P05 – Looking west
(DSCN0036.jpg)

P06 – Looking east
(DSCN0037.jpg)

P07 – North end of the bridge
(DSCN0038.jpg)

P08 – North approach
(DSCN0039.jpg)

P09 – East side of the bridge
(DSCN0040.jpg)

P10 – North abutment
(DSCN0042.jpg)

P11 – Middle pier
(DSCN0045.jpg)

P12 – South abutment
(DSCN0047.jpg)

P13 – South abutment
(DSCN0048.jpg)

Structure Name:	Noble Rd Lot X
Parsons Waypoint #:	347
Remaining Lifespan (Years):	15
Replacement Cost:	$20,000
Georeference:	N 49°30'33" W 123°54'26"
Deflection at Centre (mm):	0
Weight Usage Restriction:	23 people, 1 horse, 2 ATVs
Date Inspected:	Sept. 29, 2017
Inspected By:	Grant Waldie, P. Eng., PE Michael Li, EIT
Weather:	15°C, rainy

Overall Rating of Bridge	**Structure Description**
GOOD	9.5x1.22m beam bridge with timber deck.

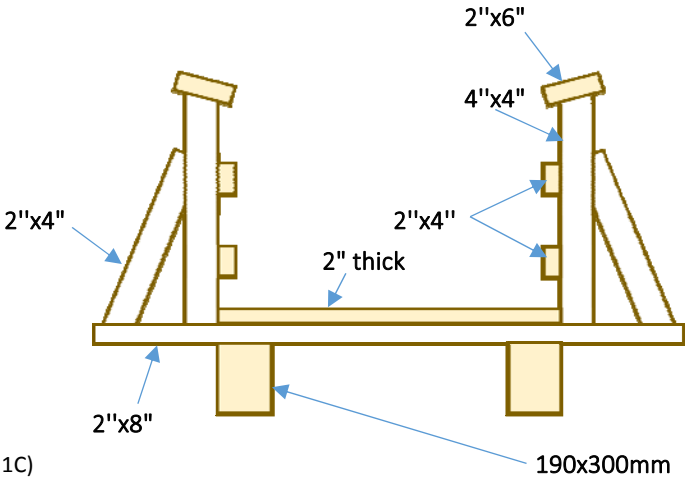
Element	Rating	Comments	Maintenance Recommendations	Estimated Cost	Priority
Primary Components					
Embankments	5				
Foundations	5				
Abutments	5				
Piers	5				
Beams, Girders	5				
Deck	5				
Secondary Components					
Approaches	5				
Railings	5				
Auxiliary Components					
Slope Protection	5				
Signs	4	No load restriction sign present			

PARSONS

PROJECT	DESIGNER	DATE
Sunshine Coast Trail Bridge Inspection Project	M.Li	Oct 24th, 2017
SUBJECT	**CHECKER**	**DATE**
Trail Bridge Load Rating	G.Waldie	Oct 25th, 2017

Input Parameters

Bridge Name	Noble Rd Lot X		
Number of Spans	2		
Span Length (m)	5.9	+	3.6
Deck Width (mm)	1220		
Deck Thickness (mm)	50		
Number of Log Beams	2		
Log Shape	Rectangul		
Log Size b*d (mm*mm)	190	X	300
Single or Double Railing	Double		
Timber Weight (kN/m^3)	5.0 (Cedar)		
Elastic Modulus of Timber	9000 (CSA-O86 T5.3.1C)		



Cross Section

Dead Load

Item	Railing	Deck	Log	Total
w_D(kN/m)	0.50	0.31	0.57	1.38

Max. Positive Moment by DL	M_{D+}	=	$9wL^2/128$	=	3.4 kN-m	(continuous span)
Max. Negative Moment by DL	M_{D-}	=	$wL^2/8$	=	6.0 kN-m	
Max. Deflection by DL	Δ_D	=	$wL^4/185EI$	=	1.2 mm	

Capacity Check

Moment Resistance	M_r	=	$\Phi F_b S K_{Zb} K_L$	=	67.72 kN-m	(CSA-O86 5.5.4.1)

Load combination for ULS: $M_r = 1.25M_D + 1.5M_L$

Max. Bending Moment by LL	M_L	=	40.2	kN-m
Max. Live Load	w_L	=	9.2	kN/m

Deflection Check

Load combination for SLS: $\Delta_{lim} = 1.0\Delta_D + 1.0\Delta_L$

Max. Deflection	Δ_{lim}	=	L / 180	=	32.8 mm	(CSA-O86 4.5.2)
Max. Deflection by LL	Δ_L	=	31.6	mm		
Max. Live Load	w_L	=	15.4	kN/m		

Deck Area Check

Total Deck Area	A	=	11.6	m^2

Summary

	Capacity Check	Deflection Check	Deck Area Check
Person	> 23 people	> 23 people	23 people
Horse	> 1 horse	> 1 horse	> 1 horse
ATV	> 2 ATVs	> 2 ATVs	> 2 ATVs

Conclusion:

The capacity of this bridge is governed by the bridge deck area. The maximum capacity of Noble Rd Lot X is: 23 people or 1 horse or 2 ATVs.

Noble Rd Lot X

Sunshine Coast Trail Bridge Inspections – 2017

P01 – North approach
(DSCN0084.jpg)

P02 – North end of the bridge
(DSCN0085.jpg)

P03 – Overall decking
(DSCN0086.jpg)

P04 – East railing
(DSCN0087.jpg)

P05 – West railing
(DSCN0088.jpg)

P06 – Upstream (looking west)
(DSCN0089.jpg)

P07 – Downstream (looking east)
(DSCN0090.jpg)

P08 – South approach
(DSCN0091.jpg)

P09 – West side of the bridge
(DSCN0092.jpg)

P10 – East side of the bridge
(DSCN0093.jpg)

P11 – South abutment
(DSCN0095.jpg)

P12 – North abutment
(DSCN0096.jpg)

P13 – Middle pier
(DSCN0097.jpg)

P14 – East side of the bridge
(DSCN0098.jpg)

Structure Name:	Owl's Friend
Parsons Waypoint #:	342
Remaining Lifespan (Years):	15
Replacement Cost:	$5,000
Georeference:	N 49°33'45" W 123°57'31"
Deflection at Centre (mm):	0
Weight Usage Restriction:	15 people, 1 horse, 2 ATVs
Date Inspected:	Sept. 29, 2017
Inspected By:	Grant Waldie, P. Eng., PE Michael Li, EIT
Weather:	15°C, rainy

Overall Rating of Bridge	**Structure Description**
GOOD	5x1.57m beam bridge with timber deck.

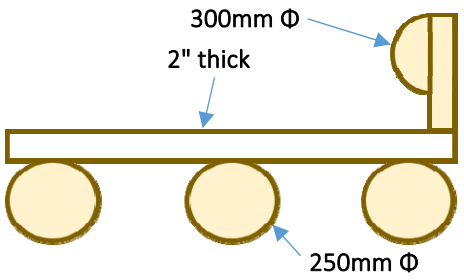
Element	Rating	Comments	Maintenance Recommendations	Estimated Cost	Priority
Primary Components					
Embankments	5				
Foundations	5				
Abutments	5				
Beams, Girders	5				
Deck	5				
Secondary Components					
Approaches	5				
Auxiliary Components					
Slope Protection	5				
Signs	4	No load restriction sign present			

PARSONS

PROJECT	DESIGNER	DATE
Sunshine Coast Trail Bridge Inspection Project	M.Li	Oct 24th, 2017
SUBJECT	**CHECKER**	**DATE**
Trail Bridge Load Rating	G.Waldie	Oct 25th, 2017

Input Parameters

Bridge Name	Owl's Friend
Number of Spans	1
Span Length (m)	5
Deck Width (mm)	1570
Deck Thickness (mm)	50
Number of Log Beams	3
Log Shape	Circular
Log Diameter (mm)	250
Single or Double Railing	Single
Timber Weight (kN/m^3)	5.0 (Cedar)
Elastic Modulus of Timber	9000 (CSA-O86 T5.3.1C)



Cross Section

Dead Load

Item	Railing	Deck	Log	Total
w_D(kN/m)	0.10	0.39	0.74	1.23

Max. Bending Moment by DL $M_D = wL^2/8 = 3.8$ kN-m

Max. Deflection by DL $\Delta_D = 5wL^4/384EI = 1.9$ mm

Capacity Check

Moment Resistance $M_r = \Phi F_b S K_{Zb} K_L = 54.67$ kN-m (CSA-O86 5.5.4.1)

Load combination for ULS: $M_r = 1.25M_D + 1.5M_L$

Max. Bending Moment by LL $M_L = 33.2$ kN-m

Max. Live Load $w_L = 10.6$ kN/m

Deflection Check

Load combination for SLS: $\Delta_{lim} = 1.0\Delta_D + 1.0\Delta_L$

Max. Deflection $\Delta_{lim} = L / 180 = 27.8$ mm (CSA-O86 4.5.2)

Max. Deflection by LL $\Delta_L = 25.8$ mm

Max. Live Load $w_L = 16.4$ kN/m

Deck Area Check

Total Deck Area $A = 7.9$ m^2

Summary

	Capacity Check	Deflection Check	Deck Area Check
Person	> 15 people	> 15 people	15 people
Horse	> 1 horse	> 1 horse	1 horse
ATV	> 2 ATVs	> 2 ATVs	2 ATVs

Conclusion:

The capacity of this bridge is governed by the bridge deck area. The maximum capacity of Owl's Friend is: 15 people or 1 horse or 2 ATVs.

Owl's Friend
Sunshine Coast Trail Bridge Inspections – 2017

P01 – South approach
(DSCN0050.jpg)

P02 – Overall decking
(DSCN0051.jpg)

P03 – West railing
(DSCN0052.jpg)

P04 – Looking west
(DSCN0053.jpg)

P05 – Looking east
(DSCN0054.jpg)

P06 – North approach
(DSCN0055.jpg)

P07 – East side of the bridge
(DSCN0056.jpg)

P08 – North abutment
(DSCN0057.jpg)

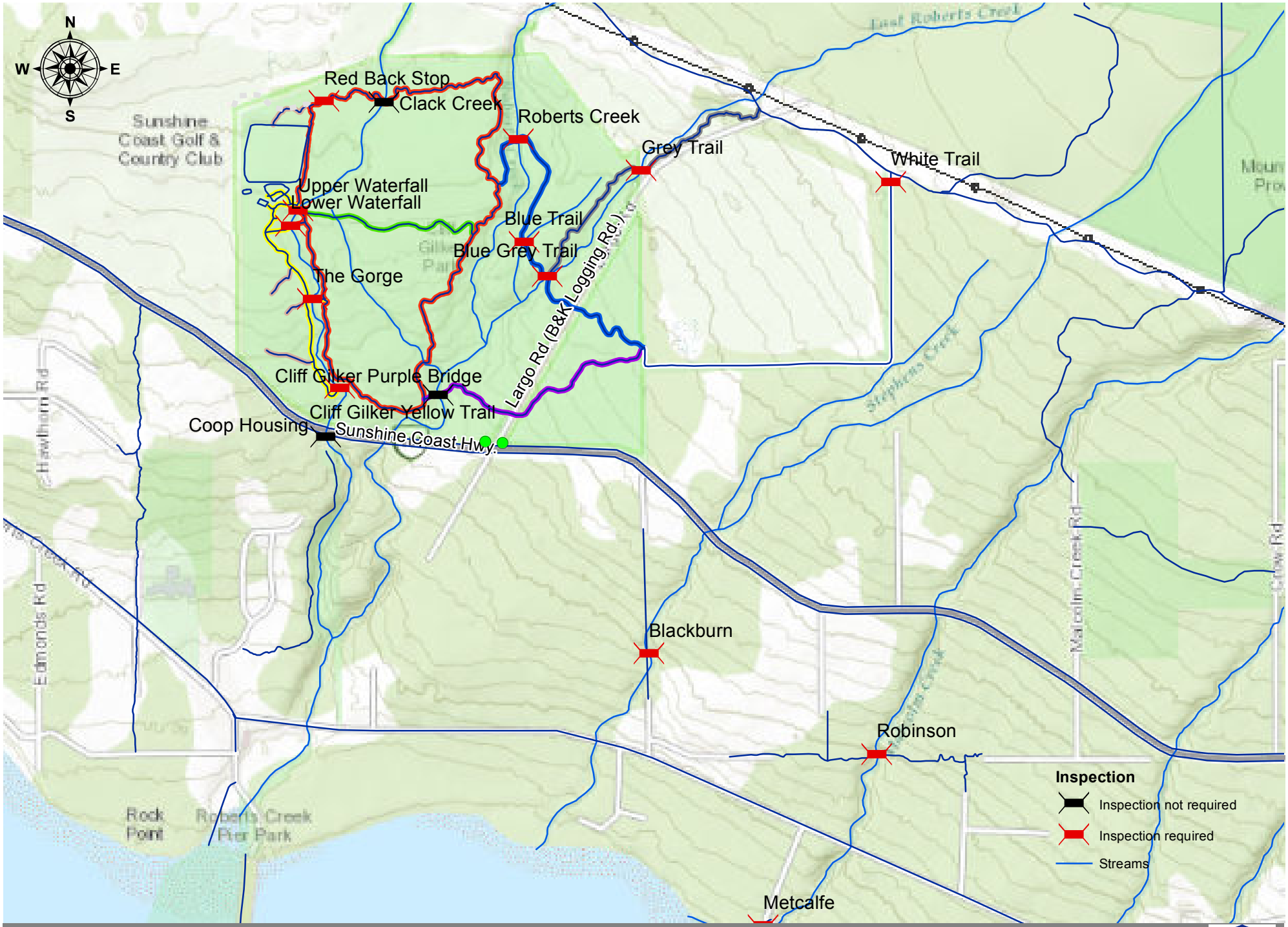
P09 – Under side of the bridge (west and middle log)
(DSCN0059.jpg)

P10 – Under side of the bridge (east and middle log)
(DSCN0060.jpg)

P11 – South abutment
(DSCN0058.jpg)

Appendix 4

Zone 4 - Schedule B - Area D Bridge Assessment North



Schedule B - Area D Bridge Assessment

Structure Name:	Blackburn Trail
Parsons Waypoint #:	275
Remaining Lifespan (Years):	40
Replacement Cost:	$30,000
Georeference:	N 49°25'19" W 123°37'51"
Deflection at Centre (mm):	0
Weight Usage Restriction:	25 people, 1 horse, 2 ATVs
Date Inspected:	Sept. 28, 2017
Inspected By:	Grant Waldie, P. Eng., PE Michael Li, EIT
Weather:	15°C, sunny

Overall Rating of Bridge	**Structure Description**
VERY GOOD	10.9x1.22m beam bridge with timber deck.

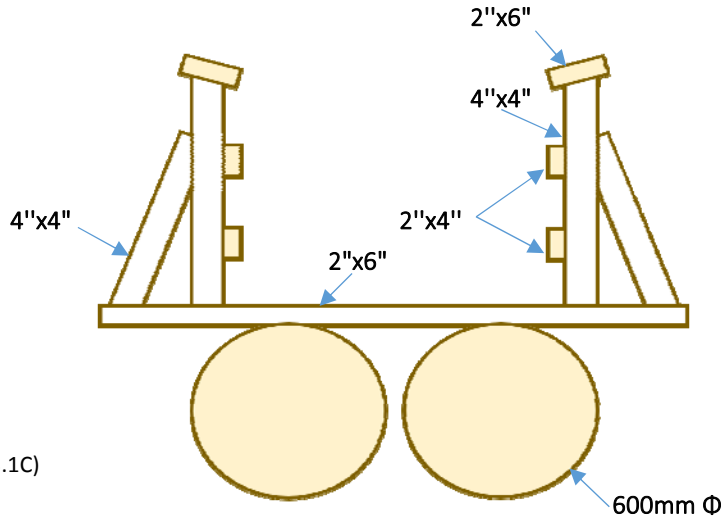
Element	Rating	Comments	Maintenance Recommendations	Estimated Cost	Priority
Primary Components					
Embankments	5				
Foundations	5				
Abutments	5				
Beams, Girders	5				
Deck	5				
Secondary Components					
Bearing Seats	5				
Approaches	5				
Railings	5				
Auxiliary Components					
Slope Protection	5				
Signs	4	No load restriction sign present			

PARSONS

PROJECT	DESIGNER	DATE
Sunshine Coast Trail Bridge Inspection Project	M.Li	Oct 24th, 2017
SUBJECT	**CHECKER**	**DATE**
Trail Bridge Load Rating	G.Waldie	Oct 25th, 2017

Input Parameters

Bridge Name	Blackburn Trail
Number of Spans	1
Span Length (m)	10.9
Deck Width (mm)	1220
Deck Thickness (mm)	50
Number of Log Beams	2
Log Shape	Circular
Log Diameter (mm)	600
Single or Double Railing	Double
Timber Weight (kN/m^3)	6.0 (Douglas Fir)
Elastic Modulus of Timber	9000 (CSA-O86 T5.3.1C)



Cross Section

Dead Load

Item	Railing	Deck	Log	Total
w_D(kN/m)	0.50	0.37	3.39	4.26

Max. Bending Moment by DL	M_D	=	$wL^2/8$	=	63.3 kN-m
Max. Deflection by DL	Δ_D	=	$5wL^4/384EI$	=	6.8 mm

Capacity Check

Moment Resistance	M_r	=	$\Phi F_b S K_{Zb} K_L$	=	503.8 kN-m	(CSA-O86 5.5.4.1)

Load combination for ULS: $M_r = 1.25M_D + 1.5M_L$

Max. Bending Moment by LL	M_L	=	283.2	kN-m
Max. Live Load	w_L	=	19.1	kN/m

Deflection Check

Load combination for SLS: $\Delta_{lim} = 1.0\Delta_D + 1.0\Delta_L$

Max. Deflection	Δ_{lim}	=	L / 180	=	60.6 mm	(CSA-O86 4.5.2)
Max. Deflection by LL	Δ_L	=	53.7	mm		
Max. Live Load	w_L	=	33.5	kN/m		

Deck Area Check

Total Deck Area	A	=	13.3	m^2

Summary

	Capacity Check	Deflection Check	Deck Area Check
Person	> 25 people	> 25 people	> 25 people
Horse	> 1 horse	> 1 horse	> 1 horse
ATV	> 2 ATVs	> 2 ATVs	> 2 ATVs

Conclusion:

The capacity of this bridge is governed by the bridge deck area. The maximum capacity of Blackburn Trail is: 25 people or 1 horse or 2 ATVs.

Blackburn Trail
Sunshine Coast Trail Bridge Inspections – 2017

P01 – South approach
(DSCN9521.jpg)

P02 – Overall decking
(DSCN9523.jpg)

P03 – West railing
(DSCN9524.jpg)

P04 – East railing
(DSCN9525.jpg)

P05 – Upstream (looking east)
(DSCN9526.jpg)

P06 – Downstream (looking west)
(DSCN9527.jpg)

P07 – North approach
(DSCN9528.jpg)

P08 – North abutment
(DSCN9529.jpg)

P09 – South abutment
(DSCN9531.jpg)

P10 – Under side of the bridge
(DSCN9533.jpg)

P11 – Utility pipe line to the west side of the bridge
(DSCN9535.jpg)

P12 – South abutment (detail view)
(DSCN9536.jpg)

Structure Name:	Blue Grey Trail
Parsons Waypoint #:	286
Remaining Lifespan (Years):	25
Replacement Cost:	$20,000
Georeference:	N 49°25'44" W 123°38'00"
Deflection at Centre (mm):	0
Weight Usage Restriction:	25 people, 1 horse, 2 ATVs
Date Inspected:	Sept. 28, 2017
Inspected By:	Grant Waldie, P. Eng., PE Michael Li, EIT
Weather:	15°C, sunny

Overall Rating of Bridge	**Structure Description**
GOOD	16.7x1.07m beam bridge with timber deck.

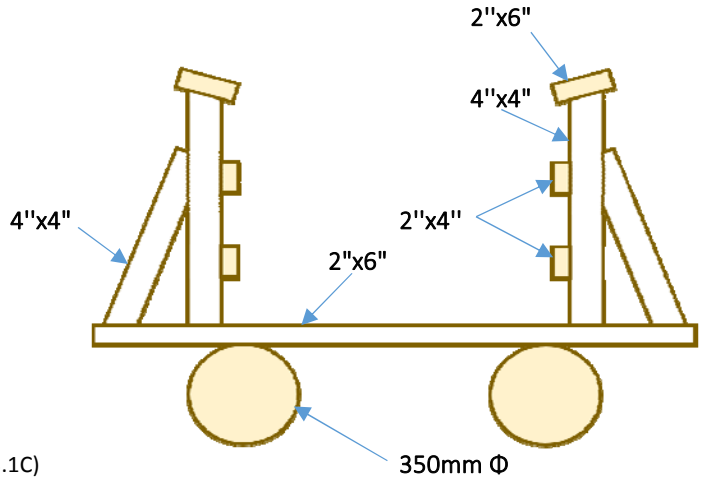
Element	Rating	Comments	Maintenance Recommendations	Estimated Cost	Priority
Primary Components					
Embankments	5				
Foundations	5				
Abutments	5				
Piers	5				
Beams, Girders	5				
Deck	5				
Secondary Components					
Approaches	5				
Railings	5				
Auxiliary Components					
Slope Protection	5				
Signs	2	No load restriction sign present	Install load restriction sign	$1,000	High

PARSONS

PROJECT	DESIGNER	DATE
Sunshine Coast Trail Bridge Inspection Project	M.Li	Oct 24th, 2017
SUBJECT	**CHECKER**	**DATE**
Trail Bridge Load Rating	G.Waldie	Oct 25th, 2017

Input Parameters

Bridge Name	Blue Grey Trail
Number of Spans	1
Span Length (m)	11.7
Deck Width (mm)	1320
Deck Thickness (mm)	50
Number of Log Beams	2
Log Shape	Circular
Log Diameter (mm)	350
Single or Double Railing	Double
Timber Weight (kN/m^3)	5.0 (Cedar)
Elastic Modulus of Timber	9000 (CSA-O86 T5.3.1C)



Cross Section

Dead Load

Item	Railing	Deck	Log	Total
w_D(kN/m)	0.50	0.33	0.96	1.79

Max. Bending Moment by DL $M_D = wL^2/8 = 30.7$ kN-m

Max. Deflection by DL $\Delta_D = 5wL^4/384EI = 33.0$ mm

Capacity Check

Moment Resistance $M_r = \Phi F_b S K_{Zb} K_L = 100$ kN-m (CSA-O86 5.5.4.1)

Load combination for ULS: $M_r = 1.25M_D + 1.5M_L$

Max. Bending Moment by LL $M_L = 41.1$ kN-m

Max. Live Load $w_L = 2.4$ kN/m

Deflection Check

Load combination for SLS: $\Delta_{lim} = 1.0\Delta_D + 1.0\Delta_L$

Max. Deflection $\Delta_{lim} = L / 180 = 65.0$ mm (CSA-O86 4.5.2)

Max. Deflection by LL $\Delta_L = 32.0$ mm

Max. Live Load $w_L = 1.7$ kN/m

Deck Area Check

Total Deck Area $A = 15.4$ m^2

Summary

	Capacity Check	Deflection Check	Deck Area Check
Person	> 25 people	25 people	> 25 people
Horse	> 1 horse	> 1 horse	> 1 horse
ATV	> 2 ATVs	> 2 ATVs	> 2 ATVs

Conclusion:

The capacity of this bridge is governed by deflection criteria. The maximum capacity of Blue Grey Trail is: 25 people or 1 horse or 2 ATVs.

Blue Grey Trail
Sunshine Coast Trail Bridge Inspections – 2017

P01 – North approach
(DSCN9751.jpg)

P02 – Overall decking
(DSCN9752.jpg)

P03 – South approach
(DSCN9754.jpg)

P04 – West side of the bridge
(DSCN9755.jpg)

P05 – Under side of the bridge
(DSCN9756.jpg)

P06 – North abutment
(DSCN9758.jpg)

P07 – South abutment
(DSCN9759.jpg)

P08 – Upstream (looking east)
(DSCN9760.jpg)

P09 – Downstream (looking west)
(DSCN9761.jpg)

Structure Name:	Blue Trail
Parsons Waypoint #:	287
Remaining Lifespan (Years):	25
Replacement Cost:	$5,000
Georeference:	N 49°25'47" W 123°38'03"
Deflection at Centre (mm):	0
Weight Usage Restriction:	12 people, 1 horse, 2 ATVs
Date Inspected:	Sept. 28, 2017
Inspected By:	Grant Waldie, P. Eng., PE Michael Li, EIT
Weather:	15°C, sunny

Overall Rating of Bridge	**Structure Description**
VERY GOOD	4.8x2.2m beam bridge with timber deck.

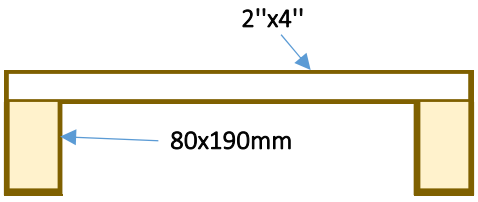
Element	Rating	Comments	Maintenance Recommendations	Estimated Cost	Priority
Primary Components					
Embankments	5				
Foundations	5				
Abutments	5				
Beams, Girders	4				
Deck	5				
Secondary Components					
Approaches	5				
Auxiliary Components					
Slope Protection	5				
Signs	2	No load restriction sign present	Install load restriction sign	$1,000	High

PARSONS

PROJECT	DESIGNER	DATE
Sunshine Coast Trail Bridge Inspection Project	M.Li	Oct 24th, 2017
SUBJECT	**CHECKER**	**DATE**
Trail Bridge Load Rating	G.Waldie	Oct 25th, 2017

Input Parameters

Bridge Name	Blue Trail		
Number of Spans	1		
Span Length (m)	4.8		
Deck Width (mm)	2200		
Deck Thickness (mm)	50		
Number of Log Beams	2		
Log Shape	Rectangul		
Log Size b*d (mm*mm)	80	X	190
Single or Double Railing	N/A		
Timber Weight (kN/m^3)	5.0	(Cedar)	
Elastic Modulus of Timber	9000	(CSA-O86 T5.3.1C)	



Cross Section

Dead Load

Item	Railing	Deck	Log	Total
w_D(kN/m)	0.00	0.55	0.15	0.70

Max. Bending Moment by DL	M_D	=	$wL^2/8$	=	2.0	kN-m
Max. Deflection by DL	Δ_D	=	$5wL^4/384EI$	=	5.9	mm

Capacity Check

Moment Resistance	M_r	=	$\Phi F_b S K_{Zb} K_L$	=	11.44	kN-m	(CSA-O86 5.5.4.1)

Load combination for ULS: $M_r = 1.25M_D + 1.5M_L$

Max. Bending Moment by LL	M_L	=	5.9	kN-m	
Max. Live Load	w_L	=	2.1	kN/m	

Deflection Check

Load combination for SLS: $\Delta_{lim} = 1.0\Delta_D + 1.0\Delta_L$

Max. Deflection	Δ_{lim}	=	L / 180	=	26.7	mm (CSA-O86 4.5.2)
Max. Deflection by LL	Δ_L	=	20.8	mm		
Max. Live Load	w_L	=	2.5	kN/m		

Deck Area Check

Total Deck Area	A	=	10.6	m^2	

Summary

	Capacity Check	Deflection Check	Deck Area Check
Person	12 people	> 12 people	> 12 people
Horse	1 horse	1 horse	1 horse
ATV	> 2 ATVs	> 2 ATVs	2 ATVs

Conclusion:

The capacity of this bridge is governed by strength capacity. The maximum capacity of Blue Trail is: 12 people or 1 horse or 2 ATVs.

Blue Trail
Sunshine Coast Trail Bridge Inspections – 2017

P01 – West approach
(DSCN9764.jpg)

P02 – East approach
(DSCN9766.jpg)

P03 – Downstream (looking south)
(DSCN9767.jpg)

P04 – Upstream (looking north)
(DSCN9768.jpg)

P05 – Under side of the bridge (east abutment)
(DSCN9769.jpg)

P06 – West abutment
(DSCN9770.jpg)

P07 – South side of the bridge
(DSCN9771.jpg)

Structure Name:	Cal Bridge
Parsons Waypoint #:	284
Remaining Lifespan (Years):	5
Replacement Cost:	$30,000
Georeference:	N 49°25'52" W 123°38'05"
Deflection at Centre (mm):	0
Weight Usage Restriction:	15 people, 1 horse, 2 ATVs
Date Inspected:	Sept. 28, 2017
Inspected By:	Grant Waldie, P. Eng., PE Michael Li, EIT
Weather:	15°C, sunny

Overall Rating of Bridge	**Structure Description**
POOR	11.9x0.81m beam bridge with timber deck.

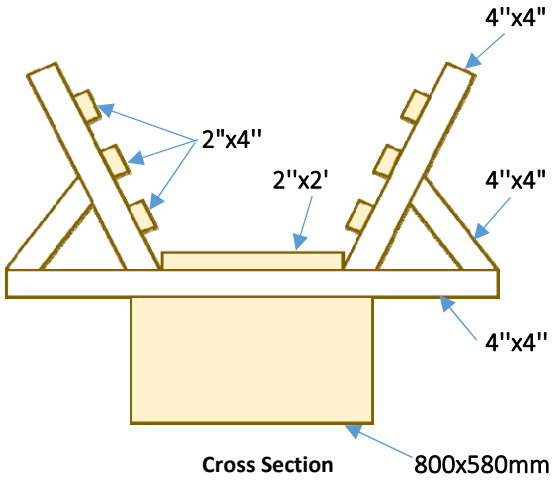
Element	Rating	Comments	Maintenance Recommendations	Estimated Cost	Priority
Primary Components					
Embankments	4				
Foundations	3	Deteriorating timber under bridge	Monitor		Low
Abutments	4				
Piers	3				
Beams, Girders	3	Rot present in main members	Monitor		Low
Deck	4				
Secondary Components					
Approaches	4				
Railings	3	Railing is loose	Monitor		Low
Auxiliary Components					
Slope Protection	5				
Signs	4	No load restriction sign present			

PARSONS

PROJECT	DESIGNER	DATE
Sunshine Coast Trail Bridge Inspection Project	M.Li	Oct 24th, 2017
SUBJECT	**CHECKER**	**DATE**
Trail Bridge Load Rating	G.Waldie	Oct 25th, 2017

Input Parameters

Bridge Name	Cal Bridge		
Number of Spans	1		
Span Length (m)	7.3	+	4.6
Deck Width (mm)	660		
Deck Thickness (mm)	50		
Number of Log Beams	1		
Log Shape	Rectangul		
Log Size b*d (mm*mm)	800	X	580
Single or Double Railing	Double		
Timber Weight (kN/m^3)	5.0 (Cedar)		
Elastic Modulus of Timber	9000 (CSA-O86 T5.3.1C)		



Dead Load

Item	Railing	Deck	Log	Total
w_D(kN/m)	0.50	0.17	2.32	2.99

Max. Bending Moment by DL $M_D = wL^2/8 = 19.9$ kN-m

Max. Deflection by DL $\Delta_D = 5wL^4/384EI = 0.9$ mm

Capacity Check

Moment Resistance $M_r = \Phi F_b S K_{Zb} K_L = 532.9$ kN-m (CSA-O86 5.5.4.1)

Load combination for ULS: $M_r = 1.25M_D + 1.5M_L$

Max. Bending Moment by LL $M_L = 338.7$ kN-m

Max. Live Load $w_L = 50.8$ kN/m

Deflection Check

Load combination for SLS: $\Delta_{lim} = 1.0\Delta_D + 1.0\Delta_L$

Max. Deflection $\Delta_{lim} = L / 180 = 40.6$ mm (CSA-O86 4.5.2)

Max. Deflection by LL $\Delta_L = 39.6$ mm

Max. Live Load $w_L = 125.4$ kN/m

Deck Area Check

Total Deck Area $A = 7.9$ m^2

Summary

	Capacity Check	Deflection Check	Deck Area Check
Person	> 15 people	> 15 people	15 people
Horse	> 1 horse	> 1 horse	1 horse
ATV	> 2 ATVs	> 2 ATVs	> 2 ATVs

Conclusion:

The capacity of this bridge is governed by the bridge deck area. The maximum capacity of Cal Bridge is: 15 people or 1 horse or 2 ATVs.

Cal Bridge
Sunshine Coast Trail Bridge Inspections – 2017

P01 – West approach
(DSCN9693.jpg)

P02 – Overall decking (west span)
(DSCN9694.jpg)

P03 – Overall decking (between west and east span)
(DSCN9696.jpg)

P04 – Overall decking (east span)
(DSCN9697.jpg)

P05 – East approach
(DSCN9698.jpg)

P06 – South side of the bridge (west span)
(DSCN9699.jpg)

P07 – Under side of the bridge (erosion noticed)
(DSCN9700.jpg)

P08 – West abutment of west span
(DSCN9701.jpg)

P09 – East abutment of the west span
(DSCN9702.jpg)

P10 – South side of the bridge (east span)
(DSCN9703.jpg)

P11 – West abutment of the east span
(DSCN9704.jpg)

P12 – East abutment of east span
(DSCN9705.jpg)

P13 – North side of the bridge (east span)
(DSCN9706.jpg)

Structure Name:	Clake Creek
Parsons Waypoint #:	282
Remaining Lifespan (Years):	40
Replacement Cost:	$20,000
Georeference:	N 49°25'56" W 123°38'18"
Deflection at Centre (mm):	0
Weight Usage Restriction:	19 people, 1 horse, 2 ATVs
Date Inspected:	Sept. 28, 2017
Inspected By:	Grant Waldie, P. Eng., PE Michael Li, EIT
Weather:	15°C, sunny

Overall Rating of Bridge	**Structure Description**
VERY GOOD	21.7x0.66m beam bridge with timber deck.

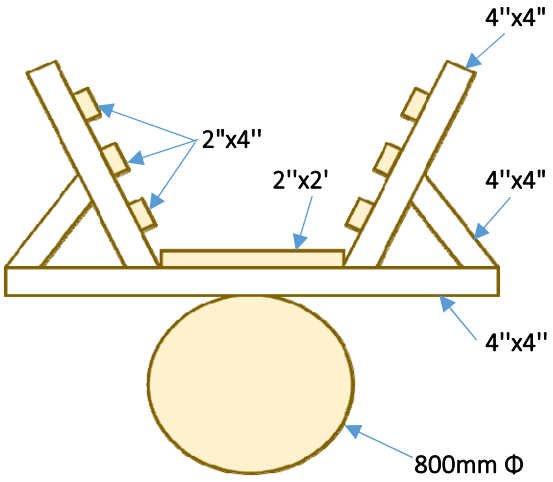
Element	Rating	Comments	Maintenance Recommendations	Estimated Cost	Priority
Primary Components					
Embankments	5				
Foundations	5				
Abutments	5				
Beams, Girders	5				
Deck	5				
Secondary Components					
Approaches	5				
Railings	5				
Auxiliary Components					
Slope Protection	5				
Signs	4	No load restriction sign present			

PARSONS

PROJECT	DESIGNER	DATE
Sunshine Coast Trail Bridge Inspection Project	M.Li	Oct 24th, 2017
SUBJECT	**CHECKER**	**DATE**
Trail Bridge Load Rating	G.Waldie	Oct 25th, 2017

Input Parameters

Bridge Name	Clack Creek
Number of Spans	1
Span Length (m)	14.5
Deck Width (mm)	660
Deck Thickness (mm)	50
Number of Log Beams	1
Log Shape	Circular
Log Diameter (mm)	800
Single or Double Railing	Double
Timber Weight (kN/m^3)	5.0 (Cedar)
Elastic Modulus of Timber	9000 (CSA-O86 T5.3.1C)



Cross Section

Dead Load

Item	Railing	Deck	Log	Total
w_D(kN/m)	0.50	0.17	2.51	3.18

Max. Bending Moment by DL $M_D = wL^2/8 = 83.5$ kN-m

Max. Deflection by DL $\Delta_D = 5wL^4/384EI = 10.1$ mm

Capacity Check

Moment Resistance $M_r = \Phi F_b S K_{Zb} K_L = 597.2$ kN-m (CSA-O86 5.5.4.1)

Load combination for ULS: $M_r = 1.25M_D + 1.5M_L$

Max. Bending Moment by LL $M_L = 328.5$ kN-m

Max. Live Load $w_L = 12.5$ kN/m

Deflection Check

Load combination for SLS: $\Delta_{lim} = 1.0\Delta_D + 1.0\Delta_L$

Max. Deflection $\Delta_{lim} = L / 180 = 80.6$ mm (CSA-O86 4.5.2)

Max. Deflection by LL $\Delta_L = 70.4$ mm

Max. Live Load $w_L = 22.1$ kN/m

Deck Area Check

Total Deck Area $A = 9.6$ m^2

Summary

	Capacity Check	Deflection Check	Deck Area Check
Person	> 19 people	> 19 people	19 people
Horse	> 1 horse	> 1 horse	> 1 horse
ATV	> 2 ATVs	> 2 ATVs	> 2 ATVs

Conclusion:

The capacity of this bridge is governed by the bridge deck area. The maximum capacity of Clack Creek is: 19 people or 1 horse or 2 ATVs.

Clack Creek
Sunshine Coast Trail Bridge Inspections – 2017

P01 – West approach
(DSCN9680.jpg)

P02 – Overall decking
(DSCN9683.jpg)

P03 – Upstream (looking north)
(DSCN9685.jpg)

P04 – Downstream (looking south)
(DSCN9686.jpg)

P05 – East approach
(DSCN9687.jpg)

P06 – South side of the bridge
(DSCN9688.jpg)

P07 – Under side of the bridge
(DSCN9689.jpg)

P08 – East abutment
(DSCN9690.jpg)

P09 – West abutment
(DSCN9691.jpg)

Structure Name:	Cliff Gilker Purple Bridge (New)
Parsons Waypoint #:	353
Remaining Lifespan (Years):	40
Replacement Cost:	$30,000
Georeference:	N 49°25'37" W 123°38'12"
Deflection at Centre (mm):	0
Weight Usage Restriction:	25 people, 1 horse, 2 ATVs
Date Inspected:	Nov. 30, 2017
Inspected By:	Grant Waldie, P. Eng., PE Michael Li, EIT
Weather:	8°C, raining

Overall Rating of Bridge	**Structure Description**
VERY GOOD	14mx0.6m log bridge with timber deck.

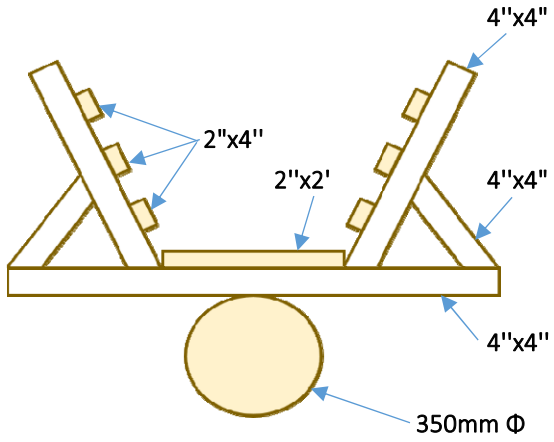
Element	Rating	Comments	Maintenance Recommendations	Estimated Cost	Priority
Primary Components					
Embankments	5				
Foundations	5				
Abutments	5				
Piers	5				
Beams, Girders	5				
Deck	5				
Secondary Components					
Approaches	5				
Railings	4	West railing end railings extend 4' past final end post and could be broken off by standing on them.	Install a final vertical end post on both railings at north abutment.	$2,000	High
Auxiliary Components					
Slope Protection	5				
Signs	5				

PARSONS

PROJECT	DESIGNER	DATE
Sunshine Coast Trail Bridge Inspection Project	M.Li	Nov 30th, 2017
SUBJECT	**CHECKER**	**DATE**
Trail Bridge Load Rating	G.Waldie	Nov 30th, 2017

Input Parameters

Bridge Name	Cliff Gilker Purple (New)
Number of Spans	1
Span Length (m)	14
Deck Width (mm)	900
Deck Thickness (mm)	50
Number of Log Beams	1
Log Shape	Circular
Log Diameter (mm)	600
Single or Double Railing	Double
Timber Weight (kN/m^3)	5.0 (Cedar)
Elastic Modulus of Timber	9000 (CSA-O86 T5.3.1C)



Cross Section

Dead Load

Item	Railing	Deck	Log	Total
w_D(kN/m)	0.50	0.23	1.41	2.14

Max. Bending Moment by DL	M_D	=	$wL^2/8$	=	52.4 kN-m	(discontinuous span)
Max. Deflection by DL	Δ_D	=	$5wL^4/384EI$	=	18.7 mm	

Capacity Check

Moment Resistance	M_r	=	$\Phi F_b S K_{Zb} K_L$	=	251.9 kN-m	(CSA-O86 5.5.4.1)

Load combination for ULS: $M_r = 1.25M_D + 1.5M_L$

Max. Bending Moment by LL	M_L	=	124.3	kN-m
Max. Live Load	w_L	=	5.1	kN/m

Deflection Check

Load combination for SLS: $\Delta_{lim} = 1.0\Delta_D + 1.0\Delta_L$

Max. Deflection	Δ_{lim}	=	L / 180	=	77.8 mm	(CSA-O86 4.5.2)
Max. Deflection by LL	Δ_L	=	59.1	mm		
Max. Live Load	w_L	=	6.8	kN/m		

Deck Area Check

Total Deck Area	A	=	12.6	m^2

Summary

	Capacity Check	Deflection Check	Deck Area Check
Person	> 25 people	> 25 people	25 people
Horse	> 1 horse	> 1 horse	> 1 horse
ATV	> 2 ATVs	> 2 ATVs	> 2 ATVs

Conclusion:

The capacity of this bridge is governed by the bridge deck area. The maximum capacity of Cliff Gilker Purple (New) is: 25 people or 1 horse or 2 ATVs.

Cliff Gilker Purple Bridge (New)

Sunshine Coast Trail Bridge Inspections – 2017

P01 – East approach
(DSCN0639.jpg)

P02 – West Approach
(DSCN0688.jpg)

P03 – Upstream (looking north)
(DSCN0678.jpg)

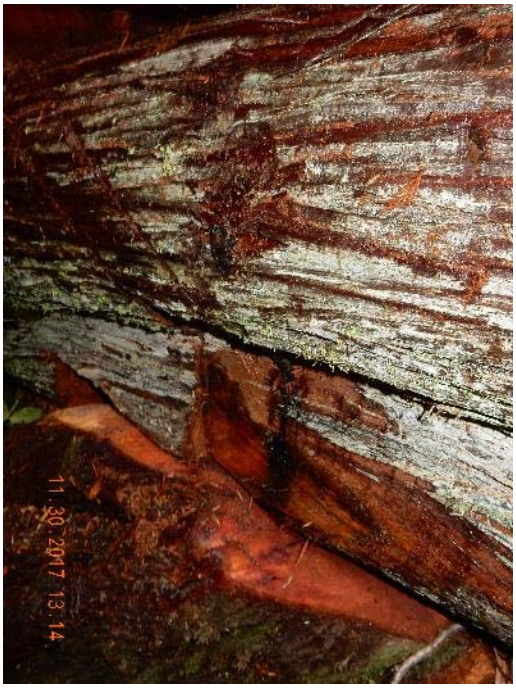
P04 – Downstream (looking south)
(DSCN0679.jpg)

P05 – Overall Decking
(DSCN0676.jpg)

P06 – North side of the bridge
(DSCN0664.jpg)

P07 – Under side of the bridge
(DSCN0671.jpg)

P08 – Main support of bridge
(DSCN0667.jpg)



P09 – Rebar driven through main log into abutment
(DSCN0692.jpg)

P10 – West Abutment with end railings extending past end post by four feet (DSCN0688.jpg)

P11 – Railing extending past end post by four feet (DSCN0690.jpg)

P12 – Railing extending past end post by four feet
(DSCN0691.jpg)

Structure Name:	Cliff Gilker Yellow Bridge
Parsons Waypoint #:	278
Remaining Lifespan (Years):	15
Replacement Cost:	$20,000
Georeference:	N 49°25'37" W 123°38'22"
Deflection at Centre (mm):	0
Weight Usage Restriction:	25 people, 1 horse, 2 ATVs
Date Inspected:	Sept. 28, 2017
Inspected By:	Grant Waldie, P. Eng., PE Michael Li, EIT
Weather:	15°C, sunny

Overall Rating of Bridge	**Structure Description**
FAIR	20.4x1.22m beam bridge with timber deck.

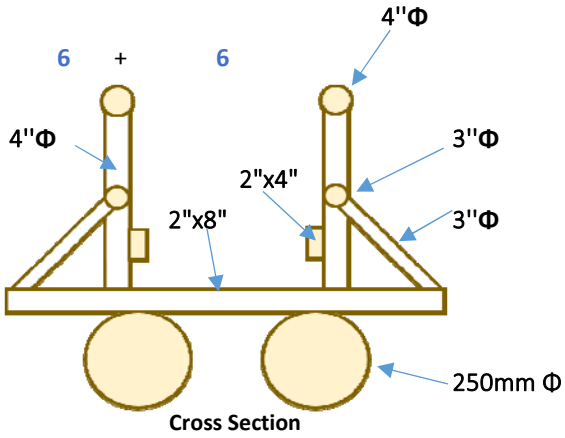
Element	Rating	Comments	Maintenance Recommendations	Estimated Cost	Priority
Primary Components					
Embankments	4				
Foundations	4				
Abutments	4				
Piers	4				
Beams, Girders	3	Rot in wood deteriorating members	Monitor beams	N/A	Medium
Deck	5				
Secondary Components					
Approaches	5				
Railings	4				
Auxiliary Components					
Slope Protection	4				
Signs	4	No load restriction sign present			

PARSONS

PROJECT	DESIGNER	DATE
Sunshine Coast Trail Bridge Inspection Project	M.Li	Oct 24th, 2017
SUBJECT	**CHECKER**	**DATE**
Trail Bridge Load Rating	G.Waldie	Oct 25th, 2017

Input Parameters

Bridge Name	Cliff Gilker Yellow Bridge	
Number of Spans	4	
Span Length (m)	4.25 + 4.25 + 6 + 6	
Deck Width (mm)	1320	
Deck Thickness (mm)	50	
Number of Log Beams	2	
Log Shape	Circular	
Log Diameter (mm)	250	
Single or Double Railing	Double	
Timber Weight (kN/m^3)	5.0	(Cedar)
Elastic Modulus of Timber	9000	(CSA-O86 T5.3.1C)



Cross Section

Dead Load

Item	Railing	Deck	Log	Total
w_D(kN/m)	0.50	0.33	0.49	1.32

Max. Positive Moment by DL	M_{D+}	=	$9wL^2/128$	=	3.3 kN-m	(continuous span)
Max. Negative Moment by DL	M_{D-}	=	$wL^2/8$	=	5.9 kN-m	
Max. Deflection by DL	Δ_D	=	$wL^4/185EI$	=	2.7 mm	

Capacity Check

Moment Resistance	M_r	=	$\Phi F_b S K_{Zb} K_L$	=	36.45 kN-m	(CSA-O86 5.5.4.1)

Load combination for ULS: $M_r = 1.25M_D + 1.5M_L$

Max. Bending Moment by LL	M_L	=	19.3	kN-m	
Max. Live Load	w_L	=	8.6	kN/m	

Deflection Check

Load combination for SLS: $\Delta_{lim} = 1.0\Delta_D + 1.0\Delta_L$

Max. Deflection	Δ_{lim}	=	L / 180	=	23.6 mm	(CSA-O86 4.5.2)
Max. Deflection by LL	Δ_L	=	20.9	mm		
Max. Live Load	w_L	=	17.0	kN/m		

Deck Area Check

Total Deck Area	A	=	27.1	m^2

Summary

	Capacity Check	Deflection Check	Deck Area Check
Person	> 25 people	> 25 people	> 25 people
Horse	> 1 horse	> 1 horse	> 1 horse
ATV	> 2 ATVs	> 2 ATVs	> 2 ATVs

Conclusion:

The capacity of this bridge is governed by the bridge deck area. The maximum capacity of Cliff Gilker Purple Bridge is: 25 people or 1 horse or 2 ATVs.

Cliff Gilker Yellow Bridge

Sunshine Coast Trail Bridge Inspections – 2017

P01 – West approach
(DSCN9578.jpg)

P02 – Overall decking (west span)
(DSCN9579.jpg)

P03 – Overall decking (pier between west and middle span)
(DSCN9580.jpg)

P04 – Overall decking (pier between west and middle span)
(DSCN9581.jpg)

P05 – Overall decking (middle span)
(DSCN9582.jpg)

P06 – Overall decking (east span)
(DSCN9583.jpg)

P07 – Upstream (looking north)
(DSCN9584.jpg)

P08 – Downstream (looking south)
(DSCN9585.jpg)

P09 – East approach
(DSCN9586.jpg)

P10 – North side of the bridge
(DSCN9587.jpg)

P11 – South side of the bridge
(DSCN9588.jpg)

P12 – South side of the bridge (east span)
(DSCN9589.jpg)

P13 – South side of the bridge (middle span)
(DSCN9590.jpg)

P14 – South side of the bridge (west span)
(DSCN9591.jpg)

P15 – Under side of the bridge (west span)
(DSCN9592.jpg)

P16 – Pier between west and middle span
(DSCN9590.jpg)

P17 – Pier between west and middle span. Typical deterioration was noticed, suggest having all bridges re-inspected in the next one or two years (DSCN9594.jpg)

P18 – Pier between west and middle span (detail condition) (DSCN9595.jpg)

P19 – Pier between west and middle span
(DSCN9596.jpg)

P20 – Under side of the bridge (middle span)
(DSCN9597.jpg)

P21 – East abutment
(DSCN9598.jpg)

P22 – Exterior bark layer of log beam was pulled off, but the condition is generally ok
(DSCN9600.jpg)

Structure Name:	Coop Housing Trail
Parsons Waypoint #:	274
Remaining Lifespan (Years):	25
Replacement Cost:	$30,000
Georeference:	N 49°25'34" W 123°38'23"
Deflection at Centre (mm):	0
Weight Usage Restriction:	17 people, 1 horse, 2 ATVs
Date Inspected:	Sept. 28, 2017
Inspected By:	Grant Waldie, P. Eng., PE Michael Li, EIT
Weather:	15°C, sunny

Overall Rating of Bridge	**Structure Description**
GOOD	8.6x1.2m beam bridge with timber deck.

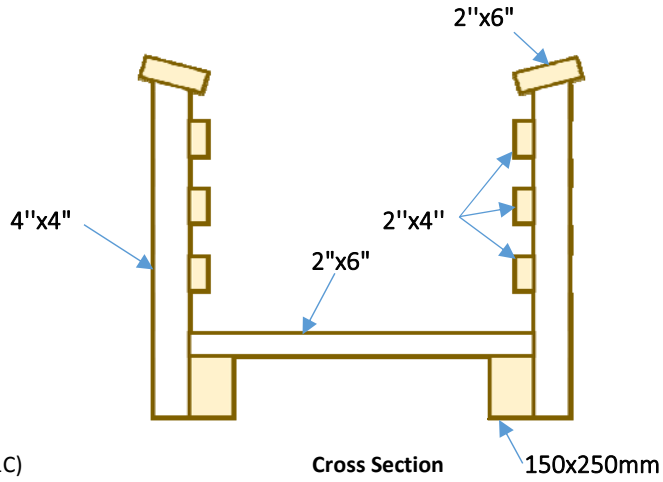
Element	Rating	Comments	Maintenance Recommendations	Estimated Cost	Priority
Primary Components					
Embankments	4				
Foundations	4				
Abutments	4				
Piers	4	Gabion baskets for piers			
Beams, Girders	4				
Deck	4				
Secondary Components					
Approaches	5				
Railings	4				
Auxiliary Components					
Slope Protection	5				
Signs	4	No load restriction sign present			

PARSONS

PROJECT	DESIGNER	DATE
Sunshine Coast Trail Bridge Inspection Project	M.Li	Oct 24th, 2017
SUBJECT	**CHECKER**	**DATE**
Trail Bridge Load Rating	G.Waldie	Oct 25th, 2017

Input Parameters

Bridge Name	Coop Housing Trail		
Number of Spans	2		
Span Length (m)	5.1	+	3.5
Deck Width (mm)	1020		
Deck Thickness (mm)	50		
Number of Log Beams	2		
Log Shape	Rectangul		
Log Size b*d (mm*mm)	150	X	250
Single or Double Railing	Double		
Timber Weight (kN/m^3)	5.0	(Cedar)	
Elastic Modulus of Timber	9000	(CSA-O86 T5.3.1C)	



Dead Load

Item	Railing	Deck	Log	Total
w_D(kN/m)	0.50	0.26	0.38	1.13

Max. Bending Moment by DL	M_D	=	$wL^2/8$	=	3.7	kN-m
Max. Deflection by DL	Δ_D	=	$5wL^4/384EI$	=	2.8	mm

Capacity Check

Moment Resistance	M_r	=	$\Phi F_b S K_{Zb} K_L$	=	37.13	kN-m	(CSA-O86 5.5.4.1)

Load combination for ULS: $M_r = 1.25M_D + 1.5M_L$

Max. Bending Moment by LL	M_L	=	21.7	kN-m	
Max. Live Load	w_L	=	6.7	kN/m	

Deflection Check

Load combination for SLS: $\Delta_{lim} = 1.0\Delta_D + 1.0\Delta_L$

Max. Deflection	Δ_{lim}	=	L / 180	=	28.3	mm (CSA-O86 4.5.2)
Max. Deflection by LL	Δ_L	=	25.5	mm		
Max. Live Load	w_L	=	10.2	kN/m		

Deck Area Check

Total Deck Area	A	=	8.8	m^2	

Summary

	Capacity Check	Deflection Check	Deck Area Check
Person	> 17 people	> 17 people	17 people
Horse	> 1 horse	> 1 horse	> 1 horse
ATV	> 2 ATVs	> 2 ATVs	> 2 ATVs

Conclusion:

The capacity of this bridge is governed by the bridge deck area. The maximum capacity of Coop Housing Trail is: 17 people or 1 horse or 2 ATVs.

Coop Housing Trail
Sunshine Coast Trail Bridge Inspections – 2017

P01 – West approach
(DSCN9505.jpg)

P02 – Overall decking
(DSCN9506.jpg)

P03 – North railing
(DSCN9507.jpg)

P04 – South railing
(DSCN9508.jpg)

P05 – East approach
(DSCN9509.jpg)

P06 – South side of the bridge
(DSCN9510.jpg)

P07 – North side of the bridge
(DSCN9511.jpg)

P08 – Downstream (looking south)
(DSCN9512.jpg)

P09 – Upstream (looking north)
(DSCN9513.jpg)

P10 – West abutment
(DSCN9514.jpg)

P11 – East abutment
(DSCN9515.jpg)

P12 – Middle pier
(DSCN9516.jpg)

P13 – Under side of the bridge (east span)
(DSCN9517.jpg)

P14 – Under side of the bridge (west span)
(DSCN9518.jpg)

P15 – Middle pier (detail condition)
(DSCN9519.jpg)

Structure Name:	Grey Trail
Parsons Waypoint #:	289
Remaining Lifespan (Years):	40
Replacement Cost:	$30,000
Georeference:	N 49°25'53" W 123°37'48"
Deflection at Centre (mm):	0
Weight Usage Restriction:	25 people, 1 horse, 2 ATVs
Date Inspected:	Sept. 28, 2017
Inspected By:	Grant Waldie, P. Eng., PE Michael Li, EIT
Weather:	15°C, sunny

Overall Rating of Bridge	**Structure Description**
VERY GOOD	12.4x3.5m steel bridge with concrete deck and steel floor beam.

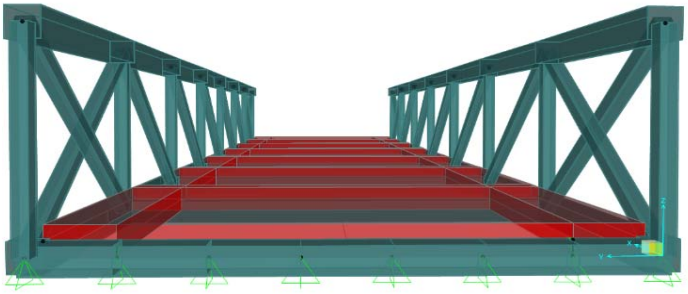
Element	Rating	Comments	Maintenance Recommendations	Estimated Cost	Priority
Primary Components					
Embankments	5				
Foundations	5				
Abutments	5				
Floor Beams	5				
Trusses	5				
Deck	5				
Coatings	4	Paint system is deteriorating	Monitor and consider painting in 2019	$5,000	Low
Secondary Components					
Bearing Seats	5				
Joints	5				
Curbs	5				
Approaches	5				
Railings	5				
Auxiliary Components					
Slope Protection	5				
Drainage System	5				
Fasteners	5				
Signs	4	No load restriction sign present			

PARSONS

PROJECT	DESIGNER	DATE
Sunshine Coast Trail Bridge Inspection Project	M.Li	Oct 24th, 2017
SUBJECT	**CHECKER**	**DATE**
Trail Bridge Load Rating	G.Waldie	Oct 25th, 2017

Input Parameters

Bridge Name	Grey Trail		
Number of Spans	1		
Span Length (m)	12.4		
Deck Width (mm)	3500		
Deck Thickness (mm)	200		
Critical Section	HSS		
Section Width and Height (mm)	180	&	180
Section Wall Thickness (mm)	5		
Steel Weight (kN/m^3)	77.0		
Elastic Modulus of Steel (MPa)	200000		



SAP2000 Model

Capacity Check

*Based on FE model analysis, the critical capacity is the bending capacity of the floor beam at mid-span

Moment Resistance	M_r	=	75.49	kN-m	($\Phi_s F_y S_x$)
Load combination for ULS: $M_r = 1.25M_D + 1.7M_L$					
Max. Bending Moment by DL	M_D	=	3.4	kN-m	(FE model analysis result)
Max Bending Moment by CL-625	M_{625}	=	15.9	kN-m	(FE model analysis result)
Max. Bending Moment Allowed by LL	M_L	=	41.9	kN-m	(M_r-M_D*1.25)/1.7
Max. Allowed Total Live Load	W_L	=	1646	kN	(M_L*625/M_{625})

Deflection Check

Load combination for SLS: $\Delta_{lim} = 1.0\Delta_D + 1.0\Delta_L$

Max. Deflection	Δ_{lim}	=	69	mm	(L / 180)
Max. Deflection by DL	Δ_D	=	3.1	mm	(FE model analysis result)
Max. Deflection by CL-625	Δ_{625}	=	7.8	mm	(FE model analysis result)
Max. Deflection Allowed by LL	Δ_L	=	66	mm	(Δ_{lim}-Δ_D)
Max. Allowed Total Live Load	W_L	=	5270	kN	(Δ_L*625/Δ_{625})

Deck Area Check

Total Deck Area	A	=	43.4	m^2

Summary

	Capacity Check	Deflection Check	Deck Area Check
Person	> 25 people	> 25 people	> 25 people
Horse	> 1 horse	> 1 horse	> 1 horse
ATV	> 2 ATVs	> 2 ATVs	> 2 ATVs

Conclusion:

1. The capacity of this bridge is governed by the bridge deck area. The maximum capacity of Grey Trail is: 25 people or 1 horse or 2 ATVs.

2. The live load rating is governed by mid-span floor beam bending capacity, the maximum live load allowed for heavy vehicle is 1646kN.

Grey Trail
Sunshine Coast Trail Bridge Inspections – 2017

P01 – East approach
(DSCN9799.jpg)

P02 – South railing
(DSCN9800.jpg)

P03 – North railing
(DSCN9802.jpg)

P04 – Overall decking
(DSCN9801.jpg)

P05 – West approach
(DSCN9803.jpg)

P06 – North side of the bridge
(DSCN9805.jpg)

P07 – South side of the bridge
(DSCN9806.jpg)

P08 – East embankment
(DSCN9807.jpg)

P09 – West abutment
(DSCN9809.jpg)

P10 – Under side of the bridge
(DSCN9812.jpg)

P11 – Floor beam
(DSCN9813.jpg)

P12 – Under side of the bridge, floor beam and concrete deck
(DSCN9814.jpg)

Structure Name:	Lower Waterfall
Parsons Waypoint #:	280
Remaining Lifespan (Years):	15
Replacement Cost:	$20,000
Georeference:	N 49°25'48" W 123°38'26"
Deflection at Centre (mm):	0
Weight Usage Restriction:	25 people, 1 horse, 2 ATVs
Date Inspected:	Sept. 28, 2017
Inspected By:	Grant Waldie, P. Eng., PE Michael Li, EIT
Weather:	15°C, sunny

Overall Rating of Bridge	**Structure Description**
POOR	21.6x1.22m beam bridge with timber deck.

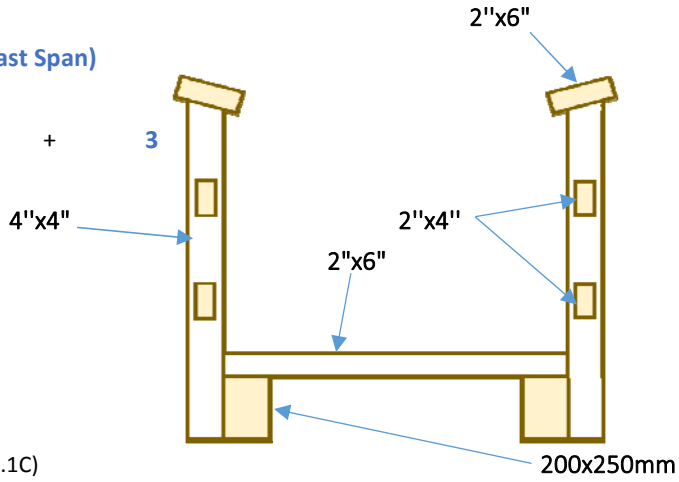
Element	Rating	Comments	Maintenance Recommendations	Estimated Cost	Priority
Primary Components					
Embankments	5				
Foundations	2	Erosion is occuring under West Span Pier 2	Fill in erosion gulley underneath pier	$5,000	High
Abutments	4				
Piers	2	Pier is starting to settle due to erosion underneath	Fill in erosion gulley underneath pier. Shim up deck planks (See photo 25)	$5,000	High
Beams, Girders	5				
Deck	4				
Secondary Components					
Approaches	5				
Railings	5				
Auxiliary Components					
Slope Protection	3	No slpe protection at West Span Pier 2	Consider installing gabian baskets	$15,000	Medium
Signs	4	No load restriction sign present			

PARSONS

PROJECT	DESIGNER	DATE
Sunshine Coast Trail Bridge Inspection Project	M.Li	Oct 24th, 2017
SUBJECT	**CHECKER**	**DATE**
Trail Bridge Load Rating	G.Waldie	Oct 25th, 2017

Input Parameters

Bridge Name	Lower Waterfall (East Span)				
Number of Spans	3				
Span Length (m)	4.5	+	3.4	+	3
Deck Width (mm)	1220				
Deck Thickness (mm)	50				
Number of Log Beams	2				
Log Shape	Rectangul				
Log Size b*d (mm*mm)	200	X	250		
Single or Double Railing	Double				
Timber Weight (kN/m^3)	5.0	(Cedar)			
Elastic Modulus of Timber	9000	(CSA-O86 T5.3.1C)			



Cross Section

Dead Load

Item	Railing	Deck	Log	Total
w_D(kN/m)	0.50	0.31	0.50	1.31

Max. Positive Moment by DL	M_{D+}	=	$0.08wL^2$	=	2.1	kN-m	(3 span continuous)
Max. Negative Moment by DL	M_{D-}	=	$0.1wL^2$	=	2.6	kN-m	
Max. Deflection by DL	Δ_D	=	$0.0069wL^4/EI$	=	0.8	mm	

Capacity Check

Moment Resistance	M_r	=	$\Phi F_b S K_{Zb} K_L$	=	49.5	kN-m	(CSA-O86 5.5.4.1)

Load combination for ULS: $M_r = 1.25M_D + 1.5M_L$

Max. Bending Moment by LL	M_L	=	30.8	kN-m	
Max. Live Load	w_L	=	19.0	kN/m	

Deflection Check

Load combination for SLS: $\Delta_{lim} = 1.0\Delta_D + 1.0\Delta_L$

Max. Deflection	Δ_{lim}	=	L / 180	=	25.0	mm	(CSA-O86 4.5.2)
Max. Deflection by LL	Δ_L	=	24.2	mm			
Max. Live Load	w_L	=	40.1	kN/m			

Deck Area Check

Total Deck Area	A	=	13.3	m^2			

Summary

	Capacity Check	Deflection Check	Deck Area Check
Person	> 25 people	> 25 people	> 25 people
Horse	> 1 horse	> 1 horse	> 1 horse
ATV	> 2 ATVs	> 2 ATVs	> 2 ATVs

Conclusion:

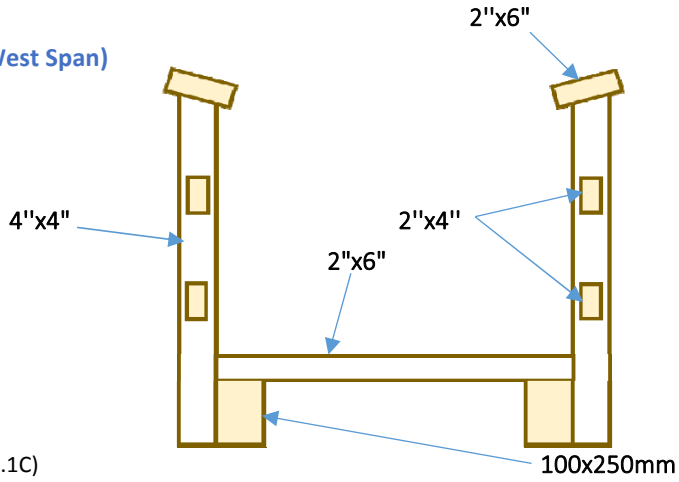
The capacity of this bridge is governed by the bridge deck area. The maximum capacity of Lower Waterfall (East Span) is: 25 people or 1 horse or 2 ATVs.

PARSONS

PROJECT	DESIGNER	DATE
Sunshine Coast Trail Bridge Inspection Project	M.Li	Oct 24th, 2017
SUBJECT	**CHECKER**	**DATE**
Trail Bridge Load Rating	G.Waldie	Oct 25th, 2017

Input Parameters

Bridge Name	Lower Waterfall (West Span)		
Number of Spans	2		
Span Length (m)	5.4	+	3.2
Deck Width (mm)	1220		
Deck Thickness (mm)	50		
Number of Log Beams	2		
Log Shape	Rectangul		
Log Size b*d (mm*mm)	100	X	250
Single or Double Railing	Double		
Timber Weight (kN/m^3)	5.0 (Cedar)		
Elastic Modulus of Timber	9000 (CSA-O86 T5.3.1C)		



Cross Section

Dead Load

Item	Railing	Deck	Log	Total
w_D(kN/m)	0.50	0.31	0.25	1.06

Max. Positive Moment by DL	M_{D+}	=	$9wL^2/128$	=	2.2 kN-m	(2 span continuous)
Max. Negative Moment by DL	M_{D-}	=	$wL^2/8$	=	3.8 kN-m	
Max. Deflection by DL	Δ_D	=	$wL^4/185EI$	=	2.1 mm	

Capacity Check

Moment Resistance	M_r	=	$\Phi F_b S K_{Zb} K_L$	=	24.75 kN-m	(CSA-O86 5.5.4.1)

Load combination for ULS: $M_r = 1.25M_D + 1.5M_L$

Max. Bending Moment by LL	M_L	=	13.3	kN-m	
Max. Live Load	w_L	=	3.6	kN/m	

Deflection Check

Load combination for SLS: $\Delta_{lim} = 1.0\Delta_D + 1.0\Delta_L$

Max. Deflection	Δ_{lim}	=	L / 180	=	30.0 mm	(CSA-O86 4.5.2)
Max. Deflection by LL	Δ_L	=	27.9	mm		
Max. Live Load	w_L	=	5.9	kN/m		

Deck Area Check

Total Deck Area	A	=	10.5	m^2

Summary

	Capacity Check	Deflection Check	Deck Area Check
Person	> 20 people	> 20 people	20 people
Horse	> 1 horse	> 1 horse	> 1 horse
ATV	> 2 ATVs	> 2 ATVs	> 2 ATVs

Conclusion:

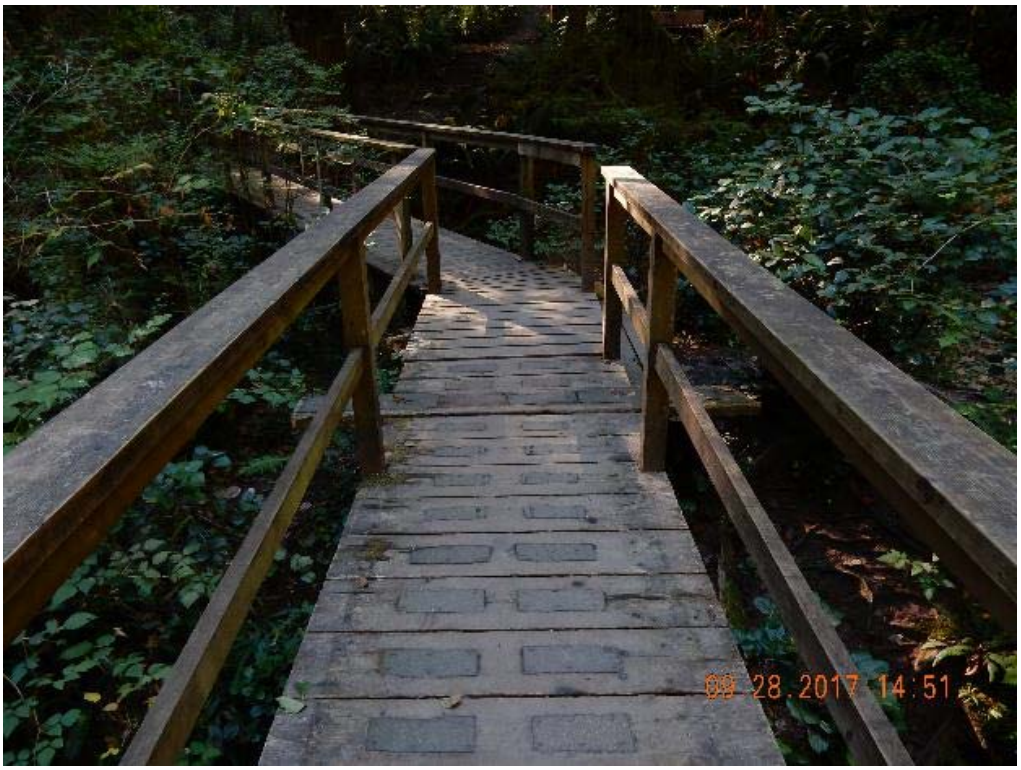
The capacity of this bridge is governed by the bridge deck area. The maximum capacity of Lower Waterfall (West Span) is: 20 people or 1 horse or 2 ATVs.

Lower Waterfall

Sunshine Coast Trail Bridge Inspections – 2017

P01 – East approach
(DSCN9620.jpg)

P02 – Overall decking (east span)
(DSCN9622.jpg)

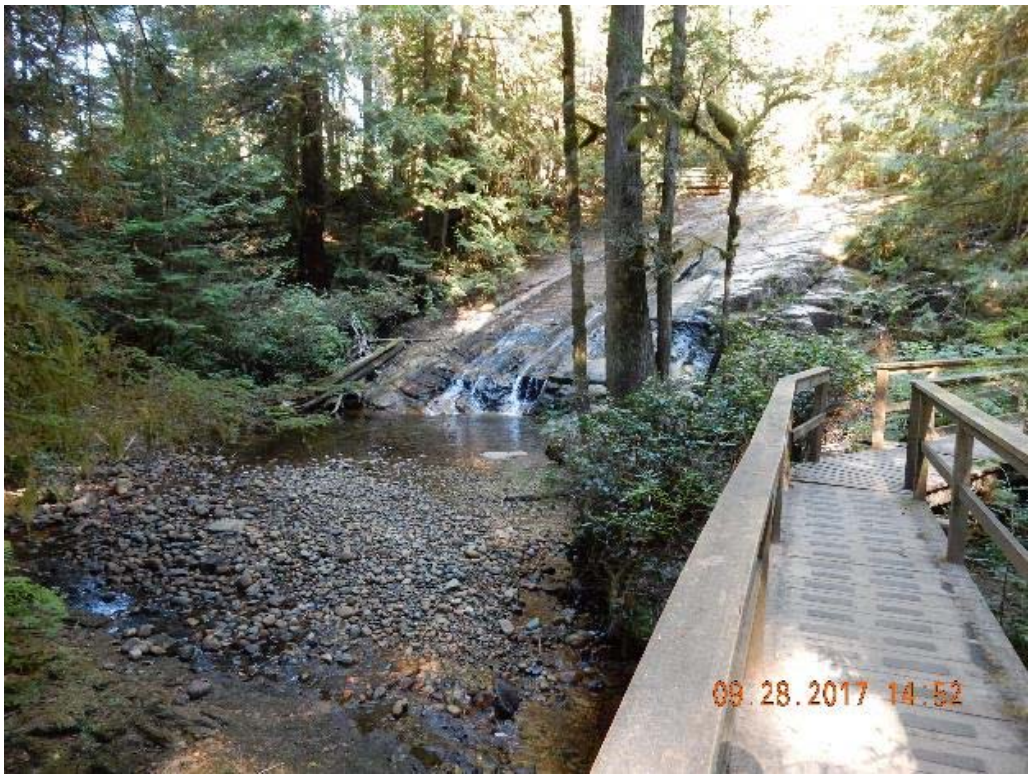


P03 – Overall decking (east span)
(DSCN9624.jpg)

P04 – Overall decking (west span)
(DSCN9626.jpg)

P05 – West end of the bridge
(DSCN9627.jpg)

P06 – West approach
(DSCN9628.jpg)



P07 – Upstream (looking north)
(DSCN9629.jpg)

P08 – Downstream (looking south)
(DSCN9630.jpg)

P09 – North side of the bridge (west span)
(DSCN9631.jpg)

P10 – North side of the bridge (west span)
(DSCN9632.jpg)

P11 – West abutment
(DSCN9633.jpg)

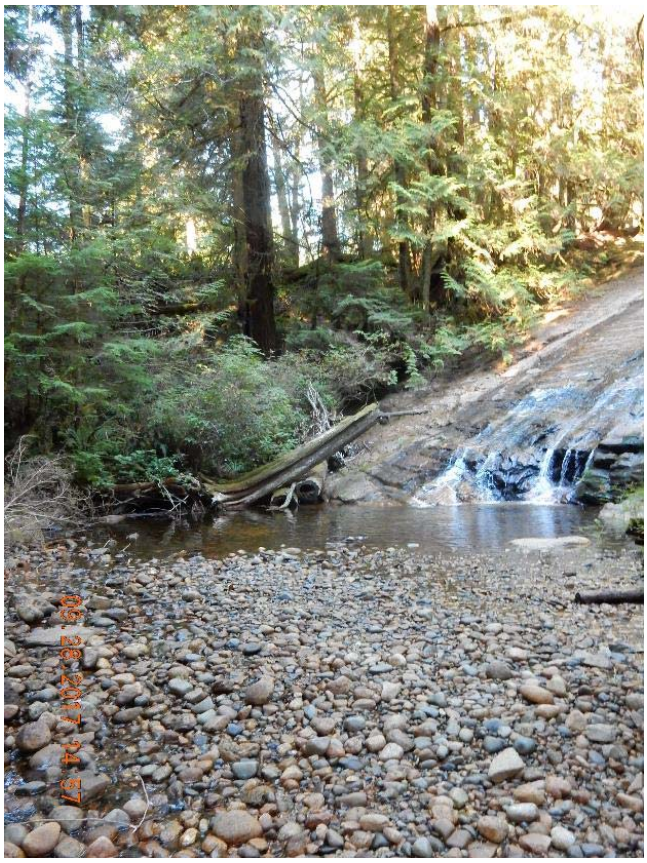
P12 – West span pier 1
(DSCN9634.jpg)

P13 – West span pier 2, erosion was noticed
(DSCN9635.jpg)

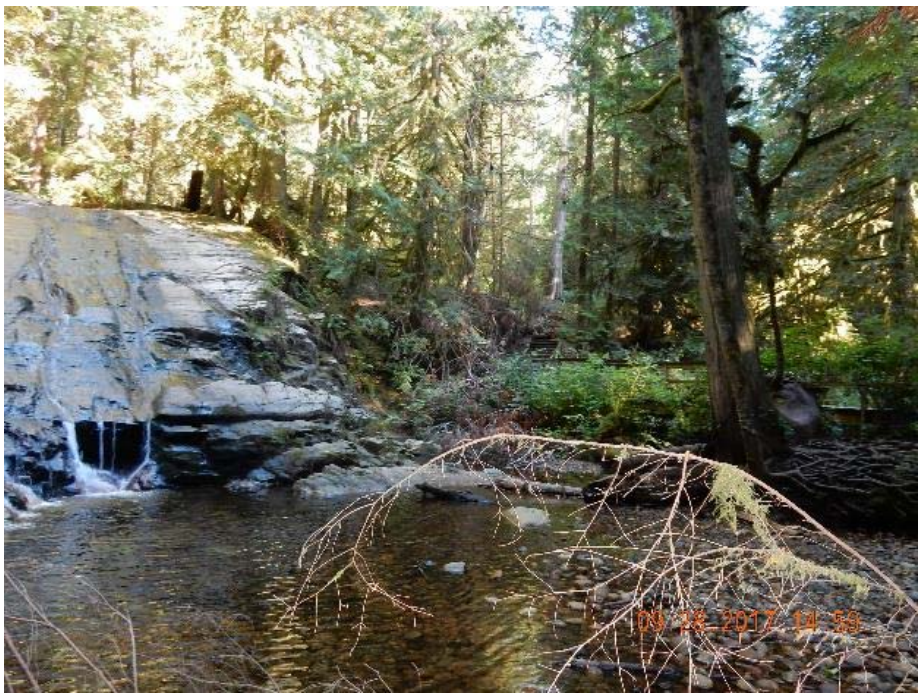
P14 – West span pier 2, erosion was noticed
(DSCN9638.jpg)

P15 – West span pier 2, erosion was noticed
(DSCN9637.jpg)

P16 – West span pier 2 (detail view), erosion noticed
(DSCN9640.jpg)



P17 – Waterfall landing area, showing low water level in September
(DSCN9642.jpg)



P18 – Waterfall landing area
(DSCN9643.jpg)

P19 – North side of the bridge (east span)
(DSCN9644.jpg)

P20 – East span pier 3
(DSCN9645.jpg)

P21 – East abutment
(DSCN9646.jpg)

P22 – Under side of the bridge (east span)
(DSCN9647.jpg)

P23 – Under side of the bridge (west span)
(DSCN9649.jpg)

P24 – West span pier 2 (south side)
(DSCN9650.jpg)

P25 – Right above west span pier 2, starting to settle.
(DSCN9652.jpg)