UPPER GOWANUS CANAL
Cleanup Sequence

U.S. Environmental Protection Agency

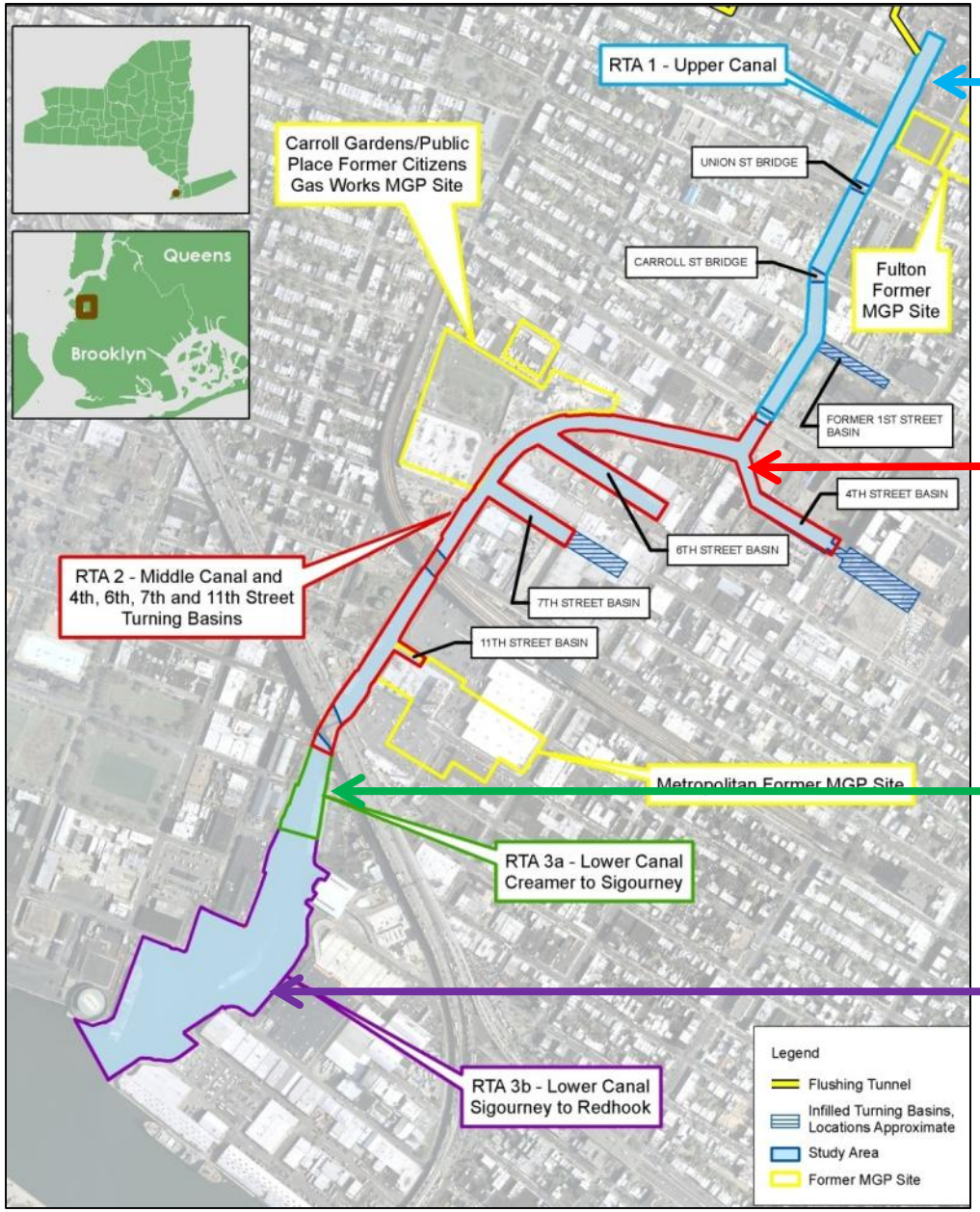
Region 2, New York, NY

CAG Meeting, FEBRUARY 25, 2020

Background

The Clean up Plan

Remediation Target Areas (RTAs)



RTA 1
Upper Canal
Intermediate level of contamination

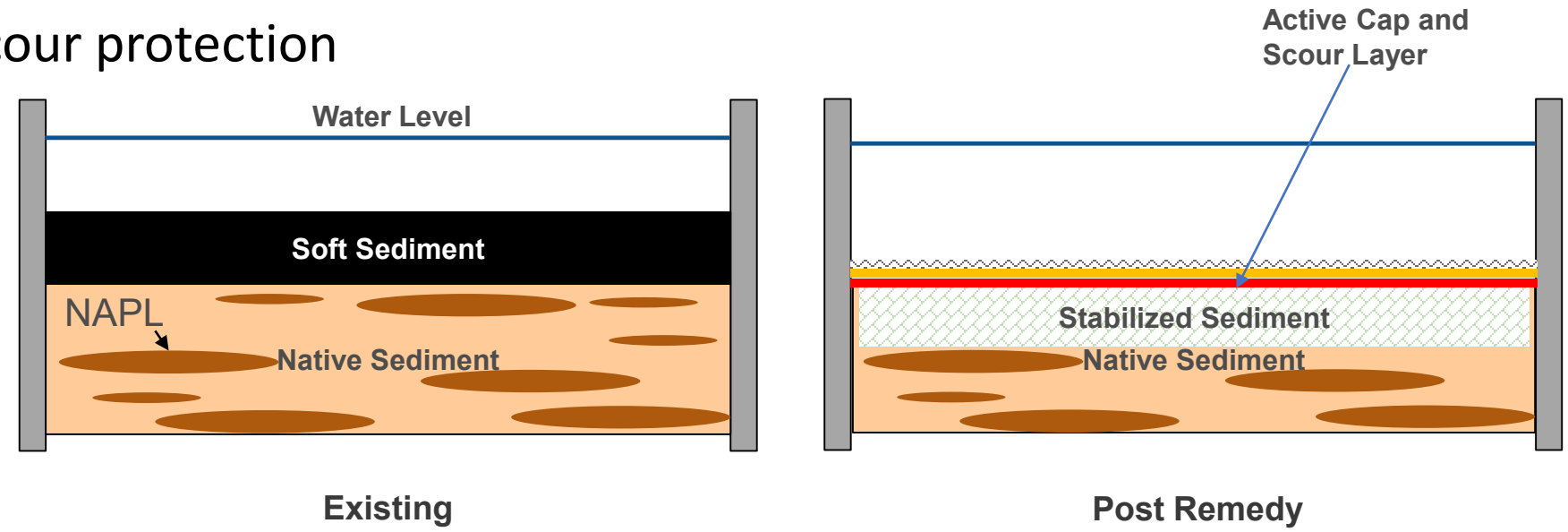
RTA 2
Middle Canal
Highest level of contamination

RTA 3a
Lower Canal
Lowest level of contamination, <u>shallower</u>

RTA 3b
Lower Canal
Lowest level of contamination, <u>deeper</u>

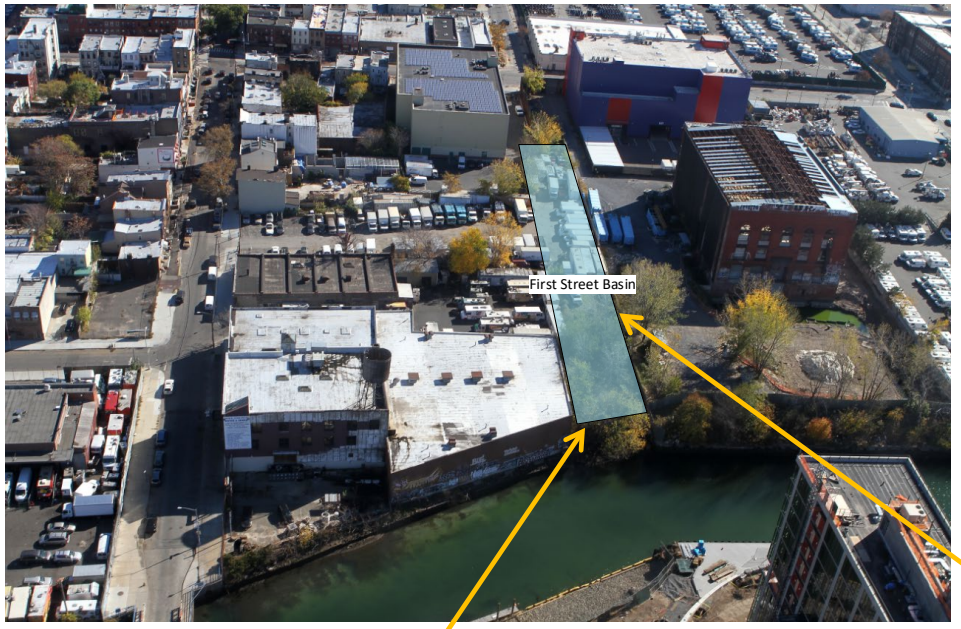
The Selected Canal Remedy

- Selected Remedy Summary
  - Soft sediment removal
  - ISS 5 feet of native sediment in select areas in RTA1 and RTA2
  - Active cap
  - Scour protection



Conceptual Layout of Capping and *In-Situ* Stabilization

First Street Turning Basin (TB-1) in RTA1



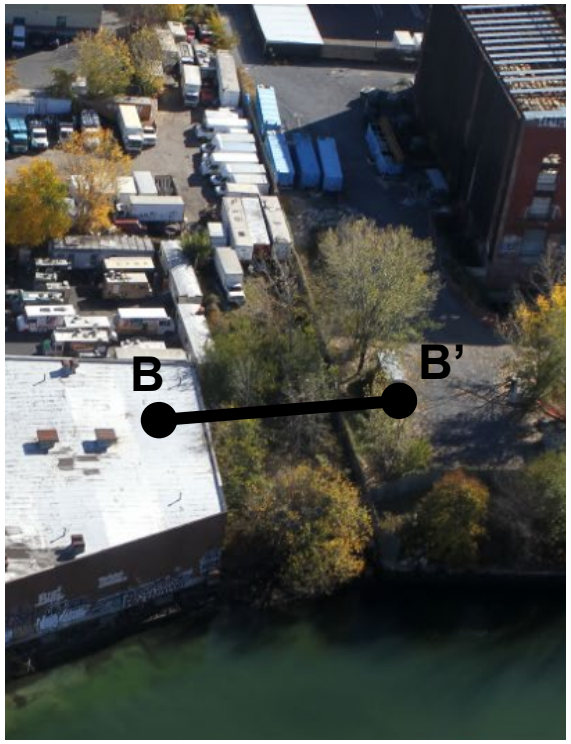
- Restoration required by Record of Decision

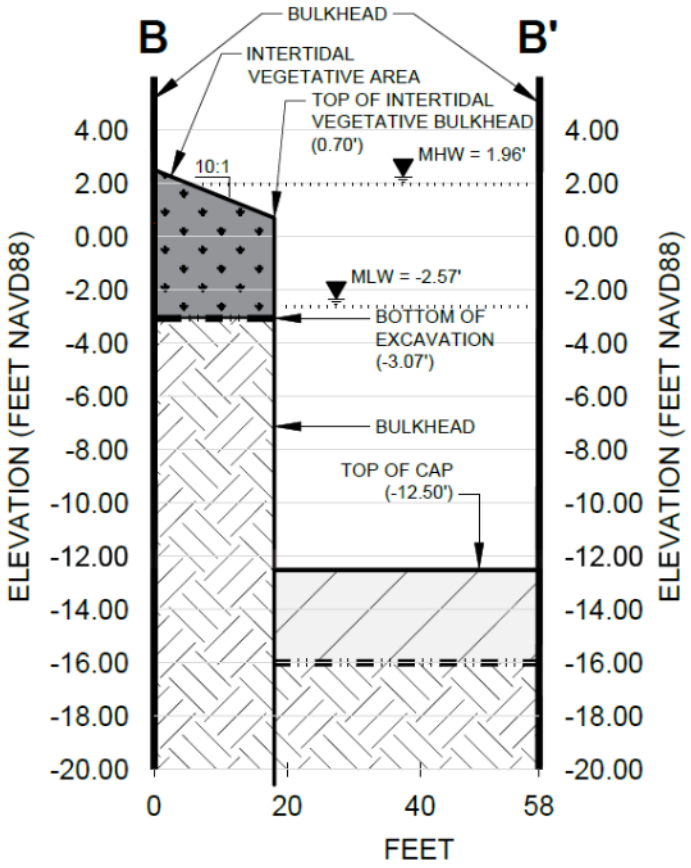
- Approximately 475 feet of the historic basin will be restored

- Restored basin will connect with main Canal

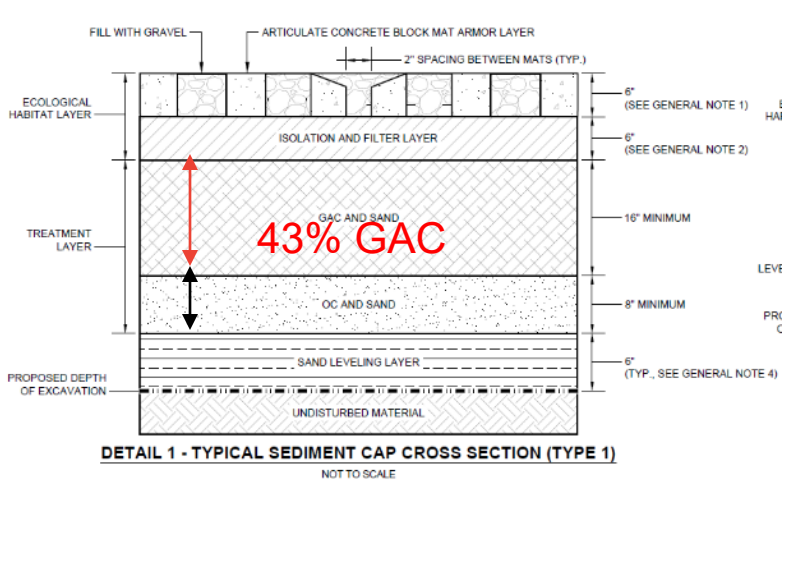
Design of ISS and Cap

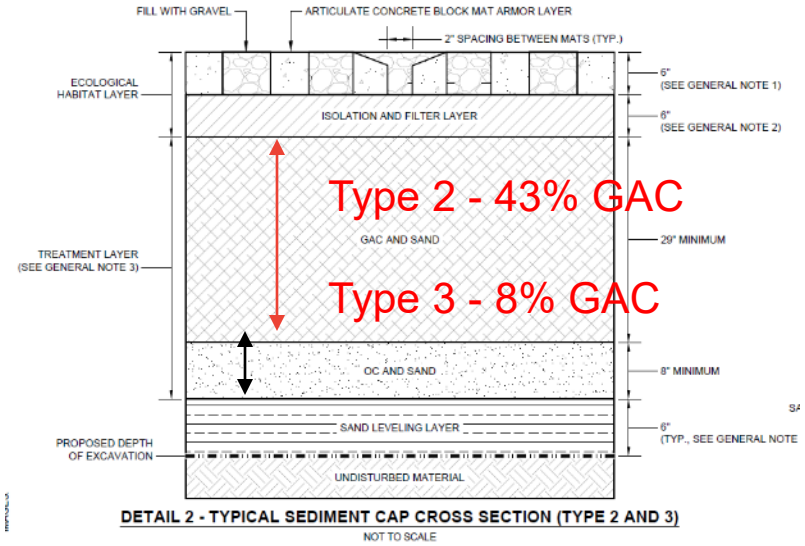
Wetland Shelf and Open Water





TB-1 Cap Types

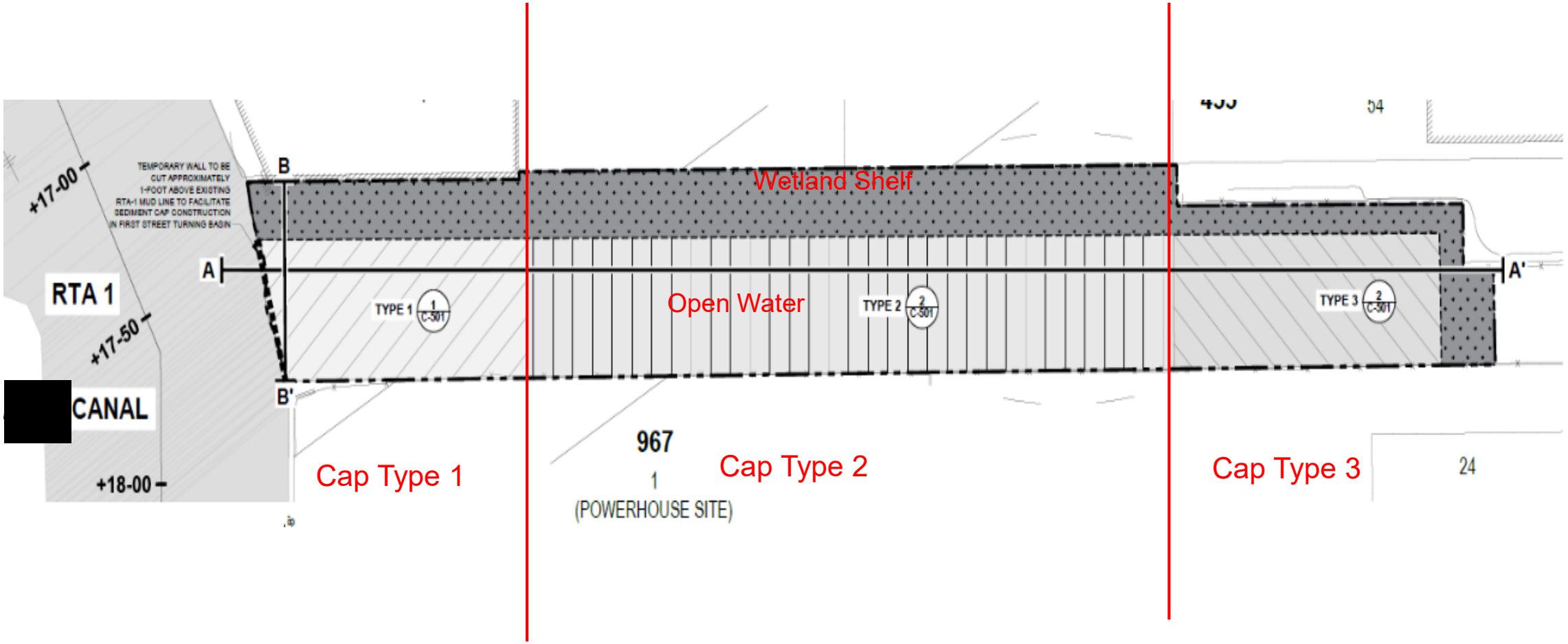




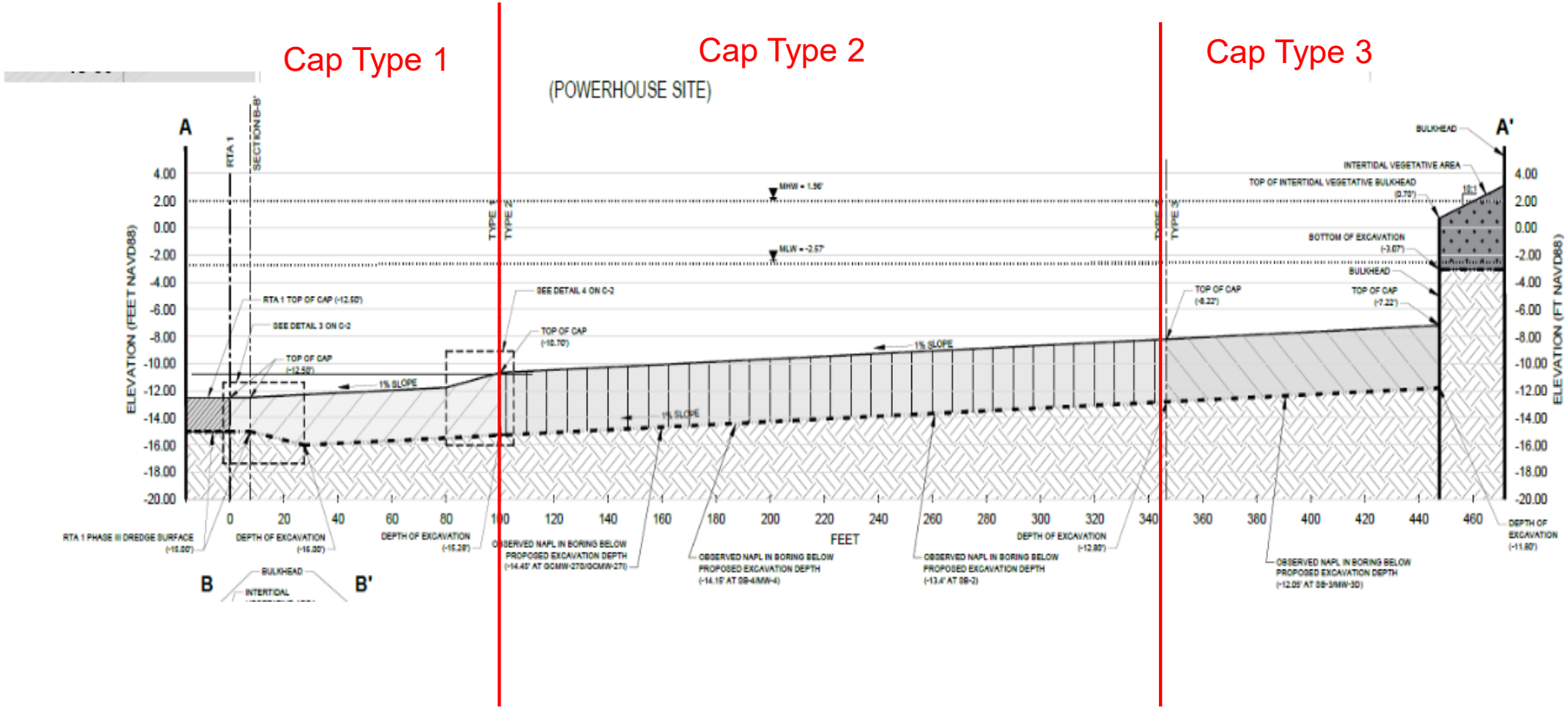
↕ Oleophilic clay layer (25% clay) used on all cap types

↕ Granular activated carbon and sand layer thickness and carbon content varies to match expected dissolve phase flux through the cap

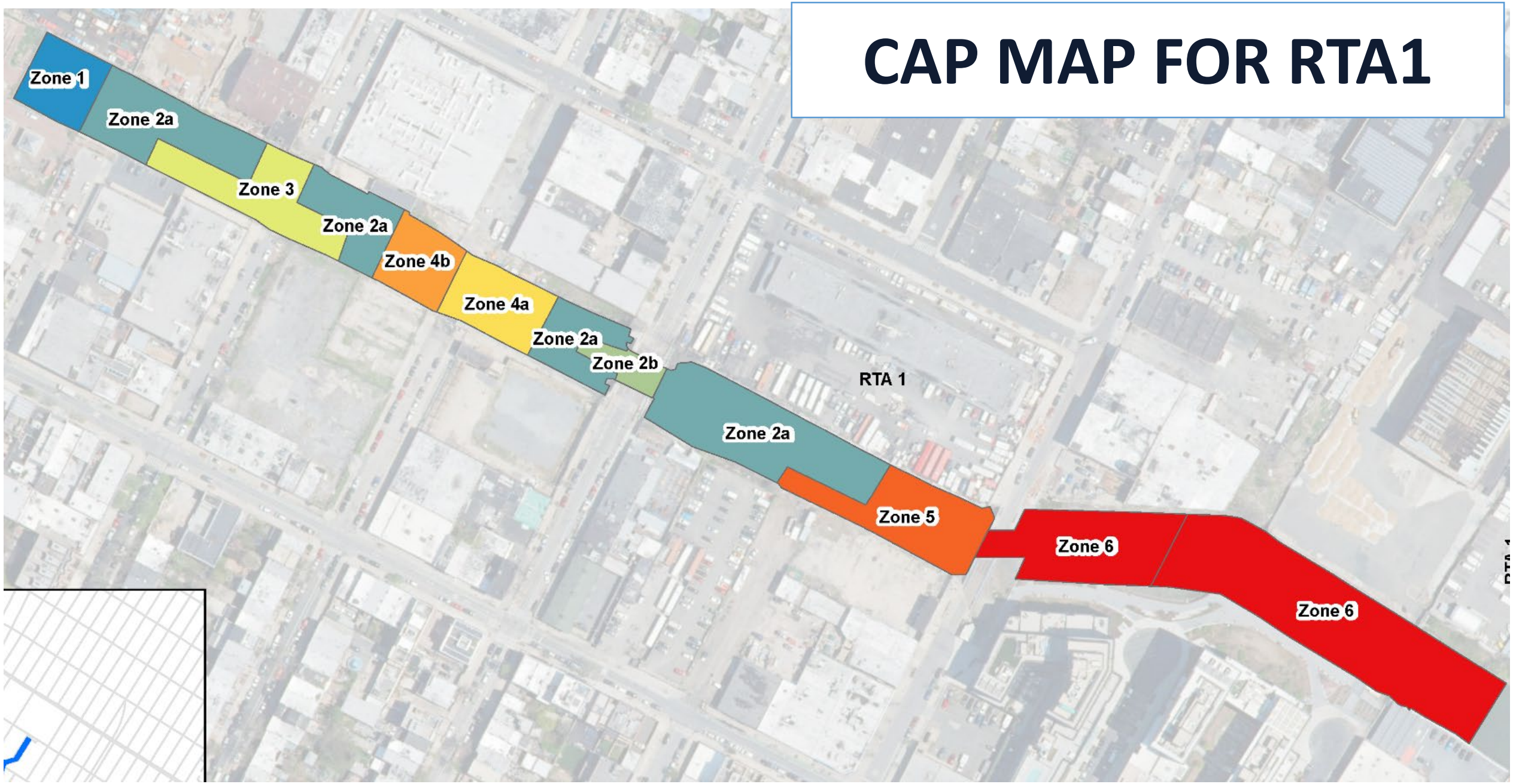
TB-1 Cap Plan View



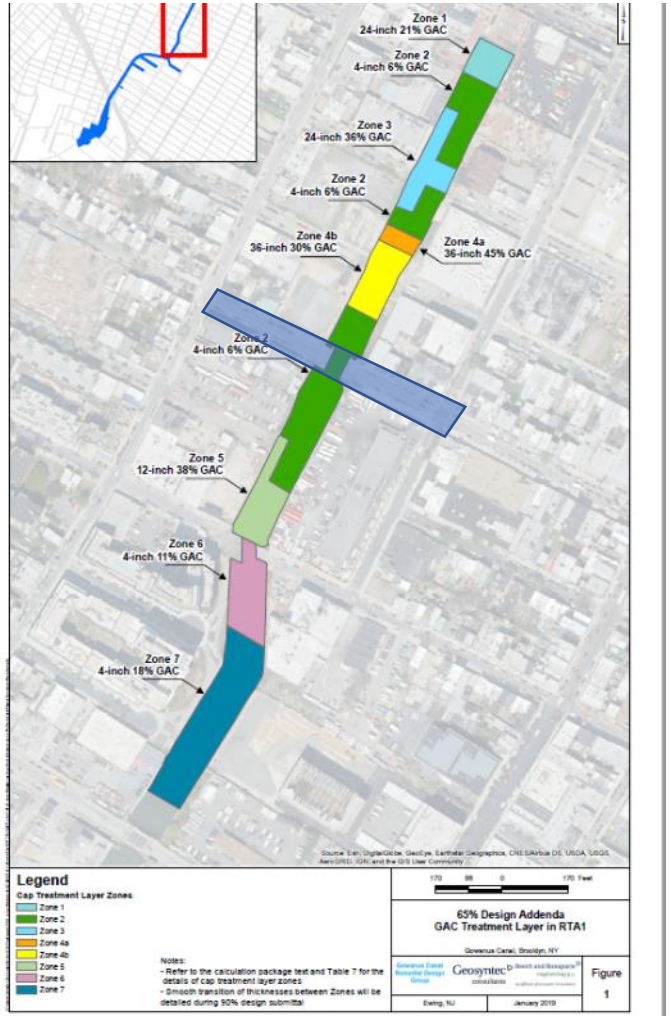
TB-1 Cap Profile

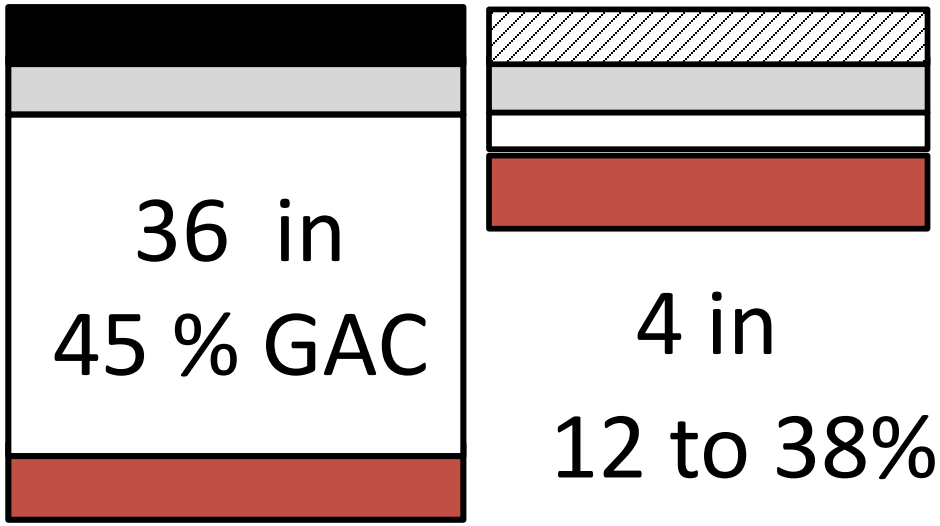


CAP MAP FOR RTA1



Example of Thickness and Composition of Cap Layer

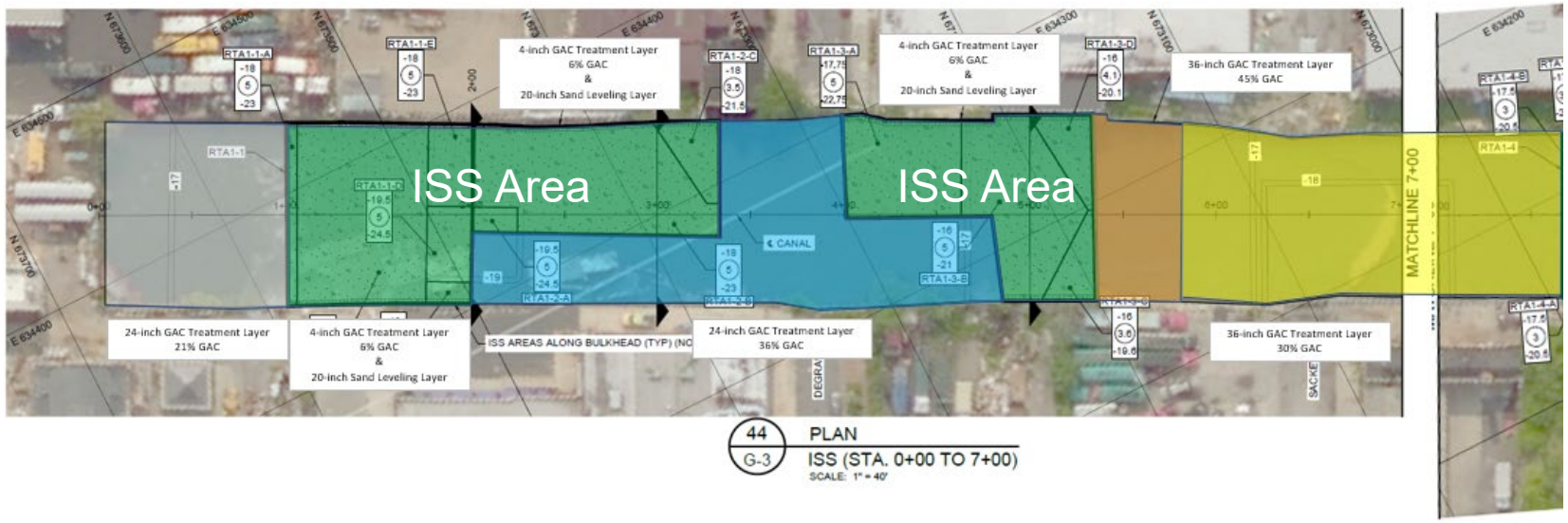


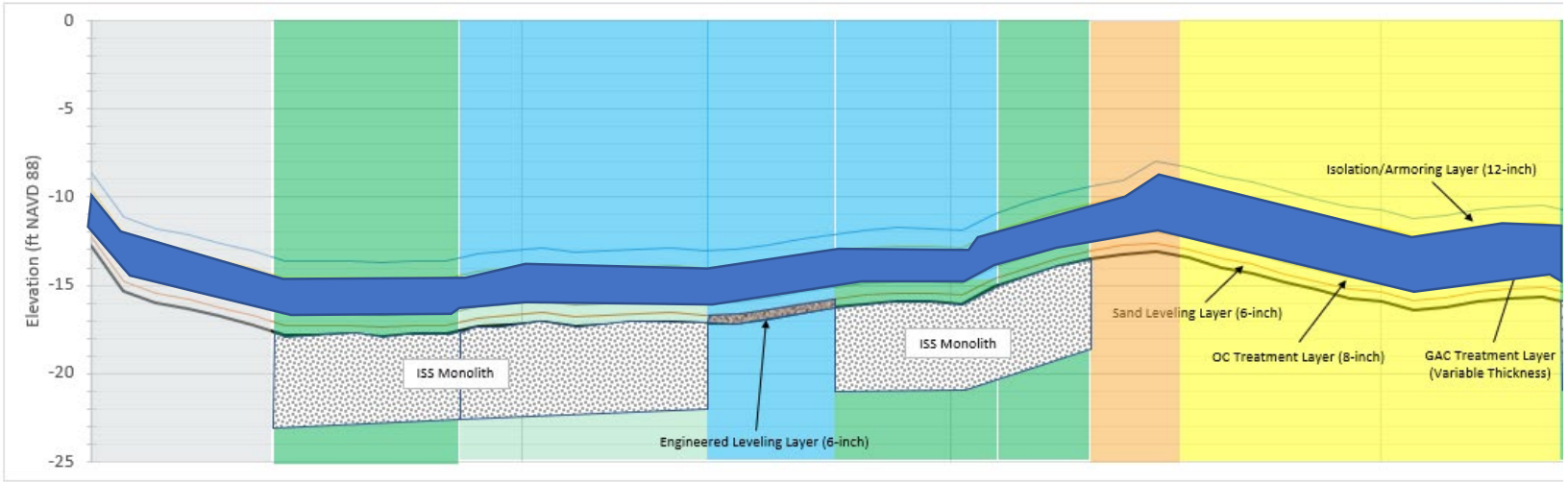


Maximum thickness above Union St

Range below Union St

Cap Treatment Layer Design





Geosyntec consultants

Beech and Bonaparte engineering p.c.

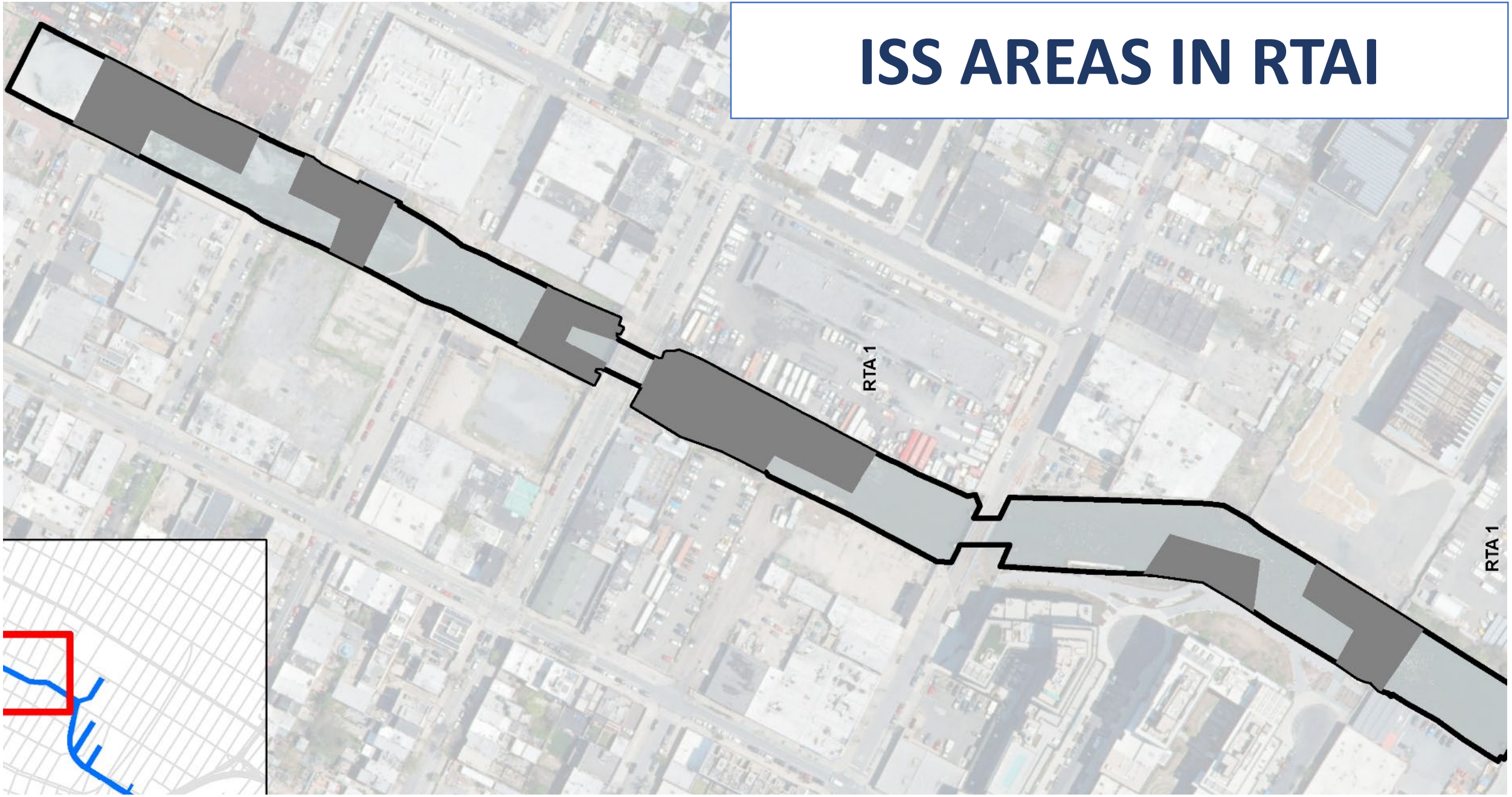
an affiliate of Geosyntec Consultants

Cap Thickness Confirmation

Confirmation Cores were taken prior to catch pan retrieval as an initial check of cap layer thickness.

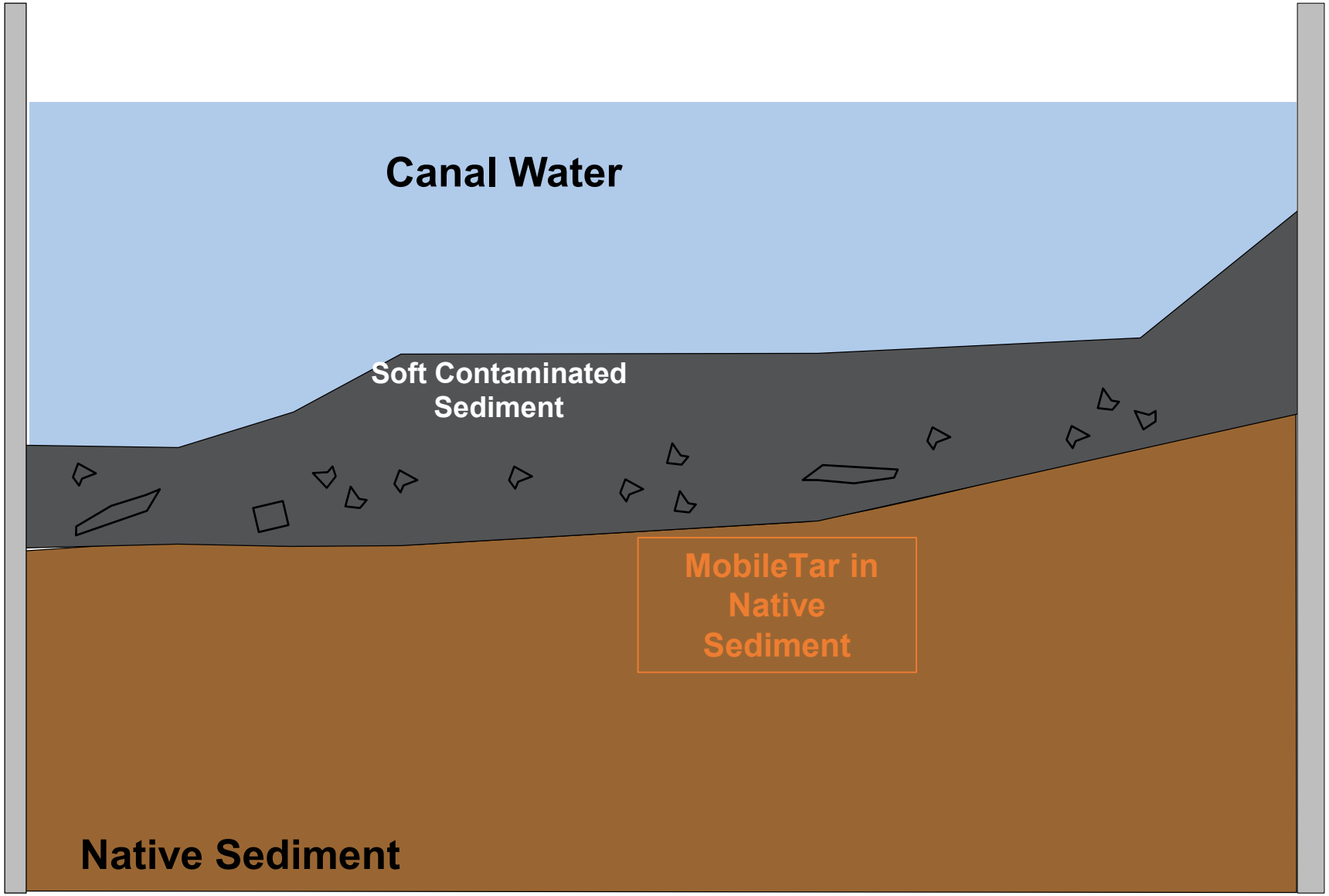
Catch Pans were deployed prior to placement of each layer and retrieved after confirmation coring in order to verify the thickness of the placed cap.

ISS AREAS IN RTAI

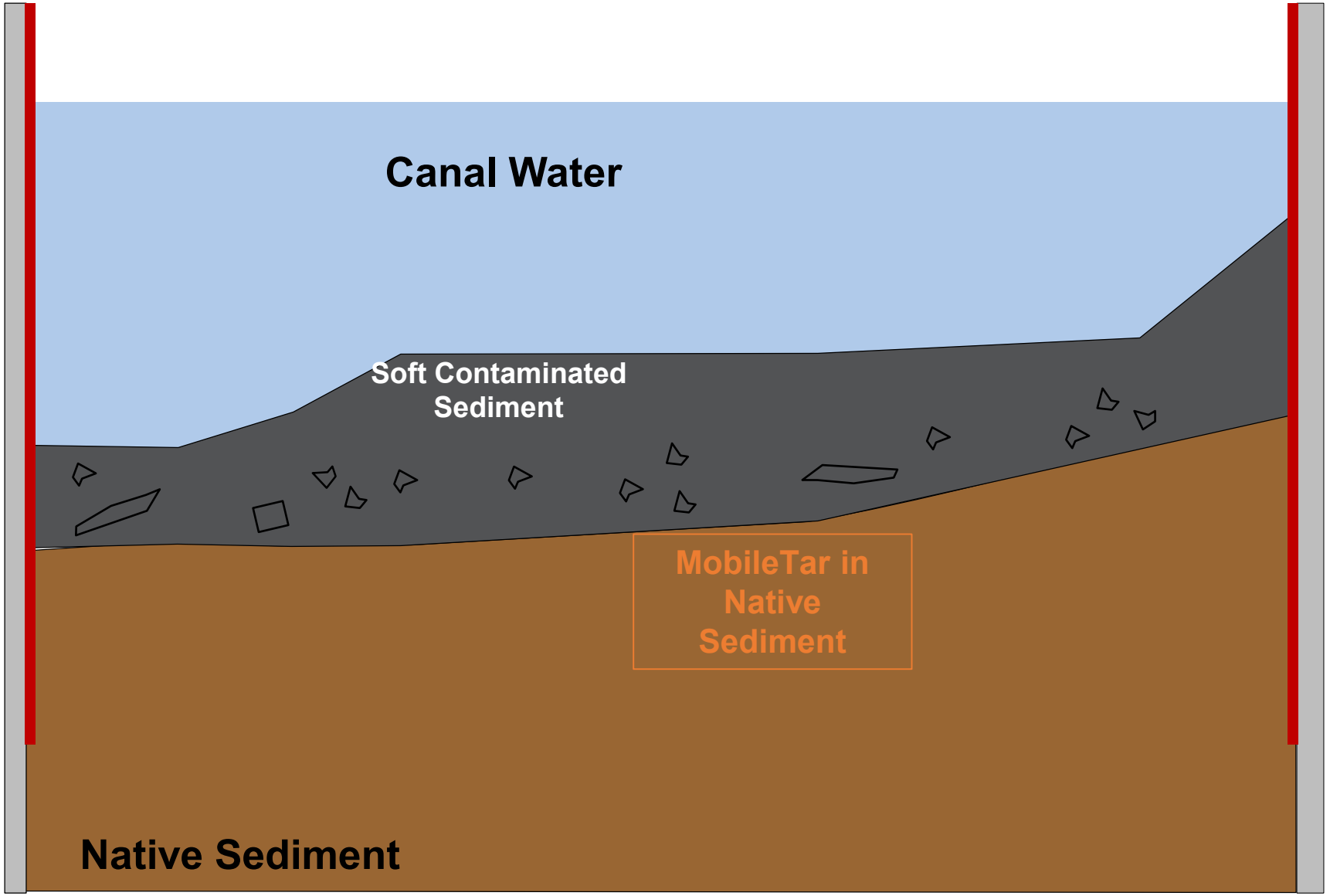


Remedy Sequence Steps

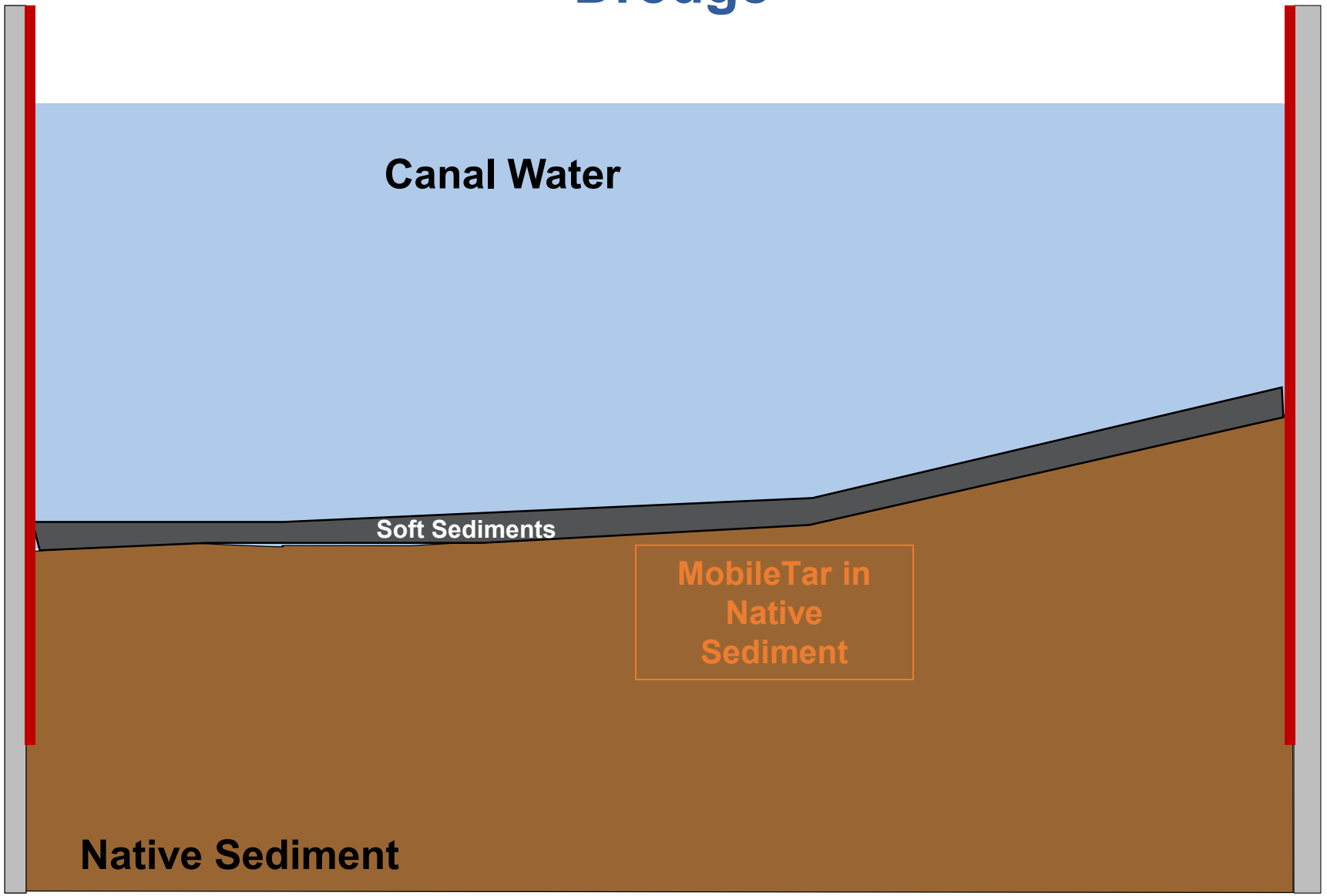
Sediment Contamination in Gowanus



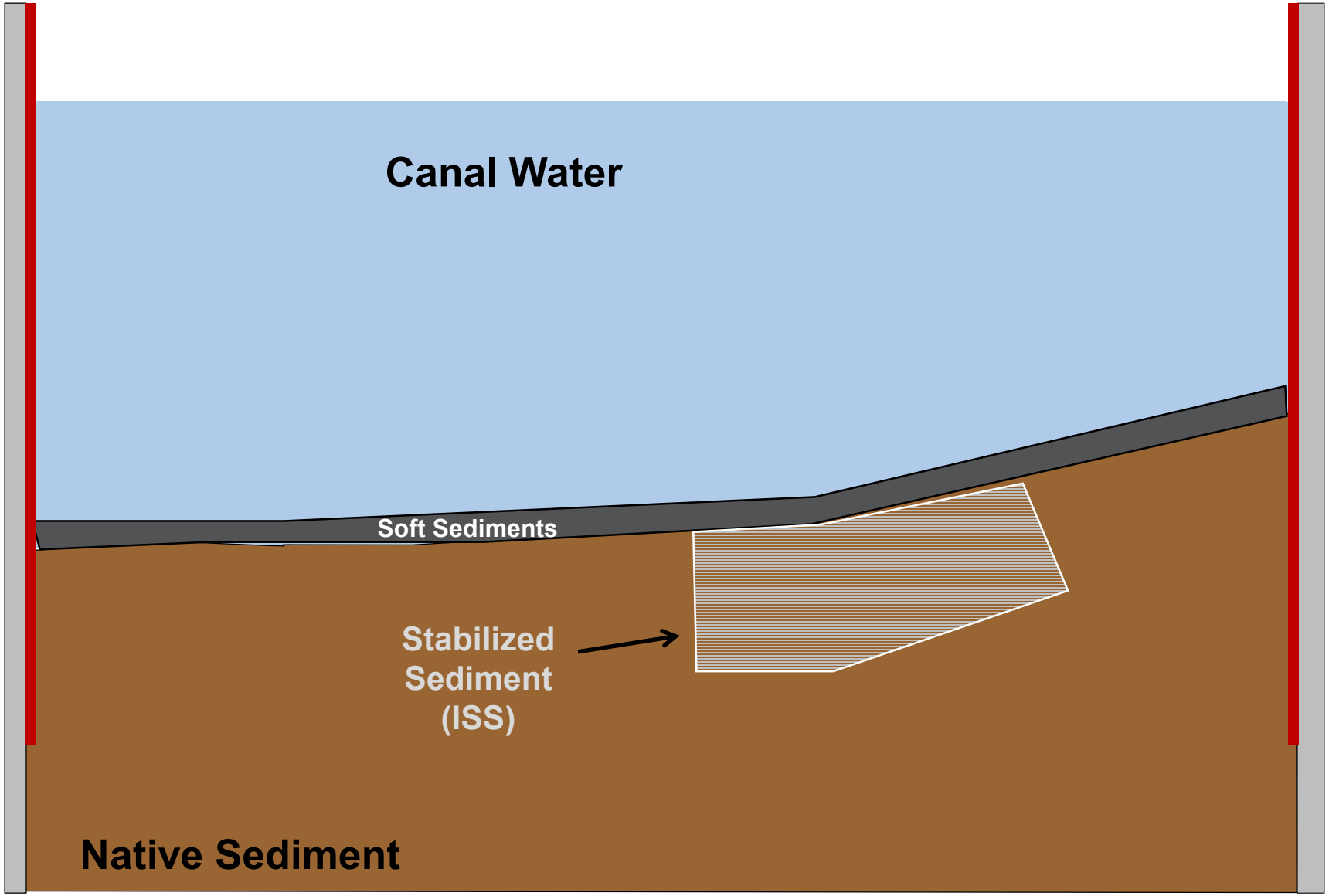
Remedy Sequence for Gowanus 1 - Bulkheads



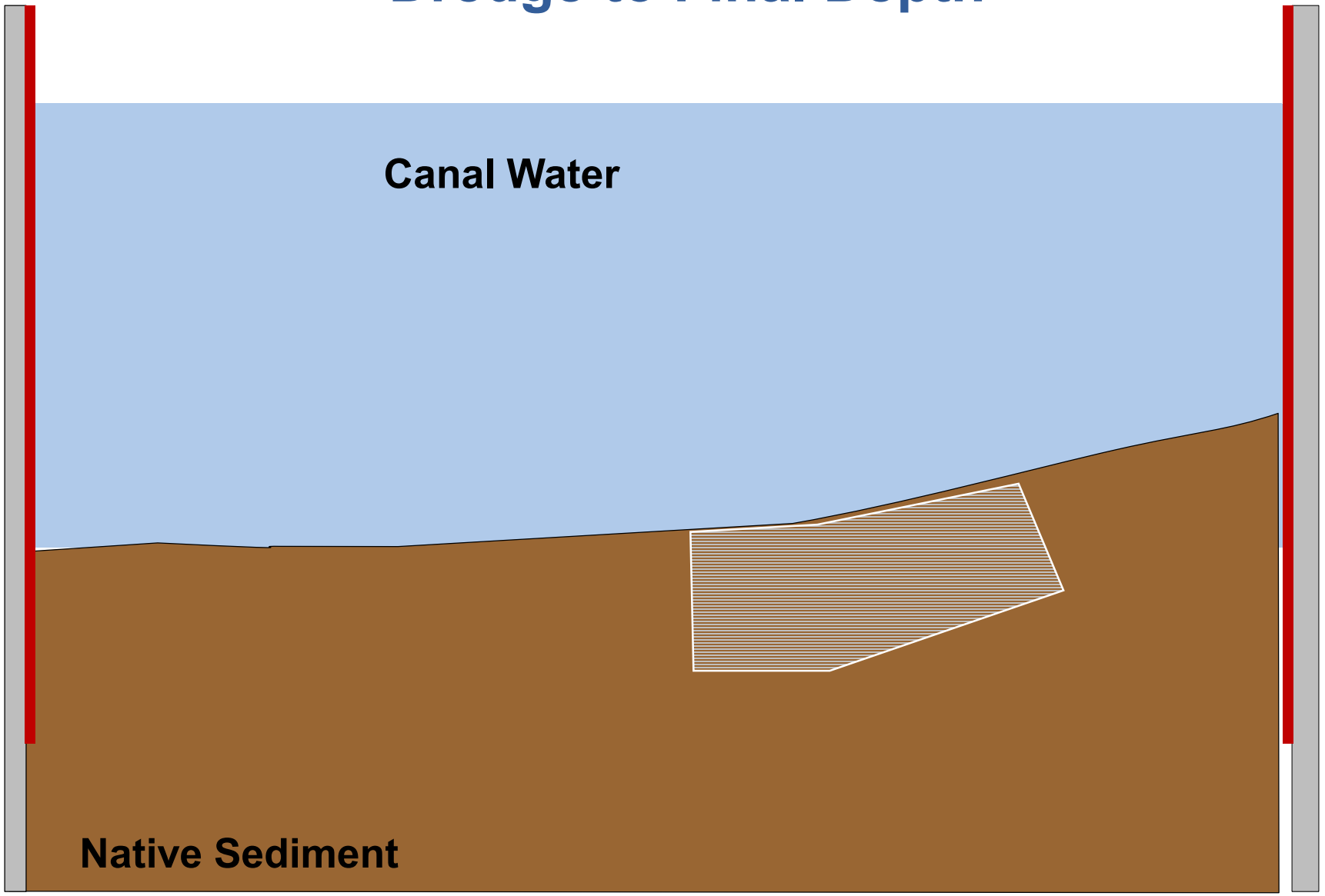
Remedy Sequence for Gowanus 2-Dredge



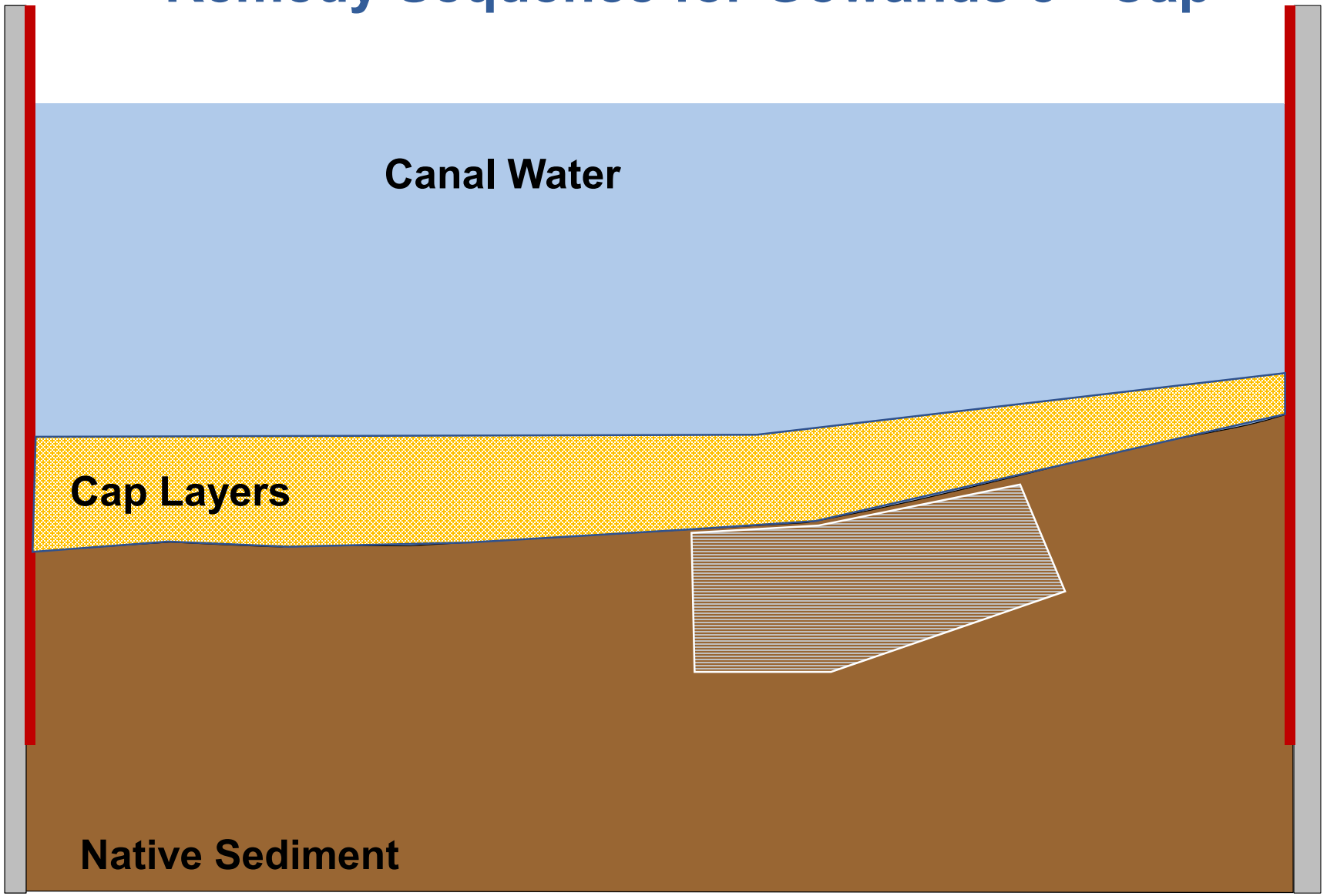
Remedy Sequence for Gowanus 3 – ISS



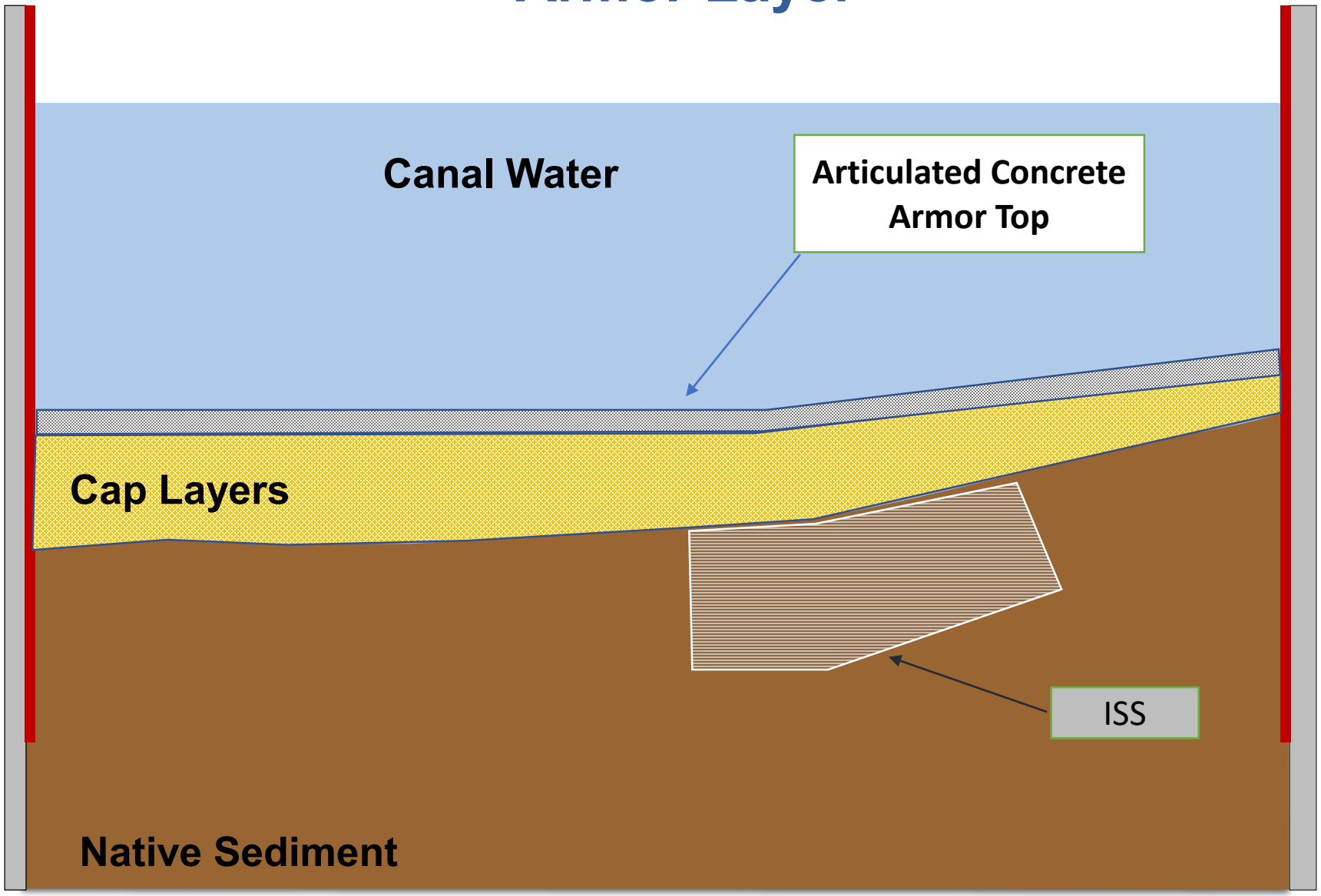
Remedy Sequence for Gowanus 4- Dredge to Final Depth



Remedy Sequence for Gowanus 5 - Cap



Remedy for Gowanus Canal 6 – Armor Layer



DREDGING AT TB4

In-Situ Stabilization (ISS)

Geosyntec consultants

Beech and Bonaparte engineering p.c.

an affiliate of Geosyntec Consultants

Hydraulic Placement of Treatment Layer

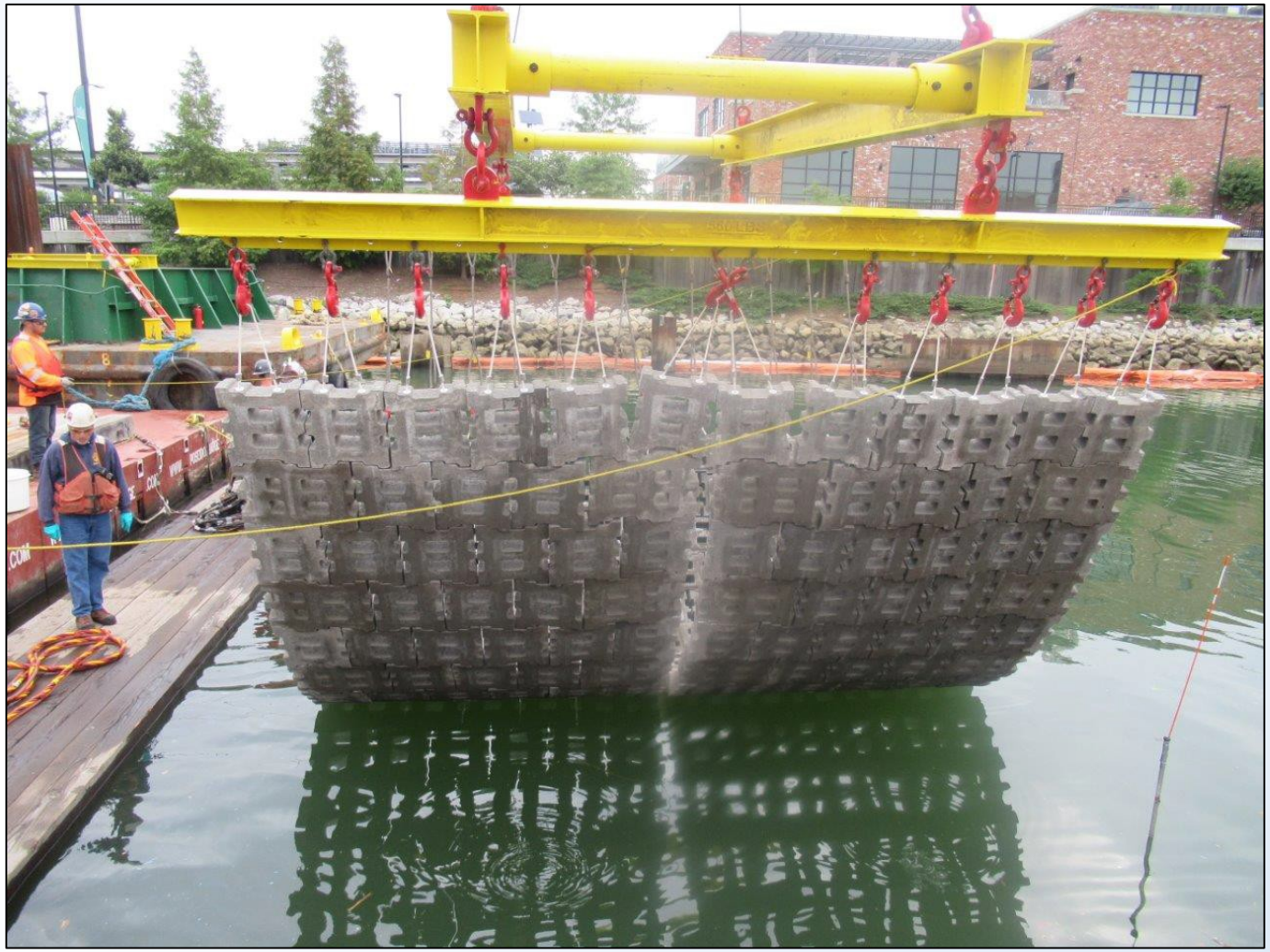
A minimum of 4 inches of GAC and sand was designed to be placed and on average a total of 7 inches were placed within the hydraulic demonstration footprint. Hydraulic capping was selected as the preferred method and used to place the treatment layers in the full scale Pilot Area. The sand-based isolation and filter layer was also placed via hydraulic capping.

Geosyntec consultants

Beech and Bonaparte engineering p.c.

an affiliate of Geosyntec Consultants

Placement of Armor Layer



An armor layer consisting of open-celled articulated concrete blocks (ACBs) was installed on top of the sand isolation and filter layer to provide stability and protection of the cap. Underwater Divers made sure the ACB "mattresses" were placed and secured in the correct location.

Sequence of Operations and Schedule

Remedy Activity
Dredging to Pre-ISS Depth
TB1 Separation Wall
Carroll St Bridge Support
Union St Bridge Support
Bulkhead Supports North of Union
ISS Operation (In Situ Stabilization)
Dredging to Final Depth
Capping & Armor Layer Installation

Remedy Activity		Approximate Schedule
Dredging to Pre-ISS Depth		
	Between Union & Carroll	08/20 to 09/20
TB1 Separation Wall		
Carroll St Bridge		
Union St Bridge		
Bulkhead Supports North of Union		
ISS		
Dredging to Final Depth		
Capping & Armor Layer		

★ Bulkhead replacements on west side of Canal need to be completed

Remedy Activity		Approximate Schedule
Dredging to Pre-ISS Depth	North of Union – Eastern pass	09/20 to 11/20
	Between Union & Carroll	08/20 to 09/20
TB1 Separation Wall		09/20 to 11/20
Carroll St Bridge		
Union St Bridge		
Bulkhead Supports North of Union		
ISS		
Dredging to Final Depth		
Capping & Armor Layer		

★ EPA-approved design for TB1 separation wall; Fulton in-water activities need completed

Remedy Activity		Approximate Schedule
Dredging to Pre-ISS Depth	North of Union – Eastern pass	09/20 to 11/20
	Between Union & Carroll	08/20 to 09/20
	South of Carroll	11/20 to 01/21
TB1 Separation Wall		09/20 to 11/20
Carroll St Bridge		11/20 to 04/21
Union St Bridge		
Bulkhead Supports North of Union		
ISS		
Dredging to Final Depth		
Capping & Armor Layer		

★ Bulkhead replacements on east side of Canal need to be completed

Remedy Activity		Approximate Schedule
Dredging to Pre-ISS Depth	North of Union – Eastern pass	09/20 to 11/20
	Between Union & Carroll	08/20 to 09/20
	South of Carroll	11/20 to 01/21
TB1 Separation Wall		09/20 to 11/20
Carroll St Bridge		11/20 to 04/21
Union St Bridge		04/21 to 06/21
Bulkhead Supports North of Union		
ISS	**Demonstration**	04/21 to 05/21
	South of Carroll	05/21 to 07/21
Dredging to Final Depth		
Capping & Armor Layer		

Remedy Activity		Approximate Schedule
Dredging to Pre-ISS Depth	North of Union – Eastern pass	09/20 to 11/20
	Between Union & Carroll	08/20 to 09/20
	South of Carroll	11/20 to 01/21
TB1 Separation Wall		09/20 to 11/20
Carroll St Bridge		11/20 to 04/21
Union St Bridge		04/21 to 06/21
Bulkhead Supports North of Union		06/21 to 08/21
ISS	Demonstration	04/21 to 05/21
	South of Carroll	05/21 to 07/21
	Between Union & Carroll (a)	07/21 to 08/21
Dredging to Final Depth		
Capping & Armor Layer		

Remedy Activity		Approximate Schedule
Dredging to Pre-ISS Depth	North of Union – Eastern pass	09/20 to 11/20
	North of Union – Western pass	08/21 to 09/21
	Between Union & Carroll	08/20 to 09/20
	South of Carroll	11/20 to 01/21
TB1 Separation Wall		09/20 to 11/20
Carroll St Bridge		11/20 to 04/21
Union St Bridge		04/21 to 06/21
Bulkhead Supports North of Union		06/21 to 08/21
ISS	Demonstration	04/21 to 05/21
	South of Carroll	05/21 to 07/21
	Between Union & Carroll	07/21 to 08/21
Dredging to Final Depth		
Capping & Armor Layer		

Bulkhead replacements on west side of Canal need to be completed

Remedy Activity		Approximate Schedule
Dredging to Pre-ISS Depth	North of Union – Eastern pass	09/20 to 11/20
	North of Union – Western pass	08/21 to 09/21
	Between Union & Carroll	08/20 to 09/20
	South of Carroll	11/20 to 01/21
TB1 Separation Wall		09/20 to 11/20
Carroll St Bridge		11/20 to 04/21
Union St Bridge		04/21 to 06/21
Bulkhead Supports North of Union		06/21 to 08/21
ISS	Demonstration	04/21 to 05/21
	South of Carroll	05/21 to 07/21
	Between Union & Carroll (b)	10/21 to 11/21
	North of Union	11/21 to 02/22
Dredging to Final Depth		
Capping & Armor Layer		

Remedy Activity		Approximate Schedule
Dredging to Pre-ISS Depth	North of Union – Eastern pass	09/20 to 11/20
	North of Union – Western pass	08/21 to 09/21
	Between Union & Carroll	08/20 to 09/20
	South of Carroll	11/20 to 01/21
TB1 Separation Wall		09/20 to 11/20
Carroll St Bridge		11/20 to 04/21
Union St Bridge		04/21 to 06/21
Bulkhead Supports North of Union		06/21 to 08/21
ISS	Demonstration	04/21 to 05/21
	South of Carroll	05/21 to 07/21
	Between Union & Carroll	07/21 to 08/21 10/21 to 11/21
	North of Union	11/21 to 02/22
Dredging to Final Depth		02/22 to 05/22
Capping & Armor Layer		

Remedy Activity		Approximate Schedule
Dredging to Pre-ISS Depth	North of Union – Eastern pass	09/20 to 11/20
	North of Union – Western pass	08/21 to 09/21
	Between Union & Carroll	08/20 to 09/20
	South of Carroll	11/20 to 01/21
TB1 Separation Wall		09/20 to 11/20
Carroll St Bridge		11/20 to 04/21
Union St Bridge		04/21 to 06/21
Bulkhead Supports North of Union		06/21 to 08/21
ISS	Demonstration	04/21 to 05/21
	South of Carroll	05/21 to 07/21
	Between Union & Carroll	07/21 to 08/21 10/21 to 11/21
	North of Union	11/21 to 02/22
Dredging to Final Depth		02/22 to 05/22
Capping & Armor Layer		05/22 to 07/23