

RIVERFRONT PARK BRIDGES

INSPECTION AND ANALYSIS

THEME STREAM BRIDGES

NOVEMBER 14, 2014 | Final Report

THEME STREAM BRIDGES

November 14, 2014

Prepared for

City of Spokane

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Prepared by

Kpff Consulting Engineers

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Project Engineer / Inspection Team Leader

Sub-consultants

SWCA Environmental Consultants

Eileen Heideman

Architectural Historian

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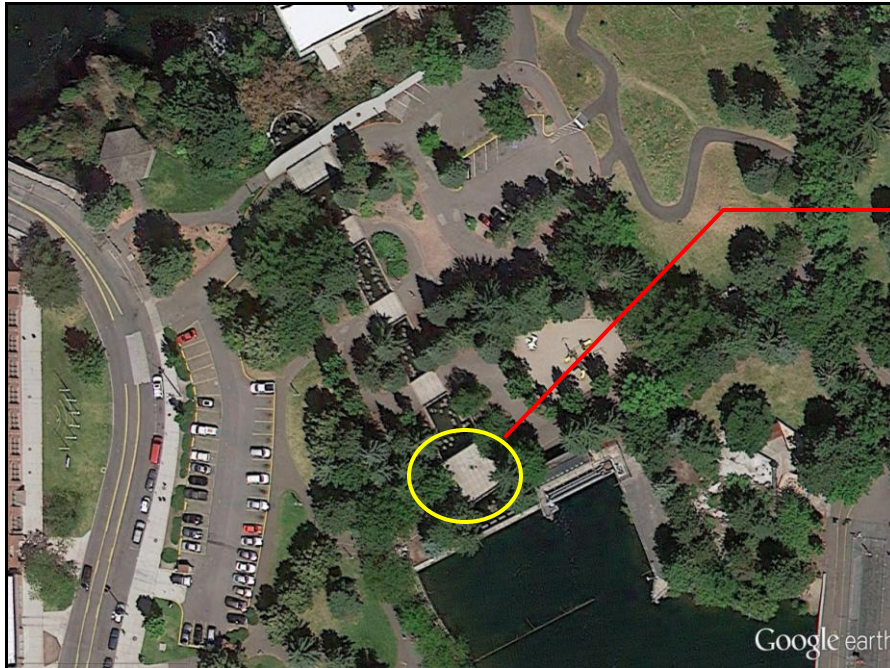
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Photograph Log

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1. BRIDGE DESCRIPTION

The five Theme Stream Bridges were built in 1973 for the Expo. The bridges carry pedestrian traffic over the man-made Theme Stream. The northernmost bridge was replaced by Avista for vehicle access to the park and powerhouse. The City is interested in replacing the southernmost bridge (48 feet long by 36 feet wide) to provide emergency vehicle access to Riverfront Park. The deck is made of transverse precast slabs supported on cast in place longitudinal beams.



Theme Stream
Bridge to be
replaced

Figure 1: Aerial view of the Theme Stream Bridges

2. DOCUMENT REVIEW

In preparation for this evaluation, Kpff reviewed the following documents related to the Theme Stream Bridges:

- PCI bridge deck replacement drawings.
- Previous routine inspection report

3. EVALUATION PROCEDURES

ROUTINE BRIDGE INSPECTION

A visual inspection of the precast concrete slabs, railings, concrete longitudinal beams and concrete piers was performed. These components were accessed by foot.

STRUCTURAL ANALYSIS

A load rating analysis was not performed for this bridge evaluation.

4. EVALUATION FINDINGS

BRIDGE INSPECTION

Overall, the structural components of the Theme Stream Bridges are in good condition. Some of the timber railing post connections are loose and some are rotted. The second and third bridges from the south have spalls in the wingwall.

The bridge inspection reports, bridge component labeling system, and photographs are included in Appendix A.

5. CONCLUSIONS AND RECOMMENDATIONS

The Theme Bridges are all in good shape structurally. The few defects are minor and easily repaired by general maintenance crews. If maintained in their current condition these bridges could remain in service indefinitely. For planning purposes there is no reason, at this time, based on the current condition and rate of deterioration (very slow) to believe that these bridges cannot continue to provide the level of service they currently provide for another 50 years or more, especially if repaired as needed and not damaged from an overload condition.

BRIDGE REPLACEMENT

Based on the span length and geometry, the southern Theme Stream Bridge can easily be replaced with a single-span pre-stressed voided slab on new concrete abutments. Because the new bridge will be carrying vehicular traffic it will need a stronger railing system than the existing timber railing. A weathering steel railing that matches the railing on the Avista Theme Stream Bridge is recommended. A plan, elevation, typical section, and cost estimate are included in Appendix B. The total cost for the south bridge replacement and railing replacement for the other bridges is approximately \$1.0 million.

TIMBER RAILING

Portions of the timber railing on the other Theme Stream Bridges are in fair to poor condition. The replacement bridge will have a weathering steel railing to match the railing on the Avista Theme Stream Bridge. Replacing all of the timber railing with weathering steel railing will provide a unified look to the bridges and will reduce routine maintenance currently required of the existing timber railing.

ABUTMENTS

The spalls in the wing-walls should be patched.

FUTURE INSPECTIONS

A routine walk-through inspection should be performed every two years. KPFF has provided inspection forms, which if utilized on a continual basis will, over time, provide an invaluable record of the bridge condition and areas of continual problems, and help inform the best way to care for the bridge and preserve the City's investment in its infrastructure.

6. PERMITS AND CULTURAL RESOURCE REQUIREMENTS

PERMITS

An environmental permit matrix was prepared by SWCA Environmental Consultants for the Riverfront Park Bridges. The proposed bridge improvement work may require the following permits or approvals:

- Hydraulic Project Approval permit from the Washington Department of Fish and Wildlife
- State Environmental Policy Act Threshold Determination from the City of Spokane
- Critical Areas Review from the City of Spokane
- Shoreline Substantial Development Permit from the City of Spokane

CULTURAL RESOURCE STUDY

This bridge is not currently listed on the National Register of Historic Places (NRHP). Although the bridge is less than 50 years old, it could meet NRHP eligibility since it was built for the '74 Expo which created a significant impact to the downtown Spokane landscape. The Southern Theme Stream Bridge replacement will require a Washington State Historic Property Inventory Form. An archeological survey will be required due to the excavation at the abutments.

For more detailed information on the permits and cultural resource requirements please see the full report prepared by SWCA Environmental Consultants.

APPENDIX A

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LIST OF PHOTOGRAPHS

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8	Spall in Abutment Backwall	A-14



CITY OF SPOKANE

PEDESTRIAN BRIDGE INSPECTION FORM

				Bridge No.	
Bridge Name				Bridge Location	
Inspection Date		Inspector(s)		Agency	
Access Method				Weather	
Load Rating Date			Live Load	Pedestrian	Vehicle
Load Rating Factor(s)	Ped.	Veh.	Controlling Component	Pedestrian	Vehicle

Description of Bridge

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Summary of Condition and Critical Findings

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Summary of Recommendations

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Summary of Bridge Condition

Bridge Component		No. of Compon.	% of **	Condition Rating*			Comments
				8 – 7 Good	6 – 5 Fair	4 – 3 Poor	
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*See Page 2 for detailed descriptions **Condition rating percentages are based on the % of area, length, or each of the bridge components inspected.

GENERAL NOTES

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	Concrete	No to minor/ insignificant defects includes: cracks, spalls, chips, consolidation, efflorescence.
	Timber	Beams: Minor splits, checks, or defects (one side), no decay or insects – sounds solid. Posts: Splits or cracks less than 3/8" (one side), no decay or insects – sounds solid.
	Paint	No defects, no sign of rust including no freckled rust, no peeling, no exposed steel.
	Scour / Erosion	None or minor.
6 – 5 Satisfactory → Fair 1 – 2 yr insp. cycle Monitor for repairs Paint: Max 10 year life estimate	Steel	Moderate corrosion, pitting, flaking, pack rust. Material loss is evident but barely measurable. Connections have up to moderate corrosion but remain fully functional. No cracks.
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	Paint	Freckled rust, small areas of exposed steel, some peeling, oxidized.
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Additional Comments by Component Number

Bridge Comp. No.	Comments



CITY OF SPOKANE

PEDESTRIAN BRIDGE INSPECTION FORM

				Bridge No.	
Bridge Name				Bridge Location	
Inspection Date		Inspector(s)		Agency	
Access Method				Weather	
Load Rating Date			Live Load	Pedestrian	Vehicle
Load Rating Factor(s)	Ped.	Veh.	Controlling Component	Pedestrian	Vehicle

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Additional Comments by Component Number

Bridge Comp. No.	Comments



CITY OF SPOKANE

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Bridge Name				Bridge Location	
Inspection Date		Inspector(s)		Agency	
Access Method				Weather	
Load Rating Date			Live Load	Pedestrian	Vehicle
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Bridge Comp. No.	Comments



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Bridge Comp. No.	Comments



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PEDESTRIAN BRIDGE INSPECTION FORM

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Bridge Name				Bridge Location		
Inspection Date		Inspector(s)			Agency	
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Description of Bridge

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Additional Comments by Component Number

Bridge Comp. No.	Comments



Photo 1 – Theme Stream Bridge – Furthest South



Photo 2 – Theme Stream Bridge South – Furthest South



Photo 3 – Theme Stream Bridge – 2nd from the South



Photo 4 – Theme Stream Bridge – 3rd from the South



Photo 5 – Theme Stream Bridge – 4th from the South



Photo 6 – Theme Stream Bridge – Most Northerly (Avista Bridge)



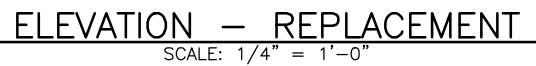
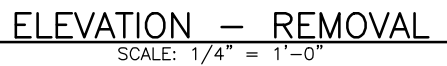
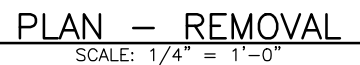
Photo 7 – Rotted Timber Railing Post



Photo 8 – Spall in Abutment Backwall

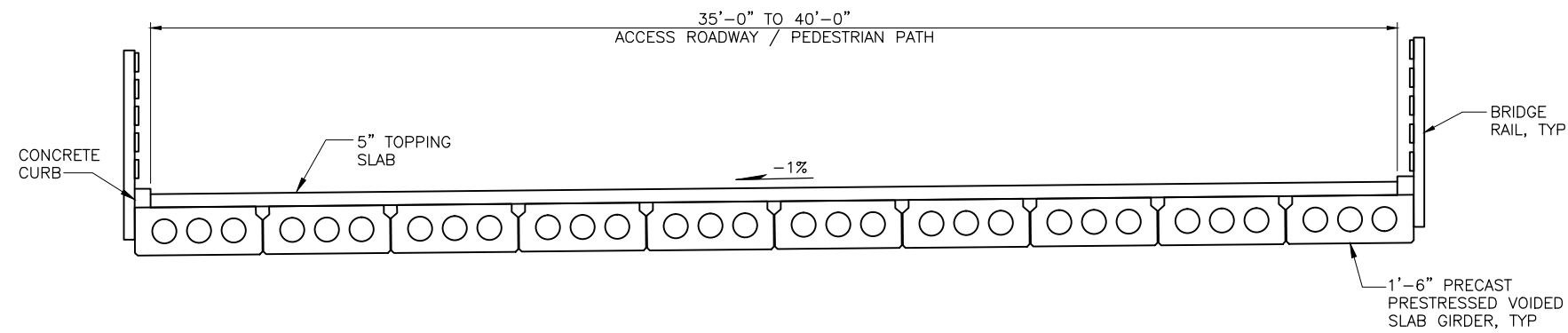
APPENDIX B

IMPROVEMENT DETAILS COST ESTIMATES



CALL BEFORE YOU DIG 1-800-424-5555

REGION NO.	STATE	FEDERAL AID PROJECT NO.	SHEET NO.
EASTERN	WASH.	---	



TYPICAL SECTION - REPLACEMENT
SCALE: 3/8" = 1'-0"

[illegible]

INVSID - 5 (ADD COM REV) - 1 (13.1)		AS OF JANUARY, 2020 USE NORTH AMERICAN VERTICAL DATUM OF 1985 (NAVD83)	
DEITCH MARK LOCATION		CURRENT C.O.S. DRAFTING STANDARDS ADOPTED FEB. 2007	
NAVD85 ELEV.	BAR OR ONE CH ON ORIGINAL DRAWING	HORIZONTAL PLANT PROFILE	AS SHOWN
COMED REV.	VERTICAL	VERTICAL	
	PEOPLE ONLY	PEOPLE ONLY	
NAVD&8 DATUM		SCALE	
IF NOT ONE CH ON THIS SHEET, ADJUST SCALES ACCORDINGLY			
		DRAWN	BY
		REVISED	MLF
		TW	MLF
		CHECKED	TW
		APPROVED	MLF



CITY OF SPOKANE, WASHINGTON
DEPARTMENT OF ENGINEERING SERVICES
808 WEST SPOKANE FALLS BLVD.
SPOKANE, WASHINGTON 99201-3343
(509) 625-6700

PROJECT NAME:		RIVERFRONT PARK BRIDGES	
BRIDGE NAME: THEME STREAM BRIDGE REPLACEMENT		TYPE OF IMPROVEMENT: BRIDGE	
		CITY PROJECT NUMBER: 2013186	PLAN NUMBER: 2 of 2
TYPICAL SECTION		ETN: --	

Name: TaunieA Date: Nov 11, 2014-11:49:44am File: V:\114176 (Spokane River Front Bridges)\Theme Stream Bridge\Design\TS-S02.dwg

Cost Estimates for Bridge Improvements Based on the 2014 KPFF Inspection and Analysis Recommendations

Bridge Name:		Theme Stream Bridges			
Bridge Length and Width (feet)		48	36	(Southern Theme Stream Bridge)	
Recommendations for Improvements - Include:		Replace existing bridge with a single span structure on similar footprint Replace timber railing on other Theme Stream Bridges with steel railing Misc. repairs on other Theme Stream Bridges			
Item no	Item Description	Cost Unit	Quantity	Unit Cost	Item Cost
1	Remove existing structure(s)	SQ FT	1728	30	\$ 51,840
2	Precast Conc Girders	LF	432	300	\$ 129,600
3	5 " concrete deck overlay	CUYD	27	750	\$ 20,000
4	Concrete Abutments & Wingwalls (2)	CUYD	275	850	\$ 233,750
5	Bridge Railing (South Bridge)	LF	96	250	\$ 24,000
6	Bridge Railing (Remaining Theme Stream Bridges)	LF	160	250	\$ 40,000
7	Bearings -Exp Joints - Drainage	LS	1	30000	\$ 30,000
8	Landscaping and Bank Enhancements	LS	1	20000	\$ 20,000
9	Misc. repairs (other Theme Stream Bridges)	LS	1	3000	\$ 3,000
Total				\$	552,190
10	Mobilization	10%		\$	55,219
11	Design, Permits, Hydraulic, Geotech, Survey	20%		\$	110,438
12	Construction Management	13%		\$	69,024
13	Taxes	8%		\$	44,175
14	Contingency	30%		\$	165,657
15	Excalation (1 year)	3%		\$	16,566
16	Agency Project Development & Mngmt.	5%		\$	27,610
Total				\$	488,688
Total Project Cost (2015)				\$	1,040,878
Square Foot Cost for South Theme Bridge (\$/SF)				\$	555

APPENDIX C

PHOTOGRAPH LOG

PHOTOGRAPH CONTACT SHEET

Project	Riverfront Park Bridges Inspection	By	MLF	Sheet No.
Location	Spokane	Date	8/14/2014	1 OF 1
Client	City of Spokane			Job No.
Inspection Photo Log				114176.12

Bridge Name: Theme Stream Bridges

Date of Inspection: 8/13/2014

Photo No.	Location	Notes	By
1813	North (Avista) Bridge	Elevation, Looking north	TW
1814	North (Avista) Bridge	Deck, Looking east	TW
1816	North (Avista) Bridge	Deck, Looking west	TW
1817	North (Avista) Bridge	Abutment, soffit	TW
1818	North (Avista) Bridge	Railing, soffit	TW
1820	North (Avista) Bridge	Railing	TW
1821	4th bridge from South	Elevation, Looking south	TW
1822	4th bridge from South	Deck	TW
1823	4th bridge from South	Approach	TW
1824	4th bridge from South	Deck	TW
1825	4th bridge from South	Approach	TW
1826	4th bridge from South	Railing	TW
1827	4th bridge from South	Girders, Piers	TW
1828	4th bridge from South	Abutment	TW
1829	4th bridge from South	Girders, Piers	TW
1830	4th bridge from South	Girder	TW
1831	4th bridge from South	Railing	TW
1832	4th bridge from South	Railing connection	TW
1833	4th bridge from South	Approach	TW
1995	Furthest South	Deck	MF
1996	Furthest South	Elevation	MF
1997	Furthest South	Elevation	MF
1998	2nd bridge from South	Elevation	MF
1999	3rd bridge from South	Deck/Elevation	MF
2000	4th bridge from South	Deck/Elevation	MF
2394	North (Avista) Bridge	Elevation	
2395	North (Avista) Bridge	Railing	
2396	North (Avista) Bridge	Deck	
2397	North (Avista) Bridge	Deck, longitudinal joints in precast slab	
2398	North (Avista) Bridge	Sidewalk	
2399	North (Avista) Bridge	Interior Railing	
2400	North (Avista) Bridge	Deck/Railing	
2404	North (Avista) Bridge	Soffit	
2405	North (Avista) Bridge	Sidewalk	
2407	4th from South	Elevation	
2408	4th from South	Deck	
2409	4th from South	Deck	
2410	4th from South	Railing, slab	
2411	4th from South	Railing, slab	
2413	3rd bridge from South	Elevation	
2414	3rd bridge from South	Railing, slab	
2415	3rd bridge from South	Approach	
2416	3rd bridge from South	Deck	
2417	3rd bridge from South	Railing	
2418	3rd bridge from South	Elevation	
2419	3rd bridge from South	Railing, slab	
2421	2nd bridge from South	Elevation	
2422	2nd bridge from South	Railing, slab	
2423	2nd bridge from South	Transverse precast slab	
2424	2nd bridge from South	Deck	
2425	2nd bridge from South	Elevation	
2426	2nd bridge from South	Railing	
2428	Furthest South	Elevation	
2429	Furthest South	Elevation	
2430	Furthest South	Elevation	
2431	Furthest South	Transverse beams, in water piers	
2432	Furthest South	Transverse beams, in water piers	
2433	Furthest South	Crack in abutment	
2434	Furthest South	Crack in abutment	
2435	Furthest South	Wingwall, abutment	
2436	Furthest South	Transverse precast slab	
2437	Furthest South	Approach	
2438	Furthest South	Deck	
2439	Furthest South	Soffit	
2440	Furthest South	Soffit	
2441	Furthest South	Elevation	

Theme Stream Bridges Photographs



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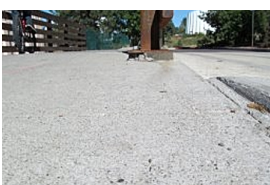
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