



Let's Go All In
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WESTPORT'S PUMP STATION NO. 2 FORCE MAIN REPLACEMENT PROJECT USING HDD: A CASE STUDY

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**HALEY
ALDRICH**
Tighe & Bond

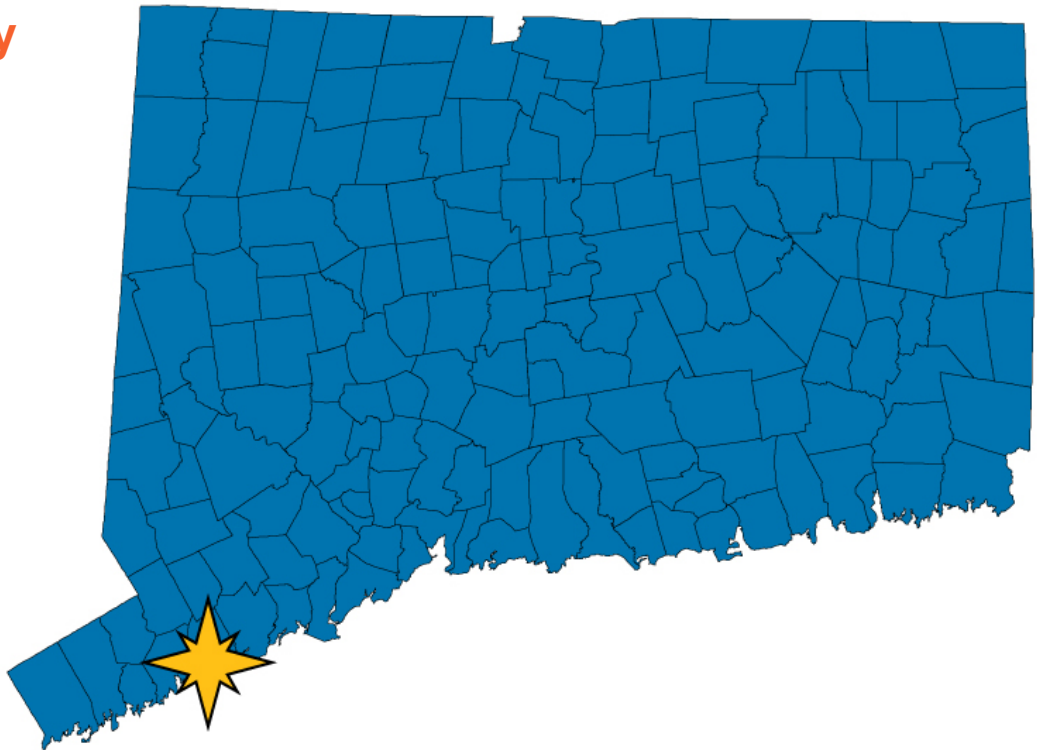
PRESENTATION OUTLINE

- **Town of Westport**
- **Project Impetus**
- **Project Requirements**
- **Project Challenges**
 - Permitting
 - Bid Phase
 - Design
 - Technical
 - Logistical
 - Construction
- **Takeaways**



TOWN OF WESTPORT

- Located southwest CT on Long Island Sound
- Population: 27,000, 40% connected to sewer
- Collection system: 128 miles of sewers and 18 pump stations
- 3.5 MGD Treatment Facility



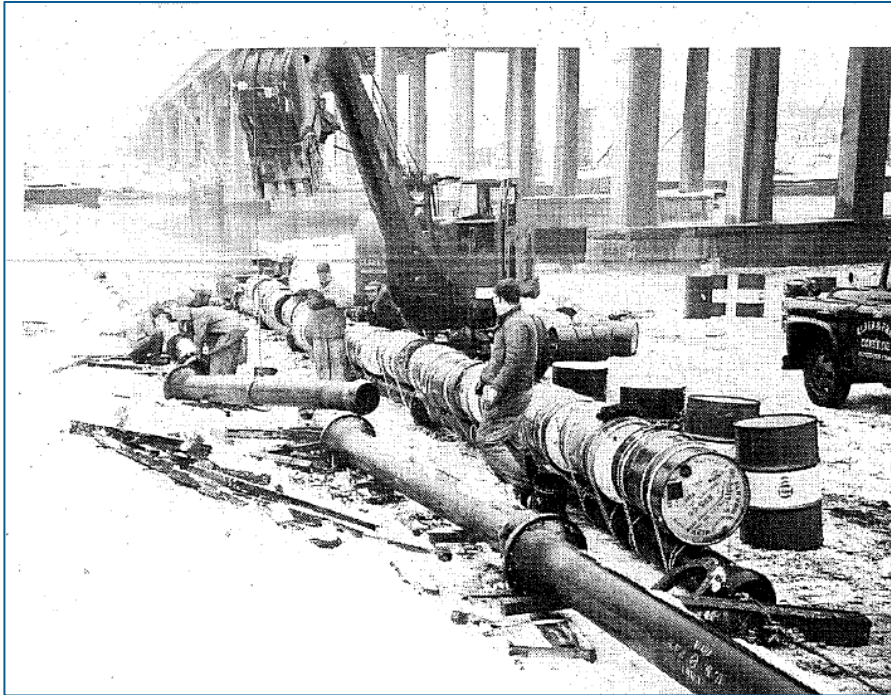
PROJECT IMPETUS

- **Existing force main**

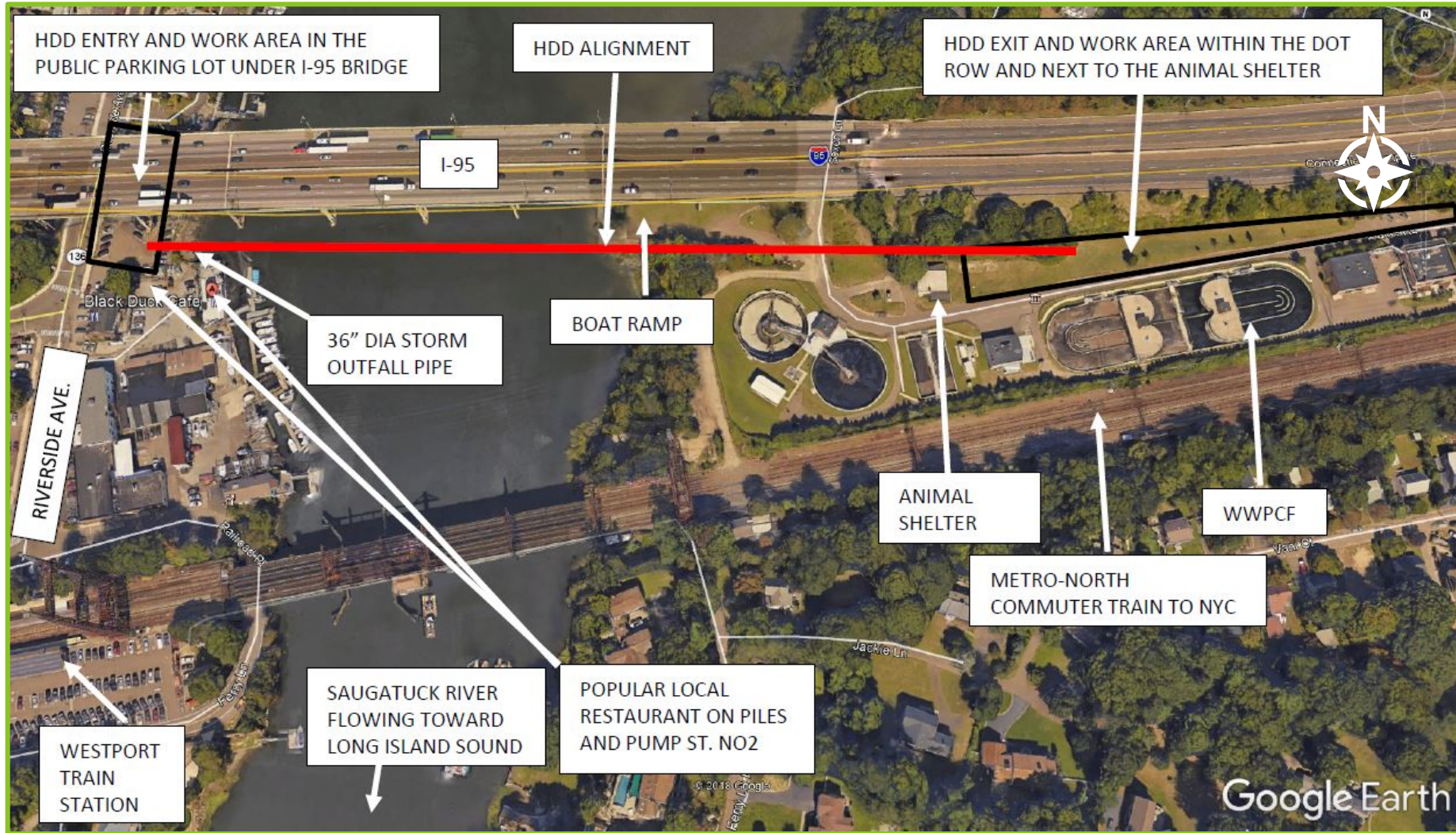
- 10" dia. cast iron force main installed in 1959
- Connects Pump Station No. 2 to WWPCF
- Services 25% of the Town's sewer customers

- **Why replace?**

- Town experienced cast iron force main failures on pipes of similar age
- Proactively maintain and replace critical infrastructure



PROJECT SITE



HDD ALIGNMENT



Looking west to east along the HDD alignment

Looking east to west along the HDD alignment

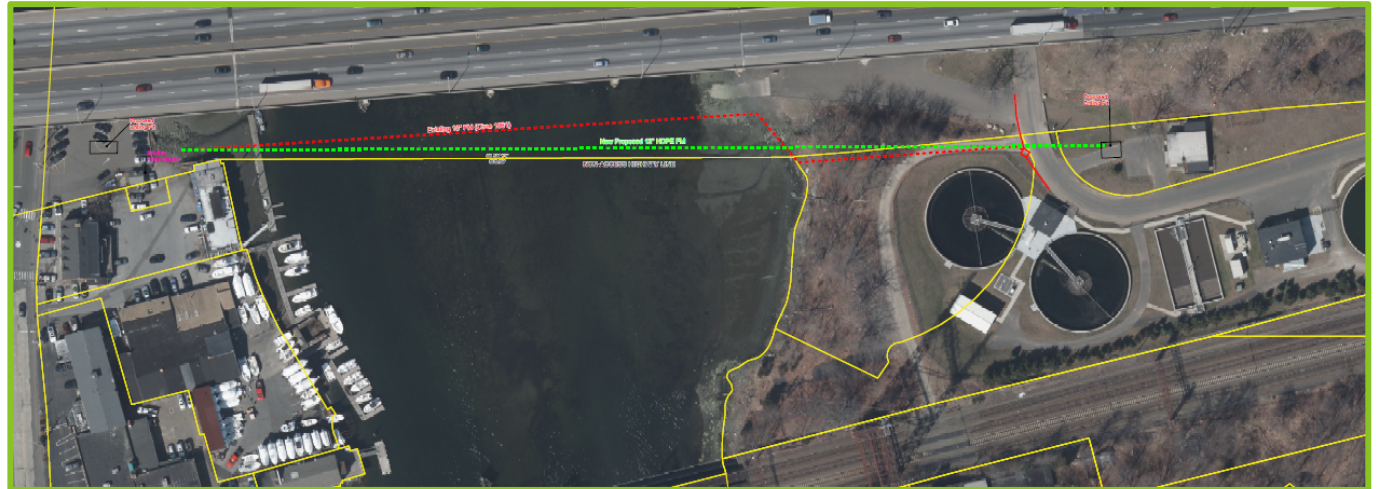


PROJECT REQUIREMENTS

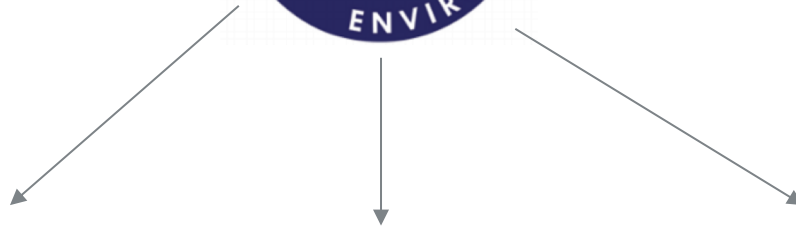
- **Hydraulic requirements**
 - Shared force main
 - Adequate velocity for existing/future pump rates
 - Suitable thickness for HDD
- **Installation requirements**
 - 14" DIPS DR 9 HDPE
 - Approx. 1,300'
 - Trenchless installation
 - Tidal fluctuations in the river
 - Permitting difficulties
 - Logistical reasons

PROJECT CHALLENGES

- **Permitting**
- **Bid phase**
- **Design**
 - Technical
 - Logistical
- **Construction**



PERMITTING CHALLENGES



BID PHASE CHALLENGES

- **Try #1**

- Drilling Work plus piping connections
- Summer Construction
- One bidder

- **Try #2**

- Drilling Work only
- Contractor selects timeframe (meeting permit requirements)
- 3 bidders
- Low bidder: Carson Corporation with bid of \$1.4M



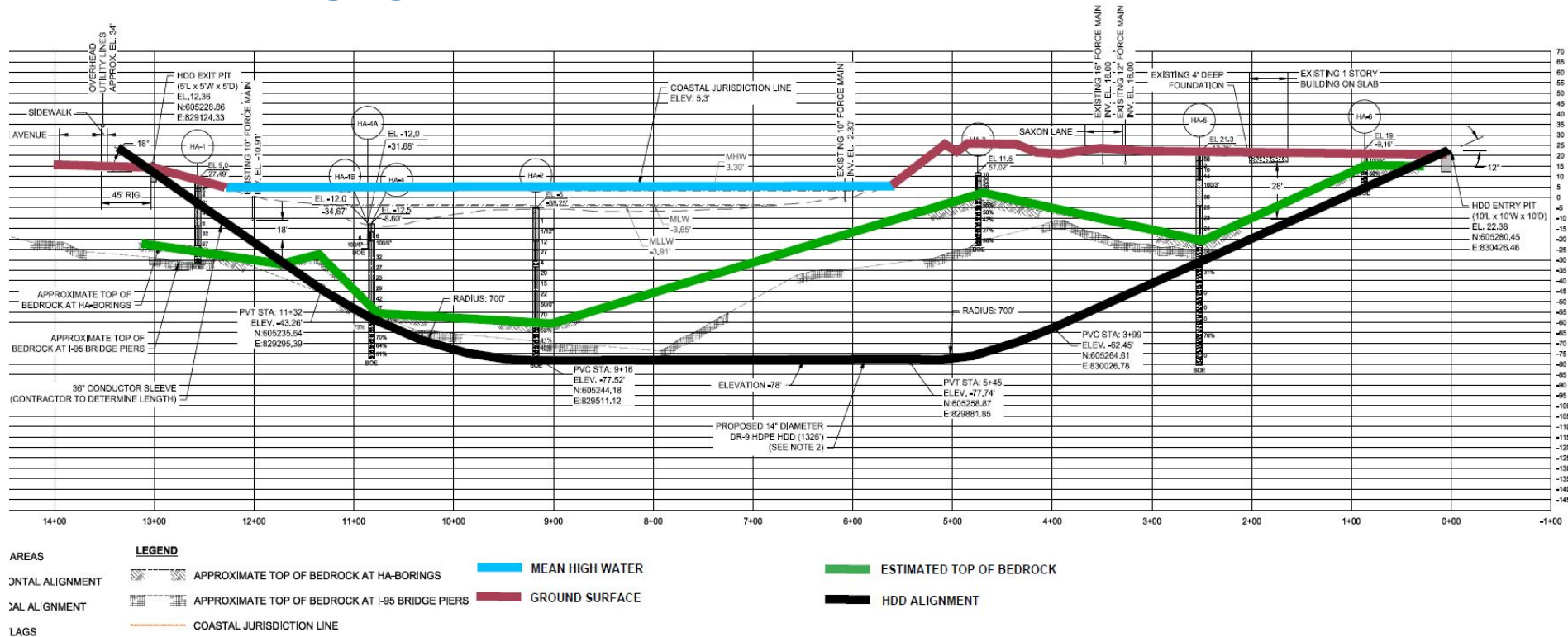
DESIGN CHALLENGES

- **Technical**
 - Subsurface conditions
 - HDD Alignment geometry in bedrock
 - Designing to manage the risk

- **Logistical**
 - Limited work area
 - I-95 bridge
 - Public and vehicular traffic
 - Overhead and underground utilities
 - Commercial establishments
 - Restaurant on piles



HDD DESIGN



- Subsurface exploration plan and findings**

- Fill soils, organic deposits, granular Glaciofluvial deposits overlying Gneissic bedrock
- Bedrock
 - Hard, coarse grained Gneiss
 - Extremely abrasive
 - Unconfined compressive strength of 34,000 psi



SUBSURFACE CONDITIONS

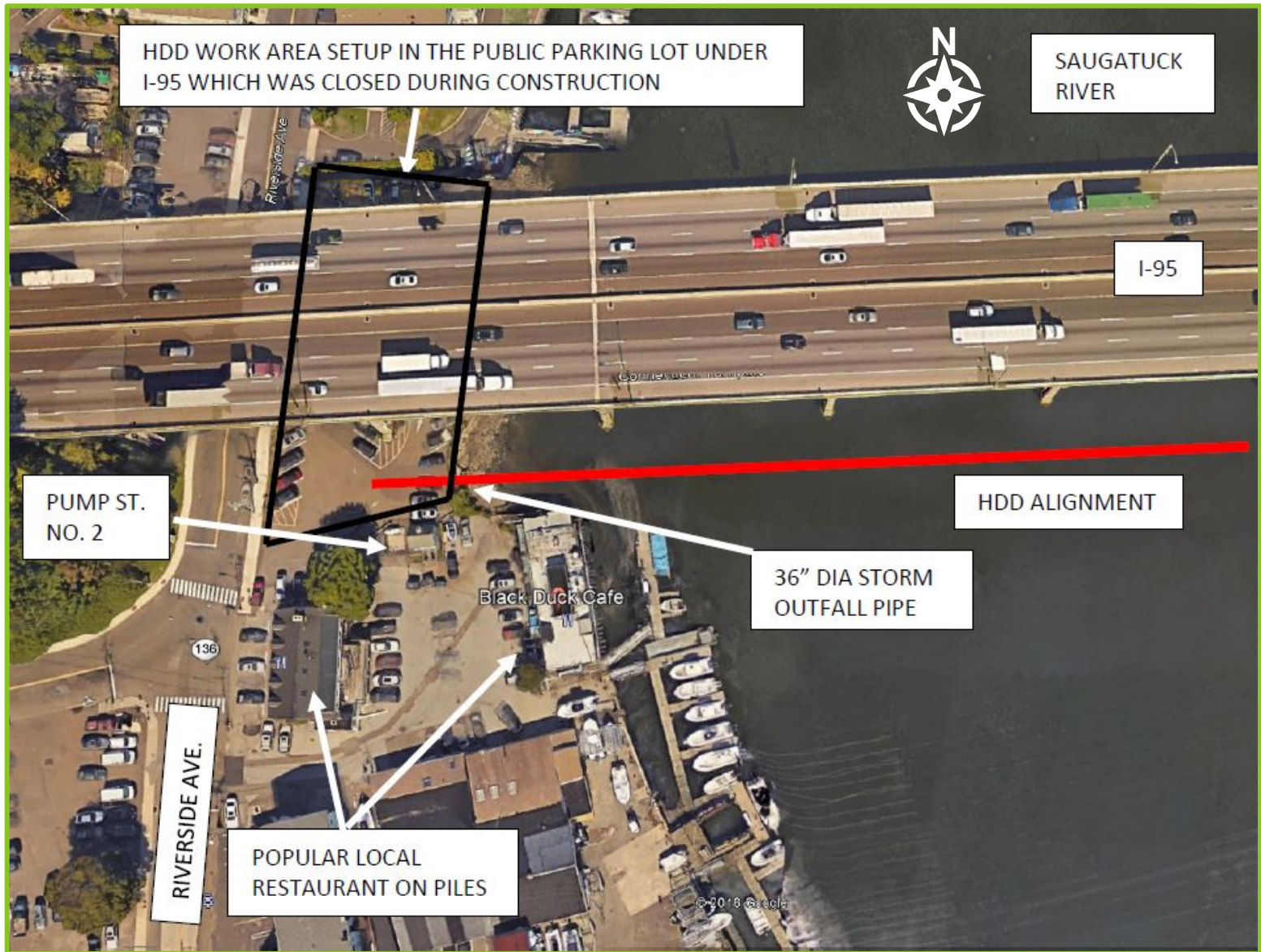


DESIGNING TO MANAGE RISK

- **Extensive subsurface exploration program**
 - Performed adequate test borings offset from the design alignment
 - Performed appropriate rock tests
 - Grouted the test borings to avoid inadvertent returns
- **Engineering**
 - Higher entry and exit angles, so as to drill in conducive subsurface conditions
 - Conductor sleeves
 - Instrumentation program
 - Extensive inadvertent return contingency plan
 - Abrasivity of rock was considered while selecting pipe wall thickness
 - Active construction management program



WEST SIDE LOGISTICAL CHALLENGES



WEST SIDE OVERHEAD UTILITIES



WEST SIDE UNDERGROUND UTILITIES AND WORK AREAS



EAST SIDE LOGISTICAL CHALLENGES



EAST SIDE PIPE ASSEMBLY AND WORK AREA



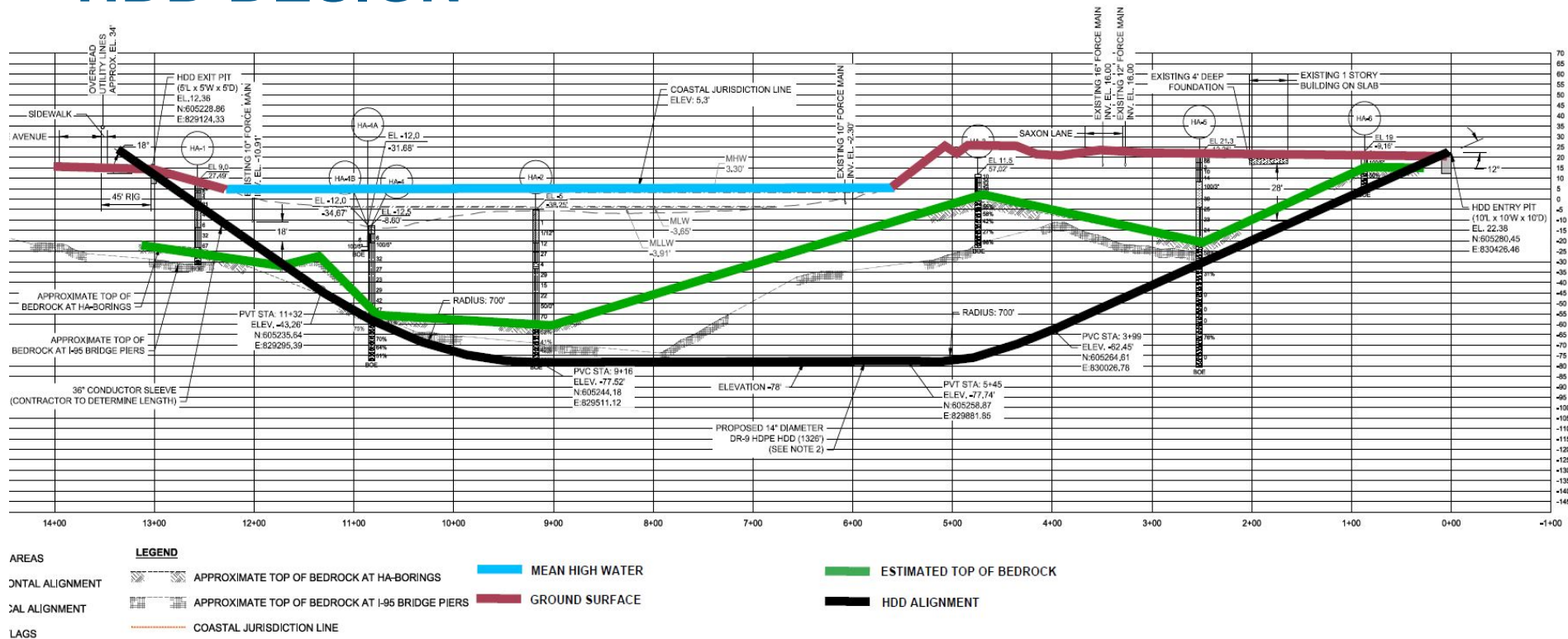
CONSTRUCTION

- **Stages of construction**

- Drill direction – West to east; pipe pull back – East to west
- East side - Install 36" dia. Steel conductor sleeve; West side - Fuse product pipe
- HDD Rig - American Augers D210 ; Pilot hole – 9.625" dia pilot head
- 1st partial ream – 20" dia reamer
- 2nd complete ream – 22" reamer
- Swab – 22" reamer
- Pipe pullback



HDD DESIGN



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PIPE FUSED AND READY ON ROLLERS FOR PULLBACK



FINAL REAM AND PIPE PULLBACK



PULLBACK COMPLETED SUCCESSFULLY



TAKEAWAYS

- **Separate HDD work into separate contract**
 - Avoids overhead charges and increases potential bidders
 - **Drilling Contractors are busy**
 - Keeping schedule flexible may increase bidders
 - **Let Municipalities take charge of certain permits**
 - Ongoing relationships can help speed up approvals
 - **Designing to manage risk**
 - Detailed evaluation of project specific challenges and risks is crucial during the design phase
 - **Active coordination between the owner, construction management team and the contractor**
 - Results in better overall communication and therefore, project success
- 



THANK YOU

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