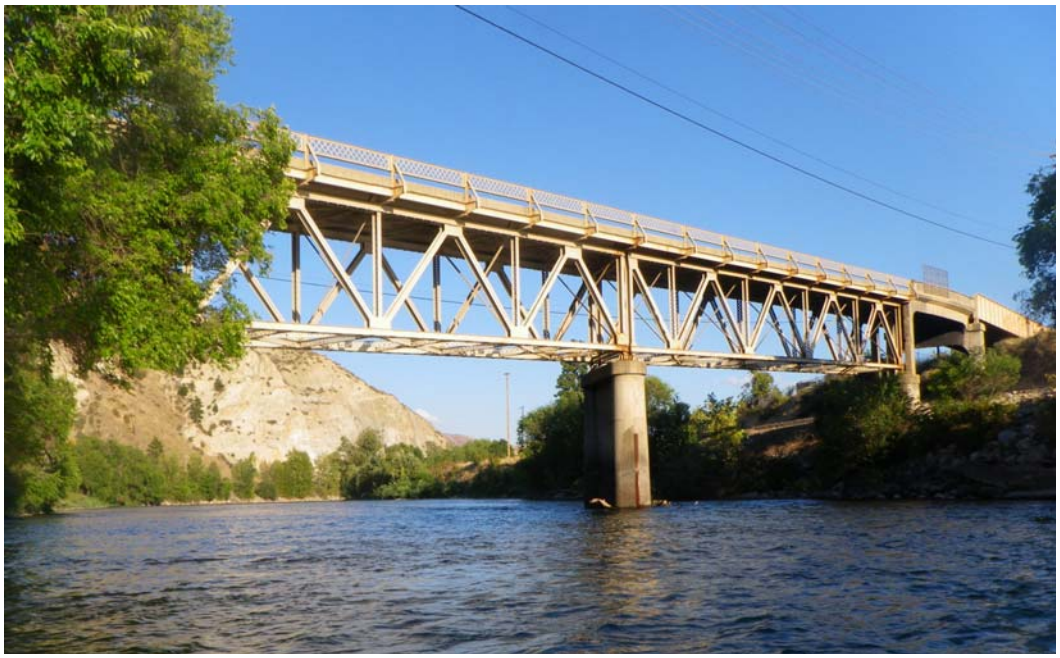
ECHELON ENGINEERING, INC.

Civil/Marine Consulting Engineers

Underwater Inspection Report
West Cashmere Bridge
Chelan County, WA

Bridge No. 401

Structure No. 08430900



Prepared For:

Chelan County
316 Washington Street, Suite 402
Wenatchee, WA 98801

ATTN: Ms. Paula Cox, PE
Project Manager
Tel: 509 / 667.6415

Prepared By:

Echelon Engineering, Inc.
21027 61st Avenue West
Lynnwood, WA 98036

ATTN: Ms. Shelley Sommerfeld, PE
President
Tel: 425 / 672.8924

Inspection Date: August 21, 2012
12-2419B

Echelon
Engineering

Civil / Marine
Consulting Engineers

October 12, 2012

Chelan County
316 Washington Street, Suite 402
Wenatchee, Washington 98801

ATTN: Ms. Paula Cox, PE
Project Manager

RE: Underwater Inspection of West Cashmere Bridge, Chelan County, Washington
Bridge No. 401 / Structure ID 08430900

Dear Ms. Cox:

This report is submitted to document the findings of our recent underwater inspection of the West Cashmere Bridge in Cashmere, Washington. The structure is an eight span steel deck truss structure supported by reinforced concrete piers and approach bents. Pier 5 was located in the river channel at the time of the inspection. Pier 5 is a cast in place reinforced concrete pier with a spread footing and foundation piles. The project was conducted by Echelon Engineering on August 21, 2012.

1. EXECUTIVE SUMMARY

Based on the observed condition, all inspected substructure components appear sound. No evidence of any cracking, spalling or other significant deterioration of the concrete was noted. However, one area on the south side of the web wall was noted to have an area of form void and scale that appears to have resulted from poorly consolidated concrete during the original construction. Monitoring of this defect is recommended. Additionally, exposure of the footing was noted at the upstream end of the pier (i.e. max. vertical height of 6 inches). No exposure of the foundation piles was found. Moderate debris build-up was evident at the upstream end of the pier in the area where the footing is exposed. Although localized scour was found in the area of the debris build-up, no significant general or localized scour patterns were identified. Conditions appear similar to that reported in the 2007 underwater inspection report.

2. INSPECTION FINDINGS

The West Cashmere Bridge located on Goodwin Road in Cashmere, Washington is an eight span steel deck truss bridge supported by reinforced concrete piers and abutments. Numbering of the structure has been designated south to north, consistent with the previous inspection report. Pier 5 was the only pier located within the channel during this inspection. Construction drawings for the bridge were not available at the time of this inspection, however, the report covering the previous underwater inspection, conducted by others in 2007, was available.

Investigation of the concrete pier showed it to be in generally good condition. The concrete was found to be sound. No significant damage was noted on Pier 5. However, one area on the south side of the web wall was noted to have an area of form void and scale which appears to have resulted from poorly

21027 61st Avenue West
Lynnwood, Washington 98036
Tel: 425 / 672.8924
E-mail: Echelon@echelonengineering.com

consolidated concrete during the original construction. The affected area is ~3 ft. x 1 ft. and ranges from ½ inch to a maximum of 4 inches deep. No exposed reinforcing or rust bleeding was noted to be associated with this area, however, access was limited due to the presence of a large rock. As this defect does not appear to have changed significantly since the previous inspection, no repair appears warranted at this time and we recommend monitoring the area during future inspections.

Minor velocity abrasion of the concrete surfaces exposed to flow was also evident on the pier (i.e. ¾ to 1 inch deep). The area of greatest abrasion was found to be on the upstream end of the pier extending from the high water mark to the mudline.

The previous inspection report noted partial exposure of the Pier 5 footing at the upstream end. Although access was limited due to the presence of timber debris at the nose of the pier, this investigation found similar exposure of the footing with a maximum vertical exposure of 6 inches noted. No evidence of undermining of the footing or exposure of the foundation piling was found. A moderate build-up of timber debris was noted on the upstream end of the pier which consists of several large logs along with numerous twigs and sticks. This condition resulted in limited access of this area to inspection.

The water level experienced during the inspection was El. 794.3'. All elevations have been determined utilizing the top of the concrete at Pier 5 of El. 817.0' as provided in the previous inspection report.

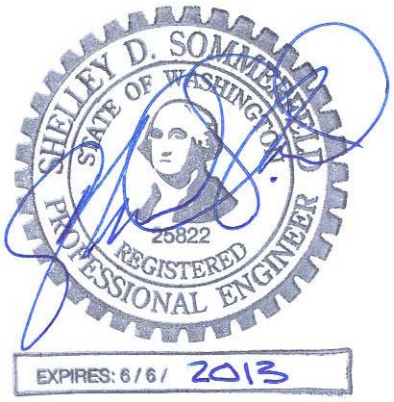
Although localized scour was evident at the upstream end of Pier 5, the scour is associated with the debris build-up and at this time is minor. No other localized scour or general scour patterns were identified. The channel bottom was found to be primarily 3-12 inch rock with cobbles and some areas of sand. A number of large rocks ranging from 1-3 ft. in diameter were present in the vicinity of the pier, but based on the information in the 2007 inspection report, these large rocks appear to be moving down river during periods of heavy flow. Probing of the channel bottom in the vicinity of the piers, using a #3 rebar allowed 3 – 9 inches of penetration primarily through the cobbles. Although minor shifting of the channel bottom was encountered, no significant change was noted when compared to the data provided in the 2007 inspection report.

It has been a pleasure to have worked with you on this project. Should you have any questions concerning this report, or if we can assist you further, please do not hesitate to contact our office.

Sincerely,
Echelon Engineering, Inc.

SDS:jds
Enclosures

Shelley D. Sommerfeld, P.E.
President



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Underwater Inspection Report

Bridge Number	Route	Agency/Owner	Date
401	Goodwin Road	Chelan County	August 21, 2012

Bridge Name	Intersecting
West Cashmere Bridge	Wenatchee River

Inspector	Identification No.	Hours on Site
Shelley Sommerfeld, P.E.	WA Br. Insp. No. G9912	1.5

Dive Contractor
Echelon Engineering, Inc.

Diver Name	Diver Name
Erling Vegsund	

Structure Type	Substructure Type
Reinforced Concrete Pier & Steel Deck Truss Bridge	Reinforced concrete pier

Foundation Type	Number of Spans	Number of Piers in Water
Concrete spread footing w/ foundation piles	8	1

☒ Interior Bents (1)	1	**Concrete Piers/Columns -**
Abut/Pier Wall (2)	2	- Inspection found the submerged portions of Pier 5 to be in overall good
Web Wall (3)		condition with no evidence of any cracking or spalling.
Columns (4)		- Moderate velocity abrasion was noted on the concrete surfaces of Pier 5
Shaft (5)		within the elevation of water fluctuation (i.e. ~3/4 to 1 in. deep).
Piles (6)		- One area located on the south side of the web wall was noted to have an
Bracing (7)		area of form void and scale which appears to have resulted during
Foundation (8)		construction. The area is ~3 ft x 1 ft with a depth of ½ - 4 inches resulting from
Footing (9)		poor consolidation. No reinforcing or rust bleeding was visible. However,
Seal (10)		there was limited assess due to a large boulder.
Piles (11)	8	**Foundation**
☒ Scour (12)	9,11	- Inspection of the mudline found exposure of the footing on the upstream end
Scour Mitigat. (13)		of the pier with the maximum vertical height of exposure measured at 6 inches.
☒ Channel (14)	12	- Pier 5 was noted to have an area of localized scour at the upstream end of the
Streambed(15)		pier where timber debris has become trapped. No significant scour condition
Drift(16)		exists at this time. Although exposure of the footing was noted, no exposure
Flow (17)		of the foundation piles was evident.

14	- The channel banks appear stable with heavy vegetation.
15	- The channel bottom in the vicinity of the piers was found to consist primarily of 3-12 inch rock and
	cobbles with some areas of sand. A number of large diameter rocks (1-3 ft) are located in the vicinity
	of the pier. Based on the previous 2007 report, it appears that these are moving down river during
	periods of heavy flow.
16	- Moderate amounts of timber drift material were encountered at the upstream end of Pier 5.
	The build-up extends from the water surface to the channel bottom and consists of several large
	logs along with numerous twigs and sticks.
17	- Flow does not appear to be restricted through the channel.

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Daily Site Dive Log

Inspector Shelley Sommerfeld, P.E. (WA Bridge Inspector No. G9912)	**Date** August 21, 2012
Bridge Number 401	**Bridge Name** West Cashmere Bridge
Bridge Type Reinforced Concrete Pier & Steel Deck Truss Bridge	**Waterway Name** Wenatchee River
Dive Objective Inspect submerged bridge members and obtain hydrographic data.	

Dive Operation

Type of Operation ☒ SCUBA ☐ Snorkel ☐ Other _____

Equipment

Suit: Dry Suit

Air Supply: Aluminum 80 / Air

Site Access: North shoreline

Inspection Tools: Nikonos camera, probing rod, hammer, scraper, U/W light, misc. inspection tools

Repair Tools: Not Applicable

Repair Materials: Not Applicable

Conditions

Water	☐ Salt	☒ Fresh	☐ Brackish	Temperature 63 °F	Visibility 10 ft.
Surface	☐ Calm	☒ Choppy	☐ Rough		
Surf	☐ Small	☐ Medium	☐ Large	☒ Not Applicable	
Tide	☐ High	☐ Low	☐ Flood	☐ Ebb	☒ Not Applicable
Current	☐ Fast	☒ Moderate	☐ Slow	Velocity >3 ft/sec	
Weather	☒ Sunny	☐ Cloudy	☐ Overcast	☐ Overcast	Air Temperature 75 °F
Thermocline	Temperature N/A °F		Depth N/A		

Dive Checks

☒ First Aid Equipment on Site	☒ Physical Condition of Diver(s) Checked
☒ Communications For EMS	☒ Communications for Diver(s) Checked
☒ Dive Gear Inspected	☒ Team Briefed and Understand Dive Plan
☒ Air Source Checked	☒ Special Site Hazards Noted
☐ _____	
☐ _____	

Dive Plan and Dive Team Procedures

General – Verify drawings and investigate submerged elements.

1. Determine access location – Access for inspection obtained on the north shore. All inspection activities conducted from the shore.
2. Hold pre-dive safety meeting to discuss planned dive, roles, responsibilities, review emergency procedures and condition of divers. Set-up dive equipment and conduct function and safety checks.
3. Conduct Level I visual/tactile and Level II cleaning/detailed inspection of Pier 5.
4. Take underwater photos. Once photos complete, conduct probing of the mudline and obtain hydrographic information.

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Dive Schedule

Dive No.	Entry Time	Exit Time	Total Time in Water	Maximum Depth	Remarks
1	5:50 PM	6:25 PM	0:35 min.	7 ffw	EBV

Dive Narrative

The bridge was accessed from the north shore. Investigation of Pier 5 was conducted by diving. Data was relayed to the support personnel (in a small skiff) using voice communications.

All underwater elements appear sound. The pier was found to be in overall good condition. Investigation of the concrete surfaces found them to be sound with moderate velocity abrasion of the areas exposed to flow (approx. ¾ - 1 inch deep). The area of greatest abrasion was noted on the upstream end of the pier extending from the high water mark to the channel bottom.

One area on the south side of the web wall was noted to have an area of form void and scale which appears to have resulted from poorly consolidated concrete during the original construction. The affected area is ~3 ft. x 1 ft. and ranges from ½ inch to a maximum of 4 inches deep. No exposed reinforcing or rust bleeding was noted to be associated with this area, however, access was limited due to the presence of a large rock.

Investigation of the pier foundation noted the footing to be exposed at the upstream end for a maximum height of 6 inches. Moderate amounts of timber debris were encountered at the upstream end of the pier. This condition did limit accessibility to the pier at the upstream end.

Probing of the mudline in the area around the piers found the bottom to be primarily 3-12 inch rock and cobbles with a number of large diameter rocks and some areas of sand. Probing of the channel bottom in the vicinity of the pier using a #3 rebar achieved 3-9 inches of penetration primarily through the cobbles. Although the pier exhibits minor localized scour at the upstream end no significant scour patterns or any undermining of the foundations was identified.

Dive Team Members

(Print Name)	(Role)
Shelley Sommerfeld, PE	Team Leader / Notes
Erling Vegsund	Dive Inspector
Travis Seigal	Topside Support
Ryan Jenson	Topside Support

PHOTO No. 1: West Cashmere Bridge, Looking Northwest - Note the build-up of timber debris on the upstream nose of Pier 5 and the minor abrasive scale evident from the high water mark down.

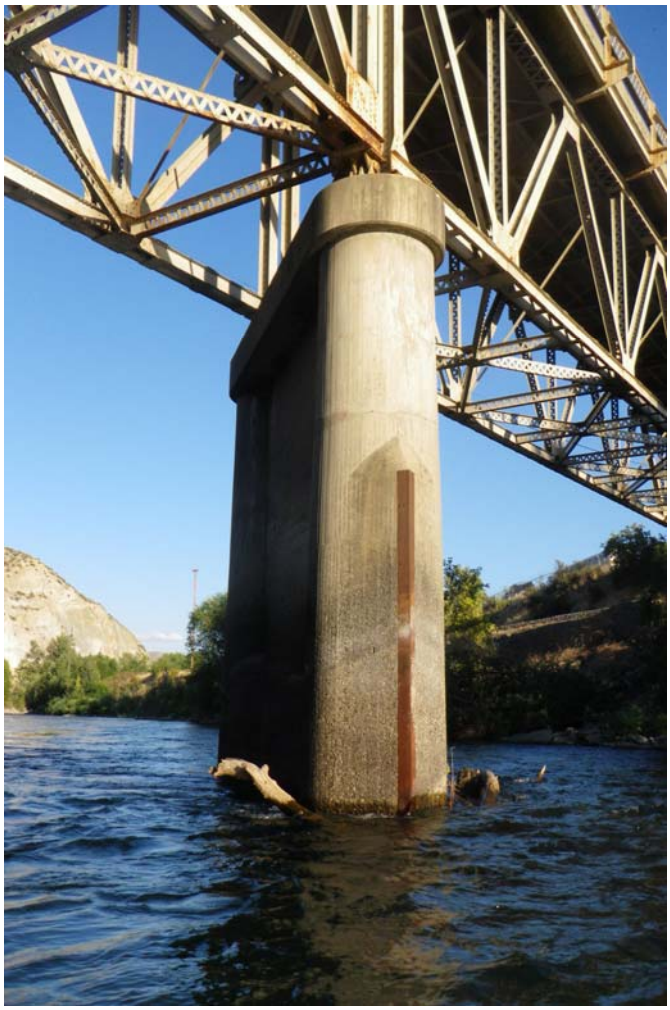


PHOTO No. 2: Pier 5, Looking East - Inspection of the pier found the concrete to be sound and in good condition. Note the embedded steel plate and the timber debris on the nose of the pier.

PHOTO No. 3: Pier 5, Looking North - Inspection of the leading edge of the pier found the steel plate to be well secured and evidence of minor abrasive scale on all concrete surfaces exposed to flow.

PHOTO No. 4: Pier 5, Upstream End - Note the good condition of the concrete and the embedded steel nose plate. Also note the large diameter timber debris that is trapped at the nose of the pier.

PHOTO No. 5: Pier 5, Upstream End, Close-up - Note the minor abrasive scale at the waterline. This area was noted to have sustained the most significant abrasive scale.

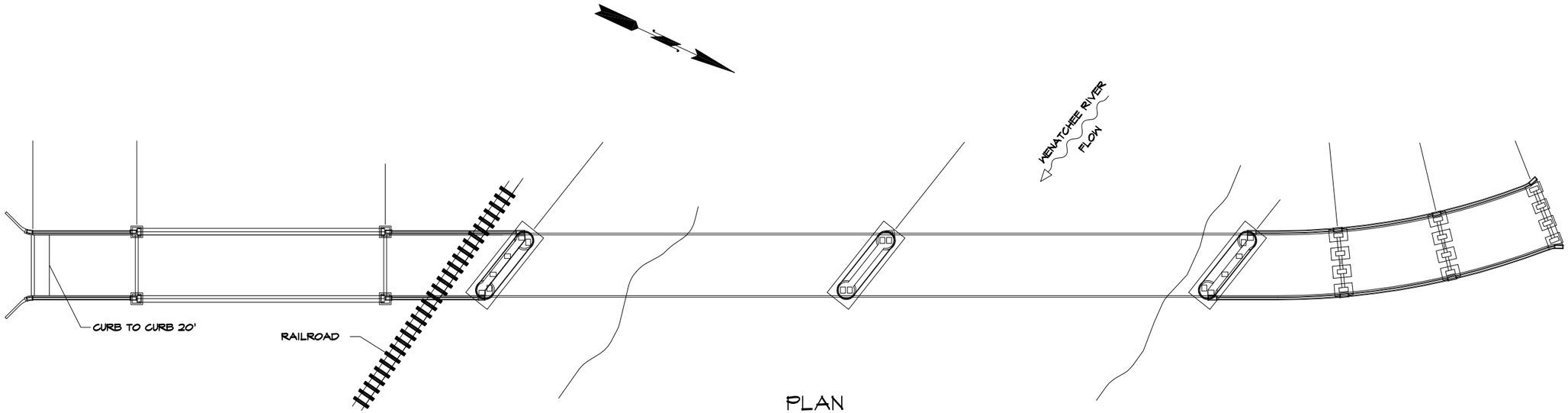
PHOTO No. 6: Pier 5, North Side - Note the good condition of the concrete in this area where the upstream column meets the web wall.

PHOTO No. 7: Pier 5, Upstream End - Note the embedded steel nose plate behind the build-up of timber debris at the upstream end of the pier. Also note the good condition of the submerged concrete and the rock and gravel bottom evident beneath the debris.

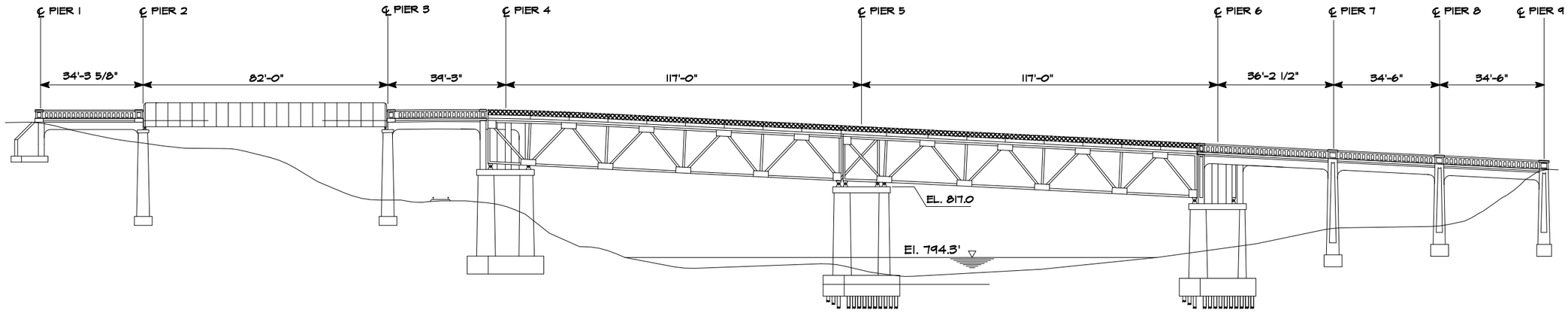
PHOTO No. 8: Pier 5, Downstream End - Note the good condition of the submerged concrete and the rock, sand and silt bottom composition.

PHOTO No. 9: West Cashmere Bridge, Looking West - Note the well vegetated shoreline on both banks downstream of the bridge.

PHOTO No. 10: West Cashmere Bridge, Looking East - Note the well vegetated shoreline on both banks upstream of the bridge.



PLAN



ELEVATION

LOOKING WEST

GRAPHIC SCALE

0 10' 20' 30' 40' 50'

NOTES:

1. Reference elevation: Pier 5, Top of Concrete Pier El. +817.0'.
2. Reference previous underwater inspection report by WSDOT Dive Team, dated August 27, 2007.
3. Reference As-built plans, Cashmere West Bridge over the Wenatchee River, Chelan Co. WA. Built in 1929.

DATE	REVISION

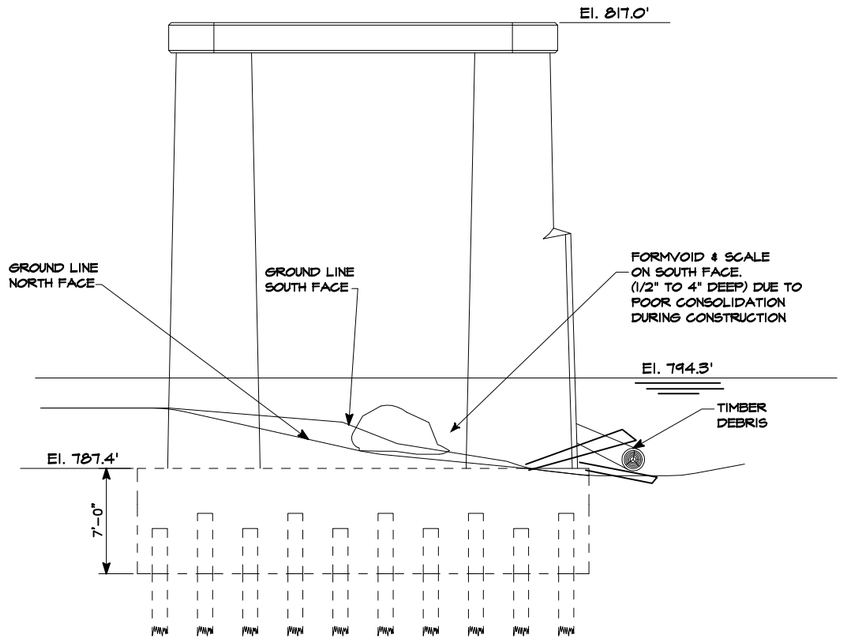
CHELAN COUNTY

West Cashmere Bridge
Br. No. 401; Underwater Inspection

PLAN & PROFILE

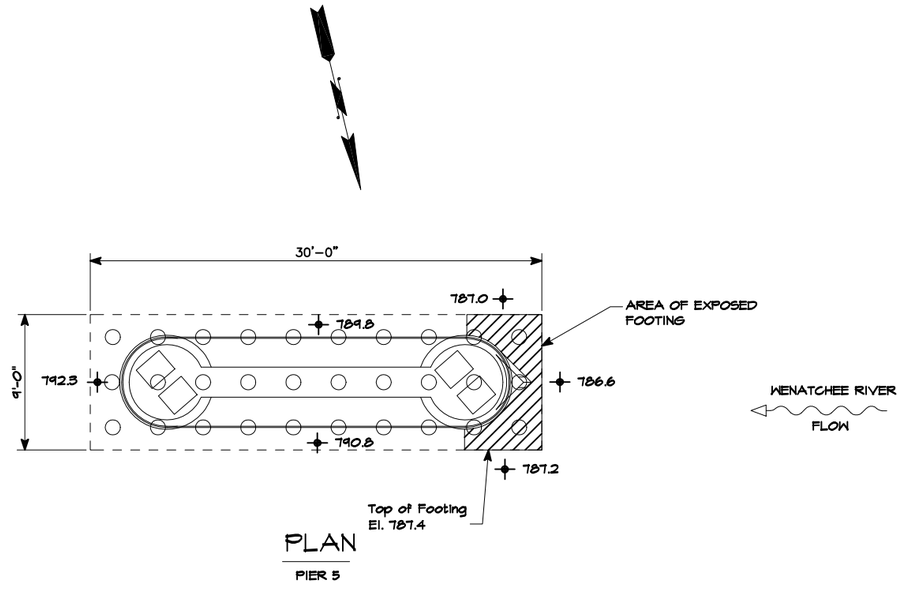
DATE: Aug. 2012
PROJECT: 12-2419B
SHEET: 1 of 2
DRAWN: SDS / JDS

ECHELON ENGINEERING, INC.
Civil/Marine Consulting Engineers
Lynnwood, Washington
Tel: (425) 672-8924



ELEVATION

PIER 5 LOOKING SOUTH



PLAN

PIER 5

GRAPHIC SCALE

0 5' 10' 15'

NOTES:

1. Reference elevation: Pier 5, Top of Concrete Pier El. +817.0'.
2. Reference previous underwater inspection report by WSDOT Dive Team, dated August 27, 2007.
3. Reference As-built plans, Cashmere West Bridge over the Wenatchee River, Chelan Co. WA. Built in 1929.

DATE	REVISION

CHELAN COUNTY

West Cashmere Bridge
Br. No. 401; Underwater Inspection

PIER 5 - Plan & Elevation

DATE: Aug. 2012
PROJECT: 12-24198
SHEET: 2 of 2
DRAWN: SDS / JDS

ECHELON ENGINEERING, INC.
Civil/Marine Consulting Engineers
Lynnwood, Washington
Tel: (425) 672-8424

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