Structure Name:	Metcalfe
Parsons Waypoint #:	277
Remaining Lifespan (Years):	15
Replacement Cost:	$20,000
Georeference:	N 49°25'02" W 123°37'40"
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**
POOR	8.4x1.04m beam bridge with timber deck and steel I girder.

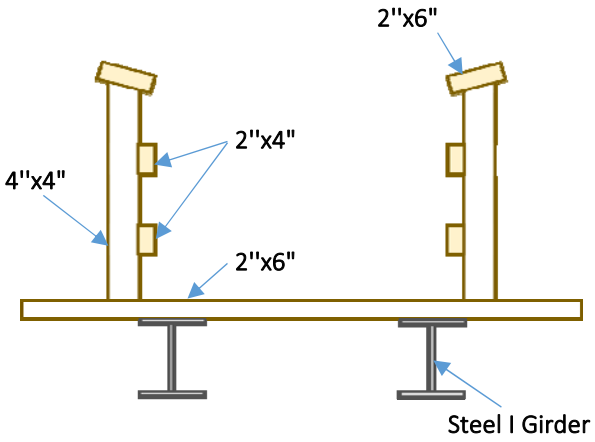
Element	Rating	Comments	Maintenance Recommendations	Estimated Cost	Priority
Primary Components					
Embankments	2	Erosion at north embankment	Relocate rocks from stream underneath eroded area on north embankment	$2,000	High
Foundations	4				
Abutments	5				
Beams, Girders	5				
Deck	5				
Secondary Components					
Approaches	5				
Railings	5				
Auxiliary Components					
Slope Protection	3	Minimal vegetation present on slopes	Monitor for erosion issues in the future	N/A	Low
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	Metcalfe		
Number of Spans	1		
Span Length (m)	8.4		
Deck Width (mm)	1040		
Deck Thickness (mm)	50		
Number of Beams	2		
Girder Shape	I Girder (Steel)		
Girder Width and Height (mm)	100	&	200
Web and Flange Thickness (mm)	10	&	8
Single or Double Railing	Double		
Timber Weight (kN/m^3)	5.0 (Cedar)		
Steel Weight (kN/m^3)	77.0		
Elastic Modulus of Steel (MPa)	200000		



Cross Section

Dead Load

Item	Railing	Deck	Girder	Total
w_D(kN/m)	0.50	0.26	0.53	1.29

Max. Bending Moment by DL	M_D	=	$wL^2/8$	=	11.4	kN-m
Max. Deflection by DL	Δ_D	=	$5wL^4/384EI$	=	10.5	mm

Capacity Check

Moment Resistance	M_r	=	$\Phi_s F_y S_x$	=	155	kN-m

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

Max. Bending Moment by LL	M_L	=	93.9	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	Δ_{lim}	=	L / 180	=	46.7 mm	(CSA-O86 4.5.2)
Max. Deflection by LL	Δ_L	=	36.2	mm		
Max. Live Load	w_L	=	4.5	kN/m		

Deck Area Check

Total Deck Area	A	=	8.7	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 Metcalfe is: 17 people or 1 horse or 2 ATVs.

P01 – North approach
(DSCN9562.jpg)

P02 – North end of the bridge
(DSCN9563.jpg)

P03 – Overall decking
(DSCN9564.jpg)

P04 – Upstream (looking east)
(DSCN9565.jpg)

P05 – Downstream (looking west)
(DSCN9566.jpg)

P06 – South approach
(DSCN9567.jpg)

P07 – East side of the bridge
(DSCN9568.jpg)

P08 – West side of the bridge
(DSCN9569.jpg)

P09 – North abutment
(DSCN9570.jpg)

P10 – North embankment. Erosion noticed. Suggest riprap using existing rocks.
(DSCN9571.jpg)

P11 – South embankment
(DSCN9572.jpg)

P12 – Under side of the bridge (south end)
(DSCN9573.jpg)

P13 – Under side of the bridge (north end)
(DSCN9574.jpg)

P14 – Suggest relocating rocks on the right to the embankment on the left.
(DSCN9575.jpg)

Structure Name:	Red Back Stop
Parsons Waypoint #:	283
Remaining Lifespan (Years):	40
Replacement Cost:	$5,000
Georeference:	N 49°25'54" W 123°38'28"
Deflection at Centre (mm):	0
Weight Usage Restriction:	3 people, 0 horses, 1 ATV
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	4m span beam bridge with timber deck (two bridges).

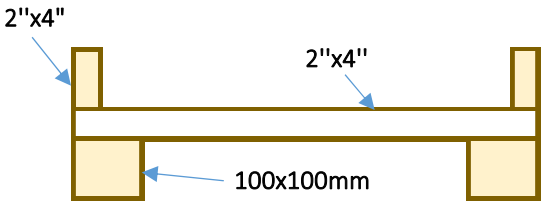
Element	Rating	Comments	Maintenance Recommendations	Estimated Cost	Priority
Primary Components					
Embankments	5				
Foundations	5				
Abutments	5				
Beams, Girders	5				
Deck	5				
Secondary Components					
Approaches	5				
Auxiliary Components					
Slope Protection	5				
Signs	4	No load restriction 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	Red Back Stop		
Number of Spans	1		
Span Length (m)	4		
Deck Width (mm)	600		
Deck Thickness (mm)	50		
Number of Log Beams	2		
Log Shape	Rectangul		
Log Size b*d (mm*mm)	100	X	100
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)	0.00	0.15	0.10	0.25

Max. Bending Moment by DL	M_D	=	$wL^2/8$	=	0.5	kN-m
Max. Deflection by DL	Δ_D	=	$5wL^4/384EI$	=	5.6	mm

Capacity Check

Moment Resistance	M_r	=	$\Phi F_b S K_{Zb} K_L$	=	3.96	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	=	2.2	kN-m	
Max. Live Load	w_L	=	1.1	kN/m	

Deflection Check

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

Max. Deflection	Δ_{lim}	=	L / 180	=	22.2	mm (CSA-O86 4.5.2)
Max. Deflection by LL	Δ_L	=	16.7	mm		
Max. Live Load	w_L	=	0.8	kN/m		

Deck Area Check

Total Deck Area	A	=	2.4	m^2	

Summary

	Capacity Check	Deflection Check	Deck Area Check
Person	> 3 people	3 people	> 3 people
Horse	0 horse	0 horse	> 0 horse
ATV	1 ATV	1 ATV	> 1 ATV

Conclusion:

The capacity of this bridge is governed by deflection criteria. The maximum capacity of Red Back Stop is: 3 people or 0 horse or 1 ATV.

Red Back Stop
Sunshine Coast Trail Bridge Inspections – 2017

P01 – Overview (east bridge)
(DSCN9826.jpg)

P02 – Side view of the bridge (east bridge)
(DSCN9827.jpg)

P03 – Overview (west bridge)
(DSCN9828.jpg)

P04 – Side view of the bridge (west bridge)
(DSCN9829.jpg)

P05 – Overview of two bridges
(DSCN9830.jpg)

P06 – View of the sport field
(DSCN9831.jpg)

Structure Name:	Roberts Creek
Parsons Waypoint #:	285
Remaining Lifespan (Years):	15
Replacement Cost:	$30,000
Georeference:	N 49°25'53" W 123°38'03"
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	19.5x1.04m beam bridge with timber deck.

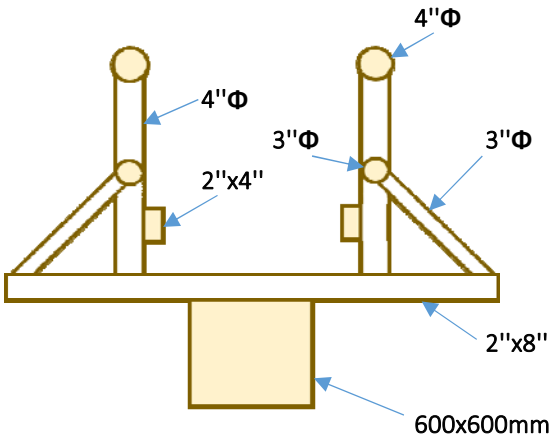
Element	Rating	Comments	Maintenance Recommendations	Estimated Cost	Priority
Primary Components					
Embankments	4				
Foundations	2	East abutment has erosion. See photo 27	Install rip rap or gabian baskets	$5,000	High
Abutments	2	East abutment has erosion. See photo 27	Install rip rap or gabian baskets	See above	
Piers	4				
Beams, Girders	4				
Deck	4				
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	Roberts Creek	
Number of Spans	1	
Span Length (m)	19.5	
Deck Width (mm)	1040	
Deck Thickness (mm)	50	
Number of Log Beams	1	
Log Shape	Rectangul	
Log Size b*d (mm*mm)	600 X	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	0.31	2.16	2.97

Max. Bending Moment by DL $M_D = wL^2/8 = 141.3$ kN-m

Max. Deflection by DL $\Delta_D = 5wL^4/384EI = 57.6$ mm

Capacity Check

Moment Resistance $M_r = \Phi F_b S K_{Zb} K_L = 427.7$ 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 $M_L = 167.4$ kN-m

Max. Live Load $w_L = 3.5$ kN/m

Deflection Check

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

Max. Deflection $\Delta_{lim} = L / 180 = 108.3$ mm (CSA-O86 4.5.2)

Max. Deflection by LL $\Delta_L = 50.8$ mm

Max. Live Load $w_L = 2.6$ kN/m

Deck Area Check

Total Deck Area $A = 20.3$ 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 Roberts Creek is: 25 people or 1 horse or 2 ATVs.

P01 – West approach
(DSCN9708.jpg)

P02 – Overall decking (main span)
(DSCN9709.jpg)

P03 – Overall decking (main span)
(DSCN9710.jpg)

P04 – Upstream (looking north)
(DSCN9711.jpg)

P05 – Downstream (looking south)
(DSCN9712.jpg)

P06 – Overall decking (board walk)
(DSCN9713.jpg)

P07 – Overall decking (board walk)
(DSCN9714.jpg)

P08 – Overall decking (board walk)
(DSCN9716.jpg)

P09 – Overall decking (board walk)
(DSCN9717.jpg)

P10 – Overall decking (board walk)
(DSCN9718.jpg)

P11 – Overall decking (board walk)
(DSCN9720.jpg)

P12 – Overall decking (board walk)
(DSCN9721.jpg)

P13 – East end of the bridge
(DSCN9723.jpg)

P14 – East approach
(DSCN9725.jpg)

P15 – Side view of the board walk
(DSCN9726.jpg)

P16 – Side view of the board walk (detail view)
(DSCN9727.jpg)

P17 – Side view of the board walk (detail view)
(DSCN9729.jpg)

P18 – Side view of the board walk (detail view)
(DSCN9732.jpg)

P19 – Side view of the board walk
(DSCN9734.jpg)

P20 – Side view of the board walk abutment
(DSCN9735.jpg)

P21 – Side view of the board walk
(DSCN9737.jpg)

P22 – Side view of the board walk abutment
(DSCN9740.jpg)

P23 – Side view of the board walk
(DSCN9741.jpg)

P24 – Side view of the board walk
(DSCN9742.jpg)

P25 – East end of the main span
(DSCN9744.jpg)

P26 – South side of the main span
(DSCN9745.jpg)

P27 – East abutment of the main span, erosion at embankment was noticed. Suggest putting six or more gabion baskets
(DSCN9729.jpg)

Structure Name:	Robinson Trail
Parsons Waypoint #:	276
Remaining Lifespan (Years):	15
Replacement Cost:	$30,000
Georeference:	N 49°25'13" W 123°37'29"
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	12x1.52m beam bridge with timber deck.

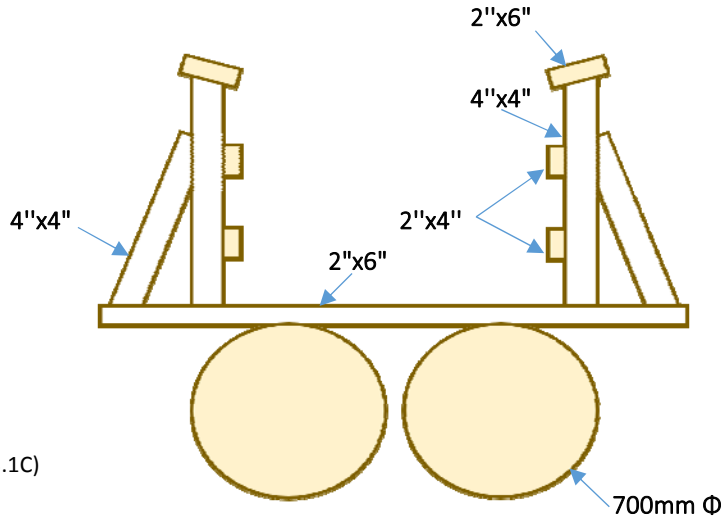
Element	Rating	Comments	Maintenance Recommendations	Estimated Cost	Priority
Primary Components					
Embankments	4				
Foundations	4				
Abutments	4				
Beams, Girders	4				
Deck	4	Some planks have been replaced. Remaining planks are all OK.			
Secondary Components					
Approaches	4				
Railings	4				
Auxiliary Components					
Slope Protection	2	Fir tree southwest of bridge has an eroding base	Monitor erosion at base of tree	N/A	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	Robinson Trail
Number of Spans	1
Span Length (m)	12
Deck Width (mm)	1520
Deck Thickness (mm)	50
Number of Log Beams	2
Log Shape	Circular
Log Diameter (mm)	700
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	0.38	3.85	4.73

Max. Bending Moment by DL	M_D	=	$wL^2/8$	=	85.1 kN-m	
Max. Deflection by DL	Δ_D	=	$5wL^4/384EI$	=	6.0 mm	

Capacity Check

Moment Resistance	M_r	=	$\Phi F_b S K_{Zb} K_L$	=	800.1 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	=	462.5	kN-m	
Max. Live Load	w_L	=	25.7	kN/m	

Deflection Check

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

Max. Deflection	Δ_{lim}	=	L / 180	= 66.7 mm	(CSA-O86 4.5.2)
Max. Deflection by LL	Δ_L	=	60.6	mm	
Max. Live Load	w_L	=	47.7	kN/m	

Deck Area Check

Total Deck Area	A	=	18.2	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 Robinson Trail is: 25 people or 1 horse or 2 ATVs.

Robinson Trail

Sunshine Coast Trail Bridge Inspections – 2017

P01 – West approach
(DSCN9538.jpg)

P02 – Overall decking
(DSCN9539.jpg)

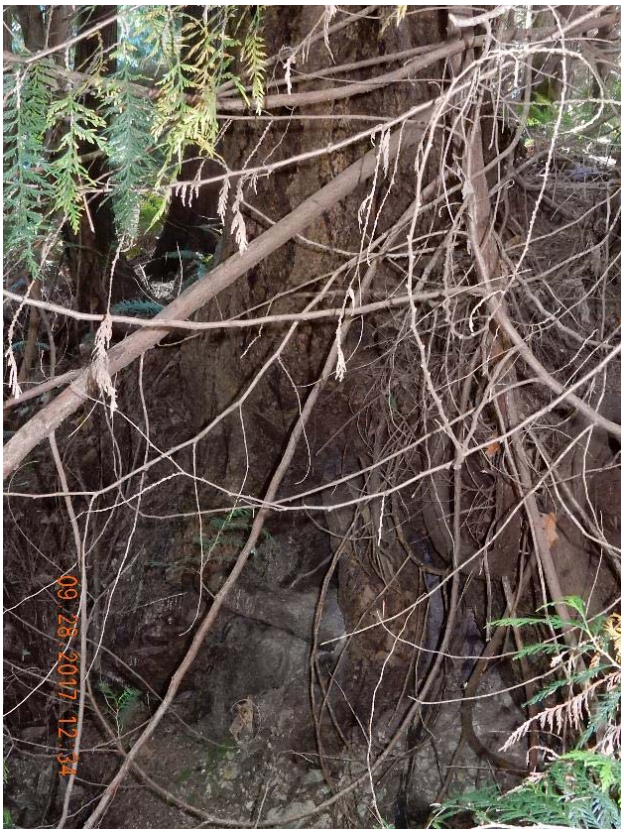
P03 – North railing
(DSCN9541.jpg)

P04 – South railing
(DSCN9542.jpg)

P05 – East end of the bridge
(DSCN9543.jpg)

P06 – Upstream (looking north)
(DSCN9544.jpg)

P07 – Downstream (looking south)
(DSCN9545.jpg)



P08 – Fir tree (5 feet diameter) southwest to the bridge, erosion was noticed beneath the bank. Needs to be monitored.
(DSCN9547.jpg)

P09 – East approach
(DSCN9548.jpg)

P10 – North side of the bridge
(DSCN9551.jpg)

P11 – South side of the bridge
(DSCN9552.jpg)

P12 – East abutment
(DSCN9554.jpg)

P13 – West abutment
(DSCN9557.jpg)

P14 – South side of the bridge (detail view)
(DSCN9552.jpg)

Structure Name:	The Gorge
Parsons Waypoint #:	279
Remaining Lifespan (Years):	25
Replacement Cost:	$30,000
Georeference:	N 49°25'43" W 123°38'24"
Deflection at Centre (mm):	350
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**
GOOD	16.3x0.64m beam bridge with timber deck.

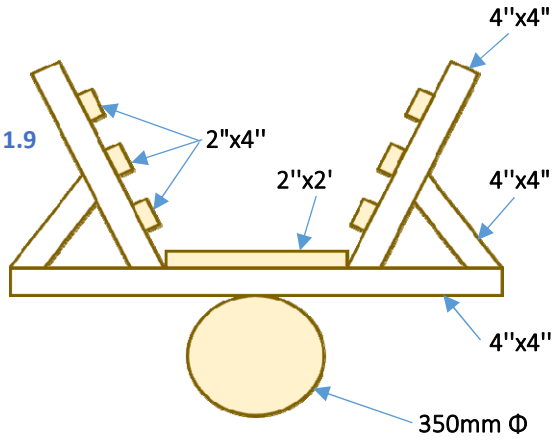
Element	Rating	Comments	Maintenance Recommendations	Estimated Cost	Priority
Primary Components					
Embankments	5				
Foundations	5				
Abutments	5				
Piers	5				
Beams, Girders	5				
Deck	5				
Secondary Components					
Approaches	5				
Railings	5				
Auxiliary Components					
Slope Protection	5				
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	The Gorge				
Number of Spans	3				
Span Length (m)	3.6	+	10.8	+	1.9
Deck Width (mm)	640				
Deck Thickness (mm)	50				
Number of Log Beams	1				
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	0.16	0.48	1.14

Max. Bending Moment by DL	M_D	=	$wL^2/8$	=	16.6 kN-m	(discontinuous span)
Max. Deflection by DL	Δ_D	=	$5wL^4/384EI$	=	30.5 mm	

Capacity Check

Moment Resistance	M_r	=	$\Phi F_b S K_{Zb} K_L$	=	50.01 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	=	19.5	kN-m
Max. Live Load	w_L	=	1.3	kN/m

Deflection Check

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

Max. Deflection	Δ_{lim}	=	L / 180	=	60.0 mm	(CSA-O86 4.5.2)
Max. Deflection by LL	Δ_L	=	29.5	mm		
Max. Live Load	w_L	=	1.1	kN/m		

Deck Area Check

Total Deck Area	A	=	10.4	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 deflection criteria. The maximum capacity of The Gorge is: 15 people or 1 horse or 2 ATVs.

The Gorge
Sunshine Coast Trail Bridge Inspections – 2017

P01 – West approach
(DSCN9602.jpg)

P02 – Overall decking
(DSCN9604.jpg)

P03 – East end of the bridge
(DSCN9607.jpg)

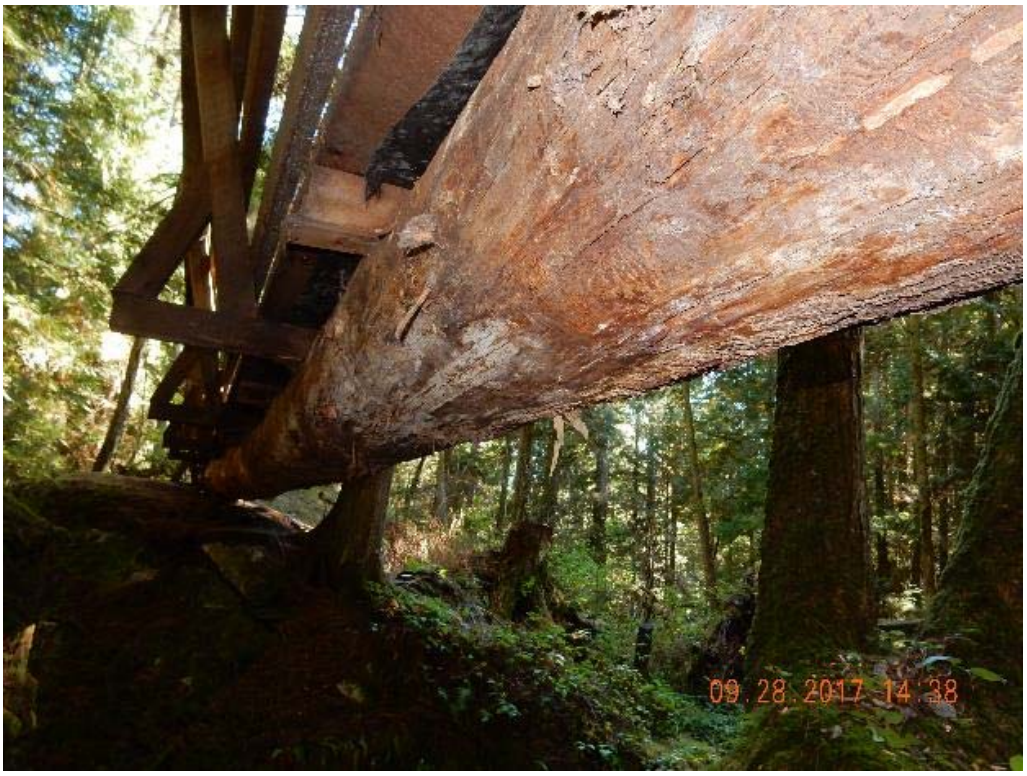
P04 – East approach
(DSCN9608.jpg)

P05 – North side of the bridge (east span)
(DSCN9610.jpg)

P06 – South side of the bridge (east span)
(DSCN9611.jpg)

P07 – North side of the bridge (east span)
(DSCN9612.jpg)

P08 – Pier
(DSCN9613.jpg)



P09 – Under side of the bridge (east span)
(DSCN9614.jpg)

P10 – Under side of the bridge (west span)
(DSCN9615.jpg)

P11 – Downstream (looking south)
(DSCN9616.jpg)

P12 – Upstream (looking north)
(DSCN9617.jpg)

P13 – South side of the bridge
(DSCN9618.jpg)

Structure Name:	Upper Waterfall
Parsons Waypoint #:	281
Remaining Lifespan (Years):	40
Replacement Cost:	$20,000
Georeference:	N 49°25'49" W 123°38'26"
Deflection at Centre (mm):	0
Weight Usage Restriction:	25 people, 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	9.2x1.52m beam bridge with timber deck.

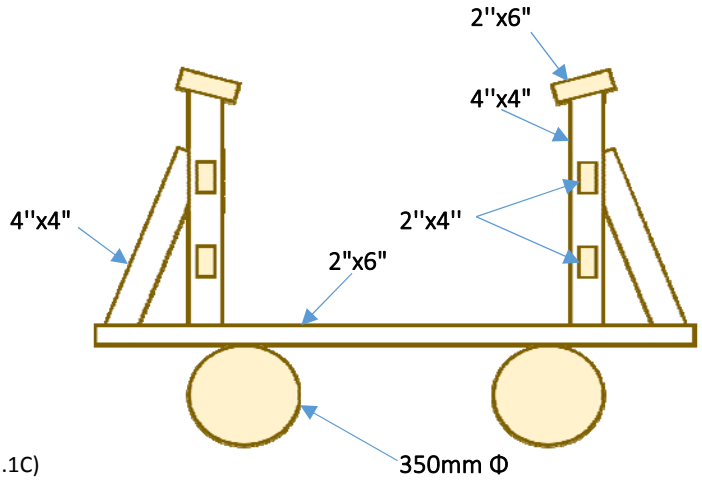
Element	Rating	Comments	Maintenance Recommendations	Estimated Cost	Priority
Primary Components					
Embankments	5				
Foundations	3	Viewing platform is supported by only one 4"x4" post. Vandalism could easily cause a structural failure.	Consider installing two more supports at each corner of viewing platform to provide redundancy in the structural support system.	$5,000	Medium
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	Upper Waterfall
Number of Spans	1
Span Length (m)	9.2
Deck Width (mm)	1520
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	0.38	0.96	1.84

Max. Bending Moment by DL	M_D	=	$wL^2/8$	=	19.5	kN-m
Max. Deflection by DL	Δ_D	=	$5wL^4/384EI$	=	13.0	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	=	50.4	kN-m	
Max. Live Load	w_L	=	4.8	kN/m	

Deflection Check

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

Max. Deflection	Δ_{lim}	=	L / 180	=	51.1	mm (CSA-O86 4.5.2)
Max. Deflection by LL	Δ_L	=	38.2	mm		
Max. Live Load	w_L	=	5.4	kN/m		

Deck Area Check

Total Deck Area	A	=	14.0	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 Upper Waterfall is: 25 people or 1 horse or 2 ATVs.

Upper Waterfall

Sunshine Coast Trail Bridge Inspections – 2017

P01 – East approach
(DSCN9654.jpg)

P02 – Overall decking
(DSCN9656.jpg)

P03 – East end of the bridge
(DSCN9655.jpg)

P04 – South railing
(DSCN9657.jpg)

P05 – East end of the bridge
(DSCN9658.jpg)

P06 – Upstream (looking north)
(DSCN9659.jpg)

P07 – Downstream (looking south)
(DSCN9660.jpg)

P08 – West approach
(DSCN9662.jpg)

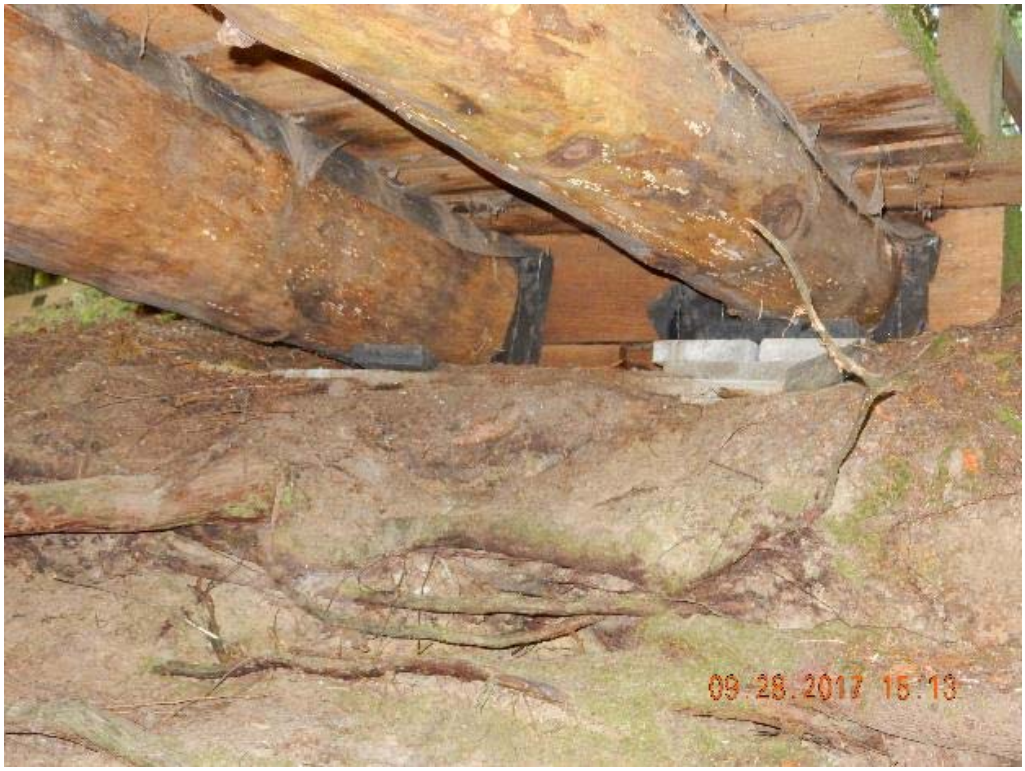
P09 – North side of the bridge
(DSCN9663.jpg)

P10 – North side of the bridge (detail view)
(DSCN9665.jpg)

P11 – North side of the bridge (detail view)
(DSCN9666.jpg)

P12 – Under side of the bridge
(DSCN9667.jpg)

P13 – East abutment
(DSCN9669.jpg)



P14 – West abutment
(DSCN9670.jpg)

P15 – South side of the bridge
(DSCN9671.jpg)

P16 – Cantilever viewing deck supported by one 4'' x 4'' pole and pulled by cable. Consider adding two more supports at both corners of the viewing deck.
(DSCN9674.jpg)

P17 – Cantilever viewing deck supported by one 4'' x 4'' pole and pulled by cable. Consider adding two more supports at both corners of the viewing deck. (DSCN9677.jpg)

Structure Name:	White Trail
Remaining Lifespan (Years):	25
Replacement Cost:	$20,000
Georeference:	N 49°25'50" W 123°37'27"
Deflection at Centre (mm):	0
Weight Usage Restriction:	14 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	6.2x1.2m beam bridge with timber deck.

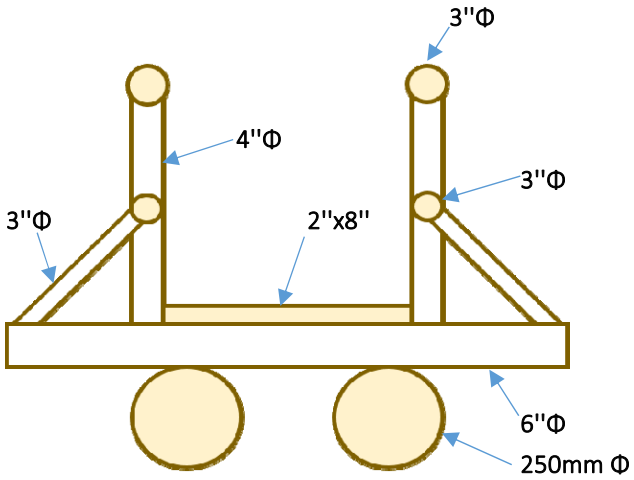
Element	Rating	Comments	Maintenance Recommendations	Estimated Cost	Priority
Primary Components					
Embankments	5				
Foundations	5				
Abutments	5				
Beams, Girders	5				
Deck	5				
Secondary Components					
Approaches	5				
Railings	5				
Auxiliary Components					
Slope Protection	5				
Signs	4	No 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	White Trail
Number of Spans	1
Span Length (m)	6.2
Deck Width (mm)	1200
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	0.30	0.49	1.29

Max. Bending Moment by DL $M_D = wL^2/8 = 6.2$ kN-m

Max. Deflection by DL $\Delta_D = 5wL^4/384EI = 7.2$ 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 $M_L = 19.1$ kN-m

Max. Live Load $w_L = 4.0$ kN/m

Deflection Check

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

Max. Deflection $\Delta_{lim} = L / 180 = 34.4$ mm (CSA-O86 4.5.2)

Max. Deflection by LL $\Delta_L = 27.2$ mm

Max. Live Load $w_L = 4.9$ kN/m

Deck Area Check

Total Deck Area $A = 7.4$ m^2

Summary

	Capacity Check	Deflection Check	Deck Area Check
Person	> 14 people	> 14 people	14 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 White Trail is: 14 people or 1 horse or 2 ATVs.

White Trail
Sunshine Coast Trail Bridge Inspections – 2017

P01 – North approach
(DSCN9816.jpg)

P02 – Downstream (looking west)
(DSCN9817.jpg)

P03 – Upstream (looking east)
(DSCN9818.jpg)

P04 – South approach
(DSCN9819.jpg)

P05 – East side of the bridge
(DSCN9821.jpg)

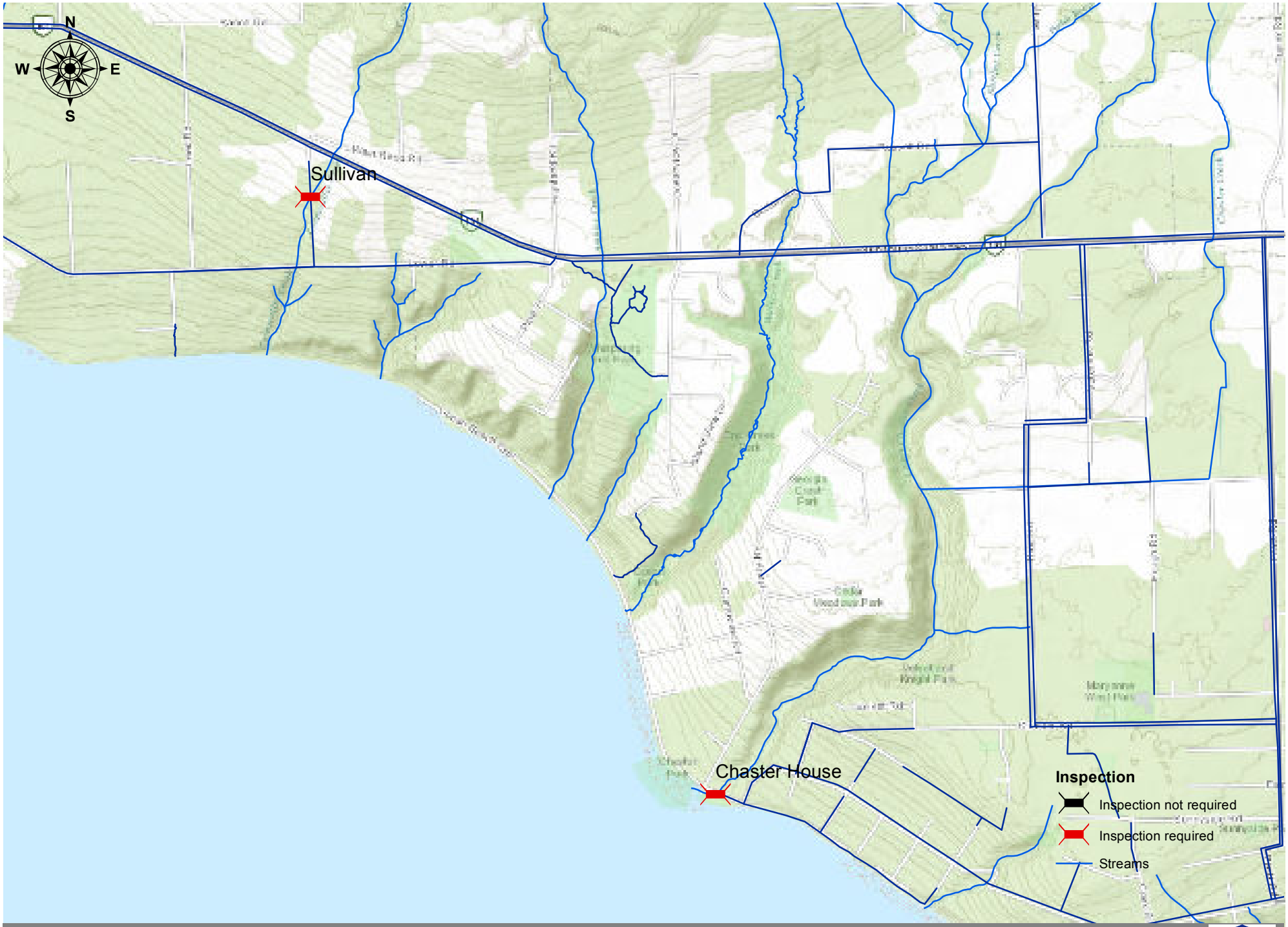
P06 – Under side of the bridge
(DSCN9822.jpg)

P07 – North embankment
(DSCN9823.jpg)

P08 – South embankment
(DSCN9824.jpg)

Appendix 5

Zone 5 - Schedule B - Area D Bridge Assessment South



Schedule B - Area D Bridge Assessment

Structure Name:	Chaster House
Parsons Waypoint #:	272
Remaining Lifespan (Years):	40
Replacement Cost:	$30,000
Georeference:	N 49°23'23" W 123°33'19"
Deflection at Centre (mm):	0
Weight Usage Restriction:	21 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	4.7x2.29m beam bridge with timber deck and two steel I gider.

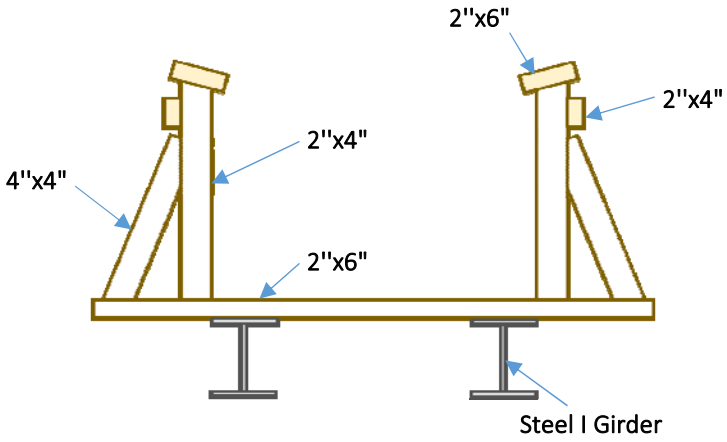
Element	Rating	Comments	Maintenance Recommendations	Estimated Cost	Priority
Primary Components					
Foundations	5				
Abutments	5				
Beams, Girders	5	Steel I-Beams in very good condition			
Deck	5				
Coatings	5	Paint system intact			
Secondary Components					
Bearing Seats	5	Steel I-Beams rest on concrete abutments			
Approaches	5				
Railings	5				
Auxiliary Components					
Slope Protection	5	Concrete retaining walls protect slope			
Signs	5	No sign present or required			

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	Chaster House		
Number of Spans	1		
Span Length (m)	4.7		
Deck Width (mm)	2290		
Deck Thickness (mm)	50		
Number of Beams	2		
Girder Shape	I Girder (Steel)		
Girder Width and Height (mm)	150	&	260
Web and Flange Thickness (mm)	10	&	11
Single or Double Railing	Double		
Timber Weight (kN/m^3)	5.0 (Cedar)		
Steel Weight (kN/m^3)	77.0		
Elastic Modulus of Steel (MPa)	200000		



Cross Section

Dead Load

Item	Railing	Deck	Girder	Total
w_D(kN/m)	0.50	0.57	0.87	1.95

Max. Bending Moment by DL	M_D	=	$wL^2/8$	=	5.4	kN-m
Max. Deflection by DL	Δ_D	=	$5wL^4/384EI$	=	0.5	mm

Capacity Check

Moment Resistance	M_r	=	$\Phi_s F_y S_x$	=	371	kN-m

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

Max. Bending Moment by LL	M_L	=	242.8	kN-m	
Max. Live Load	w_L	=	87.9	kN/m	

Deflection Check

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

Max. Deflection	Δ_{lim}	=	L / 180	=	26.1	mm (CSA-O86 4.5.2)
Max. Deflection by LL	Δ_L	=	25.6	mm		
Max. Live Load	w_L	=	100.7	kN/m		

Deck Area Check

Total Deck Area	A	=	10.8	m^2		

Summary

	Capacity Check	Deflection Check	Deck Area Check
Person	> 21 people	> 21 people	21 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 Chaster House is: 21 people or 1 horse or 2 ATVs.

Chaster House
Sunshine Coast Trail Bridge Inspections – 2017

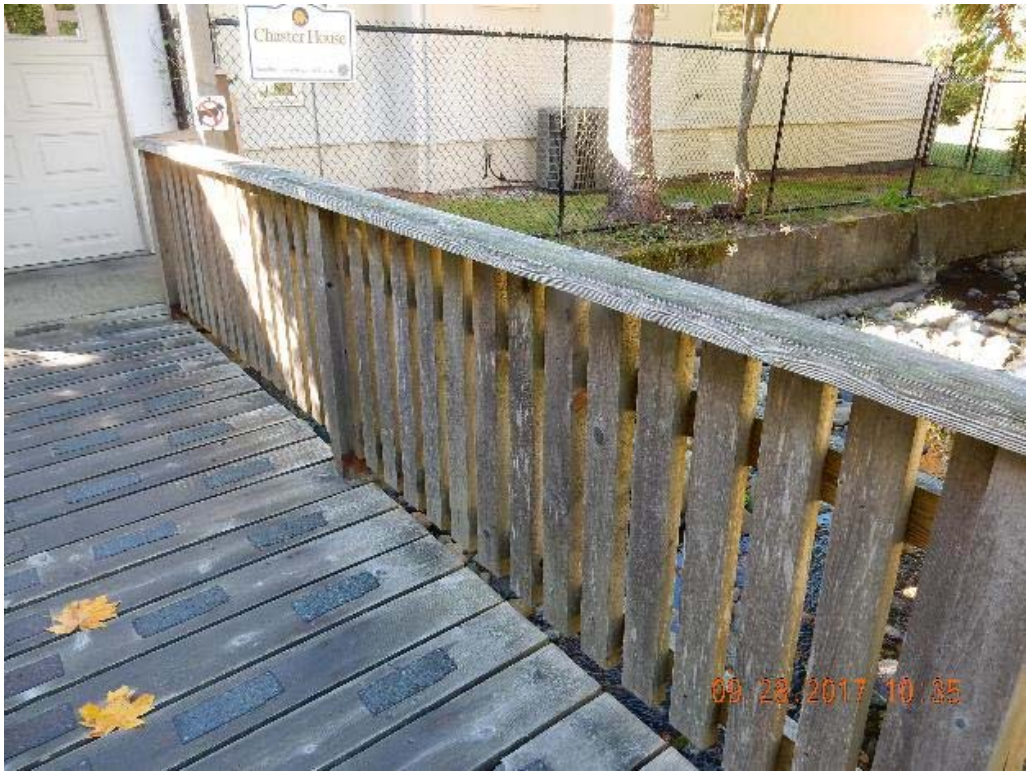
P01 – North approach
(DSCN9473.jpg)

P02 – Overall decking
(DSCN9474.jpg)

P03 – East railing
(DSCN9475.jpg)

P04 – East railing
(DSCN9476.jpg)

P05 – West railing
(DSCN9477.jpg)



P06 – West railing
(DSCN9478.jpg)

P07 – South approach
(DSCN9479.jpg)

P08 – West side of the bridge
(DSCN9480.jpg)

P09 – East side of the bridge
(DSCN9481.jpg)

P10 – North abutment
(DSCN9483.jpg)

P11 – South abutment
(DSCN9484.jpg)

P12 – Underside of the bridge
(DSCN9485.jpg)

Structure Name:	Sullivan Trail
Parsons Waypoint #:	273
Remaining Lifespan (Years):	25
Replacement Cost:	$20,000
Georeference:	N 49°24'28" W 123°34'26"
Deflection at Centre (mm):	0
Weight Usage Restriction:	7 people, 0 horses, 1 ATV
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	6.2x1.02m beam bridge with timber deck.

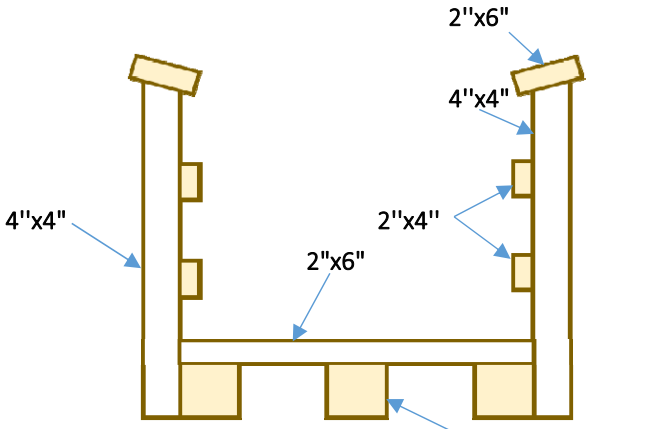
Element	Rating	Comments	Maintenance Recommendations	Estimated Cost	Priority
Primary Components					
Embankments	4				
Foundations	4				
Abutments	4				
Beams, Girders	4				
Deck	4				
Secondary Components					
Approaches	5				
Railings	5				
Auxiliary Components					
Slope Protection	5				
Signs	2	No 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	Sullivan Trail	
Number of Spans	1	
Span Length (m)	6.2	
Deck Width (mm)	1020	
Deck Thickness (mm)	50	
Number of Log Beams	3	
Log Shape	Rectangul	
Log Size b*d (mm*mm)	150 X	150
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	0.26	0.34	1.09

Max. Bending Moment by DL	M_D	=	$wL^2/8$	=	5.2 kN-m
Max. Deflection by DL	Δ_D	=	$5wL^4/384EI$	=	18.5 mm

Capacity Check

Moment Resistance	M_r	=	$\Phi F_b S K_{Zb} K_L$	=	20.05 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	=	9.0	kN-m
Max. Live Load	w_L	=	1.9	kN/m

Deflection Check

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

Max. Deflection	Δ_{lim}	=	L / 180	=	34.4 mm	(CSA-O86 4.5.2)
Max. Deflection by LL	Δ_L	=	16.0	mm		
Max. Live Load	w_L	=	0.9	kN/m		

Deck Area Check

Total Deck Area	A	=	6.3	m^2

Summary

	Capacity Check	Deflection Check	Deck Area Check
Person	> 7 people	7 people	> 7 people
Horse	> 0 horse	0 horse	> 0 horse
ATV	> 1 ATV	1 ATV	> 1 ATV

Conclusion:

The capacity of this bridge is governed by deflection criteria. The maximum capacity of Sullivan Trail is: 7 people or 0 horse or 1 ATV.

Sullivan Trail
Sunshine Coast Trail Bridge Inspections – 2017

P01 – North approach
(DSCN9489.jpg)

P02 – Overall decking
(DSCN9490.jpg)

P03 – East railing
(DSCN9491.jpg)

P04 – West railing
(DSCN9492.jpg)

P05 – East side of the bridge
(DSCN9493.jpg)

P06 – Upstream (looking east)
(DSCN9495.jpg)

P07 – Downstream (looking west)
(DSCN9496.jpg)

P08 – South approach
(DSCN9497.jpg)

P09 – West side of the bridge
(DSCN9498.jpg)

P10 – North abutment
(DSCN9500.jpg)

P11 – Under side of the bridge
(DSCN9501.jpg)

P12 – South abutment
(DSCN9502.jpg)

P13 – South abutment been framed into the stump
(DSCN9503.jpg)

Appendix 6

Zone 6 - Schedule F - Area D Bridge Assessment

Schedule F - Area D Bridge Assessment

Structure Name:	Cedar Grove
Parsons Waypoint #:	266
Remaining Lifespan (Years):	15
Replacement Cost:	$20,000
Georeference:	N 49°25'08" W 123°29'43"
Deflection at Centre (mm):	0
Weight Usage Restriction:	13 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	6.5x1.04m beam bridge with timber deck.

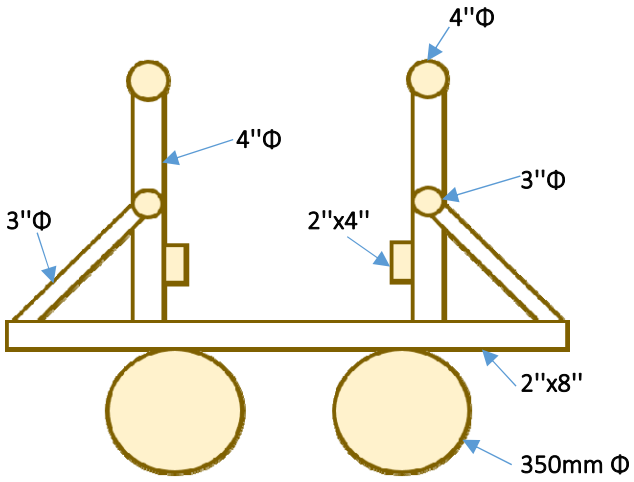
Element	Rating	Comments	Maintenance Recommendations	Estimated Cost	Priority
Primary Components					
Embankments	2	Tree is eroding southeast of bridge	Monitor erosion, fill in with riprap, or remove tree	$5,000	High
Foundations	4				
Abutments	4				
Beams, Girders	4				
Deck	4	Deck planks are solid			
Secondary Components					
Approaches	5	Approach to bridge is well-graded			
Railings	3	Some railing boards are loose	Repair railing	$2,000	Medium
Auxiliary Components					
Slope Protection	5	Surrounding area is vegetated			
Drainage System	5	Deck is free-draining			
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	Cedar Grove	
Number of Spans	1	
Span Length (m)	6.5	
Deck Width (mm)	1040	
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	0.26	0.96	1.72

Max. Bending Moment by DL	M_D	=	$wL^2/8$	=	9.1	kN-m
Max. Deflection by DL	Δ_D	=	$5wL^4/384EI$	=	3.0	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	=	59.1	kN-m	
Max. Live Load	w_L	=	11.2	kN/m	

Deflection Check

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

Max. Deflection	Δ_{lim}	=	L / 180	=	36.1	mm (CSA-O86 4.5.2)
Max. Deflection by LL	Δ_L	=	33.1	mm		
Max. Live Load	w_L	=	18.9	kN/m		

Deck Area Check

Total Deck Area	A	=	6.8	m^2	

Summary

	Capacity Check	Deflection Check	Deck Area Check
Person	> 13 people	> 13 people	13 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 Cedar Grove is: 13 people or 1 horse or 2 ATVs.

Cedar Grove
Sunshine Coast Trail Bridge Inspections – 2017

P01 – West approach
(DSCN9422.jpg)

P02 – West end of bridge
(DSCN9423.jpg)

P03 – Overall decking
(DSCN9424.jpg)

P04 – North railing
(DSCN9425.jpg)

P05 – South railing
(DSCN9426.jpg)

P06 – East approach
(DSCN9430.jpg)

P07 – North side of the bridge (Upstream)
(DSCN9431.jpg)

P08 – West abutment
(DSCN9433.jpg)

P09 – East abutment
(DSCN9434.jpg)

P10 – Underside of the bridge
(DSCN9435.jpg)

P11 – South side of the bridge
(DSCN9436.jpg)

P12 – Southeast of bridge, tree starting to erode, needs to be monitored
(DSCN9437.jpg)

Structure Name:	Esperanza
Parsons Waypoint #:	264
Remaining Lifespan (Years):	5
Replacement Cost:	$30,000
Georeference:	N 49°25'10" W 123°29'49"
Deflection at Centre (mm):	350
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	20x1.07m beam bridge with timber deck.

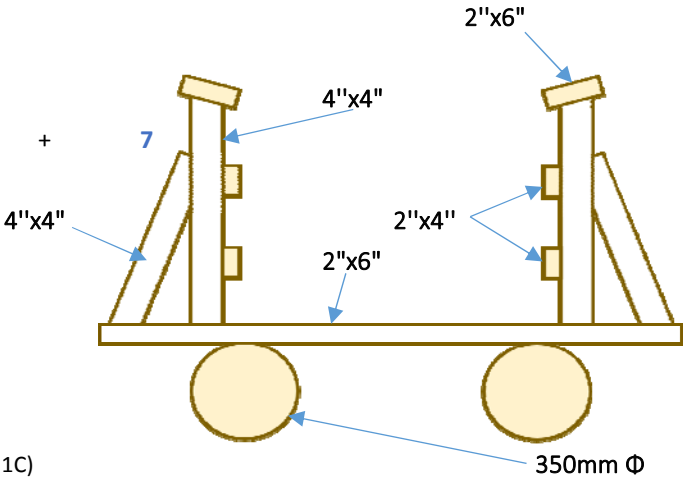
Element	Rating	Comments	Maintenance Recommendations	Estimated Cost	Priority
Primary Components					
Embankments	4	Well vegetated with no scour concerns			
Foundations	4				
Abutments	4				
Piers	2	Piers are not adequetly laterally braced	Brace piers laterally with wires or timber braces	$5,000	Medium
Beams, Girders	2	Rot present in beams, reducing cross sectional area	Monitor rot	N/A	Medium
Deck	4	Deck planks are solid			
Secondary Components					
Approaches	5	Approach to bridge is well-graded			
Railings	5	Railings are sturdy			
Auxiliary Components					
Slope Protection	5	Surrounding area is vegetated			
Drainage System	5	Deck is free-draining			
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	Esperanza	
Number of Spans	3	
Span Length (m)	9 + 4 + 7	
Deck Width (mm)	1060	
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	0.27	0.96	1.73

Max. Positive Moment by DL	M_{D+}	=	$0.08wL^2$	=	11.2 kN-m	(3 span continuous)
Max. Negative Moment by DL	M_{D-}	=	$0.1wL^2$	=	14.0 kN-m	
Max. Deflection by DL	Δ_D	=	$0.0069wL^4/EI$	=	5.9 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	=	55.0 kN-m			
Max. Live Load	w_L	=	8.5 kN/m			

Deflection Check

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

Max. Deflection	Δ_{lim}	=	L / 180	=	50.0 mm	(CSA-O86 4.5.2)
Max. Deflection by LL	Δ_L	=	44.1 mm			
Max. Live Load	w_L	=	12.9 kN/m			

Deck Area Check

Total Deck Area	A	=	21.2 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 Esperanza is: 25 people or 1 horse or 2 ATVs.

Esperanza
Sunshine Coast Trail Bridge Inspections – 2017

P01 – West approach
(DSCN9397.jpg)

P02 – West end of bridge
(DSCN9398.jpg)

P03 – Overall decking
(DSCN9399.jpg)

P04 – North railing
(DSCN9400.jpg)

P05 – South railing
(DSCN9401.jpg)

P06 – Upstream (looking north)
(DSCN9402.jpg)

P07 – Downstream (looking south)
(DSCN9406.jpg)

P08 – East approach
(DSCN9409.jpg)

P09 – North side of the bridge
(DSCN9410.jpg)

P10 – East abutment
(DSCN9413.jpg)

P11 – Pier 2
(DSCN9414.jpg)

P12 – Pier 1
(DSCN9415.jpg)

P13 – Underside of the bridge
(DSCN9417.jpg)

P14 – Support cable going from northeast corner to mid-section of bridge
(DSCN9419.jpg)

Structure Name:	Grantham Trail
Parsons Waypoint #:	271
Remaining Lifespan (Years):	25
Replacement Cost:	$5,000
Georeference:	N 49°24'53" W 123°29'43"
Deflection at Centre (mm):	0
Weight Usage Restriction:	5 people, 1 horse, 1 ATV
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	2.1x1.07m beam bridge with timber deck.

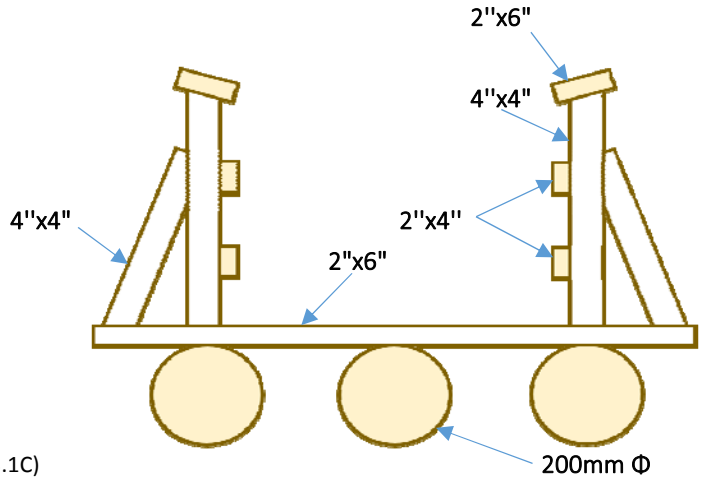
Element	Rating	Comments	Maintenance Recommendations	Estimated Cost	Priority
Primary Components					
Embankments	4	Deep gulley susceptible to erosion	Monitor for erosion under bridge	N/A	Medium
Foundations	4				
Abutments	4				
Beams, Girders	4				
Deck	4				
Secondary Components					
Approaches	5	Approach to bridge is well-graded			
Railings	4	Railing is sturdy			
Auxiliary Components					
Slope Protection	3	Gulley under bridge is not vegetated	Monitor for erosion under bridge	N/A	
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	Grantham Trail
Number of Spans	1
Span Length (m)	2.1
Deck Width (mm)	1320
Deck Thickness (mm)	50
Number of Log Beams	3
Log Shape	Circular
Log Diameter (mm)	200
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	0.47	1.30

Max. Bending Moment by DL $M_D = wL^2/8 = 0.7$ kN-m

Max. Deflection by DL $\Delta_D = 5wL^4/384EI = 0.2$ mm

Capacity Check

Moment Resistance $M_r = \Phi F_b S K_{Zb} K_L = 27.99$ 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 $M_L = 18.1$ kN-m

Max. Live Load $w_L = 32.8$ kN/m

Deflection Check

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

Max. Deflection $\Delta_{lim} = L / 180 = 11.7$ mm (CSA-O86 4.5.2)

Max. Deflection by LL $\Delta_L = 11.5$ mm

Max. Live Load $w_L = 96.4$ kN/m

Deck Area Check

Total Deck Area $A = 2.8$ m^2

Summary

	Capacity Check	Deflection Check	Deck Area Check
Person	> 5 people	> 5 people	5 people
Horse	> 1 horse	> 1 horse	1 horse
ATV	> 1 ATV	> 1 ATV	1 ATV

Conclusion:

The capacity of this bridge is governed by the bridge deck area. The maximum capacity of Grantham Trail is: 5 people or 1 horse or 1 ATV.

Grantham Trail
Sunshine Coast Trail Bridge Inspections – 2017

P01 – South approach
(DSCN9460.jpg)

P02 – Overall decking
(DSCN9461.jpg)

P03 – West railing
(DSCN9462.jpg)

P04 – East railing
(DSCN9463.jpg)

P05 – North approach
(DSCN9464.jpg)

P06 – East side of bridge
(DSCN9465.jpg)

P07 – West side of the bridge
(DSCN9466.jpg)

P08 – Under side of the bridge
(DSCN9467.jpg)

P09 – North abutment
(DSCN9468.jpg)

P10 – South abutment
(DSCN9469.jpg)

P11 – Downstream (looking east)
(DSCN9470.jpg)

P12 – Upstream (looking west)
(DSCN9471.jpg)

Structure Name:	Rock Face
Parsons Waypoint #:	270
Remaining Lifespan (Years):	15
Replacement Cost:	$20,000
Georeference:	N 49°25'13" W 123°29'32"
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	11.2x1.32m beam bridge with timber deck.

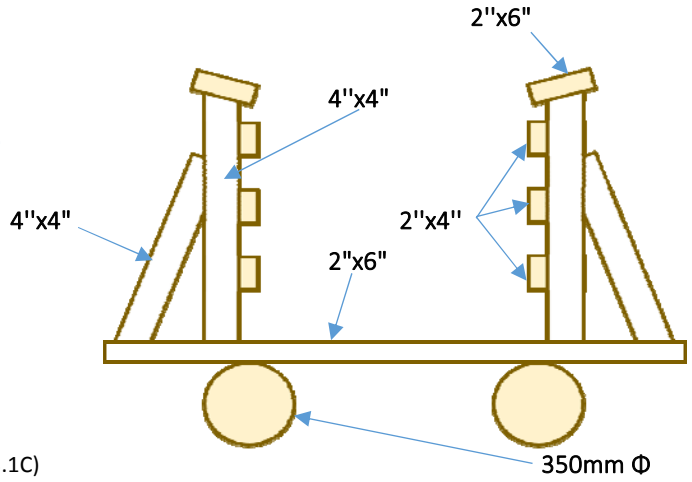
Element	Rating	Comments	Maintenance Recommendations	Estimated Cost	Priority
Primary Components					
Embankments	4				
Foundations	4				
Abutments	4				
Piers	4				
Beams, Girders	4				
Deck	4	Deck has anti-slip mesh installed			
Secondary Components					
Approaches	3	Tree roots at south approach	Consider installing gravel or wood chips at south approach	$1,000	Low
Railings	4	Railing is sturdy			
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	Rock Face		
Number of Spans	2		
Span Length (m)	5.6	+	5.6
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. Positive Moment by DL	M_{D+}	=	$9wL^2/128$	=	4.0 kN-m	(2 span continuous)
Max. Negative Moment by DL	M_{D-}	=	$wL^2/8$	=	7.0 kN-m	
Max. Deflection by DL	Δ_D	=	$wL^4/185EI$	=	0.7 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	=	60.8	kN-m	
Max. Live Load	w_L	=	15.5	kN/m	

Deflection Check

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

Max. Deflection	Δ_{lim}	=	L / 180	=	31.1 mm	(CSA-O86 4.5.2)
Max. Deflection by LL	Δ_L	=	30.4	mm		
Max. Live Load	w_L	=	31.5	kN/m		

Deck Area Check

Total Deck Area	A	=	14.8	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 Rock Face is: 25 people or 1 horse or 2 ATVs.

Rock Face
Sunshine Coast Trail Bridge Inspections – 2017

P01 – South approach
(DSCN9441.jpg)

P02 – South end of bridge
(DSCN9442.jpg)

P03 – West railing
(DSCN9443.jpg)

P04 – Overall decking
(DSCN9444.jpg)

P05 – North end of the bridge
(DSCN9449.jpg)

P06 – Pier, mid-span supported by two 8'' x 4'' posts.
(DSCN9450.jpg)

P07 – North abutment
(DSCN9451.jpg)

P08 – South abutment
(DSCN9452.jpg)