TO: Mr. James Heid, Albion Bridge Stewards

FROM: Abolhassan Astaneh-Asl, Ph.D., P.E.

Date: September 9, 2024

Subject: Review of the 2023 Caltrans Inspection Report
on the Albion River Bridge

Dear Mr. Heid:

As you requested, I have completed a review of the Caltrans Inspection Report on the Albion River Bridge, dated November 27, 2023. I will refer to this inspection report in this letter as the 2023 Inspection Report. There are severe problems in the 2023 Inspection Report and many violations of the FHWA National Bridge Inspection Standards (NBIS) requirements, making the 2023 Inspection Report almost invalid. Many statements and notes in this inspection report that declare the bridge's current condition as "Poor" are not factual and contradict the data collected by the Caltrans inspectors and reported in the later pages of the 2023 Inspection Report.

The existing condition of bridges is rated by the state departments of transportation as “Good," "Fair," or "Poor," following the provisions of the National Bridge Inspection Standards (NBIS) and using the data collected during the bridge inspections. To provide the public with the utmost safety by efficiently using available transportation funds, Congress, in budgeting and FHWA and state DOTs in carrying on the engineering work, focus on repairing, retrofitting, or replacing the bridges rated "Poor" following the NBIS. Bridges with a poor condition rating have the highest priority for repair, retrofit, or replacement using transportation funds.

For Albion River Bridge, it is clear that, for reasons that are not known to me, Mr. Warren L. Peterson, a Caltrans engineer licensed in California as a Professional Engineer in civil engineering, who has signed and put his stamp on the 2023 Inspection Report, has ignored almost entirely the inspection data that primarily he has collected himself on the Albion River Bridge, which clearly shows that the bridge is in a "Fair" close to "Good" condition rating, and has assigned the condition rating of "Poor" to this bridge. This action by the Caltrans inspector violates the third Canon of the Code of Ethics for Professional Engineers of the National Society of Professional Engineers (NSPE) (https://www.nspe.org/resources/ethics/code-ethics) that all Licensed Professional Engineers should abide. The 3rd Canon of NSPE states: "*Engineers, in the fulfillment of their professional duties, shall issue public statements only in an objective and truthful manner."*

In the remainder of this letter, first, I provide a summary for non-bridge engineers on what the National Bridge Inspection Standards (NBIS) are and how bridges, using the provisions of the NBIS, are rated as Good, Fair, or Poor. Then, using only the inspection data in the 2023 Inspection Report, I will show that the Albion River Bridge is in "Fair" close to "Good" condition rating, and designating it as in a "Poor" condition is incorrect.

With the inspection data in the 2023 Inspection Report and being a state and federally-registered historic place, the demolition and replacement of the Albion River Bridge will not only violate the National Bridge Inspection Standards, a federal law, but an irresponsible act of spending limited taxpayers' transportation funds on a bridge that is in Fair to Good condition instead of attending the 1,527 bridges in California that according to the FHWA's National Bridge Inventory (NBI) are rated Poor and in need of repair, retrofit or replacement. The number of bridges with a Poor condition rating in California is down from 1,536 in 2020 to 1,527 in 2024, which means over the past four years, Caltrans has only brought nine (i.e., 0.5%) of the 1,536 Poor-rated bridges to Fair or Good condition.

1. A Brief Background on the Bridge Inspection Program

Almost all engineering standards in the U.S. are created by committees of professionals in the specific field that the standard applies to and then put into the public comment process until all comments are resolved (accepted or rejected) and the standard becomes official and used. Bridge inspection standards are an exception. An act of Congress established the National Bridge Inspection Standards in response to the 1967 tragic collapse of the Silver Bridge, where 46 people perished. In 1968, the U.S. Congress required the Secretary of Transportation to establish these standards. Federal Highway Administration (FHWA) established the National Bridge Inspection Program and published the first National Bridge Inspection Standards (NBIS) in 1971. The NBIS has been updated periodically, and the latest standard is 2022 in the Federal Register: https://www.federalregister.gov/documents/2022/05/06/2022-09512/national-bridge-inspection-standards.

The condition ratings of the three major parts of the bridge are established as Good, Fair, or Poor using the inspection data in the inspection reports. Then, if at least one of the three components has a condition rating of Poor, the bridge will be assigned a condition rating of Poor.

The three main parts of bridges are the Deck, Superstructure, and Substructure. I have shown these three parts of the Albion River Bridge in Figure 1 below. The Deck is the structure that supports the roadway. Usually, there is an asphalt overlay on the Deck. The Albion River Bridge's Deck is made of timber and has a two-inch asphalt overlay. The Superstructure is the structure that supports the Deck. For the Albion River Bridge, the Superstructure consists of two steel trusses in the main span over the river and timber trusses in the other 33 spans, which are called approach spans. The Substructure is the structure, such as piers, columns, foundations, pile caps, and piles. For the Albion River Bridge, the Substructure is made of concrete 4-legged

towers to support the main span and timber towers to support the trusses of the approach spans. The towers are supported on the foundation system.

Figure 1 Deck, Superstructure, and Substructure of the Albion River Bridge

To establish the condition rating of the Deck, Superstructure, and Substructure, the State DOTs, Federal agencies, and other bridge owners use the information and data in the "Inspection Reports," such as the 2023 Inspection Report for Albion River Bridge, on the existing condition of "Elements" of each three parts of the bridge. The elements are the individual beams, columns, bolted connections, welded connections, piles, foundations, etc.

With the above explanation, it is clear that the condition rating of the three components of a bridge is based on the inspection data on the condition of the "elements" collected by the state DOT and reported to the FHWA, which places the data on the website of the National Bridge Inventory (NBI) publicly.

National Bridge Inspection Standards (NBIS) have clear and objective guidelines and standard provisions for collecting and reporting inspection data in the Inspection Report. All bridge inspectors must strictly follow these guidelines to have a consistent rating of more than 615,000 bridges on public roads in the U.S. that are subject to the NBIS.

After the condition rating of the three parts of a bridge, namely the Deck, Superstructure, and Substructure, are established, if the condition rating of at least one of the three components is Poor, the bridge will have a condition rating of Poor.

2. Review of the Caltrans 2023 Inspection Report on Albion River Bridge

Below is the first part of the 2023 Inspection Report. After Bridge Location Information, a summary of the bridge condition rating is provided. This is the most crucial part of the 2023 Inspection Report. On the left column in lines 1, 2, and 3, it states that the condition ratings of the Deck, Superstructure, and Substructure are (5 Fair), (4 Poor), and (4 Poor), respectively. Assigning condition ratings to the Deck, Superstructure, and Substructure should be based on the inspection data gathered during the inspection. The above assignments of condition ratings are not based on the inspection data provided in the remainder of the 2023 Inspection report.

Department of Transportation - Division of Maintenance — Structure Maintenance & Investigations

Caltrans

BRIDGE INSPECTION REPORT
Other Inspection

BRIDGE NO.:	STRUCTURE NAME:	INSPECTION DATE:
10 0136	ALBION RIVER	November 27, 2023

BRIDGE LOCATION INFORMATION

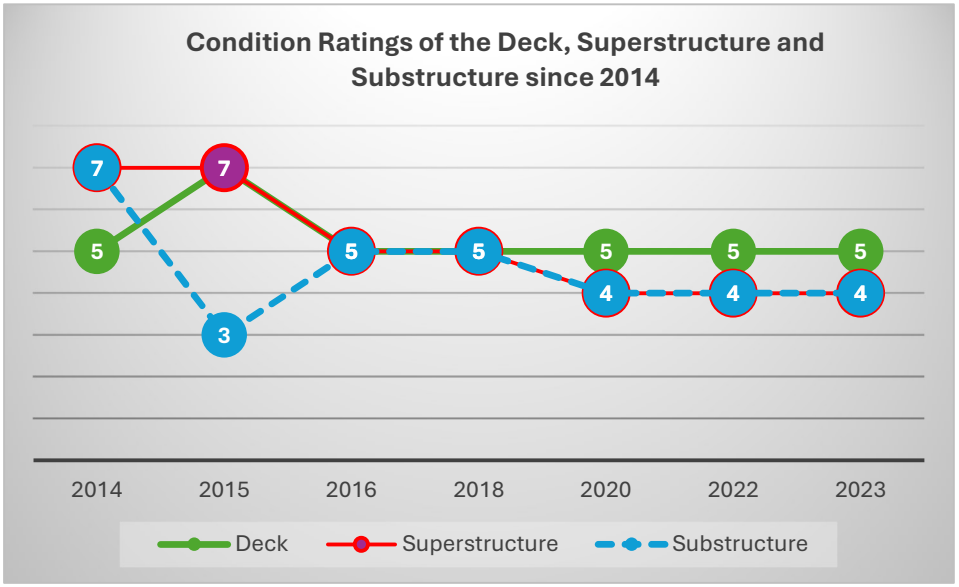
(9) LOCATION	01-MEN-001-43.74	(7) FACILITY CARRIED			STATE ROUTE 1
(11) POSTMILE	43.74	(6) FEATURE INTERSECTED			ALBION RIVER
(16) LATITUDE	39°13'30.32"	(5) INVENTORY RTE(ON/UNDER)		ON	131000010
(17) LONGITUDE	123°46'09.83"	(104) ON NATIONAL HIGHWAY SYSTEM			NOT ON NHS

STRUCTURAL HEALTH CONDITION SUMMARY INFORMATION

(58) DECK	(5 FAIR)	DECK AREA $(M)^2$	2,540
(59) SUPERSTRUCTURE	(4 POOR)	SUFFICIENCY RATING	31.3
(60) SUBSTRUCTURE	4 POOR	PAINT CONDITION	100
(62) CULVERT	N N/A (NBI)	STRUCTURALLY DEFICIENT (SD) STATUS	SD
(67) STRUCTURE EVALUATION	4 MINIMUM TOLERABLE	(113) SCOUR	5 STABLE W/IN FOOTING OR PIL

PHOTOGRAPH IDENTIFICATION

The chart below shows Deck, Superstructure, and Substructure condition ratings variations. In 2014, the rating of the Deck was 5, and the Superstructure and Substructure rating was 7. In 2014, after the author questioned assigning the rating of 5 to the Deck, Caltrans indicated widespread rot in the Deck. However, after actual testing and sampling of the Deck, Caltrans



in 2015, agreed that the Deck was in good condition and raised the rating of the Deck to 7. However, at this time, the condition rating of the Substructure dropped from 7 to 3. It is almost impossible for a bridge condition rating to drop from 7 to 3 in one year without experiencing a major damaging event such as a strong earthquake or major flood. This indicates somewhat arbitrary assignment of the condition ratings to the three main parts of the bridge.

Then, a year later, in 2016, all three ratings were 5 (Fair) until 2020, when the rating of the Superstructure and Substructure dropped to 4(Poor). This assignment of Poor condition rating to the Superstructure and Substructure was after the new changes in the National Bridge Inspection Standard were introduced, which meant if the condition rating of one of the three main parts of the bridge is less than 5, the condition of the entire bridge is rated as Poor, which makes the bridge eligible for Federal funding for repair, retrofit, and replacement.

The reason I state that the assignment of Poor condition rating to the Superstructure and Substructure is not based on actual inspection data is shown in the three tables below. The tables are similar to those currently used by the FHWA, state DOTs, including Caltrans, and other bridge owners to report the condition of the "elements" of the bridges. The 1st column of the table has the name of the "element" of the inspected bridge. I have made minor changes in the element names to make it easily understood by non-bridge engineers. The 2nd, 3rd, and 4th columns have the element condition ratings as "GOOD," "FAIR," "POOR," and "SEVERE." The numbers entered in the tables below are all from the 2023 Inspection Report for the Albion River Bridge.

Deck Elements Condition States

Element Name	Condition State			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Asphalt (m^2 = square meter)	2,354	3	0	0
Timber Deck (m^2)	2,473	17	59	0
Timber Railing (m =meter)	759	0	200	0
Joint Pourable Seal (m)	9	8	0	0
Joint Open Expansion (m)	17	0	0	0
Total %:	95%	1%	4%	0%

The condition rating assigned to the Deck part of the Albion River Bridge in the 2023 Inspection Report is Fair, while 95% of its elements are in Good, 1% in Fair, and 4% in Poor. The assignment of Fair conditions to the Deck seems arbitrary and not based on the actual inspection data in the report. Based on the inspection data, the condition rating of the Deck would be 6 or even 7. In the 2014 inspection report, the percentage of Good, Fair, Poor, and Severe were 89%, 0%,11%, and 0%, respectively, yet the condition rating assigned to the Deck

was 7. Using the inspection data in the 2023 Inspection Report, as summarized in the above table, the condition rating of the Deck would be a 6 or 7.

Superstructure Elements Condition States

Element Name	Condition State			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Timber Beams, Stringers, and Truss Elements(m)	4,350	690	0	0
Steel Truss Members (m)	71	0	0	0
Number of Steel Truss Gusset Plates	40	0	0	0
Number of Bearings Supporting Steel Trusses	4	0	0	0
Total % :	88%	12%	0%	0%

The condition rating assigned to the Superstructure in the 2023 Inspection Report is Poor, while as the table above shows, 88% of the elements of the Superstructure are in Good, 12% in Fair, and no element in Poor or Severe condition. The assignment of Poor rating condition to the Superstructure is not based on the actual inspection data in the 2023 Inspection Report but rather an arbitrary assignment. Note that there is not even one element of the Superstructure that is Poor or Severe. Then, the question is, how is the entire Superstructure in poor condition when not even a single element is in poor condition? Using the inspection data in the 2023 Inspection Report, as summarized in the above table, the condition rating of the Superstructure would be a 6 or 7.

Substructure Elements Condition States

Element Name	Condition State			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Number of Reinforced Concrete columns	6	2	0	0
Timber Column	21	11	0	0
Timber Pier Cap	10	59	0	0
Reinforced Concrete Pile Caps	120	0	0	0
Reinforced Concrete Pier Cap	33	0	0	0
Reinforced Concrete Pile	1	0	0	0
Timber Pile	1	0	0	0
Total %:	74%	26%	0%	0%

The condition rating assigned to the Substructure in the 2023 Inspection Report is Poor, while 74% of its elements are in Good, 26% in Fair, and no element is in Poor or Severe condition. Again, for whatever reason, it is clear that the assignment of Poor rating condition to

the Substructure is not based on the actual inspection data in the 2023 Inspection Report but rather an arbitrary assignment. Similar to the Superstructure case, the question is how the entire Substructure is in Poor condition while not even a single element of it is in Poor condition? Based on the inspection data in the 2023 Inspection Report, as summarized above, the condition rating of the Substructure should be a 5 or 6.

In addition to the condition ratings in the 2023 Inspection Report that cannot be justified using the actual inspection data, some other statements and notes are equally unjustified and not based on the bridge's current condition. There is more than ½ page of argument in the 2023 Inspection Report that in 2012 it was discovered that 50-70% of the bolts connecting the timber members were corroded and had to be replaced. Caltrans engineer Mr. Warren L. Peterson, who signed and stamped the 2023 Inspection Report, continues to argue that there were 5,000 bolts to be replaced at that time. Even though many bolts in the joints of timber elements of the Albion River Bridge were corroded, the corrosion was, for the most part, due to a lack of maintenance on the part of Caltrans. The corroded bolts were replaced with new bolts more than a decade ago, and since then, they have been in good condition. Using the corrosion problem that no longer exists, Mr. Peterson argues that there is a potential for corrosion of the bolts in the future; therefore, the bridge needs to be replaced with a concrete bridge. The National Bridge Inspections Standards require that the inspectors report the current condition of the bridge elements, not the past condition that has already been improved.

3. Conclusion

Caltrans engineer who has signed and stamped the 2023 Inspection Report of Albion River Bridge has almost completely ignored the actual inspection data in the inspection report and subjectively and arbitrarily has assigned the condition rating of Poor to the Superstructure and Substructure of the Albion River Bridge. The assignment of an unjustified poor condition rating to the Superstructure and Substructure automatically has made the Albion River Bridge rated as a bridge in poor condition. As I explained earlier in this letter, the ratings of Poor assigned to the Superstructure and Substructure are arbitrary and not based on actual inspection data.

It is necessary that Caltrans investigates the activities regarding the inspection and condition rating assignment of the Albion River Bridge and take necessary steps to correct the 2023 Inspection Report for the Albion River Bridge, where the condition ratings of the Deck, Superstructure, and Substructure are based on the actual element inspect data contained in the report. With my knowledge of the bridge, the element inspection data contained in the 2023 Inspection report seems to be reasonably accurate. The element inspection data should be used to assign the condition ratings of the Deck, Superstructure, Substructure, and the whole bridge.

Respectfully submitted

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