

BRIDGE MANAGEMENT INFORMATION SYSTEM

22 Jul 2013

KHODGSON

Condition Inspection Report

Criteria: Structure No = 01380B - Include Inspection Condition Photos = N
 - Include Additional Blank Lines for Notes = N - Show Not Applicable Components = N

Structure No: 01380B - OAK ST

Status: Open/In Use

Inspection Type: Routine Condition

Region: 1 - South Coast Region

District: 1 - Lower Mainland District

Contract Area: 6 - Lower Mainland CA

RFI: 06-A-@-00099S - Rte 99 Southbound - ON
 06-A-@-00099 - Rte 99 Northbound - ON

Features Crossed: FRASER RIV. (N. ARM)

Component Group/Component	E	G	F	P	V	X	N/A
HYDROTECHNICAL :							
1. Debris Risk	100						N
4. Substructure Scour	100						N
SUBSTRUCTURE :							
5. Foundation Movement	100						N
10. Pier Columns/Walls/Cribs	50	50					N
11. Bearings	95	5					N
12. Caps		100					N
14. Dolphins/Fenders	15	84		1			N
SUPERSTRUCTURE :							
15. Floor Beams/Transoms		90	5	5			N
17. Girders		97	2	1			N
19. Bracing/Diaphragms		98	1	1			N
26. Pins/Bolts/Rivets		98	1	1			N
27. Camber/Sag	100						N
28. Live Load Vibration	100						N
29. Coating (Structure)		70	25	5			N
DECK :							
30. Sub Deck/Cross Ties		94	5	1			N
31. Wearing Surface		99		1			N
32. Deck Joints		75		25			N
34. Sidewalk(s)		99		1			N
35. Railings/Parapets		99		1			N
36. Median Barrier		99	1				N
37. Drains/Pipes		100					N
38. Coating (Railings)		100					N
APPROACHES :							
39. Signing/Lighting	100						N

1st Abutment Position: N

Year Built: 1957 Estimated? ☐

Length (m): 216.100

Note:

Main Span Length: 91.400

Main Span Type: OTHER

Spans: 3

Urgency: 2

BCI Rating: 1.71

Adjusted BCI Rating: 1.83

Inspector/Inspected By: KENT HODGSON

On 2012/07/25

Amendment/Partial Inspection?

Urgency Notes:

Urgency Rating Note:

Steel Painting required and troughs under the finger joints need to be replaced.

Utility Concerns Note: April 6, 2010

The west anchor bolt on the moveable arm of navigation light on the east side walk railing north of pier S2 nearly slipped out of the anchor slot. (It was fixed on April 19, 2010 reported by Nathan Vanden Dungen)

Item Notes:

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Item Notes:

10 . Pier Columns/Walls/Cribs

Pier N2:

- random fine vertical cracks.
- The top of the pier is covered with a thick layer of dirt.

Pier N2 - south face, medium delam/spall exposing rebar, beside girder B near top.

Pier N1:

- 2 square concrete columns with concrete infill wall.
- fine map pattern cracking on top of the pier base.

Pier S1:

- 2 square concrete columns with concrete infill wall.
- fine vertical cracks at the base.

Pier S2 - random vertical cracks.

11 . Bearings

General condition: Most of bolts are too tight.

Pier N2:

- Newer laminated elastomeric bearing pads were placed between galvanized top and bottom bearing plates under each main girder.
- Longitudinal and lateral steel restraints were added.
- Seismic restraint bolts through the newer concrete diaphragms on top of the end cross beam bracing.
- Dirt has been accumulated around the west bearing area.

Pier N1 - steel pin rotation bearing in excellent condition.

Pier S1 - steel pin rotation bearing in excellent condition.

Pier S2:

- laminated elastomeric bearings between galvanized top and bottom bearing plates.
- Longitudinal and lateral steel restraints were added.

12 . Caps

Pier N2& S2 - cap top was fully covered with dirt.

Pier N1 - south face, 3 small delams near west end.

14 . Dolphins/Fenders

Pier N1 - timber fenders on both sides of the pier and at both ends in good condition. Several planks missing on the south side west end.

Pier S1 - timber fenders along both sides. Missing planks in the south face west end .

Pier S2 - timber fenders on both sides in good condition.

15 . Floor Beams/Transoms

- Light to medium corrosion on floor beam ends.
- Random peeling & spot rust on coating.
- Beam 61 - Medium corrosion on bottom flanges.

17 . Girders

- Girders are built up sections and haunched at the piers and continuously span from pier N2 to pier S2.

- light random corrosion was on the webs and bottom flanges and light to medium random corrosion was on the top flanges.

- light corrosion was on the top of girder bearing area N2 & S2.

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Item Notes:

- 19 . Bracing/Diaphragms - Extensive light spot corrosion was on all braces.
- @ Pier S2 - concrete diaphragm above the last floor beam :
 - medium spall above Girder A & large spall above Girder B.
- Three bottom brace were bent at bottom flange on west side between floor beam 26-27a, on east side between floor beam 28-29 and on east side under floor beam 31.
- 26 . Pins/Bolts/Rivets
 Areas of light to medium corrosion on the bolts and rivets.
- 29 . Coating (Structure)
 - Light to medium corrosion on the ends of most floor beams.
 - Random light spot corrosion on all components.
- 30 . Sub Deck/Cross Ties
 Span N2:
 - the deck slab had moved 30mm north over the top of the floor beams as measured at the 1st floor beam at the north end but now the sub deck stabilized.
 - 400mm wide haunches were added on both sides of floor beam 11 and 21 to stop the movement of the slab.
 - random medium to large patches along both sides of the subdeck.
 - small delam was in the south side of patch.
 - random fine longitudinal cracks with some eff.
 - short medium longitudinal crack north of beam 20.
 - small spall exposing rebar on the south of beam 1 on west side.
- Span N1 - S1:
 - 400mm wide concrete haunches were added on both sides of floor beams 31, 41 and 51 to stop the movement of the deck slab.
 - few random fine longitudinal cracks with some eff.
 - Numerous patches along both sides mainly concentrated from pier N1 to mid span.
- Span S2:
 - deck slab moved 65mm south (measured at floor beam 62) but now stabilized.
 - Patches along both sides of all bays from pier S1 to S2.
- 31 . Wearing Surface
 (2009 large area of overlay was repaved.)
 - Deck is continuous from Pier N2 to S2.
 - finger joints at both N2 & S2.
- N/B:
 - Pier N2, asphalt lightly spalling away along joint infill.
 - Span N2, lane 2, light spall ~7m from Pier N2.
 - lane 2, asphalt breaking up around med patch near Pier N2.
- S/B:
 - Main span, lane 2, asphalt breaking up around multiple patches in east wheel path.
 - Span S2, lane 2, asphalt breaking up around multiple patches in east wheel path ~8m & 5m from Pier S1.
- 32 . Deck Joints
 - Finger joints at piers N2 & S2 with rubber troughs underneath.
 - Both troughs have fully deteriorated, allowing debris to build up on piers.
- Pier N2, southbound finger joint:
 - East side, south teeth are slightly raised (~5mm).
 - West side, north teeth are slightly raised.
- 34 . Sidewalk(s)
 - Galvanized steel panels filled with concrete.
 - Concrete delam/spalling around most railing post bases.

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Inspection Type: Routine Condition
Contract Area: 6 - Lower Mainland CA

Item Notes:

- | | |
|-------------------------|---|
| 35 . Railings/Parapets | - Traffic rail, 800mm high concrete parapet with 2 rail galvanized rails 510mm high.
- Fine to medium vertical cracks/eff. on parapets with ~1m spacing.
- Sidewalk rail is 1120mm high galvanized steel panels on steel posts at 3050mm spacing. |
| 36 . Median Barrier | - 800mm concrete barrier.
- Random light impact marks. |
| 37 . Drains/Pipes | - rubber troughs below both finger joints has fallen through.
- drain inlets on deck were either partially or fully plugged at time of inspection.
- Pier S2, west side down pipe is disconnected below deck. |
| 38 . Coating (Railings) | Galvanized parapet rail and sidewalk railing. Coating is fading. |
| 39 . Signing/Lighting | Lights on both sides of bridge. |

Inspection Notes:**Maintenance Work Notes**

July 25th, 2012

- 11. Bearing - Loosen tight bolts.
- 12. Caps - Clean dirt off of caps.
- 14. Fenders - replace missing planks at piers N1 & S1.
- 19. Bracing Diaphragms - repair spall above last floor beam at pier S2.
- 29. Coating (Structure) - sandblast and paint corroded areas.
- 31. Wearing Surface - patch spalls.
- 34. Sidewalks - removed debonded areas around rail post bases.
- 37. Drains - replace troughs under finger joints. Clean drain inlets.

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Structure No: 02753M - ALEX FRASER MAIN SP

Status: Open/In Use

Inspection Type: Routine Condition

Region: 1 - South Coast Region

District: 1 - Lower Mainland District

Contract Area: 6 - Lower Mainland CA

RFI: 06-C-@-00091 - Rte 91 Northbound - ON
 06-C-@-00091S - Rte 91 Southbound - ON

Features Crossed: ANNACIS HWY / FRASER RIV.

Component Group/Component	E	G	F	P	V	X	N/A
HYDROTECHNICAL :							
1. Debris Risk	100						N
4. Substructure Scour	100						N
SUPPORT STRUCTURE :							
5. Foundation Movement	100						N
9. Footings/Piling		100					N
10. Towers		99	1				N
12. Bearings		99	1				N
CABLE SYSTEM/SUPERSTRUCTURE :							
14. Suspension/Stay Cables		99	1				N
16. Saddles/Tower Anchorages		99	1				N
17. Anchorages at Deck		98	2				N
21. Wind Line System	100						N
22. Stringers		98	1	1			N
23. Floor Beams		95	4	1			N
24. Girders		100					N
28. Pins/Bolts/Rivets/Wedges		100					N
30. Camber/Sag	100						N
31. Live Load Vibration	100						N
DECK :							
32. Sub Deck		99	1				N
33. Wearing Surface		98	2				N
34. Deck Joints		88	9	3			N
36. Sidewalk(s)		98	2				N
37. Railings/Parapets		98	1	1			N
38. Median Barrier		99	1				N
39. Drains/Pipes		99	1				N
40. Coating (Railings)		95	5				N
APPROACHES :							
41. Signing/Lighting	100						N

1st Abutment Position: N

Year Built: 1986 Estimated? ☐

Length (m): 930.500

Note: The first abutment for the main span is Pier N3 on the north end and the second abutment is Pier S3 on the south end

Main Span Length: 465.000

Main Span Type: STRINGER

Spans: 5

Urgency: 2

BCI Rating: 1.82

Adjusted BCI Rating: 1.89

Inspector/Inspected By: KENT HODGSON

On 2012/06/28

Amendment/Partial Inspection?

Item Notes:

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Item Notes:

10 . Towers

Pier 2N and 2S: fine to medium transverse cracks/eff. underside of caps.

TOWERS (Piers 1N & 1S):

EXTERIOR FACES:

- isolated fine to medium vertical cracks. Numerous shrinkage cracks.
- patching at the square blockouts seems to have delamination with shrinkage cracks / eff. on surfaces.
- north east tower - small delam. at above the deck door.

INTERIOR FACES:

- fine to medium intermittent vertical cracks at all 4 corners.
- NORTHEAST tower - about 1 m. long fine vertical crack / eff. in the middle of the south wall near the roof.

UPPER BENT:

- random fine to medium vertical cracks in the outside walls.
- random fine to medium vertical cracks, some fine diagonal cracks in the inside walls.
- random trans. & diagonal cracks / eff. in the ceiling and reflected on the roof. Cracks have been resealed.
- a few fine transverse cracks in the floor.
- 2 new safety lines installed at the top of both upper bents (@ about 2.24 m. from the roof), max. 2 users and max. 310lb. per user per safety line.

LOWER BENT:

- crack patterns on the roof are similar to the upper concrete bent and they have been sealed.
- random fine to med. vertical cracks in the inside walls. Lots of fine vertical cracks in the outside walls and some extended into the underside of the bents.

TOWER ROOF:

- fine shrinkage cracks in all 4 walls.
- some rubber pads (dampers at the bottom of the antenna posts) have wide split.

PIERS 2N & 2S - extensive map cracking near the base most likely due to Alkali-Aggregate Reactions.

12 . Bearings

- bearings at top of piers 2N & 2S appear to be OK with spot light corrosion on base plates.

- pier N1 - transverse bearing pads at west tower (just above lower bent) - north pad showing a short split in the north bottom corner. South pad showing a wide split in the north bottom corner.

14 . Suspension/Stay Cables

- some cable anchorages showing sign of wire slippage. See item 13 (Tower Anchorages) for more details.
- some cables have the plastic protective sheathing behind the rubber dampers and cannot be seen from the outside.
- sheathing on a few cables may have slipped slightly downward and thus deforming the neoprene boot near the bottom of the cable.

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Item Notes:

16 . Saddles/Tower
Anchorage

CABLE ANCHORAGE inside the towers:

- light surface rust appears on the inside wall of some of the cable anchorages.

- SOUTHEAST Tower:

- anchorage #21 (4th one up from bottom south side) - small void in the babbitt.
- anchorage #29 (5th one up from bottom north side) - large void in babbitt.
- anchorage #9 (9th one down from top south side) - a few small / medium voids in the babbitt.
- anchorage #42 (7th down from top north side) shows possible wires slippage at the west side.
- anchorage #43 (6th down from top north side) - lower locking ring has come off.
- anchorage #45 (4th down from top north side) - 50mm dia. core sunk in at the center.
- anchorage #3 (3rd down from top north side) - medium / large void in the babbitt.

- SOUTHWEST Tower:

- anchorages #3, #6, #7, #25, #30 & #42 - some voids with possible wires slippage.
- cable #5 - lower locking ring came off due to insufficient threads left at the bottom of the anchorage to hold the ring.

- NORTHEAST Tower:

- anchorages #8, #12, #13, #30 & #38 - signs of possible wires slippage.
- anchorage #3 (3rd down from top North side) - 50mm dia. core sunk in at the center.
- anchorage #9 - the lower locking ring came off.
- anchorage #16 - two small voids at the bottom.
- anchorage #34 - sitting on the lower bracket due to the possibility of the cable was too short at the construction time.
- anchorage #40 - a big deep void near the center and a smaller void at the side.

- NORTHWEST Tower:

- anchorages #8, #21, #28, #29 - signs of possible wires slippage.
- large voids in the babbitt at anchorages #28, #29, #30, #15, #37, #38 and #8.
- anchorages #4, #2, #1 and #48 - 50mm dia. core sunk in at the center.
- anchorage #9 the lower locking ring came off.
- anchorage #16 two small voids at the bottom.

CABLE DAMPERS:

- SOUTHEAST Tower:

- @ cable #43 (6th one from top North side) - half damper is slipping outward.

- SOUTHWEST Tower:

- @ cable #2 (second from top South side) - upper damper has been slipping out for almost 180mm.
- @ cable #5 (Fifth from top south side) - half damper is slipped outward and turned.
- @ cable #9 (9th from top South side) - upper damper is slipping outward and turned 180 degrees and now holding by installed two rod restraints.
- @ cable #46 (third one from top North side) - half damper is slipping outward and turned 45 degrees.

- NORTHEAST Tower:

- @ cable #4 (fourth one from top north side) - half damper is slipping outward.

- NORTHWEST Tower:

- @ cable #4 (fourth one from top north side) - half damper is slipping outward.

NOTE: lots of pipe clamps at the top of the cable ducts have slipped down the ducts.

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Item Notes:

- | | |
|------------------------|---|
| 17 . Anchorage at Deck | <ul style="list-style-type: none"> - random rust blisters at the deck / anchorage interface. - coating - random spot rust. - a number of ring bolt at the side of middle bottom cover missing. |
| | Oil leakage at anchors on deck: |
| | <ul style="list-style-type: none"> - N/B NE tower: some oil leakage at anchor #4, 5 & 6. |
| | <ul style="list-style-type: none"> <ul style="list-style-type: none"> - lower half of shield missing on anchor #38 |
| | <ul style="list-style-type: none"> - N/B SE tower: minor oil leakage at anchor #5, 6 & 43. some leakage at #4. |
| | <ul style="list-style-type: none"> - S/B NW tower: minor oil leakage at anchor #6, slightly oil leakage at #4 & 5. |
| | <ul style="list-style-type: none"> - S/B SW tower: minor leakage at anchor #1~#4 and #43. slightly oil leakage at #24. |
| | <ul style="list-style-type: none"> <ul style="list-style-type: none"> - protective shield separated on anchor #11, 13 & 19 |
| 22 . Stringers | Some minor corrosion with flakes in the bottom flanges and light sheeting in the top |
| | flange due to the possibility of water coming through the construction joints between the |
| | ends of the panels. These affected stringers are mainly in the middle half between the two |
| | towers. |
| 23 . Floor Beams | - minor corrosion with sheet of rust on the floor beams due to the possibility of water |
| | coming through the construction joints between the ends of the panels. |
| 32 . Sub Deck | - random fine cracks / some with efflorescence. Many longitudinal cracks with some small |
| | spalls are at span 3N north end and span 3S south end. |
| 33 . Wearing Surface | General wearing. |
| | Span 3N(from pier 3N to north breather joint): |
| | <ul style="list-style-type: none"> - medium transverse cracks with some being sealed in every deck panel joints (floor beam |
| | locations). |
| | <ul style="list-style-type: none"> - numerous short longitudinal cracks in the end panels next to pier 3N. |
| | Span 2N (from north breather joint to north tower) - isolated transverse cracks (most |
| | likely at the panel joints). |
| | N. Tower to S. Tower: |
| | <ul style="list-style-type: none"> - fine to medium double transverse cracks (some sealed) at the floor beams between |
| | north cable anchorage #42 and south cable anchorage #43. |
| | Span 2S (from south breather joint to south tower) - OK. |
| | Span 3S: (from pier 3S to south breather joint): |
| | <ul style="list-style-type: none"> - fine to medium transverse cracks at the floor beams mostly unsealed. |
| | <ul style="list-style-type: none"> - some short longitudinal cracks in the end panels next to pier 3S. |

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Item Notes:

34 . Deck Joints

PIER N3:

- modular joint was installed in 2008.
- several fine longitudinal cracks along the infill concrete.
- beams spacing shorten closer to north (downhill) side.
- 2nd beam from west end
 - 2nd hold down yoke from north: missing east bolt.
- 3rd beam from west end
 - 5th hold down yoke from north: east bolt weld cracked.
- 4th beam from west end
 - 4th & 5th hold down yoke from north: missing plates & pads on both sides.
 - 6th hold down yoke from north: missing east plate.
 - 7th hold down yoke from north: east bolt weld cracked.
- 8th beam from west end, south recessing box:
 - west keeper plate missing one bolt.
- 10th beam from west end, south recessing box:
 - west keeper plate missing all 4 bolts.
 - east keeper plate missing 2 bolts.

Breather joint north of PIER 2N:

- 47mm strip seal. Partially covered with dirt.
- localized areas of corrosion on steel armour.

Breather joint south of PIER 2S:

- 38mm strip seal. Partially covered with dirt.

PIER S3

- 905mm modular joint was installed in 2008.
- N/B middle lane, 4th seal from south has a small section separated from armour.
- Sand and gravel between separation beams.
- 3rd beam from west:
 - 4th hold down yoke from north: both plates & pads missing.
 - 5th & 9th hold down yoke from north: west plate & pad missing.
- 4rd beam from west:
 - 1th & 7th hold down yoke from north: west plate & pad missing.
- 5th beam from west:
 - 1st hold down yoke from north: west bolt weld cracked.
 - 6th hold down yoke from north: both plates & pads missing.
- 6th beam from west:
 - 2nd hold down yoke from north: west plate & pad missing.
- 9th beam from west:
 - 7th hold down yoke from north: west bolt missing.
 - 8th hold down yoke from north: east bolt weld cracked and west plate & pad missing.
 - 10th hold down yoke from north: west plate & pad missing.
- 5th beam from east:
 - 2nd & 7th hold down yokes from north: both bolt welds are cracked.
 - 8th hold down yoke from north: west bolt is missing and east bolt weld is cracked.
- 6th beam from east:
 - 7th & 8th hold down yokes from north: bolt weld is cracked.
 - spot rust on the bottom rail, seal leakage suspected.
- 7th beam from east end:
 - north recessing box - east keeper plate is loose.
 - 8th hold down yoke from north: east plate & pad missing.
- S/B - couple of missing cotter pins at one end of the control springs.

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Item Notes:

36 . Sidewalk(s)

Spans 3N and 3S:

- ~1400mm wide concrete sidewalk. Light wear.
- a light spall / delamination at the northwest corner of the west sidewalk next to pier 3N.
- random fine to medium transverse cracks.

Spans 2N and 2S:

- 1400mm wide galvanized checker plate with 910mm wide non-skid top coating in the middle of the sidewalk.
- isolated areas of damaged non-skid coating.

North Tower to South Tower:

- windfairing with non-skid coating on top.
- Random spot peeling along the inside edge with light corrosion underneath.
- a medium coating broken area next to west railing 1/4 span to south tower.
- 1670mm wide outside strip as sidewalk.

37 . Railings/Parapets

TRAFFIC BARRIER:

- 830mm high concrete parapet with 400mm high galvanized steel top railing.
- random vertical cracks / some with eff. in the parapets.

Span 3N:

- N/B - light delam on top north corner between anchorages #20 and #21 of NE tower.

Span 2N: Ok

N. Tower to S. Tower:

- N/B - vertical crack / possible delam in the north end of one unit beside anchorage #42 of NE tower. A light delam in the south top corner of one unit beside anchorage #36 of SE tower.
- S/B - minor damage on several galvanized rail supports between seventh cable anchorage (#31) and the eighth cable anchorage (#32) of NW tower with patches in the parapet and some loose anchor bolts.

Span 2S:

- S/B - a small delam. in the south top corner back face between cable anchorage #8 - #9 of SW tower. A light spall in the top of the parapet back face at cable anchorage #16 of SW tower. One railing post missing near the cable anchorage #20 of SW tower.
- N/B - some damaged posts near cable anchorages #2 & #3 of SE tower with bolt missing or popping up. Random light spall in the top back corner.

Span 3S:

- S/B - 5th rail post from pier S3 deck joint - delam in the top below the rail post.

SIDEWALK RAILING:

- 1220mm high galvanized fence railing. Fence support bracket spacing of 1500mm. Light rust on anchor bolts.
- S/B - couple of loose screws and a missing screw at top of the railing at cable anchorage #46 of SW tower.

38 . Median Barrier

830mm high concrete no post barrier.

Typical random cracks / some with efflorescence - heavier in spans 2N & 2S and lighter between the north and south towers.

39 . Drains/Pipes

S/B - 1 grate missing in drain inlet (between cable anchorages #26 and #27 of north west tower).

40 . Coating (Railings)

Top parapet railing - galvanized coating is fading and has random light rust.

Sidewalk fencing - galvanized coating is fading with random light rust (mostly on the east railing east face). Light rust at post / railing connection (mostly S/B, N/B has been recoated with galvanizing agent).

Galvanized bolts - mostly light-rusted.

TRA-2013-00161

Page 10

Condition Inspection Report

Criteria: Structure No = 02753M - Include Inspection Condition Photos = N
- Include Additional Blank Lines for Notes = N - Show Not Applicable Components = N

Structure No: 02753M - ALEX FRASER MAIN SP

Status: Open/In Use

Inspection Type: Routine Condition

Region: 1 - South Coast Region

District: 1 - Lower Mainland District

Contract Area: 6 - Lower Mainland CA

Item Notes:

41 . Signing/Lighting

Span N2:

- S/B - 1st light post north of north tower has 8mm gap between north side nuts and base plate.

Inspection Notes:**General Inspection Notes**

Northwest tower deck door not functioning, suspect handle.

Northeast tower upper cross beam door broken and unable to fully close.

Southeast tower lower cross beam door not functioning properly, sometimes does not open from outside, suspect handle.

2012 - Inspected SW & NE towers.
- Unable to access traveller.

BRIDGE MANAGEMENT INFORMATION SYSTEM

22 Jul 2013

KHODGSON

Condition Inspection Report

Criteria: Structure No = 02753M - Include Inspection Condition Photos = N
- Include Additional Blank Lines for Notes = N - Show Not Applicable Components = N

Structure No: 02753M - ALEX FRASER MAIN SP

Status: Open/In Use

Inspection Type: Routine Condition

Region: 1 - South Coast Region

District: 1 - Lower Mainland District

Contract Area: 6 - Lower Mainland CA

Inspection Notes:**Rehab Work Notes**

Sep.24, 2010

N3 and S3 modular deck joints - warranty work.
The communication email was attached below.

Gregory,

1) The answer to your first question:

Our inspection on July 13, 2010 noticed the following:

- # of detached guide pin hold plates/missing upper bolts at the hold down
yoke assemblies - 8 (7 at pier S3, 1 at pier N3).

- # of detached restraint bar keeper blocks at the end boxes - 3 (1 at pier S3,
2 at pier N3).

2) The answer to your second question:

- Sidewalk on both sides of the structure leading up to the hatches (photo 1)
for the access to the underside of the modular deck joints at piers S3 and N3.
A short ladder down to the pier cap (photo 2). A grating platform running
along the main span side of the pier cap below each modular deck joint (photo
3). Drawings #2753-341 and 2753-378 showing the details of the platform.
Please note there is no power supply at these locations.

Let me know if you need further information.

Regards,

Philip Mak

From: Gregory B Ross [mailto:gregory.ross@basf.com]
Sent: Wednesday, August 18, 2010 11:28 AM
To: Jellema, Willem P TRAN:EX
Cc: Gary Moore; Steve Pabst; John Manning; Kurt Schoenhals; Kent Fugard
Subject: Re: Fw: 2753 Alex Fraser Modular Joints

Wim,

I have received and reviewed your pictures. We have assembled our
action team and are beginning to formulate our plan. The quantity of the (2)
different component issues was not clear from your pictures, are you able to
give me a quantity? As for access to this underside, please forward me the
condition, is there a catwalk or temporary scaffolding? Once I have answers to
these questions I will finalize our action plan and forward it along for your
review and comment. Thank you.

Regards,

Gregory B. Ross, CWI
Quality Control / Project Manager

Phone: (716) 817-5429
Fax: (716) 691-9239
email: gregory.ross@basf.com

Postal Address:
Watson Bowman Acme
95 Pineview Drive
Amherst, NY 14228

Rehab Work Notes

June 21th, 2011

34. deck joint - warranty work for rehab modular joints at pier N3 and S3.

Condition Inspection Report

Criteria: Structure No = 02753M - Include Inspection Condition Photos = N
- Include Additional Blank Lines for Notes = N - Show Not Applicable Components = N

Structure No: 02753M - ALEX FRASER MAIN SP**Status:** Open/In Use**Inspection Type:** Routine Condition**Region:** 1 - South Coast Region**District:** 1 - Lower Mainland District**Contract Area:** 6 - Lower Mainland CA**Inspection Notes:****Maintenance Work Notes**

June 28th, 2012

12. Bearings - monitor the condition of the transverse bearings at the north tower.

14. Stay Cables - monitor condition of cable wires to observe increase of slippage.

16. Tower Anchorages - reposition the displaced rubber dampers and pipe clamps.

17. Anchorages at Deck - Clean and paint the rusty areas & seal oil leakage from anchors. Replace missed ring bolts on anchors.

33. Wearing Surface - seal cracks.

36. Sidewalk - recoat damaged non-skid coating.

37. Railings / Parapets:

- repair spalls/delam on parapets.
- Repair damaged & replace missing rail posts.

40. Coating (Railings) - touch up corroded areas.

BRIDGE MANAGEMENT INFORMATION SYSTEM

22 Jul 2013

KHODGSON

Condition Inspection Report

Criteria: Structure No = 01614B - Include Inspection Condition Photos = N
 - Include Additional Blank Lines for Notes = N - Show Not Applicable Components = N

Structure No: 01614B - PORT MANN

Status: Open/In Use

Inspection Type: Routine Condition

Region: 1 - South Coast Region

District: 1 - Lower Mainland District

Contract Area: 43 - Port Mann Highway 1

RFI: 43-B-@-09999 - PMH1 Temporary Road for BMIS
 Structures - not on map - ON
 43-B-@-09999 - PMH1 Temporary Road for BMIS
 Structures - not on map - ON
 43-B-@-09999 - PMH1 Temporary Road for BMIS
 Structures - not on map - ON
 43-B-@-09999 - PMH1 Temporary Road for BMIS
 Structures - not on map - ON

Features Crossed: TRANSCANADA / FRASER RIVER

Component Group/Component	E	G	F	P	V	X	N/A
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HYDROTECHNICAL :

1.	Debris Risk	100					N
4.	Substructure Scour	100					N

SUBSTRUCTURE :

5.	Foundation Movement	100					N
9.	Footings/Piling		90	10			N
11.	Bearings			50	25	25	N
12.	Caps		100				N

SUPERSTRUCTURE :

15.	Floor Beams/Transoms		95	5			N
17.	Girders		65	29	5	1	N
18.	Portals		100				N
19.	Bracing/Diaphragms		90	10			N
20.	Truss Chords/Arch Ribs		90	9	1		N
23.	Truss Rods/Verticals		95	5			N
26.	Pins/Bolts/Rivets		78	20	1	1	N
27.	Camber/Sag	100					N
28.	Live Load Vibration	100					N
29.	Coating (Structure)		85	10	5		N

DECK :

30.	Sub Deck/Cross Ties		98	2			N
31.	Wearing Surface	45	50	3	1	1	N
32.	Deck Joints		95	5			N
34.	Sidewalk(s)	99	1				N
35.	Railings/Parapets		100				N
36.	Median Barrier		99	1			N
37.	Drains/Pipes		100				N
38.	Coating (Railings)		100				N

APPROACHES :

39.	Signing/Lighting	100					N
-----	------------------	-----	--	--	--	--	---

1st Abutment Position: N

Year Built: 1964 Estimated? ☐

Length (m): 585.220

Note:

Main Span Length: 365.760

Main Span Type: OTHER

Spans: 3

Urgency: 4

BCI Rating: 1.93

Adjusted BCI Rating: 2.01

Inspector/Inspected By: KENT HODGSON

On 2012/07/17

Amendment/Partial Inspection?

Urgency Notes:

Urgency Rating Note: Local heavy corrosion in the splice plates, bolts & nuts inside the main steel box girders could lead to a local failure if no proper rehabilitation is taken. Removal of pigeon dung is required to stop floor corrosion.

Item Notes:

9 . Footings/Piling

Pier 1N:

- Random fine to wide cracks on top.
- Random heavy scaling along the top edge.

Pier 1S:

Cap:

- Map cracking at top surface west side.
- 2 light spalls / delamination in the top edge southwest side.

BRIDGE MANAGEMENT INFORMATION SYSTEM

22 Jul 2013

KHODGSON

Condition Inspection Report

Criteria: Structure No = 01614B - Include Inspection Condition Photos = N
 - Include Additional Blank Lines for Notes = N - Show Not Applicable Components = N

Structure No: 01614B - PORT MANN

Status: Open/In Use

Inspection Type: Routine Condition

Region: 1 - South Coast Region

District: 1 - Lower Mainland District

Contract Area: 43 - Port Mann Highway 1

Item Notes:

11 . Bearings

Pier 1N:

- Fixed bearing.
- Light corrosion on anchor bolts and nuts.
- Random paint blistering around the exposed section of the anchor bolts.

Pier 1S:

- Expansion bearing
- Light surface corrosion with random medium paint blistering.
- Top face of the guide plates has medium corrosion.
- Dirt accumulation / vegetation growth between the stiffeners and the guide plates.

Pier 2N:

East & West concrete pedestals:

- Large delamination along the top section of the north & south faces.
- Bearings have light corrosion with random spot rusts.
- Anchor bolts & nuts have light to medium corrosion.
- Bolts & nuts at lower half of tie down units have random medium corrosion.

Pier 2S:

East & West concrete pedestal:

- Medium delamination in the upper section.
- Anchor bolts have light corrosion and the nuts have medium corrosion.

12 . Caps

P 2N - heavy water stains with moss growth on both north and south faces. Dirt on the cap.

P2S - wide cracks along north top edge of cap. Dirt on the cap.

15 . Floor Beams/Transoms

Random light corrosion on the underside and heavier spot corrosion on the edges.

Condition Inspection Report

Criteria: Structure No = 01614B - Include Inspection Condition Photos = N
- Include Additional Blank Lines for Notes = N - Show Not Applicable Components = N

Structure No: 01614B - PORT MANN

Status: Open/In Use

Inspection Type: Routine Condition

Region: 1 - South Coast Region

District: 1 - Lower Mainland District

Contract Area: 43 - Port Mann Highway 1

Item Notes:

17 . Girders

Inspection inside the East & West steel box girders done in 2008.

EAST GIRDER: North end - from bay line N0 to bay line N11.

- Heavy corrosion on the rivets in the bottom flange at the north end (outside).
- A thick layer of pigeon dung on the floor.
- Paint peeled off and light spot corrosion on the ceiling.
- Medium to heavy corrosion at the side splice at vertical N8 (bay line N8).
- Random light to medium corrosion on splices at the vertical locations.
- Light to medium corrosion on diaphragm at vertical N7.
- Random light to medium corrosion at the floor corners and the roof corners.

EAST GIRDER: Center portion - from N11 to S11.

The following number designation may not be in accordance with the drawing. They were marked on the inside wall for future reference. The reference number is in ascending order from the south end to the north end.

- Piles of sand (from previous outside paint work) on the floor near most of the openings but quite thick at around the stiffeners 117 - 118.
- Light corrosion on the floor plate and along the bottom corners most likely due to the previous accumulation of pigeon dung on the floor prior to the installation of the side opening covering.
- Paint peeled off and light spot corrosion on the ceiling.
- Most water leakage problems happened at the splice plates (with hangers above) causing steel corrosion. (Leakage at stiffeners 3 - 4, 12 - 13, 20 - 21 (a small hole in the top east side), 28 - 29, 36 - 37, 52 - 53, 68 - 69, 76 - 77.

- Stiffeners 3 - 4: heavy corrosion at middle height of both walls. Medium corrosion at the top corners.
- Stiffeners 12 - 13: medium to heavy corrosion on the horizontal stiffener angle.
- Stiffeners 36 - 37: medium corrosion on the west side splice plate.
- Stiffeners 67 - 68: heavy corrosion at the west top area, medium corrosion on the floor and mid height of the west wall.
- Stiffeners 75 - 76, 83 - 84: heavy corrosion at the top area.
- Stiffeners 92 - 93: heavy corrosion at the top. Medium to heavy corrosion on both horizontal stiffener angles and in the adjacent areas above the stiffeners.
- Stiffeners 100 - 101: medium corrosion at the bottom corners. Light corrosion on the floor.
- Stiffeners 109 - 110: medium corrosion above the upper horizontal stiffener angles.
- Stiffeners 117 towards the north end: top coat starts peeling.
- Stiffeners 117 - 118: heavy corrosion on the west side horizontal stiffener angle with some rust through areas. Heavy corrosion is in the adjacent areas above the upper horizontal stiffener both east and west sides.
- Stiffeners 125 - 126, 126 - 127: medium corrosion at top.

EAST GIRDER: South end from S0 - S11.

- Extensive spot rusts especially in the ceiling.
- Extensive top coat peeling at the ceiling in two locations.
- Medium / heavy corrosion at the bolts and nuts at S3 and S4.
- Heavy pigeon dung on the floor.
- Several floor locations showing light to medium corrosion.

WEST GIRDER: North side from N0 - N11.

- First half showing random top coat peeling, areas of light corrosion thereafter.
- Random light to medium corrosion on bolts, nuts, stiffeners and splice plates at the splice locations.
- Thick layer of pigeon dung on the floor from north entrance to N2 and from N11 (interface with the arch) to N9.

WEST GIRDER: Center portion from N11 to S11.

- NOTE: the following number designation may not be in accordance with the drawing. They were marked on the inside wall for future reference. The reference number is in ascending order from the south end to the north end.

- Light corrosion on the floor plate and along the bottom corners most likely due to the previous accumulation of pigeon dung on the floor prior to the installation of the side opening covering.
- Paint peeled off and light spot corrosion on the ceiling.
- Most water leakage problems at splice areas (hangers above) causing medium to heavy corrosion.

----- Continue in Overflow Component Notes 25171-----

BRIDGE MANAGEMENT INFORMATION SYSTEM

22 Jul 2013

KHODGSON

Condition Inspection Report

Criteria: Structure No = 01614B - Include Inspection Condition Photos = N
 - Include Additional Blank Lines for Notes = N - Show Not Applicable Components = N

Structure No: 01614B - PORT MANN

Status: Open/In Use

Inspection Type: Routine Condition

Region: 1 - South Coast Region

District: 1 - Lower Mainland District

Contract Area: 43 - Port Mann Highway 1

Item Notes:

- 19 . Bracing/Diaphragms
- Random light corrosion and moss stains on the braces of the arches and on the lower cross beams above piers 1N & 1S.
 - Bolts, nuts and plate at the underside of the lower cross beams above piers 1N & 1S have medium to heavy corrosion.
 - Pier 1S - Vegetation growth at the drain holes in the bottom gusset plates. Dirt / vegetation growth at the top of the horizontal gusset plates for the x-bracing, and at the interface between the cross beam and the cross braces.
- 20 . Truss Chords/Arch Ribs
- BELOW the deck:
- Exterior faces:
- Dirt accumulation at the vertical column / arch interface.
 - Drain holes (north end both arches) at the bottom of the arch plugged with pigeon droppings. The edges of the bottom flange showing light to medium corrosion.
 - South end both arches - pigeon droppings filled up to the level of the lowest opening at the underside of each arch.
- ABOVE the deck:
- scrape marks on the west side of the east arch at the north end by traffic.
 - Light spot rusts and moss on the outside faces of the arches especially at the edges near the top.
 - The luminary on the top of west arch is not working.
 - scrape marks on the east side of east arch at the south end traffic level
- INSIDE both arches (Sep. 2007):
- Heavy layer of dust on the floor.
 - Thick layer of pigeon dropping on the floor between bay lines N10-N12 and S10-S12.
 - Random light corrosion, heavier on the ceiling where near the top of the arch.
- 23 . Truss Rods/Verticals
- Random loose caulking at the vertical / arch interface and sign of leakage at inside of the girders.
 - Random moss stain on hangers and columns.
 - Pigeon dung was piled on the inside bottom of vertical column 7 on the pier S1 and N1 up to 1.2 meter need to be cleaned out.
- 26 . Pins/Bolts/Rivets
- Outside - random light corrosion, a few medium corrosion.
- Inside the box girders:
- Few rivets were broken and missed.
 - Numerous bolts and nuts show light to medium corrosion especially at the splice locations, and at the floor and top corners mostly in ends of sections.
- Inside the arches:
- Bolts and nuts have light corrosion but heavier near the top of the arch.
- 29 . Coating (Structure)
- Newer painting on the outside faces of the steel box girders and floor beam. General fading in other areas.
 - Random light to medium corrosion with some heavy corrosion inside the main box girders.
 - Isolated top coat peeling inside the steel box girders.
 - Random paint peeling at the top of the verticals and at the gusset plates for the diagonal braces near the top of the arches.
- 30 . Sub Deck/Cross Ties
- Random light spalls.

BRIDGE MANAGEMENT INFORMATION SYSTEM

22 Jul 2013

KHODGSON

Condition Inspection Report

Criteria: Structure No = 01614B - Include Inspection Condition Photos = N
 - Include Additional Blank Lines for Notes = N - Show Not Applicable Components = N

Structure No: 01614B - PORT MANN

Status: Open/In Use

Inspection Type: Routine Condition

Region: 1 - South Coast Region

District: 1 - Lower Mainland District

Contract Area: 43 - Port Mann Highway 1

Item Notes:

31 . Wearing Surface

NORTH BOUND**Slow lane:**

- random short medium longitudinal cracks.
- north of pier N1 on east wheel path, asphalt breaking up.
- above pier N1 on west wheel path, asphalt breaking up and a light spall.
- near north arch portal on west wheel path, medium longitudinal cracks.
- south of pier S1 in east wheel path, asphalt breaking up.

SOUTH BOUND**Slow lane:**

- 30m from north arch portal on east wheel path, asphalt breaking up.
- main span - random fine to medium short cracks.
- main span near mid span on west wheel path, large patch with surrounding asphalt breaking up.
- main span near pier S1 on east wheel path, large patch with surrounding asphalt breaking up.
- 40m south of pier S1 on west wheel path, large patches with surrounding asphalt breaking up.
- near pier S2 on east wheel path, 3 large patch with surrounding asphalt breaking up.

Fast lane:

- 30m from north arch portal on west wheel path, large and small patch with surrounding asphalt breaking up.
- 20m from north portal on west wheel path, deep medium pothole.

HOV lane:

- main span north of mid span on east wheel path, medium pot hole.
- near pier S2, medium pot hole.

32 . Deck Joints

Deck joint 2N description in structure 1614A and Deck joint 2S description in structure 1614C.

35 . Railings/Parapets

- Dirt and garbage build up behind the steel traffic parapets.

36 . Median Barrier

- Concrete no post barriers with random scrape marks and bottom chips.

Inspection Notes:**General Inspection Notes**

2012 - The Preventative Spike Pad (used to deter people from climbing the arch) on the west arch, at the north end is missing.

BRIDGE MANAGEMENT INFORMATION SYSTEM

22 Jul 2013

KHODGSON

Condition Inspection Report

Criteria: Structure No = 01614B - Include Inspection Condition Photos = N
 - Include Additional Blank Lines for Notes = N - Show Not Applicable Components = N

Structure No: 01614B - PORT MANN

Status: Open/In Use

Inspection Type: Routine Condition

Region: 1 - South Coast Region

District: 1 - Lower Mainland District

Contract Area: 43 - Port Mann Highway 1

Inspection Notes:**Component Overflow Notes**

WEST GIRDER (cont.):

- Stiffeners 3 - 4: medium to heavy corrosion at top and sides, light to medium corrosion on the floor. Heavy corrosion at the east side horizontal stiffener.
- Stiffeners 5 - 6: medium corrosion at sides, light corrosion on the floor.
- Stiffeners 12 - 13: heavy corrosion at mid height on both sides.
- Stiffeners 19 - 20: medium corrosion above the upper stiffener. Light to medium corrosion at the top near the vertical hanger location.
- Stiffeners 37 - 38: heavy corrosion in the upper west side and mid height east side.
- Stiffeners 44 - 45: light to medium corrosion at above the upper horizontal stiffeners and at the lower corners ~150mm from the floor.
- Stiffeners 68 - 69: medium corrosion at above the east side upper & lower horizontal stiffeners. The top has medium corrosion and leakage problem.
- Stiffeners 76 - 77: light to medium corrosion at above the east side upper horizontal stiffener.
- Stiffeners 92 - 93: medium to heavy spot corrosion at above the east side upper horizontal stiffener.
- Stiffener 94 towards north: bottom corners (~150mm from the floor) showing light to medium corrosion.
- Stiffeners 100 - 101: medium corrosion at above the east side upper horizontal stiffener.
- Stiffeners 116 - 117: medium corrosion at above the east side upper horizontal stiffener.
- Stiffeners 124 - 125: medium corrosion at the bottom of the partition plate at south end and the top and bottom of the partition plate at north end.
- Stiffeners 125 - 126: medium to heavy corrosion at the east and west sides' upper horizontal stiffener, and at the top at south end.

Component Overflow Notes

WEST GIRDER: south end (S0 - S11):

- Extensive spot rusts especially in the ceiling.
- Extensive top coat peeling at the ceiling in two locations.
- 2 splice locations (at approx. midway between piers 1S & 2S) showing light to medium corrosion on the upper splice plate on the west side with medium corrosion on the bolts and nuts. The lower side plate / bottom flange interface also showing light to medium corrosion.
- Heavy pigeon dung on the floor on both end sections.
- Several floor locations showing light to medium corrosion.

Maintenance Work Notes

July 17, 2012

Replace missing preventative spike pad on the north end of west arch.

17. Girders:

- Monitor medium and heavily corroded splice plates. Replace if necessary.

19. Bracing

- Monitor medium to heavy corroded bolts, nuts and plate of the underside of the lower cross beams above piers 1N & 1S. Repair them if necessary.

31. Wearing Surface - Seal cracks and patch potholes.

BRIDGE MANAGEMENT INFORMATION SYSTEM

22 Jul 2013

KHODGSON

Condition Inspection Report

Criteria: Structure No = 01553B - Include Inspection Condition Photos = N
 - Include Additional Blank Lines for Notes = N - Show Not Applicable Components = N

Structure No: 01553B - QUEENSBOROUGH

Status: Open/In Use

Inspection Type: Routine Condition

Region: 1 - South Coast Region

District: 1 - Lower Mainland District

Contract Area: 6 - Lower Mainland CA

RFI: 06-C-@-00091A - Rte 91A NB - ON
 06-C-@-00091AS - Rte 91A SB - ON

Features Crossed: Fraser River/Hwy 91A

Component Group/Component	E	G	F	P	V	X	N/A
HYDROTECHNICAL :							
1. Debris Risk	100						N
4. Substructure Scour	100						N
SUBSTRUCTURE :							
5. Foundation Movement	100						N
10. Pier Columns/Walls/Cribs		98	1	1			N
11. Bearings		99		1			N
12. Caps		98		2			N
14. Dolphins/Fenders		95		5			N
SUPERSTRUCTURE :							
15. Floor Beams/Transoms		92	5	2	1		N
17. Girders		89	10	1			N
19. Bracing/Diaphragms		89	9	1	1		N
26. Pins/Bolts/Rivets		94	4	1	1		N
27. Camber/Sag	100						N
28. Live Load Vibration	100						N
29. Coating (Structure)		68	31	1			N
DECK :							
30. Sub Deck/Cross Ties		90	7	3			N
31. Wearing Surface		50	29	20	1		N
32. Deck Joints		94	5	1			N
33. Curbs/Wheelguards	100						N
34. Sidewalk(s)		50	50				N
35. Railings/Parapets	100						N
36. Median Barrier		95	5				N
37. Drains/Pipes		50	48	2			N
38. Coating (Railings)	100						N
APPROACHES :							
39. Signing/Lighting	100						N

1st Abutment Position: S

Year Built: 1960 Estimated? ☐

Length (m): 204.800

Note:

Main Span Length: 91.400

Main Span Type: OTHER

Spans: 3

Urgency: 3

BCI Rating: 1.82

Adjusted BCI Rating: 1.92

Inspector/Inspected By: KENT HODGSON

On 2012/09/14

Amendment/Partial Inspection?

Urgency Notes:

Urgency Rating Note: Repair spalled / delam. areas in the sub deck. Clean & recoat the ends of floor beams and end of diaphragms.

Item Notes:

10 . Pier Columns/Walls/Cribs Typical: fine shrinkage cracks.

Pier S2: solid concrete pier shaft

- south face, few vertical cracks with efflorescence in the center.
- west face, large delam/spall exposing rebar on north corner at mid-height.
- small delam on south corner near top.

Piers S1 and N1:

- fine cracks in the top of the pier columns.
- galvanized circular steel jackets placed around the bottom of the square column sections.

Pier N2:

- heavy scaling around the bearing of the west column.
- west face, small delam near the top.

BRIDGE MANAGEMENT INFORMATION SYSTEM

22 Jul 2013

KHODGSON

Condition Inspection Report

Criteria: Structure No = 01553B - Include Inspection Condition Photos = N
 - Include Additional Blank Lines for Notes = N - Show Not Applicable Components = N

Structure No: 01553B - QUEENSBOROUGH

Status: Open/In Use

Inspection Type: Routine Condition

Region: 1 - South Coast Region

District: 1 - Lower Mainland District

Contract Area: 6 - Lower Mainland CA

Item Notes:

- 11 . Bearings
- Old sole plates at above the bearings have light corrosion.
- Pier S2 (south side):
- newer laminated elastomeric bearings under all girders.
 - old single rocker bearings are still in place.
 - seismic restraint cables on girders B, C and D.
- Piers S2 (north side) & N2 (south side):
- laminated elastomeric bearings under both main girders.
 - grout pad under the bearings breaking up.
 - seismic restraint cables from the girders to the pier.
- Piers S1 & N1 - large laminated elastomeric bearing pads under both girders.
- 12 . Caps
- Pier S1:
- pier cap has been rehabilitated and widened under the bearings. Some fine vertical and horizontal cracks and eff.
 - A large spall / exposed rebar in the top corner, north side near west girder.
- Pier N1:
- pier cap has been rehabilitated and widened under the bearings. Some fine vertical and horizontal cracks and eff. A medium delam. in the top corner beside the steel ladder.
 - south face - light spalls / exposed rebars in the top corner - one near east girder and another one near west girder.
 - north face - three light spalls along the west half top edge.
- The ladder's rungs are having light to medium corrosion.
- 14 . Dolphins/Fenders
- Pier S1 fender is missing all but 4 planks on west end.
 - Pier N1 fender is slightly separated on the west end.
- 15 . Floor Beams/Transoms
- Light to medium corrosion on the ends of most floor beams and randomly on the bottom flanges at the mid length.
- Last 2 floor beams at both ends (S2 and N2) are repaired.
- span S2 at 5th floor beam at pier S2 has a large perforation in the lower web at west end.
- 17 . Girders
- random light to heavy spot rust on the web of girders or along the bottom flange.
 - light to medium corrosion at the bottom flanges near piers S2 & N2.
- 19 . Bracing/Diaphragms
- between floor beams N5 & N7 - minor bents in the bottom flange of the lower diagonal bracing (east and west sides of the catwalk).
 - heavy corrosion (up to 40% section loss) in the bottom ends of diaphragms including gusset plates above the pier S2 two bearings and pier N2 east bearing (medium corrosion on west bearing).
 - light rust sheeting at the middle of the bottom flange of the diaphragm at S2 and N2.
- 26 . Pins/Bolts/Rivets
- light to medium corrosion on some bolts and rivets especially near ends of structure and randomly along the top flanges.
 - heavy corrosion (up to 60% section loss at east bearing at N2) on the bolts at above the bearing area at the gusset plate and ends of diaphragm at the piers N2 west side and S2 both sides.
 - Main span east girder has a missing nut at 3rd bottom gusset plate at north of pier S1
- 28 . Live Load Vibration
- Noticeable bouncing when heavy vehicles travel on the bridge with noticeable vibration on the caps.

BRIDGE MANAGEMENT INFORMATION SYSTEM

22 Jul 2013

KHODGSON

Condition Inspection Report

Criteria: Structure No = 01553B - Include Inspection Condition Photos = N
 - Include Additional Blank Lines for Notes = N - Show Not Applicable Components = N

Structure No: 01553B - QUEENSBOROUGH

Status: Open/In Use

Inspection Type: Routine Condition

Region: 1 - South Coast Region

District: 1 - Lower Mainland District

Contract Area: 6 - Lower Mainland CA

Item Notes:

- 29 . Coating (Structure)
- light to heavy corrosion at the ends of the floor beams and steelwork.
 - random light to medium corrosion at the middle of the bottom flange of the floor beams.
 - light corrosion on the bottom flanges of the girders.
 - some medium corrosion (pitting) in the top flange of the east girder near piers N2 & S2.
 - medium corrosion (sheeting) at the inside flange of the west girder near pier S2
 - spot rusting on the interior webs of the girders.
 - random paint peeling on all steel structure members.
- 30 . Sub Deck/Cross Ties
- east overhang at pier S1 - A large delam. patch in the outside edge.
 - at floor beam 25S - large delaminated patches on both sides of the floor beam. Use of poor quality patching material.
 - at floor beam 15S - A large delam. area along the east side at south side of the floor beam.
 - at floor beam 5S - patches along the floor beam are cracking and delaminating.
 - at floor beam 0 -A large spall of 1100mm x 1100mm with exposed rebar (due to insufficient cover) on the south side above the catwalk. A small delam. area on the north side above the catwalk.
 - at floor beam 1N -A medium delam.(about 400mm dia.) on the south side above the catwalk.
 - at floor beam 5N - patches on both sides of the floor beam are delaminating.
 - at floor beam 15N - large patches along both sides of the floor beam are delaminated and dropping out.
 - at floor beam 25N - large patches along both sides of the floor beam are delaminated.
 - at floor beam 29N - A large delam. area on the north side.
 - between floor beams 31N - 32N - a small delaminated area above catwalk.

BRIDGE MANAGEMENT INFORMATION SYSTEM

22 Jul 2013

KHODGSON

Condition Inspection Report

Criteria: Structure No = 01553B - Include Inspection Condition Photos = N
 - Include Additional Blank Lines for Notes = N - Show Not Applicable Components = N

Structure No: 01553B - QUEENSBOROUGH

Status: Open/In Use

Inspection Type: Routine Condition

Region: 1 - South Coast Region

District: 1 - Lower Mainland District

Contract Area: 6 - Lower Mainland CA

Item Notes:

31 . Wearing Surface

- Numerous wide transverse, longitudinal & diagonal cracks.

North Bound:

- @ 1st full patch - slow lane, multiple medium to large patches.
- south of 2nd full patch, slow lane, small spall.
- @ 2nd full patch - slow lane, medium patch in west wheel path.
- @ 4th full patch - multiple medium patches with cracking in surrounding asphalt.
 - center line, large depressed patch on north side.
- From 4th full patch to 5th full patch - wide longitudinal cracks in the N/B F/L east wheel path.
- @ 5th full patch - map cracking in fast lane west wheel path & centerline.
 - large depressed patch with surrounding asphalt starting to break up at center line.
- @ Pier N2, small spall at centerline on south edge of joint infill.

South Bound:

- @ pier S2 joint - a medium concrete patch over the center line with a small pothole.
- @ 1st full patch - large patch in the slow lane on the south side next to the center line
- from 1st patch to 2nd patch - slow lane, intermittent short longitudinal cracks along west wheel path.
- @ 2nd full patch - short wide transverse crack along the south edge.
 - fast lane, south edge of asphalt breaking up in east wheel path.
 - slow lane, small spall in west wheel path.
- between 2nd & 3rd full patch - fast lane, cracking around large patch ~7m north of 2nd patch.
- between 3rd & 4th full patch - slow lane, 2 medium patches & small spall in west wheel path at midspan.
- @ 4th full patch - medium cracking north side at center marks.
- @ 5th full patch - transverse cracks at north & south edges.
- @ 6th full patch - asphalt breaking up on either side of patch between lanes.

32 . Deck Joints

- Finger joints at piers S2 and N2 have medium corrosion on vertical surfaces.

- Old joints between these 2 piers have been removed and covered over with ~1.5 m. wide strip of asphalt.

Pier S2: Finger joint, north bound, slow lane, south fingers raised ~5mm higher than north fingers, with traffic.

Pier N2: Finger joint, north bound, slow lane, north fingers raised ~5mm higher than south fingers, against traffic.

34 . Sidewalk(s)

Numerous transverse fine to medium cracks.

36 . Median Barrier

Random light spalls in bottom corners.

Condition Inspection Report

Criteria: Structure No = 01553B - Include Inspection Condition Photos = N
- Include Additional Blank Lines for Notes = N - Show Not Applicable Components = N

Structure No: 01553B - QUEENSBOROUGH

Status: Open/In Use

Inspection Type: Routine Condition

Region: 1 - South Coast Region

District: 1 - Lower Mainland District

Contract Area: 6 - Lower Mainland CA

Item Notes:

37 . Drains/Pipes

Drain trough at pier S2 is plugged and filled full with dirt.

Drain trough at pier N2 is half filled with dirt. The screen at the top of the drain pipe is blocked by debris.

At pier N2 - the bracket for supporting the 800mm dia. water pipe has heavy corrosion.
- clogged drainpipe caused overflown beside east girder

At pier S2 west girder - the drain elbow dislodged at west side of girder.

39 . Signing/Lighting

Luminaires on both sides of the bridge.

Inspection Notes:**Maintenance Work Notes**

September 14, 2012

10. Caps:

- repair spalls in the top corners of piers N1 & S1.
- clean debris on cap.

12. Floor Beams:

- sandblast and paint the ends and some middle part of the floor beams.

23. Bolts - replace heavily corroded bolts and rivets.

26. Coating (Structure):

- clean & paint both ends of structure that have heavily corroded areas.
- touch up other areas where required.

27. Sub Deck - repair spalls & delaminated areas.

28. Wearing Surface:

- seal cracks.
- fill spalls & depressions.

BRIDGE MANAGEMENT INFORMATION SYSTEM

22 Jul 2013

KHODGSON

Condition Inspection Report

Criteria: Structure No = 01481V - Include Inspection Condition Photos = N
 - Include Additional Blank Lines for Notes = N - Show Not Applicable Components = N

Structure No: 01481V - LIONS GATE N VIADUCT

Status: Open/In Use

Inspection Type: Routine Condition

Region: 1 - South Coast Region

District: 1 - Lower Mainland District

Contract Area: 4 - Howe Sound CA

RFI: 04-A-@-00991A - Rte 99 NB - Lions Gate Causeway - ON

Features Crossed: 1A & 99

04-A-@-N0016 - Kwumkwum Road (West Vancouver Municipality) - UNDER

04-A-@-N0017 - Welch Street (West Vancouver Municipality) - UNDER

Component Group/Component

E G F P V X N/A

HYDROTECHNICAL :

1.	Debris Risk	100						N
4.	Substructure Scour	90	10					N

SUBSTRUCTURE :

5.	Foundation Movement	100						N
6.	Abutments		95	5				N
7.	Wing/Retaining Walls		99	1				N
9.	Footings/Piling	30	69	1				N
10.	Pier Columns/Walls/Cribs		95		5			N
11.	Bearings		100					N

SUPERSTRUCTURE :

15.	Floor Beams/Transoms		95		5			N
17.	Girders		95		5			N
19.	Bracing/Diaphragms		95		5			N
26.	Pins/Bolts/Rivets		99	1				N
27.	Camber/Sag	100						N
28.	Live Load Vibration	100						N
29.	Coating (Structure)	99	1					N

DECK :

30.	Sub Deck/Cross Ties		100					N
31.	Wearing Surface		35	20	44	1		N
32.	Deck Joints		50	30	20			N
34.	Sidewalk(s)		90	5	5			N
35.	Railings/Parapets		99	1				N
37.	Drains/Pipes	95				5		N
38.	Coating (Railings)	50	45	5				N

APPROACHES :

39.	Signing/Lighting	100						N
40.	Roadway Approaches	100						N
41.	Roadway Flares		99		1			N

1st Abutment Position: S

Year Built: 1938 Estimated? ☐

Length (m): 669.500

Note:

Main Span Length: 37.490

Main Span Type: STRINGER

Spans: 25

Urgency: 2

BCI Rating: 1.9

Adjusted BCI Rating: 1.95

Inspector/Inspected By: KENT HODGSON

On 2012/09/19

Amendment/Partial Inspection?

Item Notes:

4 . Substructure Scour North abutment - New filled gravel and earth slope protection.

6 . Abutments South end - bent 0.

North abutment, ballast wall:

- a medium & a fine diagonal cracks near west end.

- a medium horizontal crack on east of girder B near the top.

7 . Wing/Retaining Walls Fine vertical crack with efflorescence near the south end of the west wing wall.

BRIDGE MANAGEMENT INFORMATION SYSTEM

22 Jul 2013

KHODGSON

Condition Inspection Report

Criteria: Structure No = 01481V - Include Inspection Condition Photos = N
 - Include Additional Blank Lines for Notes = N - Show Not Applicable Components = N

Structure No: 01481V - LIONS GATE N VIADUCT

Status: Open/In Use

Inspection Type: Routine Condition

Region: 1 - South Coast Region

District: 1 - Lower Mainland District

Contract Area: 4 - Howe Sound CA

Item Notes:

- 9 . Footings/Piling
 Transverse concrete tie beams with steel tie rods (32mm dia.) added to bents 24, 23, 22, 21, 20, 19, 17, 16, 15, 11, 7, 6 & 5. Some fine shrinkage cracks on the concrete tie beams. Some tie rods (bents 22, 19, 17, 7, 6 & 5) have light spot corrosion on the rods and the bearing plates.
 Bent 21 - west footing (west face) :
 - a large spall in the middle of top corner.
 - a medium spall in the north top corner.
 Bent 9 - some fine cracks in top of footing.
 Bent 9 - a small cut in NW bottom corner.
- 10 . Pier Columns/Walls/Cribs
 - Previous corrosion (light to medium pitting mostly near the bottom of the legs and areas above the horizontal angle bracing) has been covered with new coating.
 - Some light spot corrosion at the contact between base plate and the concrete footing.
 - Bent 9 - bent angle at the south side of the bottom bracing with some bent top laces near east leg.
 - a few random small paint scratches on bottom of piers.
- 11 . Bearings
 Fixed bearings on the north abutment.
 - the anchor bolts have light corrosion.
- 15 . Floor Beams/Transoms
 - Some light to medium corrosion near the ends.
- 17 . Girders
 - Some light to medium pitting on the top of the bottom flanges (now covered with new coating).
 - Girders in some spans have pack rust between rivets in top and bottom flanges (now painted).
 - A possible crack in the top weld of the web stiffener in span 17 east girder at 4th floor beam (also, a crack in the north side weld between the same floor beam bearing plate / top flange of girder).
- 19 . Bracing/Diaphragms
 Some light to medium pitting in the steel angles and the gusset plates.
 Cracked weld at bottom horizontal bracing / vertical bracing at bent 6 (east leg west face), bent 0 (inside face of both legs).
 Span 1, west side near mid span (@ 5th diap. from bent 0) - one of the diagonal bracing was connected to the gusset plate with tie wires at top end (due to interference with the water pipe).
- 29 . Coating (Structure)
 New coating done in 2006.
 - Previous light to medium corrosion can still be noted on random areas of the structure.
 - a few random areams where coating is flaking off.
 - Extensive graffiti on the inside face of the girders in spans 25 & 24, lighter graffiti on the next few spans.
- 30 . Sub Deck/Cross Ties
 Some light spot corrosion along random deck splices (e.g. span 16 mid span) and deck joint armouring.

BRIDGE MANAGEMENT INFORMATION SYSTEM

22 Jul 2013

KHODGSON

Condition Inspection Report

Criteria: Structure No = 01481V - Include Inspection Condition Photos = N
 - Include Additional Blank Lines for Notes = N - Show Not Applicable Components = N

Structure No: 01481V - LIONS GATE N VIADUCT

Status: Open/In Use

Inspection Type: Routine Condition

Region: 1 - South Coast Region

District: 1 - Lower Mainland District

Contract Area: 4 - Howe Sound CA

Item Notes:

31 . Wearing Surface

Numerous wide longitudinal cracks (with some asphalt pulling apart) in the wheel paths.
 Fine to medium longitudinal cracks in between wheel paths in some spans.
 Heavy abrasion & map cracking near joints.

NORTHBOUND:

- span 25 near bent 24 - wide strip pothole (~3m x 10cm) in west wheel path.
- span 24 @ bent 24 - medium patches in both wheel paths surrounding asphalt beginning to break up.
- span 23 - @ bent 23, medium patches in both wheel paths.
 - ~8m from bent 23, medium patch in west wheel path.
 - heavy abrasion & map cracking for ~6m from bent 22.
- span 22 @ bent 22 - medium patches in both wheel paths, surrounding asphalt has map cracking.
- span 21 - @ bent 21, medium patches in both wheel paths, map cracking around patches.
 - @ bent 21, small spall beside patch in west wheel path.
 - north half of span, heavy abrasion in west wheel path.
- span 20 @ bent 20 - 2 medium patches in west wheel path, surrounding asphalt is breaking up.
- span 19 @ bent 19 - large patches in both wheel paths, heavy abrasion around joint.
- span 18 @ bent 18 - small spall on east wheel path.
- span 17 @ bent 17 - medium spall in east wheel path, surrounding asphalt cracking.
 - small spall in west wheel path.
- span 16 @ bent 16 - asphalt starting to break up in west wheel path.
- span 15 @ mid span orthotropic deck panel joint - small patches in both wheel paths.
- span 14 - near mid span, medium spall in west wheel path.
 - @ mid span orthotropic deck panel joint, short wide transverse cracks in both wheel paths.
 - @ bent 13, small spall in east wheel path.
- span 13 - small spall in east wheel path ~10m from bent 13.
- span 12 @ bent 12 - asphalt starting to break up with few small spalls along joint.
- span 11 - small spall in west wheel path at bent 11.
- span 5 - south half of span, heavy abrasion & wear.
- span 3 @ south orthotropic deck panel joint - short wide transverse crack in west wheel path.
- span 2 @ north orthotropic deck panel joint - wide transverse crack.
- span 1 @ bent 1 - small spall in west wheel path.
 - near mid span, medium patches in both wheel paths, surrounding asphalt is breaking up.

CENTRE LANE:

- span 22 @ bent 22 - small spall in east wheel path.
- span 21 near bent 21, medium patch in east wheel path.
- span 19 @ bent 19 - small patch in east wheel path.
- span 14 near mid span - short wide transverse crack in east wheel path.
- span 13 @ bent 13 - asphalt spalling away from joint edge, multiple small narrow spalls.

BRIDGE MANAGEMENT INFORMATION SYSTEM

22 Jul 2013

KHODGSON

Condition Inspection Report

Criteria: Structure No = 01481V - Include Inspection Condition Photos = N
 - Include Additional Blank Lines for Notes = N - Show Not Applicable Components = N

Structure No: 01481V - LIONS GATE N VIADUCT

Status: Open/In Use

Inspection Type: Routine Condition

Region: 1 - South Coast Region

District: 1 - Lower Mainland District

Contract Area: 4 - Howe Sound CA

Item Notes:

31 . Wearing Surface

- span 2 @ north orthotropic deck panel joint - wide transverse crack.

SOUTH BOUND:

- span 25 - @ north abutment, small spall in west wheel path.
- near mid span, small spall in east wheel path.
- span 24 - near bent 24, large patch on east wheel path.
- @ bent 24, medium patch in west wheel path.
- most longitudinal cracks have been sealed (only span with sealed cracks).
- span 23 - full width patch for 6m from bent 22.
- @ bent 23, medium patch in west wheel path.
- span 22 - near mid span, small patch breaking up in east wheel path.
- full width patch ~4m from bent 22.
- span 17 @ mid span orthotropic panel joint - small spall in west wheel path.
- span 15 @ north orthotropic panel joint - short wide transverse crack in both wheel paths.
- span 13 - near bent 12, large patch in west wheel path, surrounding asphalt has heavy map cracking.
- @ bent 13, asphalt spalling away from joint edge, multiple small narrow spalls.
- span 12 near bent 12 - 2 compressed patches in west wheel path, surrounding asphalt cracking.
- span 8 near mid span - medium patch in west wheel path.
- span 6 near bent 6 - medium patch in west wheel path.
- span 2 @ north orthotropic deck panel joint - wide transverse crack.

32 . Deck Joints

Bent 0 - modular joint on south side with sliding plate joint on north side.
 - sliding plates on S/B are slightly uneven.

COMPRESSION SEALS

All other bents except bents 5, 9, 13 & 19.
 Most compression seals showing heavy wear under wheel paths, cracks, some small holes along the top & separation from the armouring.
 Ripped seals @ bents 22, 21, 20, 17, 15, 14, 12, 10, 8 & 3.
 Random splits & holes @ bents 24, 23, 18, 16, 11, 7, 6, 4, 2 & 1.

Bent 1 - S/B, seal separated from armour in west wheel path.
 Bent 2 - N/B, small metal object puncturing seal in west wheel path.
 Bent 3 - C/L, metal screw puncturing seal.

SLIDING STEEL PLATES

North abutment, bent 19, 13, 9 & 5 - stainless steel troughs below.

North Abutment - Heavy wear on south bound wheel paths.
 - 2nd & 3rd bolt from west parapet loose & making noise.

Bent 5 - N/B, metal strip added at the north edge.
 - (2010) N/B, a ~400mm section of the top plate is missing.
 - S/B, something between plates is collecting sections of tire.

BRIDGE MANAGEMENT INFORMATION SYSTEM

22 Jul 2013

KHODGSON

Condition Inspection Report

Criteria: Structure No = 01481V - Include Inspection Condition Photos = N
 - Include Additional Blank Lines for Notes = N - Show Not Applicable Components = N

Structure No: 01481V - LIONS GATE N VIADUCT

Status: Open/In Use

Inspection Type: Routine Condition

Region: 1 - South Coast Region

District: 1 - Lower Mainland District

Contract Area: 4 - Howe Sound CA

Item Notes:

- 34 . Sidewalk(s) 2m wide sidewalk on both sides of viaduct.
- WEST SIDEWALK**
 - deck joint seals @ bents 21, 14, 12, 10, 8 & 3, are torn.
 - span 3 near bent 3, area of worn out anti-skid coating.
 - span 5 near bent 4, large area of worn out anti-skid coating.
- EAST SIDEWALK**
 - deck joint seals @ bents 22, 21, 20, 15, 14, 12, 8 and 3 are torn.
 - bent 1 deck joint seal, small hole in deck seal
 - south of bent 5, several areas of worn off anti-skid coating.
 - span 20 near bent 20, small are of worn out anti-skid coating.
- WEST CATWALK** - @ bent 7, 14 & 16, missing floor planks
EAST CATWALK - @ bent 9, 12, 14 & 20, missing floor planks
- 35 . Railings/Parapets Traffic barrier & Sidewalk railing - small chips in coating with light corrosion, see coating.
- CATWALK RAILING**
West catwalk:
 - span 6 near bent 5, broken bottom bolt on post.
- East catwalk:**
 - @ bent 9, loose post.
 - @ bent 20, loose post.
- 37 . Drains/Pipes Rust through holes in random down pipes (e.g. east down pipe at pier 7 and pier 13) at the lower pipe clamp.
- 38 . Coating (Railings) Traffic barrier - galvanized coating faded.
 - Random tiny areas of coating peeling off.
 - Some light corrosion in the inside face.
- Sidewalk railing - coating (epoxy paint) faded.**
 - Random light chipping with light corrosion. Examples:
 - East railing, north approach, bottom of north post.
 - span 13 near bent 13, on kick plate.
 - West railing, span 3 near bent 2, on bottom rail.
 - span 3 near bent 3, on kick plate.
- 39 . Signing/Lighting W54 sign in span 1 S/B at the location where the main cable goes through the deck.
- Lamp standards along both sides of the structure.
- 40 . Roadway Approaches New paved asphalt on approach.
- 41 . Roadway Flares Both sides - 750mm high concrete no post tapering down to 150mm high curb.
- East flare was broken at the end of steel parapet.

Inspection Notes:**General Inspection Notes**

Nov. 17, 2008

Catwalks still missing walking planks at bents 14 & 12.

July 27, 2011

Catwalk removed in span 24 & 25.

Sept 19, 2012

Knotweed at bents 16 & 17.

Catwalks now missing walking planks at bents 7, 9, 12, 14 & 12.

Condition Inspection Report

Criteria: Structure No = 01481V - Include Inspection Condition Photos = N
- Include Additional Blank Lines for Notes = N - Show Not Applicable Components = N

Structure No: 01481V - LIONS GATE N VIADUCT**Status:** Open/In Use**Inspection Type:** Routine Condition**Region:** 1 - South Coast Region**District:** 1 - Lower Mainland District**Contract Area:** 4 - Howe Sound CA**Inspection Notes:****Rehab Work Notes**

Sept 19, 2012

19. Bracing - investigate diagonal bracing connection at span 1 (5th from bent 0)

31. Wearing Surface - Rehab deck wearing surface.

32. Deck Joints - replace or reseal ripped seals.

Maintenance Work Notes

Sept 19, 2012

29. Coating (structure): spot brush deteriorated areas.

32. Deck Joints - seal rips, splits and holes in compression seals.
- investigate bent 5, to see if it is damaging tires.

34. Sidewalk - repair deck joint seals.
- Catwalk , replace missing planks (bents 7, 9, 12, 14 & 20)

35. Railing - Catwalk , repair loose posts (spans 6, 9 & 20).

37. Drains/ pipes: repair pipe clamps at bent 7 & 13.

29. Coating (railings): spot brush deteriorated areas.

BRIDGE MANAGEMENT INFORMATION SYSTEM

22 Jul 2013

KHODGSON

Condition Inspection Report

Criteria: Structure No = 01481S - Include Inspection Condition Photos = N
 - Include Additional Blank Lines for Notes = N - Show Not Applicable Components = N

Structure No: 01481S - LIONS GATE SUSPENS.

Status: Open/In Use

Inspection Type: Routine Condition

Region: 1 - South Coast Region

District: 1 - Lower Mainland District

Contract Area: 4 - Howe Sound CA

RFI: 04-A-@-00991A - Rte 99 NB - Lions Gate Causeway -
ON

Features Crossed: IA & 99/BURRARD INLET/BCR/STANLEY PARK
SEAWALL
/STORAGE COMPOUND/ASSEMBLY TRAILER
/WELCH STREET

Component Group/Component		E	G	F	P	V	X	N/A
HYDROTECHNICAL :								
1.	Debris Risk	100						N
4.	Substructure Scour	100						N
SUPPORT STRUCTURE :								
5.	Foundation Movement	100						N
6.	Abutments		100					N
7.	Wing/Retaining Walls		100					N
9.	Footings/Piling		100					N
10.	Towers	99	1					N
12.	Bearings		95	5				N
CABLE SYSTEM/SUPERSTRUCTURE :								
14.	Suspension/Stay Cables		100					N
15.	Suspenders/Cable Bands		100					N
16.	Saddles/Tower Anchorages		100					N
17.	Anchorages at Deck		99	1				N
18.	Susp. Cable Anchorages		100					N
19.	Anchor Chambers		90	5	5			N
20.	Hand Ropes		100					N
23.	Floor Beams	100						N
25.	Truss Chords	100						N
26.	Truss Diagonals	100						N
27.	Truss Verticals/Rods	100						N
28.	Pins/Bolts/Rivets/Wedges	99		1				N
29.	Coating (Structure)	99		1				N
30.	Camber/Sag	100						N
31.	Live Load Vibration	100						N
DECK :								
32.	Sub Deck	100						N
33.	Wearing Surface	95	5					N
34.	Deck Joints	90		5	4	1		N
36.	Sidewalk(s)	100						N
37.	Railings/Parapets	99		1				N
39.	Drains/Pipes	100						N
40.	Coating (Railings)	98	1	1				N
APPROACHES :								
41.	Signing/Lighting	100						N
42.	Roadway Approaches	100						N
43.	Roadway Flares		100					N

1st Abutment Position: S

Year Built: 1938 Estimated? ☐

Length (m): 846.628

Note:

Main Span Length: 472.427

Main Span Type: OTHER

Spans: 3

Urgency: 3

BCI Rating: 1.36

Adjusted BCI Rating: 1.41

Inspector/Inspected By: KENT HODGSON

On 2012/09/19

Amendment/Partial Inspection?

Urgency Notes:

Urgency Rating Note: Off center bearing blocks under South pier modular joint need to be monitored.

Item Notes:

10 . Towers

Towers were painted in 2006. Cross beam need regular cleaning of pigeon waste.

BRIDGE MANAGEMENT INFORMATION SYSTEM

22 Jul 2013

KHODGSON

Condition Inspection Report

Criteria: Structure No = 01481S - Include Inspection Condition Photos = N
 - Include Additional Blank Lines for Notes = N - Show Not Applicable Components = N

Structure No: 01481S - LIONS GATE SUSPENS.

Status: Open/In Use

Inspection Type: Routine Condition

Region: 1 - South Coast Region

District: 1 - Lower Mainland District

Contract Area: 4 - Howe Sound CA

Item Notes:

12 . Bearings

South abutment:

- sliding bearing.
- some gravel and dirt on the tracks.

South Tower:

- sliding bearing. Telfon coating wearing off especially on the west bearing.

North Tower:

- sliding bearing. Telfon coating has been worn off.
- NW corner: steel sliding bearing plate was worn by approximately 3mm on both sides.

17 . Anchorages at Deck

There are a few traction rods have gap between the lock nut and bottom of the barrel.

19 . Anchor Chambers

(Note: check relative humidity)

SOUTH ANCHOR CHAMBERS:

East chamber :

- efflorescence stains on wall and ceiling.
- spot rust stain on cable paint surface.

West chamber - random fine cracks on ceiling.

NORTH ANCHOR CHAMBERS (under piers 3 & 4):

- some fine horizontal cracks / eff. in inside south walls.
- east cable room - efflorescence on top edge of wall.

28 . Pins/Bolts/Rivets/Wedges Rotating pins in couple of the cable bands near the mid span that would require monitoring.

West main cable:

- 1st suspender connection at north end, rotating dampening pin has removed surrounding paint.

29 . Coating (Structure)

2006 - Structure repainted.

West main cable - paint flaking off near 4th & 5th hangers from south end. (both areas ~200mm in diameter)

33 . Wearing Surface

General light wearing.

BRIDGE MANAGEMENT INFORMATION SYSTEM

22 Jul 2013

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Condition Inspection Report

Criteria: Structure No = 01481S - Include Inspection Condition Photos = N
 - Include Additional Blank Lines for Notes = N - Show Not Applicable Components = N

Structure No: 01481S - LIONS GATE SUSPENS.

Status: Open/In Use

Inspection Type: Routine Condition

Region: 1 - South Coast Region

District: 1 - Lower Mainland District

Contract Area: 4 - Howe Sound CA

Item Notes:

34 . Deck Joints

South abutment - modular deck joint. Some light gravel on the top.

South Tower - modular deck joint.

- light gravel on top near the parapets.
- joint makes banging noise as vehicles travel over it.
- the gaps between 9 rails were uneven down slope (south side) were narrower.
- west end north side end joist side restraint was cut in by the joist bottom flange.
- some of the replaced bearing blocks - off center, crushed, split, heavy wear.
- group A: 8th & 9th support beam, north blocks split.
- group B: 12th support beam, south block split.
- group C: 1st, 2nd & 3rd, blocks split.
- 6th support beam, south block missing.
- group H: 1st & 2nd, south blocks split.
- 4th support beam, north block shifted forward, key broken.
- 8th support beam, north block split.
- 9th support beam, north block split & missing nylon guide pin.
- group G: 2nd support beam, south block split.
- 9th support beam, south block split.
- group F: 2nd support beam, south block split.

North Tower - modular deck joint.

- partially filled with dirt, especially the center lane.
- a couple of missing nylon guide pins.
- some of the bearing blocks - off center, rotated, Teflon worn out.
- group C: 9th support beam, north block shifted forward, key broken.

36 . Sidewalk(s)

Sutton Line Marking in the process of applying new anti-skid coating during the inspection.

37 . Railings/Parapets

Traffic barrier:

- local galvanized coating lightly peeled off. Random light spot rust on galvanized bolts.
- East railing @ south tower - top 2 rails almost separated at the south junction.
- West railing @ north tower - top rail separated at south junction.

Sidewalk railing - random scratches with light rust.

40 . Coating (Railings)

Coating faded. Random surface peeling.

West parapet @ north tower - coating peeling off of top rail.

41 . Signing/Lighting

Lights along both sides of the bridge.

Inspection Notes:**General Inspection Notes**

March 03, 2011

- contractor attempted to tighten bottom nut on west side traction rods (at north end of mid span), but was unsuccessful.

Maintenance Work Notes

Sept 19 , 2012

12. Bearings - clean bearing area.

28. Pins/Bolts/Rivets - monitor rotating dampening pins.

29. Coating (Structure) - recoat flaking areas on west main cable.

34. Deck Joints - Replace broken or shifted bearing blocks. Replaced missing nylon guide pins.

BRIDGE MANAGEMENT INFORMATION SYSTEM

22 Jul 2013

KHODGSON

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 2ND NAR

Status: Open/In Use

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Region: 1 - South Coast Region

District: 1 - Lower Mainland District

Contract Area: 4 - Howe Sound CA

RFI: 04-A-@-00001W - Trans-Canada Hwy. - ON
 04-A-@-00001 - Trans-Canada Hwy. E/B - ON

Features Crossed: BURRARD INLET/MARINA ACCESS ROAD

Component Group/Component	E	G	F	P	V	X	N/A
HYDROTECHNICAL :							
1. Debris Risk	100						N
4. Substructure Scour	100						N
SUBSTRUCTURE :							
5. Foundation Movement	100						N
6. Abutments		99	1				N
7. Wing/Retaining Walls		98	1	1			N
9. Footings/Piling		95	5				N
10. Pier Columns/Walls/Cribs		98	1	1			N
11. Bearings	90	9	1				N
12. Caps		98	1	1			N
SUPERSTRUCTURE :							
15. Floor Beams/Transoms		73	15	10	2		N
16. Stringers		84	10	5	1		N
19. Bracing/Diaphragms		95	3	1	1		N
20. Truss Chords/Arch Ribs		92	4	3	1		N
22. Truss Diagonals		98	1	1			N
23. Truss Rods/Verticals		98	1	1			N
26. Pins/Bolts/Rivets		97	1	1	1		N
27. Camber/Sag	100						N
28. Live Load Vibration		100					N
29. Coating (Structure)	10	75	10	5			N
DECK :							
30. Sub Deck/Cross Ties		98	1	1			N
31. Wearing Surface		98	1	1			N
32. Deck Joints		80	14	5	1		N
34. Sidewalk(s)		90	5	5			N
35. Railings/Parapets		70	20	5	5		N
36. Median Barrier		95	5				N
37. Drains/Pipes		100					N
38. Coating (Railings)		40	30	30			N
APPROACHES :							
39. Signing/Lighting		99	1				N
40. Roadway Approaches	89	10	1				N
41. Roadway Flares		67		33			N

1st Abutment Position: N

Year Built: 1956 Estimated? ☐

Length (m): 963.500

Note:

Main Span Length: 85.800

Main Span Type: OTHER

Spans: 7

Urgency: 4

BCI Rating: 1.91

Adjusted BCI Rating: 1.98

Inspector/Inspected By: KENT HODGSON

On 2012/09/18

Amendment/Partial Inspection?

Urgency Notes:

Urgency Rating Note: - cracks in the copes in numerous stringers.
 - medium to heavy corrosion on some of the floor beams with some perforations and cracks, random locations on top & bottom chords, gusset plates etc.

Item Notes:

6 . Abutments

North abutment is pier 9.

South abutment:

- general wear on the concrete. Minor cracks.
 - dirt buildup on the bearing area from the open finger joint.

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Contract Area: 4 - Howe Sound CA

Item Notes:

7 . Wing/Retaining Walls Approach span, chamber concrete walls at south abutment:
 - general wear, fine to medium random vertical cracks in both walls.
 - large delam in top of column (supporting the upper wall panel) at the chamber entrance.

9 . Footings/Piling Pier 9:
 - light scaling. Fine vertical cracks.

Pier 10:
 - light scaling.
 - tiltmeter base plates on the top at east and west ends.
 SE corner - medium delam & wide crack near top.
 north & south faces - numerous wide vertical cracks & few horizontal cracks.

Piers 11 to 15:
 - light scaling in the wetted area. Fine vertical cracks.

10 . Pier Columns/Walls/Cribs Pier 9:
 - columns widened at deck truss level. Fine shrinkage cracks in the extended sections.
 - column 1 - A large delam. in the south east corner at about 2 m. from the underside of the cap. Heavy water stain in the south face below the truss.

Pier 10:
 - general wear.
 - column 1 - fine cracks / eff. in the east and south faces near the top. Heavy water stains.
 - column 2 west face - fine cracks / eff. near the top.

Pier 11:
 - light scaling from water coming through the deck joint.
 - column 1 - fine cracks / eff. near the top in the east face. Heavy water stain especially on the east face.
 - column 2 west face - fine cracks / eff. near the top.

Pier 12:
 - light scaling from water coming through the deck joint.
 - column 1 - fine cracks / eff. near the top in the east face.
 - column 2 - fine cracks / eff. near the top in the west face.

Pier 13 - light scaling.

Pier 15 - side opening in lower tie beam is not enclosed. Previous report indicated that pigeons have been nesting and a heavy layer of bird droppings inside the beam.

11 . Bearings Pier 13 - top rocker bearings were cleaned in 2010. Dust covers have corrosion holes through them.

Piers 14 & 15 - random vertical cracks / some with efflorescence in the concrete bearing pedestal.

South abutment - corrosion holes in the dust cover.

12 . Caps Pier 9:
 - shrinkage cracks in both north and south faces near the ends.
 - south face - a delam. in the bottom corner near the middle of the cap.
 - underside - a few large delams. between columns 1 and 2.

Piers 10 to 13 - light scaling at the top of the caps. A large delam. in the top of pier 13 at north east corner.

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Item Notes:**15 . Floor Beams/Transoms**

Floor beams are numbered from 1 to 9 in spans 10, 11, 12 and 13, and then from 1N to 22N towards the center of the main arch. Similarly from 1S to 22S from the south abutment towards the center of the main arch. The center floorbeam is located between FB 22S and FB22N.

(Painting work started from 2009 to 2010. The painted floor beam include from FB S1 to FB N16, FB 1&4 of Span 13, FB 1&9 of Span 12, FB1,4,6,8&9 of Span 11, FB1,4,6&9 of Span 10.)

Light to heavy (including pack rust) corrosion on the top and bottom flanges, horizontal and vertical stiffeners, webs of most floor beams (near both ends and the center portion of the floor beams. Section loss in some areas is more than 50% and some perforations in the web at near ends of floor beams.

Perforations in the web of FB 5S at stringers 5G, 5J and 5M as reported in the past have been repaired by welding small plates over the holes. Also, areas (web) with heavy section loss at below stringers 6G have been repaired by adding thick plates between the stiffeners.

Horizontal cracks in the mid height of some of the floor beams (mainly the opposite side of the bearing pedestal) as reported previously have been repaired (holes provided at both sides of the vertical stiffener in FB 10S at stringer J to stop the crack from progressing).

Horizontal bearing plates in some of the stringer support pedestals at the expansion ends have been heavily worn and corroded (some heavier corroded and worn pedestals have been replaced and there are still some plates with heavy section loss, e.g. stringers 6B, 6K & 6L at FB 5S, stringer 11B at FB 10S, stringers 15B & 15C at FB 14S).

Cracks noted previously in the welds at the underside of horizontal plate / vertical support plate of some bearing pedestals have been repaired.

Cracks found in painting work are located in the top of web of FB 17N(at the stringer C&K) and 19N at stringer C.

On going monitoring is necessary to ensure the behaviour of the cracks and perforations not getting worse.

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Item Notes:**16 . Stringers**

Light to heavy corrosion (including pack rust) on the ends of the stringers and the adjacent stiffeners (in the floor beams) at the deck joints. Some stringers have severe wear in the underside of the bottom flange and as such, some stringers (at expansion joints) are moving up and down when heavy trucks travelling on top.

(Painting work started from 2009 to 2010. the stringer ends were painted within one foot from floor beam. The painted floor beam include from FB S1 to FB N16, FB 1&4 of Span 13, FB 1&9 of Span 12, FB1,4,6,8&9 of Span 11, FB1,4,6&9 of Span 10.)

Main arch - stringers 6G, 6K, 11G, 11H, 11M have been beefed up in the south end by adding steel angles and plates.

Notches & cracks have been noted in the top copes in the stringers' ends. They are mainly on the outside 3 stringers (stringers A, B & C on the east side and stringers K, L & M on the west side). See separate spread sheets (saved in P drive under SCR Bridge Engineering) for the details. NDT on random cracks by Canspec on September 12, 2005 indicated that these cracks stop at where they show. The cracks with more than 15mm long have been repaired (as proposed by Associated Engineering) by providing holes (some with bolt in place) in the webs to stop the cracks from further growing.

On going monitoring is necessary to ensure the behaviour of the cracks not getting worse.

Stringers of interest:

SPAN 10

FB 2, Stringer A south, E.face = 10mm

FB 2, Stringer A north, E.face = 10mm

FB 7, Stringer F south - hole to prevent growth in coping crack was done by torch instead of drill.

SPAN 13

FB 2, Stringer K south, W.face = 10mm

FB 2, Stringer L north, W.face = 10mm

FB 2, Stringer M north, W.face = 10mm

FB 2, Stringer M south, W.face = 13mm

SPANS 14, 15 & 16

FB 2N, Stringer A2N, E.face = 10mm

FB 2N, Stringer A3N, E.face = 12mm

FB 3N, Stringer L3N, E.face = 4mm, W.face = 14mm

FB 4N, Stringer A4N, E.face = 10mm

FB 4N, Stringer A5N, E.face = 11 & 12mm

FB 5N, Stringer L6N - not bearing, gap (common)

FB 6N, Stringer A6N, E.face = 14mm, W.face = 8mm

FB 6N, Stringer A7N, E.face = 10mm

FB 12N, Stringer A12N E.face = 16mm, W.face = 10mm

- bottom flange has heavy corrosion.

FB 16N, Stringer A17N, E.face = 9mm, W.face = 20mm

FB 16N, Stringer B17N, E.face = 12mm

FB 9S, Stringer M9S, E.face = 10mm, W.face = 8mm

FB 9S, Stringer L9S, E.face = 3mm, W.face = 12mm

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Contract Area: 4 - Howe Sound CA

Item Notes:

- 19 . Bracing/Diaphragms Light to medium corrosion at the ends of the lateral bracings where they connect to the chords. Heavy corrosion in some gusset plates (for lateral bracing) along the top chords.
- Flanges (top edge) of some top chord horizontal bracings have been nicked by the braces (rods) of the center tram beams.
- At main span FB 19N - thick plates have been added to the underside of the worn bottom plates that are supporting the wind anchor. Thick layer of dirt has been accumulated on top of the wind anchor because of the finger joint opening above.
- Random (possible) cracks were noted in the weld at the top of the stiffener angles for the intermediate diaphragms (e.g. span 13 girder K east face - south intermediate diaphragm).
- Dirt collected on top of some of the gusset plates for the bottom lateral bracing. Medium to heavy corrosion on random bottom gusset plates, the ones in the north section (i.e. spans 10, 11, 12 & 13) have heavier corrosion.
- Light to medium corrosion on random cross frames (near the intersection) including the spacer plates.
- 20 . Truss Chords/Arch Ribs Large areas of light to heavy corrosion on the top plate of the top chord at most floor beams, caused by water leakage through the joints at the floor beams.
- Large areas of heavy rust blisters in random areas along the top chords (e.g. at spans 4S east top chord, span 11S and 17S of both top chords) and bottom chords (e.g. spans 6S, 7S, 8S, 15S, 16S and 19S).
- Random crevice corrosion along the web plates / flange angles (top and bottom chords).
- Some light buildup of dirt on the bottom chord at the bottom of the verticals with areas of light to heavy corrosion. Buildup of dirt & bird droppings on the west top chord, at south side of FB 3 in span 10.
- 22 . Truss Diagonals Small areas of pack rust along the edges of the diagonals.
- Piles of dirt have been accumulating at the lower end of some diagonals (with vegetation growing on some).
- 23 . Truss Rods/Verticals Small random areas of light to medium corrosion.
- Pier 15 east column - previous inspection indicated that about 1.6 m. deep bird droppings inside the bottom of the vertical.
- 26 . Pins/Bolts/Rivets Medium to heavy corrosion on some bolts and rivets on the top chords (mostly near the floor beams), at the base of the verticals on the bottom chords and at the stringer / floor beam connections.
- Span 10, west top chord at FB 9 - bottom bolt for the x-bracing missing.
- Span 11, east top chord at FB 9 - bottom bolt for the x-bracing missing.
- Span 12, south side of FB 8 - 2 rivets missing in top of west top chord near east edge.
- Span 10N, stringer 10M @ FB 10N - bottom bolt missing at the FB / stringer connection angle.
- Span 19S @ FB 19S - nut missing at trimmer beam in bay 6 beside stringer F.
- Span 15S @ FB 14S - nuts missing at trimmer beams at both sides of stringers B & C.
- 28 . Live Load Vibration Noticeable bouncing at some locations.

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Contract Area: 4 - Howe Sound CA

Item Notes:

- 29 . Coating (Structure) Paint is generally faded and chalking. Paint on new bracing is still in good condition.
- Light to heavy corrosion (including pack rust) on floor beams, stringer support pedestals, ends of stringers, top and bottom chords and old bracing.
- Steel members underneath the finger joints generally have some light to heavy corrosion with some dirt on them.
- Spot / light rust on the underside of the bottom chord.
- 30 . Sub Deck/Cross Ties Extensive patching of the sub deck mainly along the sides of the floor beams and random areas between. Random short hairline cracks / eff.
- South approach span - A large delamination in the east overhang near south abutment deck joint and a few medium ones randomly along the span. Diagonal crack / eff. in the north east corner of the chamber (inside).
- From south abutment to pier 13:
- Span 5N at FB 5N:
- bay 4 -a medium delam. beside stringer D.
 - bay 5 -a medium delam. beside stringer E.
 - bay 7 -a medium delam. beside stringer H.
 - bay 8 -a medium delams. beside stringers H and I.
 - bay 9 -a medium delam. beside stringer I.
- Span 21S:
- bay 1 - 1 med. delam. & 2 light delams. near mid span beside stringer A.
 - bay 2 -a delam. at FB 20S.
- Span 20N at FB 19N -a medium spall at west end.
- Span 14N at FB 14N:
- bay 1 - short medium diagonal crack beside stringer A. A medium delam. beside stringer B.
 - bay 2 - sub deck lifted up by about 2mm. A medium delams. / cracks beside stringers B and C. Some fine transverse cracks.
 - bay 3 -a medium delams. beside stringers C and D.
 - bay 12 - a large delam. patch at FB 13N.
- Span 14N at FB 13N - bay 5 - delam. patch.
- Span 10N at FB 10N:
- bay 1 -a medium delam. beside stringer A.
 - bay2 -a medium delam. in the south west corner beside stringer C.
 - bay 3 -a medium delams. beside stringers C and D.
 - bay 10 -a medium delam. beside stringer J.
 - bay 11 -a medium delam. beside stringer K.
- Span 5N at FB 5N:
- bay 1 -a small delam. beside stringer A and a medium delam. beside stringer B.
 - bay 2 -a medium delam. beside stringer B.
 - bay 12 -a medium delam. beside stringer 5M. Sub deck seems lifting up slightly from the top of the floor beam.
- Span 12: (from pier 11 to 12)
- West sidewalk panel leg at the 2nd rail post south of FB3: a medium spall with exposed reinforcements.
- Span 11: (from pier 10 to 11)
- at floor beam 8. west sidewalk support beam over floor beam has a large spall/delam.
 - North side of floor beam 8: west sidewalk panel longitudinal exterior leg has medium longitudinal cracks and delams.

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Item Notes:

31 . Wearing Surface

Resurfaced in 1996.

- numerous small patches due to the removal of contaminates (cement bag) during 1996 resurfacing.

- random fine to medium longitudinal cracks and diagonal cracks with some being sealed.

- random areas around filled joints are cracking & breaking up. Some areas have been patched & some patches are cracking as well.

Span 10:

Southbound (S/B), lane 3 west wheelpath (WWP) - light spall at pier 10 deck joint.
 N/B, lane 3 WWP - light spall at pier 10 deck joint.

Spans 11, 12 & 13:

S/B, lane 3 - random lumps of spilt & cured concrete in middle of lane.

Span 11:

FB 2 & 4: S/B, lane 2 - midsize area of broken concrete at joints.

FB 6: S/B, lane 2 WWP - medium crack on south side of joint.

Span 12:

N/B, lane 2 WWP - small spall at pier 12 finger joint.

Span 13:

FB 2: NB, lane 2 & 3, long narrow transverse patch is cracking.

MAIN ARCH SPAN

FB 16S: S/B, lane 3 WWP - large patch.

FB 7S: S/B, lane 3 - short longitudinal crack.

South approach span:

S/B - lane 2 & 3, medium to wide longitudinal & transverse cracks.

- lane 2 EWP - large area (0.6mx1m) of concrete breaking up around a patch ~10m from south end.

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Item Notes:

32 . Deck Joints

None of the finger joints have troughs below.
 Ongoing loss and replacement of fingers on the smaller sized finger joints.

2010- Resealing of the deck joints and construction joints with flexible sealant
 However, there is still some random minor leakage through joints.

Pier 10 finger joint:

- S/B 13 missing fingers. N/B 6 missing fingers.
- random fingers on the north side are ~5mm higher than the south side.
 (against traffic on N/B with traffic on S/B)

Span 10:

FB 5 filled joint: S/B, lane 2 EWP, possible seal discontinuity.

Pier 11 finger joint :

- S/B 9 missing fingers. N/B 5 missing fingers.
- north side armour is ~5mm higher than the south side.

Span 11:

FB 6 filled joint: S/B, lane 1 seal debonding by lane marker
 FB 11 filled joint: S/B, lane 3 WWP, slight seal debonding

Pier 12 finger joint :

- S/B 10 missing fingers. N/B 8 missing fingers.
- north side armour is ~5mm higher than the south side.

Span 12, FB 3 filled joint:

- S/B, lane 3 WWP - short (~200mm) seal debonding.

Pier 13 finger joint :

- medium to heavy corrosion on the underside of the fingers below the median, typical with the other finger joints.

Main Arch Span 15:

FB 4N filled joint:

- S/B, lane 3 WWP - slight seal debonding

FB 5N, FB 10N & FB 14N control joints:

- north side armour is ~10 to 15mm higher than south side.

FB 5N control joint:

- S/B, lane 3 WWP - seal is gone ~300mm
- small spall in north infill.

FB 19N finger joint (north end of drop in span):

- finger on south side are ~15mm higher than north side.
- dirt accumulating on beams below.
- 2 bolts west of stringer K under deck on south side are loose, allowing lots of movement & noise.

FB 14S, 10S & 5S control joints:

- south side armour is ~10 to 20mm higher than north side.

FB5S control joint:

- lane 2 WWP - 1m section of the seal missing.

South approach span, south end compression seal:

- minor bulging & tearing on seal below wheel paths.
- Sign of leakage / eff. along the corner of the sub deck down below.
- N/B, lane 2 WWP - small cracked area on south infill.

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Item Notes:

34 . Sidewalk(s)

Delamination & spalling around rail post connections is typical.
Some of larger spalls have exposed the post anchorage.

Light scaling on the sidewalk surface.

East sidewalk:

- some medium scaling (south approach span and span 12).
- Random delams along the traffic barrier.
- Metal plates on pier 9 joint are not level with sidewalk surface creating a tripping hazard.

West sidewalk:

- large spall at FB 13N in span 15.
- light spalls near FB 2S
- gap patched with asphalt at south end of approach span.

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Item Notes:

35 . Railings/Parapets

TRAFFIC PARAPETS:

Vertical cracks in the parapet (at Floor Beam locations)
 2nd barrier south of south end deck joint - medium spall in top SE corner.

West Parapet:

Span 10:
 2nd rail south of FB 3 - south bolt sheared off

SIDEWALK RAILING:

- Extensive light rust with random areas of medium to heavy corrosion on posts & bottom rails.
 - Random perforations in web & flanges of some posts and along bottom rail.
 - A few cracks in the lower rail brackets.
 - Random bent pickets.
 3rd joint from FB 14S - loose post

West Railing:

Span 16:
 1st post south of FB 10S - perforation in the front (60% loss of section) & back of the post.
 3rd post south of FB 10S - heavy section loss in bottom with perforation in back flange.
 1st post north of FB 10S - full width perforation in web near top rail.
 - large perforation in web near bottom rail.
 - almost full section loss in back flanges near bottom rail.
 - small perforation in front flange near mid height.
 1st post north of FB 10S - full section loss front flange.
 - only a small piece of the back flange remains at web.
 6th post north of FB 10S - full section loss front flange.
 - only a small piece of the back flange remains at web.
 7th post north of FB 10S - only half of one flange still there (~80% section loss) near bottom rail.
 8th post north of FB 10S - 2 perforations near bottom rail.

1st post north of FB 5N - small perforation in web near bottom rail.

6th post north of 10N - larger than normal spall around base 1m x 0.35m.

Span 13:

2nd post north of pier 13 - connection to bottom rail is broken.

Span 12:

- bent panel north of pier 12 at 2nd FB.
 6th post south of pier 12 - large perforation in web near bottom rail.
 3rd post south of pier 11 - web has almost full height perforation.

Span 11:

3rd, 6th & 7th posts north of pier 11 - large perforation in web at bottom rail.
 8th post north of pier 11 - full width perforation in web near bottom rail.
 - heavy section loss back flange near bottom rail.

East Railing:

Span 16:
 7th post north of s.abut finger joint - broken bottom rail connection.

Span 15:

7th post north of FB S14 - small perforation on front flange near mid height.

Span 13:

1st & 2nd posts north of pier 13 - full width crack on bottom rail connection.
 3rd post north of pier 13 - large spall exposing post anchors in base.
 3rd post south of pier 12 - medium perforation on web near bottom.

Span 12:

2nd, 5th, 6th & 7th posts south of pier 11 - large perforation in web near bottom rail.
 6th post north of pier 12 - 2 large perforation in web near top & bottom rail.

Span 11:

3rd post south of pier 11 - large perforation in web near bottom rail.

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Structure No: 01459B - IRONWORKERS MEMORIAL
 2ND NAR

Status: Open/In Use

Inspection Type: Routine Condition

Region: 1 - South Coast Region

District: 1 - Lower Mainland District

Contract Area: 4 - Howe Sound CA

Item Notes:

- 36 . Median Barrier Random traffic scrapes. Random light to large spalls in the bottom corners.
 2nd barrier south of s.abut - shifted 50mm out of line & bottom west edge spalled off
 3rd barrier north on N11 - NW edge fractured
- 37 . Drains/Pipes Some deck inlets are partially plugged, such as:
 - S/B, Span 11 @ FB 2
 - SB, Span 20S @ FB 19S
 - SB, Span 11S @ FB 10S
- 38 . Coating (Railings) Galvanized parapet railings - coating faded with random light corrosion.
 Coating on the sidewalk railing is generally faded and there are lots of areas of corrosion on the rail posts, top and bottom rails.
- 39 . Signing/Lighting Luminaires on both sides of the structure.
 West side walk:
 - Span 16 between FB 2S & 3S - turning sign has a broken U bolt connection to bottom rail.
 - Span 16 near FB 14S - 70km/hr sign has small amount of graffiti on in.
- 40 . Roadway Approaches South approach:
 N/B:
 - medium transverse cracking in all lanes, 3m from the deck end.
 - knot weed on hill just east of approach, reported and treated, confirm success of pesticides next year.
 S/B:
 - medium transverse crack from S/L east wheel path to F/L west wheel path, 3m from the deck end.
- 41 . Roadway Flares West side - No flare, 250mm high concrete curb.
 East side - 800mm high no post barrier, attached to the bridge end post. Medium spall in the south top corner of the unit near the south end of the top rail.
 Middle - Continued no post barriers followed the intermediate traffic barriers.

Inspection Notes:**General Inspection Notes**

- side travellers' tram beams - random guide plates sticking out due to the rust build up behind the plates.
- west tram beam - at span 4S - middle hanger is loose.

Rehab Work Notes

Sept. 18th, 2012

- 15. Floor Beams - Repair areas of heavy sections loss & cracks.
- 29. Coating (Structure) - recoat the corroded areas on the top and bottom chords, floor beams, gusset plates and ends of stringers.
- 35. Railings / Parapets - replace heavy corroded posts & rails.
- 41. Flares - add flare on west side of south approach.

Condition Inspection Report

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Structure No: 01459B - IRONWORKERS MEMORIAL
2ND NAR

Status: Open/In Use

Inspection Type: Routine Condition

Region: 1 - South Coast Region

District: 1 - Lower Mainland District

Contract Area: 4 - Howe Sound CA

Inspection Notes:**Maintenance Work Notes**

Sept. 18th, 2012

7. Wing / Retaining Walls - repair delam in the top of the entrance column at the south approach chamber.

10. Pier Columns:

- Pier 15 lower tie beam - clean inside & install screen to prevent birds from entering.

11. Bearings:

- replace the dust covers for the rocker bearings in south abutment and pier 13.

16. Stringers - monitor cracks in the top coping.

26. Bolts / Rivets - replace the heavily corroded bolts & rivets.

30. Subdeck - repair delams & seal cracks.

31. Wearing Surface - repair spalls & seal cracks.

32. Deck Joints - repair broken fingers & seal holes.
- tighten bolts beside stringer K at floor beam 19N.

34. Sidewalk - repair spalls.

- level sidewalk with cover plate on east sidewalk at pier 9.

36. Median Barrier - repair spalls.

37. Drains - clear drain inlets.

40. Approaches - seal transverse cracks.

41. Flares - repair spalls.

42. Traveler trails - East traveler, west track at FB N10, the guide tab at junction of joining rails is bent out causing the travelers wheels to hit it.

BRIDGE MANAGEMENT INFORMATION SYSTEM

22 Jul 2013

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Condition Inspection Report

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Structure No: 01459A - IRONWORKERS MEMORIAL
 2ND NAR

Status: Open/In Use

Inspection Type: Routine Condition

Region: 1 - South Coast Region

District: 1 - Lower Mainland District

Contract Area: 4 - Howe Sound CA

RFI: 04-A-@-00001 - Trans-Canada Hwy. E/B - ON
 04-A-@-00001W - Trans-Canada Hwy. - ON
 04-A-@-N0026 - Railway Street (North Vancouver Municipality) - UNDER

Features Crossed: TRANSCANADA/SPICER ROAD/CNR

Component Group/Component

E G F P V X N/A

HYDROTECHNICAL :

1.	Debris Risk	100					N
4.	Substructure Scour	100					N

SUBSTRUCTURE :

5.	Foundation Movement	100					N
6.	Abutments		88	10	2		N
7.	Wing/Retaining Walls		99	1			N
9.	Footings/Piling		99	1			N
10.	Pier Columns/Walls/Cribs		97	2	1		N
11.	Bearings		100				N
12.	Caps		97	2	1		N

SUPERSTRUCTURE :

17.	Girders		98	1	1		N
19.	Bracing/Diaphragms		97	2	1		N
27.	Camber/Sag	100					N
28.	Live Load Vibration	100					N

DECK :

30.	Sub Deck/Cross Ties		95	4	1		N
31.	Wearing Surface		80	20			N
32.	Deck Joints		90	10			N
34.	Sidewalk(s)		97	2	1		N
35.	Railings/Parapets		69	20	6	5	N
36.	Median Barrier		100				N
37.	Drains/Pipes		100				N
38.	Coating (Railings)		60	20	20		N

APPROACHES :

39.	Signing/Lighting	100					N
40.	Roadway Approaches	50	49	1			N
41.	Roadway Flares		100				N

1st Abutment Position: N

Year Built: 1956 Estimated? ☐

Length (m): 328.300

Note:

Main Span Length: 35.900

Main Span Type: STRINGER

Spans: 9

Urgency: 3

BCI Rating: 1.8

Adjusted BCI Rating: 1.89

Inspector/Inspected By: KENT HODGSON

On 2012/09/18

Amendment/Partial Inspection?

Urgency Notes:

Urgency Rating Note: - repair delams., spalls and cracks in the abutment, columns and caps.
 - rehab sidewalk railing.

Item Notes:

6 . Abutments

North abutment:

- numerous cracks including map cracking / eff. in the ballast wall.
 - a large delam. under girder 1E.
 - fine to medium horizontal cracks near the top between girders 1J & 1L.
 - a medium delam. near the top of the breast wall at bay 11.
 - numerous medium to wide vertical cracks with some fine map cracking in the front face (mostly under girder 1G and between girders 1H & 1I).

- concrete slope protection - a large cavity under the top berm at the east wing wall. Wide horizontal cracks in mid height, west half only. Weed / grass growing in the cracks. Concrete broke off at the toe under deck.

South abutment - pier 9.

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Condition Inspection Report

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Structure No: 01459A - IRONWORKERS MEMORIAL
 2ND NAR

Status: Open/In Use

Inspection Type: Routine Condition

Region: 1 - South Coast Region

District: 1 - Lower Mainland District

Contract Area: 4 - Howe Sound CA

Item Notes:

- 7 . Wing/Retaining Walls - fine map cracking in both wing / retaining walls.
- 9 . Footings/Piling
- Pier 1:
- fine to medium random vertical cracks in the sides. Light scaling.
 - a medium (quite shallow) spall from fire on the north side near center of the footing.
- Pier 2 :
- a few random transverse cracks across the top. Light scaling.
 - random longitudinal cracks on the top.
- Piers 5 to 9:
- light scaling on the top and sides, some map cracks at pier 7.
- 10 . Pier Columns/Walls/Cribs
- PIER 4:
- Column 1 - light scaling. A short medium vertical crack in the east corner of the south face at the cap.
 - Column 2 - south face - full height fine to wide vertical crack / delam. in the west corner.
- PIER 5 - Repaired.
- Column 1 - west face - a wide vertical crack 2m long under cap.
- PIER 6 - Repaired.
- Column 1:
 - west face - a wide 2m long vertical crack near north edge below cap.
 - Column 2: a 1m long medium crack at SW corner bottom.
- PIER 7 - some medium vertical cracks with map cracks at the bottom.
- Column 1:
 - north face - 2 medium, a large delam. near the east edge at ~ mid height. 2 large delams. in the north west corner in the upper half of the column.
 - east face - fine map cracking / some eff. in the middle of the column near the top.
 - south face - several fine vertical cracks near top.
 - Column 2:
 - north face - 3 medium delams. near east edge at mid height. Several small to medium delam. near the west edge at mid height.
 - east face - A large delam. in the north edge at mid height.
 - south face - A small delam. in the west top corner below the cap. A few fine to med. vertical cracks especially along the west edge. A large delam. in west corner at mid height. A med. delam. in the west corner at ~ 5 m. above the reinforced section.
 - west face - A large delams. in the north and south edges at ~ mid height. Med. and small delams. near the south edge at ~ 4 m. above the reinforced section.
- PIER 8:
- light scaling. Some medium vertical / horizontal cracks with some eff. at the bottom.
 - Column 2:
 - north face - A med. delam. along the top below the cap. A large delam. in the west corner at ~ 4 m. below the cap & extend. into the west face.
 - south face, west corner - small and medium delams. near the top, med. delam. near mid height.
 - west face - A large delam. in the north corner at ~ 4 m. below the cap & extend. into the north face. A Med. delam. in middle of the col. at mid height. Small and medium delams. in the south corner near the top. A Med. delam. in the south corner near mid height.
- 11 . Bearings
- Steel sliding bearings at North abutment with seismic restraint blocks installed around bearing pad.

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District: 1 - Lower Mainland District

Contract Area: 4 - Howe Sound CA

Item Notes:

12 . Caps

PIER 1:

- light scaling and general wearing.
- north face - numerous fine shrinkage cracks. A wide vertical crack (with delam. from the west face) near west edge.
- east face - wide vertical cracks near the north edge, a short diagonal cracks is at SE bottom corner.
- a large delam at the bottom edge.
- west face - a medium delam. near north edge. Med. delam. in the bottom & extended into the underside.
- west overhang - fine shrinkage cracks with eff. near west end.
- underside - some medium map cracks along both sides of the cap between the columns.

PIER 2:

- north face - medium vertical / horizontal cracks / eff. in mid height under bay 3.
- both overhangs - shrinkage (map) cracks / eff. (end face & underside).

PIER 4:

- north face - some fine horizontal cracks.
- south face - medium efflorescence near east end.
- underside - some fine map cracks.
- both overhangs - extensive shrinkage cracks with eff. (vertical faces & underside).

PIER 5:(Repaired)

- underside - fine to medium map cracking and longitudinal cracks.
- east overhang - a medium delam in the south top corners, east face. Several fine cracks/some with eff.(esp. near north edge) in the east face. Large delam./med. spall in the east top corner.

PIER 6:

- Repaired.

PIER 7:

- north face - 2 small delams. in the bottom corner under bay 4.
- south face - large patch in the top corner under girder 8A.
- both overhangs - light scaling, fine cracks / eff. in both ends of the cap but heavier in the west end.
- underside - some fine cracks.

PIER 8:

- light scaling on both ends.
- underside - wide horizontal crack near the north edge. Large delams. in the north edge under bay 4, under bay 6 and beside col. 2.
- west overhang - cracks / heavy efflorescence in the underside.

PIER 9:

- underside - large delams. between the columns.

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Contract Area: 4 - Howe Sound CA

Item Notes:

17 . Girders

Light scaling with exposed steel chairs causing rust staining on the underside of the bottom flanges of several girders.
 Small to medium random spalls in the bottom flanges of the girders over the bearings.

Span 1:

- medium spalls around the bearings on girders B, C, D, G, H, I, K and L at the north abutment.
- fine horizontal cracks in the outside face of top flange of the exterior girders.
- girder 1B - tiny chips along the underside of the bottom flange due to extensive exposed metal rebar supports.
- girder 1E - a medium delam in east bottom flange.
- girder 1H - a medium spall in upper flange near abutment.
- girder 1K - a medium spall in upper flange north of the 1st intermediate diaphragm and a light spall in the top flange (east side) between two intermediate diaphragms.

Span 2:

- girder 2A - a light spall / exposed rebar in the west bottom edge at north side of the north intermediate diaphragm.
- girder 2L - 2 horizontal cracks in the south end at pier 2.

Span 3 - random areas of light scaling on the underside of the bottom flanges.

Span 4:

- girder 4A - a strip spall in the east side bottom edge at the south side of the north intermediate diaphragm. Fine vertical cracks at pier 4.

Span 5:

- random areas of light scaling in the underside of the bottom flanges.
- girder 5A - fine horizontal and vertical cracks in the south end.

Span 6:

- fine horizontal cracks in both ends of girders 6K & 6L.
- girder 6L at pier 7 - a small delam. in the bottom flange on the west face.

Span 7:

- fine horizontal crack in the ends of outside girders.
- girder 7A at pier 7 - wide crack in the top of the exterior end block.

Span 8:

- girder 8A - fine longitudinal cracks in the underside near pier 7.

Span 9:

- girder 9A - a wide vertical crack in the exterior face at pier 8.
- girder 9G - a medium delam. in the southeast bottom corner next to bearing at pier 9.

19 . Bracing/Diaphragms

- small areas of poorly consolidated concrete in the bottom of most diaphragms between piers.
- horizontal cracks in the bottom of the diaphragms at piers 5, 6 and 8.

North abut. - bay 1 - a large patch in the bottom beside girder 1A.

Pier 1 - several patches in the bottom of span 1 diaphragms.

Pier 3, span 3, bay 3 - a large spall / delam. / exposed rebar in the bottom corner.

Pier 5 - small spalls in the south side diaphragms.

Pier 8, span 9, bay 4 - a large delam. / spall / exposed 10M rebars in the end diaphragm.

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Contract Area: 4 - Howe Sound CA

Item Notes:

- 30 . Sub Deck/Cross Ties Galvanized corrugated steel panels between each girder. Some small random areas of light corrosion. Light to medium corrosion on the steel in the center bay in all spans below the median barrier.
- Span 1, east overhang - random light spalls with some exposed rebar in the underside of the sidewalk support beams.
- Span 4, east overhang - first support beam from pier 3 -a large spall / wide cracks near the top, north face.
- Span 7, east overhang - first support beam from pier 7 has a large spall / exposed rebars in the top south corner and fifth support beam from pier 7 has a large delamination.
- Span 9, west overhang - the first two support beams from pier 9 have two medium spall/exposed rebars.
- 31 . Wearing Surface New concrete overlaid in 1996. General wear/abrasion under wheel paths. Small random patches where pieces of cement bags were removed, from overlay. Patches are generally 50mm x 50mm or 75mm x 75mm in size.
- North Bound:
- random fine to medium longitudinal & transverse cracks.
 - some diagonal cracks near drain inlets & joints.
- Pier 4, just south of joint infill, a wide transverse crack in lane 2 & 3.
- Span 7 close to pier 6 - lane 1, 5 small rough patches.
- lane 3, medium transverse & longitudinal cracks with a medium rough patch in east wheel path.
- South Bound:
- light scaling along all wheel paths on upward slope from north abutment to span 5.
 - random medium transverse cracks and longitudinal cracks.
- 32 . Deck Joints New joints installed 2001-2002. Compression seals are compressed to ~50mm. All deck joints cover with dirt. Sidewalk joints are leaking as they are just sliding plates.
- North abutment, compression seal:
- signs of leakage below
- S/B, lanes 2 & 3 - light map cracking in north infill.
- N/B, lane 3 - light scaling on joint infill.
- Pier 7, N/B lane 1 - medium spall / concrete breaking on south infill
- light spall exposing anchors on north infill.
- Pier 8, N/B lane 2 - seal squeeze upward & slightly worn near the east side marker.
- Pier 9, S/B - newly sliding plate joint installed in 2010.

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District: 1 - Lower Mainland District

Contract Area: 4 - Howe Sound CA

Item Notes:

34 . Sidewalk(s)

- Light scaling & abrasion exposing aggregate.
- Random cracks and small to medium spalls in the concrete supports for the sidewalk on both sides.

East sidewalk:

- pier 1 - south side of joint is higher by ~ 20mm (east half) & ~30mm (west half).
 - East half, has been ramped up with asphalt. - West half, plate bent down to match deck.
- piers 2 - steel plate is 20mm higher than the ground.
- span 3 - 1st panel south of pier 2 - ~70mm gap.
- piers 3 - steel plate is 20mm higher than the ground.
- pier 4 - tiny spalls along the south side of the floor plate.
- pier 6 - plate raised 20mm & 20mm gap south of steel plate.
- pier 7 - steel plates ~30mm higher than sidewalk, there is a asphalt ramp to level out surface.
- pier 8 - steel plates ~10mm higher than sidewalk.
- pier 9 - plate raised ~ 25mm on the east half of walkway.

West sidewalk:

- pier 1 - steel plate loose & raised 25mm on north edge.
 - spall on north side of joint, with raised plate, creates a tripping hazard
- pier 4 - tiny spalls along the south side of the floor plate.
- span 8 near pier 7 some protruding rebar in panel joint.

35 . Railings/Parapets

Traffic parapets:

- random fine vertical cracks / some with eff.
- west parapet at north abutment - a large spall in the top with exposed anchor bolts in the back face.

Sidewalk railing:

- Extensive light rust with random areas of medium to heavy corrosion on posts & bottom rails.
- Random perforations in web & flanges of some posts and along bottom rail.

East railing:

- Span 1: large perforation (80% section loss) on bottom rail near midspan.
- Span 2: 2 posts top web perforation.
- Span 3: 1 post, web top & flange bottom large perforation and
 - 2 post, perforation in web at mid height.
- Span 4, 5: post web bottom has perforation.
- Span 6: 3rd post south of pier 5 - bottom rail connection large section loss.
 - 6th post south of pier 5 - bottom rail connection completely rusted.
- Span 7: 2 post web perforation at bottom rail.
- Span 8: 1 post web top perforation.
 - 2 areas of heavy corrosion in bottom rail near midspan.

West railing:

- 9 corroded fully corroded bottom rails are detached from posts.
- Span 2: 3rd rail from pier 2 - large perforation (70% section loss) on bottom rail.
- Span 5: bottom rail near pier 5 has completely rusted through.
- Span 7: 4th rail from pier 7 - bottom rail connection has completely rusted through.

38 . Coating (Railings)

Galvanized coating fading.

Painted coating on the sidewalk railing has generally faded and there are extensive areas where the railings and posts have light to heavy corrosion.

39 . Signing/Lighting

No signs but there are luminaires on both sides of the structure.

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Status: Open/In Use

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Region: 1 - South Coast Region

District: 1 - Lower Mainland District

Contract Area: 4 - Howe Sound CA

Item Notes:

- 40 . Roadway Approaches**
- North bound:**
 - lane 2 & 3 - newer asphalt.
 - fast lane - small transverse crack starting 3m from deck end similar to S/B.
- South bound:**
 - medium transverse cracking in all lanes, 3m from deck end to N/B.
 - some short wide transverse cracks in the joint in fill.

- 41 . Roadway Flares**
- East side - 300mm high concrete curb.**
- West side - approx. 30 m. extension of the concrete parapet and railing tapers down to 300mm concrete curb.**
- Middle - Continuous intermediate traffic barriers.**

Inspection Notes:**Rehab Work Notes**

Sept. 18th, 2012

35. Railings/Parapets: Buckland and Taylor beginning preliminary planning for sidewalk widening and new railing.

Maintenance Work Notes

Sept 18th, 2011

6. Abutment:
 - repair spalls, delams & seal cracks.
 - repair slope protection.
10. Pier Columns - repair delams. & spalls on pier 4 & 8.
12. Caps - repair spalls & delams in pier 1, 5, 8 & 9.
17. Girders - repair spalls & seal cracks.
30. Subdeck - repair spalls.
32. Deck Joints - repair spalls & seal cracks in the joint infill.
34. Sidewalk(s):
 - level the remaining floor plates at the piers with asphalt ramps.
 - seal gaps between panels & patch over exposed rebar.
35. Railings / Parapets:
 - repair the spall in west parapet at north abutment.
40. Approaches - seal transverse cracks.