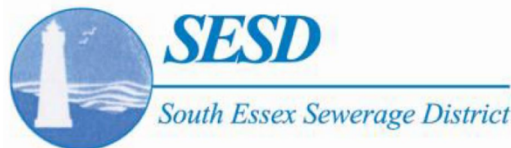


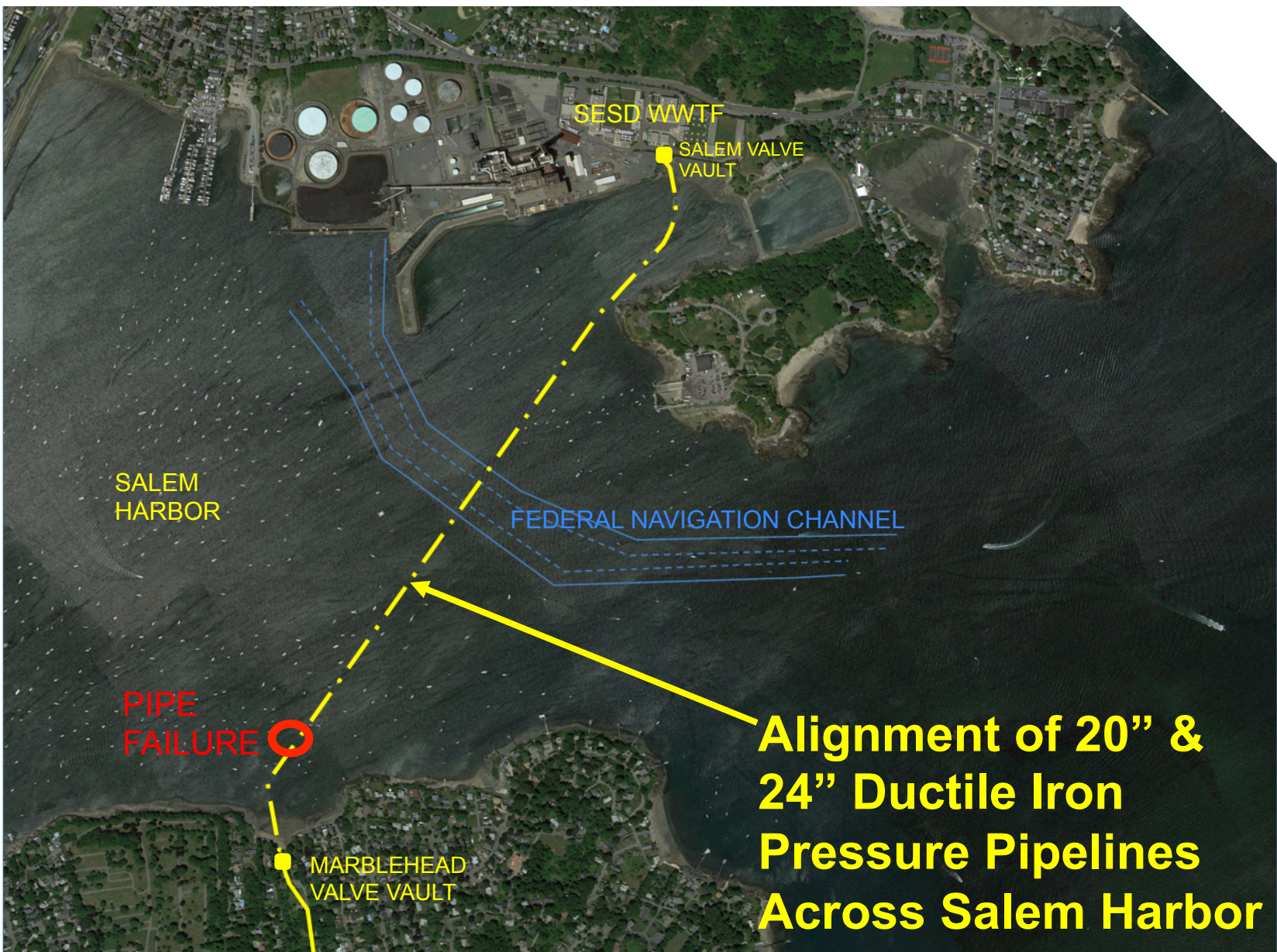
PIPE FAILURE SPURS ACTION

Study, Analysis, Permitting, Design, &
Construction for the

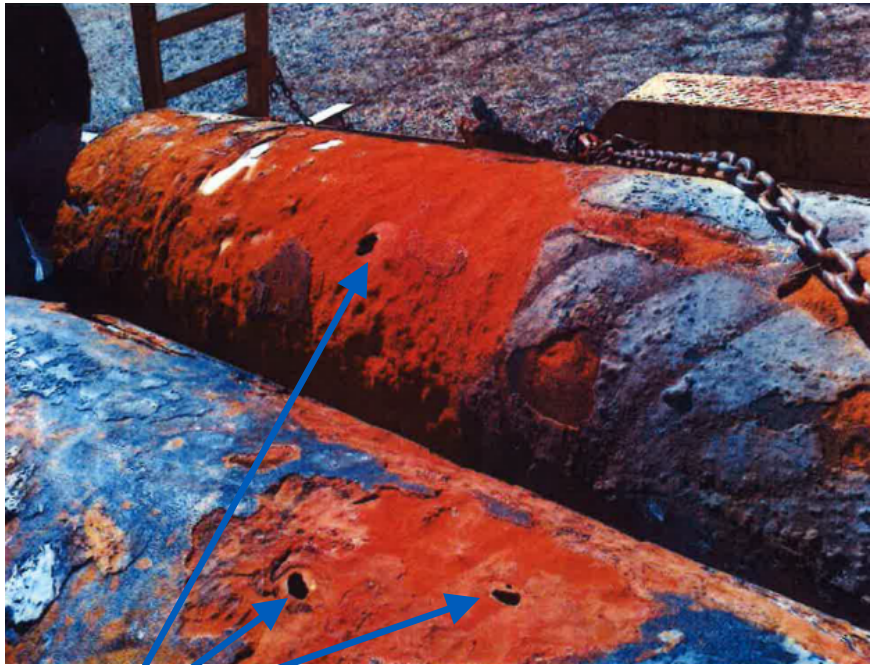
MARBLEHEAD PIPELINES REPLACEMENT PROJECT



**PARSONS
BRINCKERHOFF**



MARCH 2013 EMERGENCY REPAIR



Perforation through DI pipe wall

PROJECT DESIGN TEAM

- **Parsons Brinckerhoff, Inc.**
 - Prime Consultant
 - Project Management / Controls
 - Data Collection
 - Pipeline Alternatives Analysis
 - Hydraulic Analysis
 - Pipeline Design
- **Thielsch Engineering**
 - Ultrasonic Thickness Measurements
- **J. F. White Contracting Company, Inc.**
 - Diving, Underwater Photography
- **Meridian Associates, Inc.**
 - Survey and Bathymetric
- **Alpha Analytical, Inc.**
 - Soils Testing
- **David S. Robinson Associates, Inc.**
 - Underwater Archaeology
- **Ocean Surveys, Inc.**
 - Vibracore sampling
- **John King Associates**
 - Analysis of vibracore samples
- **Alpine Ocean Seismic Survey, Inc.**
 - Bottom seismic and sonar surveys
- **CR Environmental, Inc.**
 - Sonar and drop video surveys
 - Post-construction bathymetric survey
- **AECOM**
 - Eelgrass surveys



EXISTING PIPELINES CONDITION ASSESSMENT PROGRAM

*Marblehead Force Main Condition Assessment and Repair Project
Phase A*

*Summary Report No. 1
Condition Assessment Summary Report*

December 2013



Prepared for:
South Essex Sewerage District
Salem, Massachusetts



Prepared by:

Parsons Brinckerhoff, Inc
Boston, Massachusetts

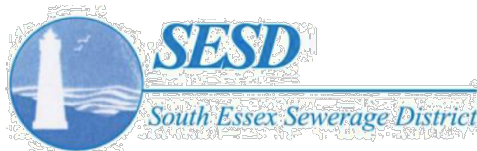
**PARSONS
BRINCKERHOFF**

Direct Observations and Measurements

- Expose ductile iron pipelines/
underwater photos
- Ultrasonic thickness measurements

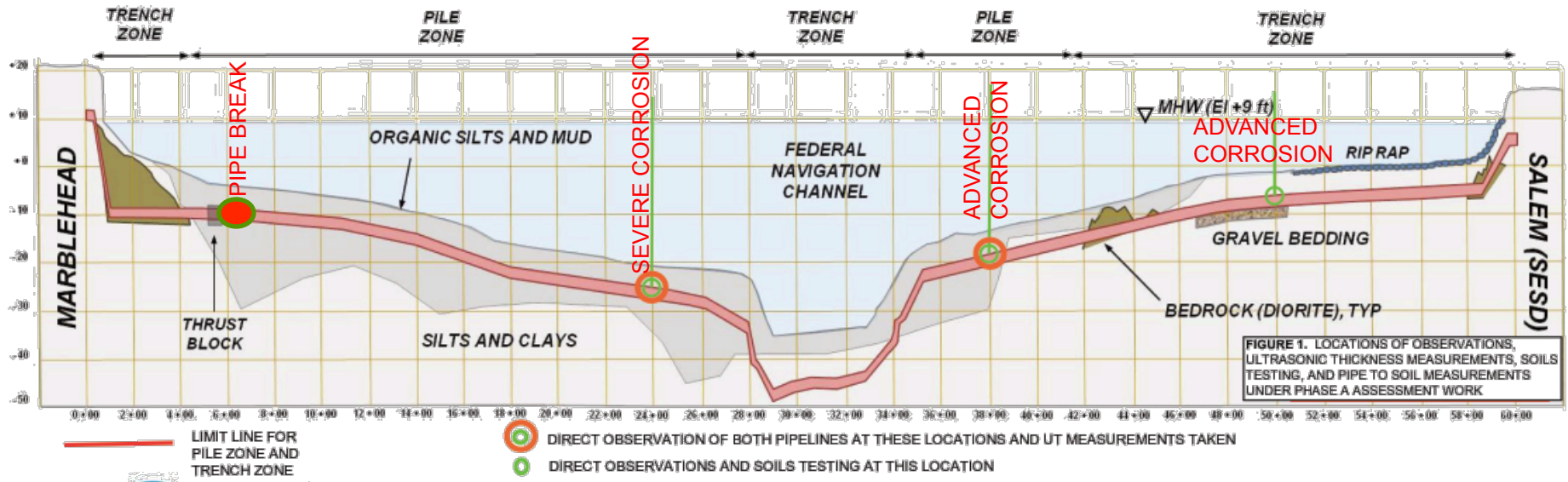
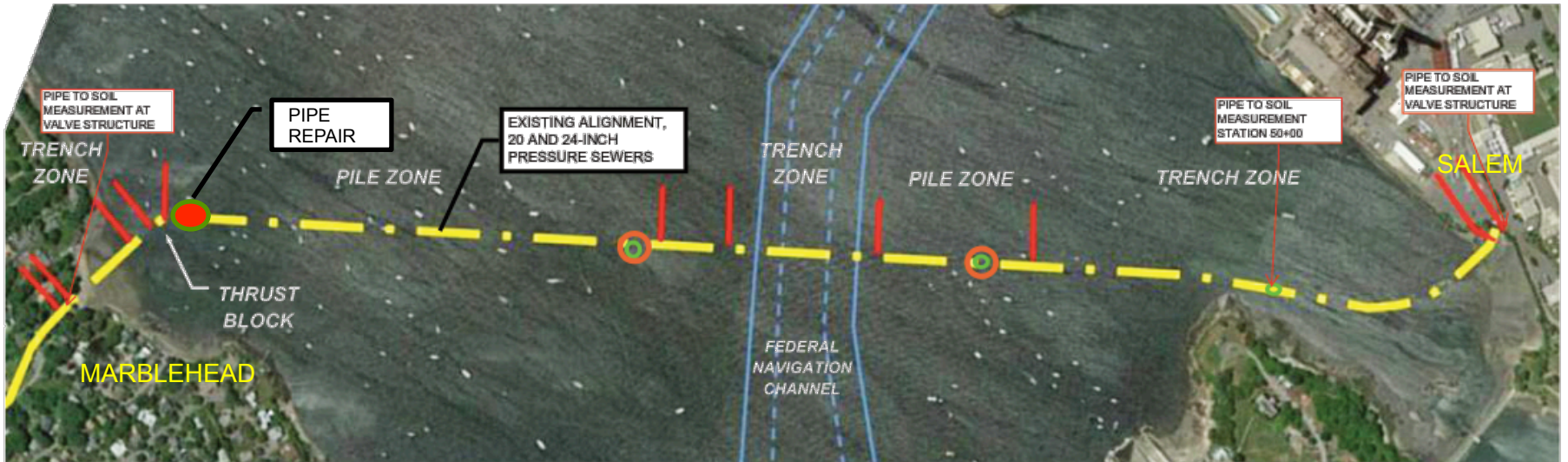
Data Collection

- Geotechnical evaluation
- Soils testing for corrosivity
- Sediment testing for disposal
parameters
- Metallurgical evaluation



**PARSONS
BRINCKERHOFF**

CONDITION ASSESSMENT PROGRAM AND SUMMARY FINDINGS



REPAIR AND REPLACEMENT ALTERNATIVES

REPAIR

SLIPLINE EXISTING DI PIPES
CURED IN PLACE LINER

REPLACEMENT

REPLACE IN KIND (DI PIPE)
DIRECTION DRILL

DIRECT BURY NEW HDPE PIPE SYSTEM

RECOMMENDED PLAN

- Provides best long-term solution and service life
- Butt-fusion provides continuous pipeline, minimizes joints
- Shortest lead time
- Lowest risk to environment, cost



RECOMMENDED PLAN

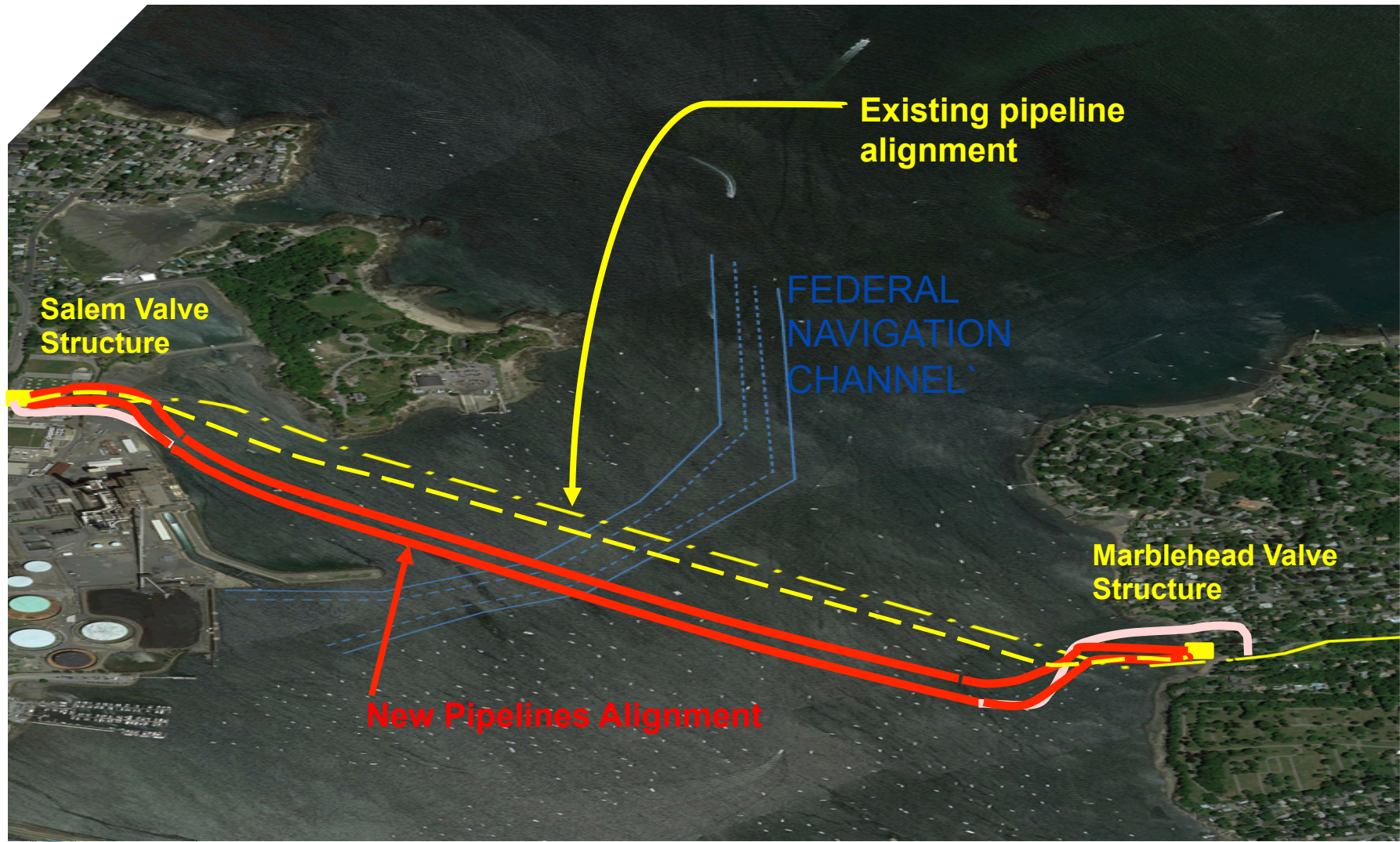
INSTALL NEW HDPE DUAL PIPE SYSTEM COAST TO COAST

- Dual HDPE 24” DR 11 Pipes
- Offshore Parallel Alignment with Dredging/Sidecasting
- Float & Sink Installation
- Utilize Rock Trenches in Nearshore areas (no blasting!)
- Temporary Bypass

- **Permitting Issues**
 - Federal Shipping Channel (USACE)
 - Water Quality/Eel Grass/ Winter Flounder (MA DEP, Fisheries)
 - Time of Year Restriction TOYR (April 15- June 15)
 - MEPA ENF Process
 - Chapter 91 Filing
 - Historical/Archeology (MHC/BUAR)
 - Local Conservation Commissions (Salem and Marblehead)



PHASING PLAN FOR INSTALLATION



FINAL DESIGN, BIDS & AWARD

DESIGN COMPLETE OCTOBER 2014

BIDS RECEIVED NOV. 2014

→ Caldwell Marine International LLC

- \$9.38M

→ Weeks Marine, Inc

- \$11.96M

AWARD TO CALDWELL MARINE INT'L NOV. 19, 2014

*Construction Costs Covered by Loan from SRF
Program through DEP in Amount of \$10.59 million*



CONSTRUCTION CHALLENGES

- RECORD BREAKING WINTER: 110 INCHES OF SNOW (43 AVERAGE)
- PUBLIC SAFETY/BOAT TRAFFIC, MOORINGS MAINTENANCE IN BUSY RECREATIONAL HARBOR DURING WARM MONTHS
- TIGHT CONSTRUCTION WINDOW ASSOCIATED WITH TOYR



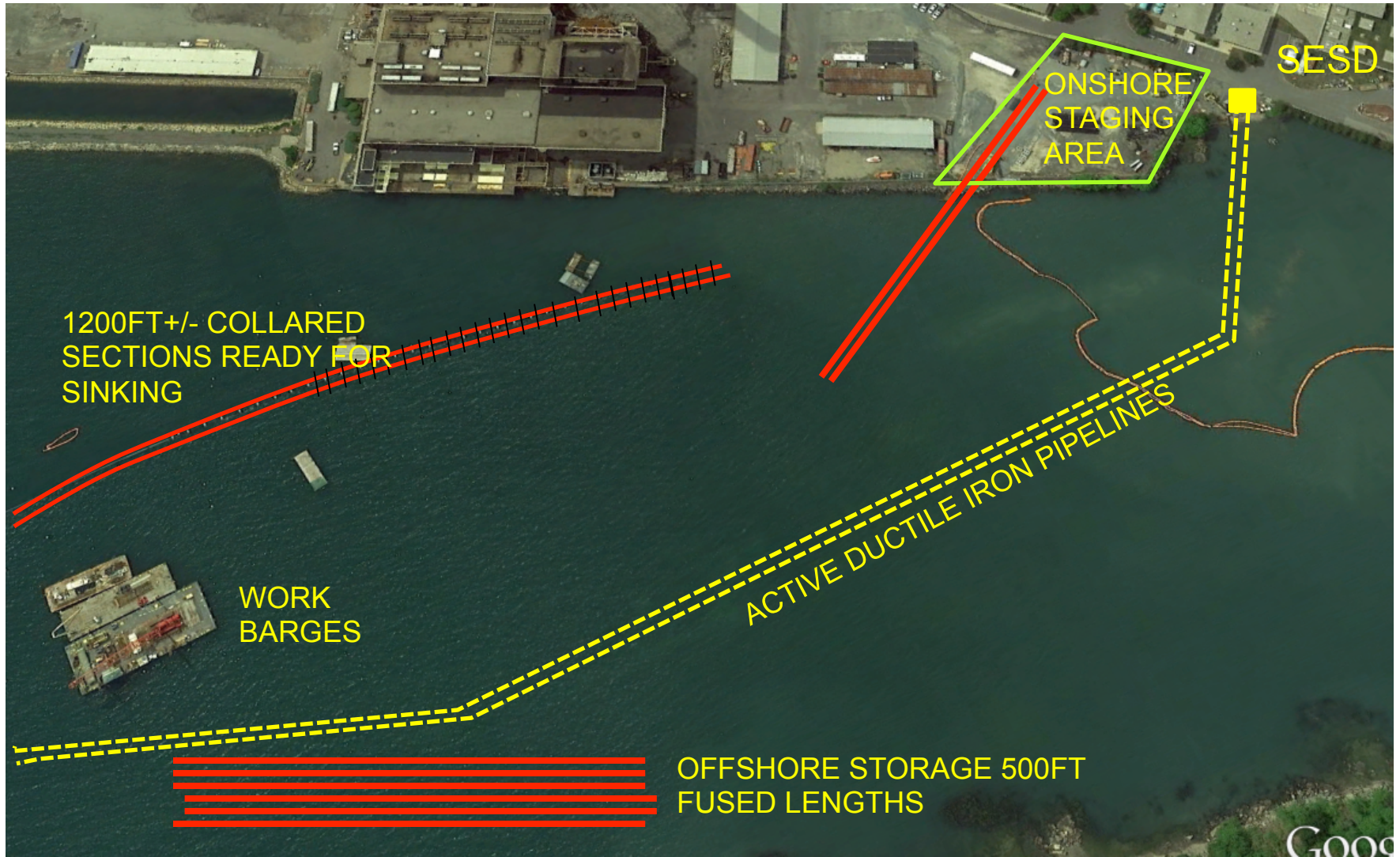
CONSTRUCTION SCHEDULE

ACTIVITY		2014		2015												
		Nov	Dec	Jan	Feb	Mar	April	May	June	July	August	Sept	Oct	Nov	Dec	
AWARD CONTRACT TO CMI		█														
MOBILIZE			█													
DREDGING OF TRENCH IN HARBOR				█	█	█	█	█	█	█						
PIPELINE SYSTEM ASSEMBLE AND INSTALL																
	DELIVERY OF PIPE AND CONCRETE COLLARS				█	█	█	█	█	█						
	BUTT FUSING AND TESTING				█	█	█	█	█	█						
	OFFSHORE INSTALL DUAL COLLARS AND FLOAT						█	█	█	█						
	FLOAT AND SINK OFFSHORE PIPELINES						█	█	█	█						
	INSTALL LINESSTOP AND BYPASS VALVE						█	█	█	█						
	INSTALL AC COUPLING						█	█	█	█						
	PIPE TEST /ROV INSPECTIONS						█	█	█	█						
	ACTIVATE TEMPORARY BYPASS PIPE						█	█	█	█						
	BACKFILL PIPELINES						█	█	█	█						
	BOTH PIPELINES MADE OPERATIONAL						█	█	█	█						
	PRESSURE TESTING OF PIPELINE						█	█	█	█						
	SUBSTANTIAL COMPLETION						█	█	█	█						
	SURFACE RESTORATION (THRU 2016/PLANTING SEASON)										█	█	█	█	█	█

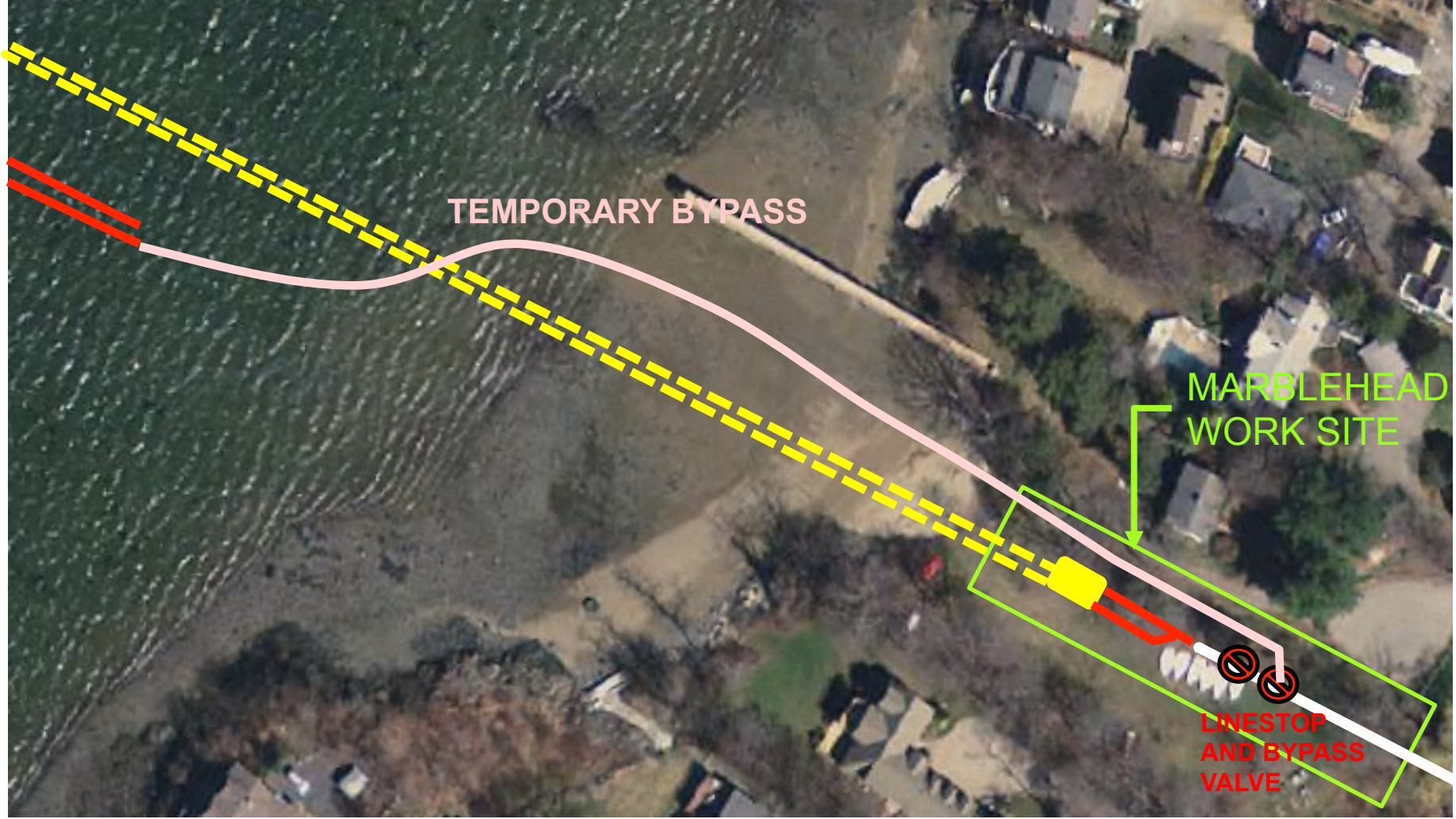
TOYR



OFFSHORE CONSTRUCTION STAGING



MARBLEHEAD NEAR AND ONSHORE CONSTRUCTION



DREDGING

→ **Sidecasting**

→ **Environmental Protection**

- Eel grass
- Turbidity monitoring
- Double Silt Curtain
- TOYR (April 15- June 15)



HDPE PIPE JOINTS

- Primary Method Butt Fusion
- Limit electrofusion couplings
- Hastelloy Couplings



FLOAT & SINK (VIDEO)

- Onshore Fusion of 50 ft lengths pipe
- Offshore Fusion of 500 ft segments
- Offshore Installation Concrete Collars
- Sinking of 1400 ft Collared Segments

17



TEMPORARY BYPASS (AT SALEM VAULT)

→ Installation of pipe in
“existing” trench

- Avoid blasting/rock removal



TEMPORARY BYPASS (AT MARBLEHEAD SHORE)



INSTALLATION QUALITY AND VERIFICATION

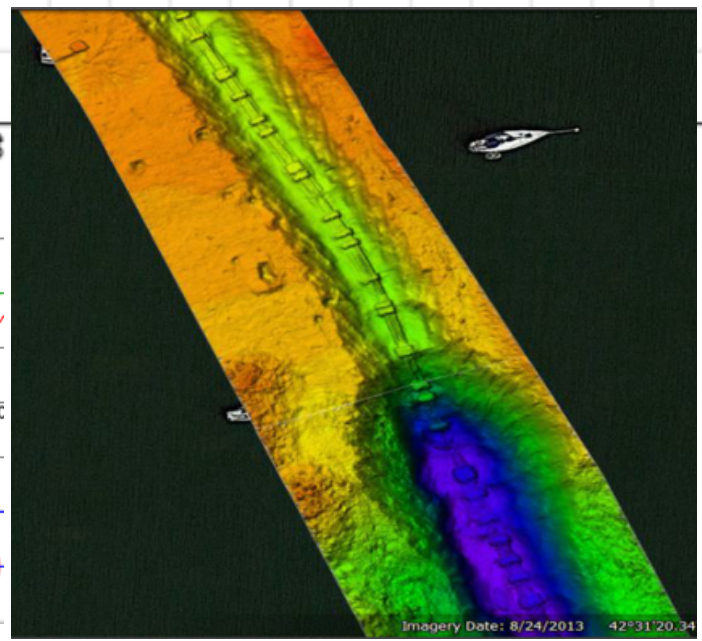
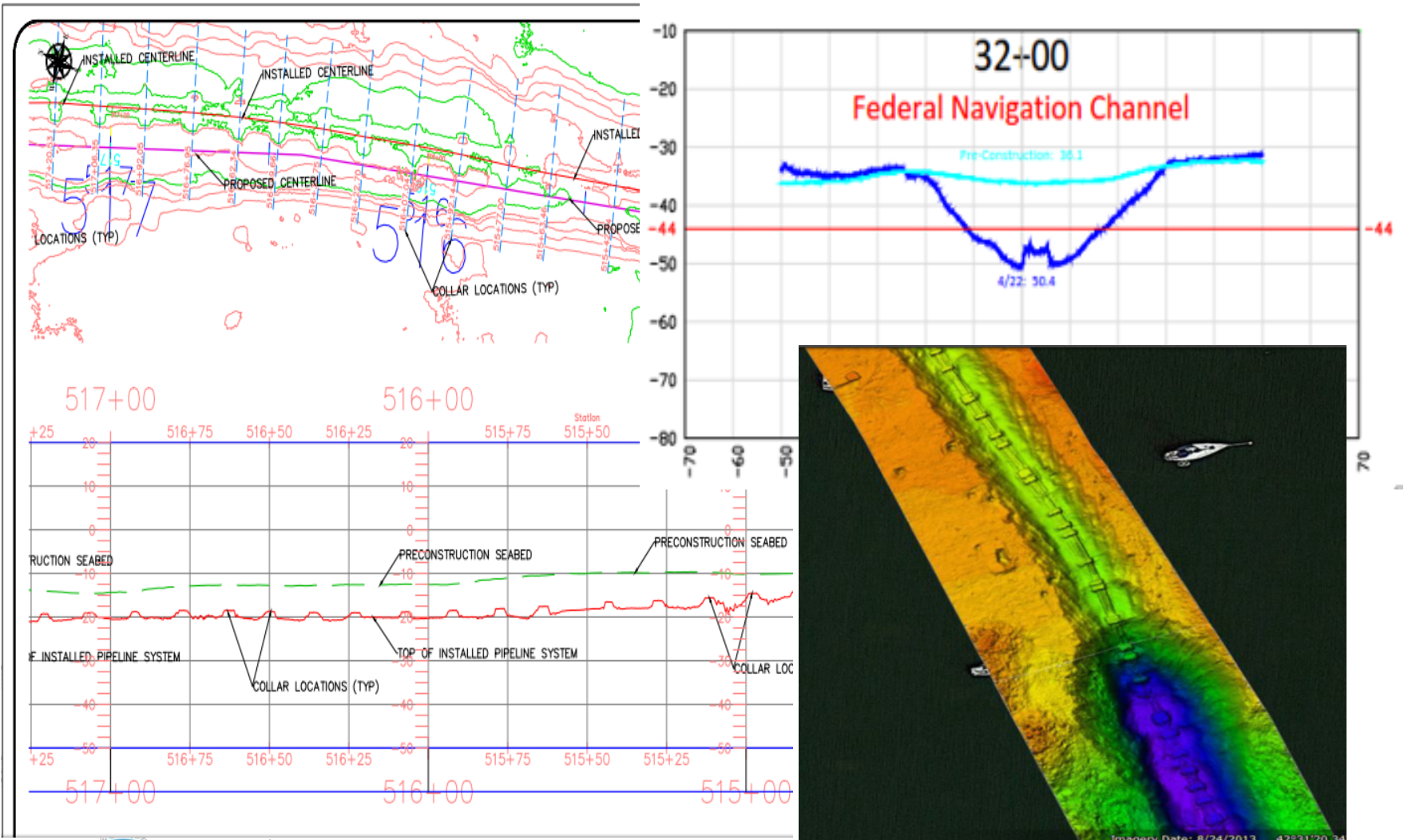
ONSHORE/ ABOVE SURFACE

- Onshore Air Test of 500-foot butt-fused sections
- Off-shore air pressure testing of 1200-ft lengths (or more)
- Pressure Testing Prior to Activation of Temporary Bypass

SUBAQUEOUS/SUBSURFACE

- Pre-sink bathymetry of trench
- Post-sink bathy and sonar profiling of trench and pipe in plan, profile and section, pre-backfill
- ROV Inspection each pipeline pre-backfill and Post-backfill
- Pressure Testing Coast to Coast, each line

OFFSHORE PLAN, PROFILE AND SECTION VERIFICATION (PRE AND POST-SINK)



ROV INSPECTION COAST TO COAST

→ CCTV AND PROFILING SONAR TO CONFIRM ROUNDNESS OF EACH PIPE AT 25FT INTERVALS



HYDRO-PRESSURE TEST




Jul 24, 2015 8:28 AM

BACKFILL IN NEARSHORE AREAS AND SURFACE/ BEACH RESTORATION



CONCLUSIONS/LESSONS LEARNED

- 
- DIRECT BURY APPROACH VS. HDD
 - WORK WITH PERMITTING AGENCIES
 - CONSTRUCTION WORK PLAN
 - UNCERTAINTIES RELATED TO UNDERWATER/
MARINE CONSTRUCTION

THANK YOU
QUESTIONS?

