



September 10, 2021

Ms. Alysén Abel, P.E., MPA
Director of Public Works
Parkville City Hall
8880 Clark Avenue
Parkville, MO 64152

Re: BEAP Project 22TTAP-04
Bridge No. 2220012

Dear Ms. Abel:

We are pleased to submit our recommendations under the Bridge Engineering Assistance Program (BEAP) for the above referenced structure. The City has requested recommendations for potential repairs of Bridge 2220012 in order to reopen this currently closed bridge. In addition, recommendation for a full structure replacement option is discussed in this report.

Existing Bridge

The structure is located in the city limits of Parkville south of Route 152 on NW 76th Street in the location where NW 76th Street becomes a frontage road to Route I-435. NW 76th Street then dead end's just south of Route 152. (See Project Location – Exhibit 1, attached.) The roadway has a sharp horizontal curve on the north approach and a straight alignment on the south. The existing bridge is a 3 span (29'-40'-29') bridge with a total length of 98 foot. The structure has a steel stringer superstructure with a concrete deck and asphalt pavement wearing surface. The bridge carries a 14 foot roadway with a horizontal clearance of 16 feet and has concrete curbs and a steel rail on both sides. The bridge crosses Brush Creek. (See Photos 1 and 2 - Exhibit 2, attached)

The abutments consist of timber piles, timber backing, and timber cap. The piers are timber pile bents with timber bracing. There is rock slope protection on the spill slope for the south abutment.

Condition.

The concrete deck and asphalt pavement wearing surface are in poor/failed condition as observed from above and below the deck. The asphalt pavement is missing, cracked, and has failing patches in many locations. The concrete deck has failed in several locations. There are two plates that cover two failed locations. However, the deck over the north pier is spalled with holes and exposed rebar and not plated. The overhangs on both sides are severely spalled with exposed and deteriorated rebar. The concrete deck in the east bay in the north span is severely cracked and deflected as observed from below. This area is also not plated. (See Photos 3 thru 8 - Exhibits 3,4, and 5, attached) The steel stringers and bearings are in fair to poor condition with heavy rust, corrosion, and loss of section particularly at the substructure units and where steel diaphragms frame into the beams. (See Photo 9 and Photo 10 - Exhibit 6, attached)

The timber abutments are in fair condition. The piles and cap have moderate splitting. The abutment backwalls and wingwalls have local rot and gaps with some loss of backfill material. The timber piers are

in fair to poor condition. There is moderate splitting in all piles. The piles are bowed, particularly in the south pier. The lateral bracing is partially missing in the south pier. (See Photos 11, 12, and 13 - Exhibits 7 and 8, attached.)

Overall, the structure is in poor condition and subsequently closed.

Recommendations

This report will address a repair option and a replacement option. Due to the extent of disrepair of the bridge, the repair option will include work that will require replacement of most of the bridge while still matching the existing width and length of the current bridge. These repairs will not improve the approved (undamaged) weight limit posting of the bridge since the steel stringer beams are the best candidate for salvage for the repair of the bridge, and these stringers likely dictate the weight limit of the bridge. A replacement bridge will enable the structure to handle two lanes of traffic and carry legal loads. Therefore, the following is recommended:

Bridge Repair: In order to restore the bridge to a functional condition and safely carry the previously posted limit of 12 tons, it is recommended that the entire bridge be removed and the steel stringers be rehabilitated for reuse. The piers are unstable or will become unstable due to the bow in the timber piles and lack of lateral support from the missing bracing. These piers should be replaced with steel pile trestle bents with additional steel channel sections for lateral stability. The abutment piles may be in fair condition but should be replaced with steel piles to assure that the piles have adequate bearing capacity. The repaired structure should not be dependent on the existing piles that have unknown deterioration and questionable capacity below the groundline. Wingwalls and backing should be replaced in the abutments also.

The steel stringers should have all the rust removed and the steel members cleaned for inspection. It is likely that several stringers will require repair to restore the cross-sectional area and thus the steel properties of the stringers. This can be accomplished by welding steel plates to the web and flanges of the deteriorated beams. The bearings for the stringers should be cleaned, inspected, and replaced if required. All structural steel will be painted after cleaning and repair.

The entire concrete deck and bridge rail will require removal and replacement. For safety, the bridge rail should be replaced with a crash-tested bridge rail.

The estimated cost for this repair is **\$430,000**.

Bridge Replacement: This bridge is estimated to be over 70 years old. It is a reasonable assumption that the existing bridge is beyond the usable life expected from a bridge of this obsolete type of construction. For a replacement, a prestressed concrete I-beam superstructure with reinforced concrete deck would be recommended for this location. The effective Flood Insurance Study indicates the 100-year frequency discharge would pass through the existing bridge opening with no overtopping of the bridge or roadway. The proposed bridge length is then estimated to match this capacity plus provide extra length to enable stable spill slopes in front of the abutments. This will result in a proposed bridge 110 feet to 120 feet in length. The bridge should carry a 24 foot wide roadway allowing for two lanes of traffic. The bridge should include standard steel thrie beam bridge rails or concrete safety barrier curbs. Recommended abutments would be reinforced concrete integral end bents on steel piles and the intermediate bents would

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be steel pile trestle bents with reinforced concrete caps. The spill slopes would be protected from scour and erosion with a rock blanket on top of a geotextile fabric.

The roadway approaches may require a raise in grade of about 2 to 3 feet for a length of approximately 200 feet on each approach in order to provide freeboard for drift passage during a 100-year flood event. The length of bridge and roadway improvements in this recommendation does not include realignment of the roadway and bridge to mitigate the horizontal curve on the north.

The estimated cost for this replacement is **\$720,000**. This total does not include additional costs for realignment of the bridge and roadway including Right -of-Way acquisition for a more desirable north approach as mentioned above.

Summary:

The **Bridge Replacement** option is recommended over the **Bridge Repair** option. Although initially more costly, the replacement could prove economical over time due to the longevity of the new crossing versus the shorter life span of the repaired structure. In addition, the City would most likely experience additional maintenance costs for the repaired structure in the future. A structure with a wider roadway and capacity to handle legal loads could potentially facilitate future development for this area. A new bridge would provide a better opportunity for the development to occur.

If you should have any questions, please contact us. We appreciate the opportunity to be of service to Parkville under the Bridge Engineering Assistance Program.

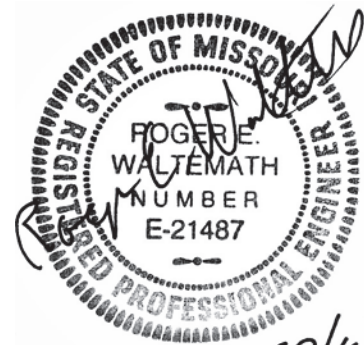
Sincerely,
Veenstra & Kimm, Inc.



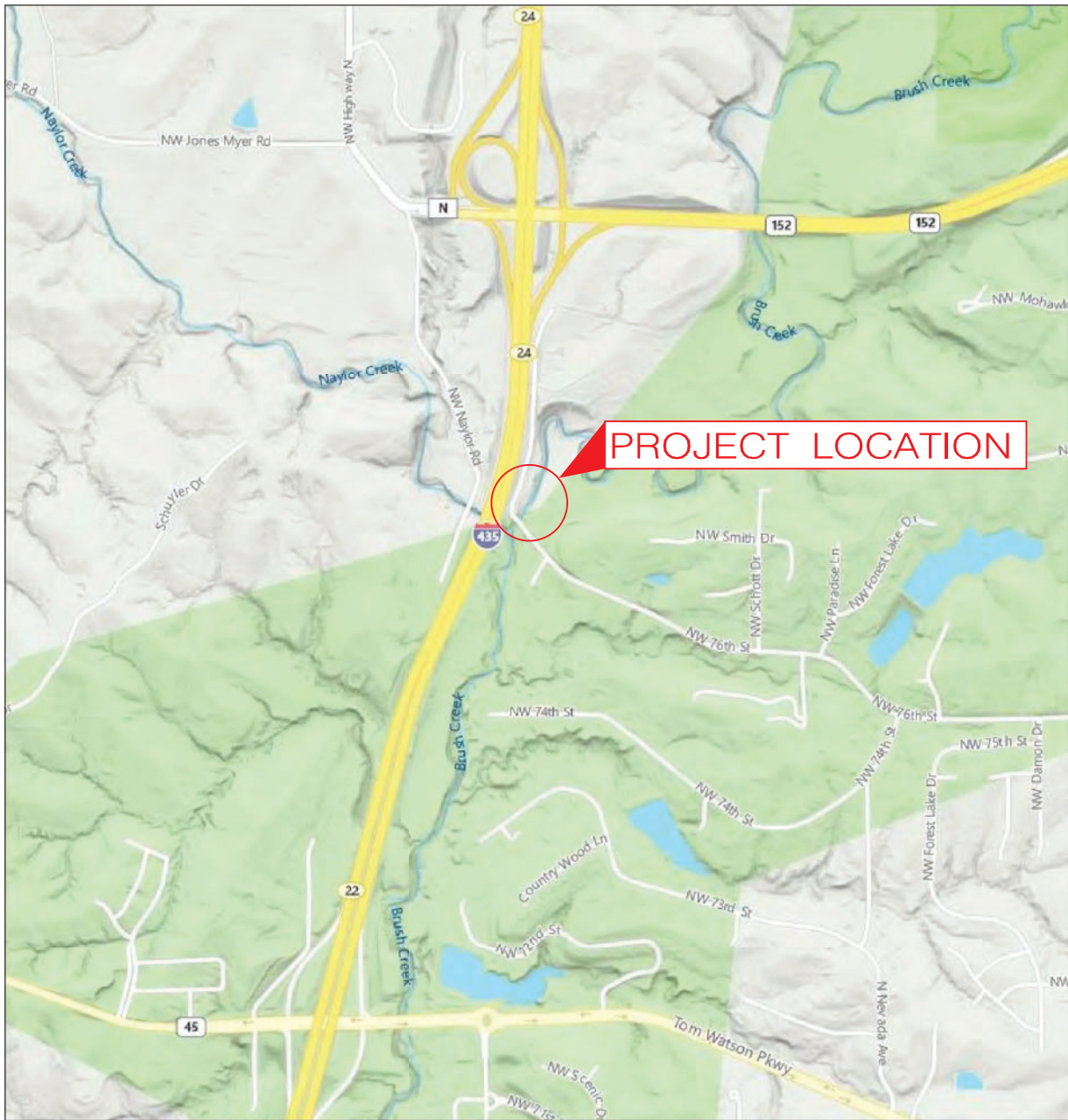
Roger E. Waltemath, P.E.

Encl.
(6431)

cc: Mr. Bryce Acton, Missouri Department of Transportation
Mr. Jamey Laughlin, Missouri Department of Transportation

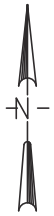


09/10/21



PROJECT LOCATION

PROJECT LOCATION



BRIDGE NO. 2220012
 PARKVILLE, MISSOURI

EXHIBIT 1

22TTAP-04



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Date 09-10-2021

PARKVILLE, MISSOURI
BRIDGE NO. 2220012



PHOTO 1 - NORTH APPROACH



PHOTO 2 - EAST FASCIA



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EXHIBIT 2
22TAP-04
BRIDGE NO. 2220012

PARKVILLE, MISSOURI
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PHOTO 3 - LOCAL DECK FAILURE (SOUTH SPAN, WEST BAY)



PHOTO 4 - DECK SPALL (OVER NORTH PIER)



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EXHIBIT 3
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PHOTO 5 - DECK DETERIORATION (EAST OVERHANG, MIDDLE SPAN)



PHOTO 6 - DECK DETERIORATION (EAST OVERHANG, MIDDLE SPAN)



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EXHIBIT 4
22TTAP-04
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PHOTO 7 - DECK DETERIORATION (WEST FASCIA, MIDDLE SPAN)



PHOTO 8 - DECK FAILURE (EAST BAY, NORTH SPAN)



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EXHIBIT 5
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PHOTO 9 - STRUCTURAL STEEL, RUST & CORROSION
(MIDDLE STRINGER, SOUTH END - NORTH SPAN)



PHOTO 10 - RUST, CORROSION
(EAST STRINGER, SOUTH END - NORTH SPAN)



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EXHIBIT 6
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PHOTO 11 - ROTTED AND WEATHERED TIMBER BACKWALL
(NORTH ABUTMENT)



PHOTO 12 - WEATHERED AND MISSING TIMBER BACKING
(NORTHWEST WINGWALL)



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EXHIBIT 7
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PHOTO 13 - BOWED, SPLIT PILES
MISSING BRACING
(SOUTH PIER)



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EXHIBIT 8
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