FOR REFERENCE ONLY

Additional Probing and Wading Inspection Adjacent to Reviewing Stands – January 16, 2020

Reviewing Stands
Along the Schuylkill River
Philadelphia, PA

Prepared For:

City of Philadelphia
Department of Public Property
1515 Arch Street, 11th Floor
Philadelphia, PA 19102

Prepared By:

Pennoni Associates Inc.
1900 Market Street, Suite 300
Philadelphia, PA 19103
(215) 222-3000

Professional Engineer: Andrew T. Fulton, P.E.

6/5/2020
Date

FOR REFERENCE ONLY

May 29, 2020

City of Philadelphia
Department of Public Property
1515 Arch Street
11th Floor
Philadelphia, PA 19102

RE: Additional probing and wading inspection adjacent to reviewing stands – Renovation of the East Schuylkill River Wall at Reviewing Stands, Philadelphia, PA

Project Description

On January 16, 2020 Pennoni Associates Inc. (Pennoni) performed an additional probing and wading inspection of the stone masonry seawall located on the eastern bank of the Schuylkill River adjacent to the reviewing stands on Kelly Drive. The purpose of this inspection was to determine if and how the undermining of the seawall noted during the July 19, 2018 probing inspection by Pennoni had changed. The inspection was conducted by a two-person team, led by a professional engineer. A cursory inspection of the condition of the seawall was performed during this probing and wading inspection.

For the purposes of this memo, stationing will run along the wall from south to north with Sta. 0+00 located at the north end of the reviewing stands. The inspection covered approximately 2,250 linear feet of the wall spanning from Sta. -6+50 to Sta. 16+00. The previous probing inspection on July 19, 2018 was conducted between the same stations.

Summary of Findings

The inspection found that the previously noted areas of undermining have relatively stayed the same. There are locations that the undermining has reduced since the previous inspection. In the July 19, 2018 Inspection the undermining at Stations 0+75 to 1+75, 2+25 and 2+25 was called out up to 8-feet deep. At the time of our inspection our max undermining depth in these areas was 5-feet deep. Stations 10+50 to 12+00 had undermining noted in the July 19, 2018 probing inspection. At the time of our inspection no undermining was detected at these locations. During our inspection undermining was noted at Stations 15+00 to 15+50 and 16+00 where previously no undermining was noted. It should be noted that undermining depths/penetrations could be larger than what was recorded as the water depth in most locations were too deep for the inspector to go under the cribbing and probe horizontally under the seawall. The inspector had to probe at an angle between the timber cribbing to obtain the undermining depths/penetrations. *For additional details see attached Undermining Table in Appendix B.*

The seawall has weep holes (Approximately 10-inch diameter) periodically throughout. Weep holes were found at the following Stations: 0+48, 1+92, 3+80, 4+70, 7+15, 7+37, 9+37, 10+30, 12+10, 12+30, 15+55 and 15+75. The weep holes at Stations 0+48, 1+92, 9+37 and 10+30 are collapsed and clogged. The weep holes at Stations 7+37 and 15+55 have misaligned sections.

There are 18-inch diameter outlet pipes at Stations -5+80 and 3+51. The outlet pipe at Station -5+80 exhibits a 2.1-feet void under the pipe and at Station 3+51 the seawall exhibits a 1-foot void under the pipe.

The seawall typically exhibits random small (less than 3-inch diameter) trees/vegetation growing out of it. A majority has been cut, but the roots still remain. The row of stones at the waterline typically exhibits 30% missing mortar.

The top row of stones are overhanging from Stations 9+25 to 12+75 and have settled from Stations 9+25 to 10+75. The maximum overhang of the top row of stones is up to 1-foot. The maximum settlement at the time of inspection was 9.4 degrees from the horizontal, with the stones leaning towards the river. At Stations 11+25 to 11+40 timber shims have been installed between the first and second course of stone from the top.

The channel along the seawall is comprised of rock and gravel at areas of no undermining. At locations of undermining the channel is mostly soft silty sand with probe rod penetrations up to 1.5-feet deep. There are isolated locations of riprap along the wall.

Appendix A - Photographs

Photo 1: Seawall view looking north towards Strawberry Mansion Bridge.

Photo 2: Seawall view looking south towards reviewing stands.

Photo 3: Typical view of the timber cribbing under the seawall.

Photo 4: Area of undermining (Station 8+75 Shown)

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Photo 5: Collapsed weep hole at Sta. 0+48.

Photo 6: 2.1-feet void under outlet pipe at Station -5+80

Photo 7: Typical vegetation growing in seawall.

Photo 8: Top row of stones overhanging. (Station 9+50 Shown)

Photo 9: Top row of blocks settled up to 9.4 degrees towards the river

Photo 10: Timber shim installed between first and second course of stone

Appendix B – Undermining Table

FOR REFERENCE ONLY

Station	Water Depth (ft.)	Top of Cribbing (ft.)	Undermining		7/19/18 Undermining	Notes
			Height (ft.)	Penetration (ft.)	Penetration (ft.)	
-6+50	3.5	NE	-	-	-	Ledge starts at -6+30 and ends at -6+10. 2.2-feet to top of the ledge. Ledge appears to be an offset block. The block goes into the channel 6-inches.
-6+25	3.3	NE	-	-	-	
-6+00	2.4	NE	-	-	-	
-5+75	1.2	NE	-	-	-	Riprap in place in front of seawall.
-5+50	1.4	NE	-	-	-	Riprap in place in front of seawall.
-5+25	1.0	NE	-	-	-	Offset block starts at -5+25 and ends at -2+05. 2.2-feet to top of the ledge. The block goes into the channel 6-inches.
-5+00	1.3	NE	-	-	-	
-4+75	3.3	NE	-	-	-	
-4+50	4.4	NE	-	-	-	
-4+25	4.3	NE	-	-	-	
-4+00	4.1	NE	-	-	-	
-3+75	6.0	NE	-	-	-	
-3+50	5.5	NE	-	-	-	
-3+25	4.1	NE	-	-	-	
-3+00	4.2	NE	-	-	-	
-2+75	3.8	NE	-	-	-	
-2+50	3.1	NE	-	-	-	
-2+25	4.2	NE	-	-	-	
-2+00	2.6	NE	-	-	-	
-1+75	2.3	NE	-	-	-	Riprap in place in front of seawall.
-1+50	1.8	NE	-	-	-	
-1+25	1.4	NE	-	-	-	
-1+00	1.9	NE	-	-	-	Offset block starts at 0+95 and ends at 0+80. 1.9-feet to top of the ledge. Block goes into the channel 6-inches.
-0+75	4.0	1.9	0.9	1.0	2.7*	
-0+50	3.8	1.9	0.7	1.5	1.1	
-0+25	4.4	1.9	1.3	2.0	1.3*	
0+00	2.9	NE	-	-	-	
0+25	3.7	1.7	0.8	2.8	3.2	
0+50	3.7	1.7	0.8	1.5	5.0	
0+75	3.1	2.0	-	2.7	6.0	
1+00	4.0	2.0	0.8	4.0	8.0	
1+25	4.7	2.0	1.5	4.5	5.5	
1+50	4.4	2.0	1.2	5.0	8.0	
1+75	5.0	2.0	1.8	4.0	8.0	
2+00	4.7	2.0	1.5	5.3	6.0	

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Station	Water Depth (ft.)	Top of Cribbing (ft.)	Undermining		7/19/18 Undermining Penetration (ft.)	Notes
			Height (ft.)	Penetration (ft.)		
2+25	4.5	2.0	1.3	5.0	8.0	
2+50	4.6	2.5	0.9	4.5	8.0	
2+75	4.0	2.5	0.3	6.0	3.5	
3+00	4.2	2.5	0.5	5.5	6.0	
3+25	3.4	2.5	-	4.0	5.5	
3+50	3.4	2.5	-	2.5	6.0	
3+75	3.4	2.5	-	4.5	6.0	
4+00	4.0	2.5	0.3	4.7	5.0	
4+25	3.1	2.5	-	3.5	-	
4+50	3.9	2.5	0.2	4.5	7.0*	
4+75	4.0	2.5	0.3	6.5	0.5*	
5+00	4.3	2.5	0.6	4.0	0.5	
5+25	4.7	2.5	1.0	5.3	2.0*	
5+50	5.6	2.5	1.9	5.0	6.4*	
5+75	4.5	2.5	0.8	5.0	3.0*	
6+00	4.5	2.5	0.8	5.2	6.4	
6+25	4.6	2.5	0.9	6.0	3.5*	
6+50	5.0	2.5	1.3	6.2	7.0*	
6+75	6.0	2.5	2.3	7.0	4.3*	
7+00	3.9	2.5	0.2	3.8	5.3	
7+25	3.7	2.5	-	2.0	3.5*	
7+50	3.6	2.5	-	4.5	2.4*	
7+75	3.8	2.5	-	2.2	4.3*	
8+00	4.1	2.5	0.4	3.5	6.2	
8+25	6.0	2.5	2.3	2.5	6.5*	
8+50	5.1	2.5	1.4	2.7	2.0	
8+75	5.1	2.5	1.4	4.0	-	
9+00	6.0	2.5	2.3	2.0	5.0	
9+25	6.2	2.5	2.5	2.5	-	
9+50	6.4	2.5	2.7	4.0	3.0	
9+75	3.8	2.5	-	1.0	-	
10+00	4.0	1.9	0.9	4.0	4.5	
10+25	3.2	1.9	0.1	0.5	-	
10+50	1.1	NE	-	-	4.5	Riprap in place in front of seawall.
10+75	2.2	1.9	-	-	-	

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Station	Water Depth (ft.)	Top of Cribbing (ft.)	Undermining		7/19/18 Undermining Penetration (ft.)	Notes
			Height (ft.)	Penetration (ft.)		
11+00	1.4	NE	-	-	6.7	
11+25	1.3	NE	-	-	-	
11+50	1.1	NE	-	-	1.8	
11+75	1.0	NE	-	-	-	
12+00	0.9	NE	-	-	6.2	
12+25	1.1	NE	-	-	-	
12+50	0.9	NE	-	-	-	
12+75	1.3	NE	-	-	-	
13+00	1.3	NE	-	-	-	
13+25	1.1	NE	-	-	-	
13+50	1.4	NE	-	-	-	
13+75	1.5	NE	-	-	-	
14+00	2.2	1.6	-	-	-	
14+25	2.5	1.6	-	-	-	
14+50	2.5	1.6	-	-	-	
14+75	2.8	1.6	-	-	-	
15+00	3.9	1.9	0.8	3.5	-	
15+25	3.3	1.9	0.2	1.5	-	
15+50	3.4	1.9	0.3	1.0	-	Timber debris
15+75	2.0	1.9	-	-	-	Timber debris
16+00	3.5	1.9	0.4	0.5	-	

Notes:

1. NE stands for Not Exposed
2. Water Depth is the depth from the waterline to the channel bottom. The top of cribbing is the height from the water line to the top of the cribbing.
3. The height of undermining is calculated by Water depth - Top of Cribbing -1-3" (height of cribbing). If this number is negative a - has been placed in the cell.
4. Undermining depths were obtained even if there is no undermining height due to the probing at an angle through the timber cribbing.
5. The waterline datum is taken from the top of the seawall at Station 0+00 and was 4.6-feet.

*. This indicates that the previous 7/19/2018 inspection did not take a measurement at this Station. The measurements from the closest station where undermining was recorded on the previous report is shown.

Appendix C – Undermining Bar Chart

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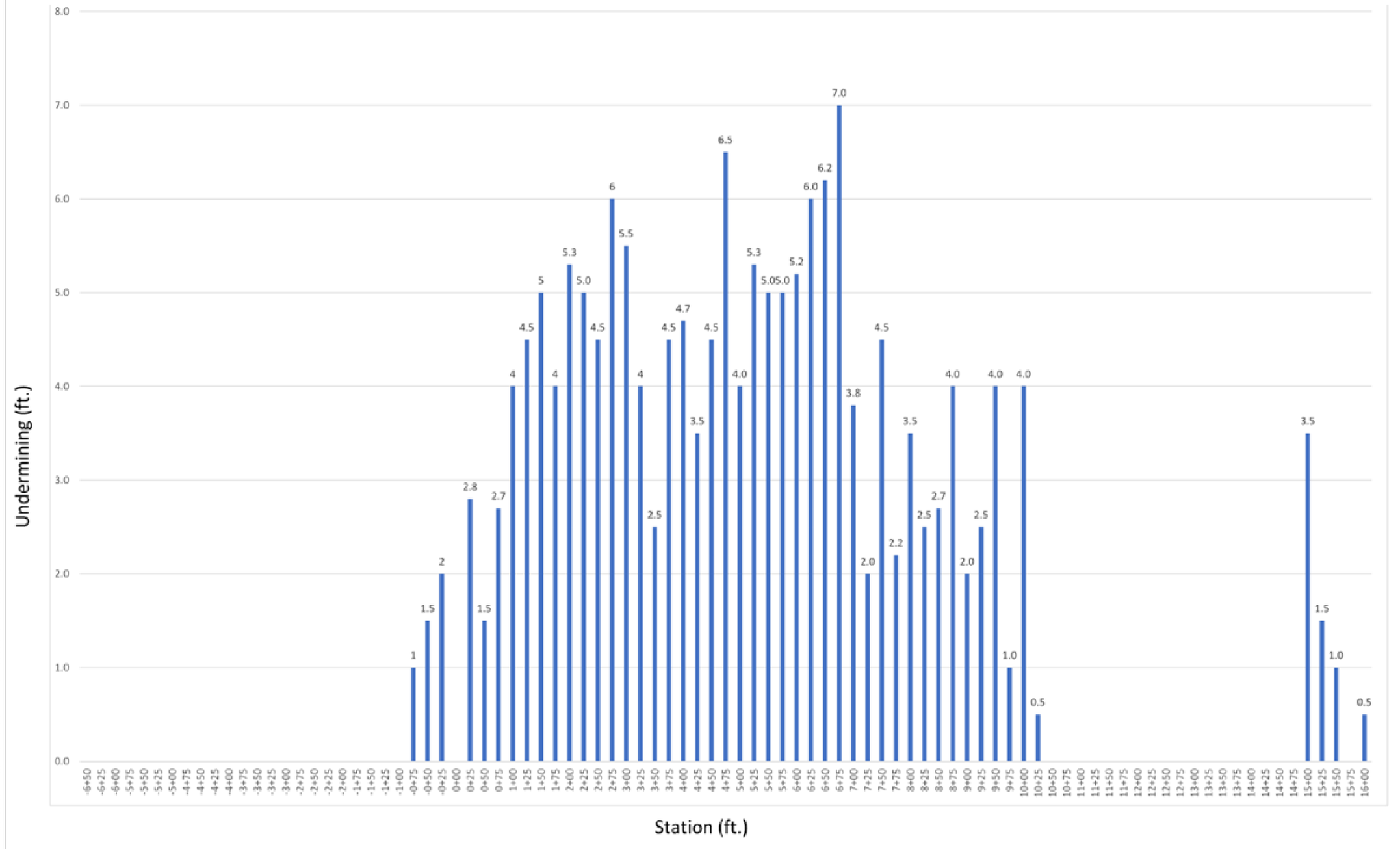

U:\Accounts\PHILP\PHILP18003 - 03 Renovation of the East Schuylkill\DESIGN\SHEETS\Border for Inspection Report.dwg PLOTTED: 5/26/2020 2:02 PM BY: Sean McCreesh PLOTSTYLE: PABrudorial.ctb PROJECT STATUS: —

PENNONI ASSOCIATES INC.
1900 Market Street, Suite 300
Philadelphia, PA 19103
T 215.222.3000 F 215.222.3588

ALL DIMENSIONS MUST BE VERIFIED BY CONTRACTOR AND OWNER MUST BE NOTIFIED OF ANY DISCREPANCIES BEFORE PROCEEDING WITH WORK

RENOVATION OF THE EAST SCHUYLKILL RIVER WALL AT REVIEWING STANDS

PHILADELPHIA, PA

UNDERMINING TABLE

CITY OF PHILADELPHIA
1515 ARCH STREET, 11TH FLOOR
PHILADELPHIA, PA 19102

NO.	DATE	REVISIONS	BY

PROJECT	PHILP18003
DATE	5/26/2020
DRAWING SCALE	NTS
DRAWN BY	SAN
APPROVED BY	ATF

S-00

SHEET 1 OF 1

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Additional Probing Inspection Adjacent to Reviewing Stands - July 19, 2018

Reviewing Stands
Along the Schuylkill River
Philadelphia, PA

Prepared For:

City of Philadelphia
Department of Public Property
1515 Arch Street, 11th Floor
Philadelphia, PA 19102

Prepared By:

Pennoni Associates Inc.
1900 Market Street, Suite 300
Philadelphia, PA 19103
(215) 222-3000

COMMONWEALTH OF PENNSYLVANIA
REGISTERED PROFESSIONAL
NICHOLAS R. WARD
ENGINEER
PE081494

Professional Engineer: Nicholas R. Ward, P.E.

8/27/18
Date

FOR REFERENCE ONLY

August 21, 2018

City of Philadelphia
Department of Public Property
1515 Arch Street
11th Floor
Philadelphia, PA 19102

RE: Additional probing inspection adjacent to reviewing stands – Renovation of the East Schuylkill River Wall at Reviewing Stands, Philadelphia, PA

Project Description

On July 19, 2018 Pennoni Associates Inc. (Pennoni) performed an underwater condition inspection of the stone masonry marine wall located on the eastern bank of the Schuylkill River adjacent to the reviewing stands on Kelly Drive. This inspection was carried out to supplement the March 23, 2018 report prepared by Pennoni and evaluate larger extents of the wall where structural deficiencies similar to the previous findings were suspected. A two-person team consisting of underwater inspectors completed the inspection utilizing waders and probing rods.

For the purposes of this memo, stationing will run along the wall from south to north with Sta. 0+00 located at the north end of the reviewing stands. The inspection covered approximately 2,250 linear feet of the wall spanning from Sta. -6+50 to Sta. 16+00. The previous underwater inspection on March 23, 2018 was conducted from Sta. 0+00 to Sta. 4+00.

Summary of Findings

As suspected, deficiencies comparable to those found during the previous inspection were identified. A number of defects were found to extend both north and south from the area investigated on March 23, 2018.

- The majority of the wall from Sta. -0+90 to Sta. 12+00 is undermined up to 2-feet high and up to 8-feet deep with the timber cribbing and portions of the timber piles exposed.
- The top row of stone is rotated up to 20º and overhangs up to 1-foot towards the river for approximately 270-feet extending from Sta. 10+50 to Sta. 13+20.
- The channel material adjacent to areas of undermining is primarily soft silt/sand with probe rod penetration of up to 2-feet. Firm soil or riprap is typical elsewhere with scattered areas of up to 6-inch penetration.
- Six drainage outlets located in the face of the wall are collapsed and/or clogged.
- Tree/timber debris is located in the channel along the wall at various locations.

Photographs, tabulated field notes, and sketches are provided on the following pages in order to provide more detail on the findings of this inspection.

Photo 1: Marine wall view looking north towards Strawberry Mansion Bridge.

Photo 2: Marine wall view looking south towards reviewing stands.

Photo 3: Rotation of top row of stone at Sta. 10+50.

Photo 4: Overhang of top row of stone at Sta. 11+00.

Photo 5: Collapsed outlet pipe at Sta. 0+60.

Photo 6: Collapsed and clogged outlet pipe at Sta. 11+10.

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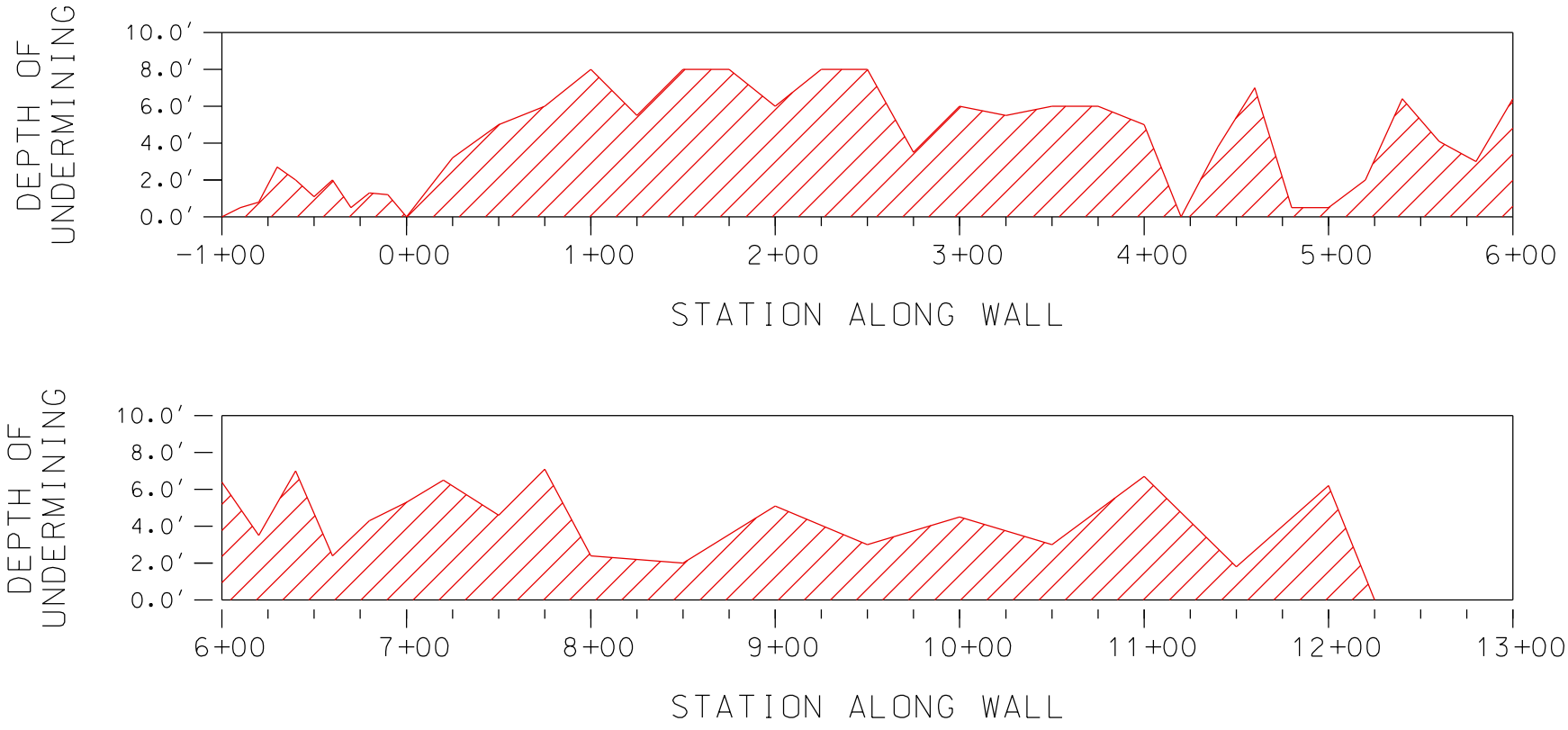

PROJECT: Repairs to East Schuylkill Seawall

SUBJECT: Underminig Measurements 7/19/2018

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Schuylkill River Marine Wall Inspection - July 19, 2018

Station	Top of Cribbing (ft.)	W/L (ft.)	M/L (ft.)	Notes
-6+50	NOT EXPOSED	4.2	0.6	LARGE RIPRAP IN PLACE; OUTLET (18" DIA.) ; TREES AT VARIOUS LOCATIONS
-6+50 ±	X	X	X	SOUTH FASCIA OF BRIDGE
-6+00	NOT EXPOSED	4.2	0.6	LARGE RIPRAP IN PLACE
-5+50	NOT EXPOSED	4.4	1.2	LARGE RIPRAP IN PLACE; 0.8' TO TOP OF LEDGE
-5+40	NOT EXPOSED	4.6	1.3	LARGE RIPRAP IN PLACE
-5+30	NOT EXPOSED	4.6	1.4	LARGE RIPRAP IN PLACE
-5+20	NOT EXPOSED	4.3	2.4	OUTLET PIPE (18" DIA.) 9" FROM TOP; LARGE RIPRAP IN PLACE
-5+20 ±	X	X	X	NORTH FASCIA OF BRIDGE
-5+10	NOT EXPOSED	3.8	2.8	SOFT SILTY SOIL WITH 1'-0" PENETRATION
-5+00	NOT EXPOSED	3.5	3.4	80% MORTAR LOSS
-4+90	NOT EXPOSED	3.5	3.4	FIRM SOIL; ISOLATED RIPRAP
-4+80	NOT EXPOSED	3.4	4.4	FIRM SOIL; ISOLATED RIPRAP
-4+50	NOT EXPOSED	3.7	4.0	FIRM SEDEMENT WITH 0'-6" PENETRATION; ISOLATED RIPRAP
-4+25	NOT EXPOSED	3.9	3.3	SOFT SILT; ISOLATED RIPRAP
-4+00	NOT EXPOSED	3.9	5.8	FIRM SEDIMENT WITH 0'-6" PENETRATION; 2.0' TO TOP OF LEDGE
-3+95	X	X	X	TREE ROOT 2'-0" BELOW CAP
-3+75	NOT EXPOSED	3.8	4.4	TREE ROOT 2'-0" BELOW CAP; OUTLET (18" DIA.) 2'-6" BELOW CAP
-3+70	X	X	5.4	1.6' UNDERMINING FOR 8'-0" L X 1'-0" H; SOIL PENETRATION OF 0'-3"; 2.3' TO TOP OF LEDGE
-3+50	NOT EXPOSED	3.6	5.0	HARD SOIL; 2.4' TO TOP OF LEDGE
-3+25	NOT EXPOSED	3.6	5.2	TRESS AT 1ST AND 2ND COURSE; SOFT SOIL; ISOLATED RIPRAP
-3+00	NOT EXPOSED	3.7	3.9	SOFT SOIL WITH 0'-6" PENETRATION; ISOLATED RIPRAP
-2+90	NOT EXPOSED	3.6	4.3	SOFT SOIL WITH 0'-6" PENETRATION; ISOLATED RIPRAP
-2+80	NOT EXPOSED	3.5	4.2	I-BOLT OUT OF STONE; SOFT SOIL WITH 0'-6" PENETRATION; ISOLATED RIPRAP
-2+70	NOT EXPOSED	3.5	3.5	SOFT SOIL WITH 0'-6" PENETRATION; ISOLATED RIPRAP
-2+60	NOT EXPOSED	3.5	4.0	TREE 2.5' BELOW TOP; SOFT SOIL WITH 0'-6" PENETRATION; ISOLATED RIPRAP
-2+50	NOT EXPOSED	3.5	4.5	I-BOLT OUT OF STONE; SOFT SOIL WITH 0'-6" PENETRATION; ISOLATED RIPRAP
-2+40	NOT EXPOSED	3.5	4.0	FLOATING DOCK; FIRM SOIL
-2+30	NOT EXPOSED	3.5	3.6	FLOATING DOCK; FIRM SOIL
-2+20	NOT EXPOSED	3.6	3.9	FLOATING DOCK; FIRM SOIL
-2+10	NOT EXPOSED	3.5	3.2	FLOATING DOCK; FIRM SOIL
-2+00	NOT EXPOSED	3.5	2.6	I-BOLT OUT OF STONE
-1+90	NOT EXPOSED	3.5	2.7	RIPRAP
-1+80	NOT EXPOSED	3.5	1.9	RIPRAP; TREE 2.5' BELOW TOP
-1+75	X	X	X	I-BOLT OUT OF STONE
-1+70	X	3.5	1.7	RIPRAP
-1+60	NOT EXPOSED	3.6	1.7	RIPRAP
-1+50	NOT EXPOSED	3.6	1.7	RIPRAP/GROUT BAG
-1+40	1.6	3.8	1.9	RIPRAP; SMALL TREES
-1+30	NOT EXPOSED	4.1	1.3	RIPRAP
-1+20	NOT EXPOSED	4.3	1.1	2.5" VOID BETWEEN STONES AT WATERLINE; RIPRAP
-1+10	1.4	4.4	1.4	I-BOLT OUT OF STONE; RIPRAP
-1+00	1.8	4.4	2.2	SOFT SOIL WITH 0'-6" PENETRATION; ISOLATED RIPRAP
-0+95	X	X	X	(3) TREES 2.5' BELOW TOP
-0+90	2.2	4.3	2.5	0.5' UNDERMINING; SOFT SOIL WITH 0'-6" PENETRATION; ISOLATED RIPRAP
-0+80	2.2	4.4	3.7	0.8' UNDERMINING; SOFT SILT WITH 2'-0" PENETRATION
-0+70	2.2	4.5	5.0	2.7' UNDERMINING; PILE EXPOSED; (2) TREES 2.5' BELOW TOP
-0+60	2.2	4.5	5.0	2.0' UNDERMINING; (2) TREES 2.5' BELOW TOP; HARD SILT WITH 0'-6" PENETRATION
-0+50	2.2	4.5	3.7	1.1' UNDERMINING; (4) TREES 2.5' BELOW TOP; HARD SILT WITH 0'-6" PENETRATION
-0+40	1.9	4.5	3.4'	2.0' UNDERMINING; HARD SILT WITH 0'-6" PENETRATION
-0+30	1.9	4.6	3.6	0.5' UNDERMINING; HARD SILT WITH 0'-6" PENETRATION
-0+20	1.8	4.6	3.9	1.3' UNDERMINING; HARD SILT WITH 0'-6" PENETRATION
-0+10	1.9	4.6	3.6	1.2' UNDERMINING; HARD SILT WITH 0'-6" PENETRATION
0+00	2.0	4.5	2.7	HARD SILT WITH 0'-6" PENETRATION
0+25	X	X	X	3.2' UNDERMINING*; (2) TREES 2.0' BELOW TOP
0+50	X	X	X	5.0' UNDERMINING*; (2) TREES 2.0' BELOW TOP
0+60	X	X	X	COLLAPSED PIPE (10" DIA.)
0+75	X	X	X	6.0' UNDERMINING*
1+00	X	X	X	8.0' UNDERMINING*
1+25	X	X	X	5.5' UNDERMINING*
1+50	X	X	X	8.0' UNDERMINING*
1+75	X	X	X	8.0' UNDERMINING*; (2) TREES 2.0' BELOW TOP
2+00	X	X	X	6.0' UNDERMINING*
2+20	X	X	X	(2) TREES 2.0' BELOW TOP
2+25	X	X	X	8.0' UNDERMINING*; COLLAPSED PIPE (10" DIA.)

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2+30	X	X	X	(4) TREES 2.0' BELOW TOP
2+50	X	X	X	8.0' UNDERMINING*; (4) TREES 2.0' BELOW TOP
2+75	X	X	X	3.5' UNDERMINING*
3+00	X	X	X	6.0' UNDERMINING*
3+25	X	X	X	5.5' UNDERMINING*; (3) TREES 2.0' BELOW TOP
3+50	X	X	X	6.0 UNDERMINING*
3+75	X	X	X	6.0' UNDERMINING*
4+00	2.0	4.7	3.5	5.0' UNDERMINING*; SOFT SILT/SAND WITH 1'-0" PENETRATION
4+20	1.6	4.8	3.5	SOFT SILT/SAND WITH 1'-0" PENETRATION
4+30	X	X	X	10" STEEL OUTLET
4+40	1.6	4.9	3.8	3.8' UNDERMINING; SOFT SILT/SAND
4+60	1.6	4.9	3.5	7.0' UNDERMINING; SOFT SILT/SAND
4+80	1.6	4.8	3.1	0.5' UNDERMINING; SOFT SILT/SAND
5+00	1.6	4.8	3.3	0.5' UNDERMINING; SOFT SILT/SAND
5+20	1.6	4.8	3.6	2.0' UNDERMINING; SOFT SILT/SAND
5+30	X	X	X	10" STEEL OUTLET
5+40	1.6	4.9	4.2	6.4' UNDERMINING; SOFT SILT/SAND
5+60	1.7	4.9	3.9	4.1' UNDERMINING; SOFT SILT/SAND
5+80	1.8	4.8	4.5	3.0' UNDERMINING; SOFT SILT/SAND
6+00	1.8	4.7	4.7	6.4' UNDERMINING; SOFT SILT/SAND
6+20	1.8	4.6	5.4	3.5' UNDERMINING; SOFT SILT WITH 2'-0" PENETRATION
6+40	1.7	4.7	4.6	7.0' UNDERMINING; SOFT SILT WITH 2'-0" PENETRATION
6+60	1.7	4.7	4.6	2.4' UNDERMINING; SOFT SILT WITH 2'-0" PENETRATION
6+80	1.7	4.7	4.4	4.3' UNDERMINING; SOFT SILT WITH 2'-0" PENETRATION
7+00	1.6	4.6	4.9	5.3' UNDERMINING; SOFT SILT WITH 2'-0" PENETRATION
7+20	1.7	4.7	4.8	6.5' UNDERMINING; SOFT SILT WITH 2'-0" PENETRATION
7+50	1.7	4.7	5.1	4.6' UNDERMINING; SOFT SILT WITH 2'-0" PENETRATION
7+75	1.7	4.7	3.9	7.1' UNDERMINING; SOFT SILT WITH 2'-0" PENETRATION
8+00	1.7	4.6	6.2	2.4' UNDERMINING; SOFT SILT WITH 2'-0" PENETRATION
8+40	X	X	X	CLAY OUTLET (10" DIA.) 3' FROM TOP
8+50	1.7	4.7	3.5	2.0' UNDERMINING; SOFT SILT WITH 2'-0" PENETRATION
8+65	X	X	X	CLAY OUTLET (10" DIA.) 1' FROM TOP
9+00	1.7	4.8	3.2	5.0' UNDERMINING; SOFT SILT WITH 2'-0" PENETRATION
9+50	1.8	4.7	4.5	3.0' UNDERMINING; SOFT SILT WITH 2'-0" PENETRATION
10+00	1.7	4.6	5.0	4.5' UNDERMINING; SOFT SILT WITH 2'-0" PENETRATION
10+50	1.8	4.5	5.7	3.0' UNDERMINING; SOFT SILT WITH 2'-0" PENETRATION; TOP ROW ROTATION**
11+00	1.8	4.5	5.5	6.7' UNDERMINING; SOFT SILT WITH 2'-0" PENETRATION; TOP ROW ROTATION**
11+10	X	X	X	COLLAPSED CLAY OUTLET (10" DIA.) 3' FROM TOP; TOP ROW ROTATION**
11+50	1.8	4.5	3.7	1.8' UNDERMINING; SOFT SILT WITH 2'-0" PENETRATION; TOP ROW ROTATION**
12+00	1.6	4.7	3.3	6.2' UNDERMINING; SOFT SILT WITH 2'-0" PENETRATION; TREES; TOP ROW ROTATION**
12+20	X	X	X	COLLAPSED CLAY OUTLET (12" DIA.); TOP ROW ROTATION**
12+25	NOT EXPOSED	4.6	1.5	RIPRAP; SAND; TOP ROW ROTATION**
12+50	NOT EXPOSED	4.6	2.0	RIPRAP; SAND; TOP ROW ROTATION**
13+00	NOT EXPOSED	4.6	1.3	RIPRAP; SAND; TOP ROW ROTATION**
13+20	X	X	X	TOP LAYER OF STONE ROTATED 20º FOR 20'-0"
14+00	NOT EXPOSED	X	X	X
15+00	NOT EXPOSED	X	X	X
16+00	NOT EXPOSED	X	X	X

*UNDERMINING MEASUREMENTS FROM STA. 0+00 TO 4+00 TAKEN FROM 3/23/18 REPORT
**TOP ROW OF STONE ROTATED UP TO 15º TOWARDS RIVER, OVERHANGS UP TO 12"