State of Rhode Island
Department of Transportation

Underwater Inspection of

Bridge Nos. 020001 & 020021

Washington Bridge South & Washington Bridge South Pedestrian

Interstate 195 Eastbound & Bike Path/Pedestrian Bridge

Over

Seekonk River

In

East Providence, Rhode Island

MARK J. STANKARD
No. 8065
REGISTERED PROFESSIONAL ENGINEER
CIVIL

July 24, 2017

Prepared by:

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MPA No. 359 AWARD No. 3381151

State of Rhode Island
Department of Transportation

Underwater Inspection Report

Bridge Nos.:	020001 & 020021	Inspection Date:	7/24/2017
Bridge Names:	Washington Bridge South & Washington Bridge South Pedestrian		
Facility Carried:	Interstate 195 Eastbound & Bike Path/Pedestrian		
Feature Intersected:	Seekonk River		
City/Town:	East Providence		

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Bridge Names:	Washington Bridge South & Washington Bridge South Pedestrian		
Facility Carried:	Interstate 195 Eastbound & Bike Path/Pedestrian		
Feature Intersected:	Seekonk River		
City/Town:	East Providence		

Bridge Inventory Information

Bridge Types:	Steel multi-girder (Interstate 195 Eastbound) and reinforced concrete open spandrel arch (bikepath / pedestrian bridge)
Year Built / Rebuilt:	1930 / 2008
Bridge Orientation:	Bridge is logged from west to east which is consistent with the previous NBIS inspection report and the structure plans.
Structure Length:	1670.4 feet
Width Out-to-Out:	71.5 feet
No. of Span(s):	14
No. of Pier(s):	13
No. of Abutment(s) in Water:	0
No. of Pier(s) in Water:	6
Abutment / Pier Type:	The pier walls are reinforced concrete with stone facing.
Foundation Type:	The pier walls are founded on reinforced concrete pile caps with unknown type piles.

Waterway Information

Type of Water:	Brackish (Tidal)
Current Strength:	Approximately 1.5 feet/second
Underwater Visibility:	Approximately 4 feet
Max. Water Depth:	29.5 feet
Max. Depth at substructure:	25.9 feet
Bottom Composition:	The channel bottom consists of mud, sand, and shells with scattered construction debris throughout. The maximum penetration into the channel bottom is 1'.
Marine Growth:	There is marine growth up to 1/2" thick on the piers, most notably beneath the tidal zone.

Inspection / Diving Operations

Crew Chief / Supervisor:	Seth Lemoine, P.E.
Inspection Team Members / Diver:	Rob Snelgrove, Curtis Cheney and James Karalekas
Inspection Date Started:	6/7/2017
Inspection Date Completed:	7/24/2017
Bridge Access:	Boat (launched from Bold Point Park, southeast of the bridge)
Boat Size:	21 foot
Dive Mode:	Commercial SCUBA
Equipment Comments:	Standard hand tools were used for this inspection.
General Remarks:	Inspection performed between 6/7/2017 and 7/24/2017. Soundings performed on 6/7/2017.

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Facility Carried:	Interstate 195 Eastbound & Bike Path/Pedestrian		
Feature Intersected:	Seekonk River		
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Summary of Findings

Item 60 - Substructure **Overall Rating:** 6 - Satisfactory

At Piers #4 through #9, the steel encased reinforced concrete caisson pile at the north (upstream) end of the piers exhibits minor corrosion below the fiberglass jackets. The caisson pile at Pier #5 has a 1' high band of laminar corrosion with negligible section loss along the channel bottom. At Piers #4 through #7 and #9, the stone masonry facade exhibits less than 5% deteriorated mortar with 3" to 6" of penetration between stones and isolated full-height cracked stones. Pier #8 has 15% deteriorated mortar with up to 6" of penetration between stones. The reinforced concrete stem below the stone masonry facade has abrasion 1/2" deep. Piers #4, #7 and #9 have cracks up to full height and open 1/4" to 1/2" wide. At Piers #4, #5 and #8, the steps / pile caps have been exposed up to 3' vertically x up to the full perimeter of the piers.

Item 61 - Channel & Channel Protection **Overall Rating:** 6 - Satisfactory

The channel bottom consists of mud, sand, and shells and has scattered construction debris throughout. The maximum penetration into the channel bottom is 1'. Since the 2013 Underwater Inspection Report, there is evidence of scour up to 9.9’ high (Pier #6) and aggradation up to 6.0’ high (Pier #5), however the pile cap exposure of up to 3' vertically x up to the full-length of the piers at Piers #4, #5 and #8 remains relatively unchanged. There has been no apparent change to the channel orientation as compared to the 2013 Underwater Inspection Report (See Photo Nos. 22 and 23). No erosion was observed along the channel embankments. There is construction debris consisting of concrete rubble and cut-off timber piles at the channel bottom adjacent to the piers. There is no significant obstructions or debris accumulation which would affect the hydraulic opening at the bridge.

The timber fender system members exhibit minor splits and checking. The newer navigational lighting system in did not have lights on at the time of the inspection.

Item 113 - Scour Critical **Overall Rating:** 3 - Unstable

As compared to the 2013 Underwater Inspection Report, there is evidence of scour up to 9.9’ high (Pier #6) and the pile caps at Piers #4, #5 and #8 remain exposed. A scour analysis was performed to evaluate the scour potential at the bridge site. Based on this scour analysis, the structure has been rated a "3" or "Unstable".

General Condition Rating for Evaluating the Condition of Substructure & Channel Components

NOTE: Condition ratings are assigned in accordance with the National Bridge Inspection Standards (NBIS) coding information, as presented in the Federal Highway Administration Report No. FHWA-PD-96-001 “Recording and Coding Guide for the Structure Inventory and Appraisal of the Nation’s Bridges,” dated December 1995 (revised March 11, 2004).

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Item 60 - Substructure

Abutment No.: 1 **Overall Rating:** NA

Component	Rating	Description
STEM	7	The abutment is located out of the water and therefore was not inspected as part of this underwater inspection. Rating is based on the 2017 NBIS Inspection Report.
FOOTING	N	
EROSION	N	Erosion was not evaluated along the abutment.
SETTLEMENT	N	The abutment is located out of the water and therefore was not inspected as part of this underwater inspection.
SCOUR	N	
WINGWALLS	7	The return walls are located out of the water and therefore was not inspected as part of this underwater inspection. Rating shall be based on the 2017 NBIS Inspection Report.

General Condition Rating for Evaluating the Condition of Substructure Components

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Item 60 - Substructure

Abutment No.: 2 **Overall Rating:** NA

Component	Rating	Description
STEM	7	The abutment is located out of the water and therefore was not inspected as part of this underwater inspection. Rating is based on the 2017 NBIS Inspection Report.
FOOTING	N	
EROSION	N	Erosion was not evaluated along the abutment.
SETTLEMENT	N	The abutment is located out of the water and therefore was not inspected as part of this underwater inspection.
SCOUR	N	
WINGWALLS	7	The return walls are located out of the water and therefore was not inspected as part of this underwater inspection. Rating is based on the 2017 NBIS Inspection Report.

General Condition Rating for Evaluating the Condition of Substructure Components

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City/Town:	East Providence		

Item 60 - Substructure

Pier/Bent Nos.: 1 - 3 & 10 - 13 **Overall Rating:** NA

Component	Rating	Description
PILES	7	The caisson piles at the north (upstream) ends of the piers are located out of the water and therefore were not inspected as part of this underwater inspection. Rating shall be based on the 2017 NBIS Inspection Report.
STEM	7	The piers are located out of the water and therefore were not inspected as part of this underwater inspection. Rating shall be based on the 2017 NBIS Inspection Report.
FOOTING	N	
SCOUR	N	
SETTLEMENT	N	The piers are located out of the water and therefore were not inspected as part of this underwater inspection.

General Condition Rating for Evaluating the Condition of Substructure Components

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Item 60 - Substructure

Pier/Bent No.: 4 **Overall Rating:** 6 - Satisfactory

Component	Rating	Description
PILES	7	There is a steel encased reinforced concrete caisson pile at the north (upstream) end of the pier. The caisson pile has a fiberglass jacket in place that extends 13'-6" down from the underside of the concrete cap section which has no significant deficiencies (See Photo Nos. 3 and 4). The exposed steel casing exhibits minor corrosion.
STEM	7	The pier consists of a reinforced concrete pier wall with a granite stone masonry facade that extends from the top of the wall (bottom of pier cope) to the sloped step / pile cap. The stone masonry facade exhibits less than 5% deteriorated mortar with 3" to 6" of penetration between stones (See Photo Nos. 3 and 4). There are vertical cracks up to 1/4" wide in the stones (See Photo Nos. 3 thru 5).
FOOTING	7	The sloped concrete step / pile cap (steps out 18" from the pier face then slopes off at the 45˚ angle towards the channel bottom). The step / pile cap is exposed up to 2' vertically at the southeast shoulder and extends along the full-length of the east face of the pier and terminates at the northwest shoulder. The exposed surfaces of the step / pile cap exhibit abrasion up to 1/2" deep.
SCOUR	6	Since the 2013 Underwater Inspection Report, the reinforced concrete pile cap remains exposed up to 2' vertically at the southeast shoulder and extends along the full length of the east face of the pier and terminates at the northwest shoulder. There has been aggradation of the channel bottom up to 1.8' high and scour of less than 1' high around the pier pile cap.
SETTLEMENT	8	

General Condition Rating for Evaluating the Condition of Substructure Components

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Feature Intersected: Seekonk River
City/Town: East Providence

Item 60 - Substructure

Pier/Bent No.: 5 **Overall Rating:** 6 - Satisfactory

Component	Rating	Description
PILES	6	There is a steel encased reinforced concrete caisson pile at the north (upstream) end of the pier. The caisson pile has a fiberglass jacket in place that extends 13'-6" down from the underside of the concrete cap section, which has no significant deficiencies (See Photo Nos. 6 and 7). The exposed steel casing exhibits a 1' high band of laminar corrosion with negligible section loss along the channel bottom. The remainder of the caisson pile has minor corrosion.
STEM	6	The pier consists of a reinforced concrete pier wall with a granite stone masonry facade that extends 16-1/2' below the top of the wall (bottom of pier cope) to the pile cap. The stone masonry facade exhibits less than 5% deteriorated mortar with 3" to 6" of penetration between stones (See Photo Nos. 6 and 7). The reinforced concrete step has abrasion up to 1/2" deep throughout, and an isolated band of abrasion full width x 2-1/2' high x up to 3/4" deep at the north (upstream) nose of the pier near the channel bottom.
FOOTING	7	The reinforced concrete pile cap (steps out 2' from the pier face) remains exposed up to 1' vertically along the south (downstream) nose of the pier and over a length of 4' along the west face of the pier at the southwest corner, which is unchanged from the 2013 Underwater Inspection Report. The exposed surfaces of the pile cap exhibit abrasion up to 1/2" deep throughout.
SCOUR	6	Since the 2013 Underwater Inspection Report, the channel bottom along the west side of the pier has scour up to 4.7’ high near the north nose while the channel bottom along the east side of the pier has aggradation up to 6’ high near the south nose.
SETTLEMENT	8	

General Condition Rating for Evaluating the Condition of Substructure Components

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Feature Intersected: Seekonk River
City/Town: East Providence

Item 60 - Substructure

Pier/Bent No.: 6 **Overall Rating:** 6 - Satisfactory

Component	Rating	Description
PILES	7	There is a steel encased reinforced concrete caisson pile at the north (upstream) end of the pier. The caisson pile has a fiberglass jacket in place that extends 13'-6" down from the underside of the concrete cap section which has no significant deficiencies (See Photo Nos. 8 and 9). The exposed steel casing exhibits minor corrosion.
STEM	6	The pier consists of a reinforced concrete pier wall with a stone masonry facade that extends 16-1/2' below the top of the wall (bottom of pier cope). The stone masonry facade exhibits less than 5% deteriorated mortar with 3" to 6" of penetration between stones and isolated full-height cracked stones (See Photo Nos. 8 and 9). There is also a missing stone 2' long x 2-1/2' high on the east face. There are intermittent voids up to 3' long x 6" high x 6" deep along the interface of the facade and the concrete pier stem on the west pier face. The reinforced concrete portion of the stem below the stone masonry facade has abrasion up to 1/2" deep.
FOOTING	N	There is no observed exposure of the pier pile cap.
SCOUR	6	Since the 2013 and 2009 Underwater Inspection Reports, there is evidence of scour along the west face of the pier, increasing in depth toward the southwest corner up to 9.9' high. There is evidence of aggradation up to 4.3’ high on the east side of the pier, approximately 20’ south of the northwest corner.
SETTLEMENT	8	

General Condition Rating for Evaluating the Condition of Substructure Components

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Item 60 - Substructure

Pier/Bent No.: 7 **Overall Rating:** 6 - Satisfactory

Component	Rating	Description
PILES	7	There is a steel encased reinforced concrete caisson pile at the north (upstream) end of the pier. The caisson pile has a fiberglass jacket in place that extends 13'-6" down from the underside of the concrete cap section which has no significant deficiencies (See Photo Nos. 10 and 15). The exposed steel casing exhibits minor corrosion.
STEM	6	The pier consists of a reinforced concrete pier wall with a stone masonry facade that extends 16-1/2' below the top of the wall (bottom of pier cope), as noted in the 2013 Underwater Inspection Report. The stone masonry facade exhibits less than 5% deteriorated mortar with 3" to 6" of penetration between stones and isolated full-height cracked stones (See Photo Nos. 10 and 15). On both the west and east faces of the pier, there are vertical cracks open between 1/8" and 1/4" wide that extend from the top of the wall down to the channel bottom near the midpoint of the pier wall. Some of the cracks have been partially sealed with epoxy and mortar and show no change since the 2013 Underwater Inspection. There is also a missing stone 3-1/2' long x 5' high on the west face (See Photo Nos. 10, 11, 15 and 16). The reinforced concrete portion of the stem below the stone masonry facade has abrasion up to 1/2" deep. There are bands of abrasion full width x 5' high x up to 1" deep on the north (upstream) face of the pier near the channel bottom; 2' long x 1' high x 2" deep at the south (downstream) face of the pier near the channel bottom; and a 12" diameter x 5" deep area of abrasion at the southwest corner of the pier along the channel bottom (See Photo Nos. 12 thru 14).
FOOTING	N	There is no observed exposure of the pier pile cap.
SCOUR	6	As compared to the 2013 Underwater Inspection Report, the channel bottom remains relatively unchanged (± 1.5'), however the channel bottom on the east side of the pier has a trend of scour up to 5.1' high. There is no observed exposure of the pier foundation.
SETTLEMENT	6	On both the west and east faces of the pier, there are vertical cracks open to 1/4" wide that extend from the top of the wall down to the channel bottom, near the midpoint of the pier stem, that may indicate slight settlement of the pier (See Photo Nos. 10, 11, 15 and 16).

General Condition Rating for Evaluating the Condition of Substructure Components

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Feature Intersected: Seekonk River
City/Town: East Providence

Item 60 - Substructure

Pier/Bent No.: 8 **Overall Rating:** 6 - Satisfactory

Component	Rating	Description
PILES	7	There is a steel encased reinforced concrete caisson pile at the north (upstream) end of the pier. The caisson pile has a fiberglass jacket in place that extends 13'-6" down from the underside of the concrete cap section which has no significant deficiencies (See Photo Nos. 17 and 18). The exposed steel casing exhibits minor corrosion.
STEM	6	The pier consists of a reinforced concrete pier wall with a stone masonry facade that extends from the top of the wall (bottom of pier cope) to the sloped step / pile cap. The stone masonry facade exhibits 15% deteriorated mortar with up to 6" of penetration between stones (See Photo Nos. 17 and 18). There are two stones with vertical cracks up to 1/2" wide on the east face of the pier at the north fascia of the pedestrian bridge (See Photo No. 19).
FOOTING	7	The reinforced concrete pile cap (steps out 18" from the pier face then slopes off at the 45˚ angle towards the channel bottom) is exposed 3' vertically along the south face, extends 6' along the west face and 3/4 of the length of the east face. The exposed surfaces of the step / pile cap exhibit abrasion up to 1/2" deep with an isolated area of abrasion 18" long x 6" high x 2" deep on the east face located 5' from the southeast corner.
SCOUR	6	Since the 2013 Underwater Inspection Report, the exposure of the pile cap remains relatively unchanged however there is evidence of scour up to 3.8' high on the west side of the pier near the southwest corner.
SETTLEMENT	8	

General Condition Rating for Evaluating the Condition of Substructure Components

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Item 60 - Substructure

Pier/Bent No.: 9 **Overall Rating:** 6 - Satisfactory

Component	Rating	Description
PILES	7	There is a steel encased reinforced concrete caisson pile at the north (upstream) end of the pier. The caisson pile has a fiberglass jacket in place that extends 13'-6" down from the underside of the concrete cap section which has no significant deficiencies (See Photo No. 20). The exposed steel casing exhibits minor corrosion.
STEM	6	The pier consists of a reinforced concrete pier wall with a stone masonry facade that extends from the top of the wall (bottom of pier cope) to the channel bottom. **Note: The east face of the pier is located out of the water and was therefore was not included in this Underwater Inspection.** The stone masonry facade exhibits less than 5% deteriorated mortar with 3" to 6" of penetration between stones and isolated full-height cracked stones (See Photo No. 18). There is also a vertical crack 1/2" wide that extends through the top three courses of the stone facade on the west face, located mid-length of the pier (See Photo Nos. 20 and 21).
FOOTING	7	The pile cap is no longer exposed as compared to the 2013 Underwater Inspection Report.
SCOUR	7	Since the 2013 Underwater Inspection Report, the channel bottom adjacent to the west side of the pier has aggradation up to 1' high and the south and north sides of the pier have aggradation up to 2.1' high and 3.0' high, respectively.
SETTLEMENT	8	

General Condition Rating for Evaluating the Condition of Substructure Components

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City/Town:	East Providence		

Item 61 - Channel & Channel Protection

Overall Rating: 6 - Satisfactory

Component	Rating	Description
CHANNEL SCOUR	6	Since the 2013 Underwater Inspection Report, there is evidence of scour up to 9.9' high (Pier #6) and aggradation up to 6.0' high (Pier #5), however the pile cap exposure of up to 3' vertically x up to the full-length of the piers at Piers #4, #5 and #8 remains relatively unchanged.
EMBANKMENT EROSION	8	There is no significant erosion along the channel embankments adjacent to the bridge. Erosion up to 70' long x 5' high was observed on the southwest channel embankment south of the Brown University Boat House, which is approximately 400' to the south of the bridge (See Photo No. 25).
CHANNEL CHANGE	7	There has been no apparent change to the channel orientation as compared to the 2013 Underwater Inspection Report (See Photo Nos. 22 and 23).
ADEQUACY OF OPENING	7	There are no significant obstructions or debris accumulation which would affect the hydraulic opening at the bridge.
DEBRIS	6	There is construction debris consisting of concrete rubble and cut-off timber piles at the channel bottom adjacent to the piers. There are no significant obstructions or debris accumulation which would affect the hydraulic opening at the bridge.
VEGETATION	8	
RIP RAP	N	There is evidence of scattered rip-rap along the east side of Pier #5. The southwest channel embankement has a stone revetment (See Photo No. 24).

General Condition Rating for Evaluating the Condition of Channel Components

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Item 61 - Channel & Channel Protection (Cont'd)

Rating: 6 - Satisfactory

Component	Rating	Description
FENDER SYSTEM	6	This item shall be used to rate the condition of the fender system and navigational lighting in place along the east side of Pier #6 and the west side of Pier #7. Fender System: The timber fender system members exhibit minor splits and checking along with damaged or missing handrails (See Photo Nos. 27 thru 30). The dolphin pile groups at the south (downstream) end of the fenders appear to have been recently replaced and have no significant defects. Navigational Lighting: There is a newer navigational lighting system in place , however the lights were not on at the time of the inspection (See Photo Nos. 27 thru 30).
SPUR DIKES & JETTIES	N	

Water Velocities

Channel/Span No.	Max. Depth (ft)	20% (fps)	60% (fps)	80% (fps)
4	4.7	Tidal	Tidal	Tidal
5	26.2	Tidal	Tidal	Tidal
6	27.0	Tidal	Tidal	Tidal
7	29.5	Tidal	Tidal	Tidal
8	23.1	Tidal	Tidal	Tidal
9	15.2	Tidal	Tidal	Tidal

General Condition Rating for Evaluating the Condition of Substructure Components

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Bridge Nos. 020001 & 020021

Washington Bridge South & Bike Path / Pedestrian Bridge

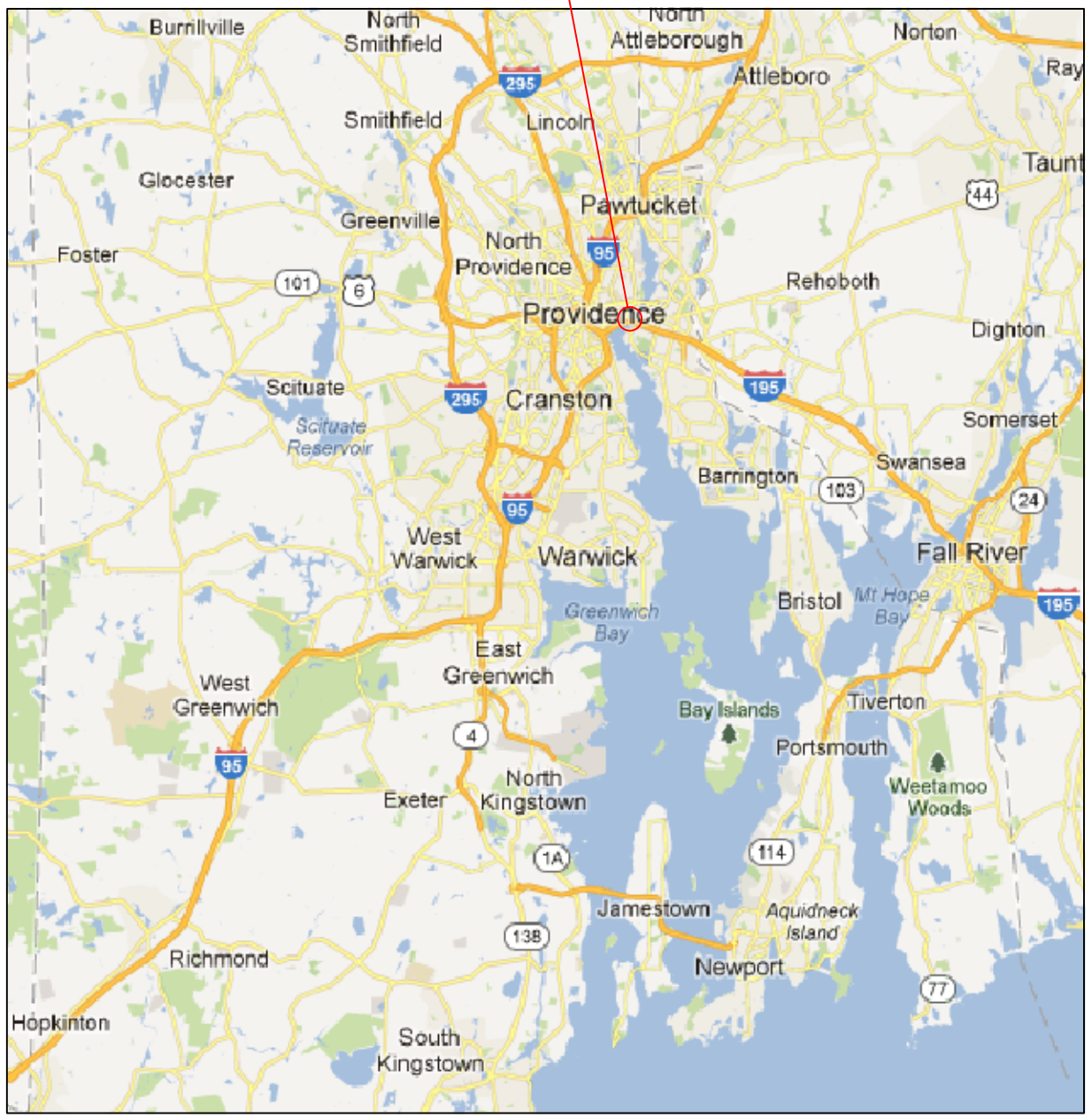
Drawings / Sketches

Prepared by:

COLLINS ENGINEERS INC.

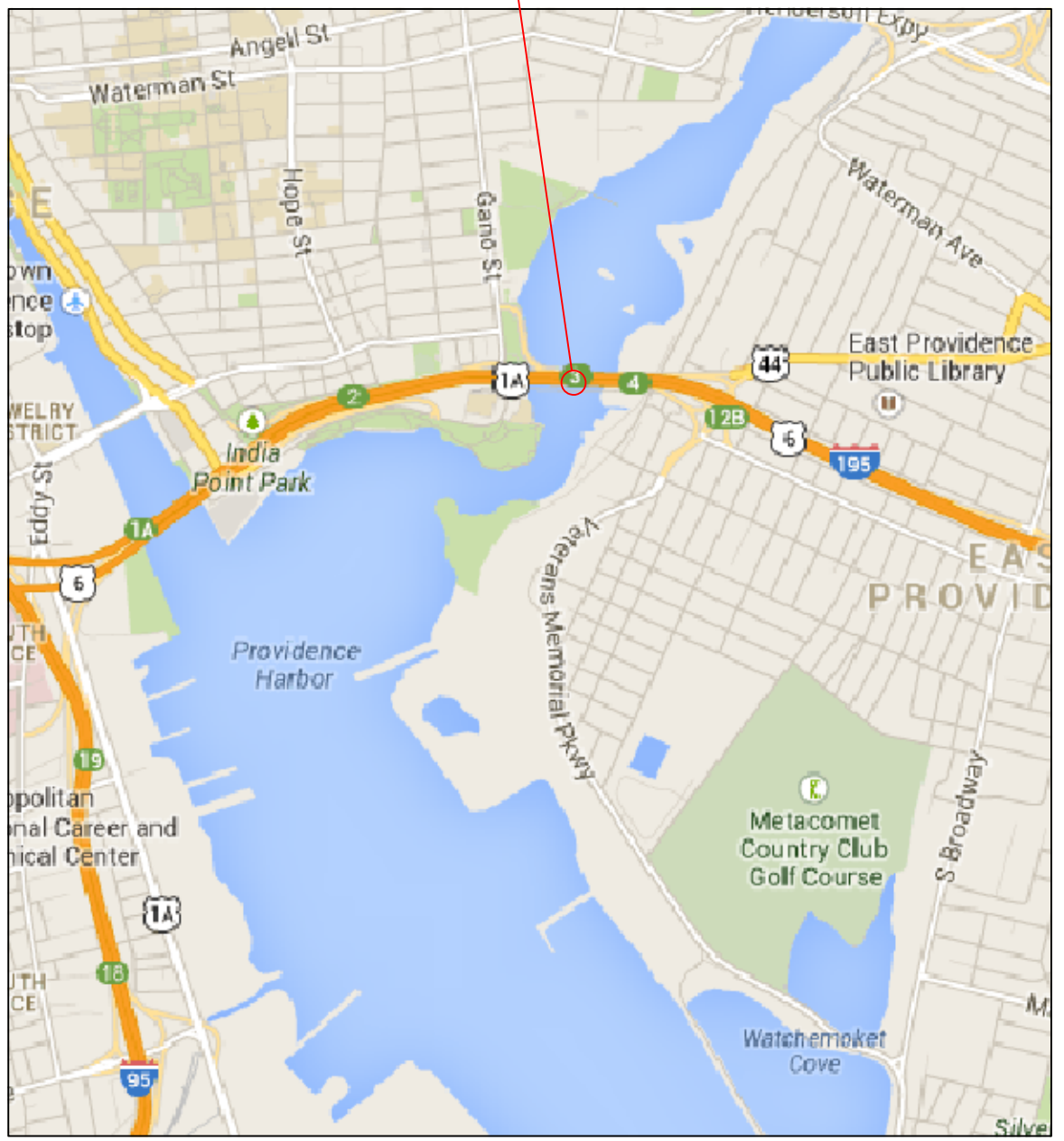
MPA No. 359 AWARD No. 3381151

Bridge Nos. 020001 and 020021



VICINITY
(Scale 1"=28000')

Bridge Nos. 020001 and 020021



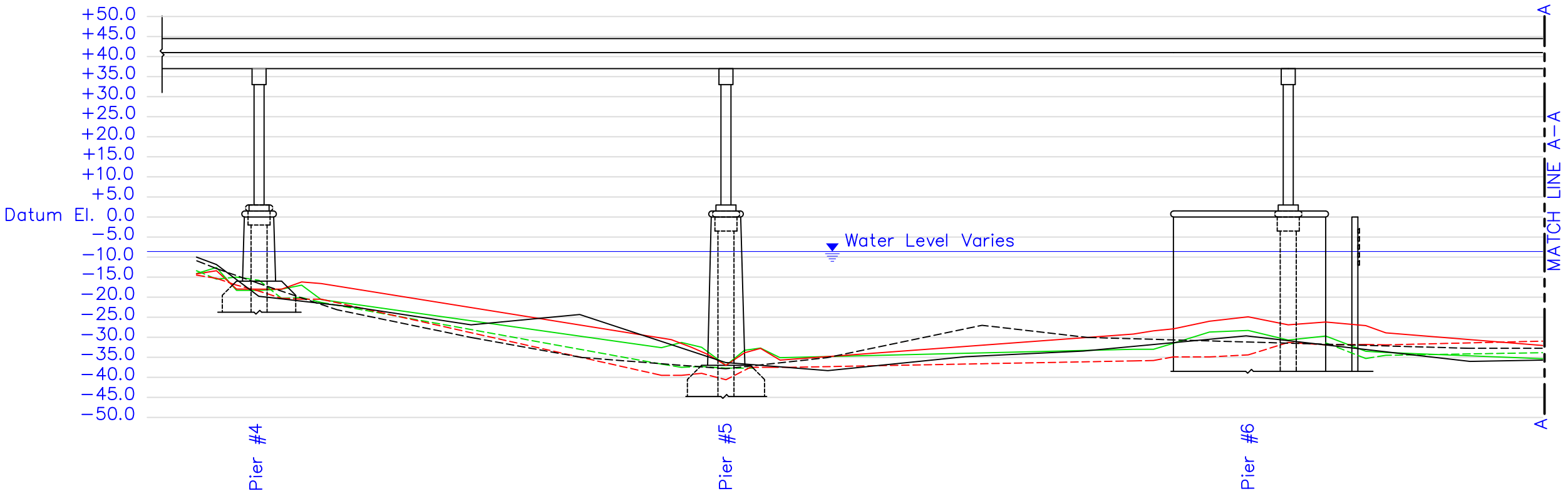
LOCATION
(Scale 1"=2000')

State of Rhode Island
Department of Transportation

BRIDGE NOS. 020001 & 020021 (WASHINGTON BRIDGE SOUTH)
INTERSTATE 195 EASTBOUND & BIKE PATH / PEDESTRIAN
OVER SEEKONK RIVER
EAST PROVIDENCE, RI

LOCATION AND VICINITY MAPS

Drawn By: ML	COLLINS ENGINEERS INC.	2350 POST ROAD WARWICK, RI 02886 (401) 732-7714	Date: 07/24/2017
Checked By: SL			Scale: VARIES
Project: 66-08460			Figure No.: 1



ELEVATION
(Scale: 1" = 25'−0")

GENERAL NOTES:

1. At the time of inspection on June 7, 2017 the waterline was located between 6.0 and 10.0 ft below the top of the stone facing at the upstream (north) nose of Piers #1−#10 (Datum Elevation 0.0).
2. At the time of inspection on August 5, 2013 the waterline was located between 7.5 and 10.5 ft below the top of the stone facing at the upstream (north) nose of Piers #1−#10 (Datum Elevation 0.0).
3. At the time of inspection on July 7, 2009 the waterline was located between 6.9 and 11.0 ft below the top of the stone facing at the upstream (north) nose of Piers #1−#10 (Datum Elevation 0.0).
4. Soundings across the channel were taken parallel to the bridge immediately adjacent to, 5 ft off and 10 ft off the the pile cap and tremie seal at the piers as well as at the quarter points and midpoint of each span at the bridge fascias, and are actual distances from the assigned datum in feet.
5. Soundings parallel to the substructure were taken at 5 ft intervals immediately adjacent to, 5 ft off and 10 ft off the pile cap and tremie seal at the piers as well as both pier noses, and are actual distances from the assigned datum in feet.
6. Variations between the 2017 and 2013 channel bottom profiles are likely due to the soft composition of the channel bottom at certain locations.
7. This figure was developed from field notes, sketches and structure plans.

LEGEND

- 2017 Upstream Fascia Channel Bottom Profile
- 2017 Downstream Fascia Channel Bottom Profile
- 2013 Upstream Fascia Channel Bottom Profile
- 2013 Downstream Fascia Channel Bottom Profile
- 2009 Upstream Fascia Channel Bottom Profile
- 2009 Downstream Fascia Channel Bottom Profile

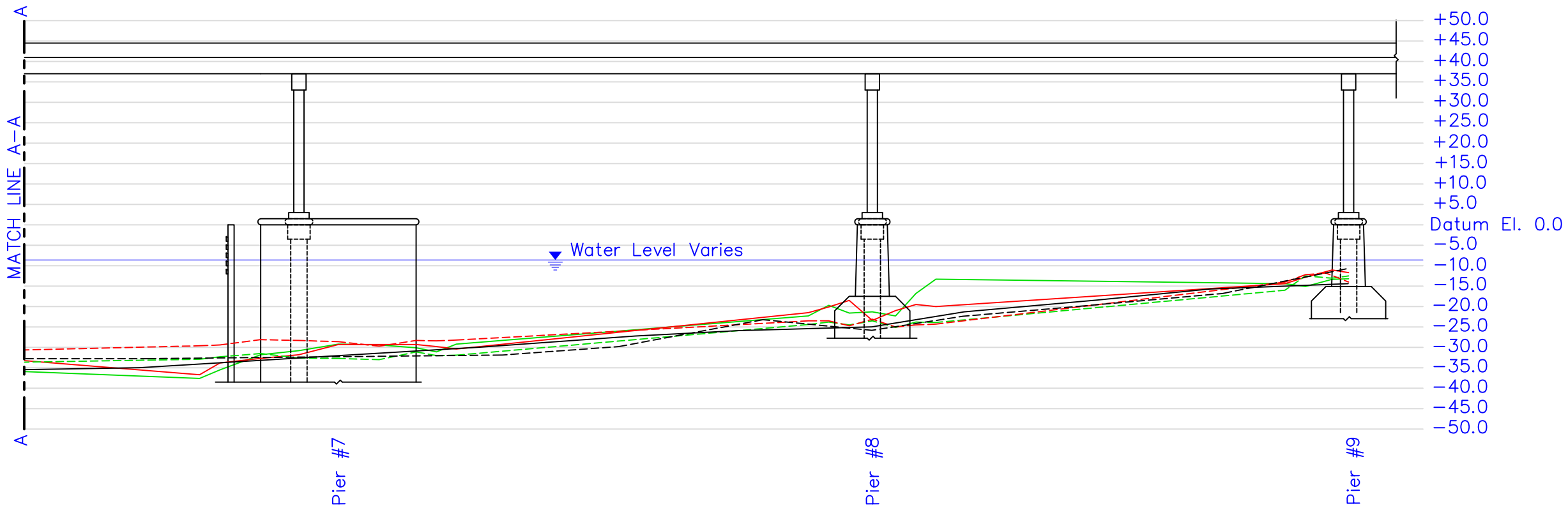
0 25' 50'
GRAPHIC SCALE IN FEET

State of Rhode Island
Department of Transportation

BRIDGE NOS. 020001 & 020021 (WASHINGTON BRIDGE SOUTH)
INTERSTATE 195 EASTBOUND & BIKE PATH / PEDESTRIAN
OVER SEEKONK RIVER
EAST PROVIDENCE, RI

ELEVATION (PIER #4 TO PIER #6)

Drawn By: ML	COLLINS ENGINEERS INC	2350 POST ROAD WARWICK, RI 02886 (401) 732−7714	Date: 07/24/2017
Checked By: SL			Scale: 1" = 25'−0"
Project: 66−08460			Figure No.: 2



ELEVATION
(Scale: 1" = 25'–0")

GENERAL NOTES:

1. At the time of inspection on June 7, 2017 the waterline was located between 6.0 and 10.0 ft below the top of the stone facing at the upstream (north) nose of Piers #1–#10 (Datum Elevation 0.0).
2. At the time of inspection on August 5, 2013 the waterline was located between 7.5 and 10.5 ft below the top of the stone facing at the upstream (north) nose of Piers #1–#10 (Datum Elevation 0.0).
3. At the time of inspection on July 7, 2009 the waterline was located between 6.9 and 11.0 ft below the top of the stone facing at the upstream (north) nose of Piers #1–#10 (Datum Elevation 0.0).
4. Soundings across the channel were taken parallel to the bridge immediately adjacent to, 5 ft off and 10 ft off the the pile cap and tremie seal at the piers as well as at the quarter points and midpoint of each span at the bridge fascias, and are actual distances from the assigned datum in feet.
5. Soundings parallel to the substructure were taken at 5 ft intervals immediately adjacent to, 5 ft off and 10 ft off the pile cap and tremie seal at the piers as well as both pier noses, and are actual distances from the assigned datum in feet.
6. Variations between the 2017 and 2013 channel bottom profiles are likely due to the soft composition of the channel bottom at certain locations.
7. This figure was developed from field notes, sketches and structure plans.

LEGEND

- 2017 Upstream Fascia Channel Bottom Profile
- 2017 Downstream Fascia Channel Bottom Profile
- 2013 Upstream Fascia Channel Bottom Profile
- 2013 Downstream Fascia Channel Bottom Profile
- 2009 Upstream Fascia Channel Bottom Profile
- 2009 Downstream Fascia Channel Bottom Profile

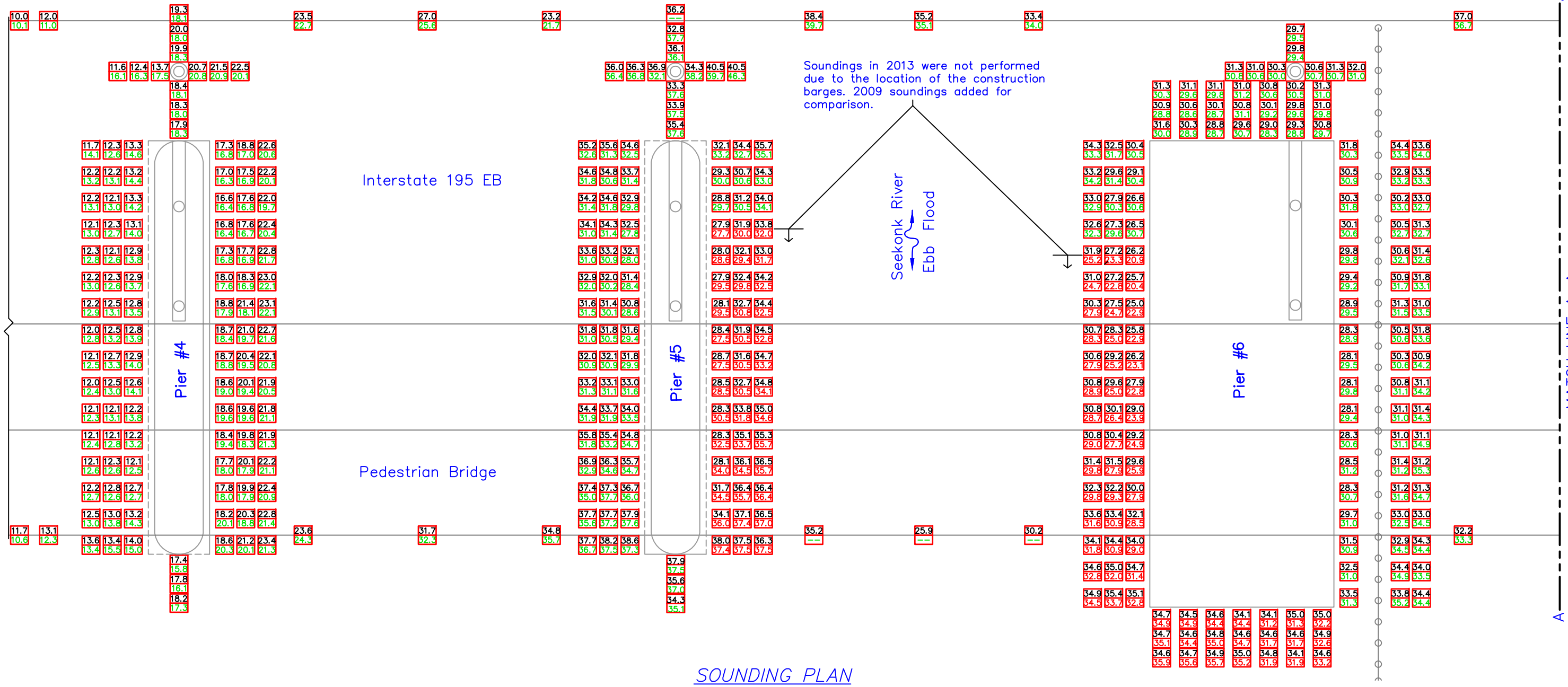
0 25' 50'
GRAPHIC SCALE IN FEET

State of Rhode Island
Department of Transportation

BRIDGE NOS. 020001 & 020021 (WASHINGTON BRIDGE SOUTH)
INTERSTATE 195 EASTBOUND & BIKE PATH / PEDESTRIAN
OVER SEEKONK RIVER
EAST PROVIDENCE, RI

ELEVATION (PIER #7 TO PIER #9)

Drawn By: ML	COLLINS ENGINEERS INC	2350 POST ROAD WARWICK, RI 02886 (401) 732–7714	Date: 07/24/2017
Checked By: SL			Scale: 1" = 25'–0"
Project: 66–08460			Figure No.: 3



SOUNDING PLAN
(Scale: 1" = 20'–0")

GENERAL NOTES:

1. At the time of inspection on June 7, 2017 the waterline was located between 6.0 and 10.0 ft below the top of the stone facing at the upstream (north) nose of Piers #1–#10 (Datum Elevation 0.0).
2. At the time of inspection on August 5, 2013 the waterline was located between 7.5 and 10.5 ft below the top of the stone facing at the upstream (north) nose of Piers #1–#10 (Datum Elevation 0.0).
3. At the time of inspection on July 7, 2009 the waterline was located between 6.9 and 11.0 ft below the top of the stone facing at the upstream (north) nose of Piers #1–#10 (Datum Elevation 0.0).
4. Soundings across the channel were taken parallel to the bridge immediately adjacent to, 5 ft off and 10 ft off the the pile cap and tremie seal at the piers as well as at the quarter points and midpoint of each span at the bridge fascias, and are actual distances from the assigned datum in feet.
5. Soundings parallel to the substructure were taken at 5 ft intervals immediately adjacent to, 5 ft off and 10 ft off the pile cap and tremie seal at the piers as well as both pier noses, and are actual distances from the assigned datum in feet.
6. Variations between the 2017 and 2013 channel bottom profiles are likely due to the soft composition of the channel bottom at certain locations.
7. This figure was developed from field notes, sketches and structure plans.

LEGEND

2017 2013	Channel bottom depths from datum parallel to structure along the upstream and downstream fascias and along pier fascia
2017 2009	Channel bottom depths from datum at locations where 2013 soundings are unavailable due to placement of construction barge

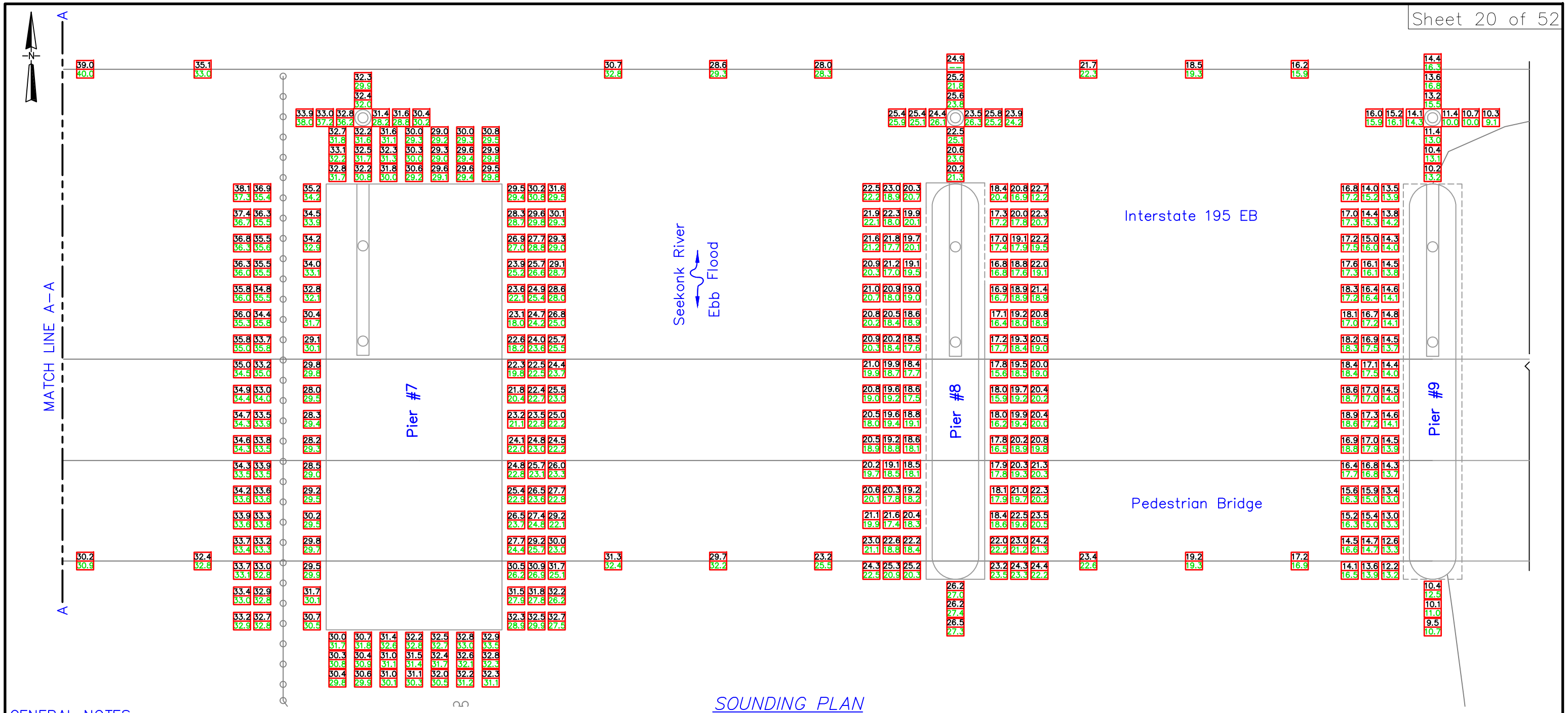
0 20' 40'
GRAPHIC SCALE IN FEET

State of Rhode Island
Department of Transportation

BRIDGE NOS. 020001 & 020021 (WASHINGTON BRIDGE SOUTH)
INTERSTATE 195 EASTBOUND & BIKE PATH / PEDESTRIAN
OVER SEEKONK RIVER
EAST PROVIDENCE, RI

SOUNDING PLAN (PIER #4 TO PIER #6)

Drawn By: ML	COLLINS ENGINEERS INC	2350 POST ROAD WARWICK, RI 02886 (401) 732–7714	Date: 07/24/2017
Checked By: SL			Scale: 1"= 20'–0"
Project: 66–08460			Figure No.: 4



SOUNDING PLAN
(Scale: 1" = 20'–0")

0 20' 40'
GRAPHIC SCALE IN FEET

GENERAL NOTES:

1. At the time of inspection on June 7, 2017 the waterline was located between 6.0 and 10.0 ft below the top of the stone facing at the upstream (north) nose of Piers #1–#10 (Datum Elevation 0.0).
2. At the time of inspection on August 5, 2013 the waterline was located between 7.5 and 10.5 ft below the top of the stone facing at the upstream (north) nose of Piers #1–#10 (Datum Elevation 0.0).
3. At the time of inspection on July 7, 2009 the waterline was located between 6.9 and 11.0 ft below the top of the stone facing at the upstream (north) nose of Piers #1–#10 (Datum Elevation 0.0).
4. Soundings across the channel were taken parallel to the bridge immediately adjacent to, 5 ft off and 10 ft off the the pile cap and tremie seal at the piers as well as at the quarter points and midpoint of each span at the bridge fascias, and are actual distances from the assigned datum in feet.
5. Soundings parallel to the substructure were taken at 5 ft intervals immediately adjacent to, 5 ft off and 10 ft off the pile cap and tremie seal at the piers as well as both pier noses, and are actual distances from the assigned datum in feet.
6. Variations between the 2017 and 2013 channel bottom profiles are likely due to the soft composition of the channel bottom at certain locations.
7. This figure was developed from field notes, sketches and structure plans.

LEGEND

2017
2013

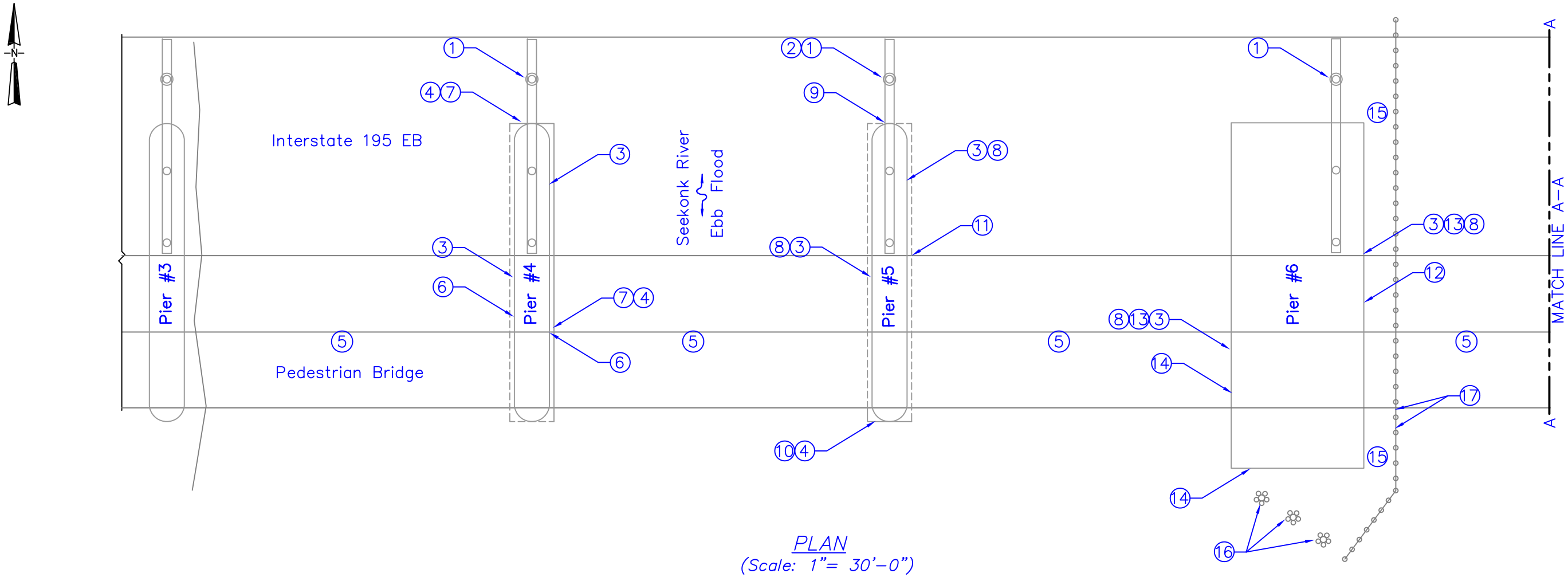
Channel bottom depths from datum parallel to structure along the upstream and downstream fascias and along pier fascia

State of Rhode Island
Department of Transportation

BRIDGE NOS. 020001 & 020021 (WASHINGTON BRIDGE SOUTH)
INTERSTATE 195 EASTBOUND & BIKE PATH / PEDESTRIAN
OVER SEEKONK RIVER
EAST PROVIDENCE, RI

SOUNDING PLAN (PIER #7 TO PIER #9)

Drawn By: ML	COLLINS ENGINEERS INC	Date: 07/24/2017
Checked By: SL	2350 POST ROAD WARWICK, RI 02886 (401) 732–7714	Scale: 1"= 20'–0"
Project: 66–08460		Figure No.: 5



PLAN
(Scale: 1"= 30'–0")

INSPECTION NOTES:

① At Piers #4 thru #6, the caisson pile at the north (upstream) end of the pier exhibits minor corrosion on the exposed portions of the steel casing. Also, there is a fiberglass wrap that extends 13–1/2' down from the underside of the concrete cap that exhibits no significant deficiencies.

② At Pier #5, the steel casing of the caisson pile exhibits a 1' high band of laminar corrosion with negligible section loss.

③ At Piers #4 thru #6 the granite stone masonry facade exhibits less than 5% deteriorated mortar with 3" to 6" of penetration between stones.

④ The exposed surfaces of the reinforced concrete step / pile cap exhibit abrasion up to 1/2" deep.

⑤ The channel bottom consists of mud, sand, and shells with scattered construction debris throughout. The maximum penetration into the channel bottom is 1.0'.

⑥ At Pier #4, there is a crack full height x 1/4" wide that extends onto the concrete step / pile cap near midspan of the west face and one cracked stone full height x 1/4" wide in the fourth stone course near the south end of the east face of the pier.

⑦ At Pier #4, the reinforced concrete step / pile cap is exposed up to 2' vertically extending from the northwest (upstream) shoulder, along the full–length of the east face of the pier with maximum exposure at the southeast (downstream) shoulder.

⑧ At Piers #5 and #6, there is abrasion up to 1/2" deep on the reinforced concrete stem below the stone masonry facade.

⑨ At Pier #5, on the north (upstream) nose, there is a band of scaling full width x 2–1/2' high x up to 3/4" deep near the channel bottom.

⑩ At Pier #5, the reinforced concrete step / pile cap has been exposed up to 1' vertically along the along the full–length of the south (downstream) nose of the pier and over a length of 4' along the west face of the pier.

⑪ At Pier #5, there is rip rap up to 2' diameter intermittently along the full length of the east face of the pier.

⑫ At Pier #6, there is a missing granite stone 2' long x 2–1/2' high.

⑬ At Pier #6, there are isolated full–height cracked stones in the granite facade.

⑭ At Pier #6, there are voids at the concrete/granite interface up to 3' long x 6" high x 6" deep along the south and west faces of the pier.

⑮ At Pier #6, there is a timber pile cut off 10' above the channel bottom at the northeast (upstream) shoulder and three timber piles lying on the channel bottom at the southeast (downstream) shoulder of the pier.

⑯ The previously noted (2013) areas of splintering / section loss to the dolphin pile groups at the south (downstream) end of the fenders was not found and the piles appear to have been replaced.

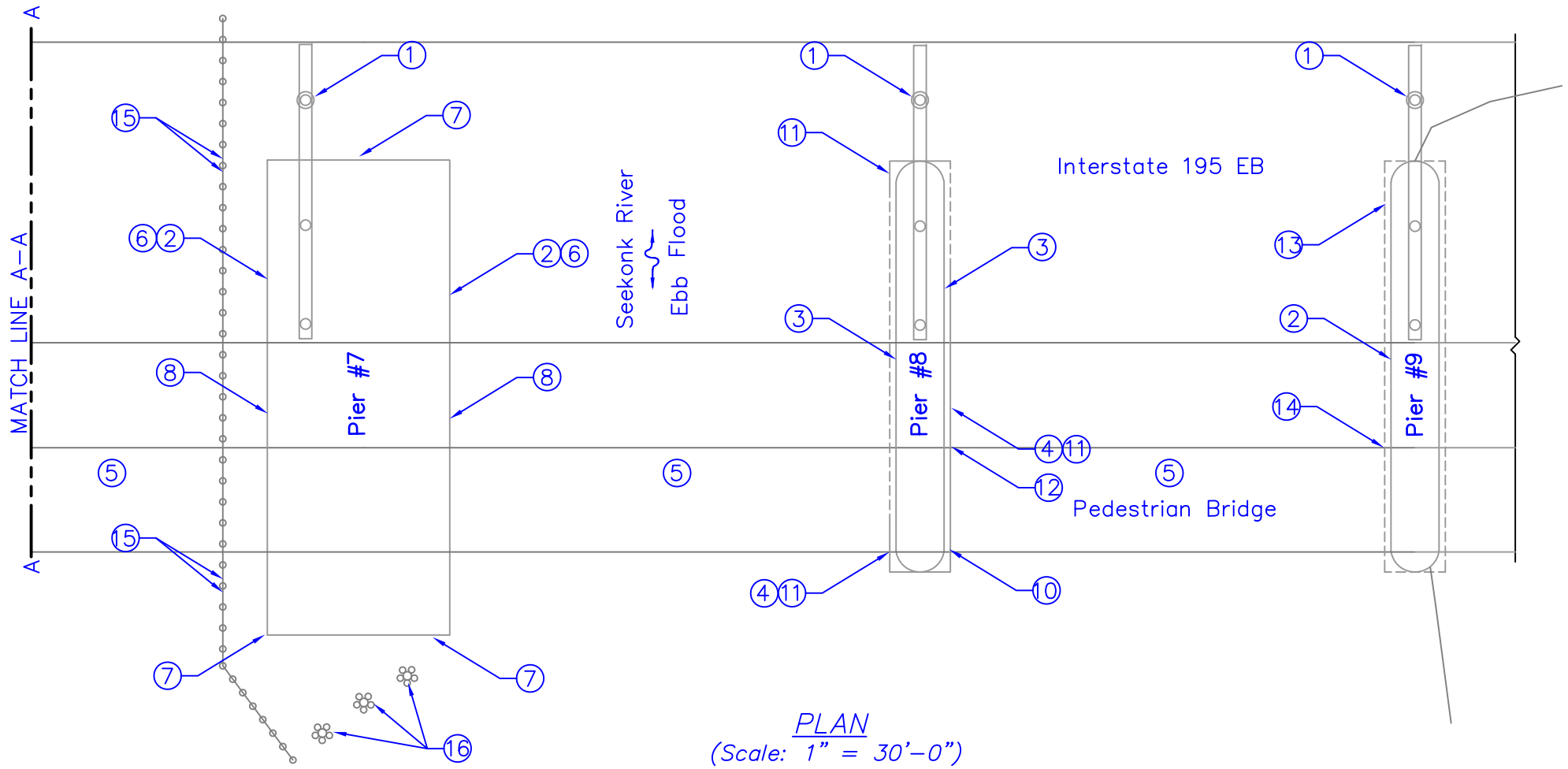
⑰ The timber fender system members along the east side of Pier #6 exhibit minor checks and splits in the tidal zone and a fractured handrail in two locations with one broken post.

0 30' 60'
GRAPHIC SCALE IN FEET

State of Rhode Island
Department of Transportation

BRIDGE NOS. 020001 & 020021 (WASHINGTON BRIDGE SOUTH)
INTERSTATE 195 EASTBOUND & BIKE PATH / PEDESTRIAN
OVER SEEKONK RIVER
EAST PROVIDENCE, RI
PLAN (PIER #4 TO PIER #6)

Drawn By: ML	COLLINS ENGINEERS	Date: 07/24/2017
Checked By: SL	2350 POST ROAD WARWICK, RI 02886 (401) 732–7714	Scale: 1"= 30'–0"
Project: 66–08460		Figure No.: 6



PLAN
(Scale: 1" = 30'–0")

INSPECTION NOTES:

1. At Piers #7 thru #9, the caisson pile at the north (upstream) end of the pier exhibits minor corrosion on the exposed portions of the steel casing. Also, there is a fiberglass wrap that extends 13–1/2' down from the underside of the concrete cap that exhibits no significant deficiencies.
2. At Piers #7 and #9, the granite stone masonry facade exhibit less than 5% deteriorated mortar with between 3" to 6" of penetration between stones and isolated full–height cracked stones.
3. At Pier #8, the granite stone masonry facade exhibits 15% deteriorated mortar with up to 6" of penetration between stones and isolated full–height cracked stones.
4. The exposed surfaces of the reinforced concrete step / pile cap exhibit abrasion up to 1/2" deep.
5. The channel bottom consists of mud, sand, and shells with scattered construction debris throughout. The maximum penetration into the channel bottom is 1.0'.
6. At Pier #7, there is abrasion up to 1/2" deep on the reinforced concrete stem below the stone masonry facade.
7. At Pier #7, there is a 5' high band of abrasion up to 1" deep near the channel bottom at the north (upstream) nose, area of abrasion 1' diameter x 5" deep near the channel bottom at the southwest (downstream) shoulder and isolated areas of abrasion 2' long x 1' high x 2" deep near the channel bottom at the southeast (downstream) shoulder of the pier.
8. At Pier #7, there are vertical cracks open between 1/8" and 1/4" wide that extend from the top of the pie cope down to the channel bottom near the midpoint of the pier stem on the west and east faces. The cracks have previously been partially sealed with epoxy and mortar.
9. At Pier #7, there is are missing granite stones 3–1/2' long x 5' high on the west face of the pier.
10. At Pier #8, there is a void in the concrete step / pile cap 18" long x 6" high x 2" deep at the south end of the east face of the pier.
11. At Pier #8, the reinforced concrete step / pile cap has been exposed 6' long x 4' vertically at the north and south ends of the west face and intermittently for the full length along the east face of the pier.
12. At Pier #8, there is a vertical crack in the top two stone courses below the cap up to 1/2" wide.
13. At Pier #9, the previously noted (2013) exposure of the reinforced concrete step / pile cap 65' long x up to 0.5' vertically along the west face of the pier was not found.
14. At Pier #9, there is a crack through the first three stone courses x 1/2" wide near the south end of the west face of the pier.
15. The fender system members along the west side of Pier #7 exhibit minor checks and splits in the tidal zone and a missing section of handrail near the south end.
16. The previously noted (2013) areas of splintering / section loss to the dolphin pile groups at the south (downstream) end of the fenders was not found and the piles appear to have been replaced.

0 30' 60'
GRAPHIC SCALE IN FEET

State of Rhode Island
Department of Transportation

BRIDGE NOS. 020001 & 020021 (WASHINGTON BRIDGE SOUTH)
INTERSTATE 195 EASTBOUND & BIKE PATH / PEDESTRIAN
OVER SEEKONK RIVER
EAST PROVIDENCE, RI

PLAN (PIER #7 TO PIER #9)

Drawn By: ML	COLLINS ENGINEERS INC	2350 POST ROAD WARWICK, RI 02886 (401) 732–7714	Date: 07/24/2017
Checked By: SL			Scale: 1"= 30'–0"
Project: 66–08460			Figure No.: 7

State of Rhode Island
Department of Transportation

Bridge Nos. 020001 & 020021

Washington Bridge South & Bike Path / Pedestrian Bridge

Photos

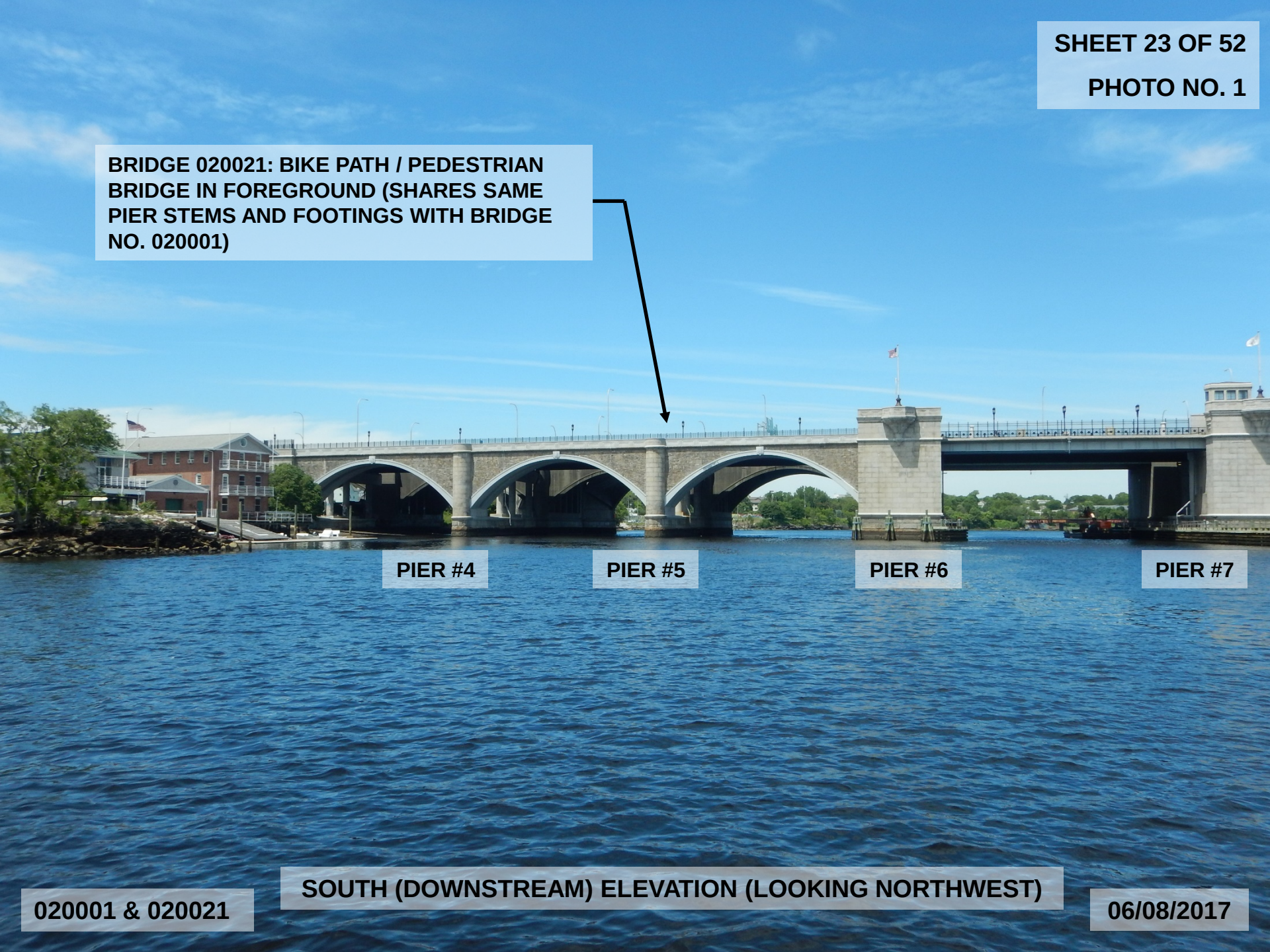
Prepared by:

COLLINS ENGINEERS INC.

MPA No. 359 AWARD No. 3381151

SHEET 23 OF 52

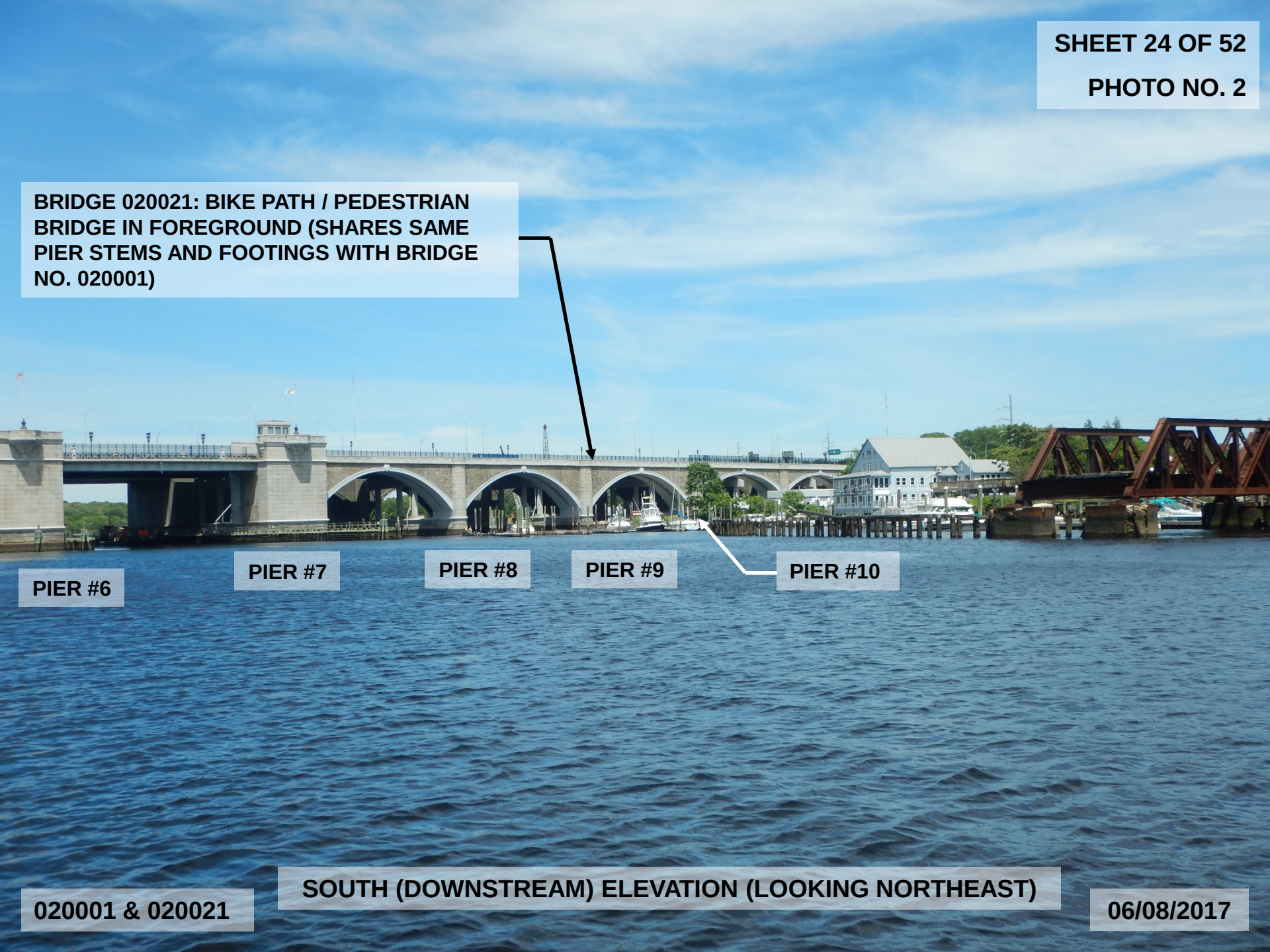
PHOTO NO. 1

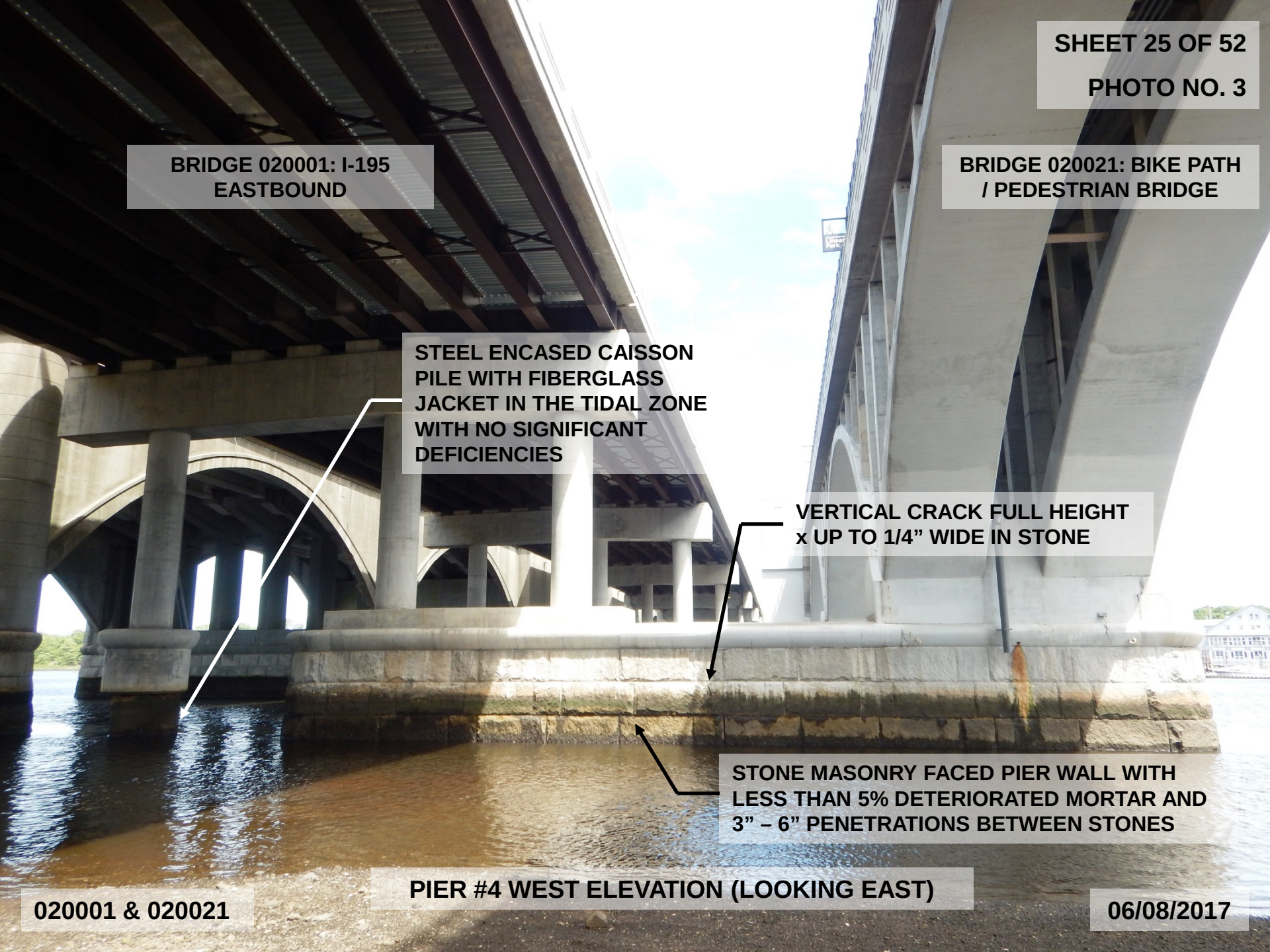


020001 & 020021

SOUTH (DOWNSTREAM) ELEVATION (LOOKING NORTHWEST)

06/08/2017


SHEET 24 OF 52
PHOTO NO. 2
BRIDGE 020021: BIKE PATH / PEDESTRIAN BRIDGE IN FOREGROUND (SHARES SAME PIER STEMS AND FOOTINGS WITH BRIDGE NO. 020001)
PIER #6
PIER #7
PIER #8
PIER #9
PIER #10
020001 & 020021
SOUTH (DOWNSTREAM) ELEVATION (LOOKING NORTHEAST)
06/08/2017


SHEET 25 OF 52
PHOTO NO. 3
BRIDGE 020001: I-195 EASTBOUND
BRIDGE 020021: BIKE PATH / PEDESTRIAN BRIDGE
STEEL ENCASED CAISSON PILE WITH FIBERGLASS JACKET IN THE TIDAL ZONE WITH NO SIGNIFICANT DEFICIENCIES
VERTICAL CRACK FULL HEIGHT x UP TO 1/4" WIDE IN STONE
STONE MASONRY FACED PIER WALL WITH LESS THAN 5% DETERIORATED MORTAR AND 3" – 6" PENETRATIONS BETWEEN STONES
PIER #4 WEST ELEVATION (LOOKING EAST)
020001 & 020021
06/08/2017

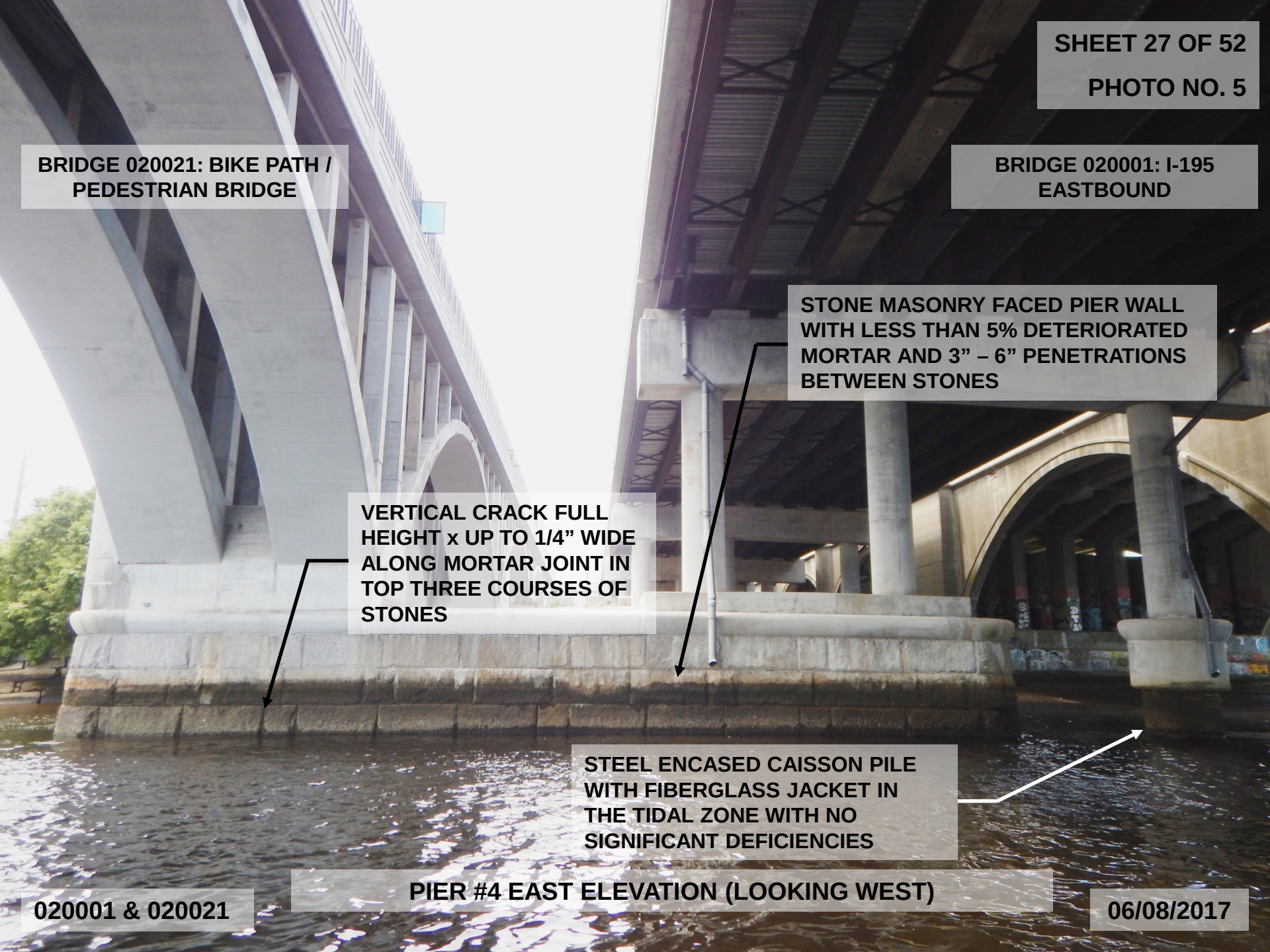
SHEET 26 OF 52

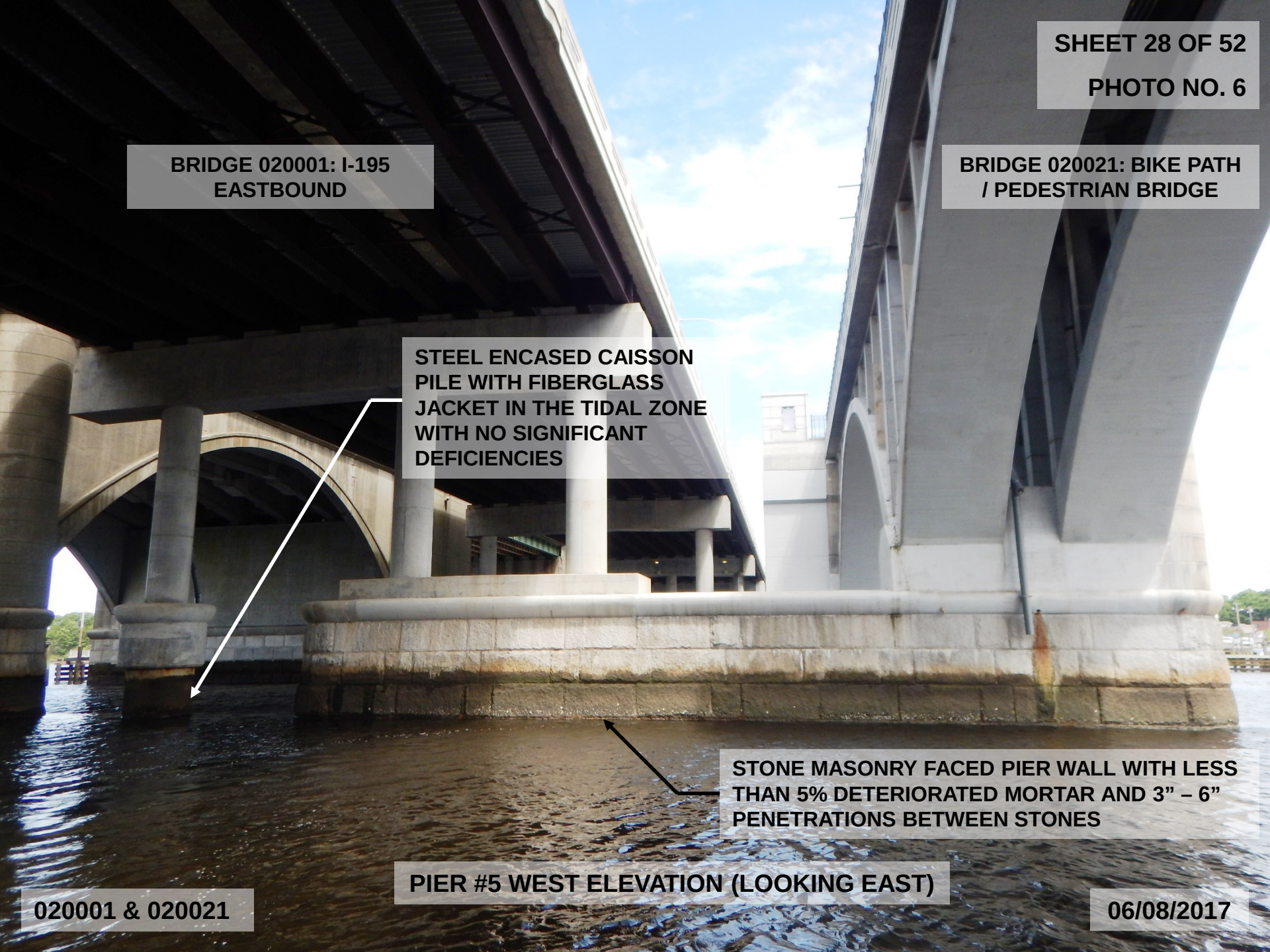
PHOTO NO. 4

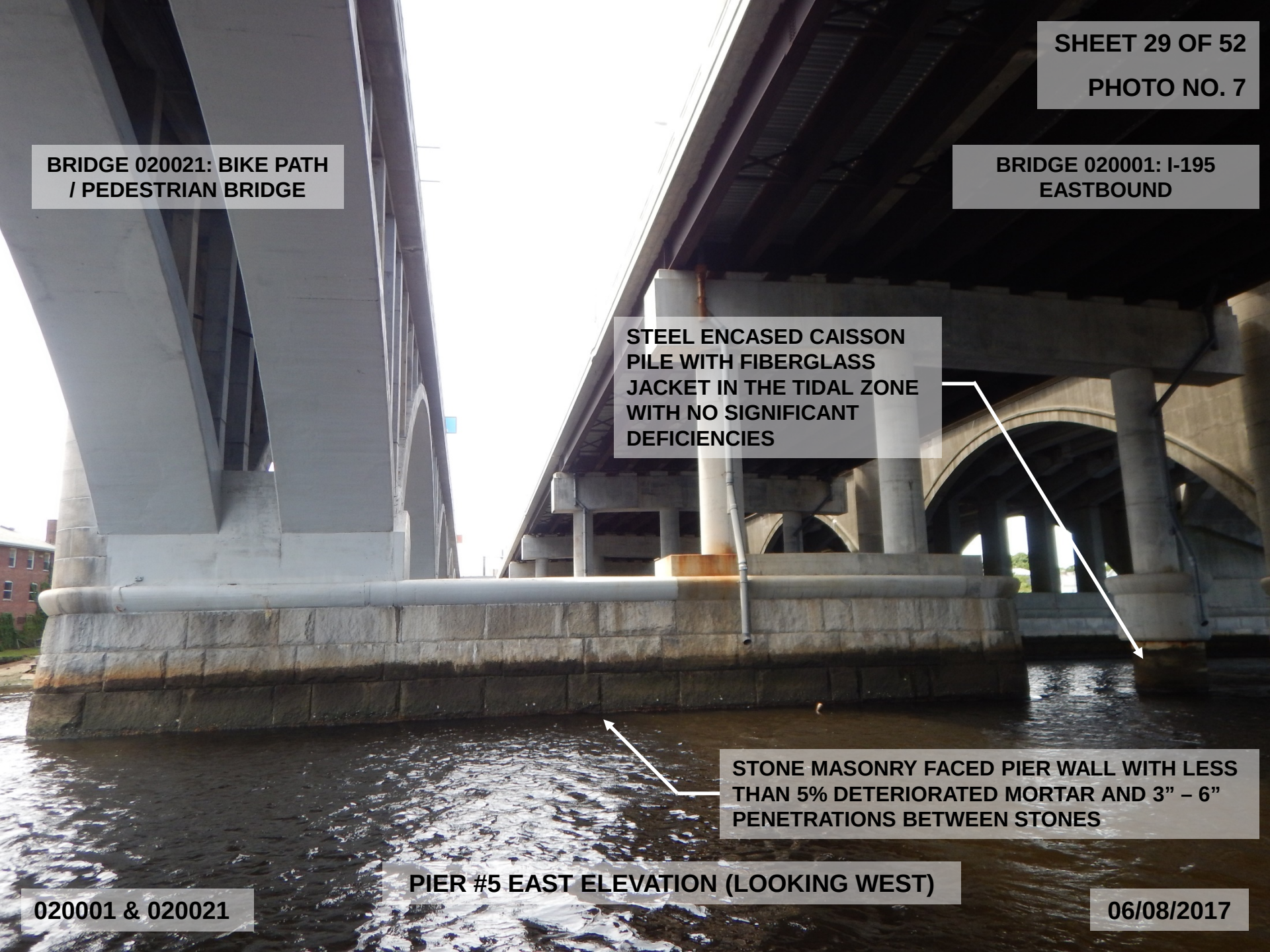
PIER #4 WEST ELEVATION (LOOKING EAST)

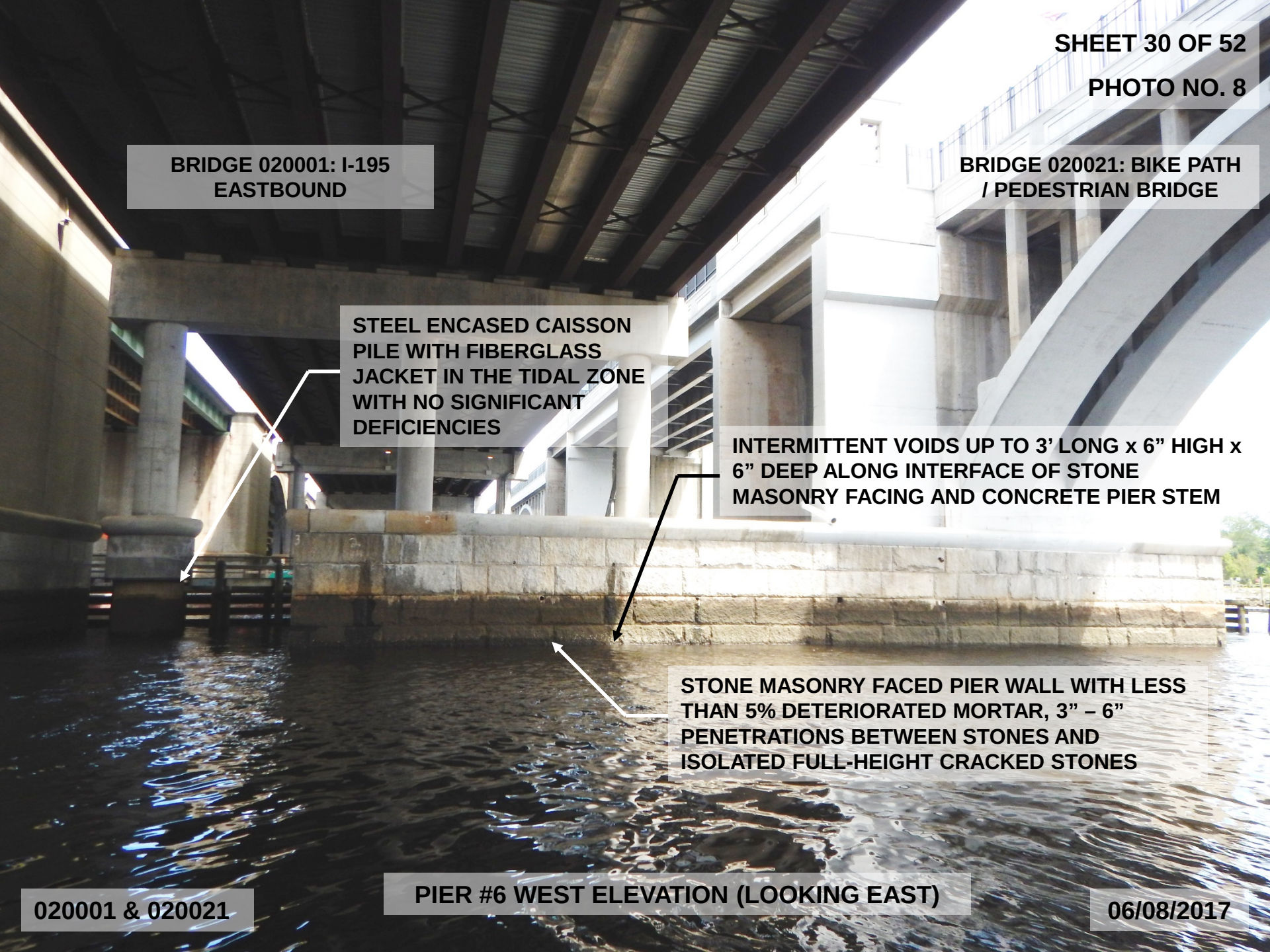
020001 & 020021

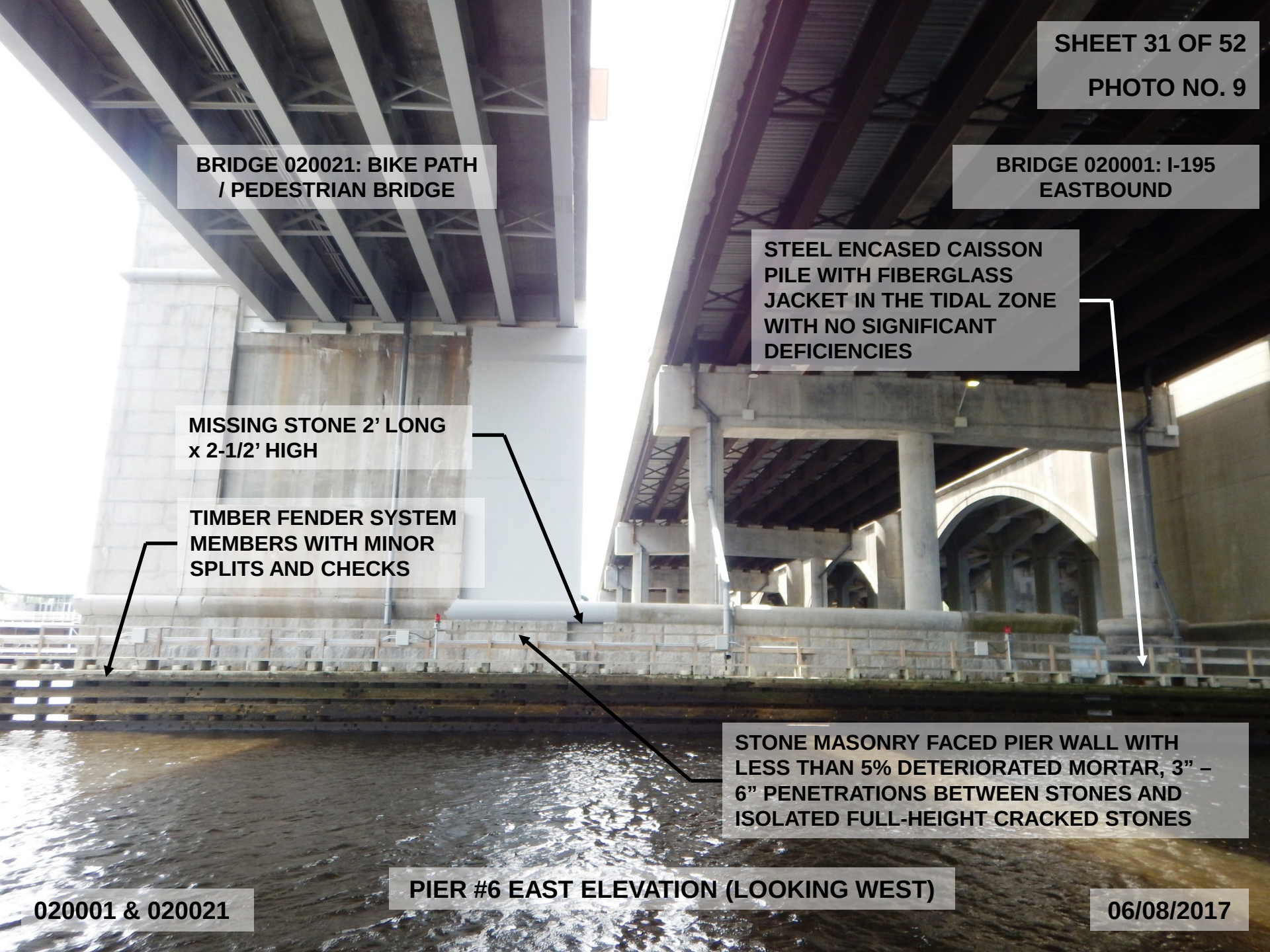
06/08/2017

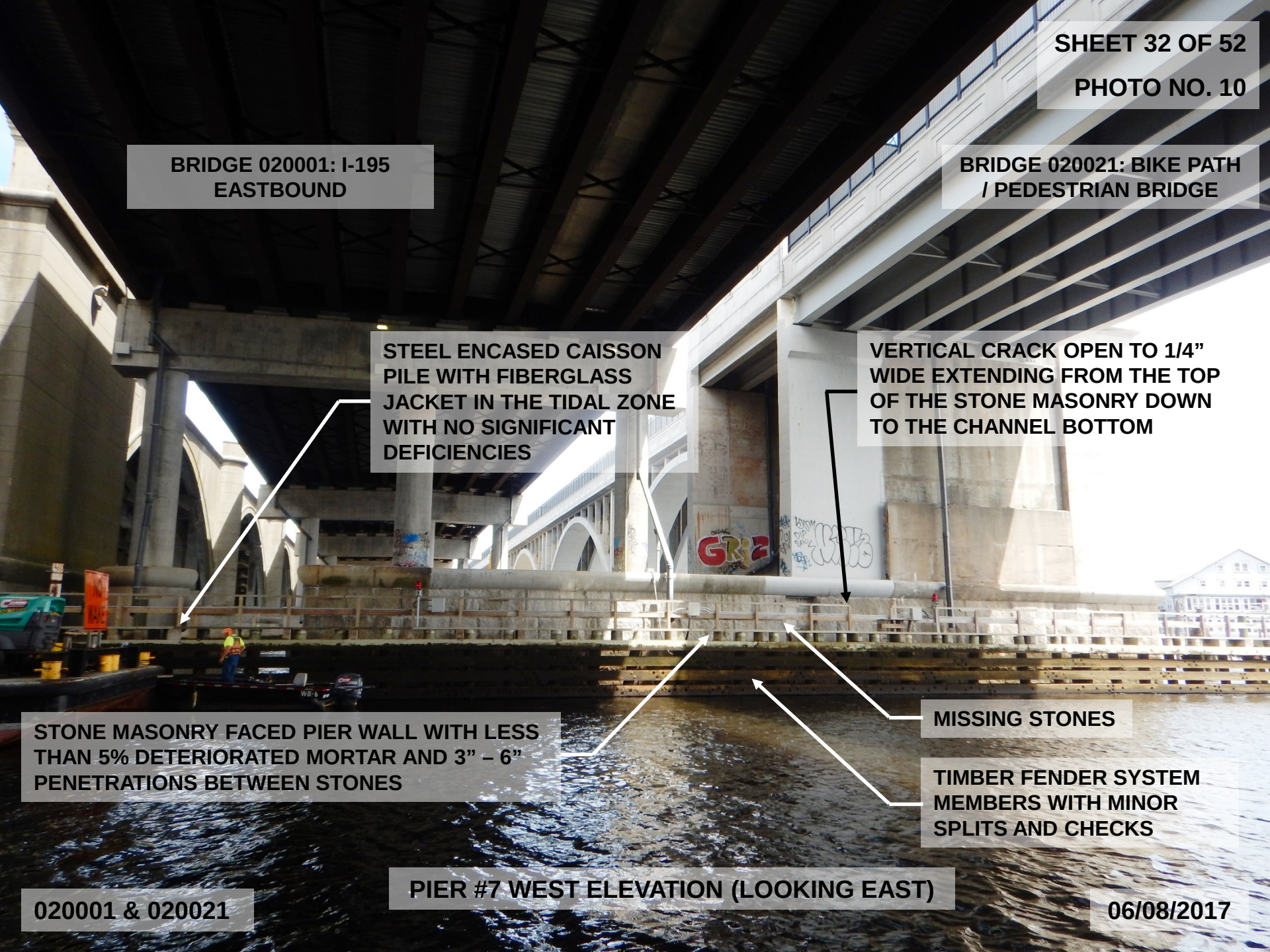

SHEET 27 OF 52
PHOTO NO. 5
BRIDGE 020021: BIKE PATH / PEDESTRIAN BRIDGE
BRIDGE 020001: I-195 EASTBOUND
STONE MASONRY FACED PIER WALL WITH LESS THAN 5% DETERIORATED MORTAR AND 3” – 6” PENETRATIONS BETWEEN STONES
VERTICAL CRACK FULL HEIGHT x UP TO 1/4” WIDE ALONG MORTAR JOINT IN TOP THREE COURSES OF STONES
STEEL ENCASED CAISSON PILE WITH FIBERGLASS JACKET IN THE TIDAL ZONE WITH NO SIGNIFICANT DEFICIENCIES
PIER #4 EAST ELEVATION (LOOKING WEST)
020001 & 020021
06/08/2017


SHEET 28 OF 52
PHOTO NO. 6
BRIDGE 020001: I-195 EASTBOUND
BRIDGE 020021: BIKE PATH / PEDESTRIAN BRIDGE
STEEL ENCASED CAISSON PILE WITH FIBERGLASS JACKET IN THE TIDAL ZONE WITH NO SIGNIFICANT DEFICIENCIES
STONE MASONRY FACED PIER WALL WITH LESS THAN 5% DETERIORATED MORTAR AND 3” – 6” PENETRATIONS BETWEEN STONES
PIER #5 WEST ELEVATION (LOOKING EAST)
020001 & 020021
06/08/2017

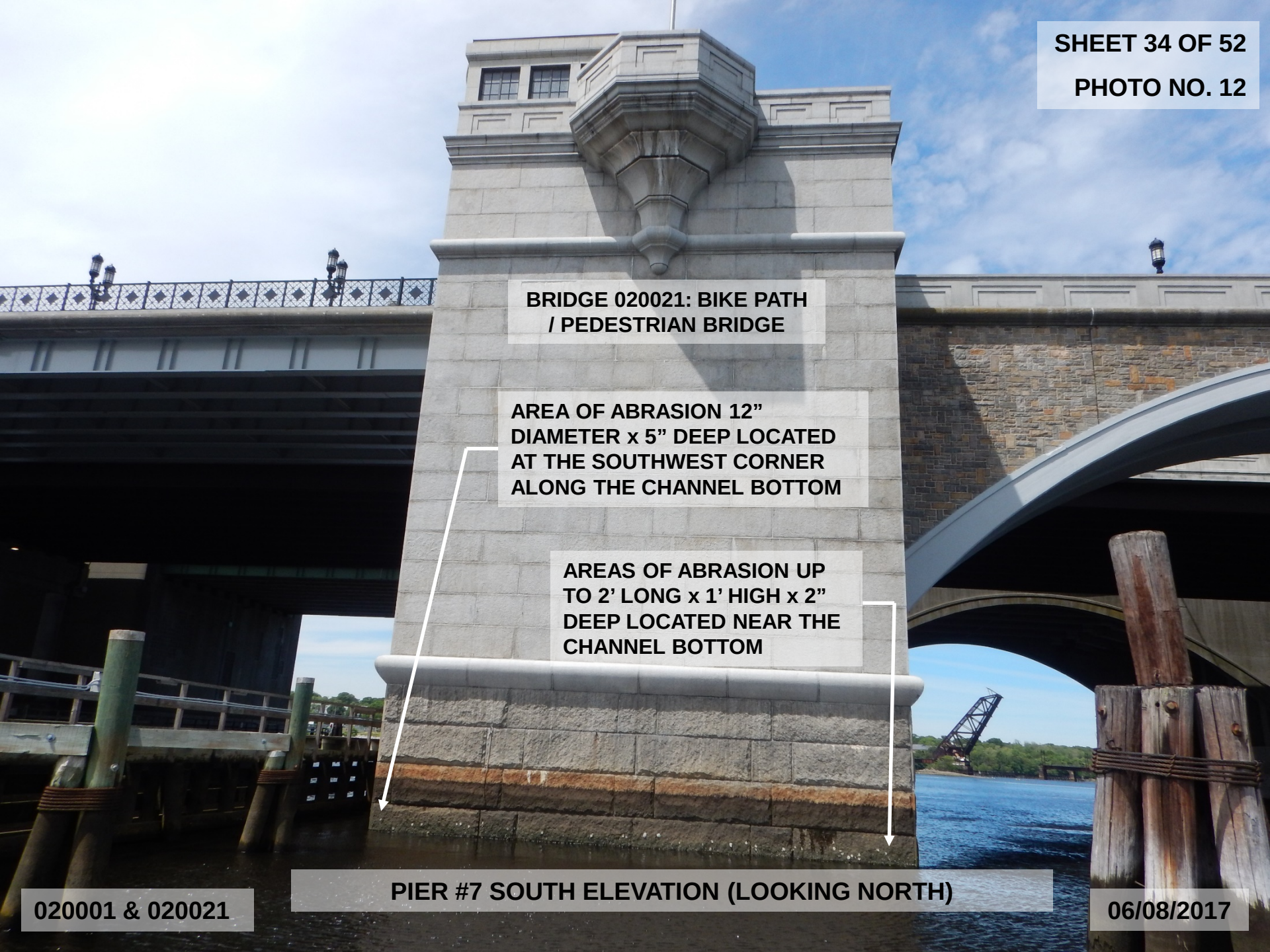

SHEET 29 OF 52
PHOTO NO. 7
BRIDGE 020021: BIKE PATH / PEDESTRIAN BRIDGE
BRIDGE 020001: I-195 EASTBOUND
STEEL ENCASED CAISSON PILE WITH FIBERGLASS JACKET IN THE TIDAL ZONE WITH NO SIGNIFICANT DEFICIENCIES
STONE MASONRY FACED PIER WALL WITH LESS THAN 5% DETERIORATED MORTAR AND 3” – 6” PENETRATIONS BETWEEN STONES
PIER #5 EAST ELEVATION (LOOKING WEST)
020001 & 020021
06/08/2017

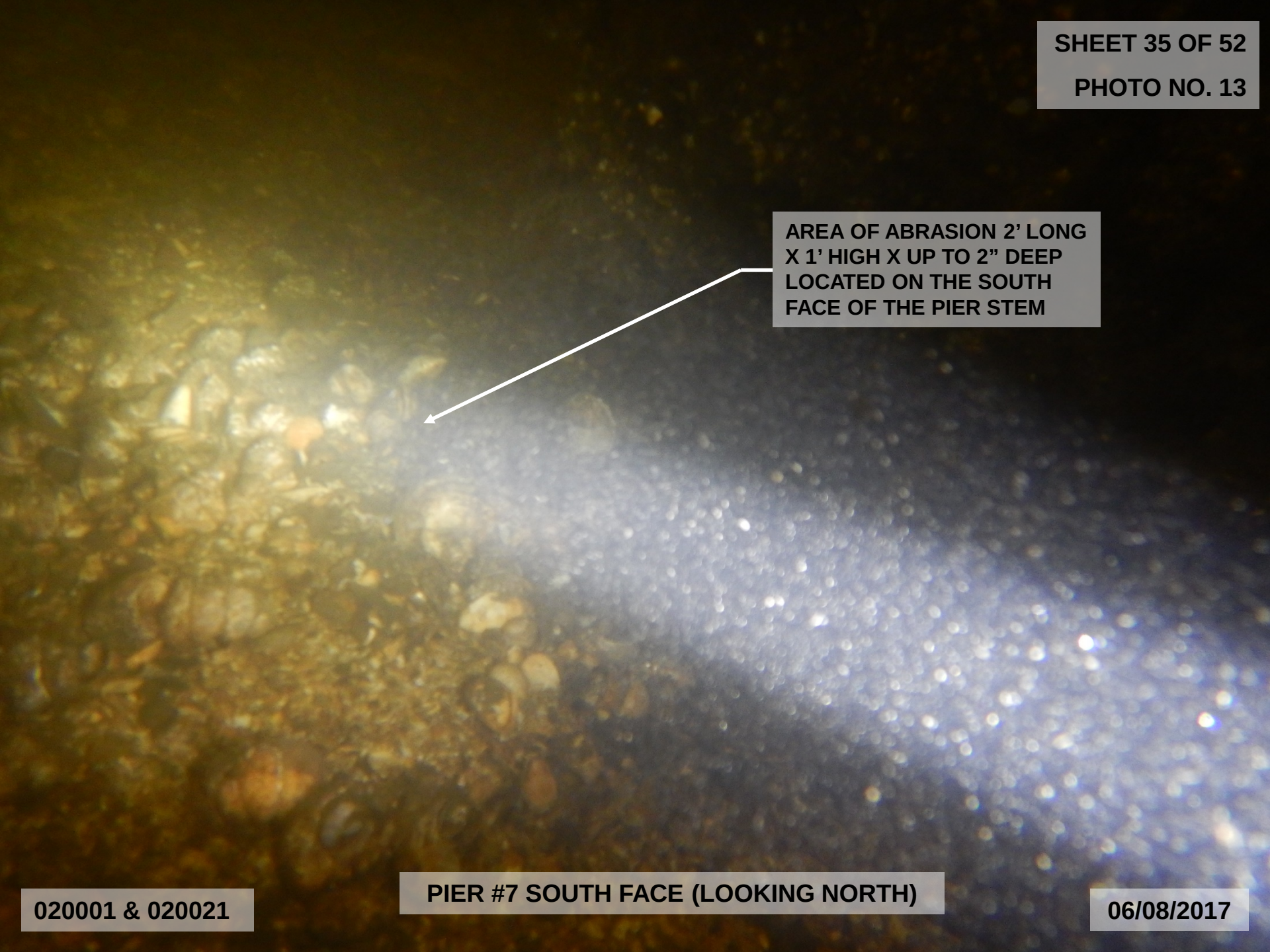

SHEET 30 OF 52
PHOTO NO. 8
BRIDGE 020001: I-195 EASTBOUND
BRIDGE 020021: BIKE PATH / PEDESTRIAN BRIDGE
STEEL ENCASED CAISSON PILE WITH FIBERGLASS JACKET IN THE TIDAL ZONE WITH NO SIGNIFICANT DEFICIENCIES
INTERMITTENT VOIDS UP TO 3' LONG x 6" HIGH x 6" DEEP ALONG INTERFACE OF STONE MASONRY FACING AND CONCRETE PIER STEM
STONE MASONRY FACED PIER WALL WITH LESS THAN 5% DETERIORATED MORTAR, 3" – 6" PENETRATIONS BETWEEN STONES AND ISOLATED FULL-HEIGHT CRACKED STONES
PIER #6 WEST ELEVATION (LOOKING EAST)
020001 & 020021
06/08/2017

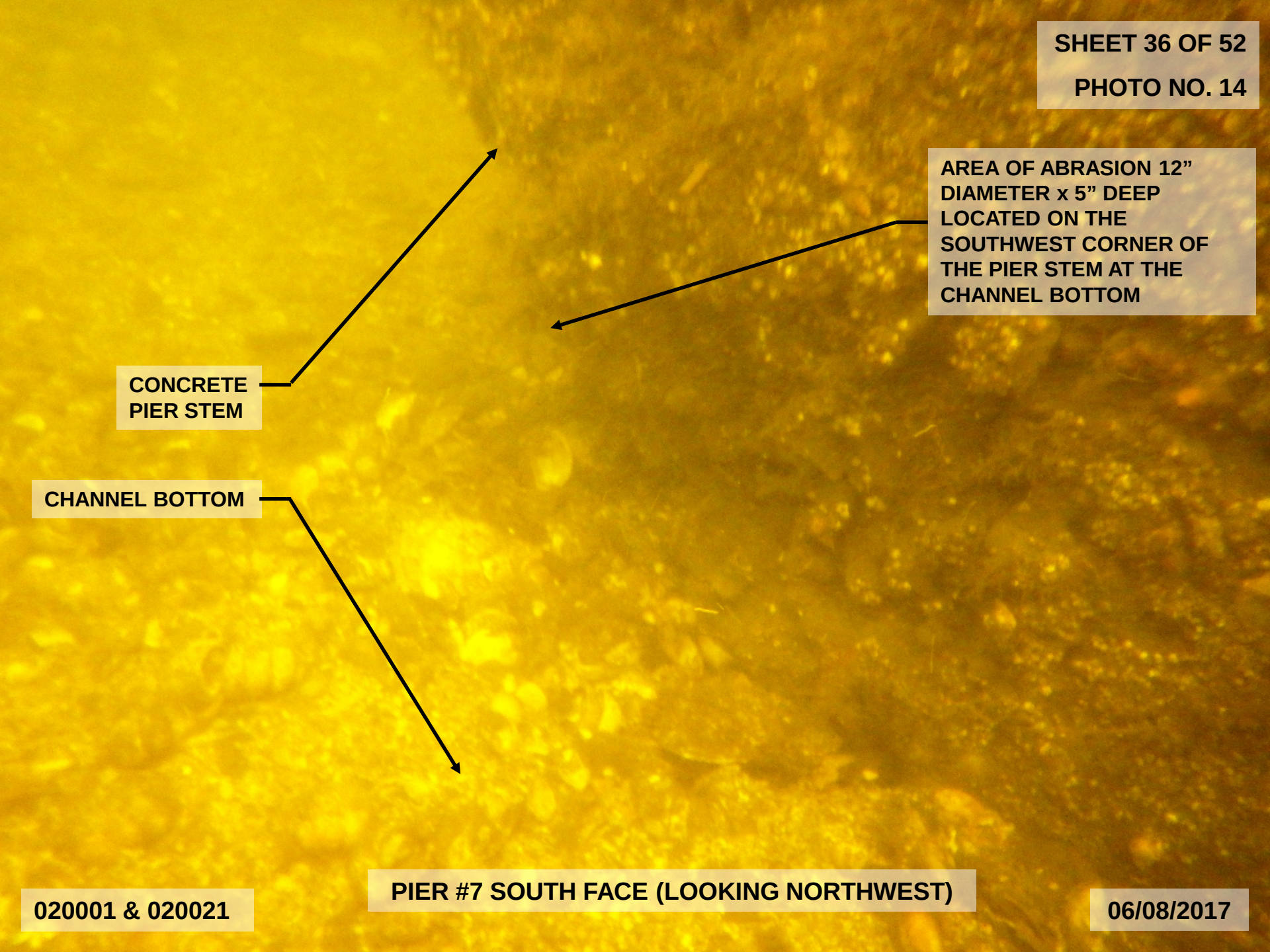

SHEET 31 OF 52
PHOTO NO. 9
BRIDGE 020021: BIKE PATH / PEDESTRIAN BRIDGE
BRIDGE 020001: I-195 EASTBOUND
STEEL ENCASED CAISSON PILE WITH FIBERGLASS JACKET IN THE TIDAL ZONE WITH NO SIGNIFICANT DEFICIENCIES
MISSING STONE 2' LONG x 2-1/2' HIGH
TIMBER FENDER SYSTEM MEMBERS WITH MINOR SPLITS AND CHECKS
STONE MASONRY FACED PIER WALL WITH LESS THAN 5% DETERIORATED MORTAR, 3" – 6" PENETRATIONS BETWEEN STONES AND ISOLATED FULL-HEIGHT CRACKED STONES
PIER #6 EAST ELEVATION (LOOKING WEST)
020001 & 020021
06/08/2017

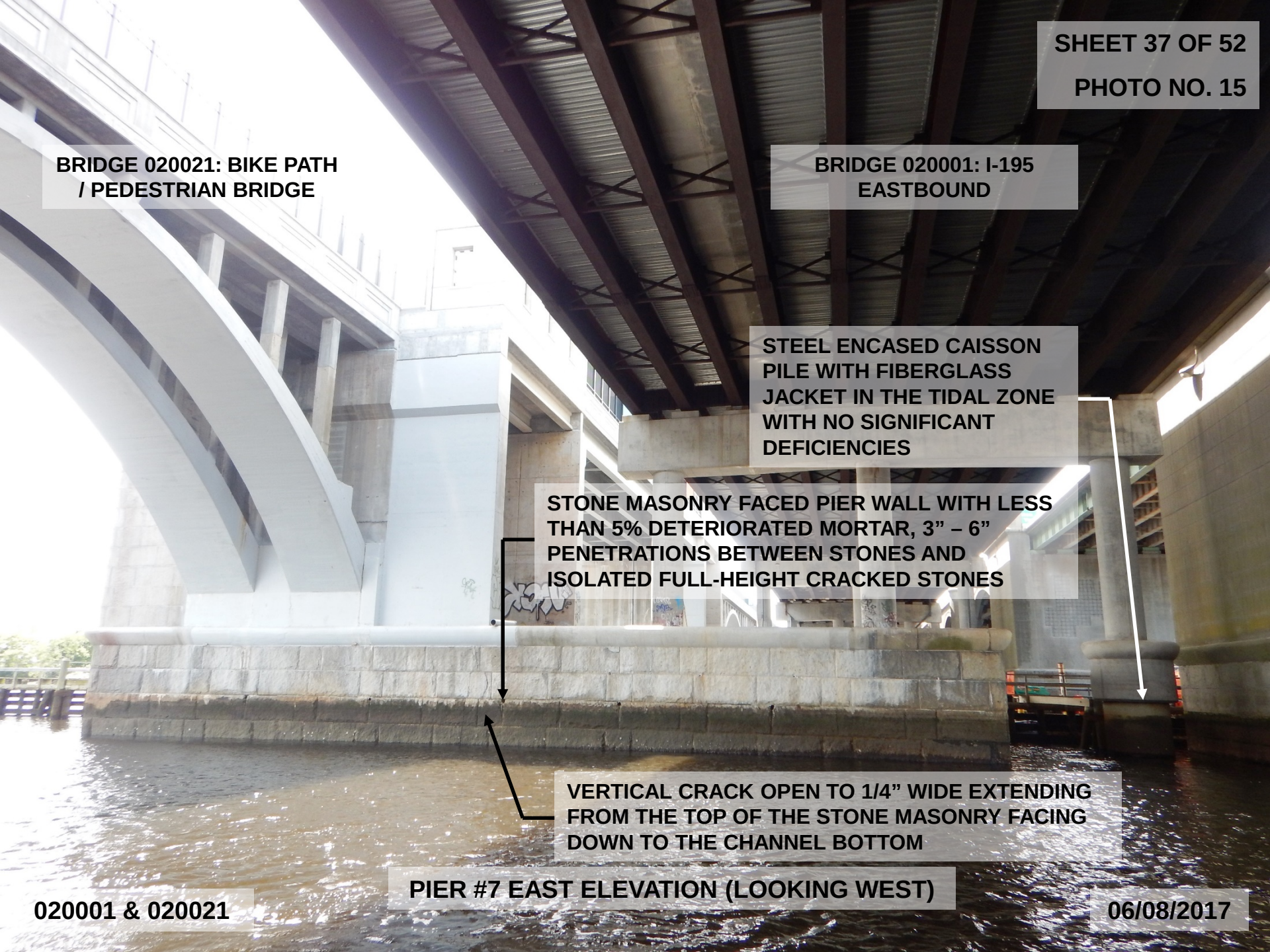

SHEET 32 OF 52
PHOTO NO. 10
BRIDGE 020001: I-195 EASTBOUND
BRIDGE 020021: BIKE PATH / PEDESTRIAN BRIDGE
STEEL ENCASED CAISSON PILE WITH FIBERGLASS JACKET IN THE TIDAL ZONE WITH NO SIGNIFICANT DEFICIENCIES
VERTICAL CRACK OPEN TO 1/4" WIDE EXTENDING FROM THE TOP OF THE STONE MASONRY DOWN TO THE CHANNEL BOTTOM
MISSING STONES
STONE MASONRY FACED PIER WALL WITH LESS THAN 5% DETERIORATED MORTAR AND 3" – 6" PENETRATIONS BETWEEN STONES
TIMBER FENDER SYSTEM MEMBERS WITH MINOR SPLITS AND CHECKS
PIER #7 WEST ELEVATION (LOOKING EAST)
020001 & 020021
06/08/2017


SHEET 33 OF 52
PHOTO NO. 11
MISSING STONES 3-1/2’ LONG x 5’ HIGH
VERTICAL CRACK OPEN TO 1/4” WIDE EXTENDING TO THE CHANNEL BOTTOM
PIER #7 WEST ELEVATION (LOOKING EAST)
020001 & 020021
06/08/2017


SHEET 34 OF 52
PHOTO NO. 12
BRIDGE 020021: BIKE PATH / PEDESTRIAN BRIDGE
AREA OF ABRASION 12” DIAMETER x 5” DEEP LOCATED AT THE SOUTHWEST CORNER ALONG THE CHANNEL BOTTOM
AREAS OF ABRASION UP TO 2’ LONG x 1’ HIGH x 2” DEEP LOCATED NEAR THE CHANNEL BOTTOM
PIER #7 SOUTH ELEVATION (LOOKING NORTH)
020001 & 020021
06/08/2017


SHEET 35 OF 52
PHOTO NO. 13
AREA OF ABRASION 2’ LONG X 1’ HIGH X UP TO 2” DEEP LOCATED ON THE SOUTH FACE OF THE PIER STEM
020001 & 020021
PIER #7 SOUTH FACE (LOOKING NORTH)
06/08/2017


SHEET 36 OF 52
PHOTO NO. 14
AREA OF ABRASION 12” DIAMETER x 5” DEEP LOCATED ON THE SOUTHWEST CORNER OF THE PIER STEM AT THE CHANNEL BOTTOM
CONCRETE PIER STEM
CHANNEL BOTTOM
PIER #7 SOUTH FACE (LOOKING NORTHWEST)
020001 & 020021
06/08/2017


SHEET 37 OF 52
PHOTO NO. 15
BRIDGE 020021: BIKE PATH / PEDESTRIAN BRIDGE
BRIDGE 020001: I-195 EASTBOUND
STEEL ENCASED CAISSON PILE WITH FIBERGLASS JACKET IN THE TIDAL ZONE WITH NO SIGNIFICANT DEFICIENCIES
STONE MASONRY FACED PIER WALL WITH LESS THAN 5% DETERIORATED MORTAR, 3” – 6” PENETRATIONS BETWEEN STONES AND ISOLATED FULL-HEIGHT CRACKED STONES
VERTICAL CRACK OPEN TO 1/4” WIDE EXTENDING FROM THE TOP OF THE STONE MASONRY FACING DOWN TO THE CHANNEL BOTTOM
PIER #7 EAST ELEVATION (LOOKING WEST)
020001 & 020021
06/08/2017

SHEET 38 OF 52

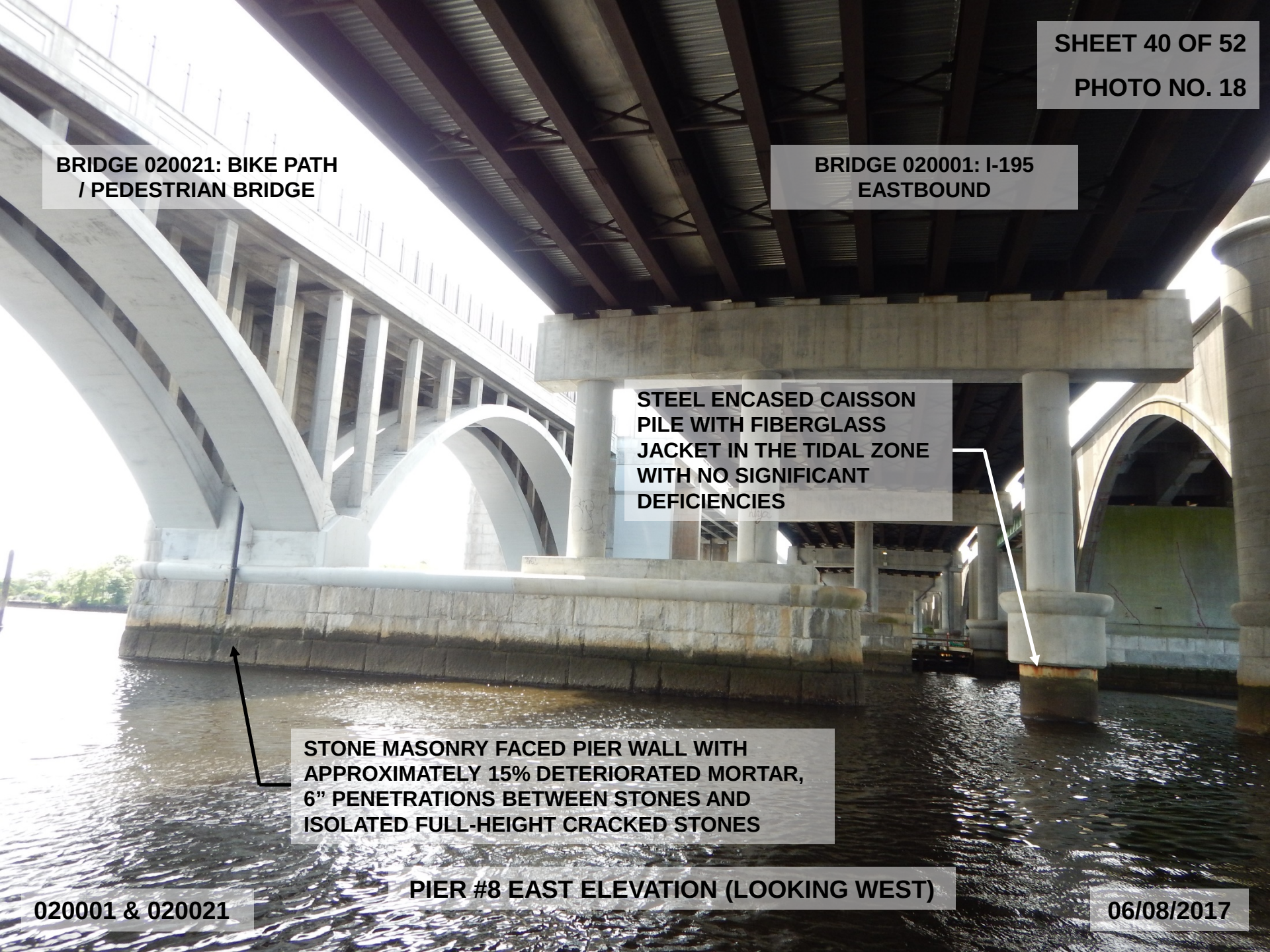
PHOTO NO. 16

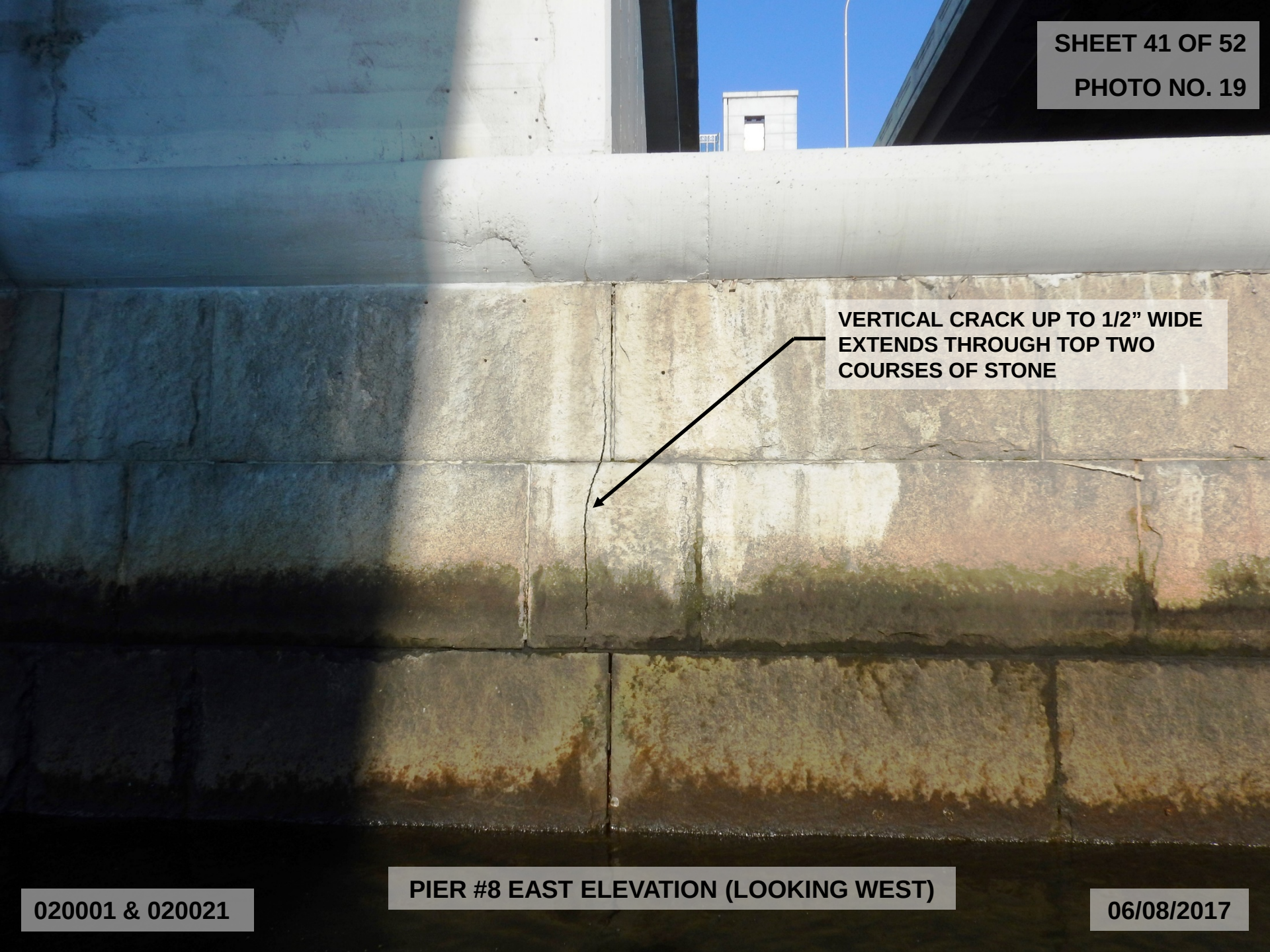
PIER #7 EAST ELEVATION (LOOKING WEST)

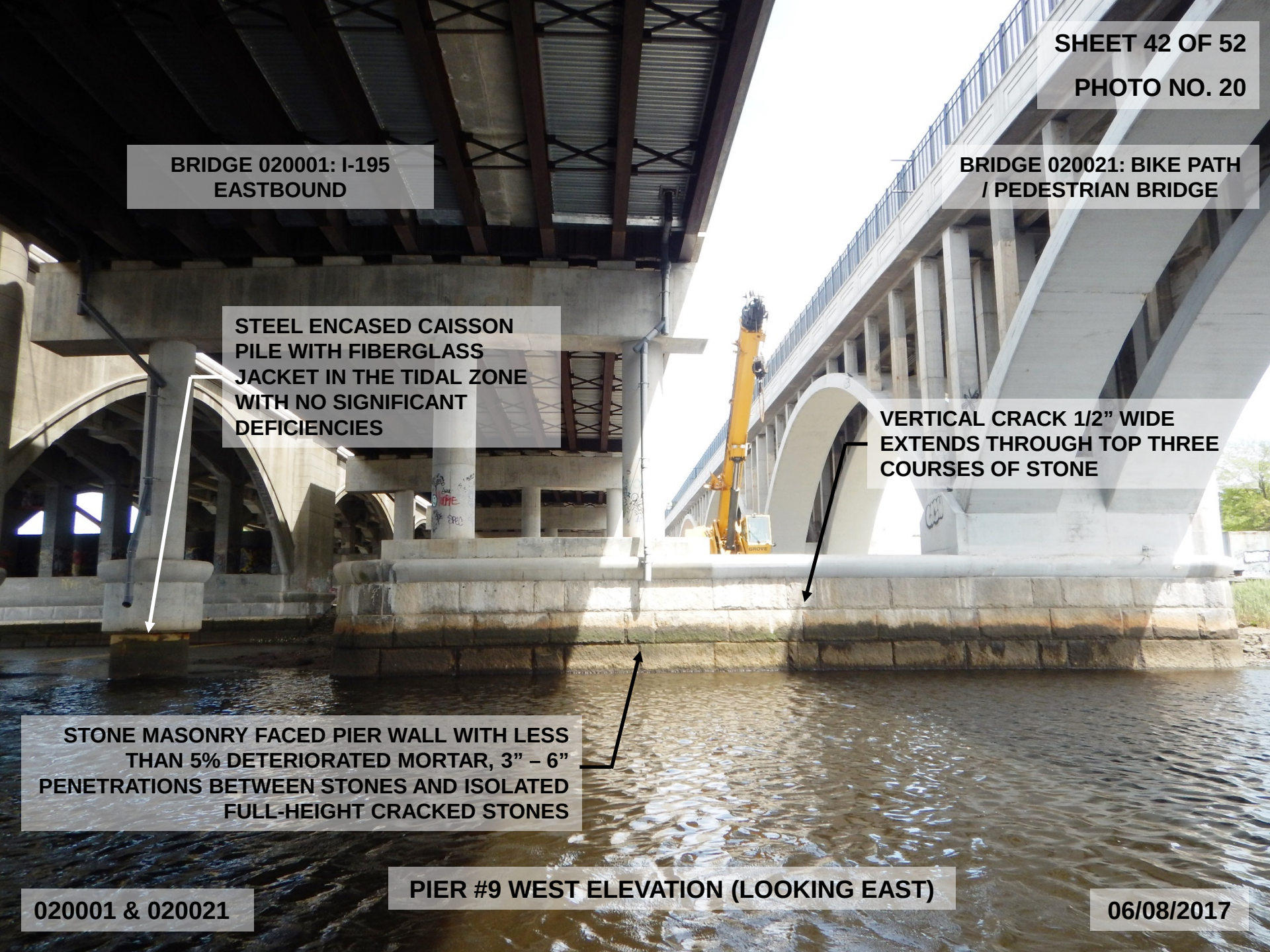
020001 & 020021

06/08/2017


SHEET 39 OF 52
PHOTO NO. 17
BRIDGE 020001: I-195 EASTBOUND
BRIDGE 020021: BIKE PATH / PEDESTRIAN BRIDGE
STEEL ENCASED CAISSON PILE WITH FIBERGLASS JACKET IN THE TIDAL ZONE WITH NO SIGNIFICANT DEFICIENCIES
STONE MASONRY FACED PIER WALL WITH APPROXIMATELY 15% DETERIORATED MORTAR, 6” PENETRATIONS BETWEEN STONES AND ISOLATED FULL-HEIGHT CRACKED STONES
PIER #8 WEST ELEVATION (LOOKING EAST)
020001 & 020021
06/08/2017


SHEET 40 OF 52
PHOTO NO. 18
BRIDGE 020021: BIKE PATH / PEDESTRIAN BRIDGE
BRIDGE 020001: I-195 EASTBOUND
STEEL ENCASED CAISSON PILE WITH FIBERGLASS JACKET IN THE TIDAL ZONE WITH NO SIGNIFICANT DEFICIENCIES
STONE MASONRY FACED PIER WALL WITH APPROXIMATELY 15% DETERIORATED MORTAR, 6” PENETRATIONS BETWEEN STONES AND ISOLATED FULL-HEIGHT CRACKED STONES
PIER #8 EAST ELEVATION (LOOKING WEST)
020001 & 020021
06/08/2017


SHEET 41 OF 52
PHOTO NO. 19
VERTICAL CRACK UP TO 1/2” WIDE EXTENDS THROUGH TOP TWO COURSES OF STONE
PIER #8 EAST ELEVATION (LOOKING WEST)
020001 & 020021
06/08/2017


SHEET 42 OF 52
PHOTO NO. 20
BRIDGE 020001: I-195 EASTBOUND
BRIDGE 020021: BIKE PATH / PEDESTRIAN BRIDGE
STEEL ENCASED CAISSON PILE WITH FIBERGLASS JACKET IN THE TIDAL ZONE WITH NO SIGNIFICANT DEFICIENCIES
VERTICAL CRACK 1/2” WIDE EXTENDS THROUGH TOP THREE COURSES OF STONE
STONE MASONRY FACED PIER WALL WITH LESS THAN 5% DETERIORATED MORTAR, 3” – 6” PENETRATIONS BETWEEN STONES AND ISOLATED FULL-HEIGHT CRACKED STONES
PIER #9 WEST ELEVATION (LOOKING EAST)
020001 & 020021
06/08/2017


SHEET 43 OF 52
PHOTO NO. 21
VERTICAL CRACK 1/2” WIDE EXTENDS
THROUGH TOP THREE COURSES OF STONE
PIER #9 WEST ELEVATION (LOOKING EAST)
020001 & 020021
06/08/2017

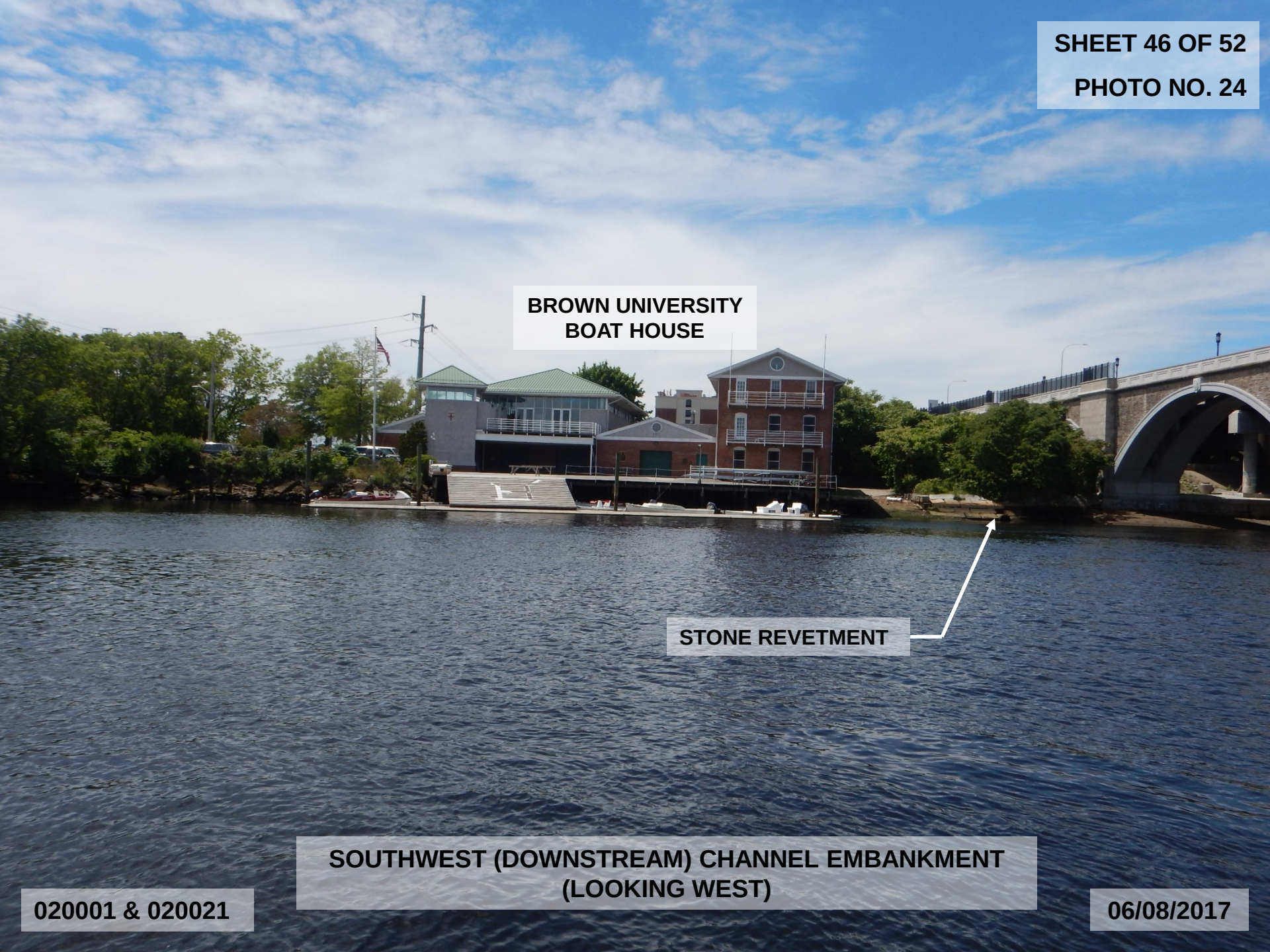
PHOTO NO. 22

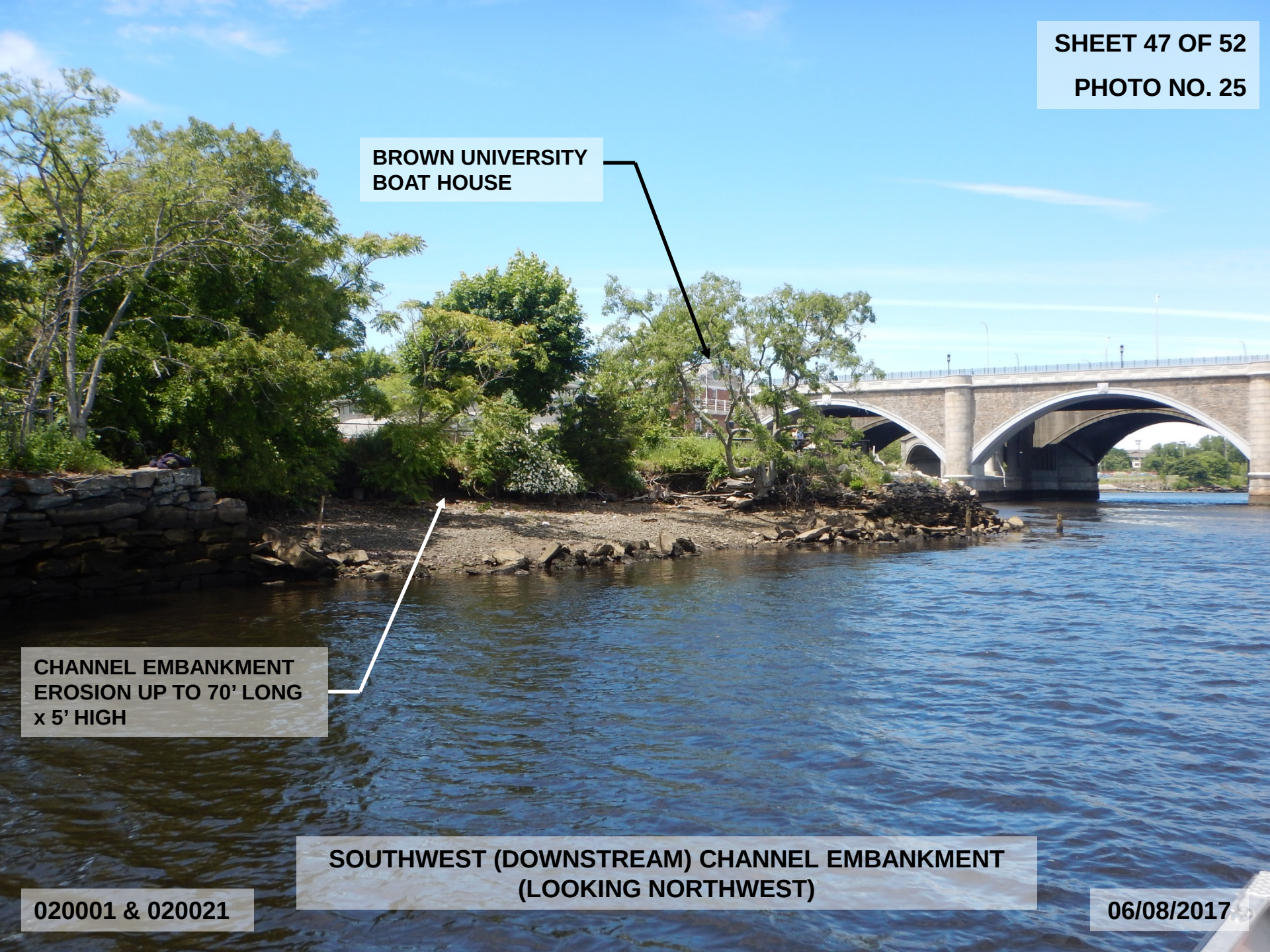
CHANNEL LOOKING UPSTREAM (FLOOD)
FROM BRIDGE NO. 070001 (LOOKING NORTH)

020001 & 020021

06/08/2017


SHEET 45 OF 52
PHOTO NO. 23
CHANNEL LOOKING DOWNSTREAM (EBB)
FROM THE BRIDGE (LOOKING SOUTH)
020001 & 020021
06/08/2017


SHEET 46 OF 52
PHOTO NO. 24
BROWN UNIVERSITY
BOAT HOUSE
STONE REVETMENT
SOUTHWEST (DOWNSTREAM) CHANNEL EMBANKMENT
(LOOKING WEST)
020001 & 020021
06/08/2017



SOUTHWEST (DOWNSTREAM) CHANNEL EMBANKMENT
(LOOKING NORTHWEST)

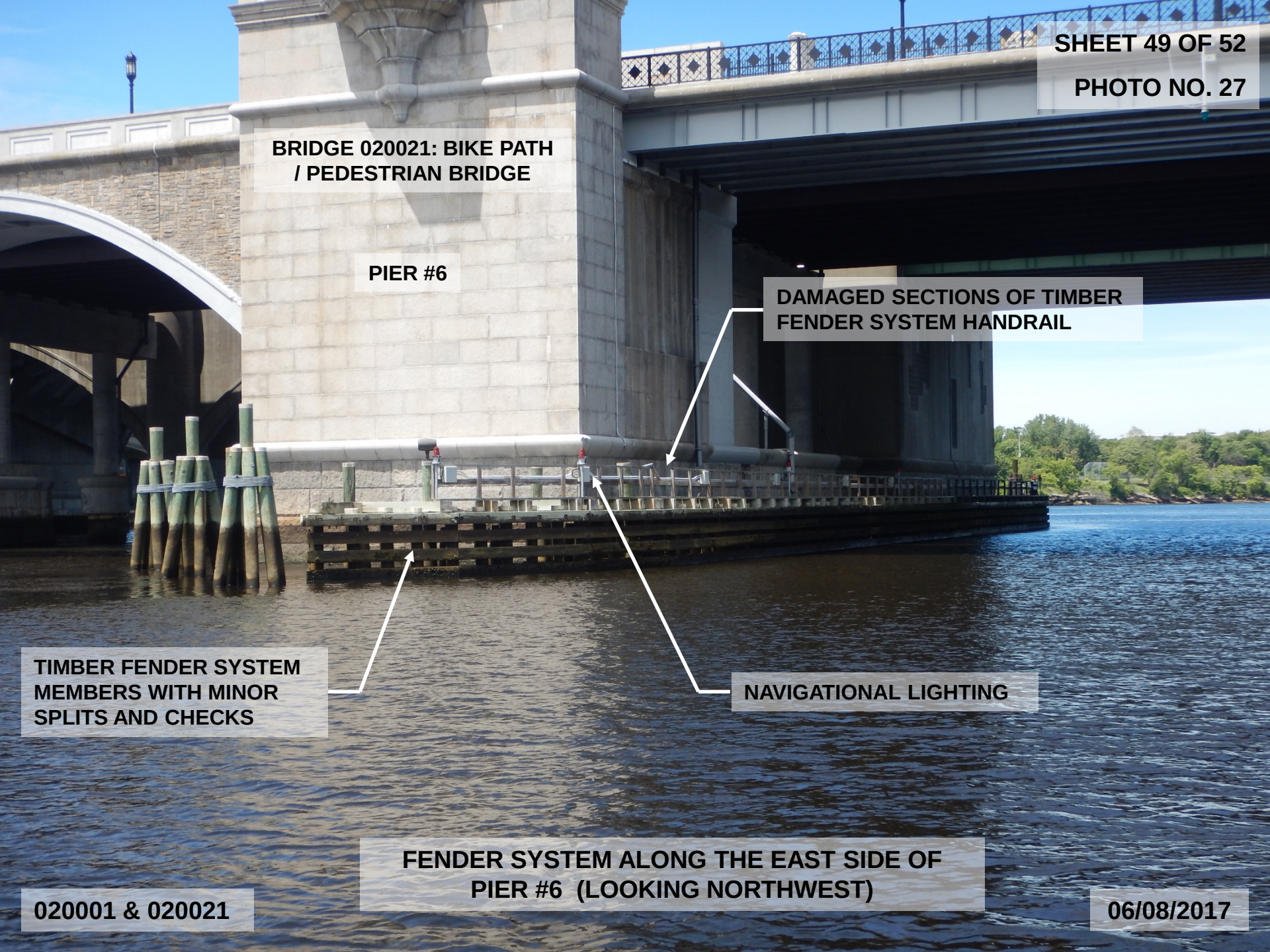
020001 & 020021

06/08/2017

SOUTHEAST (DOWNSTREAM) CHANNEL EMBANKMENT
(LOOKING NORTHEAST)

020001 & 020021

06/08/2017

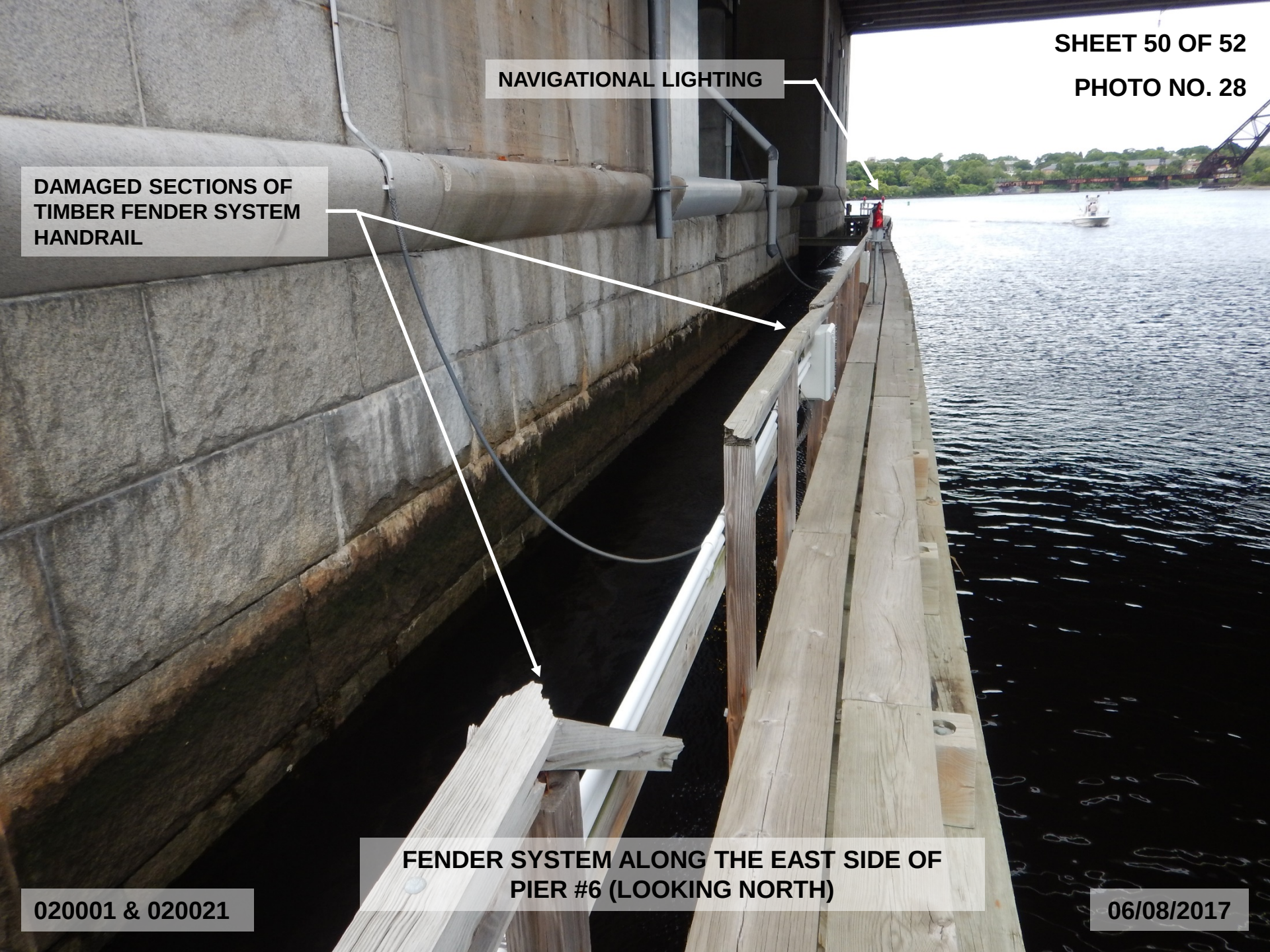


FENDER SYSTEM ALONG THE EAST SIDE OF PIER #6 (LOOKING NORTHWEST)

020001 & 020021

06/08/2017

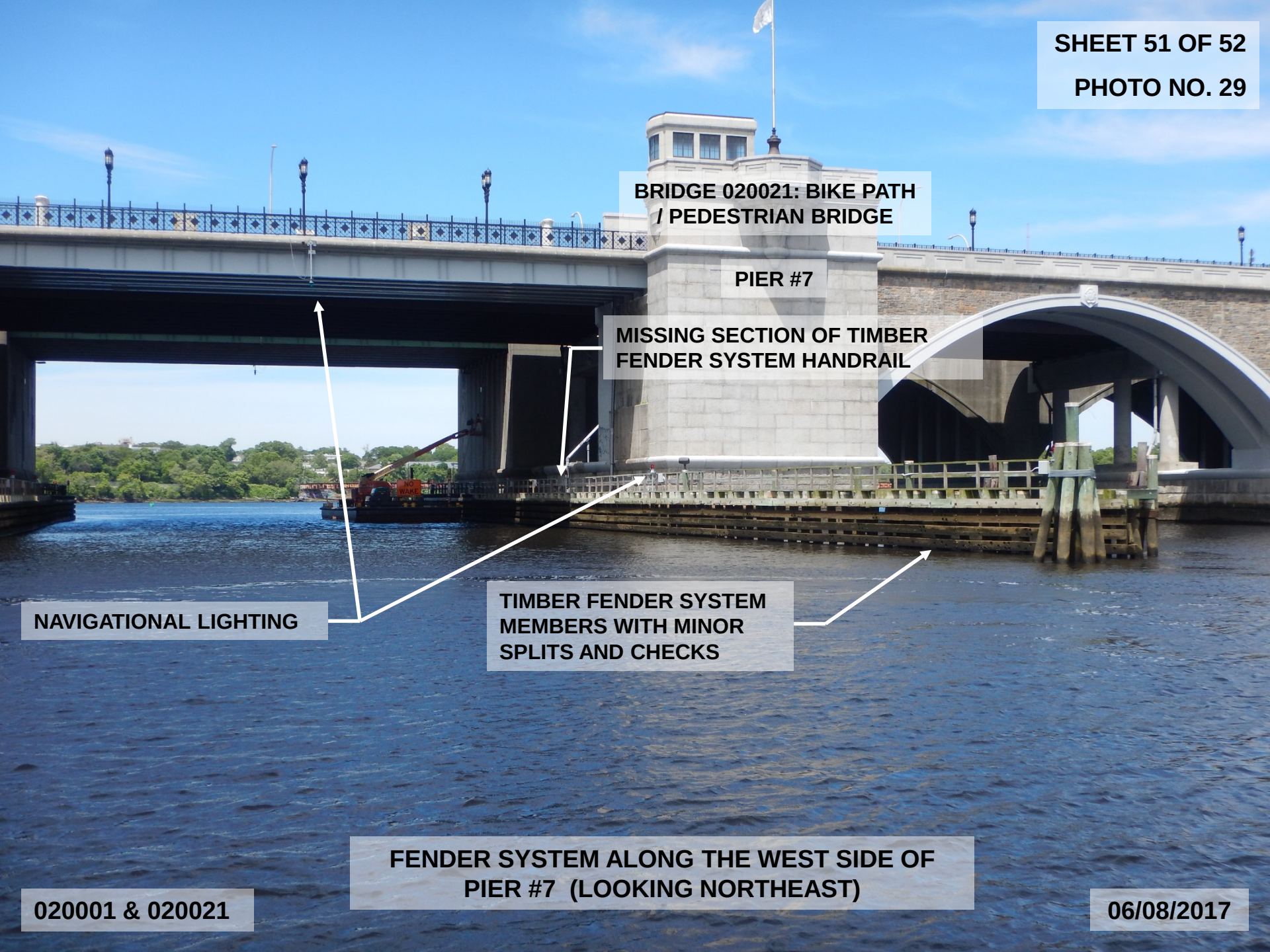
PHOTO NO. 28



FENDER SYSTEM ALONG THE EAST SIDE OF PIER #6 (LOOKING NORTH)

020001 & 020021

06/08/2017


SHEET 51 OF 52
PHOTO NO. 29
BRIDGE 020021: BIKE PATH / PEDESTRIAN BRIDGE
PIER #7
MISSING SECTION OF TIMBER FENDER SYSTEM HANDRAIL
NAVIGATIONAL LIGHTING
TIMBER FENDER SYSTEM MEMBERS WITH MINOR SPLITS AND CHECKS
FENDER SYSTEM ALONG THE WEST SIDE OF PIER #7 (LOOKING NORTHEAST)
020001 & 020021
06/08/2017

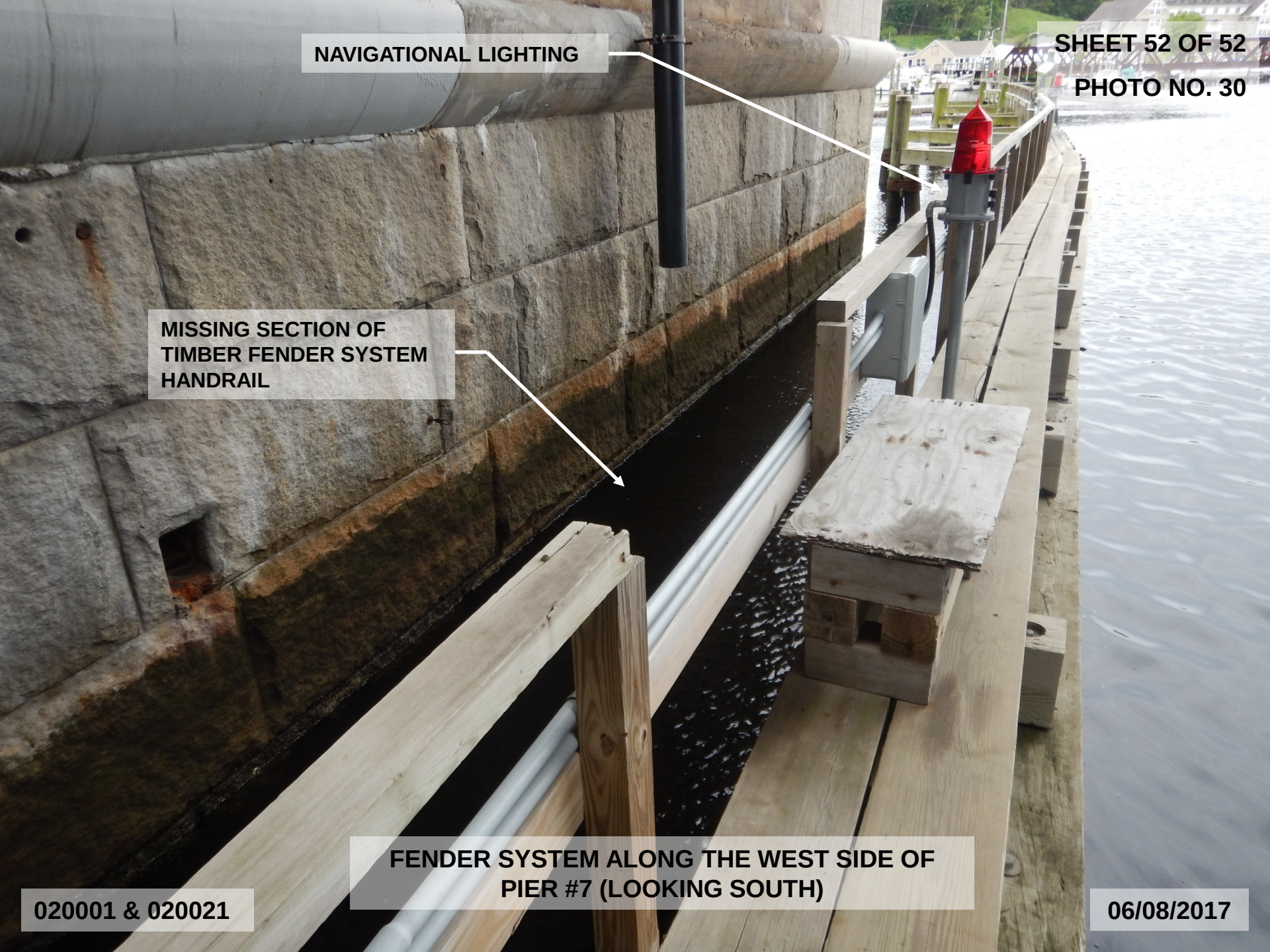


PHOTO NO. 30

FENDER SYSTEM ALONG THE WEST SIDE OF PIER #7 (LOOKING SOUTH)

020001 & 020021

06/08/2017

State of Rhode Island
Department of Transportation

Bridge Nos. 020001 & 020021

Washington Bridge South & Bike Path / Pedestrian Bridge

Appendix

BrM Element Notes

Prepared by:

COLLINS ENGINEERS INC.

MPA No. 359 AWARD No. 3381151

BrM Element Notes for Bridge No. 020001

Element 12 – Reinforced Concrete Deck

The top of the grooved reinforced concrete deck is bare, with no protective wearing surface (See Photo Nos. 4 thru 8 and 11 thru 19).

The underside of the deck is covered by stay-in-place forms except for in Bay "G" and at the overhangs (See Photo Nos. 9 and 10).

Element 1080 - Delamination/Spall/Patched Area - (Refers to Element 12)

On the top of deck, there are areas of minor scaling throughout the four (4) main travel lanes in Span #14 (See Photo No. 19).

Along the middle of Bay "G", with evenly spaced anchor bolt holes adjacent to Girder "G" (See Photo Nos. 23 and 30). Some of these holes have been filled while others have not (See Photo No. 30). A few of the holes that have not been filled exhibit signs of leakage.

In Span #13, the exposed deck underside in Bay "G" exhibits an area of scaling up to 36" long x 20" wide x 1/2" deep near the first interior cross frame from Pier #12 (See Photo No. 56).

Element 1120 - Efflorescence/Rust Staining - (Refers to Element 12)

The exposed deck underside in Bay "G" exhibits hairline transverse cracks with efflorescence at random locations (See Photo No. 56).

Element 1130 - Cracking (RC and Other) - (Refers to Element 12)
On the top of the deck, there are full width hairline cracks spaced every 2’ to 3’ in all spans (See Photo No. 13).

The exposed deck underside in Bay “G” exhibits hairline transverse cracks spaced 3’ to 6’ apart (See Photo Nos. 30 and 56). The north and south deck overhangs exhibit a few random hairline cracks spaced 3’ to 6’ apart.

Element 1190 - Abrasion (PSC/RC) - (Refers to Element 12)
The exposed top of the deck exhibits moderate wear, minor chips in the concrete and isolated scrapes (See Photo Nos. 6, 13, and 19).

Element 8382 – Stay-in-Place Form - (Refers to Element 12)
In Bays “A” and “I”, the stay-in-place forms exhibit scattered areas of rust, mainly at the interfaces between adjacent form sections. Areas of rust cover up to 5% of the bay area in several spans (See Photo Nos. 24 and 52).

Element 107 – Steel Open Girder/Beam

The superstructure consists of ten (10) weathering steel plate girders, continuous over all piers except Piers #4 and #9 (See Photo No. 9). Span #14 is splayed at Abutment #2, with two rolled section kicker beams supporting the flared section of deck along the south side of the bridge (See Photo No. 10). The girder ends are painted below the deck joints at the abutments and at Piers #4 and #9 (See Photo No. 31).

The following locations present minor defects as follows:
In Spans #4 and #5, Girders “A” and “J” do not exhibit the positive camber as adjacent girders and the same girders in other spans.

In Span #11, Girders “A”, “B” and “C” do not exhibit the positive camber as adjacent girders and the same girders in other spans, as previously noted in the 2015 Routine Inspection.

In Span #1, Girder “J” has a slightly bent bottom flange, approximately 11’ from Pier #1 measuring 5” long x 1/8” high.

Element 1000 – Corrosion (Refers to Element 107)
Girder “A” in all spans has scattered light areas of laminar rust on the north side and underside of the bottom flange (See Photo No. 32).

In Span #3 at Girder “H” there is an area of laminar rust on the underside of the bottom flange 4’ long x full width that continues on the north web 14’ long x 3” high located between the first and second cross frame from Pier #3 (See Photo No. 15).

In Span #11 at Girder “A”, there is an area of light rust and laminar rust along the interface of the girder top flange and the stay-in-place form between the first and second interior cross frames from Pier #10 (See Photo No. 52).

In Span #14 at Girder “A”, there is an area of laminar rust 62” long x 1-1/2” high along the bottom of the north web at the east field splice plate.

Element 1020 – Connection (Refers to Element 107)
In Span #4, at Girder “F” bolted field splice, a bolt head on the bottom flange is not flush with the splice plate (See Photo No. 27).

In Span #7 at Girder “G”, there are three (3) missing bolts in the bottom flange at the west field splice plate (See Photo No. 40). Also, there is one missing bolt in the east field splice plate at the bottom of the flange.

In Span #8 at Girder “G”, the bottom flange field splice plate is bent on the top of the flange up to 1/8” high.

In Span #9 at the Girder “A”, there is a loose, undersized bolt in the bottom flange field splice (See Photo No. 45).

In Span #14 at Girder “B”, there is a nut that is backed off at the north top flange field splice plate.

Element 7000 – Damage (Refers to Element 107)
In Span #2 at Girder “I”, the bottom flange is bent upward 3/4” high over a 2’ length near the second interior cross frame from Pier #2 and the bottom flange at Girder “J” is slightly bent upward in the same location (See Photo No. 21).

Element 515 – Steel Protective Coating (Refers to Element 107)
The weathering steel girders exhibit a normal surface patina with some scattered areas of yellow to orange rust, most common along the top flanges (See Photos Nos. 3, 9, 10, 27, 31 and 32).

The girder ends are painted 8’ to 11’ long below the deck joints at the abutments and at Piers #4 and #9. The painted girder ends have isolated locations of chipped, peeling and bubbling paint (See Photo No. 31).

In Span #1 at Girder “A”, the bottom flange near Abutment #1, has an area of peeling/bubbling paint 18” long x 9” wide (top and underside of flange) extending 4” high on the north web.

In Span #9 at Girder “H”, the bottom flange underside at Pier #9 has an area of peeling/bubbling paint up to 9’ long x full width.

In Span #10 at Pier #9 in Bay “G” the backside of the bearing stiffeners for Girders “G” and “H” are not painted (See Photo No. 48).

In Span #12 at Girder “I”, approximately 5% of the bottom flange underside face exhibits yellow to orange rust.

Element 205 – Reinforced Concrete Column

There are three (3) reinforced concrete columns at each pier. Column “A” (north column) is supported on an independent drilled shaft. Columns “B” and “C” (center and south columns) are supported by a reinforced concrete pier wall that was part of the original structure (See Photo Nos. 36, 42, 50, 51 and 55). The columns exhibit no deficiencies.

Element 8368 – Graffiti (Refers to Element 205)

The columns have scattered areas of graffiti, particularly at the piers on land (See Photo Nos. 42, 50 and 51).

Element 210 – Reinforced Concrete Pier Wall

The reinforced concrete pier walls are part of the original structure and support Columns “B” and “C” (center and south columns) (See Photo Nos. 36, 42, 50, 51 and 55). The piers have a stone masonry facade from below the water surface to the top of the pier wall. There are scattered areas of missing mortar between masonry stones and random cracked stones (See Photo No. 36).

2017 Underwater Inspection:
The reinforced concrete pier walls are part of the original I-195 Eastbound structure and support Columns “B” and “C” (center and south columns) and support the arches (Arches “E” and “F”) along with the Pedestrian / Bike Path Bridge (Br. No. 020021). For the Underwater Inspection, the Pier Wall for Bridge No. 020001 and Bridge No. 020021 was inspected and reported as a single structure.

Piers #4 through #9 were included in the underwater inspection from the top of the stone masonry facade (bottom of the pier cope) to the channel bottom.

The stone masonry has scattered areas of missing mortar, up to 15% with penetrations 3” to 6” deep between the stones, cracked stones and missing stones (See UW Photo Nos. 3 thru 21).

The piers also have intermittent areas of footing / pile cap exposure with minor abrasion of the concrete.

Element 1080 - Delamination/Spall/Patched Area - (Refers to Element 210)

At Pier #10, there is a spall 1’ high x 1’ wide x 2” deep on top of the southwest corner of the pier wall.

At Pier #11, the previously noted area of severe scaling 31” high x 23” wide x 4” deep on the west face has been repaired with a concrete patch.

At Pier #12, the previously noted spall 39” high x 2’ wide x up to 5” deep at the north end of the pier wall east face has been repaired with a concrete patch (See Photo No. 55).

2017 Underwater Inspection:
At Pier #6 there are intermittent voids up to 3’ long x 6” high x 6” deep along the interface of the stone facade and the concrete pier wall.

Element 1120 - Efflorescence/Rust Staining - (Refers to Element 210)
At Pier #13 there are two (2) cracks full height x up to 1/16” wide with one on the west face and the other on the east face that exhibit moderate efflorescence.

Element 1130 - Cracking (RC and Other) - (Refers to Element 210)
The pier walls typically have scattered vertical hairline cracks (See Photo Nos. 36 and 51). Wider and more extensive cracking is present as follows:

At Pier #9, south of Column “C”, there is a transverse crack full-width x 1/16” wide across the top face and a crack full height x up to 1/8” wide on the west face south of Column #3. There is also an area of hairline map cracking 12’ long x 6’ wide on the top face of pier wall between Columns “B” and “C”.

At Pier #10, south of Column “C”, there are three (3) transverse cracks full-width x up to 1/8” wide across the top of the pier wall, and extend down the vertical faces of the wall. There is also a vertical crack 3’ high x 1/8” wide at the northwest corner.

At Pier #12, there is a crack full height x 1/16” wide on both the east and west face of the pier wall between Columns “B” and “C” (See Photo No. 55). There is also a vertical crack full height x up to 1/2” wide on the east face, south of Column “C” that has been repaired.

Element 1190 – Abrasion – (Refers to Element 210)
2017 Underwater Inspection:
The reinforced concrete pier walls, exposed below the stone facade have areas of abrasion as follows:

At Pier #5 there is a band of abrasion 2’-6” high x 3/4” deep across the north nose and 1/2" deep abrasion along mid-length of the pier wall below the stone facade.

At Pier #7 there are isolated areas of abrasion 2’ long x 1’ high x 2” deep on the south face and there is a band of abrasion 5’ high x 1” deep near the channel bottom on the north face of the pier wall. There is also an area of abrasion 12” diameter x 5” deep near the channel bottom at southwest corner of the pier wall (See Photo Nos. 12 thru 14).

Element 4000 - Settlement - (Refers to Element 210)
Settlement gauges previously installed at Pier #12 have either been removed or covered/painted over. As a result, previously noted minor rotation of the pier wall could not be verified from the 2013 Routine Inspection Report. There are some medium to wide vertical cracks in

the pier walls of Piers #9, #10 and #12, however no signs of settlement were observed (See Photo No. 55).

2017 Underwater Inspection Notes:
At Pier #7, on both the west and east faces of the pier, there are vertical cracks open to 1/4" wide that extend from the top of the stone masonry facade down to the channel bottom near the midpoint of the pier wall that may indicate slight settlement of the pier, as previously noted in the 2013 Underwater Inspection Report (See UW Photo Nos. 10, 11, 15 and 16).

Element 6000 – Scour - (Refers Element 210)
2017 Underwater Inspection:
Since the 2013 Underwater Inspection, there is evidence of scour at the piers up to 9.9’ high (Pier #6), however the exposure of the steps / pile caps up to 3' vertically x up to the full-length of the piers at Piers #4, #5 and #8 has remained relatively unchanged.

Element 8368 – Graffiti (Refers to Element 210)
The pier walls on land exhibit areas of graffiti (See Photo Nos. 42, 50 and 51).

Element 215 – Reinforced Concrete Abutment

Abutment #1 is continuous from Abutment #1 for adjacent Bridge 070001 to the north and Abutment #2 is continuous with the remaining original section of the abutment for Bridge No. 020021 to the south.

Both abutments exhibit random hollow areas, minor spalls, and hairline cracks with and without efflorescence (See Photos 20 and 61). At Abutment #1, the previously noted areas of graffiti have been painted over.

Element 1080 - Delamination/Spall/Patched Area - (Refers to Element 215)

At Abutment #2, on the north face, there is a full height x 1’ wide hollow area with perimeter cracking and adjacent 3’ high x 12” wide x up to 8” deep spall located at near the top of the abutment (See Photo No. 61).

Element 1120 - Efflorescence/Rust Staining - (Refers to Element 215)

At Abutment #1, there is a hairline crack 20’ long with efflorescence, located near the base of the abutment under Bays “H” and “I” (See Photo No. 20).

At Abutment #2, there are random hairline cracks with efflorescence, some which have been repaired (See Photo No. 61).

Element 1130 - Cracking (RC and Other) - (Refers to Element 215)

At Abutment #1, there are scattered vertical and diagonal hairline cracks, most of which have been sealed (See Photo No. 20). Random areas of hairline map cracking are present along the top 10’ of the abutment face.

Element 220 – Reinforced Concrete Pile Cap/Footing

At Pier #10, there is some erosion at the northwest corner of wall, exposing a 22’ long x 42’ high portion of the pile cap.

2017 Underwater Inspection:
The pier walls are founded on reinforced concrete pile caps with unknown type piles. The sloped concrete step / pile cap steps out 18" to 2’ from the pier face then slopes downward at a 45° angle.

Element 1190 – Abrasion – (Refers to Element 220)

2017 Underwater Inspection:
The pile caps exhibit abrasion up to 1/2" deep on the exposed surfaces.

At Pier #8 the sloped concrete step / pile cap has an area of abrasion 18” long x 6” high x 2” deep on the east face of the pier, located 5’ from the southeast corner.

Element 225 – Steel Pile

2017 Underwater Inspection:
This element shall be used to rate the condition of the steel encased reinforced concrete caisson piles at the north (upstream) end of the piers.

Over the steel casing at the caisson piles, there is a fiberglass jacket in place that extends 13’-6” down from the underside of the concrete cap section, which has no significant deficiencies (See UW Photo Nos. 3, 5 thru 10, 15, 17, 18 and 20).

Element 1000 – Corrosion (Refers to Element 225)
2017 Underwater Inspection Notes:
At Piers #4 through #9, the steel casing at the caisson piles exhibits minor corrosion below the fiberglass jackets.

At Pier #5, the exposed steel casing exhibits a 1' high band of laminar rust with negligible section loss along the channel bottom.

Element 234 – Reinforced Concrete Pier Cap

There are reinforced concrete pier caps at each pier (See Photo Nos. 26, 36, 42, 44, 50, 51 and 55). The pier caps have minor spalls and randomly spaced hairline cracks. There are also areas of isolated minor debris on the seats and the steel template plates for bearings are left on top of the seats from construction.

Element 1080 - Delamination/Spall/Patched Area - (Refers to Element 234)
At Pier #1, the west face has a chip 6” long x 3” high x 1/2” deep at the bottom edge between Columns “A” and “B”.

At Pier #13, the east face of has a spall 6” diameter x 3/4” deep along the bottom edge between Columns “A” and “B”.

Element 1120 - Efflorescence/Rust Staining - (Refers to Element 234)

The pier caps have some scattered vertical and diagonal hairline cracks with light efflorescence (See Photo Nos. 26 and 44).

Element 1130 - Cracking (RC and Other) - (Refers to Element 234)
The pier caps have scattered hairline vertical and diagonal cracks, up to full-height (See Photo Nos. 26 and 44). Pier #6 and Pier #8 have a few crescent shaped cracks present at the caps.

Pier #3 has two (2) vertical cracks in the west face of the pier cap beneath Girders “E” and “F” that extend onto the underside of cap (See Photo No. 26). Below Girder “E” the vertical crack measures 6’ high x 0.010” wide and continues across the full width of the cap underside. Below Girder “F” the vertical crack measures 6’ high x 0.005” wide and continues 12” onto the underside of cap.

Element 300 – Strip Seal Expansion Joint

There is a strip seal expansion joint at Abutment #1 (See Photo No. 12). The seal is depressed downward slightly in a few locations up to 3’ long with debris impaction and cracking of the seal.

Element 2340 – Seal Cracking (Refers to Element 300)
At the Abutment #1 joint, there is a transverse crack 45’ long x up to 1” wide (See Photo No. 12).

Element 2350 – Debris Impaction - (Refers to Element 300)
There is light to moderate dirt and debris in the joint (See Photo No. 12).

Element 301 – Pourable Joint Seal

There is pourable joint sealant at the approach slab joints at both ends of the bridge (See Photo No. 12). The joint sealant exhibits no defects.

Element 303 – Assembly Joint with Seal

There are modular expansion joints at Piers #4 and #9 and at Abutment #2 that have locations of rips and debris impaction (See Photo Nos. 16 and 17).

Element 2340 – Seal Cracking (Refers to Element 303)

At the Pier #4 joint, in the low speed shoulder, there are few areas where the neoprene seal is ripped and torn along approximately half the length of the joint (See Photo No. 16).

At Abutment #2, the neoprene seal is torn up to 5’ long in the low speed lane (See Photo No. 19).

Element 2350 – Debris Impaction - (Refers to Element 303)

The modular joints typically exhibit light to moderate dirt and debris impaction, with heavier impaction observed in the low speed shoulder.

The joint at Piers #4 and #9 have moderate debris in the joint up to full length (See Photo No. 16 and 17).

Element 321 – Reinforced Concrete Approach Slab

There are reinforced concrete approach slabs at either end of the bridge. The west approach slab is paved over with a bituminous wearing surface and is therefore not visible (See Photo Nos. 4 and 5). The east approach slab is bare, with no protective wearing surface and exhibits minor defects (See Photo Nos. 7 and 8).

Element 1130 – Cracking (RC and Other) - (Refers to Element 321)

The top surface of the east approach slab has scattered longitudinal cracks in the off ramp lane (See Photo No. 19).

Element 1190 – Abrasion (PSC/RC) - (Refers to Element 321)

The east approach slab exhibits areas of minor to moderate wear, as well as a few minor scrapes and gouges (See Photo No. 19).

Element 510 – Wearing Surfaces - (Refers to Element 321)

The west approach slab is paved over with a bituminous wearing surface that exhibits cracking and wheel path rutting up to 1/2” deep (See Photo No. 12).

Element 3220 – Crack – Wearing Surfaces - (Refers to Element 510 for Element 321)

The bituminous wearing surface at the west approach slab has longitudinal cracks, both sealed and unsealed, full length x 1/2" wide along the paving seam in the low speed lane (See Photo No. 12).

Element 331 – Reinforced Concrete Bridge Railing

There are reinforced concrete bridge railings along both sides of the bridge (See Photo Nos. 3 thru 8 and 12 thru 19). The bridge railings/safety barriers extend beyond the approaches. The railings exhibit scattered vertical cracks, a few isolated scrapes, and minor gouges (See Photo Nos. 12 and 15).

Element 1130 – Cracking (RC and Other) - (Refers to Element 331)

The concrete railings have scattered full height hairline cracks spaced 2’ to 3’ apart on the bridge (See Photo No. 15).

Element 7000 – Damage (Refers to Element 331)

The northwest approach rail has impact damage approximately 9’ long x 3’ high (See Photo No. 11).

Element 8060 – Scupper

There is a scupper along both bridge curbs at each pier and both abutments with 8” diameter PVC downspouts directing the drainage below the superstructure.

Scupper Grates – The grates along the south curb are partially clogged with dirt at Abutment #1 and Piers #2, #8, #9, #10, #11 and #12 and 100% clogged at Abutment #2 and Piers #5, #6 and #7 (See Photo Nos. 14 and 18). In addition, grates along the north curb make a banging noise when vehicles pass over them.

Scupper Downspouts – The downspouts are clogged at Abutment #1 south side, Pier #1 north side, Pier #2 south side, and Pier #5 south side (See Photo Nos. 22 and 35). In addition, the Pier #1 downspout outlet has a buildup of debris causing erosion adjacent to the pier wall (See Photo No. 61).

Element 8213 – Reinforced Concrete Return Wall

There is a reinforced concrete return wall at the northeast corner of the bridge. The Northeast Return Wall has an architectural finish and displays hairline cracks with light to moderate vegetation growth in front of the wall.

Element 1130 – Cracking (RC and Other) - (Refers to Element 8213)

The Northeast Return Wall has vertical hairline cracks extending from the weep holes up to 10’ high.

Element 8218 – Backwall, All Types

There are reinforced concrete backwalls at both abutments. The backwalls exhibit spalls, cracks with and without efflorescence.

Element 1080 - Delamination/Spall/Patched Area - (Refers to Element 8218)

At Abutment #2, there is a spall 7” high x 24” wide x up to 12” deep at the top of backwall, behind Girder “A” (See Photo No. 61).

Element 1120 - Efflorescence/Rust Staining - (Refers to Element 8218)
The backwalls have random hairline vertical cracks up to full height, with efflorescence (See Photo No. 62).

Element 1130 - Cracking (RC and Other) - (Refers to Element 8218)
The backwalls have random hairline cracks up to full height (See Photo No. 62).

Element 8316 – Isolation Bearing

There are isolation bearings at the piers and both abutments. Several of the bearings have light to moderate rust (See Photo Nos. 25, 38, 39, 49, 53 and 60) and concrete debris/over-pour from construction at a few bearing locations (See Photo No. 37).

Element 1000 - Corrosion - (Refers to Element 8316)
At Pier #3, Girders “E” and “G” bearings exhibit areas of light to moderate rust (See Photo No. 25).

At Pier #4, Girder “J” bearing in Span #4 exhibits moderate rust on the masonry plate (See Photo No. 31). Light rust was observed on the Girder “H” bearing.

Element 1020 – Connection - (Refers to Element 8316)
The bearing connection hardware consists of anchor rods, nuts, bolts and washers. Approximately 50% of all connections are either loose, tilted, backed off, or missing. Generally, bolts and nuts are backed off from 1/16” up to 1-1/2” (See Photo Nos. 29, 41, 43, 49, 53 and 60).

Element 2220 - Alignment (Refers to Element 8316)
At Pier #4, Span #5, Girders “B” through “I” centerline is offset approximately 1” south of the bearing pad centerline (See Photo No. 34).

At Pier #8, Girders “G” and “H” centerlines of are offset approximately 1-1/2” south of the bearing pad centerline. Girder “B”, centerline is offset 2-1/4” to the south of the centerline of the bearing. Girders “C”, “D” and “E” centerlines are also offset up to 3” to the south of the bearing pad centerlines (See Photo No. 43).

At Pier #9 in Span #9, all girder centerlines are offset up to 1” to the south of the bearing pad centerlines.

At Abutment #2, Girders “B”, “D” and “G” through “L” centerlines are offset 2” south of the bearing pad centerline. In addition, some girder bottom flanges are not seated flush with the sole plates. These deficiencies are as follows:

At Pier #2, Girder “J” bearing in Span #2, exhibits a 1/16” gap between the bottom flange and sole plate at the southwest corner and tapers flush at the northwest corner of the bearing.

At Pier #5, Girder “H” bearing in Span #6, exhibits a 1/16” gap between the bottom flange and sole plate on the east face of the bearing (See Photo No. 38).

At Pier #9, Girder “A” bearing in Span #10, exhibits a 1/16” gap between the bottom flange and the sole plate.

At Pier #12, Girder “J” bearing in Span #13, exhibits a 1/16” gap between the bottom flange and the sole plate at the southeast corner and tapers flush at the northeast corner of the bearing.

Element 2230 – Bulging, Splitting, Tearing (Refers to Element 8316)
At Pier #4, Girder “E” bearing in Span #4, the bearing material is compressed up to 1/4” on the south side. (Photo No. 28)

At Pier #8, Girder “A” bearing is compressed up to 1/4” on the south side.

Element 2240 – Loss of Bearing Area (Refers to Element 8316)
Several of the bearings exhibit gaps between the masonry plate and the top surface of the concrete pedestal along the edges of the plate. The gaps between the masonry plate and the concrete bearing pedestal are up to 1/4” high at several locations and up to 5/8” high in a few locations. The gaps are the result of the top surface of the concrete pedestal having an uneven finish at these locations (See Photo Nos. 39, 43, 49, 53 and 58).

Element 8370 – Steel Diaphragms

The interior cross frames and end diaphragms have scattered areas of yellow to orange rust with scattered locations of concrete debris / over-pour from construction and isolated locations of connection deficiencies. (See Photo Nos. 9, 10, 33 and 37).

Element 1020 - Connection - (Refers to Element 8370)

Bay “G” interior cross frames in several spans have plate washers overlapping adjacent washers and are slightly bent (See Photo No. 46).

At Pier #9 in Span #10, the bolts at the end diaphragm connections to Girder “G” and “H” in Bay “G” are loose or not fully engaged (See Photo No. 48). There is also a slight gap between the bearing stiffener plate and the end diaphragm at both connections.

Element 515 - Steel Protective Coating - (Refers to Element 8370)

The cross frames and diaphragms are protected by a weathering steel patina. The weathering steel diaphragms and cross frames exhibit a normal surface patina with some scattered areas of yellow to orange rust (See Photo Nos. 9, 10, 33 and 37).

The end diaphragms below the deck joints at the abutments and at Piers #4 and #9 are painted. However, the end diaphragm at Pier #9 in Span #10 is not painted on the west face. (See Photo No. 48).

Structure / Bridge Notes:

Equipment Used: 60’ Manlift, 60’ Bucket Boat, 21’ Dive Boat

Dive Mode: Commercial SCUBA

Traffic Control Used: Yes

Crash Truck Used: Yes

State and Local Police Used: Yes

Access: Boats can be launched from public boat ramps located on the southeast channel embankment and on the northwest channel embankment.

Scheduling Notifications –

1) The Coast Guard must be notified prior to the start of work.

Inspection Notes:

Inspection Dates: 06/19/17 – 07/24/17 (Abovewater)
06/8/2017 – 06/12/2017 (Underwater)

Crew Chief / Dive Supervisor: Seth Lemoine, P.E. (Abovewater & Underwater)

Staff Inspectors: James Karalekas Jr., P.E., Robert Snelgrove, P.E., Matthew Liguore, Curtis Cheney, Juan Quintero

Divers: Seth Lemoine, P.E., James Karalekas Jr., P.E., Robert Snelgrove, P.E., Matthew Liguore, Curtis Cheney

Weather: Varied, 55°F - 90°F

Deflection and Vibration – No unusual deflection or vibration was noted.

Underbridge Lights – There are four (4) lights over Waterfront Drive which were on during the inspection and two (2) lights over Water Street which were off during the inspection. The electrical conduit under Beam "I" in Span #14, is missing an attachment bracket.

Light Standards – There are ten (10) lights spaced evenly along the north side and south side of the bridge, respectively. The lights were not on at the time of the inspection and it is unknown if they function.

Vertical Clearances – The minimum vertical clearances are as follows:

In Span #1 over Gano Street the minimum vertical clearance was measured at 26’-6” at the roadway centerline under Girder “J”. The posted clearance sign on Girder “J” reads 26’-1” (See Photo No. 63).

In Span #14 over Water Street the minimum vertical clearance was measured at 27’-2” at the east roadway shoulder under Girder “J” and the posted clearance sign on Girder “J” reads 27’-2” (See Photo No. 64).

In Span #14 over Waterfront Drive the minimum vertical clearance was measured at 20’-10” at the left (east) curb, left (east) shoulder and the roadway centerline under Girder “J” and the same measurement was taken from the bottom of the underbridge light at the right (west) shoulder adjacent to Girder “I. There are no posted clearance signs for Waterfront Drive under Span #14.

Curb Reveal – The average curb reveal was measured at 3-1/2” along the south side of the bridge. Safe access to the north curb was not available as a result of lane closure restrictions.

Underwater Inspection Notes:
Fender System – There is a timber fender system in place along the east side of Pier #6 and the west side of Pier #7. The timber fender system members exhibit minor splits and checking along with damaged or missing handrails (See Photo Nos. 27 thru 30). The dolphin pile groups at the south (downstream) end of the fenders have recently been replaced and have no significant defects.

Navigational Lighting – The navigational lighting system in place exhibits no significant deficiencies, however the lights were not on at the time of the inspection (See Photo Nos. 27 thru 30).

Channel Debris – There are no obstructions or debris accumulation which would affect the hydraulic opening at the bridge.

Deck (Rating = 7) – The top of the reinforced concrete deck is bare, with no protective wearing surface. The top of the deck has transverse hairline cracks spaced approximately 2’ to 3’ apart and moderate wear (See Photo Nos. 13). The deck underside is concealed from view with stay in-place steel forms in all bays except Bay “G”. The exposed deck in Bay “G” has transverse hairline cracks spaced approximately 3’ to 6’ apart with and without efflorescence (See Photo No. 56).

Superstructure (Rating = 7) – The superstructure consists of weathering steel plate girders continuous over all piers except Piers #4 and #9. There are locations of light laminar rust, bent bottom flanges, isolated locations of missing splice plate bolts and a bent splice plate (See Photo Nos. 15, 21, 27, 31, 32, 40, 45, 52 and 59).

Substructure (Rating = 6) – At Piers #4 through #9, the steel encased reinforced concrete drilled shafts exhibit minor corrosion on the exposed steel surfaces below the fiberglass jackets and an isolated 1’ high band of laminar rust with negligible section loss along the channel bottom at Pier #5. At Piers #4 through #9, the stone masonry facade exhibits up to 15% deteriorated mortar with 3” to 6” penetrations between stones and

isolated cracked stones. The reinforced concrete portion of the pier stems has abrasion up to 1/2" deep. On both the west and east faces of Pier #7, there are vertical cracks open between 1/8” and 1/4" wide that extend from the top of the cap down to the channel bottom near the midpoint of the pier stem.

Channel/Channel Protection (Rating = 6) – The channel bottom consists of mud, sand, and shells with scattered construction debris throughout. The maximum penetration into the channel bottom is 1'. As compared to the 2013 Underwater Inspection Report, there is evidence of scour up to 9.9’ high (Pier #6) and aggradation up to 6.0’ (Pier #5), however the pile cap exposure of up to 3' vertically x up to the full-length of the piers at Piers #4, #5 and #8 remains relatively unchanged (See UW Photo Nos. 22 and 23).