

BRIDGE INSPECTION REPORT

SI-5559 Nahmint River



BRIDGE FSR: **SI-5559 Nahmint River Lake Main 0.5 km**

Inspection Date: August 16th 2016

Inspected By: M. Horner, P.Eng., J. Rupar Gilliatt, P.Eng.



GENERAL BRIDGE DESCRIPTION:

Reference Drawings: No reference drawings available.

Year Built: Unknown

Number of Spans: 3

Span Length: 12,200 mm, 33,600 mm, 12,200 mm

Girder Type: Span 1: Two non composite steel plate girders.
Span 2: Two pairs of glulam I girders.
Span 3: Two non composite steel plate girders.

Deck: Span 1: Precast concrete deck panels.
Span 2: 100 mm thick untreated timber running planks, 75 mm thick treated structural planks, and 250 x 300 mm treated ties at 400 mm c/c.
Span 3: Precast concrete deck panels.
Clear width between curbs of 4880 mm.

Curb: 250 x 250 mm untreated timber curb rail, risers, and blocking.

Handrail: None.

BRIDGE INSPECTION REPORT

SI-5559 Nahmint River



Substructure:

Abutments: Left abutment: Closed face cedar log crib breast wall and wing walls retain road fill with average 900 mm log diameter. A steel abutment comprising pipe columns and bracing support the superstructure. Creosote treated sawn timber ballast wall.

Right abutment: Closed face cedar log crib breast wall and wing walls retain road fill with average 900 mm log diameter. A steel abutment comprising pipe columns and bracing support the superstructure. Creosote treated sawn timber ballast wall.

Piers: Pier 1: Mass concrete pier supports span 1 and 2. Short steel pipe risers accommodate difference in elevation between span 1 girders and pier. Span 2 glulam girders bear on creosote treated timber sill.

Pier 2: Mass concrete pier supports span 2 and 3. Short steel pipe risers accommodate difference in elevation between span 3 girders and pier. Span 2 glulam girders bear on creosote treated timber sill.

GENERAL BRIDGE CONDITION:

Superstructure: Fair (Girder 4 in Poor Condition)

Substructure: Fair

Deck: Fair

Load Posting: 120 tons.

Date for the Next Close Proximity Inspection: 2019

Estimated Replacement Date: 2021

BRIDGE INSPECTION SUMMARY/RECOMMENDATIONS:

The previous inspection was performed with a small snooper truck from Vancouver Island. The inspectors were unable to inspect the upper sections of the interior faces of Girder 2, and Girder 3. Accordingly, we performed the 2016 inspection with Precision Stone Slinger's snooper truck, which provided full access to the exposed faces of each girder pair. A bat roost at Pier 1 limited access to Girders 2 and 3 near Pier 1.

With the exception of Girder 4, the bridge is generally in fair condition with routine maintenance required. The weathering of the glulam girders has increased since the 2013 inspection with an increase in the depth and length of the girder checks. A significant series of checks with an average depth of 130 mm was noted in the mid third of Girder 4 near the right end, and includes an end check. Refer to

BRIDGE INSPECTION REPORT

SI-5559 Nahmint River



Checks 16 and 17 in Table 3. We did not identify any indications of rot in the girder. Based on the depth and location of the series of checks we immediately contacted the Ministry and recommend reviewing the load rating of the glulam girder span. The increase in girder weathering is not unusual and the size of the significant series of checks in Girder 4 has not increased notably since the 2013 inspection. We therefore recommend the Ministry maintain the existing three year inspection schedule for the bridge and monitor the girder condition during future inspections.

Old log cribs at the abutments retain road fill and are generally in fair condition. A few logs were noted with rotten ends indicating that the crib is starting to deteriorate. The bridge is supported independently of the cribs, and the structure is currently serving its purpose. The log cribs should be monitored during future inspections.

A broken down RV is parked under span 3 and the area below the bridge is being used as a camp ground. The Ministry should be aware of the possible hazards associated with temporary occupancy below the bridge, which include the potential fire hazard to timber components, such as the log crib retaining walls. We recommend the Ministry consider removing the RV and install "No Camp Fires" signs.

INSPECTION NOTES:

APPROACHES:

- Approaches are in fair condition with potholes in left approach.
- Small delineators in place at all corners.
- Guide logs act as fenders at both approaches.
- No bridge ahead signs in place.
- Vegetation starting to obscure right end of bridge.
- 120 ton load posting signs in place at both approaches.

DECK:

Span 1 & 3 Concrete Deck:

- Non-composite deck panels over the jump spans are in good condition showing minor wear.
- Joints between concrete deck panels are full of debris and appear to have been left vacant resulting in leaking and staining on underside of panels.
- Light map cracking on underside of concrete deck panels.
- Debris accumulation and moss growth along deck edge.

Span 2 Timber Deck

- Running planks over the main span are in fair to poor condition. Four running planks in upstream wheel track and three running planks downstream wheel tracks are in fair condition with localized small pockets of rot, remaining planks are in poor condition with large pockets of rot.

BRIDGE INSPECTION REPORT

SI-5559 Nahmint River



- Curb rail, risers, and blocking are in fair condition. Curb rails are starting to deteriorate with moss growth, a few pockets of rot at ends of curb sections, and some mechanical damage. A few risers have pockets of rot.
- Ties and structural planks are in good condition with no deterioration noted.
- Debris accumulation and moss growth along deck edge.

SUPERSTRUCTURE:

Span 1 & 3 Steel Girders:

- Steel girders are in good condition with light surface corrosion and no measurable section loss.
- Minor flaking on bottom flanges.
- Girders cantilever over steel posts at each abutment.
- Diaphragms are in good condition.
- Minor debris accumulation on girder 2, downstream bottom flange.

Span 2 Glulam Girders:

- With the exception of Girder 4, the girders are generally in fair condition with creosote leaching on the exterior girder faces and moderate checking.
- The depth and length of tagged checks has increased since previous inspection. See Table 2 & 3 for girder condition and check identification, and Drawings 1- 4 for check locations.
- A significant 145 mm deep check was identified in Girder 4 downstream face. The check is located in the mid third of the girder near the right end of the span. See Check 16 in Table 3.
- No indications of rot identified in girders.
- Limited access to inspect Girder 2 & 3 near Pier 1 due to bat roost.
- Diaphragms are in good condition.

Girder Depth (mm)	Flange Width (mm)	Flange Thickness (mm)	Flange Laminate Width (mm)	Web Width (mm)	Web Laminate Width (mm)
2100	425	510	3 x 140	400	230 & 170

Table 1: Glulam Girder Geometry

BRIDGE INSPECTION REPORT

SI-5559 Nahmint River



Girder	Face	Condition
1	U/S	Creosote leaching; visible creosote on >25% of girder face. Moderate checking – numerous checks noted, see Table 3 for record of notable checks.
1	D/S	No access to inspect downstream face of girder.
2	U/S	No access to inspect upstream face of girder.
2	D/S	Minimal creosote leaching at laminated joints; girder face 100% covered by creosote. Moderate checking – number of checks noted typically in top flange, see Table 3 for record of notable checks.
3	U/S	Minimal creosote leaching at laminated joints; girder face 100% covered by creosote. Moderate checking – number of checks noted typically in top flange, see Table 3 for record of notable checks.
3	D/S	No access to inspect downstream face of girder.
4	U/S	No access to inspect upstream face of girder.
4	D/S	Creosote leaching; visible creosote on 50% of girder face. Moderate checking – numerous checks noted, see Table 3 for record of notable checks.

Table 2: Glulam Girder General Condition

BRIDGE INSPECTION REPORT

SI-5559 Nahmint River



Check	Span	Girder	Face	Tag 1	Tag 2	Length (mm)	Max Depth (mm)	Max Width (mm)	Comment
1	2	1	U/S	AE066	AE914	9250	150	8	Propagated 100 mm to the right since previous inspection.
2	2	1	U/S	SNT007	SNT008	6500	200	7	New check at level of tie clips under 3 adjacent pairs of clips. 200 mm deep at x = 11070 mm. Average 140 mm deep.
3	2	1	U/S	AE190	AE151	3380	130	7	Minor propagation since previous inspection: 200 mm right & 250 mm left.
4	2	1	U/S	AE168	AE187	2850	115	4	Propagation since previous inspection: 300 mm left and 850 mm right in 1 lamination up from original check. Average 80 mm deep.
5	2	1	U/S	SNT009	Pier 2	16850	180	5	Marks a series of checks in top 7 laminations average 1500 mm long 90 mm deep and 3 mm wide. 180 mm deep at x = 28170 mm y = 1985 mm. Longest check 6400 mm.
6	2	1	U/S	AE691	Pier 2	4600	100	6	Increased in depth by 40 mm. Has not propagated. Average 70 mm deep.
7	2	2	D/S	AE694	Pier 1	4350	110	4	Propagated 400 mm to the right since previous inspection. No close access to left end due to bats and guano.
8	2	2	D/S	SNT010	-	900	80	1	New check extends to right of tag.
9	2	2	D/S	Pier 2	-	700	425	3	End split in top flange at right end. Extends 700 mm on D/S face and 130 mm on U/S face. Average 80 mm deep.
10	2	3	U/S	SNT011	AE788	4690	160	4	Extension to check AE788-AE019 one lamination up, 160 mm deep at x = 22340 mm y = 1875 mm.
11	2	3	U/S	AE788	AE019	2190	80	5	Propagated 2690 mm to the left to SNT 011 one lamination up.
12	2	3	U/S	AE677	AE689	3810	100	6	Has not propagated.
13	2	3	U/S	AE658	Pier 2	3270	120	7	Propagated 700 mm to the left.
14	2	3	U/S	Pier 1	-	5400	60	2	Series of minor checks extend 5400 mm from Pier 1. Typically 60 mm deep with varying length.
15	2	4	D/S	AE150	AE212	15690	170	5	A series of checks in Girder 4 top flange, near tie clips.
16*	2	4	D/S	AE251	AE280	2370	145	4	Continuous series of checks linking to check AE1439-Pier 2. 145 deep at x = 29770 mm y = 1310 mm. Propagated 750 mm left of AE251. Average 130 mm deep.
17	2	4	D/S	AE1439	Pier 2	2115	130	4	100 mm deep at Pier 2. Average 130 mm deep.

BRIDGE INSPECTION REPORT

SI-5559 Nahmint River



18	2	4	D/S	Pier 2	-	680	55	4	Wide but shallow checking in top flange at blocking bolts.
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Table 3: Glulam Girder Check Table

*Critical Check

BRIDGE INSPECTION REPORT

SI-5559 Nahmint River



SUBSTRUCTURE:

Left Abutment:

Log Cribs:

- Cribs are in fair condition with typical sap rot, up to 35 mm, and a number of logs with heart rot in the ends.
- Second log and fifth log from bottom of downstream wing wall have rotten ends.
- 75 mm wide split in 2nd log from bottom of left abutment downstream wing wall.
- Top log of upstream wing wall has rotten end.
- Previously noted rot in third face log could not be identified.
- No signs of crushing or distress noted in cribs.
- A 1300 mm deep, 1700 mm wide scour hole was noted at interface of left abutment breast wall and downstream wing wall. The scour is not a concern at this time.
- Newer creosote treated sawn timber ballast walls are in good condition.

Steel Pipe Columns:

- Steel pipe columns are in good condition.
- Span 1 rubber bearings are bulging between keeper bars and are in fair condition.
- The steel pipe columns are founded on the river bank with no signs of scour noted.

Right Abutment:

Log Cribs:

- Cribs are in fair condition with typical sap rot, up to 35 mm, and typical heart rot in the ends of logs.
- White fungal growth on ends of tie backs in centre of abutment.
- Second log from bottom of upstream wing wall has rotten end.
- No signs of crushing or distress noted in cribs.
- Log cribs are founded on the river bank with no signs of scour noted.
- Newer creosote treated sawn timber ballast walls are in good condition.

Steel Pipe Columns:

- Steel pipe columns are in good condition.
- Span 1 rubber bearings are bulging between keeper bars and are in fair condition.

BRIDGE INSPECTION REPORT

SI-5559 Nahmint River



Pier 1:

- Concrete pier is in fair condition with $\sim 1 \text{ m}^2$ of right face with exposed rebar due to inadequate concrete cover.
- Staining on faces of pier from water migrating through gap between timber and concrete decks.
- Timber sill is in fair condition.
- Steel posts are in good condition.
- Span 1 rubber bearings are bulging between keeper bars and are in fair condition.

Pier 2:

- Concrete pier is in good condition.
- Staining on faces of pier from water migrating through gap between timber and concrete decks.
- Timber sill is in fair condition. Crushing noted in previous inspection could not be identified, and may have referred to minor crushing of plywood shim under glulam.
- Steel posts are in good condition.
- Span 1 rubber bearings are bulging between keeper bars and are in fair condition.

CHANNEL:

- Substructure components are founded on the river banks and were above the PWL at the time of inspection.
- Tall steel pipe columns and concrete piers provide adequate high water clearance for bridge.
- A large tree deposited on the bank below Span 1 indicates the river sees significant high water flows.
- No scour of the substructure was noted with the exception of the left abutment log crib at the interface between the breast wall and downstream wing wall.

LIST OF MAINTENANCE ITEMS TO BE COMPLETED:

Item	Description	Priority
1	Post bridge prior to review of glulam girder load rating.	High
2	Perform load rating to confirm bridge capacity.	High
3	Install full size delineators and bridge ahead signs.	Medium
4	Plan to replace rotten running planks for industrial use, or install additional plank (3 x 300 x 6200 mm) on downstream running strip and remove rotten running planks that are adjacent to wheel paths.	Medium
5	Seal joints between concrete deck panels with sealant.	Medium
6	Fill potholes in approach.	Medium
7	Clear debris from deck.	Low
8	Brush approaches.	Low
9	Consider removing RV below span 3 and installing "No Camp Fires" signs.	Low

BRIDGE INSPECTION REPORT

SI-5559 Nahmint River



LIST OF MONITORING ITEMS:

1. Monitor condition of glulam girders.
2. Monitor deterioration of abutment cribs.
3. Monitor scour hole at interface of left abutment breast wall and downstream wing wall.

Prepared by:



DEC 21 / 2016

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Bridge Engineer

Reviewed by:



Les Thiessen, P.Eng.
Project Manager

ATTACHMENTS:

1. Annotated Photo Sheet
2. Girder Drawings with Check Locations

BRIDGE INSPECTION REPORT

SI-5559 Nahmint River



NOTES:

Naming & Numbering Conventions:

Girders and piles are numbered from upstream to downstream. Left end or right end is determined facing downstream. Spans and piers are numbered from left end when facing downstream.

Projected Replacement:

The projected bridge replacement date is based on the remaining service life of the bridge. We used the following guidelines for estimating remaining service life:

- Original design life is typically: 40 years for glulam girder bridges, 60 years for steel girder and concrete bridges, 40 years for timber piled structures, and 20 years for log crib structures.
- Determine the remaining service life based on the design life and age of structure.
- If the remaining service life exceeds five years, assign a replacement date based on the design life and age of structure
- If the bridge has less than five years of remaining service life, assign a remaining service life of five years.
- If the design life has been exceeded but condition warrants assign a remaining service life of five years.
- If the design life is unknown:
 - If the bridge appears relatively new, assign a remaining service life of 25 years for steel girder and concrete bridges, and 10 years for glulam girder bridges.
 - If it appears as though the design life has been exceeded, assign a remaining service life of five years.

The projected replacement date does not preclude a shorter or longer service life. If no further deterioration occurs, future inspections may determine the same estimated remaining service life.

Condition Ratings:

Excellent:	New or almost new condition properly installed.
Good:	Structurally sound, in good repair with minimal wear.
Fair:	Structurally functional, shows moderate wear or preliminary indications of deterioration.
Poor:	Structurally unsound, items typically in need of repair or replacement.

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SI-5559 Bridge Inspection Photo Sheet



Photo 01: Upstream Elevation



Photo 02: Downstream Elevation



Photo 03: Looking Upstream



Photo 04: Looking Downstream



Photo 05: Looking Right Across Bridge



Photo 06: Right Approach Facing Bridge

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Photo 07: Left Approach Facing Bridge



Photo 08: Typical Curb Rail Condition



Photo 09: Typical Deck Panel Condition



Photo 10: Span 2 Timber Deck Condition



Photo 11: Typical Wear/Deterioration in Centre Running Planks



Photo 12: Pocket of Rot in Centre Running Planks

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Photo 13: Typical Tie Condition



Photo 14: Typical Light Map Cracking on Underside of Concrete Deck



Photo 15: Typical Span 1 & 3 Girder Condition



Photo 16: Steel Girders Cantilever Over Steel Columns at Abutments



Photo 17: Typical Steel Post Arrangement at Piers



Photo 18: Typical Steel Span Bearing Condition

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SI-5559 Bridge Inspection Photo Sheet

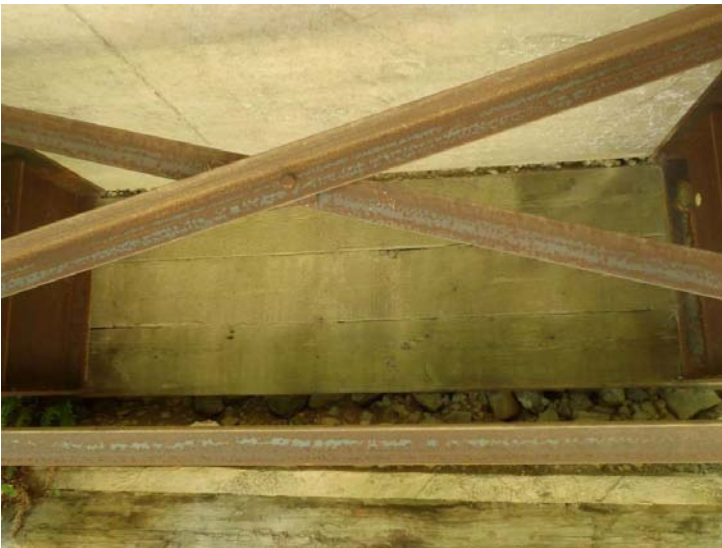


Photo 19: Typical Ballast Wall Condition



Photo 20: Span 2 Girder 1 Upstream Face

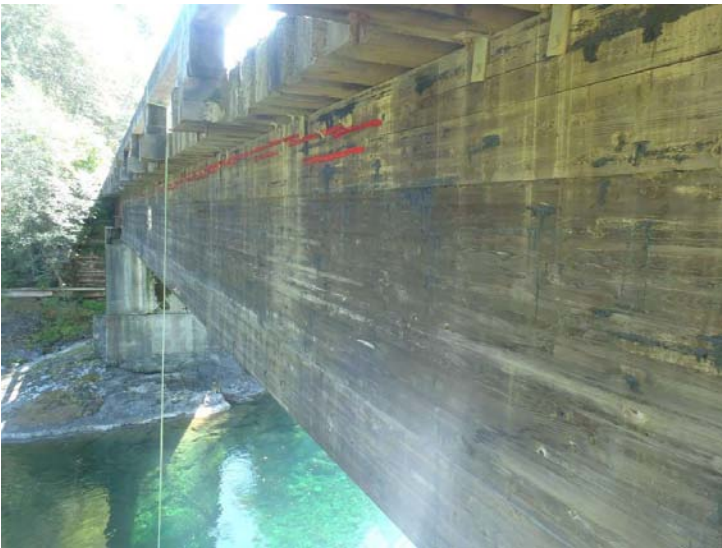


Photo 21: Span 2 Girder 1 Upstream Face Top Flange Series of Checks Along Whole Length



Photo 22: Span 2 Girder 1 Upstream Face Top Flange Series of Checks Along Whole Length



Photo 23: Span 2 Diaphragm 1 at Pier 1 Note Checking in Top Flanges Of Girders 2 & 3



Photo 24: Span 2 Girder 2 at Pier 2 Full Width End Split

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Photo 25: Span 2 Girder 4 Downstream Face



Photo 26: Significant Check AE251-AE280



Photo 27: Girder 4 at Pier 2



Photo 28: Span 2 Girder 4 Typical Checking in Line with Tie Clips



Photo 29: Span 2 Typical Timber Sill and Anchor Detail



Photo 30: Left Abutment

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Photo 31: Left Abutment Upstream Wingwall



Photo 32: Left Abutment Downstream Wingwall



Photo 33: Left Abutment Downstream Wingwall Wide Split in 2nd From Bottom Log and Minor Scour



Photo 34: Left Abutment Downstream Wingwall Minor Scour



Photo 35: Left Abutment Downstream Corner 2nd Tieback From Bottom End Rot



Photo 36: Right Abutment

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Photo 37: Right Abutment Upstream Wingwall



Photo 38: Right Abutment Downstream Wingwall



Photo 39: Typical Sap Rot in Cedar Crib Logs



Photo 40: Typical Core Rot in Crib Face Log



Photo 41: Right Abutment Fungal Growth On Tiebacks



Photo 42: Pier 1 Left Face

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Photo 43: Pier 1 Right Face



Photo 44: Pier 1 Right Face Exposed Reinforcing



Photo 45: Pier 2 Left Face



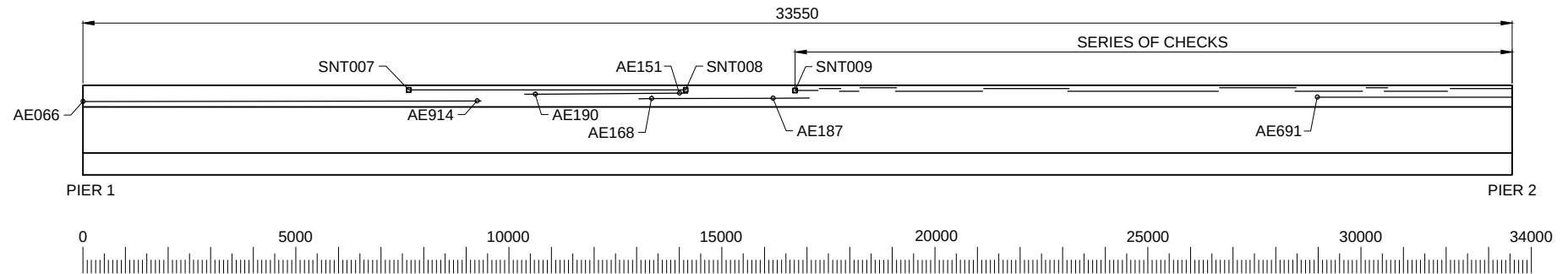
Photo 46: Pier 2 Right Face



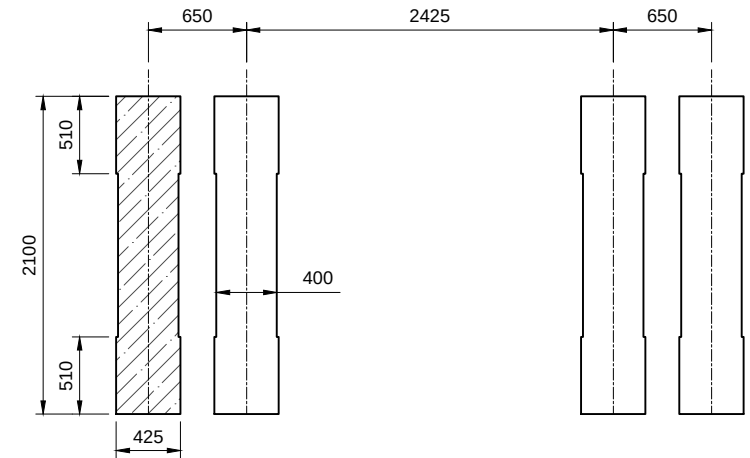
Photo 47: Typical Pier Condition

LEFT BANK

RIGHT BANK



ELEVATION SPAN #2 - GIRDER #1 - US FACE
SCALE 1:150



BRIDGE SECTION AT SPAN #2 GLULAM GIRDERS
SCALE 1:50



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- Geotechnical

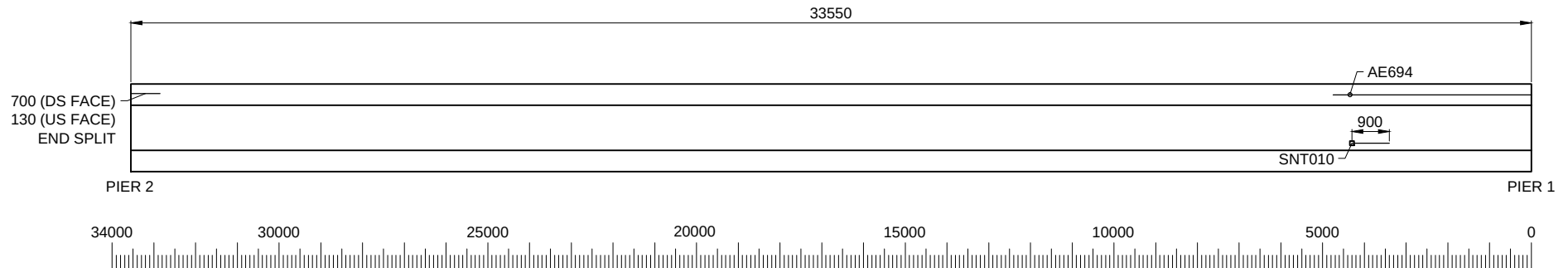
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SCALE AS NOTED		Inspected by: <u>M. HORNER & J. RUPAR GILLIATT</u> Checked: <u>J. RUPAR GILLIATT</u> Drawn: <u>A. MCINTYRE</u>	Date: <u>2016/08/16</u> Date: <u>2016/09/15</u> Date: <u>2016/09/15</u>	BUSINESS AREA: PORT ALBERNI	
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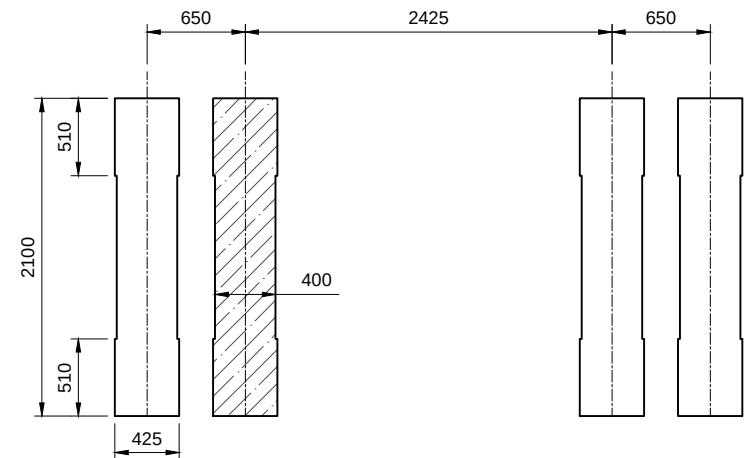
CANCEL PRINTS BEARING
PREVIOUS LETTER

RIGHT BANK

LEFT BANK



ELEVATION SPAN #2 - GIRDER #2 - DS FACE
SCALE 1:150



BRIDGE SECTION AT SPAN #2 GLULAM GIRDERS
SCALE 1:50

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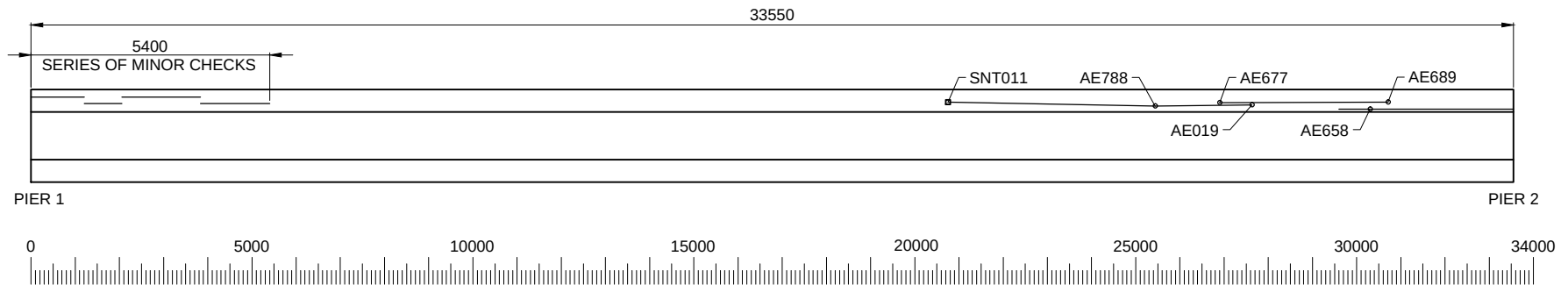
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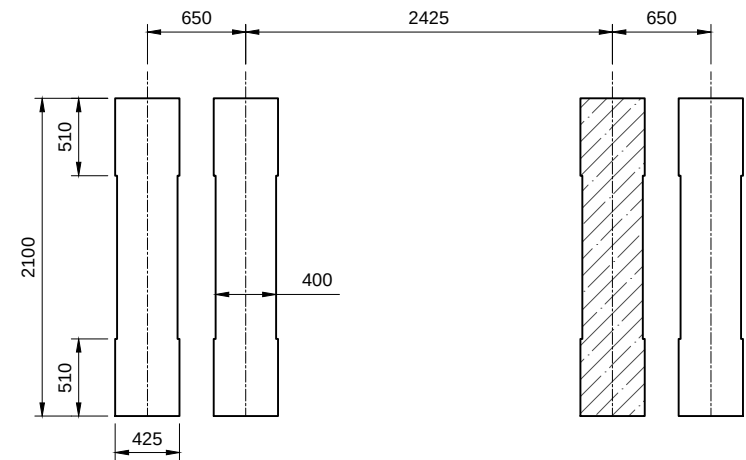
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PREVIOUS LETTER

LEFT BANK

RIGHT BANK



ELEVATION SPAN #2 - GIRDER #3 - US FACE
SCALE 1:150



BRIDGE SECTION AT SPAN #2 GLULAM GIRDERS
SCALE 1:50



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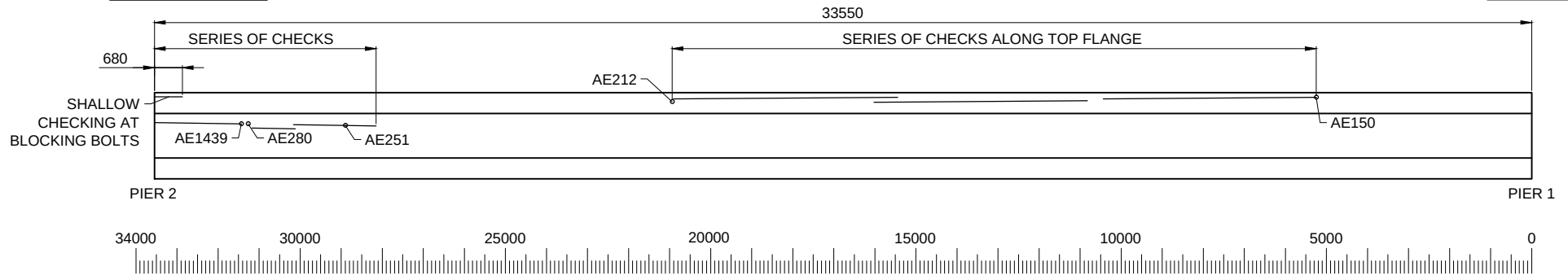
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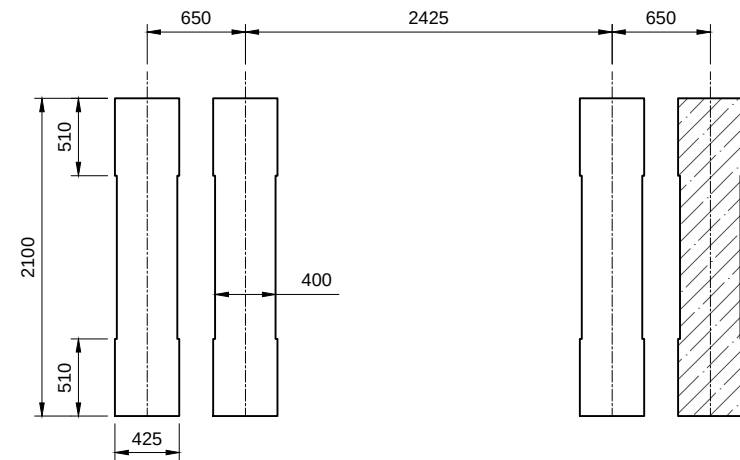
CANCEL PRINTS BEARING
PREVIOUS LETTER

RIGHT BANK

LEFT BANK



ELEVATION SPAN #2 - GIRDER #4 - DS FACE
SCALE 1:150



BRIDGE SECTION AT SPAN #2 GLULAM GIRDERS
SCALE 1:50



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REVISIONS					

CANCEL PRINTS BEARING
PREVIOUS LETTER