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July 3, 2018

Sarah J. Beimers, Manager
Government Programs and Compliance
Minnesota State Historic Preservation Office
Administration Building #203
50 Sherburne Ave.
St. Paul, MN 55155

RE: TH 74 Bridges (Br. 8592, 8593, 8594, and 8595) in Whitewater State Park, Winona County
MnDOT District 6 Project SP 8508-38
SHPO Number 2017-2036

Dear Ms. Beimers:

Our office is reviewing the above referenced undertaking pursuant to our FHWA-delegated responsibilities for compliance with Section 106 of the National Historic Preservation Act, as amended (36 CFR 800), and as per the terms of the applicable Programmatic Agreements between the FHWA and the Minnesota State Historic Preservation Office. The Section 106 Review fulfills MnDOT's responsibilities under the Minnesota Historic Sites Act (MS 138.665-.666); the Field Archaeology Act of Minnesota (MS 138.40); and the Private Cemeteries Act (MS 307.08, Subd. 9 and 10).

This letter is to continue Section 106 consultation with your office and to provide information about rehabilitation alternatives for four bridges on the southern end of the project that are contributing elements within the National Register listed Whitewater State Park Historic District. Bridges 8592, 8593, 8594, 8595 were constructed between 1936 and 1938 as part of an overall project to reconstruct TH 74 and to protect the roadway from ongoing erosion. Enclosed please find the historic bridge rehabilitation alternatives study for the four bridges in the historic district titled *Whitewater State Park Culverts Bridges 8592, 8593, 8594 & 8595 TH 74 over Drainage Channels Condition and Rehabilitation Study* (Study). It was completed in June 2018 by LHB and Gemini Research for MnDOT.

As you know from our previous letter, the undertaking includes two non-historic bridges, Bridges 5835 and 5836, which lie outside and to the north of the historic district and are not individually eligible for the NRHP. MnDOT is currently studying rehabilitation and replacement options for Bridges 5835 and 5836 and a separate report will be prepared for those bridges. If the rehabilitation or replacement of the two non-historic bridges has the potential to impact to other historic properties, we will consult with your office on that in a separate submittal. The two northern bridges are not included in this report and will not be discussed in this letter.

In a letter dated January 9, 2018, our office initiated consultation; provided a map of the Area of Potential Effects (APE) for direct and indirect effects; identified the architecture-history properties; indicated that it is unlikely the project will impact intact significant archaeological resources because construction activity will be confined to previously disturbed areas; provided updated inventory forms; and indicated that MnDOT along with its engineering consultant LHB and historian Gemini Research are preparing a historic bridge rehabilitation study for the four bridges in the historic district. Enclosed with that letter were draft excerpts of the in-progress rehabilitation study to give you an idea of the condition of the bridges and the scope of the rehabilitation alternatives being considered.

Your reply of February 7, 2018, concurred with the APE, with the identification of architecture-history properties, and with our recommendation that Bridges 8592, 8593, 8594, and 8595 are contributing resources in the historic district and not individually eligible for the NRHP. You asked some questions about potential rehabilitation that are answered below.

Your February 7th letter also recommended we confirm with MnDNR Parks and Trails archaeologists that archaeological survey is not needed. Dave Radford, MnDNR Parks and Trails Archaeologist, in emails to Richard Augustin, Senior Engineer and Project Manager of MnDOT District 6, dated March 15 and 20, 2018, indicated the APE for direct effects for Bridges 8592, 8593, 8594, and 8595 would have very low archaeological potential for intact sites. He stated that he has walked through the area and the steepness of the grade and past flash flooding have disturbed the soils such that intact resources are very unlikely.

Historic Bridge Rehabilitation Alternatives Study for Bridges 8592, 8593, 8594, and 8595

The enclosed Study describes the bridges and summarizes their history and significance as well as current condition. An overview description of the bridges is provided on page 14 of the Study. The character-defining features of the bridges and of the historic district are listed on page 16 of the Study. The Study analyzes the Bridges' condition and describes and evaluates a range of rehabilitation alternatives. Because the bridges are similar in design and condition, the rehabilitation strategy is generally similar for all. The report includes a summary of each alternative's consistency with the Secretary of the Interior's Rehabilitation Standards and concludes with a recommendation of rehabilitation alternatives for each bridge to be carried forward to the NEPA document.

History and Significance

Whitewater State Park CCC/WPA/Rustic Style Historic Resources, a 563-acre historic district, was listed in the NRHP in 1989. The district was listed under Criterion A (broad patterns of history) and Criterion C (design and construction). The areas of significance are Architecture, Landscape Architecture, Recreation, and Politics/Government and the period of significance is 1934-1941. The historic district includes most of the buildings and structures designed by the National Park Service (NPS) and built by the WPA and CCC during the New Deal development of the park, including the four bridges. See pages 10-15 of the Study for a summary of the history and significance of the historic district and the bridges.

Bridges 8592, 8593, 8594, and 8595 were designed by the NPS, in collaboration with the Minnesota Department of Highways and the Minnesota Department of Conservation. They were designed in the NPS Rustic Style. They were built in 1936 by enrollees of the park's WPA Transient Camp using limestone from a quarry located within the park. The bridges all have corrugated metal multi-plate arches manufactured by Armco. The only original plan sheet known to exist is reproduced on page 196 of the Study.

Description and Character-Defining Features

The four bridges are located near the southwestern corner of the historic district. (See the maps on pages 6 and 195 of the Study.) This portion of the historic district includes the south entrance to the park along TH 74 but no buildings, use areas, or designated hiking trails. This part of the road is flanked on both sides by steep forested bluffs with occasional outcrops of exposed dolomite. Roadside ditches, once stone-lined, collect water from the surrounding hillsides. The flow switches back and forth under the highway through the stone culverts northward toward the Middle Fork of the Whitewater River in the center of the park. The ditches and culverts are usually dry and typically only carry water in the spring and during heavy rain events.

Three of the bridges (8593, 8594, and 8595) have extended wingwalls that create unusual 6-foot-deep limestone flumes that help guide the fast-moving water into and out of the culverts (see photos on pages 44 of the Study for an example). A sketch on page 199 of the Study shows the as-built configuration of the bridges with their flumes. As the sketch indicates, the designers and builders adapted the original plans during construction in response to existing topography.

Alterations to the bridges have been fairly minor. The stone floors have been covered with a poured concrete overlay. Concrete caps were added to the top of the stone knee walls. The upper portion of the roadbed has been widened and raised in elevation by several inches. To help support the widened roadbed, the east headwalls of Bridges 8593 and 8594 were supplemented with steel beams around the 1970s (see photos on pages 32 and 40). Modern guardrail has been installed on both sides of the road at Bridges 8592 and 8593 and on the east side at Bridge 8594.

In the 1930s, the roadbed itself was reconstructed as part of the development of the park with labor provided by the WPA. It is still on its original alignment and has been surfaced with bituminous since the 1930s. The upper part of the roadway has been increased in width and elevation as noted above. Guardrail installed in the 1930s was likely post and cable style. It was eventually replaced with modern post and beam guardrail. The existing guardrail in the APE is about 385 feet long on the west side of the road and about 770 feet long on the east side (see Figure 1 below).

Bridge Condition

The bridges are in fair to poor condition. The stone masonry headwalls, wingwalls and knee walls are in various stages of deterioration with both stones and mortar joints cracked, damaged, or missing. Water is flowing beneath most of the floors which is leading to erosion and stress on the knee wall foundations. Over time, widening and raising the roadway by several inches resulted in steep inslopes prone to erosion. The changes also increased surcharge loading on the headwalls and wingwalls leading to their accelerated deterioration. The grade raise was significant enough to require that the steel I-beams be added to the east headwalls of Bridges 8593 and 8594. To support the steep slopes, the beams were bolted to the top of the multi-plate arches causing the arch plates to corrode. The beams themselves are now severely corroded.

Alternatives Recommended to be Carried Forward to the NEPA Document

To facilitate your review, the key points of the rehabilitation alternative recommended to be carried forward in the NEPA process for each bridge are outlined below. The alternatives are similar but the details vary slightly by bridge as noted. References to specific pages in the Rehabilitation Study are provided below and the questions raised in your February 7, 2018, letter are answered.

Within the NEPA document a 'No Build' alternative must be carried. Therefore Alternative 1 will be carried forward for each culvert. Only three alternative types fully meet the project's primary need of improving the bridge condition. Those alternatives are 'Rehabilitate and Extend Height of Inlet Walls with Structural Walls and Stone Masonry', 'Rehabilitate and Place Structural Wall between Inlet Stone Headwall and Roadway', and 'Rehabilitate and Reinforce Soil Slopes.' Of these three alternative types, only 'Rehabilitate and Reinforce Soil Slopes' preserves the integrity of the historic structure. Therefore, the alternative recommended to move forward to the NEPA document for each culvert is.

- Bridge 8592 – Alternative 1 & Alternative 2E
- Bridge 8593 – Alternative 1 & Alternative 2
- Bridge 8594 – Alternative 1 & Alternative 2
- Bridge 8595 – Alternative 1 & Alternative 2C

Bridge 8592

See pages 19-26 of the Study for photos and a condition assessment. The recommended rehabilitation is Alternative 2/2E on page 65. See also pages 60-64, 68-69, and 87. The recommended work items consist of:

Basic Rehabilitation

- The headwalls and wingwalls would be repaired by selectively replacing cracked and unsound stones, reconstructing severely deteriorated regions, and repointing.
- The knee walls would be repaired by selectively repairing the concrete cap, replacing cracked and unsound stones, and repointing.
- The stone floor would be repointed (or reconstructed as needed) and the non-historic concrete overlay replaced, similar to existing, with integrally colored concrete to help the new floor visually blend.
 - Restoring the stone floor may be preferable from a preservation standpoint but covering the stone with concrete is considered a necessary trade-off for durability. The floor is an element especially vulnerable to scour and erosion from the high-velocity water, and soundness of the floor is essential to the bridge's longevity.
- All stonework would be documented before rehabilitation begins to help ensure that the repaired stonework matches the historic stonework as closely as possible. Reconstruction would only occur in select areas. Replacement stones, mortar, and mortar joint tooling would match the original. Mockups and other safeguards would be used to insure historic integrity is preserved.

Slope Reinforcement

- To control erosion, a geo-grid soil reinforcement system would be installed at the east end of the culvert (see sketch on page 87 of the Study). Reinforcement is not needed at the west end.
 - Your February 7th letter expressed concern that the erosion and headwall loading due to the elevated roadway be resolved in a way that preserves the historic integrity of the bridges. Page 60 of the Study explains that lowering the profile of the road was explored but eliminated from consideration. The geo-grid reinforcement system would be hidden and would not require alteration of the culvert.

Guardrail

- The guardrail, which is on both sides of the road, would be replaced with new guardrail that meets current standards. It would be 3 inches taller than existing.
 - Because of the geo-grid soil reinforcement at the east end, the east guardrail will likely need a buried concrete moment slab or similar anchoring scheme. The slab would not extend above grade.

Bridge 8593

See pages 27-34 of the Study for photos and a condition assessment. The recommended rehabilitation is Alternative 2 on page 91. See also pages 60-64 and 95-97. The recommended work items consist of:

Basic Rehabilitation

- Same as Bridge 8592 above.

Southwest Flume Wall Extension

- The southwest wingwall (i.e., the wall on the roadway side of the west flume) would be lengthened by up to 10 feet to mitigate severe inslope erosion. (See the upper-left photo on page 28 and the center-left photo on page 32.) It is believed there was historically a dry-stacked stone wall at this location, similar to the existing dry-laid wall in the drainage ditch southeast of Bridge 8594 (see Figure 2 below). Reconstructing the dry-laid wall would not provide sufficient durability, and using loose riprap would be infeasible given the steep grade. The proposed wall addition would be about 5 feet tall, tapering to about 2 feet at its end. Modest in size, it would increase the wall area of the flume by about 2.5%. It would be made of mortared stone that matches the existing masonry, and would be set back about 3 inches from the existing wall to differentiate it. Other materials that would provide more differentiation such as contrasting stone and cast-in-place concrete were considered but it was determined they would be visually distracting and detrimental to one of the bridge's most important characteristics, the way it harmonizes with its setting.

Multi-Plate Arch

- The I-beam bolted to the east end of the arch would be removed, reversing this alteration.
- Two corroded partial plate sections (where the I-beam was attached) would be removed and replaced (see pages 61-62 in the Study, as well as Figure 3 below). Your February 7th letter expressed concern that plate replacement may damage too much historic fabric. As Figure 3 indicates, the affected area is located at the end of the arch and is modest in size (the plates are not full size due to the skew). The plates would be unbolted at existing seams. The process would not damage the rest of the arch and the repairs should be fairly inconspicuous. The surface of the new metal will initially be brighter than the existing metal, but the culvert sometimes fills completely with muddy water so the new metal will eventually be dulled.

Slope Reinforcement

- Same as Bridge 8592 except that the geo-grid soil reinforcement would be installed at both ends of the culvert (see sketches on pages 96-97 of the Study).

Guardrail

- Same as Bridge 8592 except that moment slabs would be required under both guardrails due to the geo-grid.

Bridge 8594

See pages 35-42 of the Study for photos and a condition assessment. The recommended rehabilitation is Alternative 2 on page 119. See also pages 60-64 and 123-125. The recommended work items consist of:

Basic Rehabilitation

- Same as Bridge 8592 above.
- The missing portion of the west flume would be reconstructed (see "washed away" in the sketch on page 199 of the Study).

Multi-Plate Arch

- Same as Bridge 8593 above.

Slope Reinforcement

- Same as Bridge 8592 above with geo-grid at both ends of the bridge (see sketches on pages 123-124).

Guardrail

- Same as Bridge 8592 except that there is guardrail on the east side of the road only. (None is required on the west side at this location.) The new guardrail would need a moment slab or similar anchoring system because of the geo-grid on the east inslope.

Bridge 8595

See pages 43-50 of the Study for photos and a condition assessment. The recommended rehabilitation is Alternative 2/2C on page 149. See also pages 60-64, 153-154, and 166-167. The recommended work items consist of:

Basic Rehabilitation

- Same as Bridge 8592 above.

Southwest Flume Wall Extension

- Same as Bridge 8593 above except that the wall extension would be a maximum of 6 feet long (see the upper-left photos on pages 44 and 48 of the Study for the location).

Slope Reinforcement

- Same as Bridge 8592 above with geo-grid at both ends of the bridge (see sketches on pages 166-167).

Guardrail

- There is no guardrail at Bridge 8595 and none would be needed.

Roadway Segment

See pages 25, 33, and 41 in the Study for photos.

- Excavation would occur over the culvert ends. The road would be repaved with bituminous within the limits of the APE for direct effects (see Figure 1 below). The width of the pavement would be the same as existing.
- As noted above, the existing guardrail would be replaced with guardrail that is 3 inches taller. The guardrail would need a moment slab or similar anchoring system in locations where the geo-grid soil reinforcement would also be installed.
- There would no significant change to roadway signage.

Consistency with the Secretary of the Interior's Standards

The rehabilitation alternative recommended to be carried forward for each bridge is consistent with Secretary of the Interior's Rehabilitation Standards and would not diminish the bridge's historic integrity. Taken together, the project would not diminish the historic integrity of the Whitewater State Park CCC/WPA/Rustic Style Historic Resources historic district. Historic character would be retained and preserved, meeting Standard 1. The removal of distinctive materials and the alteration of characteristic features, spaces, and spatial relationships would be avoided. Per Standard 5, distinctive materials, features, finishes, construction techniques, and craftsmanship would be preserved. Consistent with Standard 6, deteriorated historic features would be repaired rather than replaced, and, if unrepairable, historic materials

and features would be replaced in-kind. Per Standard 7, treatments that damage historic materials would not be used. Consistent with Standard 9, new additions would not destroy characteristic historic materials, features, and spatial relationships; would be differentiated from the old; and would be compatible with historic materials and features in size, scale, proportion, and massing. Per Standard 10, if new additions were removed in the future the essential form and integrity of the historic property would be unimpaired.

It is the determination of this office that the rehabilitation alternatives recommended to be carried forward in the NEPA process in the enclosed Rehabilitation Study will have **No Adverse Effects** to Bridges 8592, 8593, 8594 and 8595 or to the Whitewater State Park CCC/WPA/Rustic Style Historic Resources historic district.

At this time we are requesting your comments on our recommended alternatives and our determination. . We look forward to consulting with you as the project proceeds. As always, we appreciate your timely response to this submittal within 30 days of receipt of this letter and enclosure. Please do not hesitate to contact me if you have any questions or would like more information.

Sincerely,

A handwritten signature in cursive script that reads "Linda Pate".

Linda Pate, Historian
Cultural Resources Unit
Minnesota Department of Transportation

Enclosure: *Whitewater State Park Culverts Bridges 8592, 8593, 8594 & 8595 TH 74 over Drainage Channels Condition and Rehabilitation Study (June 2018)*

cc: Phil Forst, FHWA
Abbi Ginsburg, FHWA
Richard Augustin, MnDOT District 6
Dave Radford, MnDNR Parks and Trails
Joe Litman, LHB
Sue Granger, Gemini Research

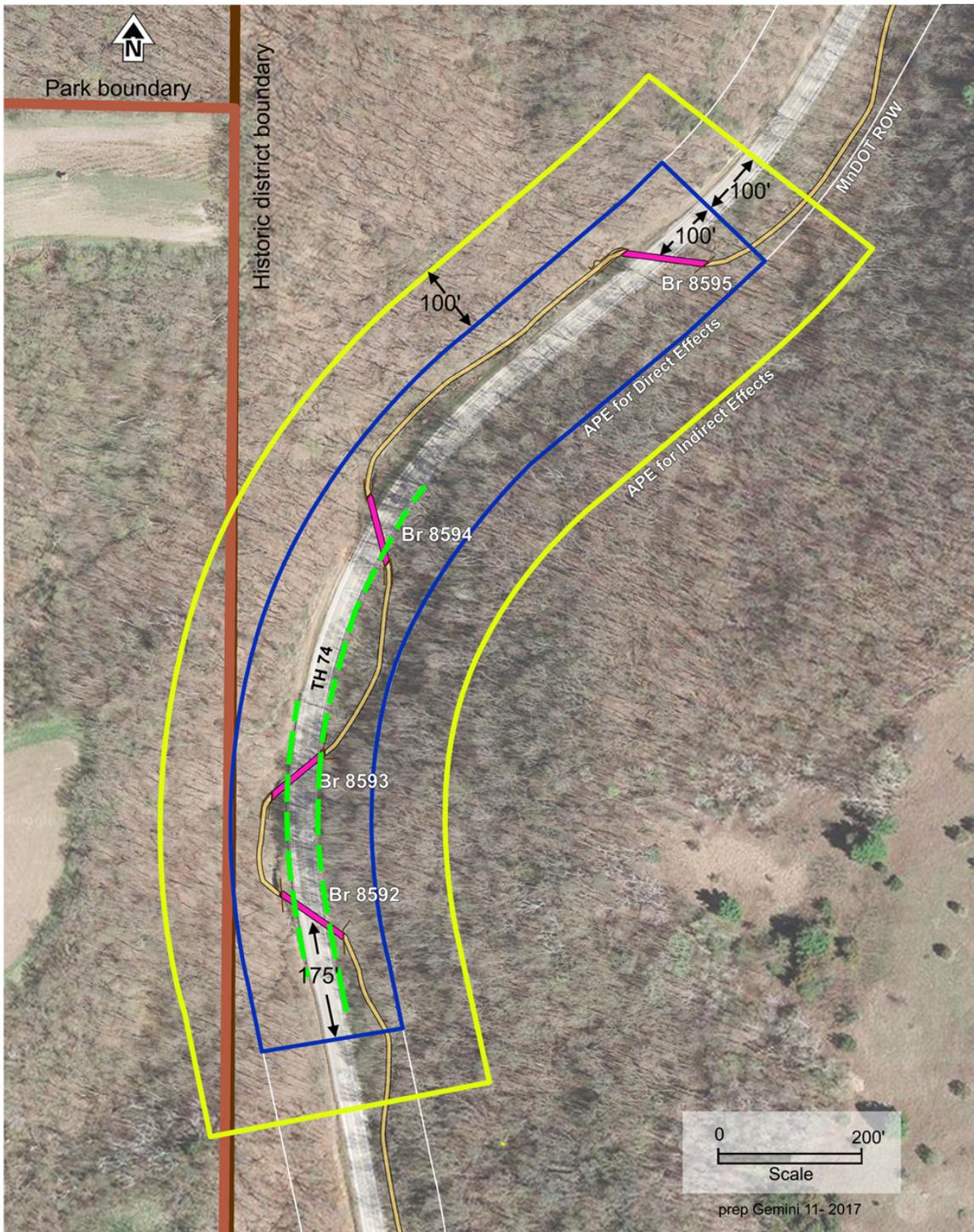


Figure 1. The dashed line on this APE map shows the approximate location of the existing guardrail. It is about 385 feet long on the west side of the road and about 770 feet long on the east side. The project would replace the guardrail, in the same location as existing, with an updated version that meets current design standards. The new guardrail would be 3 inches taller than it is today.



Figure 2. Surviving segment of dry-laid wall lining the drainage ditch southeast of the east headwall of Bridge 8594. Similar walls probably lined other parts of the ditches but have washed away.



Figure 3. Sections of the multi-plate arches at the east ends of Bridges 8593 and 8594 are corroded where the steel I-beams were attached in the 1970s. As outlined in this photo, sections of the corrugated plates would be unbolted (at existing seams) and replaced. For both bridges the replacement would likely involve two partial plates. (The plates are partial because the skew.) The corrugation pattern of the new plates is not an exact match, so gaps at the plate edges would be unobtrusively sealed and a concrete “collar” cast on the hidden (buried) side of the repair area.