



**Washington State  
Department of Transportation**

**Bridge Preservation Dive Team**

Highways & Local Programs  
**RECEIVED**

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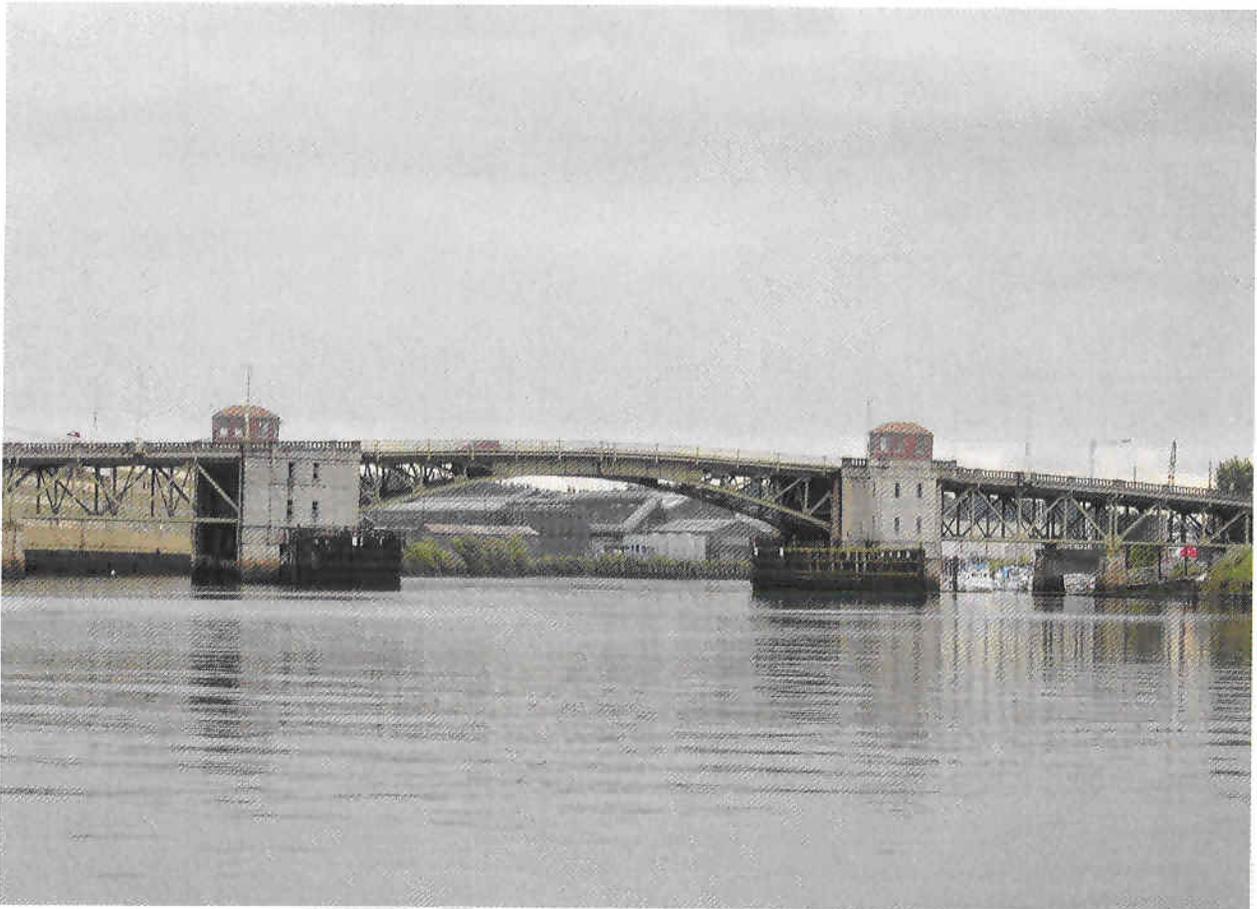
OLYMPIA, WA

**UNDERWATER INSPECTION REPORT**

**FOR THE**

**SOUTH PARK BRIDGE - 14TH AVE. OVER THE DUWAMISH RIVER**

**BRIDGE NO. 3179**



**Inspection Date:** May 10, 2005

**Lead Inspector/Diver:** Shawn M. Plichta, P.E.

**Cert. #:** G0407

*Shawn M. Plichta*

(Signature)

**Inspector/Diver:** Darren Nebergall, P.E.

*Darren Nebergall*

(Signature)

UNDERWATER INSPECTION REPORT  
FOR THE  
SOUTH PARK BRIDGE - 14<sup>TH</sup> AVE. OVER THE DUWAMISH RIVER  
BRIDGE NO. 3179

EXECUTIVE SUMMARY

An underwater inspection of the South Park Bridge was completed by the BPO Dive Team on May 10, 2005. All substructure units exhibited concrete deterioration, spalling, delaminations, leaching cracks, and abrasion. In some areas, the concrete is soft and easily removed with a hammer. Both Bascule Piers have exposed reinforcing at various corner locations due to penetrating spalls. Previously noted exposed reinforcing has corroded and provides no structural strength. Below the waterline, concrete spalls ranging from 4" diam. to 8" diam. were typical on the Bascule Piers. Due to the massive size of the piers, the deterioration in this structure is not considered to be structurally significant. Although no repairs are recommended at this time, the concrete deterioration should be closely monitored.

INSPECTION FINDINGS

Typical defects in the substructure units consist of both vertical and horizontal leaching cracks, abrasion in the intertidal zone, corner spalls and delaminations.

Specifically, the West face of Column A Pier 1 South has a 2-1/2' long x 1' wide x 2" deep area of section loss. The northeast corner of this same column has a 4' long delamination to the mudline and deteriorating concrete on the East face. On the East face of Column B Pier 1 South there is a 2' long x 1' wide x 2" deep spall at the mudline.

At the South Bascule Pier, corner delaminations and spalling occur on most elements. There is a 6' long section of exposed rebar due to a concrete spall measuring 1-1/2' wide x 8" deep on the northeast corner. Concrete exfoliation at the South face of the southwest corner 6" wide x 10" deep. The North face of the northeast corner has a 2 sq. ft. area soft patch of concrete that can be removed with a hammer. Along this face at the northwest corner is a spall 3-1/2' long x 2-1/2' wide x 6" deep.

On the North Bascule Pier, the concrete deterioration is similar to the South Bascule Pier. Corner spalls and delaminations are present as well as a 4' long exposed piece of rebar at the northwest corner. In the previous report dated December 2003, it was noted that large section losses ranging from 6" to 1-1/2' deep occur at 10' below MLLW to mudline on all but the West face of the Pier. Soundings recorded in these areas have mudline at 10' MLLW or less so these defects are not noted in this report. There is approximately 1' of exposed footing at the southwest corner, however, the footing extends 5' deep.

Footing exposure is prevalent at Pier 1 North. Column A footing and seal is exposed 5' along the East face of the Pier and 8' along the West face of the Pier. Column B footing and seal is exposed 4' along the East face of the Pier and 1-1/2' along the West face of the Pier. No

undermining of seal noted. The West face of Column A has abraded 3" deep in the intertidal zone. Concrete delaminations and spalls are present on the West face of Column B.

### FATHOMETRIC SURVEY

A fathometric survey of the channel was completed May 10, 2005. In comparison to data in the December 2003 report, the water depths vary at the bascule pier locations but the main channel has remained static. This is due to the nature of the silty bottom and varying current of the Duwamish River as well as dredging operations. No undermining of structural foundation components was noted. The northwest corner of the South Bascule Pier is aggrading with silt equal to the MLLW line. At the southwest corner of the North Bascule Pier, the footing is exposed approximately 1' due to degradation of the channel bottom. Also, Pier 2 North Column A footing is exposed (see photo # 10).



Dive Schedule					
Dive No.	Entry Time	Exit Time	Total Time in Water	Maximum Depth	Remarks
1	10:00 am	11:30 am	1:30:00	14'	

**Dive Narrative**

Site was accessed from a boat launch under Hwy 99. Dive team performed pre-dive safety checklist and developed inspection procedures.

Shawn Plichta and Darren Nebergall inspected the structure from the South end to the North. The dive progressed smoothly and several Level II inspections were performed at various locations around the Piers. At the completion of the dive, a physical check of the divers was completed.

The North Bascule and approach piers were inspected from the surface due to the extreme low tide at the site. All defects noted in the previous report were visible in the intertidal zone so no dive was conducted on these elements.

Dive Team Members

Shawn Plichta, P.E.

(Print Name)

Darren Nebergall, P.E.

(Print Name)

Dave Bruce, P.E.

(Print Name)

Jim Harding

(Print Name)

(Print Name)

Working Diver

(Role)

Safety Diver

(Role)

Standby Diver

(Role)

Surface Support / Communications

(Role)

(Role)



# Underwater Inspection Report

Bridge Number 3179	Route 14th Ave.	Agency King County	Date 5/10/2005
Bridge Name South Park Bridge		Intersecting Duwamish River	
Inspector Shawn Plichta, P.E.	Identification No. G0407	Hours on Site 6	
Dive Contractor WSDOT Dive Team			
Diver Name Shawn Plichta, P.E.		Diver Name Darren Nebergall, P.E.	

Structure Type Steel Truss Bascule	Substructure Type Concrete Piers and Columns	
Foundation Type Timber Piles	Number of Spans 5	Number of Piers in Waterway 4

<p><b>5</b> Bents (1) Abut/Pier Wall (2) Web Wall (3) Columns (4) Shaft (5) Piles (6) Bracing (7)</p> <p>Foundation (8) Footing (9) Seal (10) Piles (11)</p> <p><b>8</b> Scour (12) Scour Mitigat. (13)</p> <p><b>7</b> Channel (14) Streambed (15) Drift (16) Flow (17)</p>	1	Typical defects in the substructure units consist of both vertical and horizontal leaching cracks, abrasion in the intertidal zone, corner spalls and delaminations. (photos 6 & 17).
	2	South Bascule Pier, corner delaminations and spalling occur on most elements (photos 5, 11, 12, & 13). 6' long section of exposed rebar due to a concrete spall measuring 1-1/2' wide x 8" deep on the northeast corner (photo 18). Concrete exfoliation at the South face of the southwest corner 6" wide x 10" deep. North face of the northeast corner has a 2 sq. ft. area soft patch of concrete that can be removed with a hammer. Northwest corner has a 3-1/2' long x 2-1/2' wide x 6" deep spall.
		North Bascule Pier, the concrete deterioration is similar to the South Bascule Pier. Corner spalls and delaminations are present as well as a 4' long exposed piece of rebar at the northwest corner (photo 16). Corner delaminations, abrasion, and leaching cracks on East face (photos 14 & 15).
	4	West face of Column A Pier 1 South has a 2-1/2' long x 1' wide x 2" deep area of section loss (photo 1). Northeast corner of Column A Pier 1 South has a 4' long delamination to the mudline and deteriorating concrete on the East face (photo 2 & 3). East face of Column B Pier 1 South there is a 2' long x 1' wide x 2" deep spall at the mudline (photo 4).
		West face of Column A Pier 1 North has abraded 3" deep in the intertidal zone (photos 7 & 8). Concrete delaminations and spalls are present on the West face of Column B Pier 1 North (photo 9).
	8	North Bascule Pier: approximately 1' of exposed footing at the southwest corner. Footing exposure is prevalent at Pier 1 North. Column A footing and seal is exposed 5' along the East face of the Pier and 8' along the West face of the Pier. Column B footing and seal is exposed 4' along the East face of the Pier and 1-1/2' along the West face of the Pier.



# Underwater Inspection Report

Bridge Number 3179	Route 14th Ave.	Agency King County	Date 6/28/2005
Bridge Name South Park Bridge		Intersecting Duwamish River	
Inspector Shawn Plichta, P.E.		Identification No. G0407	Hours on Site 6
Dive Contractor WSDOT Dive Team			
Diver Name Shawn Plichta, P.E.		Diver Name Darren Nebergall, P.E.	

Structure Type Steel Truss Bascule	Substructure Type Concrete Piers and Columns	
Foundation Type Timber Piles	Number of Spans 5	Number of Piers in Waterway 4

<b>5</b> Bents (1) Abut/Pier Wall (2) Web Wall (3) Columns (4) Shaft (5) Piles (6) Bracing (7)  Foundation (8) Footing (9) Seal (10) Piles (11)	12	No undermining of substructure noted. Localized scour present at Pier 1 North.	
	14	Channel bottom is silty with some cobbles and gravel.	
	16	No drift or debris noted.	
	17	Flow was less than 1 ft/sec. North Bascule Pier and Pier 1 North has higher flow than other substructure components.	
<b>8</b> Scour (12) Scour Mitigat. (13)			
<b>7</b> Channel (14) Streambed (15) Drift (16) Flow (17)			

Bridge Number 3179	Bridge Name South Park Bridge	Date May 10, 2005
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Photograph 1 : Concrete section loss on West face of Column A Pier 1 South.



Photograph 2 : Delamination on northeast corner of Column A Pier 1 South. Note concrete abrasion at top of photo, typical on all substructure components in the intertidal zone.

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Photograph 3 : Deteriorating concrete on East face of Column A Pier 1 South.



Photograph 4 : East face of Column B Pier 1 South: 2' long x 1' wide x 2" deep spall.

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May 10, 2005



Photograph 5 : Southwest corner of South Bascule Pier. Note corner delamination, transverse leaching cracks, and abrasion.

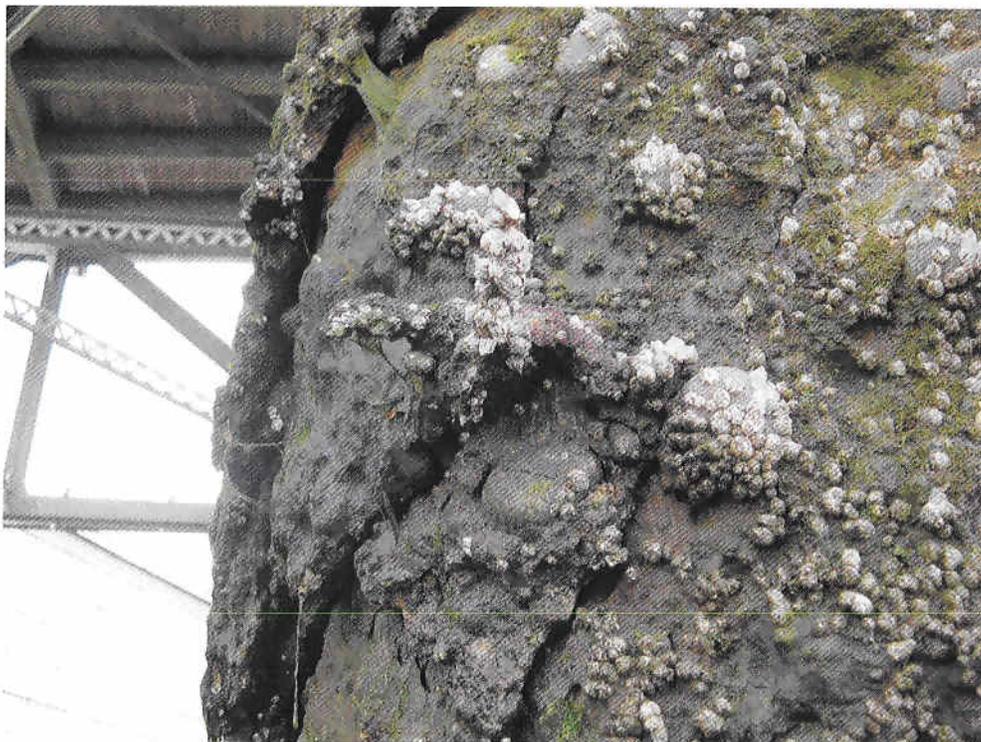


Photograph 6 : East face of North Bascule Pier abrasion in intertidal zone, spalling concrete at corners of tower, longitudinal cracks, and transverse leaching cracks.

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Photograph 7 : Column A section loss, West face, in intertidal zone to mudline at Pier 1 North.



Photograph 8 : Close up view of concrete at Column A West face Pier 1 North.

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May 10, 2005



Photograph 9 : Corner spalls and concrete delaminations on the West face of Column B Pier 1 North.



Photograph 10 : South face of Pier 2 North. Exposed footing at Column A with undermining of the pier wall.

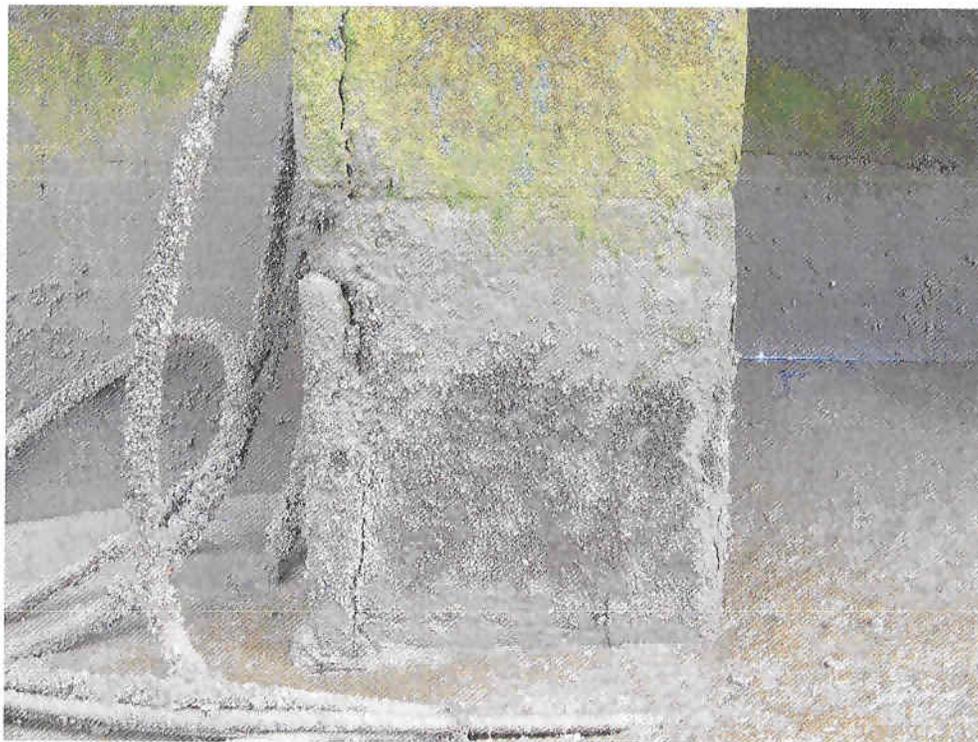
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Photograph 11 : Concrete spall East face of South Bascule Pier.



Photograph 12 : Delaminations at Northwest corner of South Bascule Pier.

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Photograph 13 : Delaminations at Southwest corner of South Bascule Pier.



Photograph 14 : Abrasion and concrete spall at Northeast corner of North Bascule Pier.

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Photograph 15 : Concrete section loss at Southeast corner of North Bascule Pier.



Photograph 16 : Exposed longitudinal reinforcing at Northwest corner of North Bascule Pier.

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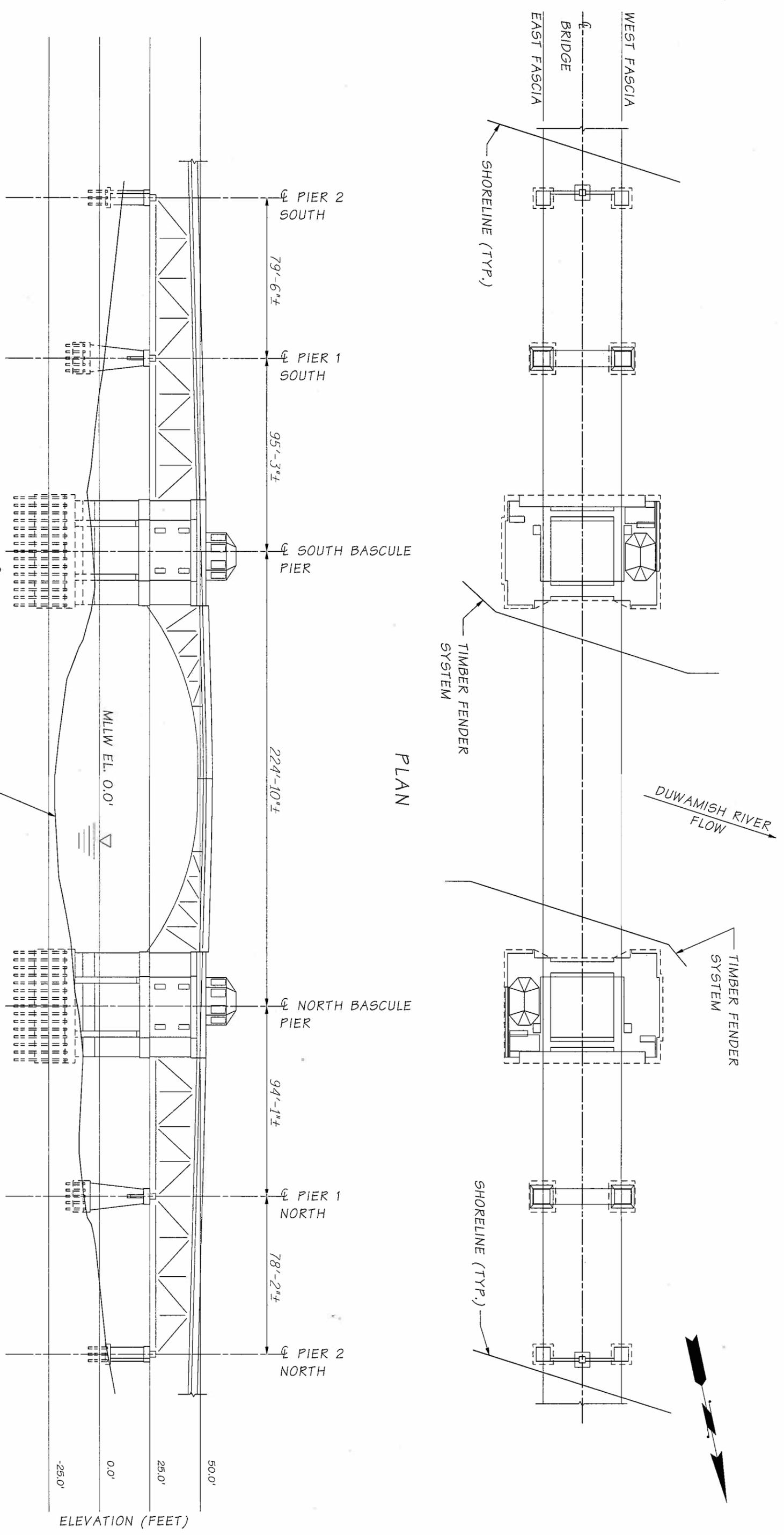


Photograph 17 : View of typical spalls on submerged substructure components.



Photograph 18 : Exposed rebar at Northeast corner of South Bascule Pier.

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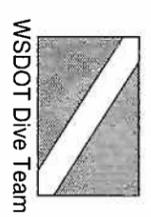
ELEVATION  
(TIMBER FENDER SYSTEM NOT SHOWN)

PLAN

REFERENCE ELEVATION: MEAN LOW LOW WATER ELEV. 0.0



Drawn By:	SMP
Approved By:	DRB
Date:	June 28, 2005
DATE	REVISION
BY	



3179 SOUTH PARK BRIDGE  
UNDERWATER INSPECTION

LAYOUT

SHEET NO.	1
OF	4
SHEETS	4

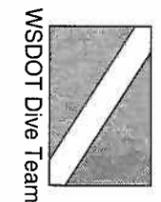
176 Jul 05 08:54:11 2005

- TYPICAL INSPECTION NOTES:
1. CONCRETE ABRASION IN INTERTIDAL ZONE AT ALL PIER LOCATIONS.
  2. VERTICAL AND TRANSVERSE LEACHING CRACKS AT ALL PIER LOCATIONS.
  3. 4" DIAM. TO 8" DIAM. CONCRETE SPALLS UNDERWATER IN BASCULE PIERS (PHOTO 17).

REFERENCE ELEVATION: MEAN LOW LOW WATER ELEV. 0.0

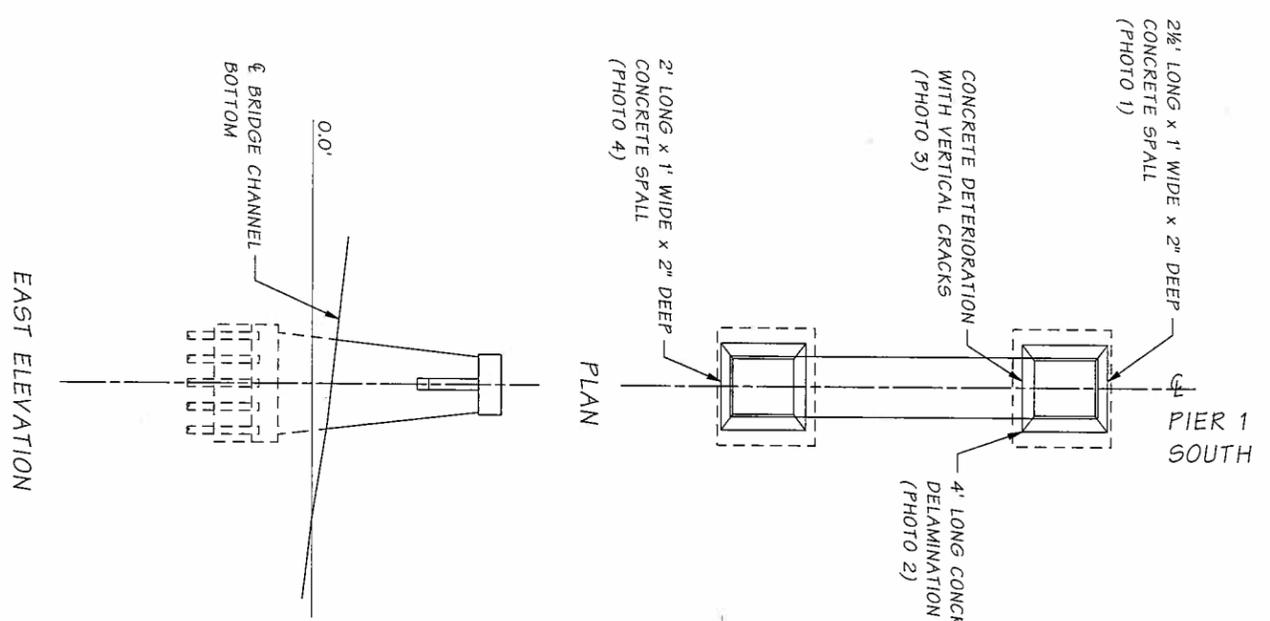


Drawn By:	GMP
Approved By:	DRB
Date:	June 28, 2005
DATE	REVISION
BY	

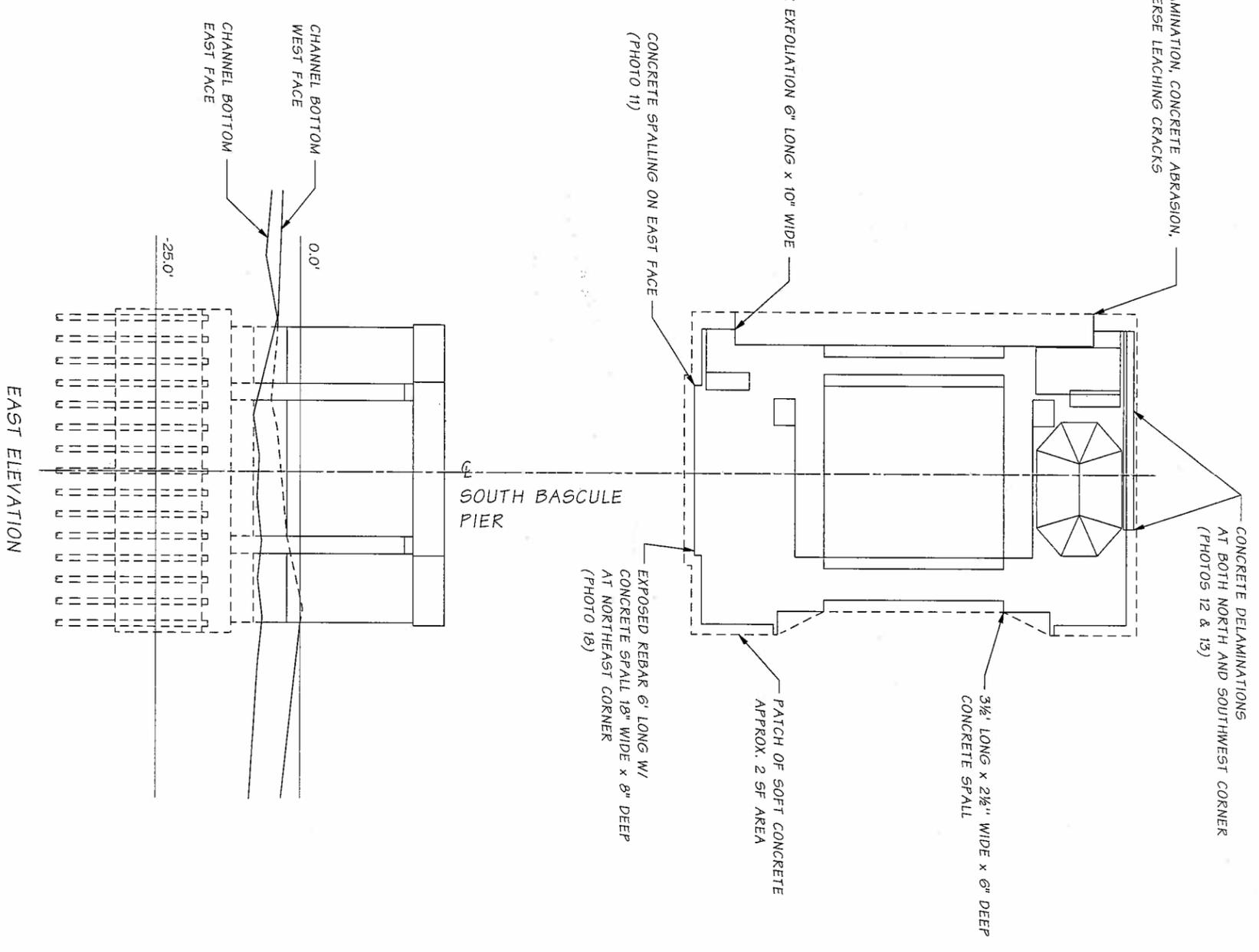


3179 SOUTH PARK BRIDGE  
UNDERWATER INSPECTION  
SOUTH PIERS

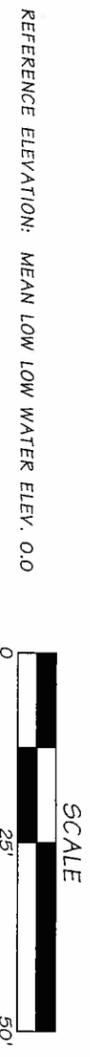
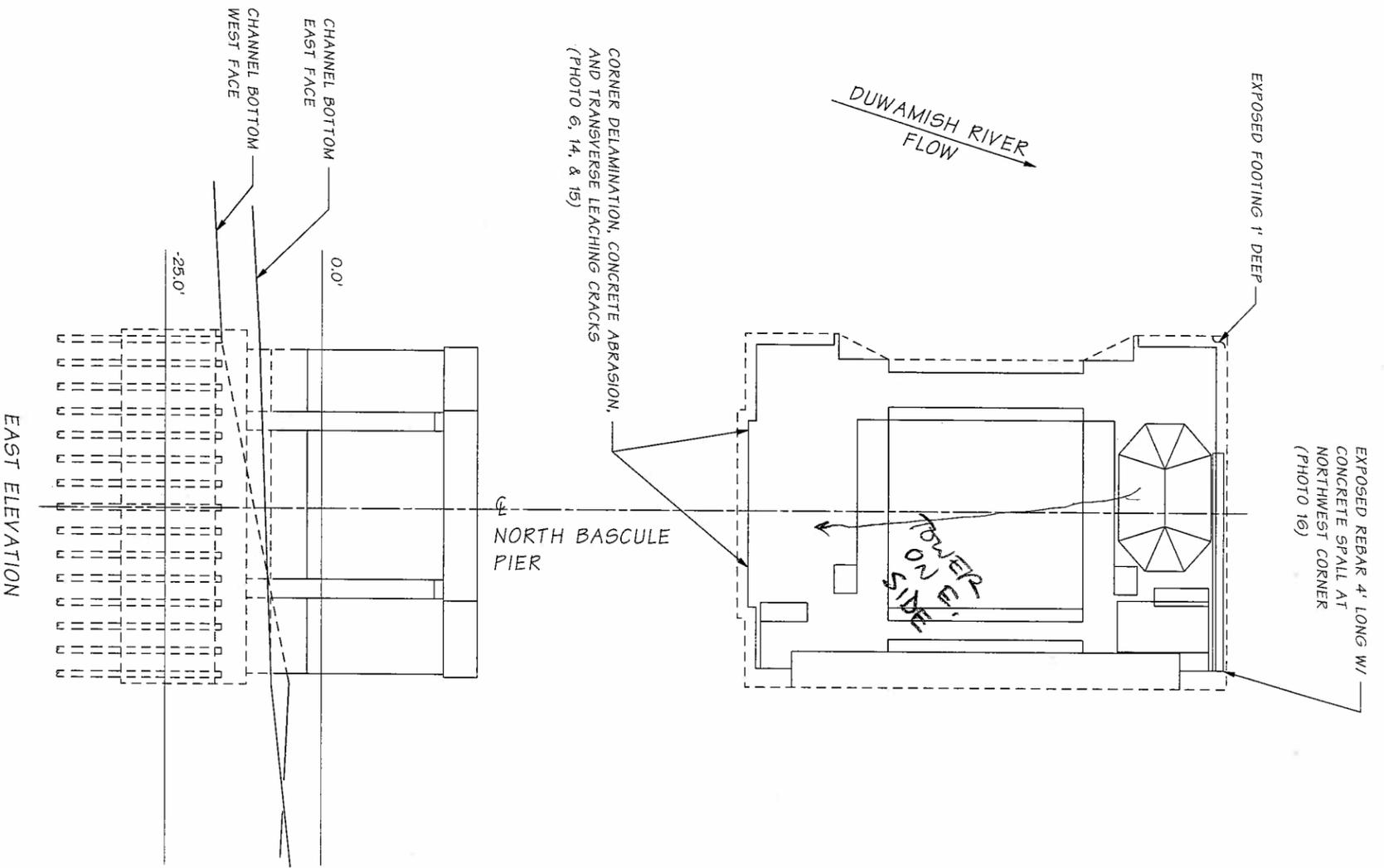
SHEET NO.	2
OF	2
SHEETS	4



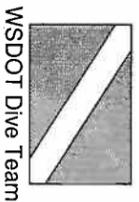
DUWAMISH RIVER FLOW



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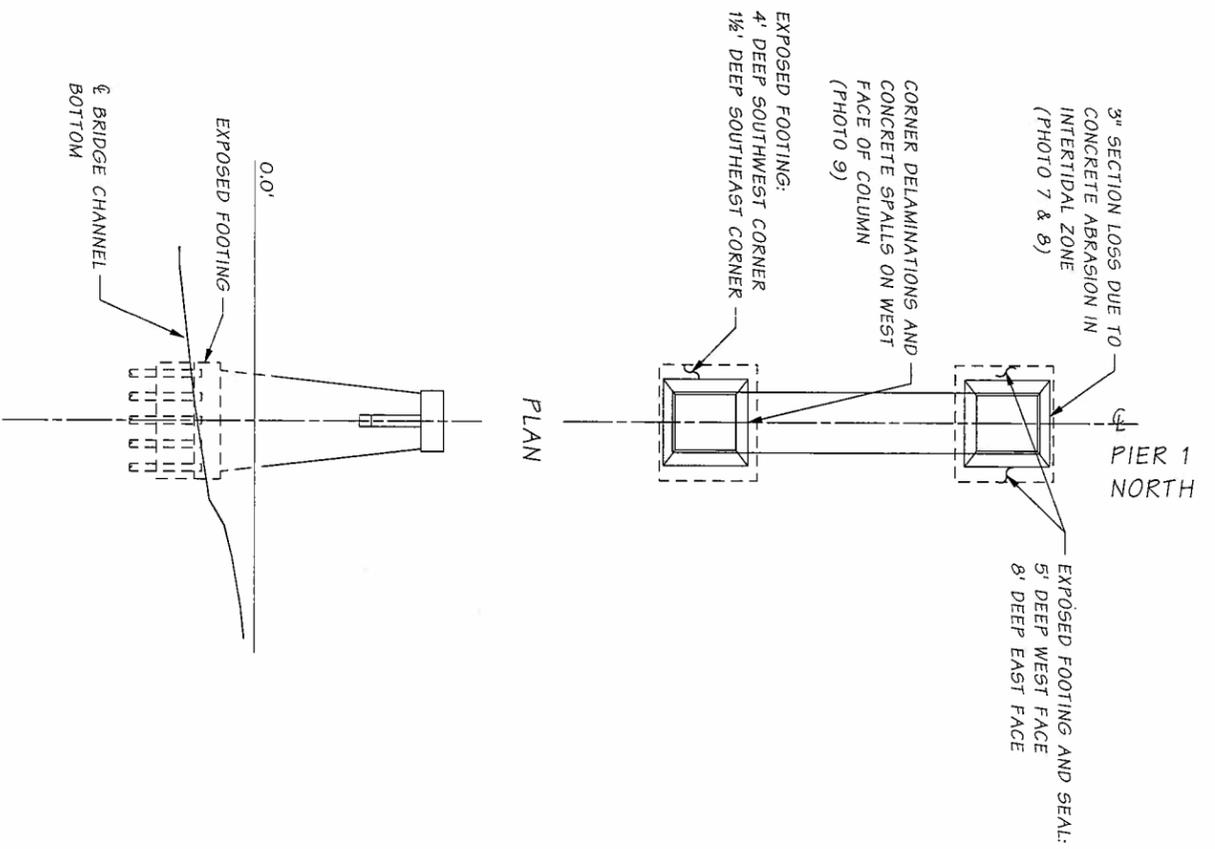
Drawn By:	GMP
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DATE	REVISION
BY	

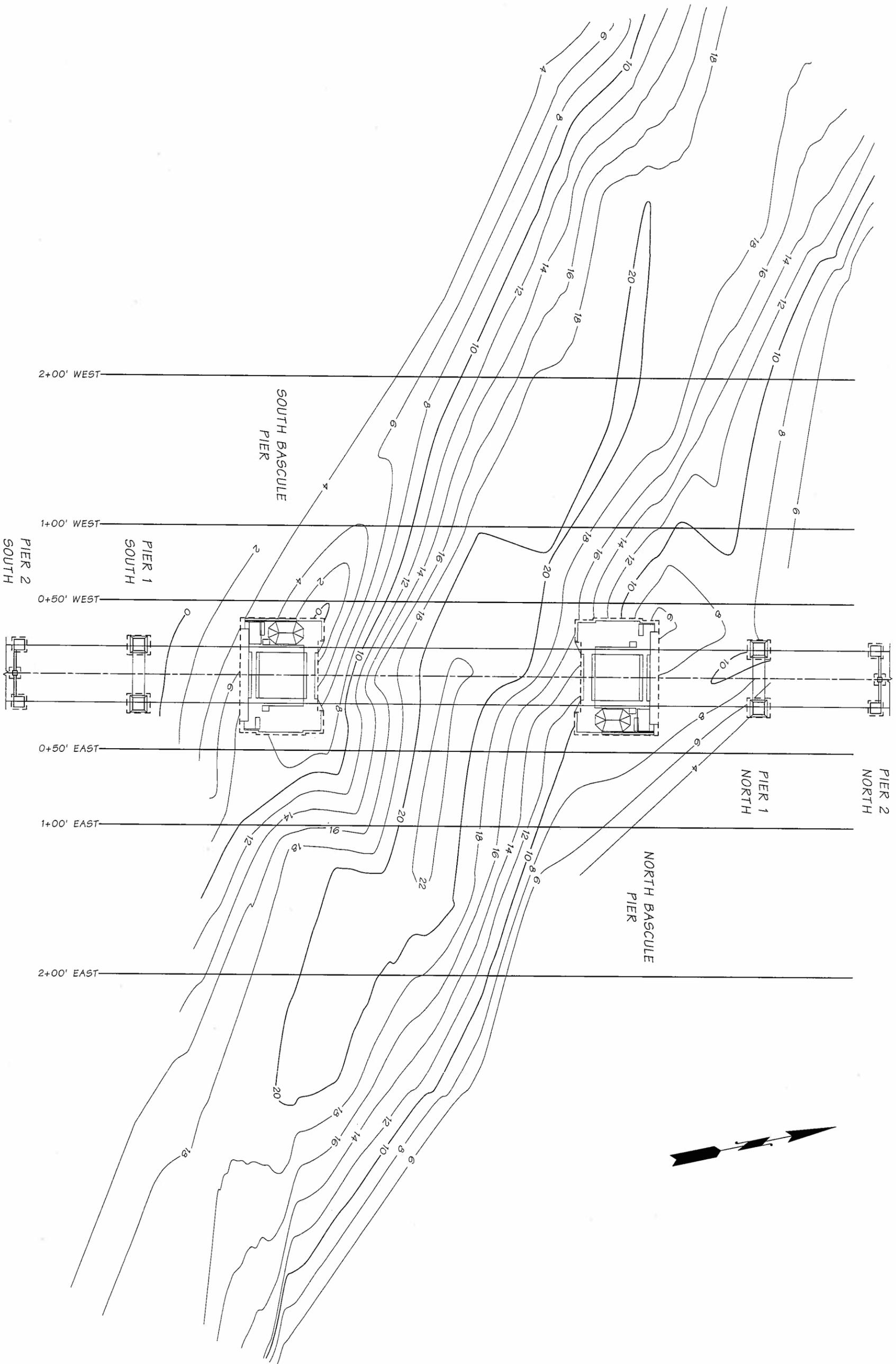


3179 SOUTH PARK BRIDGE  
UNDERWATER INSPECTION

SHEET NO. 3  
3  
4  
SHEETS

- TYPICAL INSPECTION NOTES:
1. CONCRETE ABRASION IN INTERTIDAL ZONE AT ALL PIER LOCATIONS.
  2. VERTICAL AND TRANSVERSE LEACHING CRACKS AT ALL PIER LOCATIONS.
  3. 4" DIAM. TO 8" DIAM. CONCRETE SPALLS UNDERWATER IN BASCULE PIERS (PHOTO 17).





REFERENCE ELEVATION: MEAN LOW LOW WATER ELEV. 0.0



Drawn By:	GMP
Approved By:	DRB
Date:	June 28, 2005
DATE	REVISION
BY	



**Washington State**  
**Department of Transportation**  
 Bridge and Structures Office

**3179 SOUTH PARK BRIDGE**  
**UNDERWATER INSPECTION**  
 FATHOMETRIC SURVEY

SHEET	4
OF	4
SERIES	4

Thu Jun 05 08:54:11 2005