PRELIMINARY FINDINGS OF THE VISUAL ASSESSMENT

FOR THE

Pruitt Avenue Bridge Over Pruitt Creek

Prepared for Zero Waste Sonoma

Prepared by

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BCA JOB # 2023302

This Structural Assessment report was prepared by Biggs Cardosa Associates, Inc. (BCA) in general accordance with the scope of work as per our agreement with Zero Waste Sonoma. The recommendations in this report are based on site investigations, and standard engineering practice. No as-built plans, maintenance reports or inspections reports were provided to BCA for preparation of this report. Due to the inherent limitations in site investigations, it is neither uncommon to encounter unforeseen variations in conditions along the project alignment nor is it practical to determine all such variations during a program of field investigation for a project of this scope. Such variations, when encountered, generally require additional engineering services to attain a reasonable explanation and resolution.

INTRODUCTION

1.1 Background and Organization of Report

Zero Waste Sonoma is considering taking ownership of a parcel of land that is to the Northeast of Pruitt Avenue and Standard Avenue. There is a bridge within this parcel of land. This report documents the structural assessment of the existing bridge that has been completed as part of this acquisition process. The scope of this report is limited to structural inspection and assessment of the structure.

The Structural Assessment Report includes the following sections:

- Summary of Existing Structure
- Summary of Structural Assessment approach and methodology
- Summary of Structural Assessment findings including:
  - Existing structure condition
  - Proposed structure mitigation measures
  - Recommended inspection frequency

1.1 Existing Structure Description

General:

The bridge is located just north of Standard Avenue and Pruitt Avenue. The parcel of land is just to the West of Highway 101 and South of Shiloh Road in the Town of Windsor. The bridge runs North/South and provides access over Pruitt Creek. There is another bridge approximately 500 feet to the West of this bridge at Caletti Avenue. The bridge is approximately 25'-10" long and 20'-11" wide. No as-built drawings or inspection reports were provided at the time of inspection.

Historical maps show that the bridge was constructed between 1950 and 1980 as part of Standard Avenue. Pruitt Avenue was built around 1987 and it appears that at that time, the portion of Standard Avenue between Pruitt Avenue and Shiloh Road, including this bridge, became part of a private parcel. We understand there is a roadway easement through this parcel that includes the bridge.

A vicinity map and parcel map indicating the location of the structure and its proximity to surrounding streets and highways has been included as part of this report in Appendix A.

Bridge Description:

a) Substructure:

The single span bridge is supported by two concrete abutments. Each abutment consists of a stemwall, two wingwalls, and a backwall. From our site visit, it appears the abutments are supported on spread footings. No piles were observed under the footing in areas of undermining. The stemwalls are 28'-10" wide and approximately 8'-8" tall based on the North abutment. The wingwalls are 8'-2" long and approximately 11.5" thick. The backwalls are the same width as the stemwall and 8" thick. The extents of the spread footing are unknown but is approximately 16"-18" thick and the same width as the stemwall. The seat of the abutment is approximately 10" wide.

b) Superstructure:

The main superstructure consists of (9) wide flange stringers that spans the total length of the bridge with timber decking laid transversely over the stringers. Asphalt was laid on top of this decking as a wearing surface. The top and bottom flanges of the stringers are 7.5" wide and 7/16" thick. The overall beam depth is 18". The stringers are spaced at approximately 27" on-center. There is a wide flange beam perpendicular to the main stringers near the midspan of the bridge bolted to the bottom flange of the stringers. In addition to the main stringers, an additional beam has been added to the outer East side of the bridge to become the new edge stringer for support of a railing replacement. This added beam consists of a wide flange beam with a steel channel welded to the top flange.. The stringers are supported directly on top of the abutment concrete seats.

c) Deck:

The bridge deck consists of timber decking with 4" thick asphalt overlay. The timber deck consists of transverse 2x6 untreated timbers laid directly on the steel stringers. The timbers are oriented to be 5 ½" tall. There are no spaces between the timbers and connections between timbers, if any, were not visible. There are steel bolts connecting the timbers to the top flange of the steel stringers.

Miscellaneous Bridge Elements:

a) Railings:

Railings consist steel pipe posts and horizontal rails and steel mesh infill between the rails. The posts at the abutments are installed in post pockets in the wingwalls. The railings appear to have been installed with the last 10 years without formal design. Components are typically tack welded together.

b) Channel Bank Protection

There is rock riprap upstream of the bridge in the channel bed and banks near the outfall of a 42" corrugated metal pipe (CMP) on the south bank of the creek.

At the upstream end of the north abutment, there is an area of asphalt on the north bank of the creek. There is also sacked concrete in this area that may have been installed prior to the asphalt for bank protection.

c) Utilities

There is a steel conduit on the west side of the North abutment that is carrying a insulated cable. This cable exits the conduit and travels diagonally under the bridge to the east side of the South abutment where it transitions to underground. The cable lays on the creek bed under the bridge.

The owner and purpose of this cable was not evident. With the cable laying within the channel bed and across the full width of the channel, there is substantial risk for debris catching on the cable and obstructing the creek flow or breaking the cable. The cable should be relocated or removed based on coordination with the cable owner.

STRUCTURAL ASSESSMENT METHODOLOGY

2.1 General

This section provides an overview of the approach to conducting the structural assessment. The assessment was performed in three phases:

Phase 1: Data Collection
Phase 2: Field Review
Phase 3: Data Evaluation

2.2 Data Collection

As-built drawings for the bridge were not available at the time of this report. Field measurements were taken in lieu of this. Photos were taken in the field and sketches were created to document the dimensions of the existing structural members. Excerpts of field photos are included in Appendix B and a copy of the field sketches are in Appendix C.

2.3 Field Review Approach

A preliminary field review was conducted by a two-person inspection team comprised of structural engineers to evaluate the condition of the bridge. The inspection was performed on October 10th, 2023. The two-person inspection team conducted detailed structure inspections including visual inspections, photo log preparation, observation of visible evidence of structure condition/ deterioration and preparation of draft field review reports.

In general, the detailed inspection consisted of making observations, taking measurements needed to determine the physical and functional condition of the bridge, and verification of any posted load capacity. These inspections are generally conducted from the deck, ground and/or water level

2.4 Structural Assessment Approach

Based on the findings of the fieldwork and data collection, structural assessment was made and the Field Review Report was finalized (See Appendix D). Biggs Cardosa Associates, Inc reviewed the draft field review and photo log and estimated existing structural condition and prepared structural assessment recommendations. In general, the condition rating can be grouped into three broad categories:

- Rating (G): Good Condition
- Rating (F): Fair Condition
- Rating (P): Poor Condition

2.5 Structural Assessment

In general, the structure is in FAIR Condition and the following is a summary of the rating given to the main components of the structure (See Appendix E):

- APPROACH ROADWAY ALIGNMENT: Rating = GOOD Condition
- DECK: Rating = POOR Condition
- SUPERSTRUCTURE: Rating = GOOD Condition
- SUBSTRUCTURE: Rating = FAIR Condition

- RAILINGS: Rating = POOR Condition
- OVERALL CHANNEL AND CHANNEL PROTECTION: Rating = POOR Condition
- WATER ADEQUACY: Rating = POOR Condition

Since there were no available as-built documents, we do not know the original design loading criteria of this bridge. Overall, the structure is in FAIR Condition and performed well when a large front loader drove over it with no signs of excessive deflection or vibration.

Below is a list of deficiencies noted during the inspection of the bridge:

- Significant scour and undermining at the North abutment. This undermining appears to have resulted primarily from lateral migration of the creek towards the north abutment. Based on this preliminary assessment, it appears the bridge would be classified as Scour Critical, meaning that future high-flow storm events could result in further undermining, reducing the stability of the abutment and potentially could result in failure.
- The existing cable laying within the channel bed and across the full width of the channel creates a substantial risk for debris catching on the cable and obstructing the creek flow or breaking the cable. The cable should be relocated or removed based on coordination with the cable owner.

- Localized concrete failure and rebar corrosion in North abutment foundation. This appears to be a localized condition in two areas of the footing approximately 2' long and may result from inadequate concrete thickness over the steel reinforcing resulting in localized corrosion of individual reinforcement bars.

- Significant paint failure on steel stringers. No significant corrosion of the stringers was observed.

- Significant timber decking deterioration. This was observed at the edges and ends of the bridge and in other isolated areas. This likely results from long term water exposure at the unprotected ends of the decking at the edges of the bridge deck and at areas where the asphalt overlay has failed, allowing surface water to pass through to the timber. The asphalt overlay prevented a complete survey of the deck condition. Further observations are recommended with removal of areas of overlay to allow for a more complete assessment of the timber deck condition. The existing overlay may conceal significant timber deck deterioration.

- Railing at the bridge and wingwalls do not provide adequate fall protection for pedestrians or vehicles. The design and construction of the railings do not appear to meet code requirements for pedestrian or vehicular barriers and do not provide adequate fall protection.

- Expansion joints have been paved over and are not sealed. This has resulted in water ingress and significant localized deterioration of decking.

- Damaged chain link fencing at the north east wingwall

2.6 Recommended Mitigations/ Repair:

There structure is in FAIR condition overall. Most of the deficiencies listed above could be rectified by maintenance and repairs. However, scour and undermining of the abutment would require significant work to the channel. Since this work would be within the jurisdiction of a number of regulatory agencies: California Department of Fish and Wildlife (CDFW), the Regional Water Quality Control Board (RWQCB), Army Corps of Engineers (ACOE) and FEMA, there may be significant restrictions on this work and significant additional mitigation work as permit requirements. Due to the cost and permit restrictions on this work, bridge replacement should be considered as an alternative.

We understand that the bridge is not required for the future planned use of the parcel. It is not clear if the existing roadway easement requires the bridge to remain open for pedestrian or vehicular use. If not, closing the bridge or removing the bridge could be considered

a) Alternative 1 – Bridge Maintenance

Bridge maintenance and repairs could be completed to restore the bridge to close to its original condition. Some additional repairs could be completed to make improvements to the original design. This could include:

- Bridge scour and undermining. Regulatory agencies typically limit the extent of any new concrete or other unnatural materials placed within the creek bed and banks, and typically require mitigation for this loss of natural creek bed and banks. Mitigation may include requirements to improve a similar area of creek bank close to the site. Remedial work to reduce the potential for scour could include installation of additional rock riprap, vegetated rock riprap, articulated concrete mats or similar erosion-resistant materials in the creek. Hydrology and hydraulic analysis are required to determine design requirements for this scour mitigation, including the extent of the required scour mitigation and the rock sizing. In some cases, long term scour mitigation is not feasible due to those requirements, and bridge replacement may be required with new foundations either located outside of scour areas or supported on deep foundations that extend below the depth of potential scour. It may be feasible to install rock riprap or other materials to reduce the potential for scour in smaller and more frequent high-flow storm events.
- Abutment footing concrete repairs. This repair would consist of localized removal of deteriorated concrete and patching with proprietary repair products. This is a standard concrete repair method that would be performed within jurisdictional areas.
- Re-painting. Due to the extent of paint failure, full repainting is recommended. This would consist of testing of the existing paint to identify any hazards, including lead, installation of a temporary containment system to prevent debris from falling into the creek, removal of the existing paint and surface protection and applying prime coats and finish coats. This work would be over the jurisdictional areas. Ideally this work would be completed in conjunction with deck replacement so the top surface of the beams can be re-painted and access to the beams is improved.
- Decking replacement. This would consist of removing the existing timber and asphalt and replacing “in kind” with similar new materials. Pressure-treated timber could be considered to extend the effective life of the timber, although may be prohibited by permit requirements. Additional waterproof flashings could be installed along the ends and edges of the bridge to extend the effective life of the new timber. This work would be over jurisdictional areas and would require a containment system to be installed under the bridge to prevent debris from entering the creek.

- Railing replacement. New code-compliant railings should be installed along the edges of the bridge and the wingwalls. Due to the nature of the bridge superstructure, full compliance with requirements for vehicular barriers may not be possible.
- Replace expansion joints. As the asphalt overlay on the bridge deck is replaced, standard bridge joints should be installed. This consists of a joint filler board in the lower portion of the joint covered by a sealant. The sealant is intended to accommodate minor movements due to thermal or load changes of the bridge while preventing surface water from seeping through the deck to the timber.
- Replace chain link fence.

Permits from regulatory agencies would be required for all work within the jurisdictional areas. There may be existing maintenance agreements and permits for the bridge and adjacent areas of the creek that may cover some or all of the work described above.

The cost of these repairs, including design and permitting is anticipated to be in the range of $750,000 to $1,000,000. We recommend the bridge be closed to pedestrians until the railings have bene replaced and closed to vehicular traffic until the bridge deck has been replaced.

b) <u>Alternative 2 – Bridge Closure and Remove</u>

If the existing roadway easement does not require the bridge to be maintained in place, or the easement is modified accordingly, the bridge could be closed and removed. The removal could be completed in several phases:

- Phase 1 - Install a physical barrier to prevent access. This could install a movable concrete barrier, for example a piece of standard "K-Rail" traffic barrier to prevent vehicular access and chain link fence to prevent pedestrian access. We recommend signage also be added.

- Phase 2 - Remove the bridge superstructure. This would include removing portions of the steel railing, the timber decking and asphalt overlay and the steel stringers.

  This work would be over jurisdictional areas and would require a containment system to be installed under the bridge to prevent debris from entering the creek. This work may be covered by existing maintenance agreements and permits. If the work is not covered by existing permits, consultation with regulatory agencies may be required. CDFW, RWQCB and ACOE may consider there are no permanent impacts to the creek and may either confirm this work does not require a permit or would issue a permit with limited requirements to address the temporary impacts, mainly related to the potential workers, equipment and materials temporarily within the creek. Sonoma County Public Infrastructure routinely coordinate with and obtain permits from these agencies and may be able to provide further guidance.

  This reach of Pruitt Creek is a FEMA Regulatory Floodway. The flood hazard areas shown on FEMA maps show a significant change in shape at the bridge, suggesting the bridge or grading directly adjacent to the bridge may influence the extent of flooding. The stringers and deck may be submerged during storm flow conditions related to these FEMA flood hazard areas, and as a result removal of these components could result in changes to the storm flow water surface elevation and extent of flooding upstream and downstream of the

bridge. As a result, this work may require modifications to the FEMA mapping. This would require hydraulic analysis to verify the extent of change, if any, and consultation with FEMA. The Sonoma County or Town of Windsor Floodplain Administrator could provide further guidance on this and potentially a policy decision on the extent of any analysis and FEMA coordination.

The existing cable could be relocated to either overhead or under the creek, using a trenchless installation method. The cost of this relocation may be the responsibility of the utility owner or bridge owner, depending on the existing agreements and easements.

- Phase 3 - Remove the bridge abutments. This would include removing the concrete abutments including buried portions typically to a depth of 3' below grade. The creek banks would also need to be locally regraded and fences or railings may be required or desired to limit access and reduce fall hazards. The extent of regrading and potential impacts to the downstream retaining wall and other existing features are undetermined and would require hydraulic analysis and creek restoration design.

  This work would result in temporary and permanent impacts to the creek that would be included in the CDFW, RWQCB and ACOE permits. Mitigation requirements may include restoring planting to the area, including temporary irrigation, monitoring over a period of 5 to 10 years and replanting if required.

  Since this work would remove concrete and stream obstructions from the creek, these agencies would consider it an overall improvement to creek. As a result, it may be possible to complete this work as part of other County projects on this creek and for this work to be used as mitigation for permanent impacts of the other project.

  FEMA consultation and modifications to FEMA mapping may also be required.

  The cost of full bridge removal including creek restoration is difficult to assess until the extent of work within the creek is known, but could be in the range of $250,000 to $1,000,000, with most of this cost incurred in removing the abutments.

c) <u>Alternative 3 – Bridge Replacement</u>

A replacement bridge would be designed to meet current code and permit requirements and would have a design life of around 75 years with routine maintenance. Since the bridge is on private property and potentially not open to public traffic, some design requirements including vehicle loads could potentially be reduced.

Bridge abutments are now typically located outside of the creek banks, resulting in a longer bridge of around 60'. The bridge deck may also have to be raised a few feet to clear the design storm-flow water elevation. This may require regrading of the roadway approaches and potentially short retaining walls along the sides of the approaches.

Since the bridge would not be open to public traffic, reduced vehicular loading could be considered.

Since the abutments would be outside of the creek, temporary and permanent impacts requiring permits and FEMA consultation and modifications to mapping would be similar to those for Alternative 2.

The cost of the replacement bridge, including design and permitting, could be approximately $2,500,000.

3 RECOMMENDED INSPECTION FREQUENCY

3.1 General

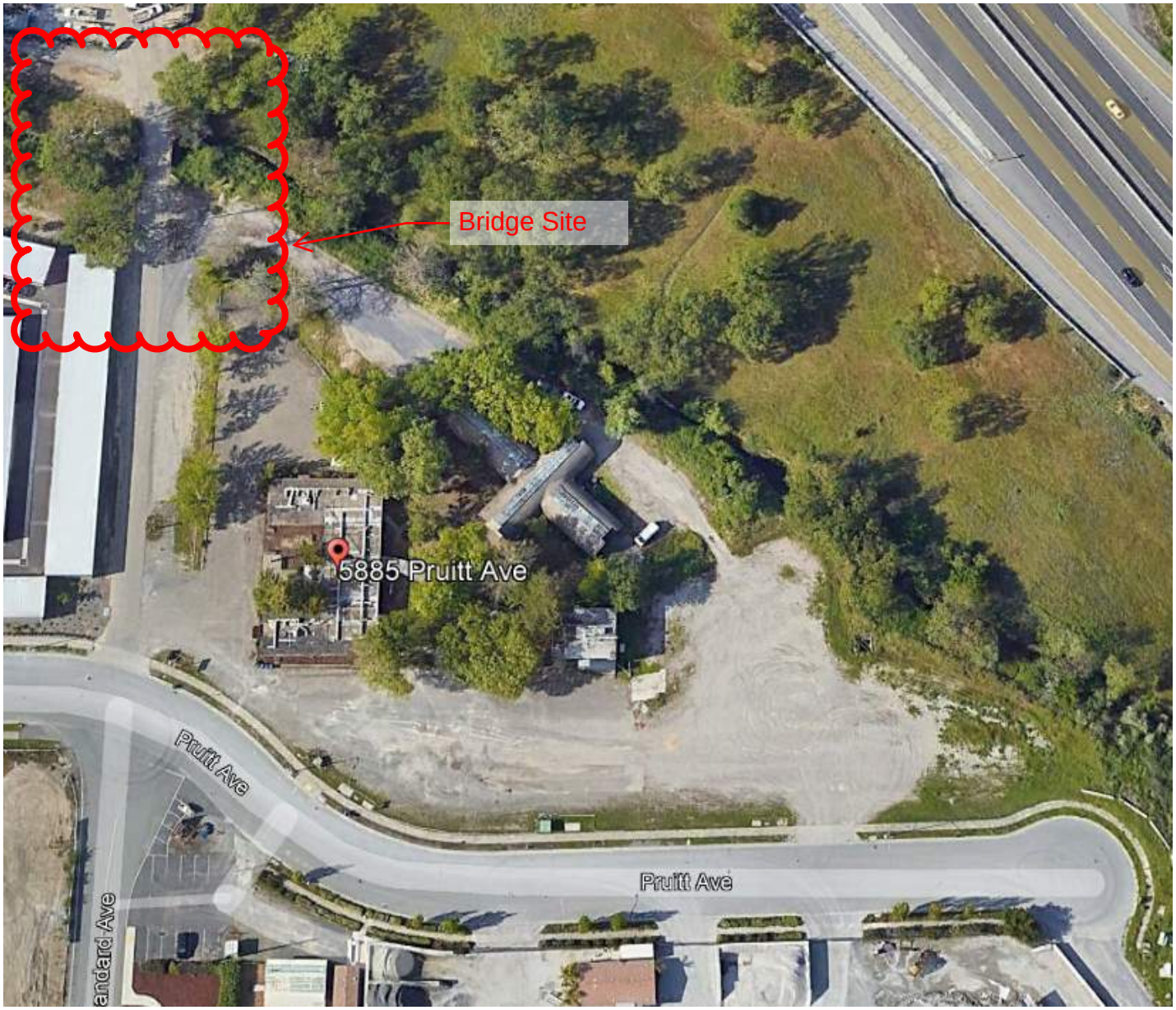
It is recommended that the owner provide structural inspections of the subject bridge on a 24 month basis. It is also recommended that the bridge foundations be observed following high-flow storm events. The structure is in FAIR Condition. Based on a preliminary assessment, the bridge would be classified as scour critical.

The following guidelines were used to determine inspection frequency recommendations for bridge structures. These guidelines are in general conformance with the NBIS criteria for routine inspections.

1. Routine inspection interval of 48-months. This inspection frequency is consistent with the NBIS maximum recommended inspection frequency for non-critical and/or non-suspect bridge structures.
2. Inspection intervals of 24-months are recommended for structures that fall into one or more of the following categories:
   (a) Structures with a condition rating of POOR
   (b) Structures that have a reduced load rating
   (c) Structures without load path redundancy
   (d) Structures that are very susceptible to vehicular damage, e.g. structures with vertical over or under clearances less than 14’-0”; narrow through or pony trusses.
   (e) Structures that are very susceptible to scour damage, e.g. structures with Overall Channel and Channel Protection Condition Rating of 5 or less
   (f) New or newly rehabilitated structures that have been inspected less than two (2) times (initial inspection plus 1 routine inspection) in order to establish structure baseline condition and performance.

APPENDIX A
Location Map

Pruitt Avenue Bridge over Pruitt Creek



APPENDIX B
Field Photo Excerpts

Pruitt Avenue Bridge over Pruitt Creek

Fig. 1: North view of bridge from approach

Fig 2: South view of bridge from approach

Fig 3: East view of bridge from creek bed

Fig 4: West view of bridge from roadway

Fig 5: Southwest wingwall

Fig 6: Northwest wingwall with metal conduit and cable

Fig 7: North Abutment Foundation

Fig 8: Localized concrete failure and rebar corrosion

Fig 9: "Intact" spalling at South abutment bearing

Fig 10: Unknown black cable disappearing underground at South abutment.

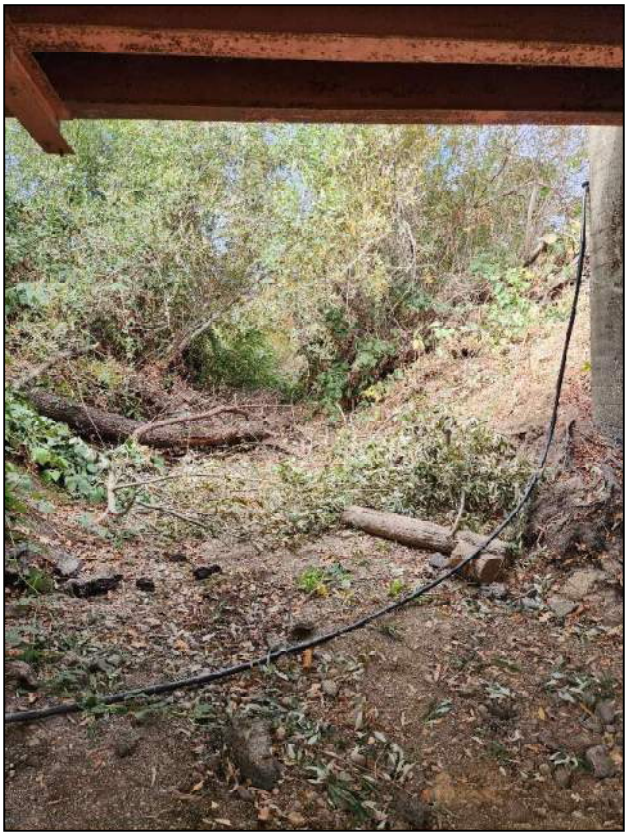


Fig 11: Unknown black cable running under the bridge from the North abutment.

Fig 12: Sacked Concrete in creek bed

Fig 13: Tree trunk and debris downstream within channel

Fig 14: Asphalt that was used to try to stabilize North abutment.

Fig 15: RSP on Northeast side of bridge

Fig 16: 42” CMP upstream from bridge

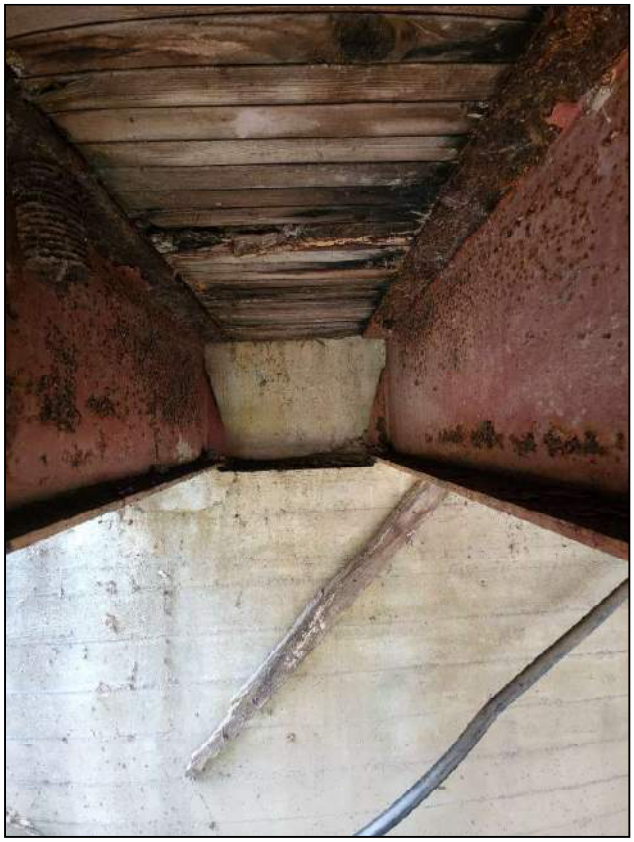


Fig 17: Broken timber decking facing South abutment

Fig 18: Paint peeling off from steel girders

Fig 19: New edge girder added for railing

Fig 20: Timber decking deterioration on Southwest edge of bridge

Fig 21: Asphalt crumbling on Southwest edge of bridge

Fig 22: Post not attached to any part of deck

Fig 23: Zipties holding mesh to tube railing

Fig 24: Tack welds holding railing together

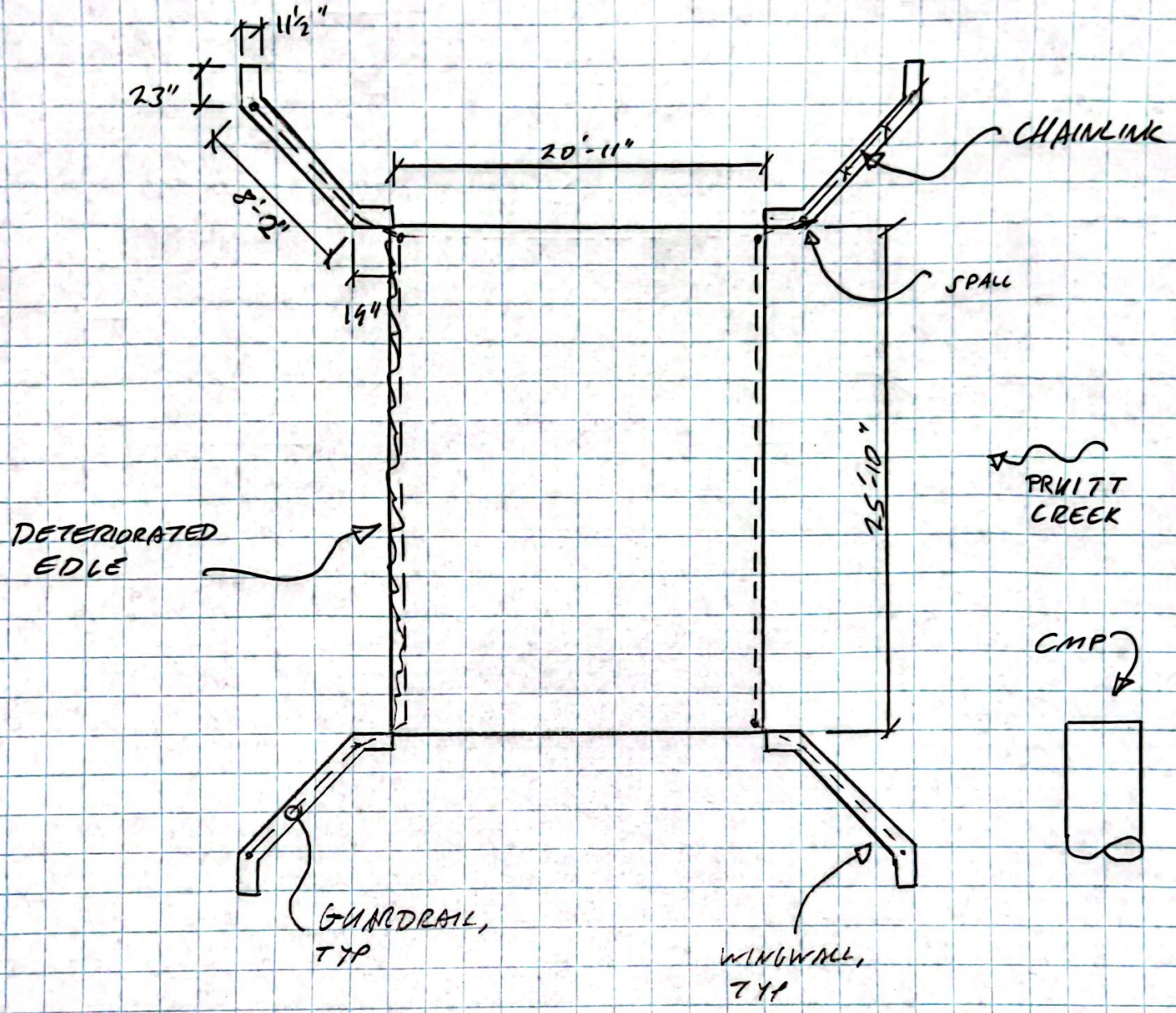
Fig 25: Sagging fence and gate post on Northeast side of bridge

Fig 26: “Alligator” cracks at approach

Fig 27: South abutment crack at expansion joint

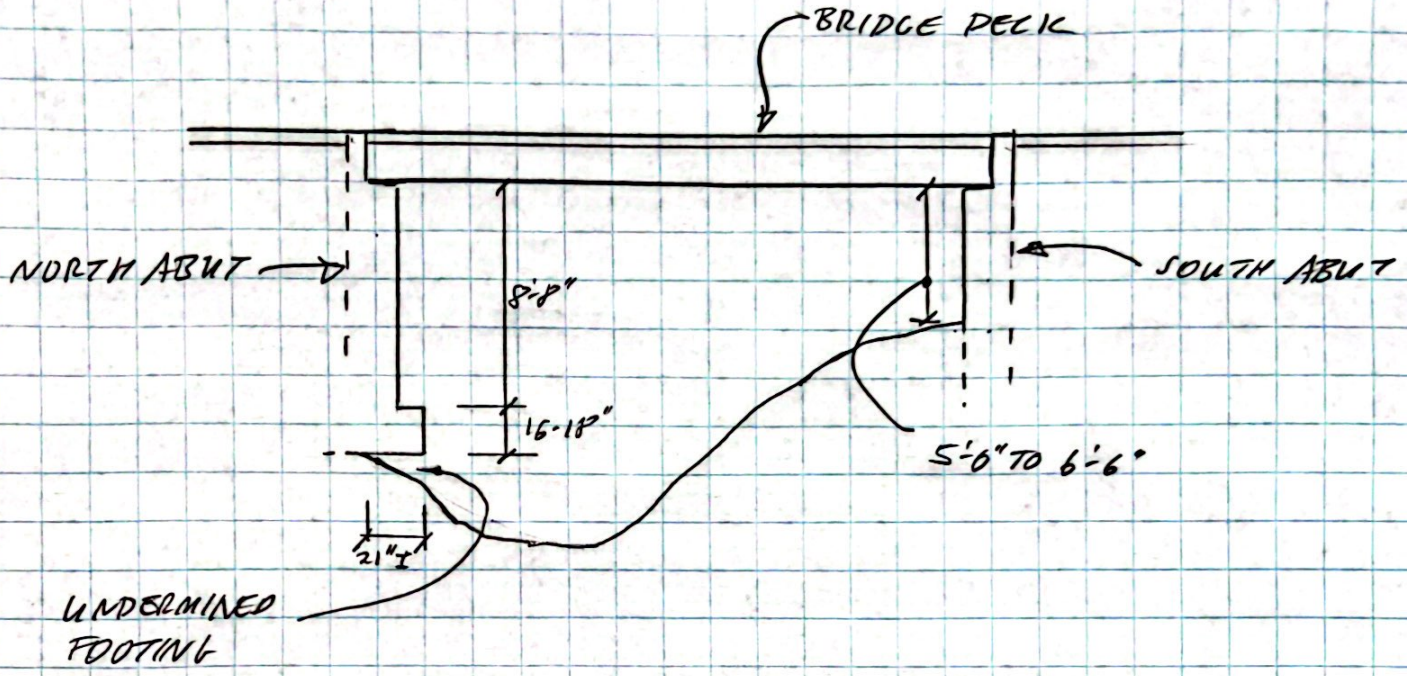
Fig 28: North abutment crack at expansion joint

APPENDIX C
Field Sketches



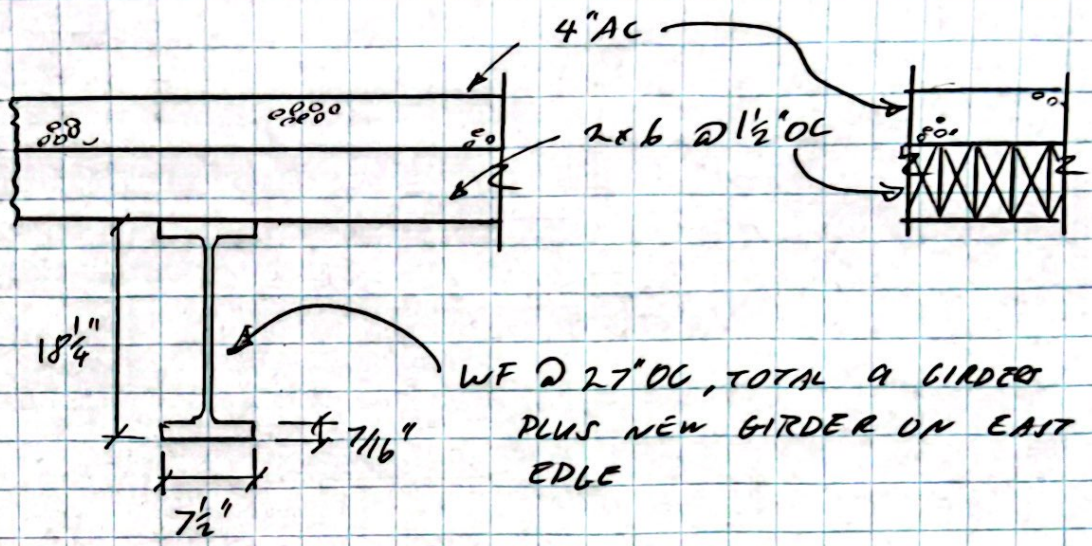
PLAN

PRUITT AVE
BCA 10/23

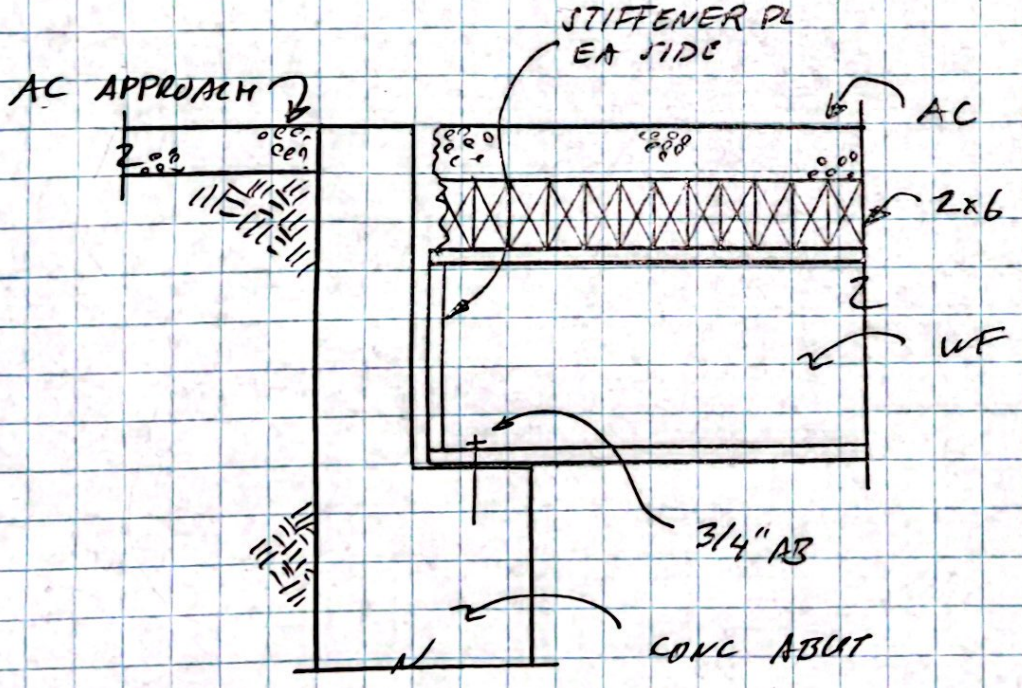


ELEVATION LOOKING EAST

PRUITT AVE
BCA 10/23



TYPICAL DECK SECTION



GIRDER SEAT

PRUITT AVE
BCA 10/23

APPENDIX D
Field Review Report

SUMMARY REPORT OF BRIDGE SURVEY

Structure No.: NA	Name: Standard Avenue Bridge over Pruitt Creek
Location: Within private parcel at the north end of Standard Avenue	Dimensions:
Type: Steel girder bridge with timber decking	Length: 25'-10"±
General Description: Existing bridge over Pruitt Creek	Width: 24'-11"±
	Roadway Width: 24'-11"±
Date Constructed: Between 1955 and 1980	Date of Other Work: Unknown (additional stringer on east side of bridge and replacement railings)
Date of Inspection: 10/10/2023	Date of Last Inspection: Unknown
Repair Work Since Last Inspection: Unknown	

Structure Component	Material	General Remarks
Approaches	Asphalt	Approaches are in Fair Condition with alligator cracking in the asphalt surface. No signs of settlement adjacent to the ends of the bridge.
Deck	Asphalt over Timber	Deck is in Poor Condition with significant deterioration of asphalt and timber at edges and ends of bridge and other localized areas.
Superstructure	Steel Stringers	Superstructure is in Good Condition. Paint has significant deterioration resulting in minor isolated surface corrosion.
Substructure	Concrete	Substructure is in Fair Condition. Concrete is in Good Condition. There is significant scour and undermining of the north abutment.

Non-Structural Items	General Remarks
Railings	Railings are in Poor Condition and do not provide adequate fall protection for pedestrians or vehicles
Channel	Channel is in Poor Condition due to lateral migration, scour and failed channel protection. There is debris downstream that is partially obstructing the channel.
Waterway Adequacy	Reported upstream flooding indicates Poor waterway flow.

Summary of Findings: **Bridge is in Fair Condition.**

SUMMARY REPORT OF BRIDGE SURVEY

Conclusions and Recommendations: Bridge is in Fair Condition.

OVERALL BRIDGE CONDITION RATING: **G** **F** **P** **N/A**

Recommendations and conclusions provided here are based on visual observations of existing conditions at the time of the field survey. Certain conditions may not be visible or may be affected by the passage of time.

Structural Element Condition Rating

Code	Description
G	GOOD - element is limited to only minor problems.
F	FAIR - structural capacity of element is not affected by minor deterioration, section loss, spalling, cracking, or other deficiency.
P	POOR - structural capacity of element is affected or jeopardized by advanced deterioration, section loss, spalling, cracking, or other deficiency.

BRIDGE INSPECTION FORM

Date	10/10/2023		Structure Name	Standard Avenue Bridge over Pruitt Creek
Temperature	68 degrees F		Structure No.	N/A
Inspected By	Best Tech and Anthony Richardson		Structure Type	Steel girder bridge with timber deck and asphalt topping
City	Windsor		Location	North end of property
County	Sonoma		Features Intersected	Pruitt Creek
Weather	Sunny		ADT/Year	Unknown
			Functional Classification	N/A

GEOMETRIC DATA

Structure Dimensions:

No. of Traffic Lanes	N/A		Span Length	25'-10"	
Curb-to-Curb Dimension	No Curbs		Vertical Over clearance	N/A	
Deck Width, Out-to-Out	20'-11"		Skew	None	degrees
Handrail Width	20'		Approach Roadway Width (w/Shoulders)	N/A	feet
Structure Length	25'-10"	feet			
Number of Spans	1		Bridge Median	N/A	feet
Comments:					

Bridge Signing:

Speed Limit =	NA	MPH			
Weight Restrictions =	NA	Tons;		Tons/Comb.	
No signs indicating rating for vehicle loads.					
Speed Limit Reduction	None	Minor	Substantial		
Vertical Clearance Overhead	N/A	Ft.		In.	
Comments:	This bridge is on private property and we understand is not intended to be open to public traffic. There are no physical barriers preventing public access and no signs were observed restricting access.				

APPROACH ROADWAY ALIGNMENT APPRAISAL RATING: **G** **F** **P** **N/A**

Comments:	There is some settlement at the transitions onto the bridge.

BRIDGE INSPECTION FORM

Approach Elements	Rating				Remarks
Pavement Condition	G	[F]	P	N/A	There are "Alligator" cracks on the approach pavement. Please see figure 26 in Appendix B
Vertical Alignment (North Abut.)	[G]	F	P	N/A	
Horizontal Alignment (North Abut.)	[G]	F	P	N/A	
Vertical Alignment (South Abut.)	[G]	F	P	N/A	
Horizontal Alignment (South Abut.)	[G]	F	P	N/A	

OVERALL CHANNEL AND CHANNEL PROTECTION CONDITION RATING: **G F [P] N/A**

Comments:
Approximately 10-feet upstream of the bridge at the corrugated metal pipe culvert (CMP), there is rock riprap/rock slope protection (RSP) that was placed and is still intact. At the upstream end of the north abutment, there appears to have been several attempts to stabilize the channel as scour and undermining has occurred. At some point, asphalt and sacked concrete were placed to try to provide channel protection. The asphalt has been undermined by continuing scour and the sacked concrete appears to have been undermined and has moved into the channel.

On the downstream side, there is no scour protection, but also no significant scour. The stream is partially obstructed with various debris.

The soil near and underneath the bridge appears to be fine silty sand and is potentially erodible/scourable.

Channel Elements	Remarks
Channel	
Streambed (align, scour, etc.)	There is a bend upstream and a 42" CMP. There was some riprap upstream in the creek bed and banks that was placed to possibly minimize erosion of the channel at the CMP. There is scour and undermining at the North Abutment.
Embankments (vegetation, etc.)	The sides of the banks are vegetated and about 20' downstream there is a timber retaining wall supporting the south bank of the creek
Streamflow (velocity, etc.)	Dry at the time of inspection.
Drift and Debris	There is a tree trunk that is approximately 14" in diameter that is partially obstructing the creek on the downstream side of the bridge. There were various forms of vegetation partially obstructing the stream as well. Please see figure 13

Channel Protection	Rating				Remarks
Riprap	[G]	F	P	N/A	Upstream RSP in the creek bed and banks appears to be stable and appears to be limiting scour and erosion.
Gabions	G	F	P	[N/A]	
Slope Protection	G	F	[P]	N/A	Sacked concrete appears to have moved and failed.
Footing Aprons	G	F	[P]	N/A	Asphalt that was placed to help protect the bridge foundation is undermined.

BRIDGE INSPECTION FORM

WATERWAY ADEQUACY APPRAISAL RATING: **G F [P] N/A**

Comments: The bridge is within a FEMA floodplain and reportedly floods upstream.
Channel appears to have migrated laterally towards the north abutment contributing to the scour and undermining of the abutment.

Waterway Elements	Remarks
Hydraulic Opening	Reportedly floods upstream. It is not known if the bridge significantly affects or causes this flooding.
Freeboard	Reportedly the floods do not reach the top of the deck.
Span	The North abutment is at the toe of the slope of channel and appears to impinge on creek flows. This may be the result of lateral migration of the creek
Floodplain	The floodplain is within FEMA Floodplain.
Chance of Overtopping	
[Unknown]	Based on visual inspection and available records, it is unknown as to what the chances of overtopping are.
Slight	
Occasional	
Frequent	

OVERALL DECK CONDITION RATING: **G F [P] N/A**

Comments: There are several locations of the deck that appear to be in poor condition. The edges, ends and the centerline of the bridge have deteriorated significantly. This is likely due to water ingress at the exposed edges of the deck and at joints and cracks in the asphalt.

On the North East wingwall, there appears to be a gate post for a full width gate. Gate has been removed.

Deck Elements	Rating				Remarks
Wearing Surface	G	[F]	P	N/A	Overall, the asphalt wearing surface is good. There are full depth cracks at the ends of the bridge. There appears to be a joint at the centerline of the bridge deck.
Deck - Topside	G	F	P	[N/A]	Top of deck was not able to be inspected due to asphalt. More investigation may need to be conducted.
Deck - Underside	G	F	[P]	N/A	Decking at ends, edges, and isolated areas toward the middle of bridge severely deteriorating due to wood rot.
Curbs/Concrete Barrier	G	F	P	[N/A]	
Medians	G	F	P	[N/A]	
Sidewalks	G	F	P	[N/A]	
Parapets	G	F	P	[N/A]	
Railing	G	F	[P]	N/A	Railing is in poor condition and poorly constructed. There are portions of unattached mesh, tack-welded connections of main members

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Deck Elements	Rating				Remarks
					and poor connections of the posts to the bridge. The post on the west side of the bridge is not attached to the bridge.
Expansion Joints	G	F	[P]	N/A	The expansion joints have previously been paved over and the asphalt now has full depth cracks at the ends of the bridge. There is significant timber decking deterioration due to ongoing water ingress at these cracks.
Drainage System	G	F	P	[N/A]	No drainage system visible. The bridge deck is almost flat with inadequate slopes for drainage.
Lighting	G	F	P	[N/A]	No lighting.
Utilities	G	F	P	[N/A]	**There is the one black cable beneath the bridge; please see "Superstructure Elements**"
Fencing	G	F	[P]	N/A	North East abutment fence is sagging and pushed over. Please see figure 25

OVERALL SUPERSTRUCTURE CONDITION RATING: **[G] F P N/A**

Comments: The superstructure elements appear to be in good condition. A large front loader was observed driving over the bridge and caused no significant deflections or vibrations. As mentioned in the deck "Deck Elements" portion, the deck elements are in poor condition.

Superstructure Elements	Rating				Remarks
Concrete Slab/Deck	G	F	P	[N/A]	Please see "Deck Elements"
Stringers	[G]	F	P	N/A	The stringers don't appear to have any significant corrosion, damage or deterioration.
Floorbeams	G	F	P	[N/A]	
Floor System Bracing	G	F	P	[N/A]	
Multibeams	G	F	P	[N/A]	
Girders	G	F	P	[N/A]	
Arches	G	F	P	[N/A]	
Cables	G	F	P	[N/A]	
Paint	G	F	[P]	N/A	There is significant paint failure. Estimated more than 50% of the paint has failed. The paint protects the steel from corrosion.
Bearing Devices	[G]	F	P	N/A	No bearing pads. The stringers are supported directly on the concrete abutment. On the East end of the South abutment, there is one intact concrete spall directly beneath a stringer bearing on the south abutment. Please see figure 9
Connections	G	[F]	P	N/A	
Welds	[G]	F	P	N/A	The minor welds at the new edge girder and at stiffener plates at the ends of the stringers are in good condition.

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Superstructure Elements	Rating / Remarks
Timber Decay	See "Deck Elements". Significant timber decay in the decking.
Concrete Deterioration	N/A
Steel Corrosion	Minor steel corrosion visible.
Collision Damage	No collision damage visible.
Live Load Deflection	No significant deflections were detected during inspections as large front loader drove across the bridge.
Vibration	No significant vibrations detected during inspections as large front loader drove across the bridge.
Member Alignment	Member alignment is Good other than railing
Utilities	Unknown black cable running under the bridge. The cable runs along the West wingwall of the North abutment through a metal conduit, then goes underneath the bridge diagonally and then is underground toward the East wingwall of the South abutment. Assumed to be electrical. The cable may have been previously supported on the bridge.

OVERALL SUBSTRUCTURE CONDITION RATING: **G** **[F]** **P** **N/A**

Comments: The substructure is in generally good condition except for undermining and two areas of localized deterioration on the north abutment. The footing/foundation for the North abutment has been exposed and partially undermined by scour. There are two areas of localized spalling or inadequate concrete cover that has resulted in corrosion of steel reinforcing bars.

Substructure Elements	Rating				Remarks
Abutments	[G]	F	P	N/A	Abutments are in general Good Condition.
Piles	G	F	P	[N/A]	No piles were observed in the undermined areas of the North abutment
End Diaphragm	G	F	P	[N/A]	
Bearing Seat	[G]	F	P	N/A	On the East end of the South abutment, there is one intact concrete spall directly beneath a stringer bearing on the south abutment. Please see figure 9
Backwall	[G]	F	P	N/A	Backwalls were observed from below the bridge.
Wingwall	[G]	F	P	N/A	No major damage or deterioration from either the top or the sides on the visible portions of the inspection. There is one spall on the north east wingwall with no exposed reinforcement or rust staining
Foundation	G	F	[P]	N/A	The foundation on the North abutment is in poor condition due to undermining and scour underneath the foundation. There are two areas of localized corrosion of reinforcement along the front edge of the foundation.
Pier Cap	G	F	P	[N/A]	
Piers	G	F	P	[N/A]	
Scour/Undermining	Significant Scour as mentioned above in "Foundation" and in "Overall				

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Substructure Elements	Rating / Remarks
	substructure" comments.
Settlement	No settlement of the structure or approaches was observed.
Substructure Protection	RSP seems to be providing channel stability upstream of the bridge. There is significant scour at the north abutment and failed asphalt and sacked concrete at the upstream end of the north abutment.
Fender System	N/A
Collision Damage	No collision damage observed.
Highwater Mark	No high-water mark observed.
Timber Decay	N/A
Concrete Deterioration	As mentioned above in "Foundations", the North abutment footing has localized deteriorating concrete and corroding rebar.
Steel Corrosion	N/A
Connections between pier walls and underside of deck?	N/A
Connections between pier walls and pier cap?	N/A
Paint	N/A

GENERAL COMMENTS

Comments:	No As-Built plans available

Follow-up Comments

Underwater Inspection:	Not required
Fracture Critical Inspection:	Not required
NDT:	Not required
Load Rating:	Not required if bridge is closed to traffic. Consider a load rating if the bridge to remains open and there is potential for heavier vehicles.
Inspection Frequency:	Recommend every 2 years
Special Equipment:	None
General:	

Additional comments and/or sketches: None