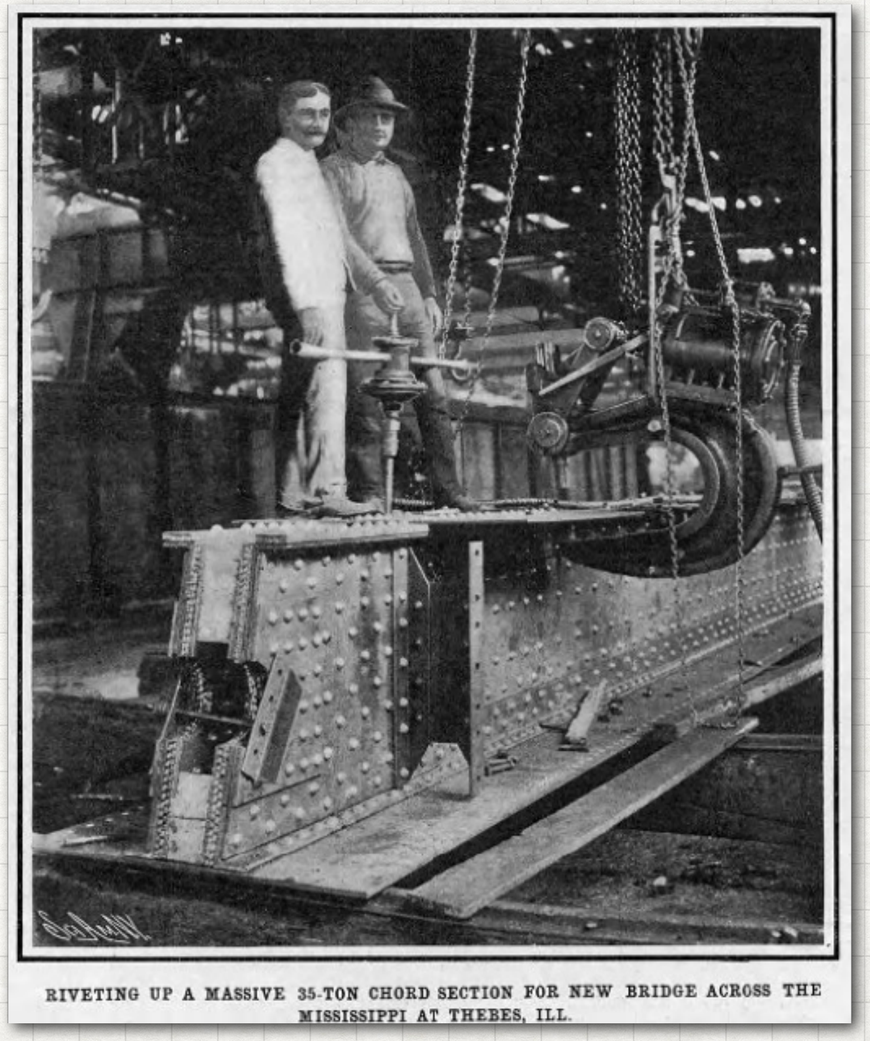
HYDRAULIC LADLE CRANE, INTO WHICH CONTENTS OF 75-TON OPEN-HEARTH FURNACE ARE TAPPED.

HISTORIC USE

AMERICAN BRIDGE COMPANY - PENCOYD IRON WORKS (EARLY 1900S)



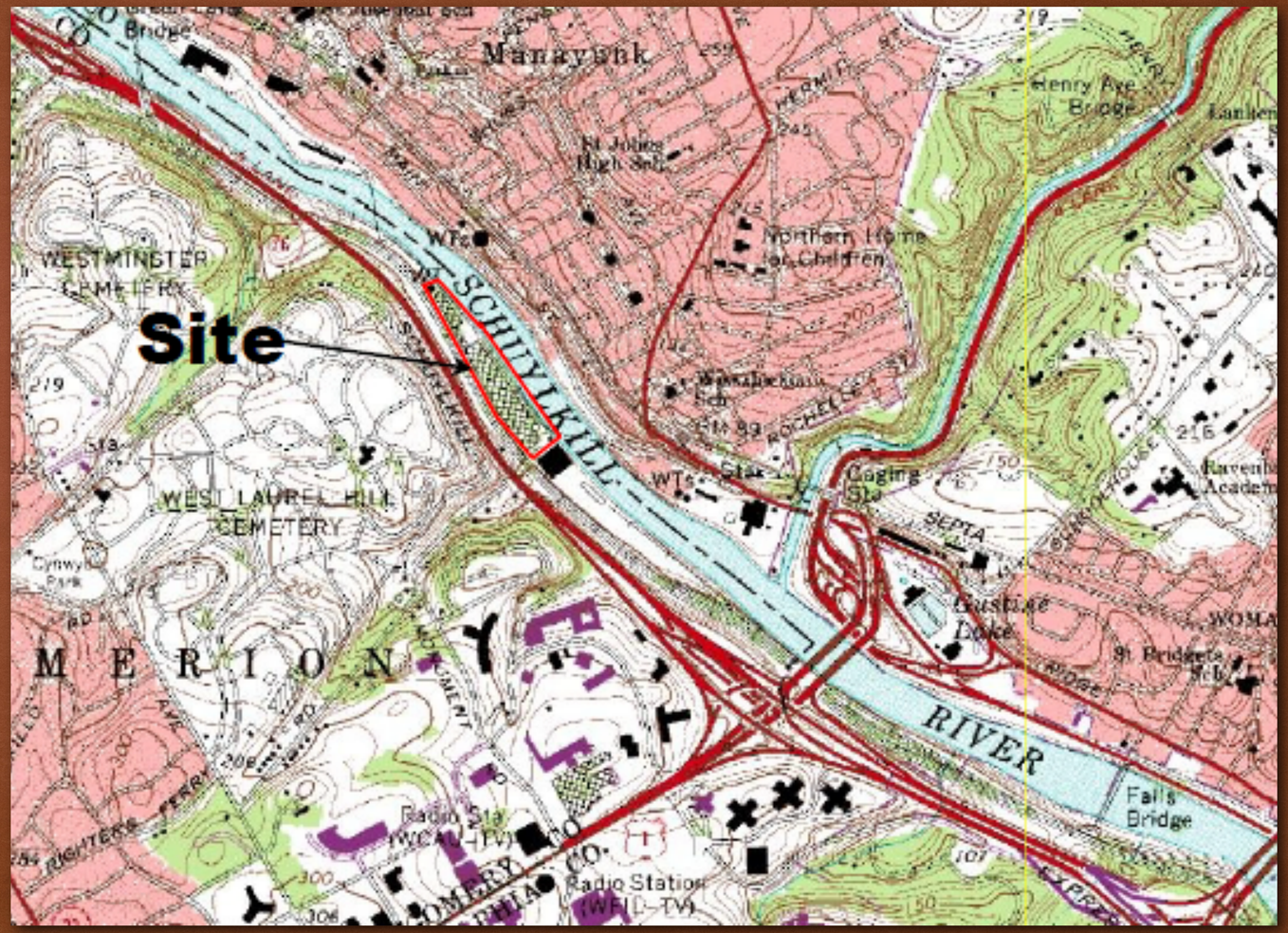
ELECTRIC BEAM PUNCHING MACHINE; WORK IS FED BY MOTOR-DRIVEN ROLLER TABLES AT RIGHT OF CUT.



RIVETING UP A MASSIVE 35-TON CHORD SECTION FOR NEW BRIDGE ACROSS THE MISSISSIPPI AT THEBES, ILL.

ENVIRONMENTAL INVESTIGATIONS

- Investigations date back to 1979
  - 80+ years of industrial operations
  - Release of No. 6 fuel oil
  - 1979–2014: 35 years of remedial investigation
- Land Recycling and Environmental Remediation Standards Act (Act 2)
  - Residential Statewide Health Standards
  - Residential Site-Specific Standards



SUSTAINABLE REDEVELOPMENT AND LIABILITY PROTECTION

Site Characterization

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Remedial Action Work Plan

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Active Remediation

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Act 2 Compliance

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Demonstration of Attainment

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Post Remediation Care

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PADEP Release of Liability = Effective Land Recycling and Sustainability

SOIL INVESTIGATION/REMEDIATION

STRATIGRAPHIC SEQUENCE

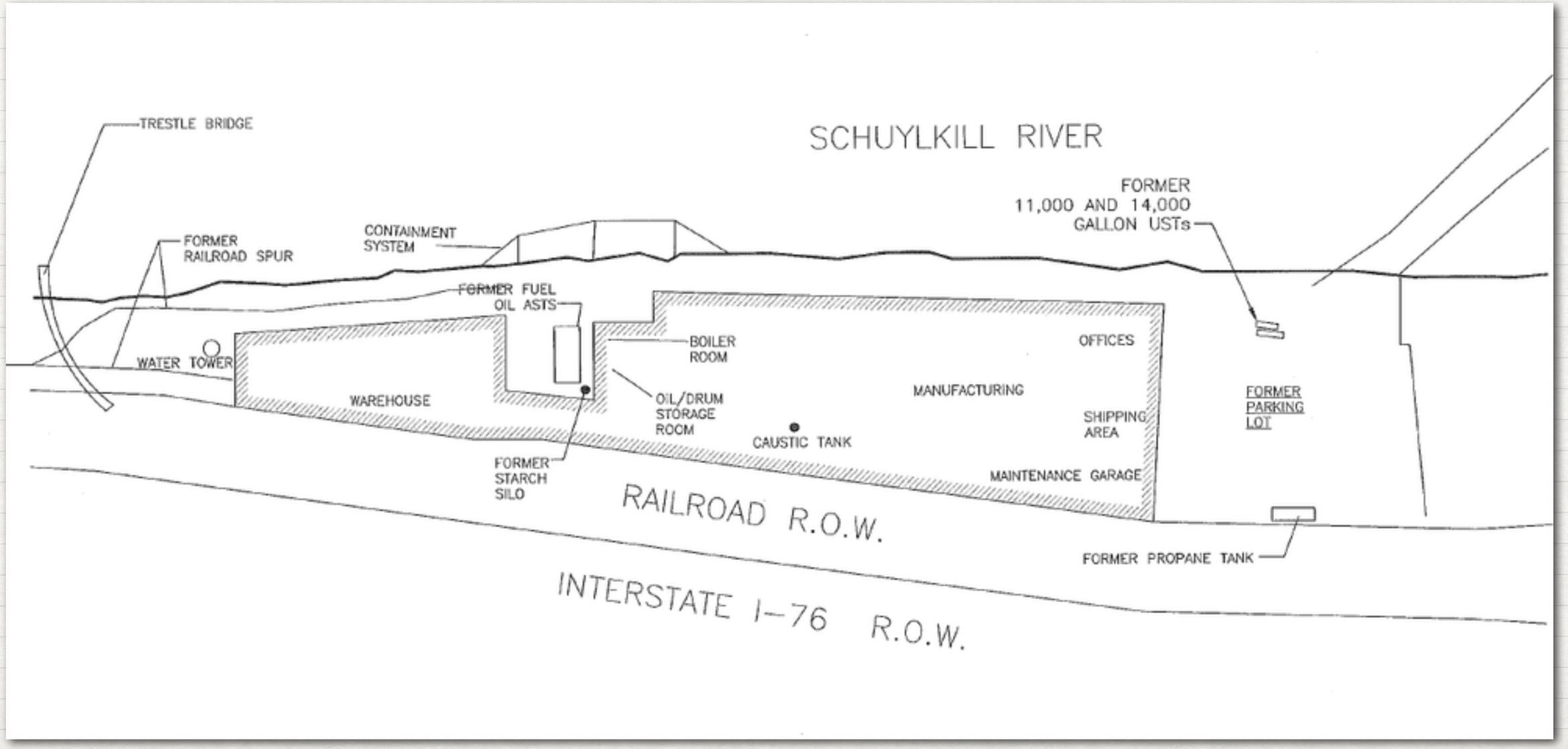
- Subsurface soil consists of 4 to 8 feet of fill material, underlain by up to 10 feet of brown sand, silt and clay generally grading to weathered schist bedrock, red shale or gravel layer
  - Soil boring refusal encountered at depths of 6.5 feet to greater than 20 feet below ground surface (BGS)

HISTORICAL SITE INVESTIGATIONS

- 1979: Two 10,000-gallon fuel oil USTs removed (north of boiler room)
  - Reportedly no contamination found during removal
  - Replaced by two 10,000-gallon fuel oil USTs (installed nearby in east-central portion of site)
- Later that year, Connelly Containers notified PADEP that existing and/or former USTs were source of petroleum release into Schuylkill River via seeps along riverbank
  - Oil sheens observed on river
    - Containment booms installed
    - Sheens skimmed off river

HISTORICAL SITE INVESTIGATIONS

SITE LAYOUT MAP



HISTORICAL SITE INVESTIGATIONS

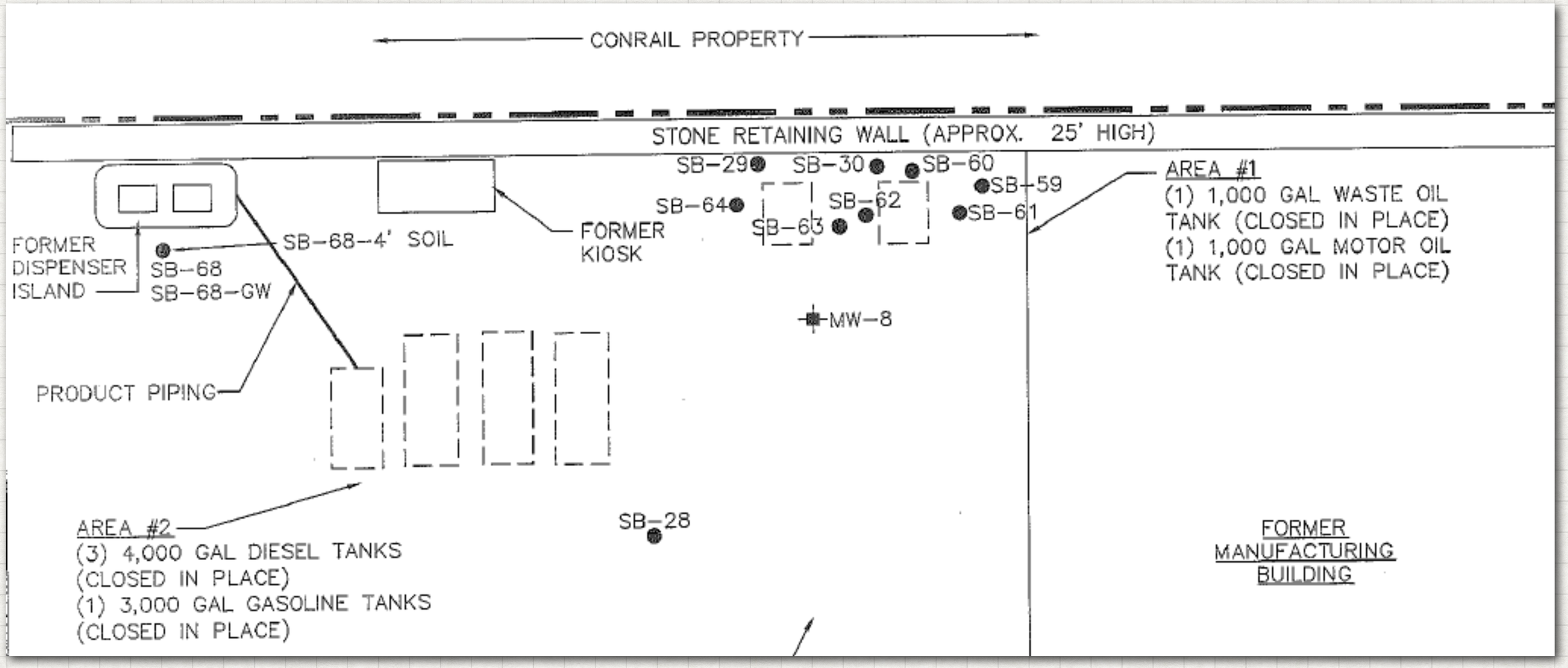
- 1990: The two 10,000-gallon USTs installed in 1979 closed-in-place (east-central portion of site)
- 1992: Connelly Containers received PADEP Notice of Violation for petroleum release
  - Limited soil boring and ground water investigation conducted in suspected release area
    - Results show minimal amount of free product present in overburden materials

HISTORICAL SITE INVESTIGATIONS

- 1994: The two 10,000-gallon No. 6 fuel oil USTs closed-in-place in 1990 removed (east-central portion of site)
  - ~700 tons of petroleum-containing soil excavated and disposed of off-site
- 1995/1996: Six USTs on property all closed-in-place
  - Three 4,000-gallon diesel fuel USTs and one 3,000-gallon gasoline UST in southern parking lot area closed-in-place
  - One 1,000-gallon new motor oil UST and one 1,000-gallon waste motor oil UST closed-in-place

HISTORICAL SITE INVESTIGATIONS

UST AREA INSET – SOIL BORING LOCATION MAP

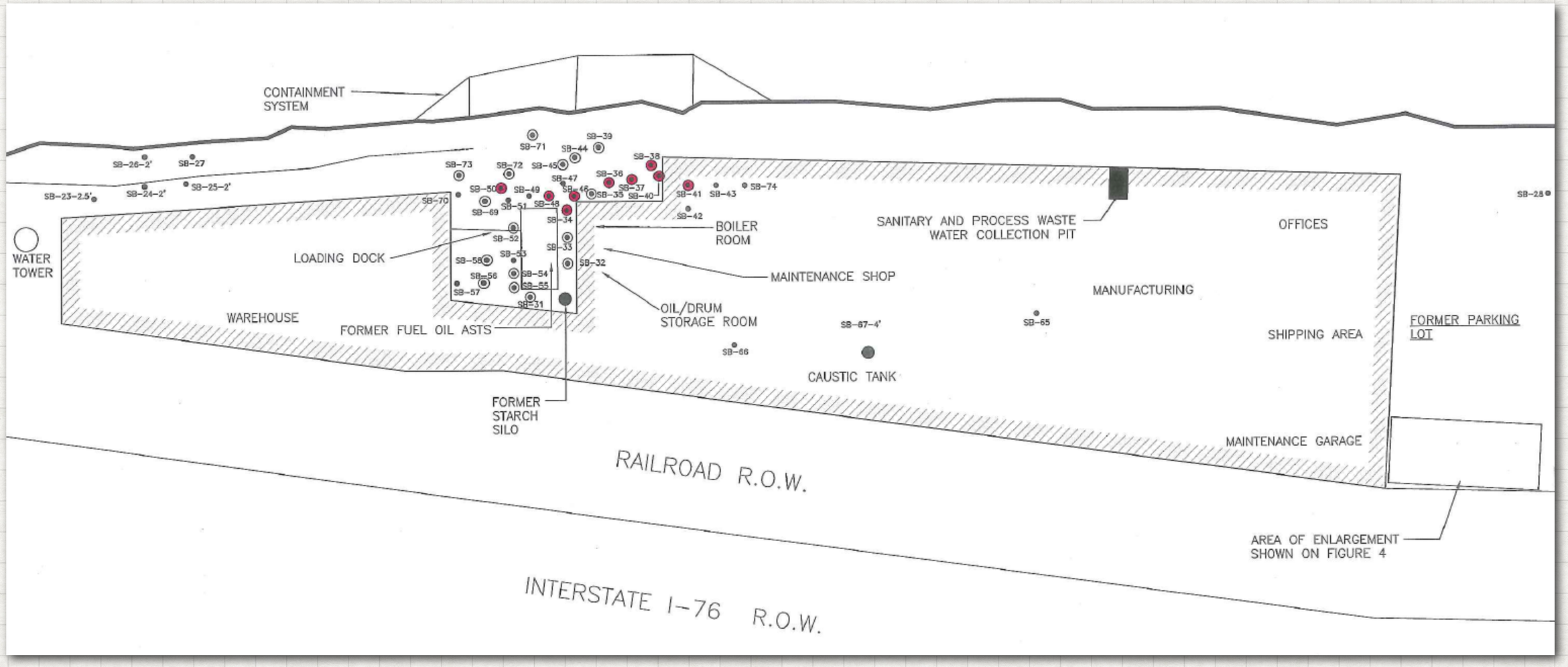


HISTORICAL SITE INVESTIGATIONS

- 1998: Phase II Environmental Site Assessment (ESA) was conducted to verify source of the release and delineate extent of the impact
  - Included 15 soil borings and additional monitoring well
- 1999: Additional Phase II investigation conducted to further investigate source of the fuel oil release, determine if preferential migration pathways existed, and evaluate potential remedial options
  - Included installation of two test trenches, 26 additional soil borings and additional monitoring well
- 2000-2001: Additional monitoring wells and soil borings were installed based on results of 1999 Phase II ESA

HISTORICAL SITE INVESTIGATIONS

SOIL BORING LOCATION MAP



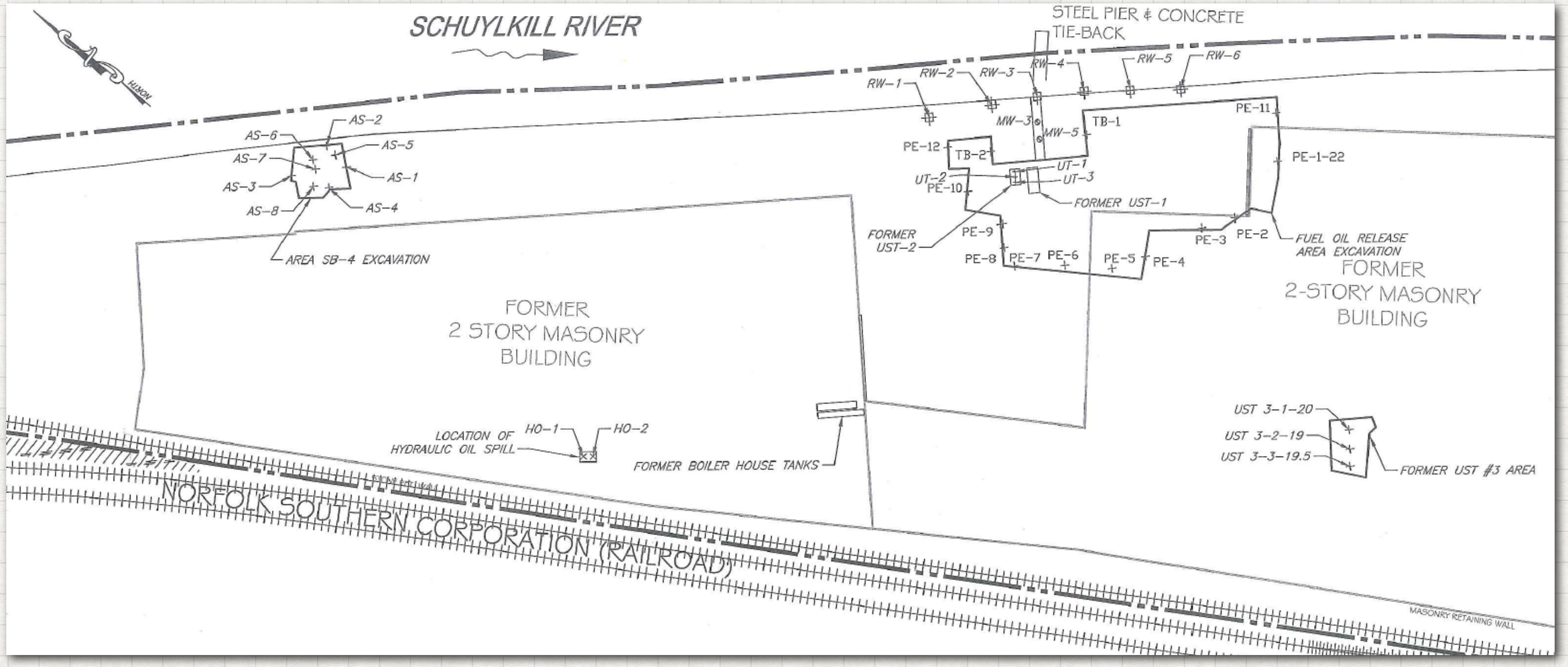
SITE CHARACTERIZATION

PHASE I ESA RELATED TO PROPERTY TRANSACTION

- 2004: Areas of Concern (AOCs) identified
  - Fuel oil release area
  - Former presence of six USTs in parking lot area
  - Former presence of 20,000-gallon fuel oil AST and 10,000-gallon AST in east-central portion of site
  - Former use and storage of raw materials, process chemicals and lubricating oils
  - Former presence of numerous floor drains and collection sumps
  - Former presence of railroad spurs
  - Presence of historic fill material

SITE INVESTIGATION

SITE LAYOUT MAP - AREAS OF CONCERN



SITE CHARACTERIZATION

PHASE II ESA RELATED TO PROPERTY TRANSACTION

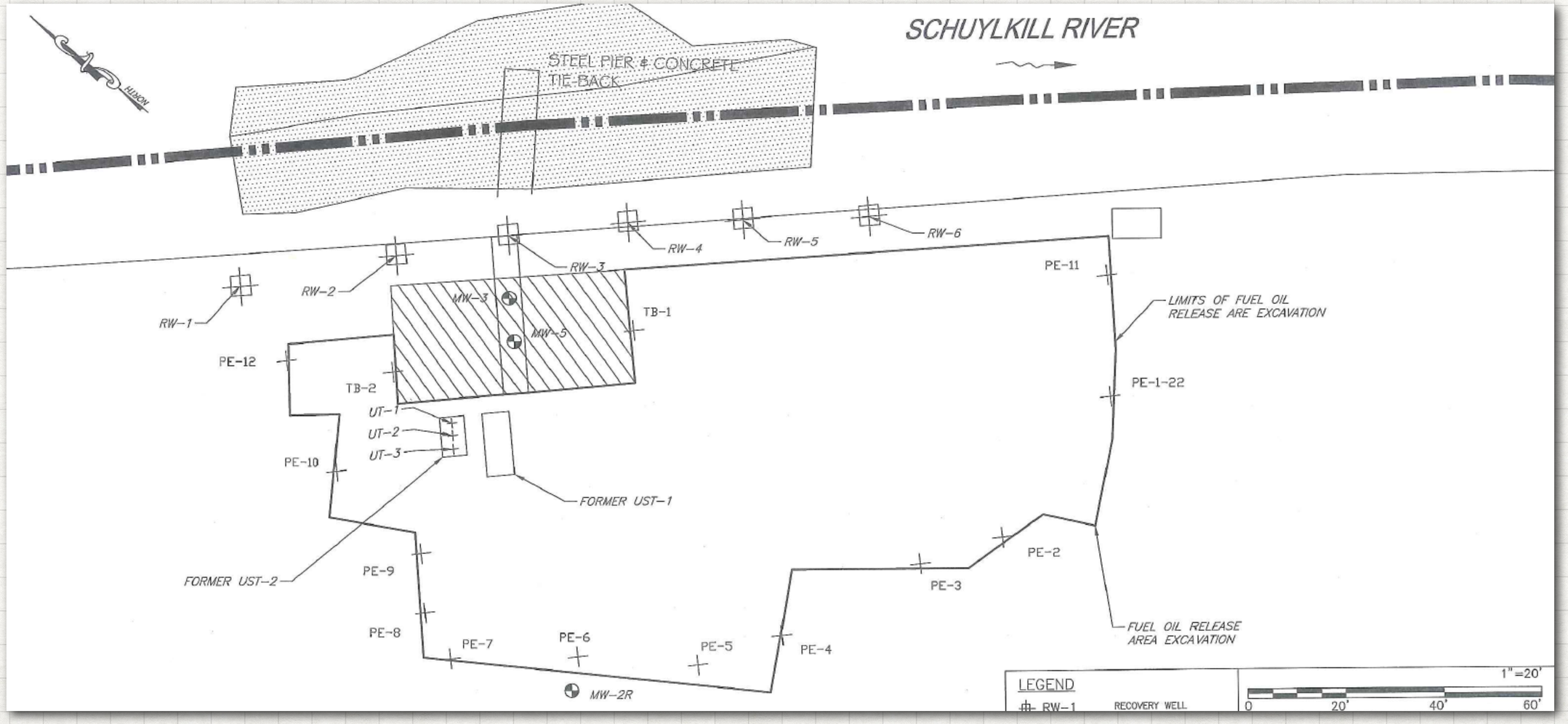
- November 2004: To further investigate AOCs Penn E&R conducted Phase II ESA
  - Installed a total of 22 soil borings
  - Results were compared to Residential Used Aquifer Direct Contact and Soil-to-Ground Water Act 2 MSCs
    - Several volatile organic compounds (VOCs), polynuclear aromatic hydrocarbons, and RCRA metals exceeded Act 2 MSCs

REMEDIAL ACTION: SOIL

- No. 6 fuel oil release impacted soil and uppermost weathered bedrock in central portion of site
  - Excavation and removal of source material
  - Excavation delayed until after adjacent structures were demolished
- Total excavation: 4,330 tons of soil
  - Shipped off-site for disposal

REMEDIAL ACTION: SOIL

FUEL OIL RELEASE AREA – FORMER UST LOCATION MAP

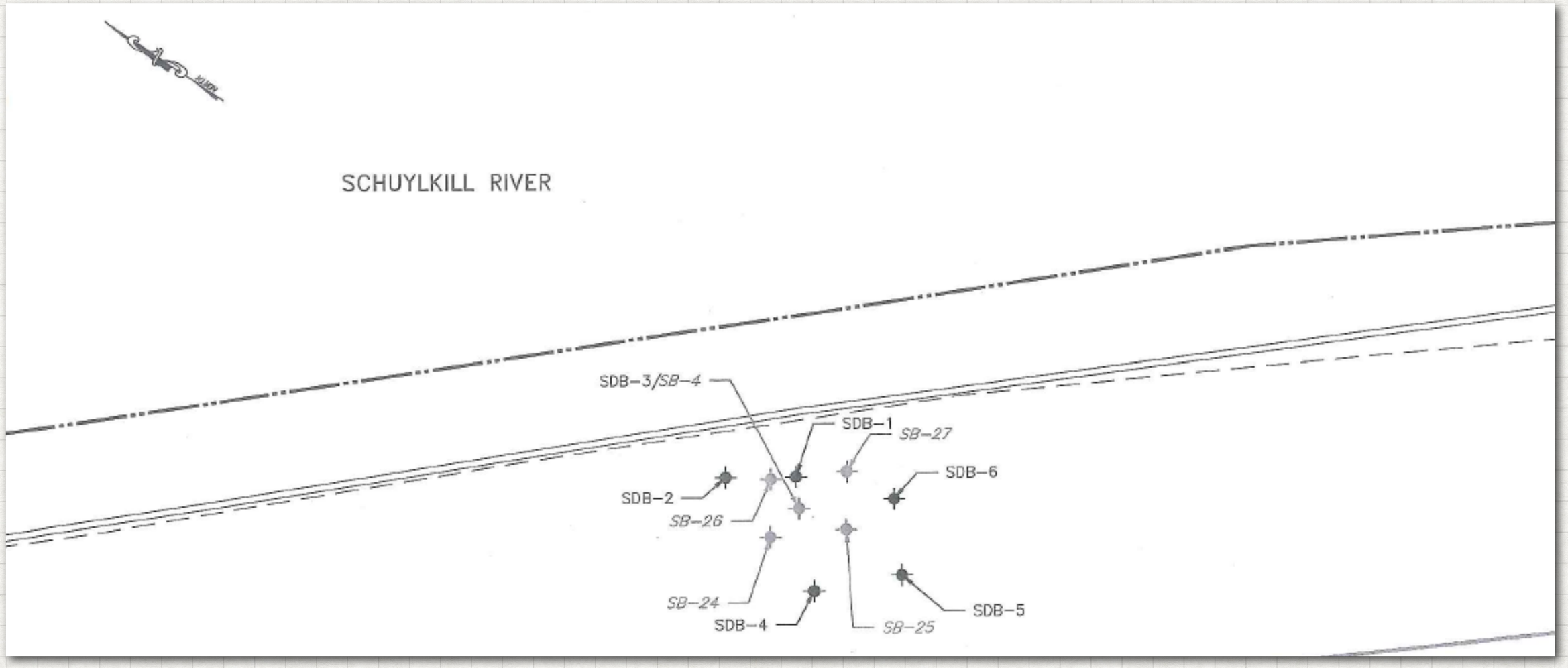


REMEDIAL ACTION: SOIL

- Soil Boring Area SB-4
  - Soil in vicinity of a former railroad spur contained compounds at concentrations exceeding Act 2 MSCs
    - Installed additional soil borings to delineate subsurface conditions
    - Petroleum-containing soil excavated and properly recycled off-site

REMEDIAL ACTION: SOIL

DELINEATION OF SOIL BORING AREA SB-4

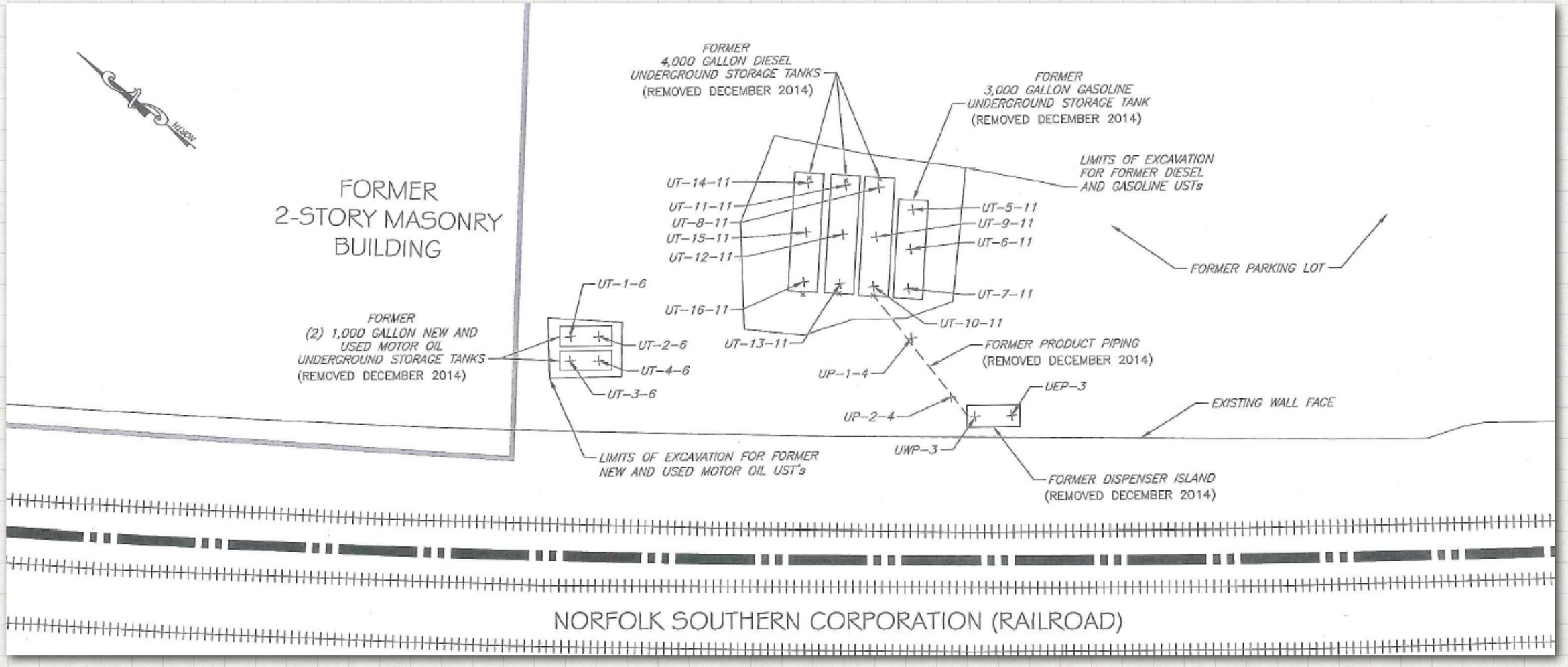


UST CLOSURE ACTIVITIES

- RFA elected to removal all underground storage tanks from the site as part of redevelopment
  - Six USTs located in southern parking lot area were reportedly closed-in-place in 1995/1996
    - Three 4,000-gallon diesel fuel USTs
    - One 3,000-gallon gasoline UST
    - One 1,000-gallon new motor oil UST
    - One 1,000-gallon used motor oil UST

UST CLOSURE ACTIVITIES

POST-EXCAVATION SOIL SAMPLE – FORMER UST LOCATION MAP



UST CLOSURE ACTIVITIES

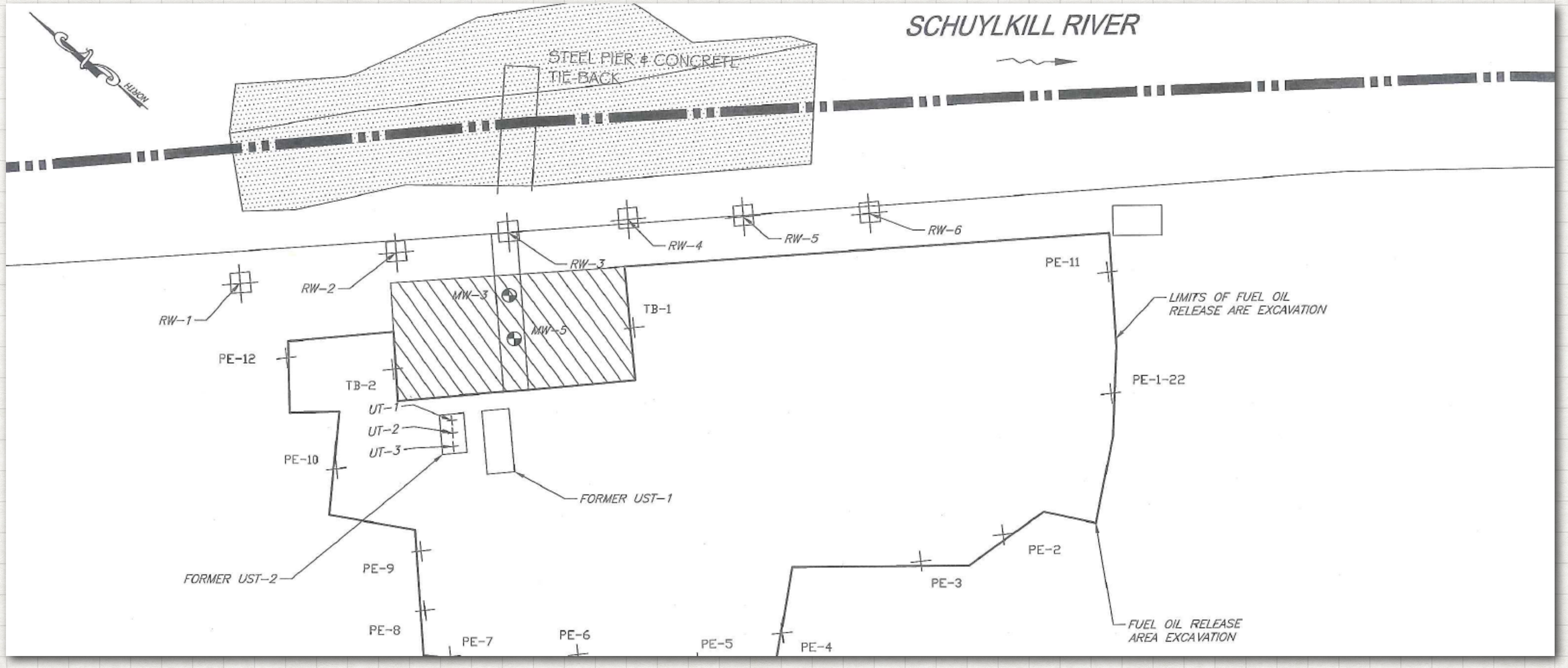
- August 2014: During excavation and removal of impacted soil, contractor discovered two unknown USTs
  - UST-1: 2,000-gallon capacity
  - UST-2: 1,000-gallon capacity
    - Located within fuel oil release excavation area
    - Neither showed evidence of a release

UST CLOSURE ACTIVITIES

- September 2014: During grading activities, contractor discovered third unknown UST
  - UST-3: 7,500-gallon capacity
    - Located beneath former building warehouse floor slab (south central portion of site)
    - Contained soil, debris, and 550 gallons of water

UST CLOSURE ACTIVITIES

FUEL OIL RELEASE AREA – FORMER UST LOCATION MAP

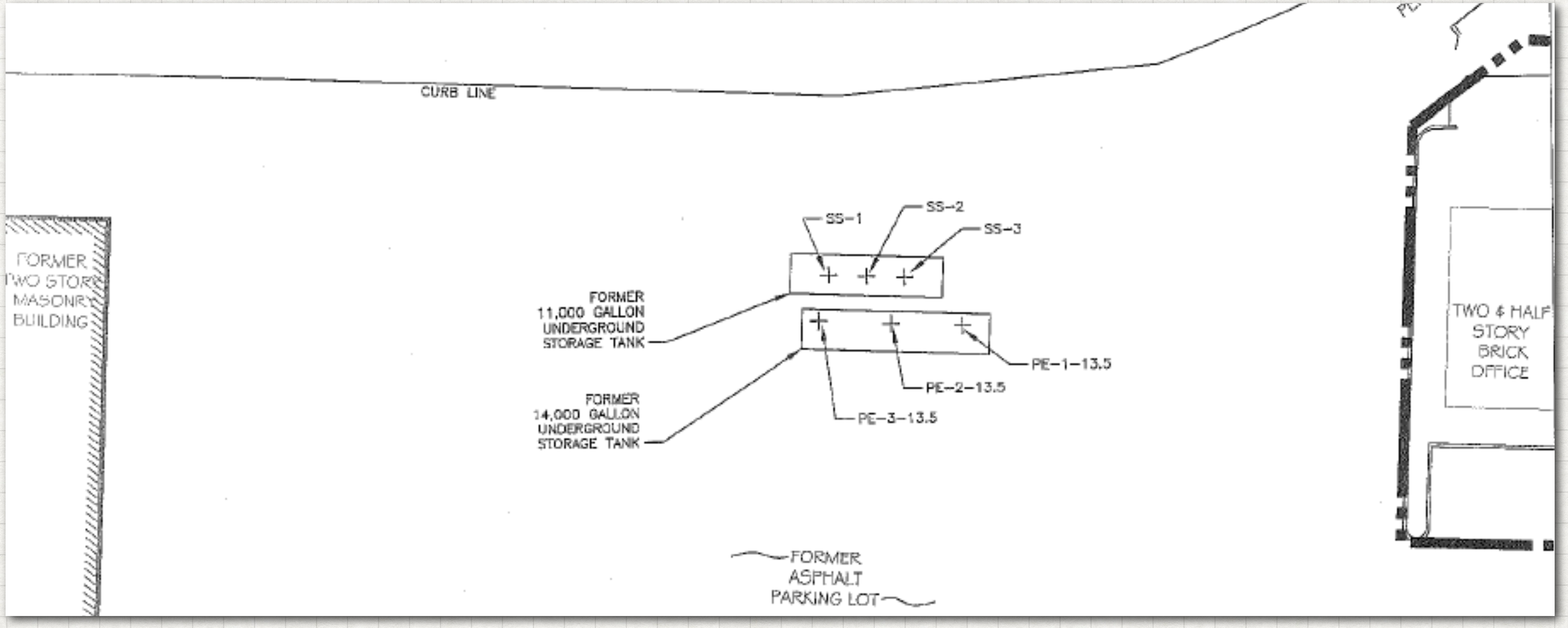


UST CLOSURE ACTIVITIES

- May 2015: During site redevelopment activities, crews discovered two unregulated fuel oil USTs
  - One 11,000-gallon capacity
  - One 14,000-gallon capacity
    - Located along southeastern portion of property
    - Neither showed sign of impact

UST CLOSURE ACTIVITIES

SOIL SAMPLE LOCATIONS – FORMER 11,000 AND 14,000 GALLON USTS



ATTAINMENT SAMPLING: SOIL

- Fuel oil release area
  - 14 soil samples collected from excavation area
    - Sample analysis shows none of the tested COCs were detected above the respective Act 2 MSCs
- Soil Boring Area SB-4
  - Eight soil samples collected from excavation area
    - Two compounds detected above Act 2 MSCs
- Fate and Transport Analysis conducted

FATE AND TRANSPORT ANALYSIS: SOIL

- Exposure Pathway Analysis
  - Direct Contact with and Ingestion of Soil pathway incomplete due to site capping
    - Concrete slabs (slab-on-grade construction) for buildings constructed at site
    - Asphalt-covered parking areas and roadways
    - One-foot clean soil buffer demarcated with geotextile fabric liner in landscaped, undeveloped portions of site

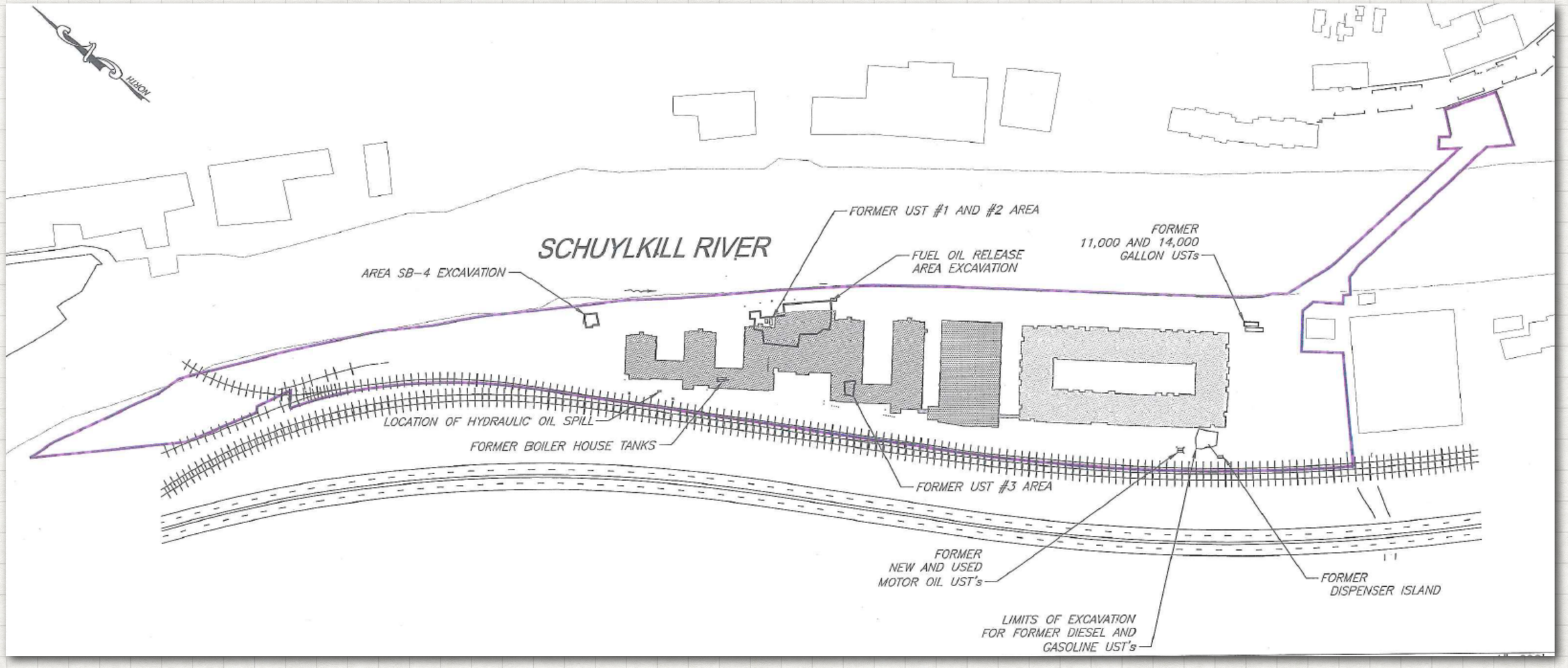
FATE AND TRANSPORT ANALYSIS: SOIL

- Inhalation of Volatiles from Soil determined to be incomplete since levels of COCs were below EPA's Regional Screening Level
    - Note: Specific compounds were not determined as Compounds of Potential Indoor Air Concern by PADEP, therefore no further action required
- Soil-to-Ground Water determined to be incomplete following use of Buffer1 Model
    - Calculations show arsenic and lead do not have the potential to leach into ground water at concentrations exceeding Act 2 MSCs

DEMONSTRATION OF ATTAINMENT: SOIL

- Impacted soil remediated through excavation and off-site disposal
  - Fuel oil release area: None of tested compounds were detected above Act 2 MSCs
  - Soil Boring Area SB-4: Two compounds detected above Act 2 MSCs, but remediated with installation of cap
- Site demonstrates attainment of Act 2 Residential Statewide Health and Site-Specific Standards for soil

PROPOSED SITE DEVELOPMENT



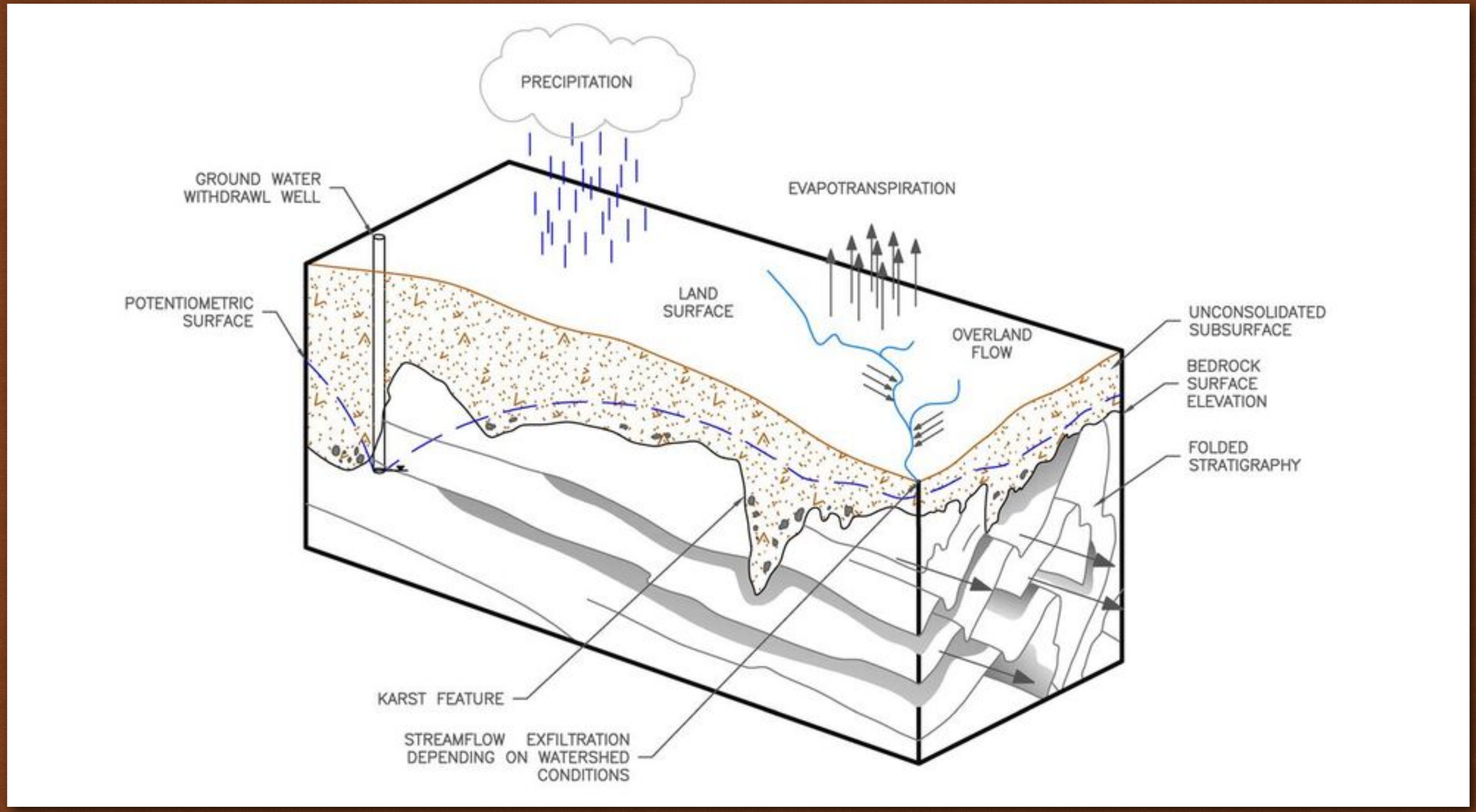
POST-REMEDIATION CARE PLAN: SOIL

- To ensure integrity of cap
  - Capped areas will be inspected annually
  - Any damage to cap will be promptly repaired
  - Record of annual inspection and documentation of any repairs to the cap will be maintained at the site by the property owner
- Environmental Covenant submitted to PADEP

REMEDIAL INVESTIGATION SUMMARY

- Since 1979…
  - Nine investigations
  - 103 soil borings installed
  - 11 monitoring wells installed
  - 115 soil samples collected
  - 75+ ground water samples collected

GROUND WATER INVESTIGATION/REMEDIATION



HYDROGEOLOGICAL SETTING

- Based on Act 2 site characterization activities
  - Site is underlain by Pre-Cambrian Age oligoclase-mica schist of Whissahickon Formation (low permeability, secondary porosity)
  - Depth-to-water range generally 15 to 21 feet BGS
  - Resistivity profiling, seismic refraction profiling, microgravity mapping confirmed presence of “shallow” free product plume in suspected release area
  - Based on the river stage, discharge via a series of bedrock joint or fracture lineaments is perpendicular to river—these features were likely controlling the migration of free-phase product within the bedrock

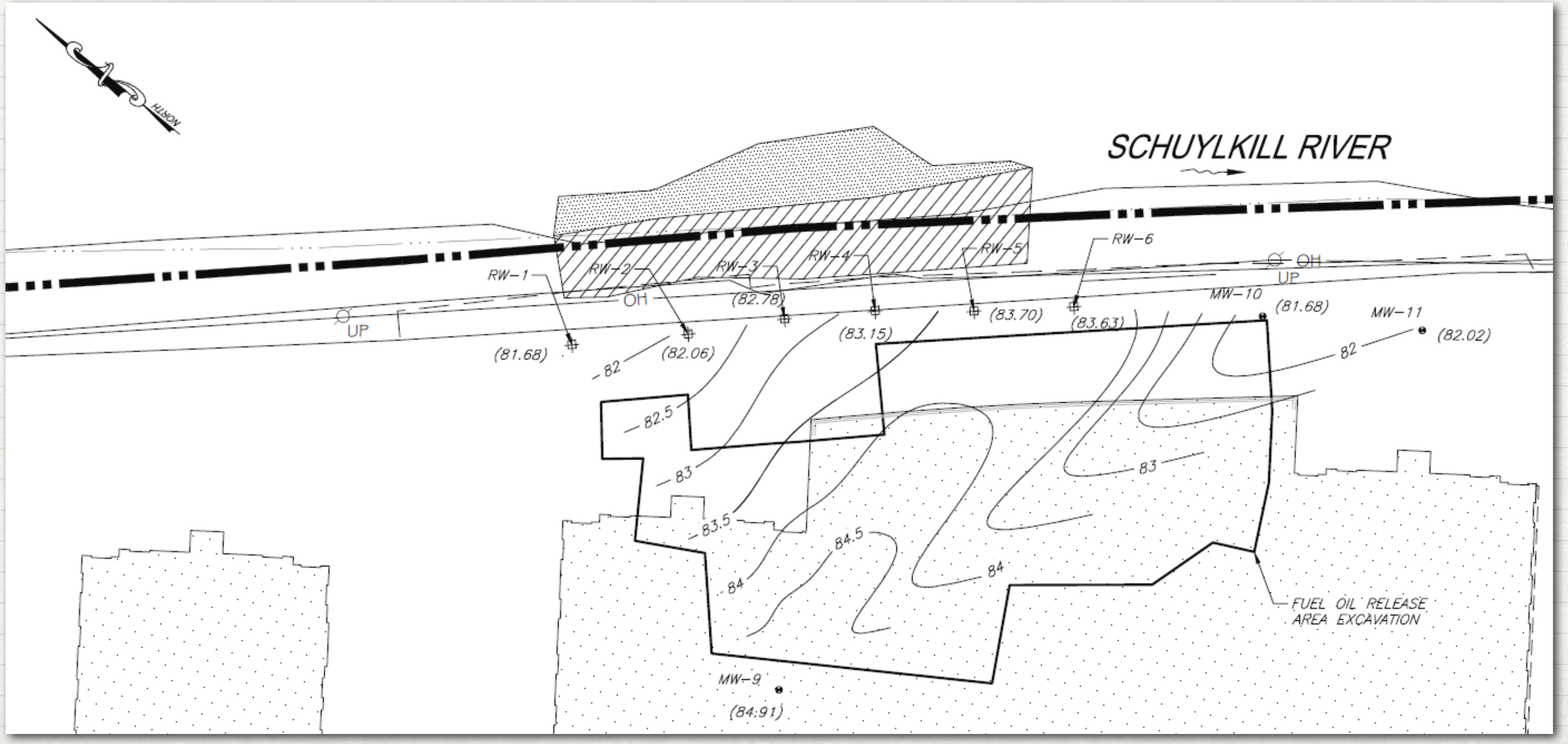
SITE CHARACTERIZATION

GROUND WATER OCCURRENCE AND MOVEMENT

- Ground water elevation contour maps generated from each of four ground water attainment sampling events (November 2015, February 2016, May 2016, August 2016)
  - Historical hydrogeological evaluation indicates a complex relationship between the ground water and surface water
  - MW-10, MW-11 and former recovery wells were identified as downgradient point-of-compliance wells

SITE CHARACTERIZATION

GROUND WATER ELEVATION CONTOUR MAP



FINAL GROUND WATER INVESTIGATION

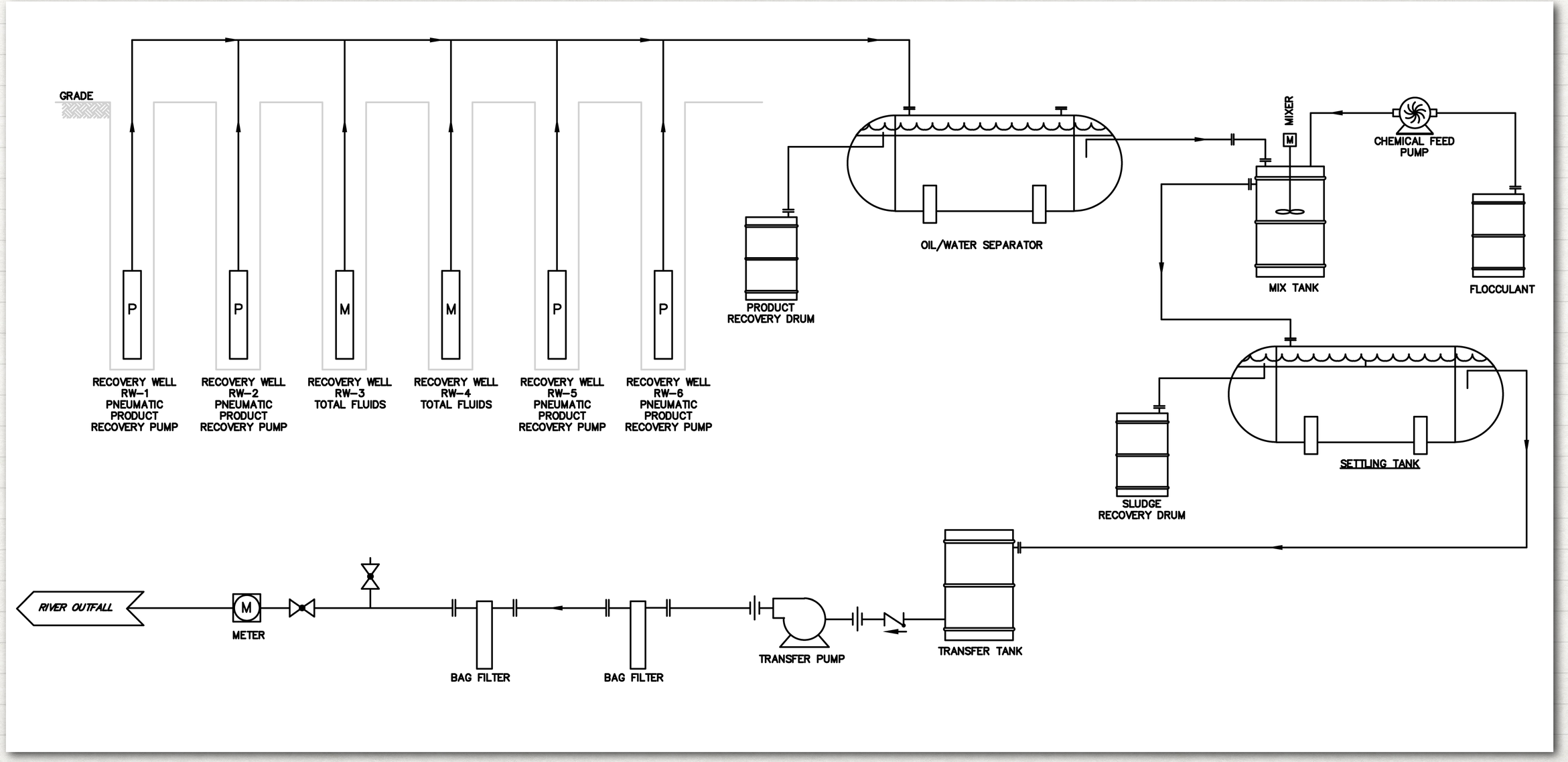
- Historical results were compiled and compared to Act 2 residential used aquifer MSCs
  - Non-detect or low semi-volatile analyte concentrations were well below MSCs
  - Ground water (outside fuel release area) was not impacted by historic site operations or presence of historic fill material
    - After numerous ground water sampling events over 11 years ground water was completely characterized
  - Based on river stage and significant ground water elevation fluctuations in this discharge zone (GW/SW interaction) petroleum was intermittently discharging to Schuylkill River

REMEDIAL ACTION: GROUND WATER

FREE-PHASE PRODUCT RECOVERY SYSTEM

- Installed 2002 (operated through 2014)
  - Concrete barrier (shotcrete) along riverbank, extending out into riverbed
  - Six recovery wells (RW-1 through RW-6, located along top of riverbank)
    - Installed into top of weathered schist at ~30 feet BGS
    - Seventh shallow overburden well (MW-7) installed in source area
  - On-site oil-water separator
  - Bag filters to remove silt from recovered ground water

SCHEMATIC OF FREE-PHASE PRODUCT RECOVERY SYSTEM



REMEDIAL ACTION: GROUND WATER

FREE-PHASE PRODUCT RECOVERY SYSTEM

- Remediation equipment housed in secured trailer along eastern property boundary near release area
- Filtered water discharged to Schuylkill River under authority of NPDES discharge permit
  - Required bi-monthly effluent sampling for following parameters:
    - Flow
    - pH
    - Oil and grease
    - Benzene
    - TPH
    - Napthalene
    - Phenanthrene
    - Pyrene
    - Chrysene

REMEDIAL ACTION: GROUND WATER

FREE-PHASE PRODUCT RECOVERY SYSTEM

- Recovered oil transferred to 55-gallon drums for off-site recycling
- Last full calendar year of operation: 2014
- System operated for 12 years
- 250+ gallons of No. 6 fuel oil recovered

ATTAINMENT SAMPLING: GROUND WATER

- Four attainment sampling events completed quarterly between November 2015 and August 2016
  - Samples collected from MW-9, MW-10, MW-11, RW-1, RW-3, RW-4, RW-5, and RW-6
    - Analyzed for PADEP fuel oils Nos. 4, 5, and 6 and lubricating oil and fluids
    - All results show none of tested compounds were detected above respective Act 2 Residential Used Aquifer MSCs, with exception of chrysene in May 2016 and August 2016
- Fate and Transport Analysis conducted

FATE AND TRANSPORT ANALYSIS: GROUND WATER

- Fate and transport modeling was required to evaluate the volumetric discharge (MGD) and the forecasted average ground water concentration for chrysene potentially entering the Schuylkill River
- SWLOAD5B model output for chrysene determined that modeled concentrations were not predicted to impact surface water quality in the Schuylkill River

DEMONSTRATION OF ATTAINMENT: GROUND WATER

- Direct Contact and Ingestion of Ground Water pathways were determined to be incomplete
  - No ground water seeps or springs were located on property
  - Potable water is supplied to the site and all adjacent properties by the City of Philadelphia
  - No water withdrawal/supply wells located within half-mile radius of site
  - Ground water at the site is not used for any purpose

DEMONSTRATION OF ATTAINMENT: GROUND WATER

- Ground Water Discharge to Surface Water pathway determined to be incomplete because no COCs are migrating from the site and therefore will not reach any off-site surface water body
- No exceedances of VOCs detected in the ground water samples therefore the inhalation of volatile organics is of no concern
- Site demonstrates attainment of Act 2 Residential Statewide Health and Site-Specific Standards for ground water

POST-REMEDIATION CARE PLAN: GROUND WATER

- Property owner must confirm the following on annual basis:
  - No potable wells have been installed at site
  - Ground water at site is not being used for any purpose

RELEASE OF LIABILITY

- Release of cleanup liability granted under Act 2 provisions
- Environmental Covenant, in accordance with Pennsylvania Uniform Environmental Covenants Act, Act No. 68 of 2007, 27 Pa. C.S. §§ 6501-6517 (“UECA”)

CONCLUSION

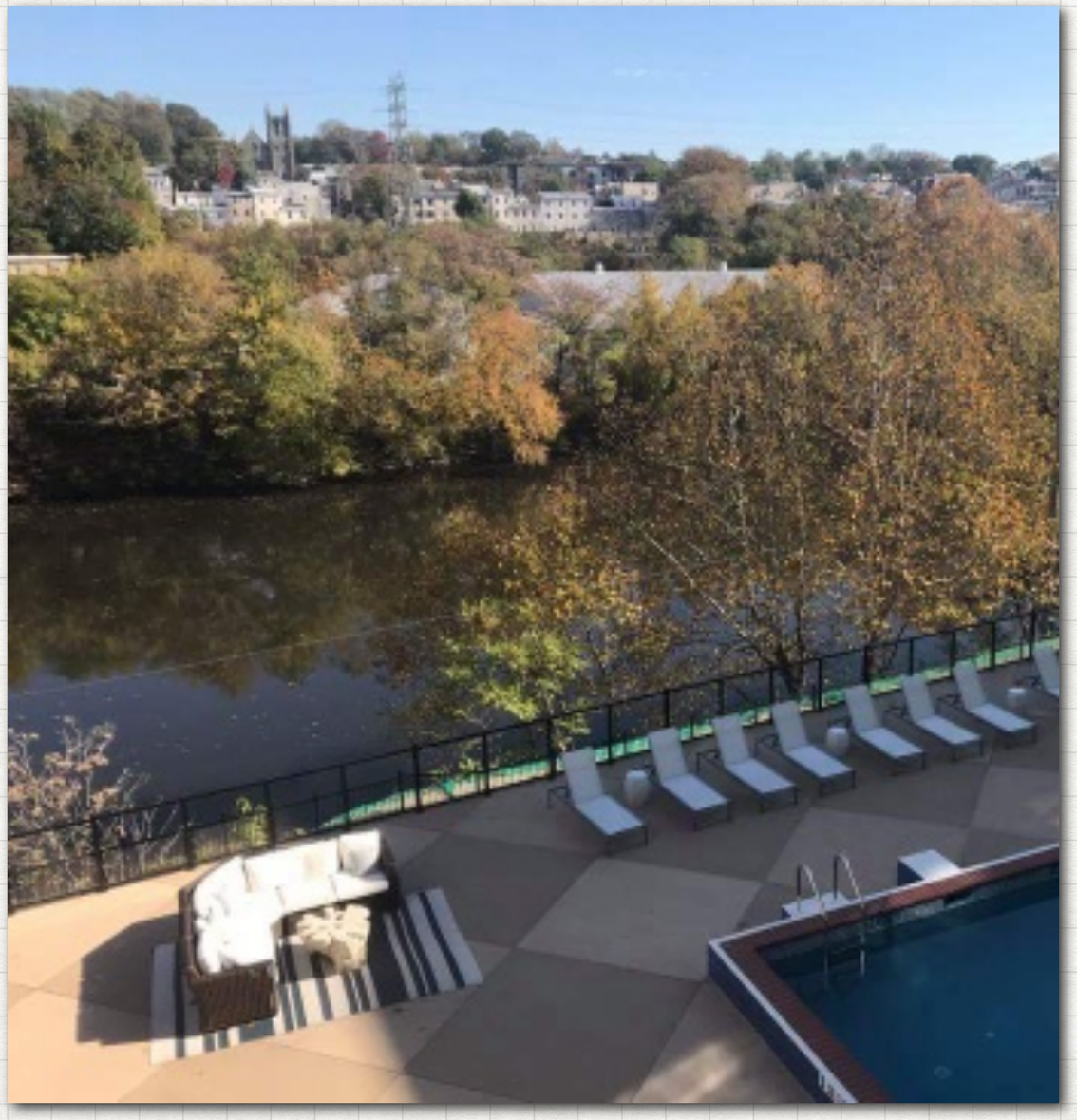
RIGHTERS FERRY PROJECT

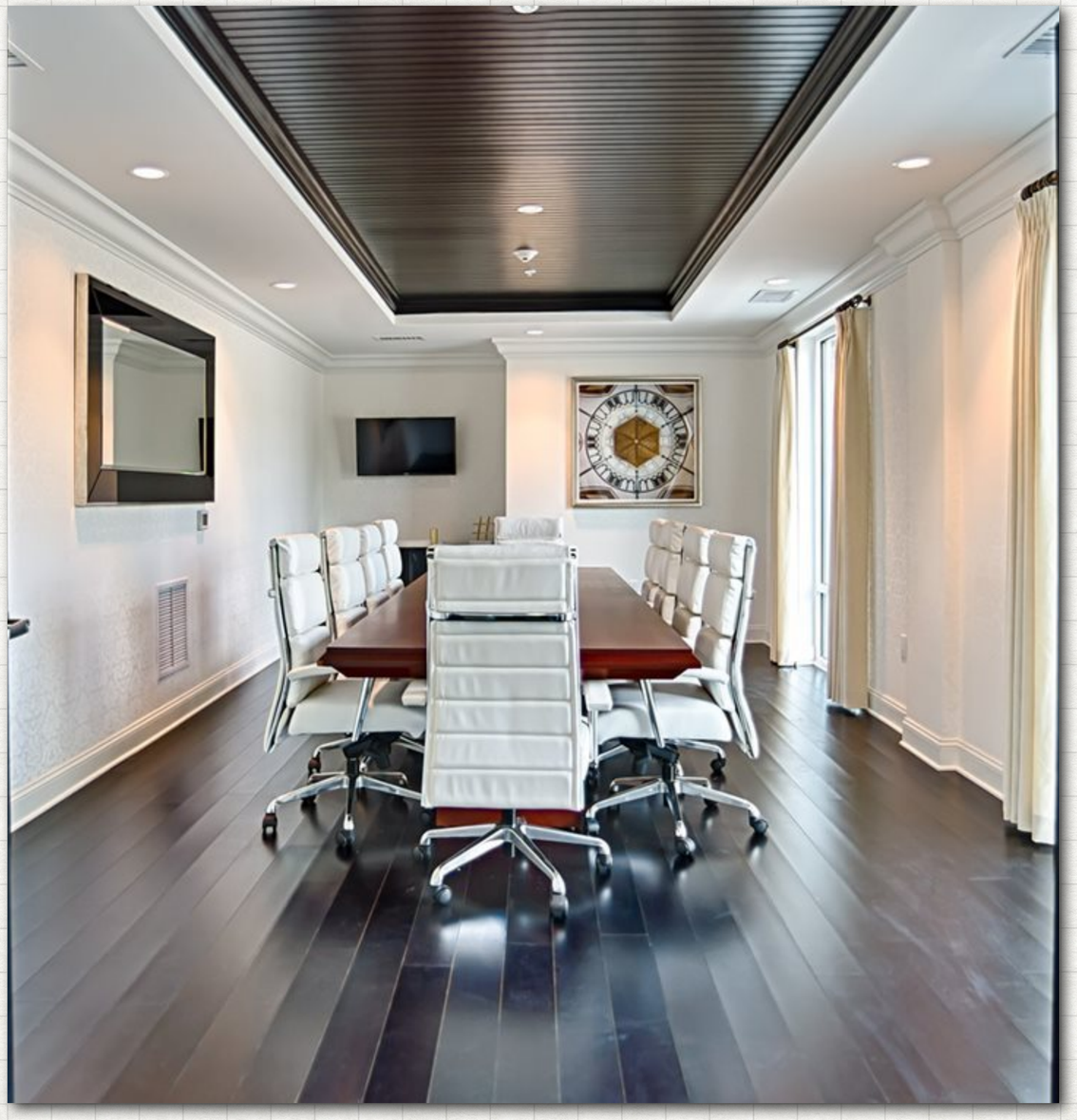
PROJECT COMPLETION

- Total redevelopment project cost: $75 million
  - Largest brownfield in Lower Merion Township
  - First redevelopment project completed under new 2008 zoning ordinance

PROJECT COMPLETION

- $10 million spent on productive reuse, bettering local economy
  - Site cleanup: $2 million
  - Rail bridge restoration, rebuild: ~$4.5 million
  - Sewage pumping plant: $1 million
  - Other improvements
    - Stormwater management
    - Public gathering places, recreational facilities





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