# BRIDGE INSPECTION

| | |
|---|---|
| **BRIDGE NO./NAME** | **62- 003A: Farwell Canyon FSR (21.00 KM)** |
| **Inspection Date:** | September 12th 2012 |
| **Inspected By:** | D. Chen, J. Rupar Gilliatt |
| **Year Built:** | 2007 |
| **Number of Spans:** | 3 |

| | |
|---|---|
| **Span Lengths:** | Span 1 – 39,000 mm<br>Span 2 – 39,800 mm<br>Span 3 – 15,400 mm |
| **Superstructure Type:** | Two steel plate girders. |
| **Deck:** | Pre-cast concrete composite panels. |
| **Deck Structural:** | Not applicable. |
| **Curb:** | Cast in place concrete parapet and Ministry standard sidewalk railing. |
| **Substructure:** | Camp end Abutment:<br>Cast in place concrete abutment with precast concrete ballast wall and wing walls.<br><br>Woods end Abutment:<br>Cast in place concrete abutment, breast wall and wing walls.<br><br>Piers:<br>Cast in place concrete base and footing, with steel pipe columns and bracing.<br>Weathering steel cap beam. |

# BRIDGE INSPECTION

## GENERAL BRIDGE CONDITION:

| | |
|---|---|
| **Superstructure Condition:** | Good |
| **Substructure Condition:** | Good |
| **Deck Condition:** | Fair |
| **Load Posting:** | No sign noted. |
| **Date for the Next Close Proximity Inspection:** | 2017 |
| **Projected Replacement Date:** | 2082 (Assumed 75 year design life) |

## BRIDGE INSPECTION SUMMARY/ RECOMMENDATIONS:

The bridge is generally in good condition. The 3 delaminating grout pockets were noted in the concrete deck. We recommend these grout pockets are repaired in order to ensure composite action between the deck and girders is maintained.

The deck joints at the camp end as well as at piers 1 & 2 have failed. We recommend replacing these joints to prevent deterioration of the steel superstructure and substructure, which will experience increased rates of corrosion when exposed to runoff from the deck.

## INSPECTION NOTES:

**Approaches:**

- The approaches are generally in fair condition.
- Loose gravel and potholes at the camp end abutment joint and potholes in the woods end approach.
- The maximum speed is posted at 30km/hr.
- The road surface is below the level of the deck at the camp end.
- A drainage channel has formed adjacent to the camp end approach.
- Concrete approach barriers are typically not connected to the parapet.
- Minor spalls on the camp end barrier and a downstream section has overturned.
- Spall in woods end downstream barrier at the interface with the parapet, and the upstream barrier bull nose is not connected.

**Deck:**

- The deck is generally in fair condition.
- There are typical hairline cracks in the parapet at approximately 1 m spacing. A few spalls were noted in parapet.
- Typical longitudinal hairline cracks extend from the downstream grout pockets on a number of panels. Minor spalls & wear was noted at the transverse grouted deck panel joints.
- Deck panel #16 woods end downstream grout pocket is delaminated.
- Deck panel #17 camp end downstream grout pocket is delaminated.
- Deck panel #32 woods end downstream grout pocket is delaminated.
- The camp end abutment joint is leaking.
- The joint seals at Piers 1 & 2 are debonded; seals are damaged in the roadway and have failed in the sidewalk.

- The woods end abutment joint is filled with debris.
- Debris is accumulating on the bridge deck with light wear in the wheel tracks.
- The scupper in the parapet at the woods end is partially blocked and the drain below the scupper is also blocked.

**Abutments:**

- The abutments are generally in good condition.
- Staining noted on the camp end ballast wall from the leaking deck joint.
- Minor bulging and deformation of the camp end bearings with the keeper bars cutting into the bearings.
- The woods end bearings are slightly deformed and bulging.
- There are signs of pooling water on the camp end bearing seat.
- There is a 0.5 mm wide vertical crack noted extending full height of the woods end breast wall, with minor scour noted under upstream corner of the footing.
- Light discolouration of the weathering steel bearing plates.
- There is minor erosion of the camp end embankment fill.
- A large drainage channel from the roadway was noted at the downstream corner of camp end abutment.

**Piers:**

- Pier 1 is generally in good condition.
- The bearings are bulging and deformed.
- There is a 1 mm crack extending the height of the concrete base of pier 1.
- Typical hairline cracks noted in the face of the base, along with isolated honey combing and scaling on the woods end face, form work ties are also protruding from the concrete.
- There was limited access to woods end face.

- Pier 2 is generally in good condition.
- The downstream bearing is spilt and bulging/deformed.
- Vacant bolt holes in the cap beam where field welds have been used.
- Debris accumulating on the cap beam.
- Minor pitting of weathering steel cap beam.
- Limited access to the concrete base.

**Girders:**

- The girders are generally in good condition.
- Light corrosion was typically noted on the top flange at grouted panel joints, with flaking and pitting noted at two locations.
- Water dripping from the grouted panel joints is causing light surface corrosion of bottom flange in places.
- The bottom plan bracing is field welded rather than bolted.

# BRIDGE INSPECTION

## LIST OF MAINTENANCE ITEMS TO BE COMPLETED:

| Items | Description | Priority |
|---|---|---|
| 1. | Repair delaminated deck panel grout pockets. | High |
| 2. | Replace damaged/failed deck joints. | Medium |
| 3. | Flush abutment joints. | Low |
| 4. | Realign and connect approach barriers as required. | Low |
| 5. | Clear deck drain and scuppers. | Low |
| 6. | Clear debris from deck. | Low |

## MONITOR DURING FUTURE INSPECTIONS:

1. Monitor condition of bearings.
2. Monitor erosion channel adjacent to camp end approach.
3. Monitor the extent of corrosion on the girder flanges beneath the grouted deck panel joints.

Prepared by:

Jamie Rupar Gilliatt M.Eng., EIT.
Project Engineer

Reviewed by:

David Chen, P.Eng.
Project Manager

Attached:

1. CBR Report
2. Annotated Photo Sheets

# BRIDGE INSPECTION

**NOTES:**

Directional & Numbering Conventions Used:
Girders and piles are numbered from upstream to downstream. Left end or right end is determined facing downstream (except for delineators). Spans and piers are numbered from the left end when facing downstream.

Projected Replacement Date:
The projected date for the bridge replacement is based on the remaining service life of the bridge. We estimate the remaining service life as the greater of:

For Glulam Girder Bridges:
1. Original design life, typically 50 years.
2. If a bridge is nearing the end of its estimated service life but is still in fair condition, we recommend that the Ministry assume a remaining service life of five years.

For Steel and Concrete Bridges:
1. Original design life, typically 60 years.
2. If a bridge is nearing the end of its estimated service life but is still in fair condition, we recommend that the Ministry assume a remaining service life of ten years.

Condition Ratings:

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

Maintenance Priority (Typical Usage):

| | |
|---|---|
| High: | Critical items that need to be addressed to protect safety of users (curbs, structural decks, delineators, major structural repairs, etc.); schedule work immediately. |
| Medium: | Items that maintain the service life of the bridge (wearing planks, deck joints, etc.) |
| Low: | Items that will extend the service life of the structure or general maintenance. |

Cost Estimate:
The cost estimate for individual maintenance items, shown in the CBR report, reflects the cost of materials and labour for completing a task; it does not include any costs associated with mobilization, demobilization, engineering or contract administration.

Date Printed: 2013/03/28
User Id: BCEID\WRILEY1
Database: PROD
Report Id: CBR001A

# BC Ministry of Forests and Range

*Permanent Bridge Inspection Report*

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Structure #:** | 62-003A | **Site #:** | 62-003 | **Road Name:** | FARWELL CANYON FSR | **Inspection Date:** | 2012/09/12 |
| **KM:** | 19.00 | **User km:** | 21.00 | **Crossing Name:** | Chilcotin R | **Next Inspection Date:** | 2012/08/20 |
| **Project File ID #:** | 6970 | **Br.** | 01 | **Forest District:** | Central Cariboo Forest District | | |

| | | | | | |
|---|---|---|---|---|---|
| **Deck Type:** | Concrete | | **Running Surface:** | Concrete | |
| **Superstructure** | Steel I-beam | | **Abutments (Left/Right):** | Concrete Precast | |
| **Total Length** *(metres)*: | 95.0 | **# Spans:** | 3 | **Span Length(s)** *(metres)*: | 39, 39.8, 15.4 |
| **UTM Zone:** | 10 | **UTM Easting:** | 530109 | **UTM Northing:** | 5741990 |
| **Inspector Name:** | D. Chen, J. Rupar | **Year Built:** | 2007 | | |
| **Access:** | | | | | |

## ABUTMENTS

| | | |
|---|---|---|
| **Bearings** | Fair | Minor bulging and deformation of the camp end bearings with the keeper bars cutting into the bearings. The woods end bearings are slightly deformed and bulging. |
| **Bracing** | Not Applicable | |
| **Ballast Wall** | Good | Staining noted on the camp end ballast wall from the leaking deck joint. |
| **Concrete Precast** | Good | |
| **Corrosion Protection** | Good | Light discolouration of the weathering steel bearing plates. |
| **Caps or Sills** | Good | Signs of pooling water on the camp end bearing seat. There is a 0.5 mm wide vertical crack noted extending full height of the woods end breast wall, with minor scour noted under upstream corner of the footing. |
| **Fill** | Good | Minor erosion of the camp end embankment fill. A large drainage channel from the roadway was noted at the downstream corner of camp end abutment. |
| **Hardware** | Not Applicable | |
| **Piles or Posts** | Not Applicable | |
| **Riprap** | Not Applicable | |
| **Wing Wall** | Good | |

## APPROACHES

| | | |
|---|---|---|
| **Alignment** | Good | |
| **Bridge Ahead Signs Missing** | 0 | Maximum speed posted 30km/hr. |
| **Brushing Required** | No | |
| **Delineator Missing Left** | 0 | Camp end: wide delineator. Woods end: wide delineator. |
| **Delineator Missing Right** | 0 | Camp end: wide delineator. Woods end: wide delineator. |
| **Fender Condition** | Fair | Concrete approach barriers are typically not connected to the parapet. Minor spalls on the camp end barrier and a downstream section has overturned. Spall in woods end downstream barrier at the interface with the parapet, and the upstream barrier bull nose is not connected. |

# BC Ministry of Forests and Range

*Permanent Bridge Inspection Report*

| Structure #: | 62-003A | Site #: | 62-003 | Road Name: | FARWELL CANYON FSR | Inspection Date: | 2012/09/12 |
|---|---|---|---|---|---|---|---|

| | | |
|---|---|---|
| **Road Surface** | Fair | Loose gravel and potholes at the camp end abutment joint and potholes in the woods end approach. The road surface is below the level of the deck at the camp end. A drainage channel has formed adjacent to the camp end approach. |

## DECK

### Span 1

| | | |
|---|---|---|
| **Concrete Deck** | Fair | Typical longitudinal hairline cracks extend from the downstream grout pockets on a number of panels. Minor spalls & wear was noted at the transverse grouted deck panel joints. |
| **Curb Rail/Blocks/Posts** | Good | There are typical hairline cracks in the parapet at approximately 1 m spacing. A few spalls were noted in the parapet. |
| **Deck Joints** | Poor | The camp end abutment joint is leaking. |
| **Grout Pockets** | Fair | Delaminating grout pockets, see AE Inspection Summary for details. |
| **Hardware** | Not Applicable | |
| **Hand Rails/Walkouts** | Good | Pedestrian sidewalk railing. |
| **Overall Deck Condition** | Fair | |
| **Running Surface** | Good | Debris is accumulating on the bridge deck with light wear in the wheel tracks. |

### Span 2

| | | |
|---|---|---|
| **Concrete Deck** | Fair | Typical longitudinal hairline cracks extend from the downstream grout pockets on a number of panels. Minor spalls & wear was noted at the transverse grouted deck panel joints. |
| **Curb Rail/Blocks/Posts** | Good | There are typical hairline cracks in the parapet at approximately 1 m spacing. A few spalls were noted in parapet. |
| **Deck Joints** | Poor | The joint seals at Piers 1 & 2 have debonded and are damaged in roadway and have failed in the sidewalk. |
| **Grout Pockets** | Fair | Delaminating grout pockets, see AE Inspection Summary for details. |
| **Hardware** | Not Applicable | |
| **Hand Rails/Walkouts** | Good | Pedestrian sidewalk railing. |
| **Overall Deck Condition** | Fair | |
| **Running Surface** | Good | Debris is accumulating on the bridge deck with light wear in the wheel tracks. |

### Span 3

| | | |
|---|---|---|
| **Concrete Deck** | Fair | Typical longitudinal hairline cracks extend from the downstream grout pockets on a number of panels. Minor spalls & wear was noted at the transverse grouted deck panel joints. |
| **Curb Rail/Blocks/Posts** | Good | There are typical hairline cracks in the parapet at approximately 1 m spacing. A few spalls were noted in parapet. |
| **Deck Joints** | Poor | The woods end abutment joint is filled with debris. |
| **Grout Pockets** | Fair | Delaminating grout pockets, see AE Inspection Summary for details. |
| **Hardware** | Not Applicable | |
| **Hand Rails/Walkouts** | Good | Pedestrian sidewalk railing. |
| **Overall Deck Condition** | Fair | |

# BC Ministry of Forests and Range

*Permanent Bridge Inspection Report*

| Structure #: | 62-003A | Site #: | 62-003 | Road Name: | FARWELL CANYON FSR | Inspection Date: | 2012/09/12 |
|---|---|---|---|---|---|---|---|

| | | |
|---|---|---|
| **Running Surface** | Good | Debris is accumulating on the bridge deck with light wear in the wheel tracks. The scupper in the parapet at the woods end is partially blocked and the drain below the scupper is also blocked. |

## PIERS

### Pier 1

| | | |
|---|---|---|
| **Bearings** | Fair | The bearings are bulging and deformed. |
| **Bracing or Sheathing** | Unrated | Limited access due to length of steel pipe columns. |
| **Caps** | Good | Weathering steel pier cap. |
| **Cribs** | Not Applicable | |
| **Dolphins** | Not Applicable | |
| **Hardware** | Good | |
| **Overall** | Good | |
| **Piles or Posts** | Unrated | Limited access due to length of steel pipe columns. |
| **Riprap** | Not Applicable | |
| **Wall** | Good | There is a 1 mm crack extending the height of the concrete base of pier 1. Typical hairline cracks noted in the face of the base, along with isolated honey combing and scaling on the woods end face, form work ties are also protruding from the concrete. Limited access to woods end face. |

### Pier 2

| | | |
|---|---|---|
| **Bearings** | Fair | The downstream bearing is spilt and bulging/deformed. |
| **Bracing or Sheathing** | Good | Limited access due to length of steel pipe columns. |
| **Caps** | Good | Weathering steel pier cap. Vacant bolt holes in the cap beam where field welds have been used. Debris accumulating on the cap beam. Minor pitting of weathering steel cap beam. |
| **Cribs** | Not Applicable | |
| **Dolphins** | Not Applicable | |
| **Hardware** | Good | |
| **Overall** | Good | |
| **Piles or Posts** | Good | Limited access due to length of steel pipe columns. |
| **Riprap** | Not Applicable | |
| **Wall** | Unrated | Limited access to the concrete base. |

## SUPERSTRUCTURE

### Span 1

| | | |
|---|---|---|
| **Bracing** | Good | The bottom plan bracing is field welded rather than bolted. |
| **Diaphrams** | Good | |
| **Girders** | Good | Light corrosion was noted on the top flange at grouted panel joints, with flaking and pitting noted at two locations. Water dripping from the grouted panel joints is causing light surface corrosion of bottom flange in places. |
| **Hardware** | Good | |

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# BC Ministry of Forests and Range

*Permanent Bridge Inspection Report*

| Structure #: | 62-003A | Site #: | 62-003 | Road Name: | FARWELL CANYON FSR | Inspection Date: | 2012/09/12 |
|---|---|---|---|---|---|---|---|

## SUPERSTRUCTURE

| | | |
|---|---|---|
| **Under Trussing** | Not Applicable | |
| **Span 2** | | |
| **Bracing** | Good | The bottom plan bracing is field welded rather than bolted. |
| **Diaphrams** | Good | |
| **Girders** | Good | Light corrosion was noted on the top flange at grouted panel joints, with flaking and pitting noted at two locations. Water dripping from the grouted panel joints is causing light surface corrosion of bottom flange in places. |
| **Hardware** | Good | |
| **Under Trussing** | Not Applicable | |
| **Span 3** | | |
| **Bracing** | Good | The bottom plan bracing is field welded rather than bolted. |
| **Diaphrams** | Good | |
| **Girders** | Good | Light corrosion was noted on the top flange at grouted panel joints, with flaking and pitting noted at two locations. Water dripping from the grouted panel joints is causing light surface corrosion of bottom flange in places. |
| **Hardware** | Good | |
| **Under Trussing** | Not Applicable | |

## CHANNEL

| | | | |
|---|---|---|---|
| **Estimated Present Water Level Depth:** | 2.0 | **Estimated Present Water Level Width:** | 30.0 |
| **Estimated High Water Level Clearance:** | 50.0 | | |

## HAZARDS

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **High Water:** | Yes | **Scour:** | No | **Ice:** | No | **Debris:** | No | **Aggradation:** | No |

**Comment:** Previous inspection photos indicate water level can increase dramatically.

## REPAIRS

| # | Status | Priority | Estimate | Description |
|---|---|---|---|---|
| 1 | Recommended | High | $5,000.00 | Repair delaminated deck panel grout pockets. |
| 2 | Recommended | Medium | $10,000.00 | Replace damaged/failed deck joints. |
| 3 | Recommended | Low | $500.00 | Flush abutment joints. |
| 4 | Recommended | Low | $500.00 | Realign and connect approach barriers as required. |
| 5 | Recommended | Low | $150.00 | Clear deck drain and scuppers. |
| 6 | Recommended | Low | $450.00 | Clear debris from deck. |
| 7 | Recommended | Low | $0.00 | N/A |

## MONITORS

| # | Description |
|---|---|
| 1 | Monitor condition of bearings. |
| 2 | Monitor erosion channel adjacent to camp end approach. |
| 3 | Monitor the extent of corrosion on the girder flanges beneath the grouted deck panel joints. |

Date Printed: 2013/03/28
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# BC Ministry of Forests and Range

*Permanent Bridge Inspection Report*

| Structure #: | 62-003A | Site #: | 62-003 | Road Name: | FARWELL CANYON FSR | Inspection Date: | 2012/09/12 |
|---|---|---|---|---|---|---|---|

**GENERAL**

| | | | | | |
|---|---|---|---|---|---|
| **Professional Inspection Required?** | No | **Regional Review Date:** | | **P. Eng Reviewer Name:** | |
| **Replacement Date for full log haul traffic** *(year)*: | 2082 | **Replacement Date for light vehicle traffic** *(year)*: | 2082 | | |
| **Current Load Rating GVW** *(tonnes)*: | 68 | **Design Load GVW** *(tonnes)*: | 68 | **Design Vehicle Config.:** | CL625 |
| **Inspector's Estimated Full Log Haul Replacement** *(year)*: | 2082 | | | | |

| | |
|---|---|
| **Inspector's Comment:** | The bridge is generally in good condition. The 3 delaminating grout pockets were noted in the concrete deck. We recommend these grout pockets are repaired in order to ensure composite action between the deck and girders is maintained.<br><br>The deck joints at the camp end as well as at piers 1 & 2 have failed. We recommend replacing these joints to prevent deterioration of the steel superstructure and substructure, which will experience increased rates of corrosion when exposed to runoff from the deck. |
| **PEng Reviewer's Comment:** | |
| **District Staff Comment:** | |

# BRIDGE INSPECTION REPORT

**BRIDGE INSPECTION PHOTOS**

Associated Engineering | GLOBAL PERSPECTIVE. LOCAL FOCUS.

BRITISH COLUMBIA | Ministry of Forests, Lands and Natural Resource Operations

| Structure # | Crossing Name | Forest Service Road | User km | CBR km | | |
|---|---|---|---|---|---|---|
| 62-003A | Chilcotin River | Farewell Canyon | 19.00 | 21.0 | | |

***Figure 1-1: Upstream elevation.***

***Figure 1-2: Downstream elevation.***

***Figure 1-3: Looking towards camp end.***

***Figure 1-4: Looking towards woods end.***

***Figure 1-5: Looking upstream.***

***Figure 1-6: Looking downstream.***

| Structure # | Crossing Name | Forest Service Road | User km | CBR km | | |
|---|---|---|---|---|---|---|
| 62-003A | Chilcotin River | Farewell Canyon | 19.00 | 21.0 | | |

***Figure 1-7: Camp end downstream barrier overturned.***

***Figure 1-8: Woods end abutment joint.***

***Figure 1-9: Upstream sidewalk condition.***

***Figure 1-10: Typical parapet condition, note vertical crack.***

***Figure 1-11: Typical connection between approach barrier and parapet, woods end upstream shown.***

***Figure 1-12: Typical deck condition.***

| Structure # | Crossing Name | Forest Service Road | User km | CBR km | | |
|---|---|---|---|---|---|---|
| 62-003A | Chilcotin River | Farewell Canyon | 19.00 | 21.0 | | |

***Figure 1-13: Marked delaminating grout pockets.***

***Figure 1-14: Typical deck panel joint condition.***

***Figure 1-15: Pier 1 sidewalk joint, failed.***

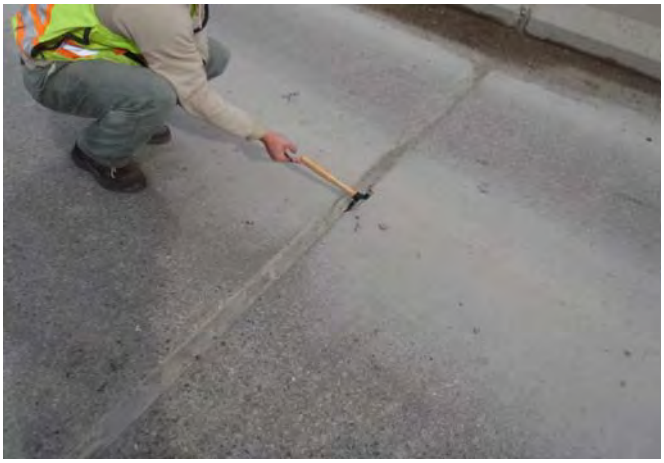

***Figure 1-16: Pier 2 joint sealant debonded.***

***Figure 1-17: Woods end upstream drain blocked.***

***Figure 1-18: Typical sub deck and bracing condition, note staining around panel joints.***

| Structure # | Crossing Name | Forest Service Road | User km | CBR km | | |
|---|---|---|---|---|---|---|
| 62-003A | Chilcotin River | Farewell Canyon | 19.00 | 21.0 | | |

***Figure 1-19: Typical corrosion of top flange at panel joint.***

***Figure 1-20: One location of steel flaking and pitting of top flange adjacent to grouted joint.***

***Figure 1-21: Typical girder condition, span 2 upstream shown.***

***Figure 1-22: Camp end abutment, water staining of ballast wall.***

***Figure 1-23: Camp end upstream bearing, note signs of water accumulation on bearing seat.***

***Figure 1-24: Typical deformation of camp end bearings.***

| Structure # | Crossing Name | Forest Service Road | User km | CBR km | | |
|---|---|---|---|---|---|---|
| 62-003A | Chilcotin River | Farewell Canyon | 19.00 | 21.0 | | |

***Figure 1-25: Drainage channel adjacent to camp end abutment.***

***Figure 1-26: Woods end abutment.***

***Figure 1-27: Woods end downstream bearing, corrosion staining on breatswall.***

***Figure 1-28: Woods end abutment, full height crack.***

***Figure 1-29: Typical bulging and deformation of pier 2 bearings, downstream shown.***

***Figure 1-30: Typical bulging and deformation of pier 1 bearings, downstream shown.***