Retaining Wall Replacement
along Theodore Fremd Avenue at Blind Brook

City of Rye
Westchester County

City Council Public Meeting Presentation
September 16, 2009

WSP · SELLS

Presentation Outline

- Project Overview
- Existing Conditions
- Alternative Analysis
- Preferred Alternative
- Impacts
- Next Steps
- Questions and Answers

WSP · SELLS

Project Overview

WSP · SELLS

Project Overview

Objectives:

1. Address the structural deficiencies and failure of the existing stone retaining wall
2. Provide a retaining system that improves the geometry of the wall and uses adequate scour protection
3. Replace distressed pavement and address loss of backfill material behind the existing T-wall
4. Remove sediment build-up in the stream
5. Provide new guide rail, curb, and edge of pavement along Theodore Fremd Avenue

WSP · SELLS

Project Overview

Issues:

1. Hydrology and hydraulics
2. Private property and easements
3. Utilities (Westchester County DEF sewer, Con Edison gas, Con Edison electric, United Water)
4. Maintenance of traffic

Existing Conditions

WSP · SELLS

Existing Conditions

WSP · SELLS

Existing Conditions

- Wall suffered significant damage / failure during April 2007 Nor'easter
- Blind Brook impacts the existing wall at a 45° angle as it exits from the I-95 / Metro-North tunnel
- Private property extends to the center of the Blind Brook
- 33" sewer main and 12" high-pressure gas main run beneath the wall

WSP · SELLS

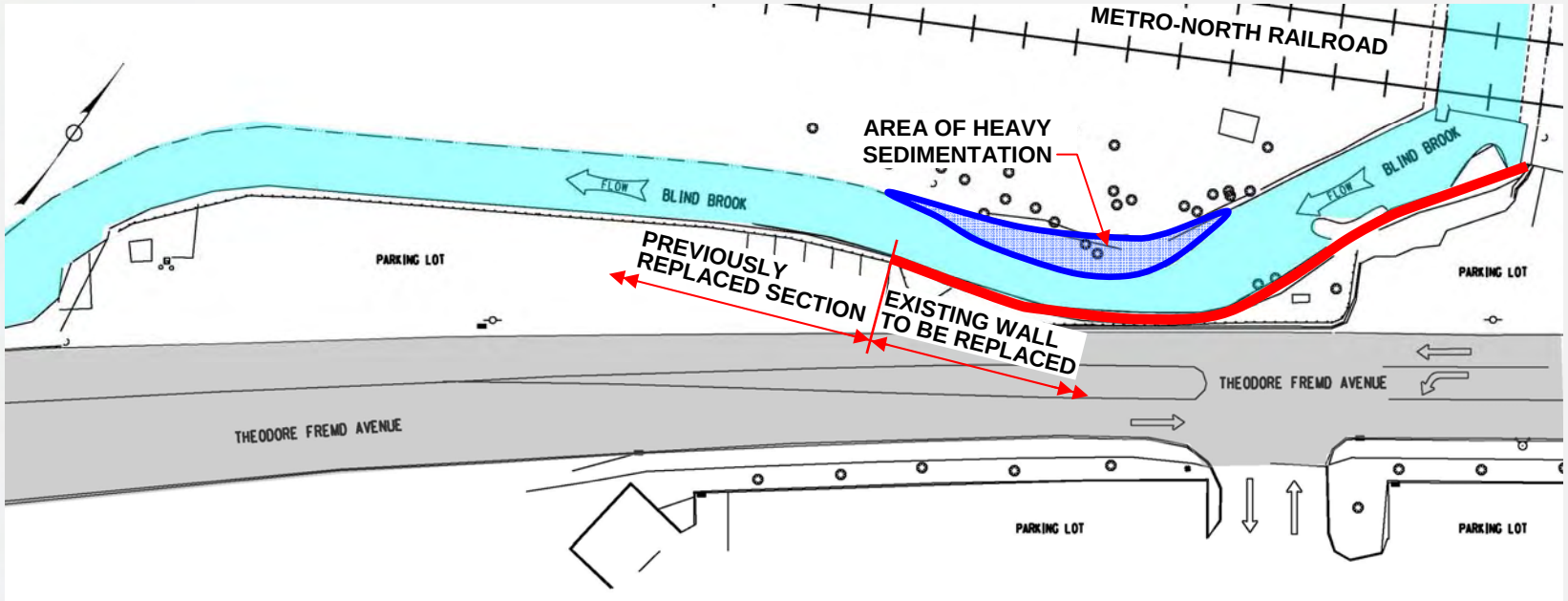
Existing Conditions

WSP · SELLS

Existing Conditions

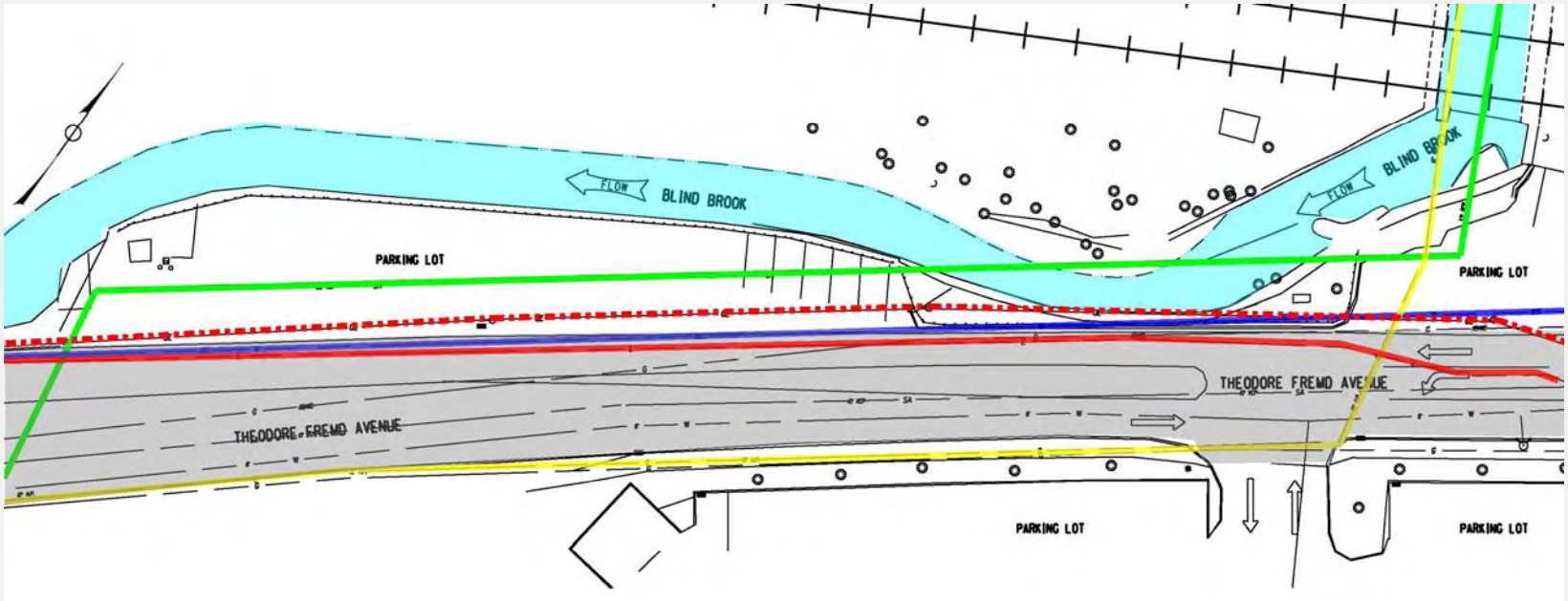
WSP · SELLS

Existing Conditions



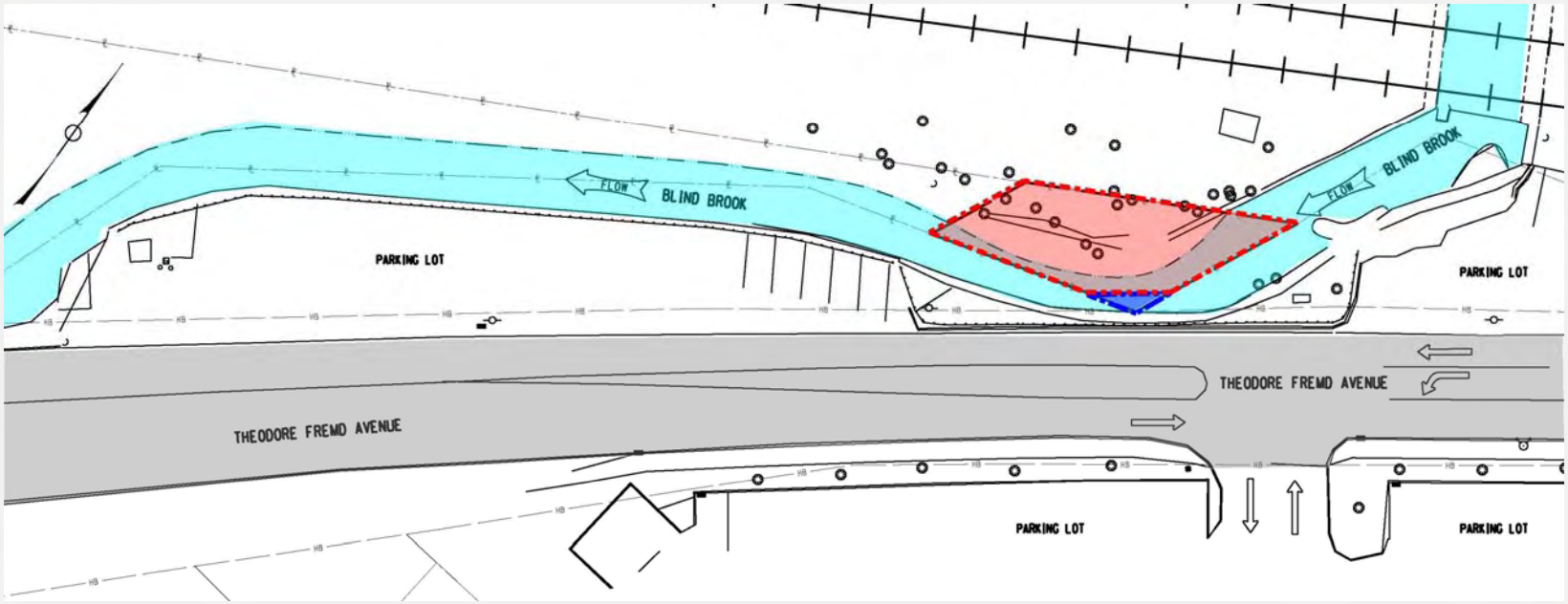
WSP · SELLS

Existing Conditions



WSP · SELLS

Existing Conditions



Alternative Analysis

WSP · SELLS

Alternative Analysis

No-build Alternative:

- No major repairs or improvements
- Provides continued maintenance on already failed wall system
- Potential for damage to gas main, sewer main, and Theodore Fremd Avenue during another significant flood event

Not a recommended alternative.

WSP · SELLS

Alternative Analysis

Wall Replacement Alternative:

- Alternative earth retaining systems
  - Retaining Wall: Cast-in-place concrete vs. Precast concrete
  - Revetment: Articulated concrete block vs. Rip-rap
- Alternative wall alignments
  - Optimize wall geometry with respect to the stream flow
  - Minimize utility interference

WSP · SELLS

Alternative Analysis

Wall Replacement Alternative:

Wall replacement is the preferred alternative.

WSP · SELLS

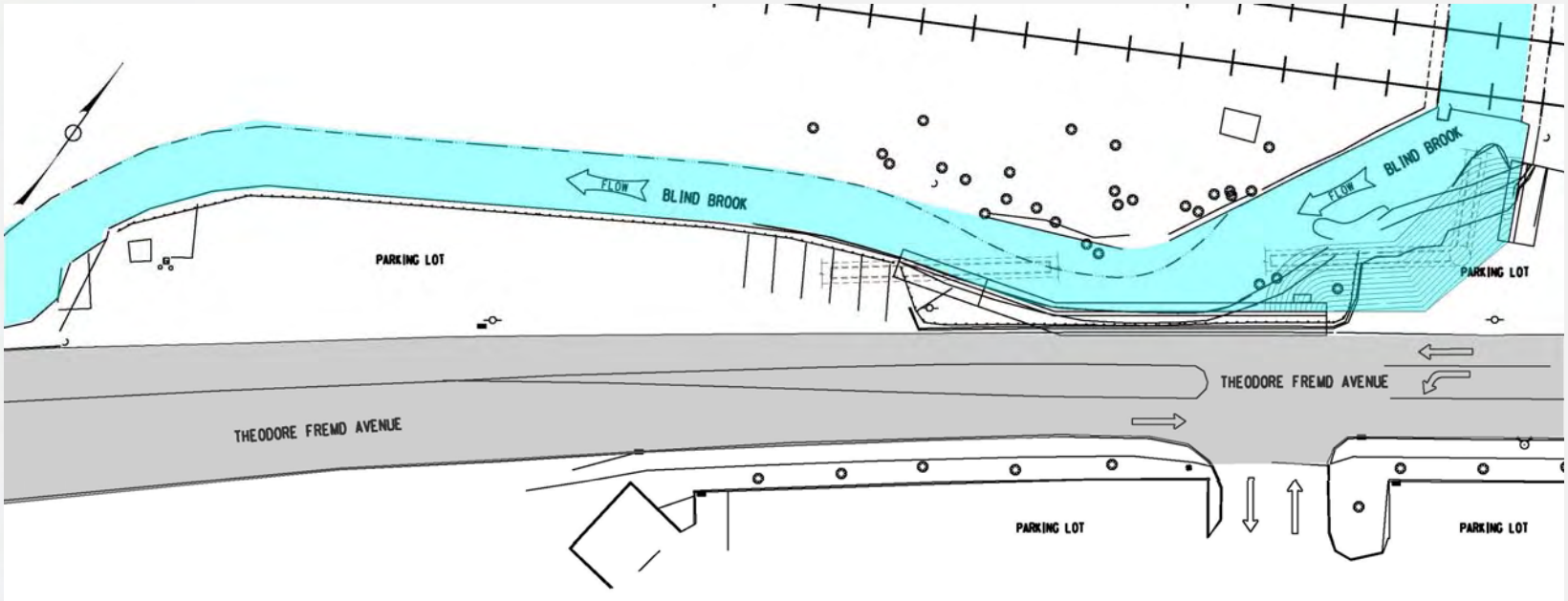
Preferred Alternative

Preferred Alternative

- Improved wall alignment decreases stream impact forces on retaining structure
- Revetment at northern project limit minimizes utility impacts
- Scour countermeasures included
- Localized sediment removed from stream channel
- New guide rail, curb, and pavement installed
- Distressed pavement and loss of fill in south parking lot remedied

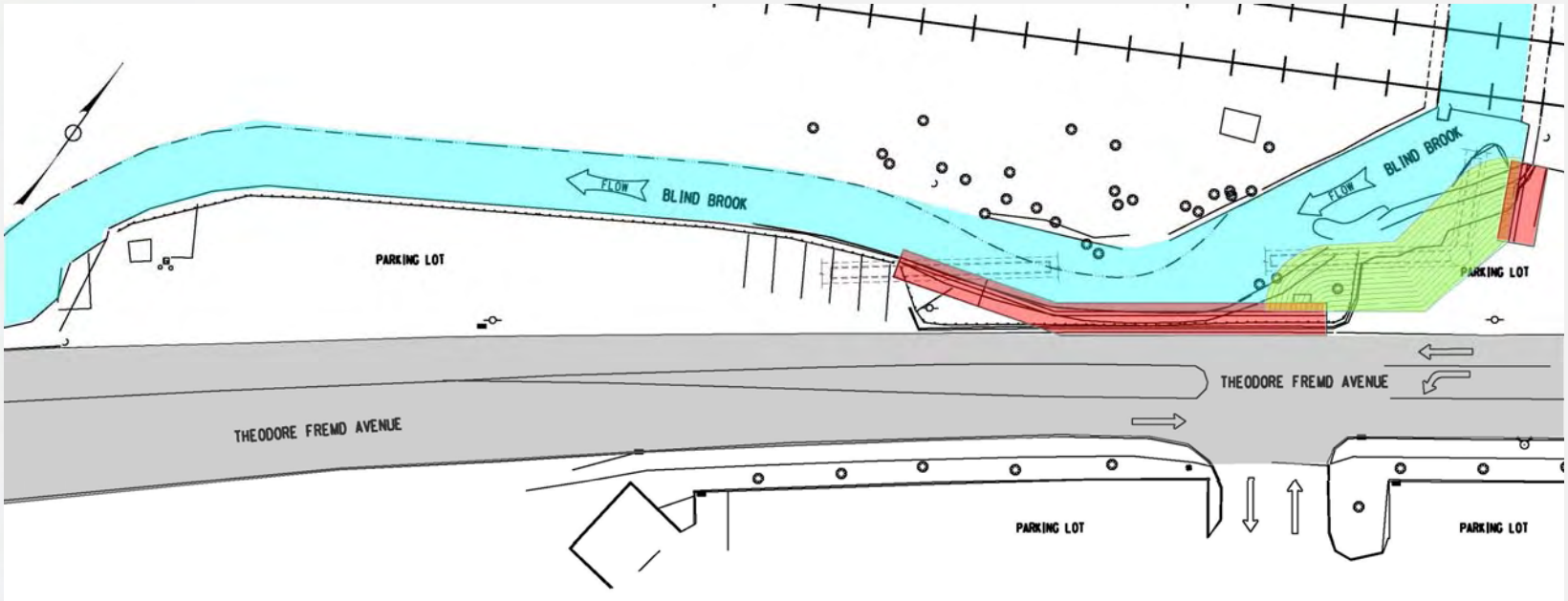
WSP · SELLS

Preferred Alternative

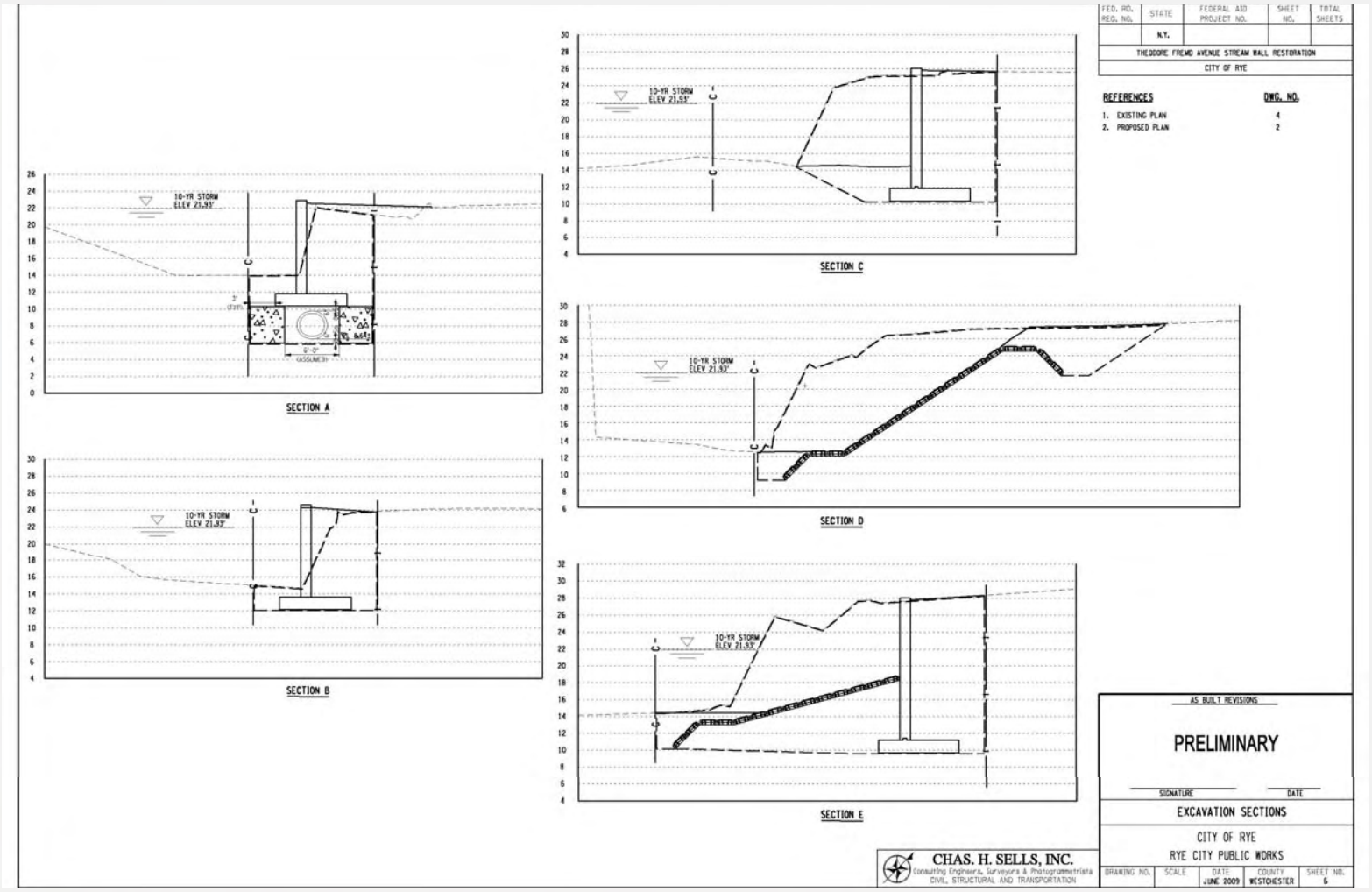


WSP · SELLS

Preferred Alternative



Preferred Alternative



WSP · SELLS

Impacts

WSP · SELLS

Impacts

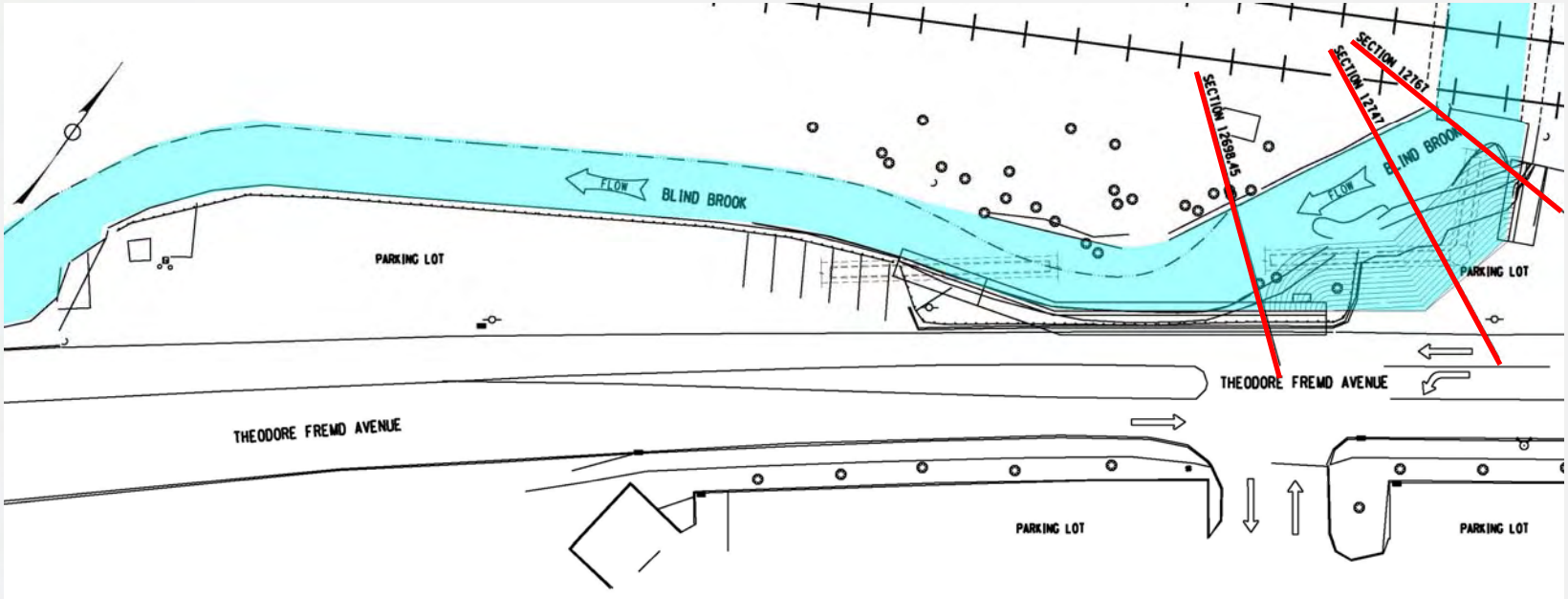
- Hydraulics (50-yr storm)
  - Studied localized, upstream and downstream impacts (approx. 1,000 feet downstream to Locust Avenue).

Results:

- Stream velocity decreases at point of impact by upwards of 33%
- Water surface elevations vary at point of impact
- No change in downstream or upstream conditions due to wall reconstruction project.

WSP · SELLS

Impacts



WSP · SELLS

Impacts

TABLE 1A: COMPARISON OF FEMA MODEL TO EXISTING/PROPOSED CONDITIONS MODEL

Q100 = 3583 cfs Sells' Discharge - Existing Bowman Dam Conditions

Water Surface Elevation					
Sec. No. (FEMA Section)	Existing Walls	Proposed Walls	Proposed Revetment	Prop.Walls vs. Exist	Prop. Rivet. vs. Exist
13040.6 (M)	32.16	32.17	32.17	0.01	0.01
12767	24.15	21.63	21.67	-2.52	-2.48
12747	21.96	22.65	22.26	0.69	0.30
12698.45	22.72	22.80	22.83	0.08	0.11
12310.87 (L)	22.89	22.89	22.89	0.00	0.00
12191.57	21.98	21.98	21.98	0.00	0.00
12079.54	21.69	21.69	21.69	0.00	0.00
12026.24	21.75	21.75	21.75	0.00	0.00
11846.84	21.70	21.70	21.70	0.00	0.00
11619.31 (K)	21.25	21.25	21.25	0.00	0.00

TABLE 1B: COMPARISON OF FEMA MODEL TO EXISTING/PROPOSED CONDITIONS MODEL

Q100 = 3583 cfs Sells' Discharge - Existing Bowman Dam Conditions

Velocity (ft/s)					
Sec. No. (FEMA Section)	Existing Walls	Proposed Walls	Proposed Revetment	Prop.Walls vs. Exist	Prop. Rivet. vs. Exist
13040.6 (M)	2.52	2.52	2.52	0.00	0.00
12767	12.35	15.67	15.77	3.32	3.42
12747	15.80	7.09	11.49	-8.71	-4.31
12698.45	8.71	7.57	7.28	-1.14	-1.43
12310.87 (L)	2.36	2.36	2.36	0.00	0.00
12191.57	8.09	8.09	8.09	0.00	0.00
12079.54	6.25	6.25	6.25	0.00	0.00
12026.24	4.99	4.99	4.99	0.00	0.00
11846.84	3.66	3.66	3.66	0.00	0.00
11619.31 (K)	5.83	5.83	5.83	0.00	0.00

TABLE 2A: COMPARISON OF FEMA MODEL TO EXISTING/PROPOSED CONDITIONS MODEL

Q50 = 3078 cfs Sells' Discharge – Existing Bowman Dam Conditions

Water Surface Elevation					
Sec. No. (FEMA Section)	Existing Walls	Proposed Walls	Proposed Revetment	Prop.Walls vs. Exist	Prop. Rivet. vs. Exist
13040.6 (M)	30.56	30.56	30.56	0.00	0.00
12767	23.12	21.50	21.62	-1.62	-1.50
12747	21.22	22.42	22.13	1.20	0.91
12698.45	22.47	22.53	22.55	0.06	0.08
12310.87 (L)	22.57	22.57	22.57	0.00	0.00
12191.57	21.75	21.75	21.75	0.00	0.00
12079.54	21.24	21.24	21.24	0.00	0.00
12026.24	21.26	21.26	21.26	0.00	0.00
11846.84	21.23	21.23	21.23	0.00	0.00
11619.31 (K)	20.80	20.80	20.80	0.00	0.00

TABLE 2B: COMPARISON OF FEMA MODEL TO EXISTING/PROPOSED CONDITIONS MODEL

Q50 = 3078 cfs Sells' Discharge – Existing Bowman Dam Conditions

Velocity (ft/s)					
Sec. No. (FEMA Section)	Existing Walls	Proposed Walls	Proposed Revetment	Prop.Walls vs. Exist	Prop. Rivet. vs. Exist
13040.6 (M)	2.41	2.41	2.41	0.00	0.00
12767	11.85	13.71	13.63	1.86	1.78
12747	14.99	6.24	10.04	-8.75	-4.95
12698.45	7.70	6.73	6.46	-0.97	-1.24
12310.87 (L)	2.29	2.29	2.29	0.00	0.00
12191.57	7.93	7.93	7.93	0.00	0.00
12079.54	6.15	6.15	6.15	0.00	0.00
12026.24	4.92	4.92	4.92	0.00	0.00
11846.84	3.54	3.54	3.54	0.00	0.00
11619.31 (K)	5.53	5.53	5.53	0.00	0.00

WSP · SELLS

Impacts

- Utilities
  - 12” diameter high-pressure Con Edison gas main running through MNR / I-95 tunnel and below wall to be lowered
  - 33” diameter Westchester County trunk sewer running through MNR / I-95 tunnel, along stream channel and below wall in two locations to remain in place
  - Overhead electric, underground electric, and 12” diameter water main along north edge of Theodore Fremd to be relocated
  - Services to be maintained during construction

Impacts

- Traffic
  - No detours required during construction
  - Lane shift to be in place, utilizing the striped median along Theodore Fremd Avenue
- Right-of-Way
  - Fee taking required for installation of proposed wall
  - Temporary easement required for construction access and debris removal
  - Combined takings less than 10% of total property area and are located within the Blind Brook stream channel

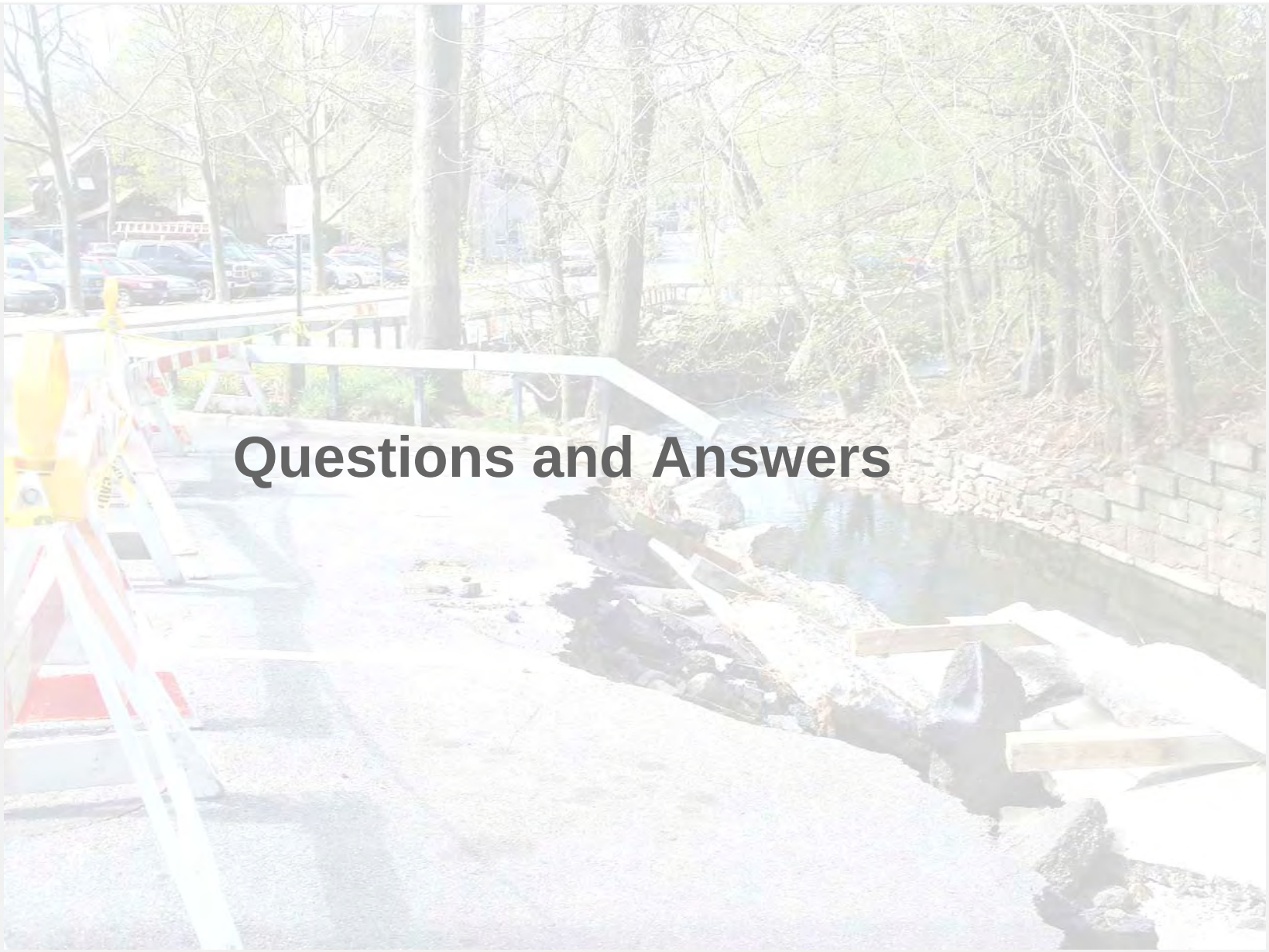
Next Steps

WSP · SELLS

Next Steps

- Submit Final Design Report to NYSDOT
- Acquire easements
- Obtain Permits (Westchester County Stream Permit, ACOE Nationwide Permit)
- Advertise, award, begin construction in Spring 2010

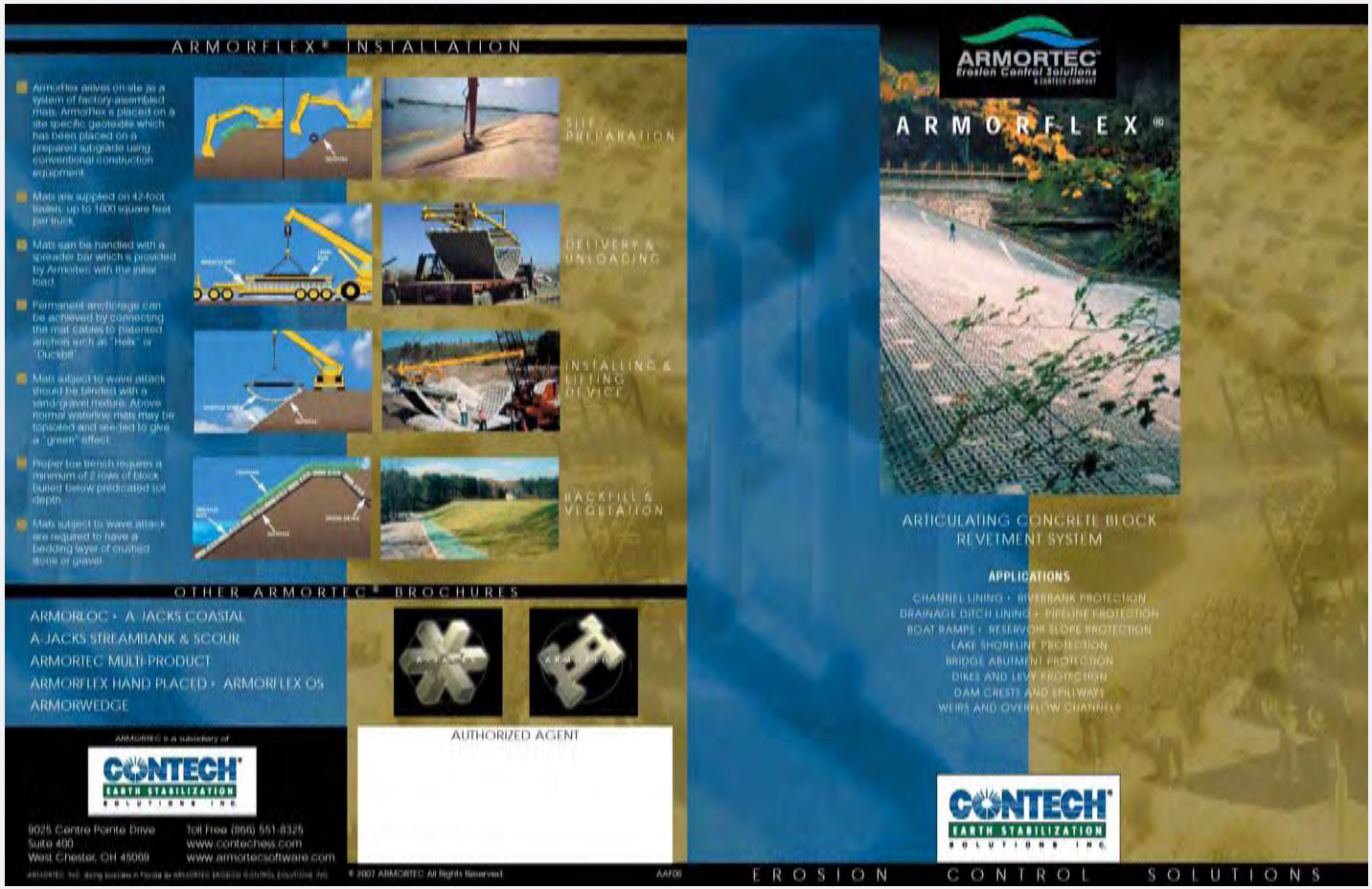
WSP · SELLS



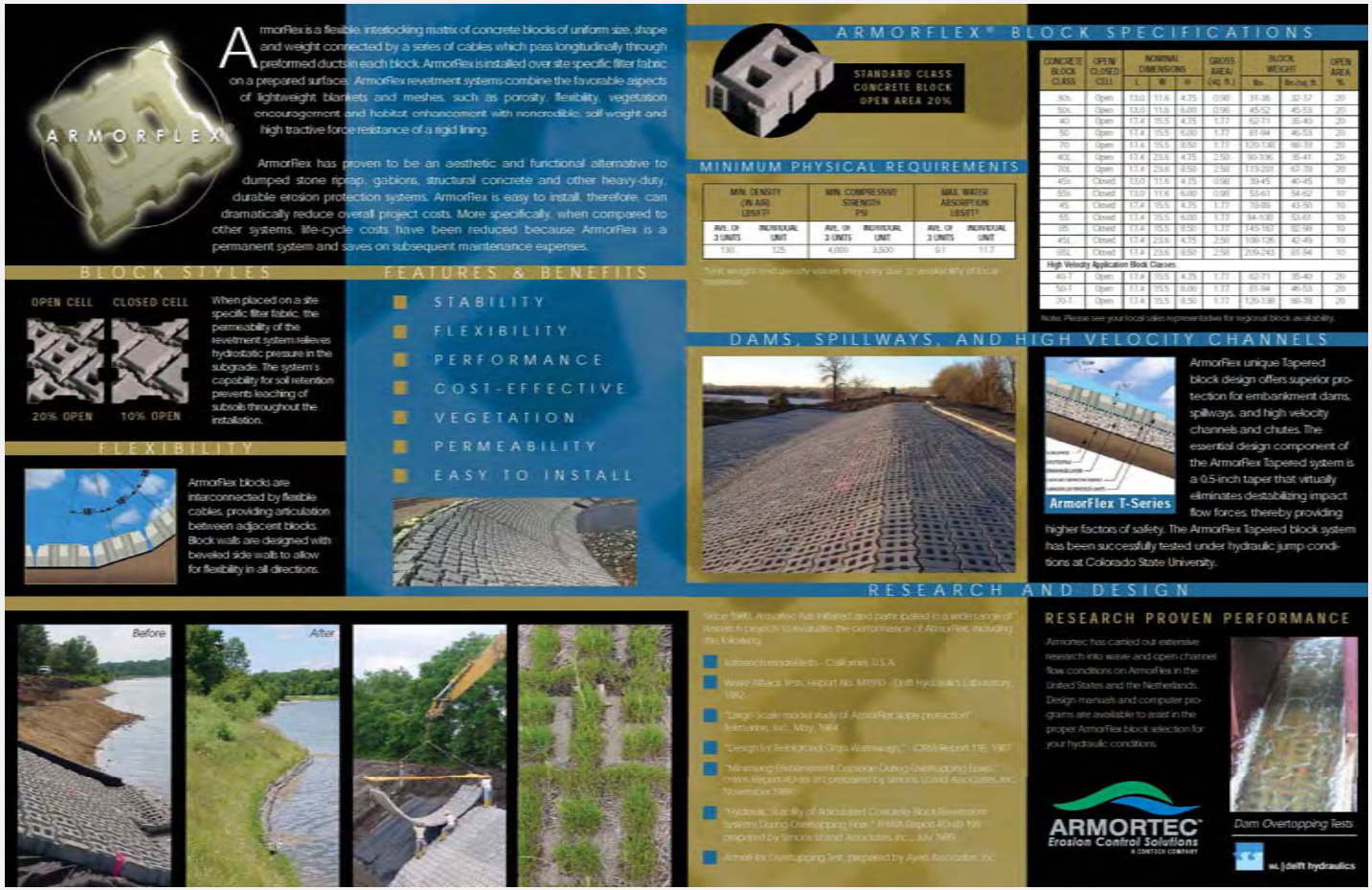
Questions and Answers

WSP · SELLS

Supplemental Data

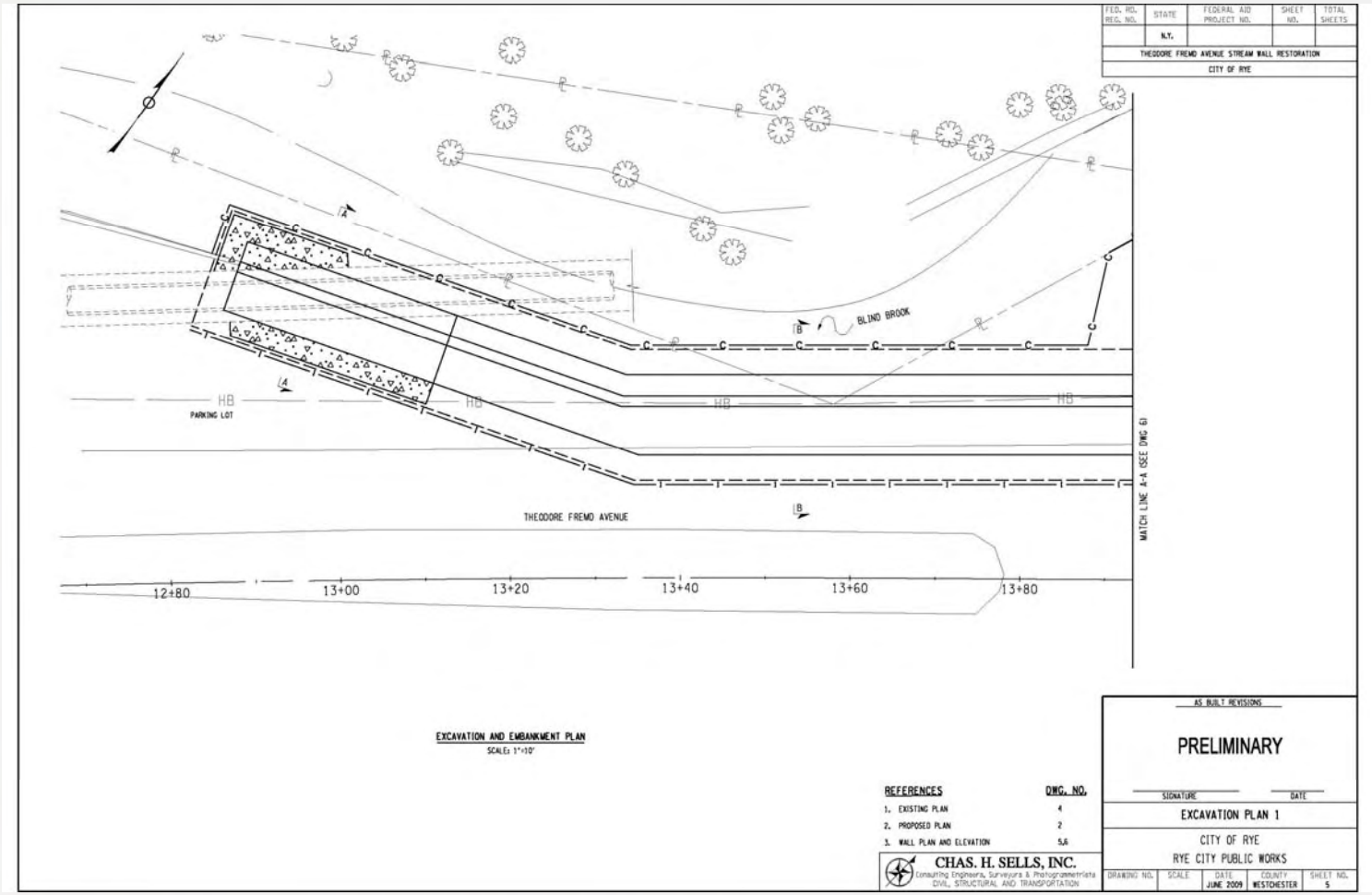


Supplemental Data



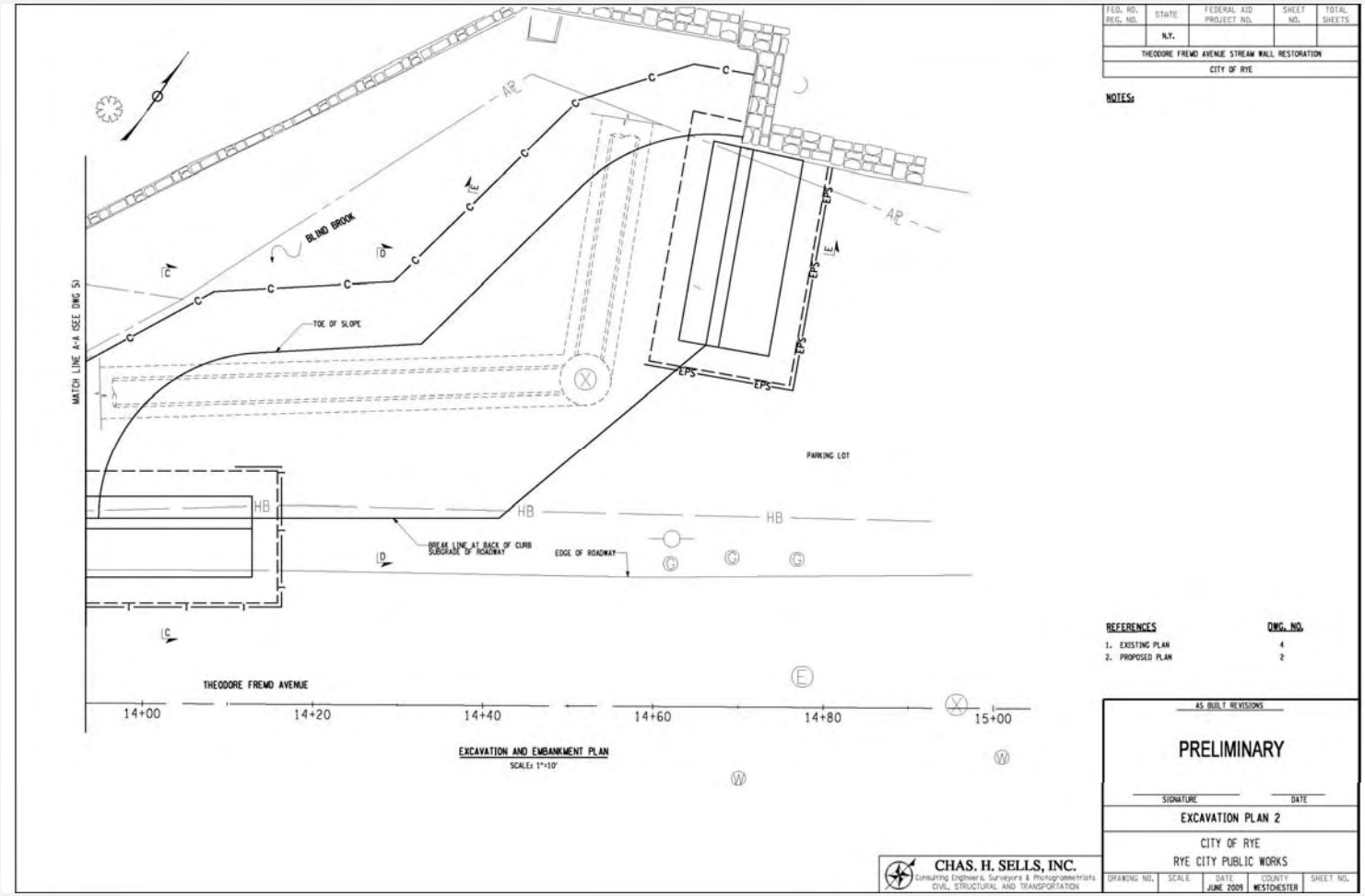
WSP · SELLS

Supplemental Data



WSP · SELLS

Supplemental Data



WSP · SELLS