MEMORANDUM

TO: Mayor and City Council

FROM: Richard Meyers, City Manager

SUBJECT: SWINGING BRIDGE REPORT

DATE: September 21, 2016

Background

Earlier this year we contracted with OBEC Consulting Engineers to conduct evaluations on all our bridges. As a part of this inspection program the engineers inspected the swinging bridge.

At the September 12th City Council meeting staff explained to Council that the engineers expressed some concerns about the bridge that may result in the bridge being closed. We were waiting for additional information from the engineers.

The inspection reports were provided to the City on September 14th which included a recommendation from the engineers that the bridge be immediately closed to all use because of major decay in the vertical tower supports of the bridge. The vertical towers support the main suspension cables for the bridge. The decay poses a serious risk could result in catastrophic failure.

Staff explored ways to effectively close the bridge that would actually work to prevent access or at least make it extremely difficult to access the bridge. We had the bridge closed on the 14th after receiving the final report from the engineers.

The City's webpage and FaceBook page were updated with the information about the closure of the bridge on the 15th. The City's notices included the reason and statements that the bridge would opened for use as soon as possible after repairs. The School District was also contacted and announcements were made asking youth to avoid the bridge.

Additional signage as well as more contacts with news media were also made and installed to provide advance warning and to stress the importance to not use the bridge. The public has also been advised if anyone is seen on the bridge, please report it immediately by calling 911.

We have asked the engineers to prepare information so we can start determining the proper course to make repairs. The bridge was constructed in the late 1950s or early 1960s (we are thinking about 1964) to apparently replace an older bridge in about the same location. Apparently load ratings were not calculated when the bridge was originally constructed and we have asked the engineers to provide current load calculations to determine the best action. Whether the bridge can be repaired as it is built or do we need to do some additional

modifications to the bridge to meet current standards. The engineers have estimated that replacing the four vertical tower supports would cost about $50,000. We are inquiring about possible contractors that can do the work.

Attached is the September 14, 2016 report from OBEC Consulting engineers as well as a copy of the report from the January 22, 2002 evaluation of the bridge. I do not know why all the repairs were not performed from the original report. Budgets and documents indicate that the evaluation was performed. However, future budgets and documents do not indicate any implementation of the recommendations. By immediately following the recommendation of the engineers and closing the bridge, it will ensure that the needed repairs will not be forgotten or misplaced again while the City crews deal with other projects or by emergencies that occur. (For example, immediately following the receipt of the report in January, 2002 the City experienced the February 7, 2002 wind storm that caused damage throughout the community, including the loss of a very large fir tree in Coiner Park that smashed the gazebo and resulted in the evaluation of existing trees and the removal of unsafe trees.)

We will be working closely with the engineers to prepare the options for the repair of the bridge. When we have more information we will let you know the progress of the project. The intent is to repair the bridge. It is actively used and a vital piece of the community pedestrian and bicycle network.

Recommendation

Information item only, no action from Council.

Cost

No Cost

Richard Meyers, City Manager

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September 14, 2016

Ron Bradsby, PE
City Engineer, Public Works Department
400 E Main Street
Cottage Grove, OR 97424

Re: Bridge Inspection: Coast Fork Willamette River Pedestrian Bridge
OBEC Project No. 158-14

Dear Ron:

Subject: BRIDGE CLOSURE RECOMMENDATION

This letter is in reference to the above mentioned bridge. OBEC Consulting Engineers (OBEC) was retained to perform a routine inspection of the pedestrian bridge crossing the Coast Fork Willamette River between Madison Avenue and River Road. This is a follow up on our conversation regarding the critical condition of this bridge and our serious concern for the safety of the public due to the potential collapse of the bridge. We strongly recommend that the City **close the bridge immediately** to all potential users

OBEC's last inspection of this structure was in 2002, and repairs were recommended to be completed on the towers as soon as possible. It is our understanding that those repairs were never completed. Our most recent routine inspection took place at two different times. Jared Trowbridge and I were on-site on August 29, 2016. A second inspection was needed to view areas thought to be accessible with small ladders. Mike Hawkins and Andy Fortner of OBEC completed a follow-up inspection on September 9, 2016. We have identified extensive decay in the vertical towers, and some decay of the horizontal braces at each tower. The amount of decay in the towers was estimated in 2002 to be 50 percent of the vertical member's capacity. These members now have approximately 1 inch of outer wood remaining.

This area of decay in the vertical towers is the area that supports the main suspension cables. The extensive decay is compromising the support for these cables which poses a serious risk that could result in a catastrophic failure. After discussing the results of our inspection, we have concluded that the bridge's capacity is in serious jeopardy. Due to the extensive decay in the main structural members, the bridge cannot safely support pedestrian traffic, and there is potential risk of catastrophic failure without warning. These are the reasons for our recommendation above.

There is also some decay in the main suspension cable that cannot be completely identified. This should be looked at further, the services of GPR Data, Inc. in Eugene, Oregon has the ability to assess the condition of the cables throughout their cross-section.

OBEC CONSULTING ENGINEERS

As we discussed on the phone, OBEC will proceed with the load rating of this structure. This will allow us to evaluate if replacing in-kind is the appropriate repair method, or if the repairs will need to increase the capacity of any of the repaired members.

OBEC recommends that the City take immediate steps to warn the public about the potential danger of the bridge failing and take all necessary precautions to keep people off the bridge. Following are some suggested steps we believe the City should consider taking:

1) Add chain-link security fencing at each portal entrance.
2) Add warning signs to each end of the bridge such as "No Trespassing" and "Danger Keep Off" and/or "Extreme Hazard."
3) Video/camera security surveillance.
4) Involve City staff in patrolling the site.
5) Media alerts warning people in the local paper and announcements in the local schools.

If you have any questions or need further assistance please do not hesitate to call me at 541.762.2108.

Sincerely,

Brad Larsen, PE
Construction Project Manager

JBL/lal
Enclosure

cc: Guy Hakanson, OBEC

Photo 1 – Looking Ahead from West

Photo 2 – Looking Back from East

Photo 3 – Splayed Suspension Cable

Photo 4 – Decayed Floorbeam Bent 2

Photo 5 – Underside of Deck

Photo 6 – Overhead Powerlines Span 3

Photo 7 – Looking East

Photo 8 – Decayed Column

Photo 9 – Typical Suspender to Deck Connection

Photo 10 – Corroded Suspender Cable

OBEC CONSULTING ENGINEERS

Bridge Inspection Report

Name: Coast Fork Willamette River
Owner: City of Cottage Grove
Crossing: Coast Fork Willamette River
AC Depth: 0 Bridge Width: 5'-8"
Insp Freq: 24 mos.
Facility: Pedestrian Crossing
Bridge Length: 150'-0"
Bridge ID: 00000
County: Lane
Mile Point: N/A
Insp Date: 8/29/2016
Inspector 1: Jared Trowbridge (C0080)
Inspector 2: Brad Larsen
Signature: Jared Trowbridge

Element Condition States

Elem	Description	Env	Qty	Units	CS1	CS2	CS3	CS4	Status
31	**Deck, Timber**	Mod.	850	(SF)	0	805	45	0	
1020	Connections	Mod.	805	(SF)	0	805	0	0	
1140	Decay/Section Loss (Timber)	Mod.	45	(SF)	0	0	45	0	
113	**Stringer, Steel**	Mod.	300	(LF)	300	0	0	0	
518	Steel Paint System	Mod.	600	(SF)	0	600	0	0	
147	**Steel Cable (primary)**	Mod.	300	(LF)	0	296	0	4	
1000	Corrosion	Mod.	300	(LF)	0	296	0	4	
147	**Steel Cable (suspender)**	Mod.	413	(LF)	411	2	0	0	
1020	Connections	Mod.	2	(LF)	0	2	0	0	
515	Steel Protective Coating	Mod.	413	(SF)	0	413	0	0	
148	**Steel Cable (secondary)**	Mod.	300	(LF)	0	300	0	0	
1000	Corrosion	Mod.	300	(LF)	0	300	0	0	
152	**Floorbeam, Steel**	Mod.	216	(LF)	216	0	0	0	
518	Steel Paint System	Mod.	500	(SF)	0	500	0	0	
156	**Floorbeam, Timber**	Mod.	25	(LF)	0	20	0	5	
1140	Decay/Section Loss (Timber)	Mod.	5	(LF)	0	0	0	5	
1150	Timber Checks	Mod.	20	(LF)	0	20	0	0	
206	**Column, Timber**	Mod.	4	(EA)	0	0	0	4	
1140	Decay/Section Loss (Timber)	Mod.	4	(EA)	0	0	0	4	
215	**Abutment, Reinforced Concrete**	Mod.	16	(LF)	16	0	0	0	
221	**Submerged Concrete Footing**	Mod.	44	(LF)	43	1	0	0	
1080	Spalls/Delams/Patches	Mod.	1	(LF)	0	1	0	0	

Element Condition States (Continued)

Elem	Description	Env	Qty	Units	CS1	CS2	CS3	CS4	Status
306	**Joint, Other**	Mod.	11	(LF)	0	11	0	0	
2310	Expansion Joint Leakage	Mod.	11	(LF)	0	11	0	0	
330	**Rail, Metal**	Mod.	300	(LF)	300	0	0	0	
515	Steel Protective Coating	Mod.	600	(SF)	0	600	0	0	
980	**Approach Rdwy Embankment**	Mod.	1	(EA)	1	0	0	0	
990	**Misc. Items**	Mod.	1	(EA)	1	0	0	0	
999	**Roadway Impact**	Mod.	1	(EA)	0	1	0	0	

Appraisal

Appraisal	NBI #	Rating
Bypass Detour	19	N/A
Lanes on/under	28	N/A
ADT	29	0
Approach Road	32	6'-0"
Bridge Rail	36A	0 Substandard
Transitions	36B	0 Substandard
Approach Rail	36C	0 Substandard
Rail Ends	36D	0 Substandard
Main Struct Type	43	313
Bridge Roadway	51	5'-0"
Vertical Clearance	53	99.99
Vert. Under Clear.	54	99.99

NBI Category

Category	NBI #	Rating
Deck Condition	58	6 Satisfactory
Superstructure	59	4 Poor
Substructure	60	1 Imminent Failure
Channel	61	7 Good
Culvert	62	N N/A (NBI)
Inv. Rating	66	n/a
Waterway	71	8 Equal Desirable
Approach Align.	72	8
Defense Hiway	100	0
Temp. Repair	103	
Wearing Surf.	108	000
Scour	113	6 Not evaluated

(Remarks)

Element	Note
General	Bent 1 is on the west side.
31	Timber decking is 3x6 with average of half-inch gap.
1020	Connections are loose but stable. Boards move when stepped on.
1040	Approximately 5% of the planks are decayed and in need of replacement. Decay can be seen at bolted connections.
113	Steel stringers consist of steel angles L3.5x3.5x0.5.
518	Paint is substantially effective with some peeling and cracking of the green top coat.
147	Steel primary cables are 1" uncoated. Vertical suspender cables are 0.25" and galvanized.
1000	The 1" cables at the east pier have several broken wire with approximately 20% of the cable comprimised. There is heavy coorosion to the main cable as it exits the tube at the towers. The rest of the cables are rusty with no signs of pitting or section loss.
1020	Connections 1 and 5 on the left side, suspender cable is splayed and there is only 1 of 2 clamps installed.
515	Galvanizing is wearing but substantially effective.
148	Steel secondary cables are 1" uncoated and act as sway bracing for the structure
1000	Cables are rusty with no signs of pitting or section loss
152	Steel floor beams are two angles L3.5x3.5x0.5 bolted together.
518	Paint is substantially effective with some peeling and cracking of the green top coat.
156	Timber floor beams are 4x12.
1140	Bent 2 floor beam is heavily decayed on the outer 1-2' each end. Bent 3 floor beam is heavily decayed about 1' on the left end. Some bug holes were noticed but there does not appear to be active bug infestation
1150	Checking throughout.
206	Each column consists of 2- 4x12. Ivy starting to grow up column at Bent 2 right.
1140	All columns have extensive decay in the top 3-6 feet and are a 1" shell. The extensive decay in the tops of the columns could lead to an imminent failure.
215	Concrete abutments act as deadman anchor blocks for steel rods.
221	Concrete footings at Bents 2 and 3.
1080	Small spall at Bent 2 on the east side.
306	Other joints.
2310	Signs of minor leakage at Bents 2 and 3.
330	Steel rail consists of five 0.25" cables clamped to suspender cables.
515	Galvanizing is wearing but substantially effective.
990	The upper lateral braces at the top of the towers are completely decayed. Transients evident at bridge with trash beneath bridge. Trees and brush growing beneath bridge are starting to encroach particularly at Span 1. Power lines cross overhead in Span 3.
999	Up to 1" difference between height of concrete abutment and timber decking. There is gap at each end filled with brush and debris.

(Maintenance)

Priority	Element	Maintenance	Est. Cost
Monitor	31	Monitor decking connections for decay, tighten as necessary	$500
Urgent	31	Replace decayed deck members	$2,000
Urgent	147	Analyze main cables with damage to determine capacity	$5,000
Routine	147	Paint steel cables	$15,000
Monitor	147	Perform GPR testing on main cables	$6,000
Routine	148	Paint secondary sway steel cables	$5,000
Monitor	156	Montior timber floor beams (Bents 2 and 3) for advancing decay	$500
Critical	206	Repair or replace all 4 columns	$50,000
Routine	330	Replace splayed cables	$1,000
Critical	990	Replace lateral bracing	$4,000
Routine	990	Trim brush and debris away from bridge	$500

(Inspection Schedule)

Conducted On	Activity	Frequency	Next Inspection
8/29/2016	Routine Inspection	24 mo.	8/1/2018
	Timber Boring	24 mo.	8/1/2018
	Cross Channel Profile	48 mo.	8/1/2018
	Fracture Critical	24 mo.	8/1/2018

Coast Fork Willamette River Pedestrian Bridge
Inspection and Load Rating Summary

February 13, 2001

Coast Fork Willamette River Suspension Footbridge

The Coast Fork Willamette River Suspension Footbridge is located west of downtown Cottage Grove. The bridge is 5.5 feet wide by 150 feet long. The suspended span arrangement consists of one 100-foot main span and two 25-foot side spans. The deck consists of 3-inch x 6-inch transverse plank timbers. The longitudinal stringers and transverse floor beams consist of structural steel angles. The bridge rail, suspender cables, and main cables consist of wire and wire rope. The bridge is supported by main cable anchorages at the abutments and timber towers on concrete piers at interior bents.

Inspection and Load Rating Summary

Inspection - OBEC inspected the bridge on January 22, 2002. A copy of the Inspection Report accompanies this letter. The Inspection Report uses a rating system according to the Federal Highway Administration *National Bridge Inventory (NBI) Coding Guide* used throughout the country. A detailed definition of rating factors is contained herein for reference.

The substructure, including the interior timber towers, consists of treated timber and received rating factor of 4. This indicates that the substructure is in poor condition. The towers are severely rotten near the support plates for the main cables. It appears the rot started in checks in the wood and was widened by woodpeckers attracted to the untreated interior of the timbers. The rotten areas are general located in the interior of the timber with the outer treated zone still sound. To account for the rot in the towers, the axial capacity of the timber tower legs has been reduced 50% in the load rating calculations. Since the rot occurs at the main cable support, we recommend that immediate temporary repairs be made to provide support of the main cables as they pass through the towers.

The superstructure is comprised of 1-inch diameter wire rope main cables, ¼-inch diameter wire rope suspender cables, steel angle stringers and floor beams, and timber plank decking. The main cables and suspender cables are rated 5, indicating fair condition. The main cables are rusty but generally in sound condition. The exception is that the main cables are severely kinked at the abutment anchor bar eyes. Due to the spreading of the cable at the kink and rust, it is difficult to assess the condition of the cable at these locations. To account for this, the cable strength has been reduced 50% in the load rating calculations.

The suspender cables are severely kinked by some over-tightened rail cable clamps. To account for this, the cable strength has been reduced 50% in the load rating calculations.

All other structural elements of the bridge are in sound condition, and no reduction of strength was used in the load rating calculations.

The bridge is very bouncy. The turnbuckles that take up slack are fully tightened; therefore, there is little additional slack that can be taken up. Once the temporary tower repair is completed, the turnbuckles could be reset to take up more slack and the bridge tightened up to reduce bounce.

The rails currently do not meet standards. The standard rail is 42 inches tall and the existing rail is 36 inches tall. The 6-inch gaps in the rail are acceptable by American Association of State Highway and Transportation Officials (AASHTO) standards.

Load Rating – OBEC performed load rating calculations for various elements of the bridge. The load rating performed on the bridge follows the procedures outlined in the current edition of the AASHTO *"Manual for Condition Evaluation of Bridges"* Each structural element of the bridge was load rated for the allowable uniform live load capacity that it can carry. Following is a summary of the load rating:

Element	*Strength Reduction Used*	*Allowable Live Load*	*Percentage Required (*)*
Wood Plank Deck	0%	197 psf	232%
Main Cables	50%	32 psf	41%
Suspender Cables	50%	89 psf	105%
Steel Stringers	0%	366 psf	431%
Towers - Axial	50%	30 psf	35%
Towers - Bearing at Cables	100%	Needs immediate temporary repairs	

(*) The current uniform live load required for pedestrian bridges of this span length is 78 pounds per square foot (psf) for primary members and 85 psf for other member .

After the immediate temporary tower repairs are made, the bridge will be sufficient for approximately 35% of the current uniform pedestrian live load (78 psf) specified for a new pedestrian bridge similar to this structure. After the timbers in the towers are replaced and cable clamp repairs made, the bridge will be sufficient for approximately 80% of the current uniform pedestrian live load specified.

Recommendations

The following are recommendations based on the inspection and load rating for this structure:

- The tower tops be repaired as shown in the sketch "Immediate Temporary Tower Repair" contained herein. For long-term repairs consider replacing the tower legs and strut timbers with new pressure treated material of similar size.
- The main cables be repaired per the detail "Short Term Main Cable Repair" contained herein. Spray cable with anti-rust compound. Replace missing clamp bolts and peen threads. Reset turnbuckles to take up more slack.
- Replace missing floor beam bolts.
- Remove rotten/dead trees and trim overhanging limbs on firs and cottonwood trees.
- Install bollards to protect anchorages from traffic collision. Install pedestrian rail protection at abutments.
- Monitor structure monthly.