

Ghiglione Bridge Replacement

Cultural Resource Report No. 2019-DENA-010

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Abstract

Denali National Park and Preserve (DENA) is considering an undertaking to replace the Ghiglione Bridge located at mile post 41.9 of the Denali Park Road. The bridge, the third to be located over Ghiglione creek, was constructed from 1958-1960 and is a contributing feature of the Park Road Historic District. The current bridge would be replaced with a concrete and steel curved bridge with wooden rails. The new bridge would be located 70 feet north of the current bridge and closer to the original alignment.

As designed the project would adversely affect the Park Road Historic District. It is recommended that Denali National Park and Preserve approach National Historic Preservation Act, Section 106, consultation under 36 CFR Part 800.5(1) (a) “Adverse Effect”.

(Cover: Ghiglione Bridge looking west, 2018)

1 Description of Undertaking

Denali National Park and Preserve (DENA) and the Federal Highways Administration (Fed Hwy) is considering an undertaking to replace the Ghiglione Bridge located at mile post 41.9 of the Denali Park Road (Park road). The bridge, constructed between 1958-1960 spans the deep, well-defined Ghiglione Creek and provides crucial access to Toklat Operations Center, Eielson Visitor Center, Kantishna, and to all road accessible facilities west for nearly fifty miles.

The bridge needs to be replaced due to it being structurally unsound. Seismic evaluations for the last 20 years have shown progressively more damage on the bridge with the finding in 2015 of the bridge being seismically deficient and presenting a safety hazard. DENA is pursuing a replacement rather than repair as repair costs would be close to replacement costs and because the weight limit of the bridge needs to be higher to accommodate current traffic.

Proposed Bridge Design:

- Curved bridge located 70ft north of current alignment.
- Treated timber bridge rail with weathering steel posts.
- Bridge deck would be cast in place concrete and stained after casting to produce darker tone.
- Weathered steel beams
- Concrete pier caps and abutments, stained to produce darker tone.
- Weathered steel pipe piles.

After the proposed bridge would be replaced the existing bridge would be demolished and the earthen abutments on the east and west ends of the bridge would be contoured to blend with the landscape. The project would also include armoring the existing north ditches on either end of the bridge with riprap to improve drainage in the area.

2 Legal location for the undertaking and Local Environment

The legal location of the undertaking is Section 6 in T16S and R11W within Quadrangle Healy C-6 and the Fairbanks Meridian. The project area, located at an elevation of approximately 3,200 ft., lies within the northern boreal forest biome (taiga).

3 Area of Potential Effect (APE)

The Area of Potential Effect (APE) encompasses 3.35 acres and is composed of a 25ft buffer around the proposed construction limits.

4 Results of Inventory and Records Check

DENA cultural resource records and GIS data were reviewed and the APE and surrounding area was surveyed by the park archeology crew in the summer of 2017. Pedestrian survey was completed over the area and shovel tests were placed on the top of two terraces to the west and east of the creek; one site was found during this survey (HEA-690). HEA-690, which is composed of dimensional lumber and metal barrels, is outside of the APE and will not be affected by the project. The proposed APE does contain the Denali Park Road Historic District and Cultural Landscape, of which the Ghiglione Bridge is a contributing feature.

4.2 Denali Park Road (HEA-429/ MMK-171)

The 92 mile Denali Park Road runs east to west in the foothills north of the Alaska Range in Denali National Park and Preserve. The road extends from milepost 237.3 of the George Parks Highway across several low passes and glacier-fed rivers to the historic mining district of Kantishna, which was incorporated into the park by the Alaska National Interest Lands Conservation Act in 1980. The road was originally constructed from 1922 to 1938 by the Alaska Road Commission (ARC) using NPA funds appropriated by Congress. The ARC and the NPS collaborated on the road design. Two sections of the current road are excluded from the historic district: the altered and rerouted entrance section and the final section of road paralleling the Kantishna airstrip that was constructed in 2002. The road is historically significant for its association with the period of scenic road development in national parks in the 1920s and 1930s, as well as for its association with the Mission 66 park development program in the 1950s and 1960s (Criterion A). The road is also a rustic example of landscape engineering combining NPS aesthetic road design principles with the ARC's experience constructing roads in northern environments (Criterion C) (Johnson 2017).

The areas of significance are Entertainment/Recreation and Transportation for its relation to automobile tourism and Landscape Architecture for its aesthetically oriented design. The period of significance begins in 1922, when the route was originally brushed. It extends to 1972, when the shuttle bus system was implemented on the road. The road was designed to flow and blend with the landscape and a sinuous route over hills and valleys is one of its important features.

5 Recommendations

Multiple designs (including a large culvert and a straight bridge) were considered as replacements for the existing bridge. DENA chose the current design based on a desire to retain the rustic feel of the road experience. The proposed design takes into account the historic design intent of the original NPS planners and designers of the road by following a sinuous path that emphasizes the natural dramatic terrain. The proposed low profile bridge with its wooden rails

was chosen in part as it will reduce the visual impact on the natural environment and enhance the natural views and vistas of the park landscape. The development of this design considered both the short term and long term impacts on the park visual experience and operations as well.

Below are the recommendations for new bridges from the Park Road Cultural Landscape Report (CLR) (Mathews 2019:326-8) and how the proposed replacement bridge fits in these recommendations:

- New bridges should be returned to their historic setting, alignment, and/or curvature when possible.
 - While not completely on the original alignment, the proposed bridge would be close to the original alignment (due to vehicle length increases the original alignment is not feasible to accommodate modern traffic).
- Use the bridges historic span and width and construction details as guidelines for the new bridge design.
 - The proposed bridge would be close in span to the original bridge; the width of the bridge is larger than the original bridge to accommodate modern large traffic.
- Avoid creating a false sense of what is historic; do not replicate the exact form of a historic bridge, rather reflect its character and have the replacement bridge blending into the surrounding natural and wild landscape in a way similar to the historic bridges and keep with the rustic design character of the Park Road.
 - The use of concrete, steel, and wood elements would help distinguish the bridge from being confused for a historic bridge.
- Use compatible but distinct, replacement materials.
 - As designed, the weathered Steel, painted concrete, and wood are all compatible replacement materials
- Select construction materials with lifespan in mind to minimize need for more frequent replacement.
 - The structural elements of the bridge (steel and concrete) would have an adequate lifespan to avoid more frequent replacement.
- Potentially reduce the footprint for some bridges as long as they can accommodate large equipment to reflect historic era character rated to narrow road sections. Provide pullouts at either end of single lane bridges where drivers can wait for oncoming traffic to clear.
 - There are two pullout areas in existence on either end of the current bridge, these would be retained to assist in line of site for traffic. The footprint of the proposed bridge is the minimum necessary to accommodate modern traffic.
- Design the approach distance to bridges with as much care as the bridge itself, with attention to how they blend into the natural landscape.
 - The approaches to the bridge takes into account the natural setting and would blend with the cultural landscape.
- When possible, ensure that elements needed for safety don't detract from the historic character of the road and its setting.
 - As designed, the railing on the bridge would be minimal and compatible with the cultural landscape.
- If bridge construction materials are bright or have a reflective quality, consider painting those elements darker to create less of a visual impact.

- The proposed bridge would have painted concrete and weathered steel to minimize any potential visual impact.

The Park Road CLR also provides the following specific recommendations for the Ghiglione Bridge (Mathews 2019: 335-6):

- The new bridge should use natural material such as local timber especially on the more visible portions of the bridge. Contemporary materials, such as concrete and steel can be used, but should be concealed as much as possible.
 - The proposed bridge would have timber railings and the concrete and steel will be painted and weathered to blend with the landscape.
- In addition to the curved alignment, character-defining details of the historic bridge should be considered as inspirations for the new design the minimal amount of railing and edging. Though it is understandable that a railing will be needed on the new bridge, efforts to minimize its height and scale would help reflect the historic character of the historic bridge's minimal design presence.
 - The proposed railings are minimal in design and height.
- Similarly, the position of this bridge on a tight curve along the road makes it difficult to consider designing a lone-lane bridge that would mimic the width of the historic bridge since that would necessitate designing pullouts on both sides of the bridge for vehicles to pause if another vehicle is approaching from the other direction. However, minimizing the width and profile of the new bridge would help reflect the historic bridge's minimal design presence.
 - No new pullouts would be constructed as a result of this project and as designed the bridge is in keeping with the historic bridge's minimal design presence.

The proposed bridge will be simple in appearance, of a proper scale for the location on the road, sinuous, and will blend in with the natural landscape. Moving the alignment further up the drainage and closer to the original alignment will be less obtrusive on the views to and from the park road due to the terraces on the east and west ends of the creek.

By keeping a curved narrow bridge the rustic character of the park road will be retained at this location; vehicles will have to maintain a low speed to safely cross the bridge which will aid in the rustic feel of the road. The proposed bridge will have a minimal profile and will blend with the natural setting while providing for the safety of the visitors and facilitating the continued use of the road as a means for tourism in DENA. The removal of this contributing feature to the Road historic district will result in an adverse effect.

Based on our review, as designed the project will adversely affect the Park Road's integrity which qualifies this property for inclusion within *the National Register of Historic Places*. It is recommended that Denali National Park and Preserve approach National Historic Preservation Act, Section 106, consultation under 36 CFR Part 800.5(1) (a) "Adverse Effect".

6 Maps and Figures

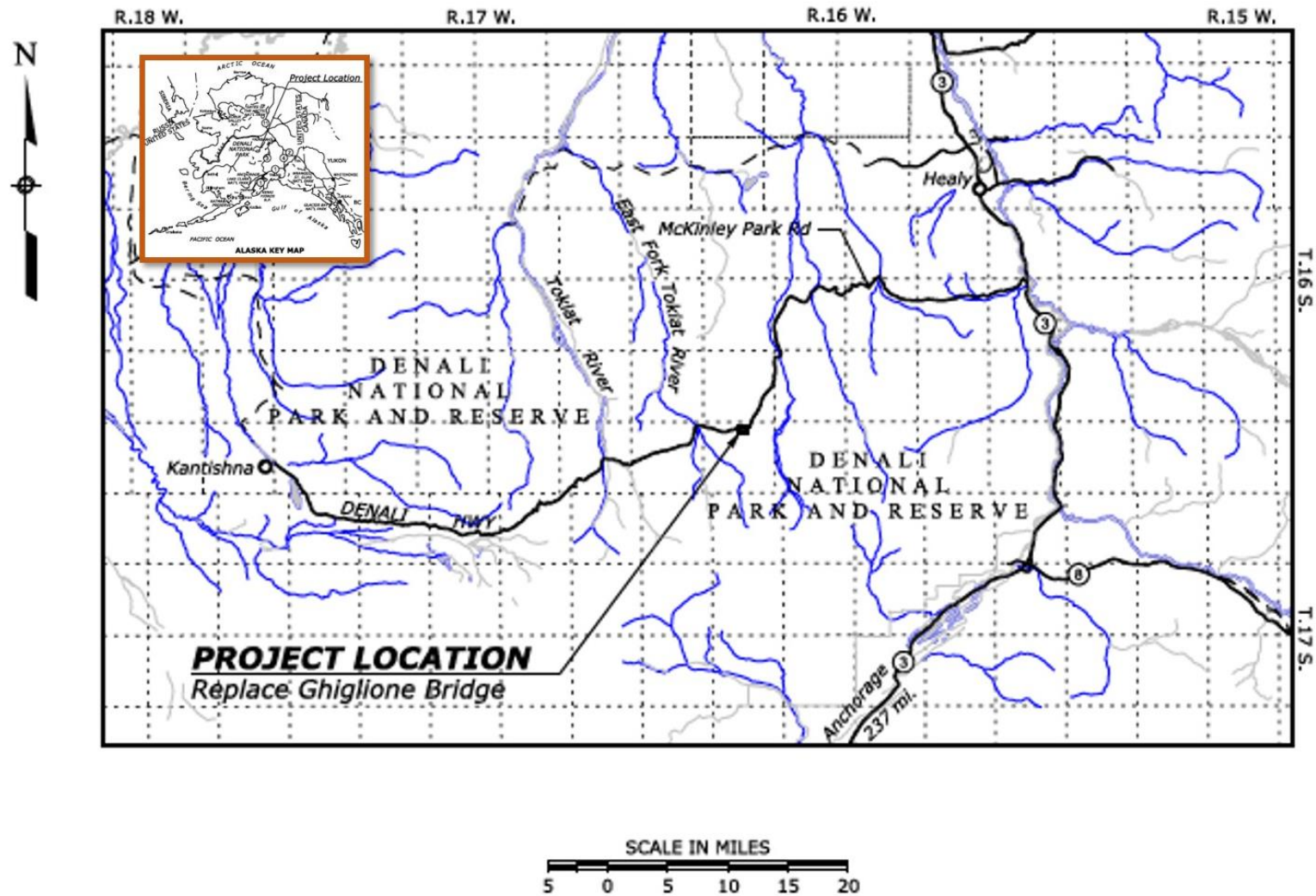


Figure 1-Project Location Overview

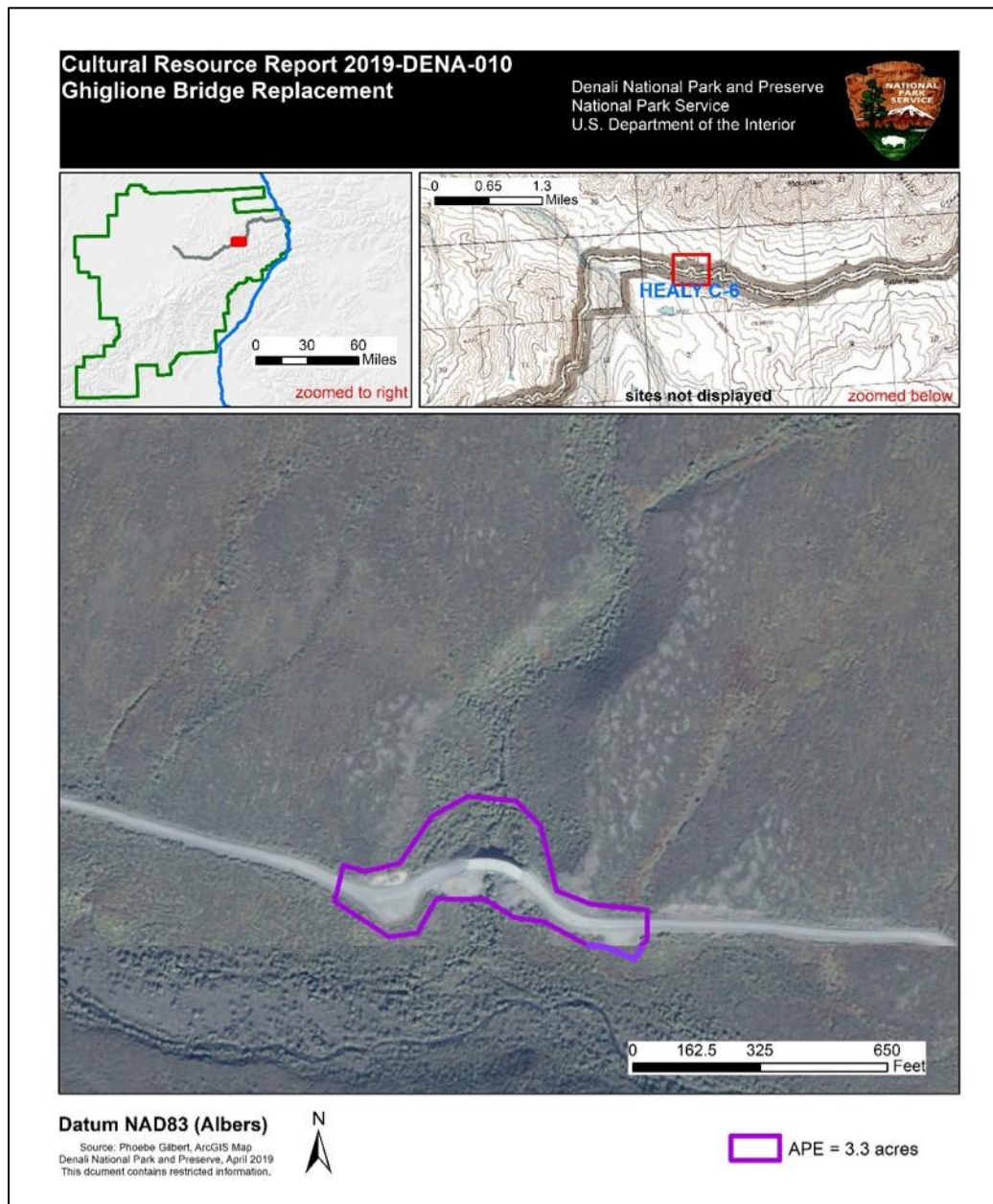


Figure 2- APE (3.35 acres)



Figure 3- Second bridge under construction, 1938 (NPS Photo)

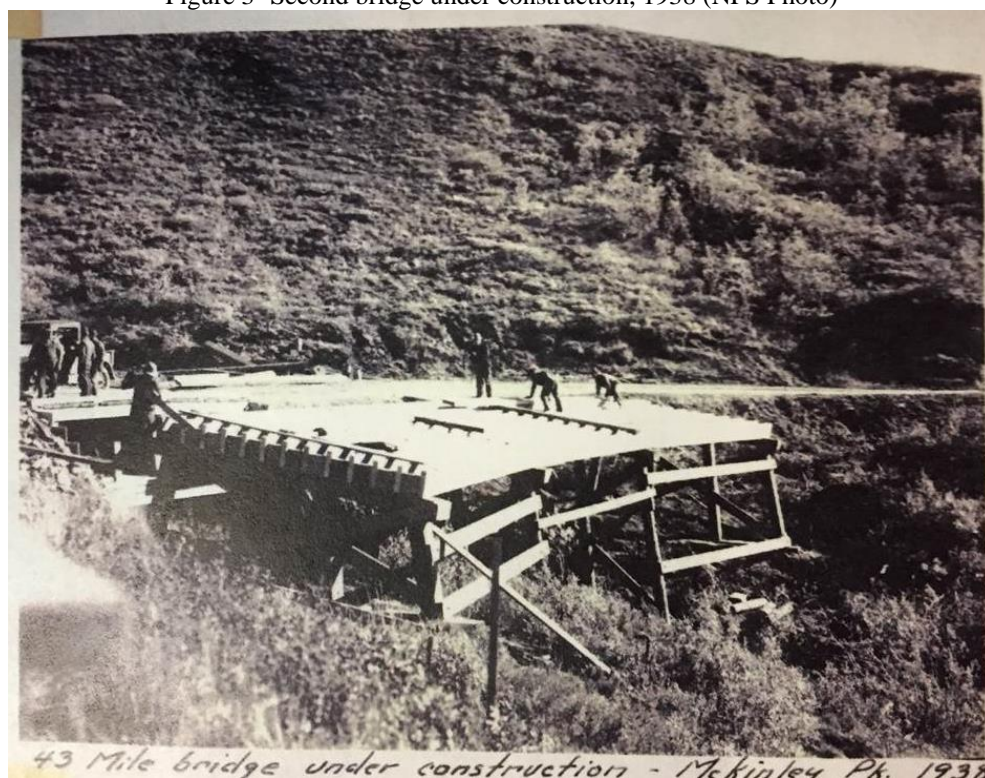


Figure 4- Construction of second bridge (mile post in photo is incorrect), 1938 (NPS Photo).



Figure 5- Existing bridge after completion of construction looking south, 1959 (NPS photo).



Figure 6- Existing bridge after completion of construction looking west, 1960 (NPS Photo).



Figure 7- Existing bridge after completion of construction, looking south. 1959 (NPS Photo).



Figure 8- Existing bridge looking west, 2015 (Fed Hwy Photo).



Figure 9- Existing bridge looking southeast, 2015 (Fed Hwy Photo).



Figure 10- Deterioration of joint material in north curb joint, 2015 (Fed Hwy Photo).



Figure 11- Spalling and cracking in south curb on east end of bridge, 2015 (Fed Hwy Photo).



Figure 12- Spalling and delamination of outside face of south curb at east abutment, 2015 (Fed Hwy Photo).



Figure 13- Sheared anchor bolt at west abutment, Beam #2, 2015 (Fed Hwy Photo).



Figure 14- Sheared anchor bolt at west abutment, Beam #3, 2015 (Fed Hwy Photo).



Figure 15- Vertical crack in center of east abutment between Beams #2 and #3, 2015 (Fed Hwy Photo).

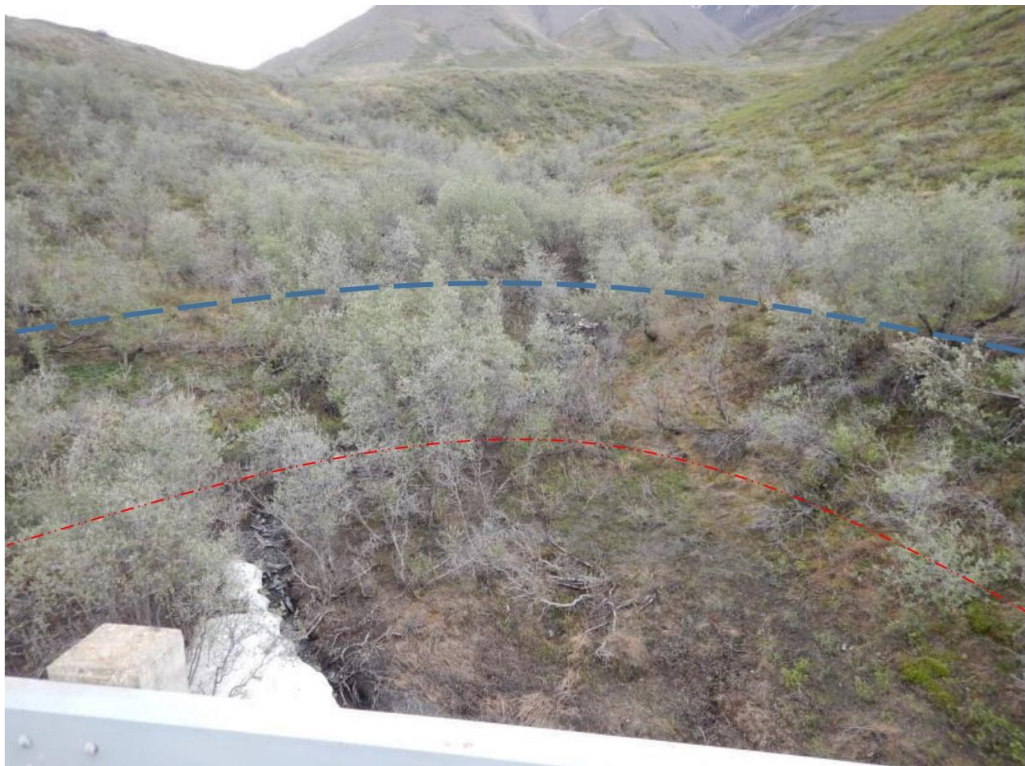


Figure 16- View from bridge looking upstream (north). Blue dashed line is original road route, red dashed line is approximate location of proposed bridge alignment, 2019 (NPS Photo).



Figure 17- Existing bridge looking west, 2017. Blue line is original alignment, red line is approximate location of proposed alignment (NPS Photo).

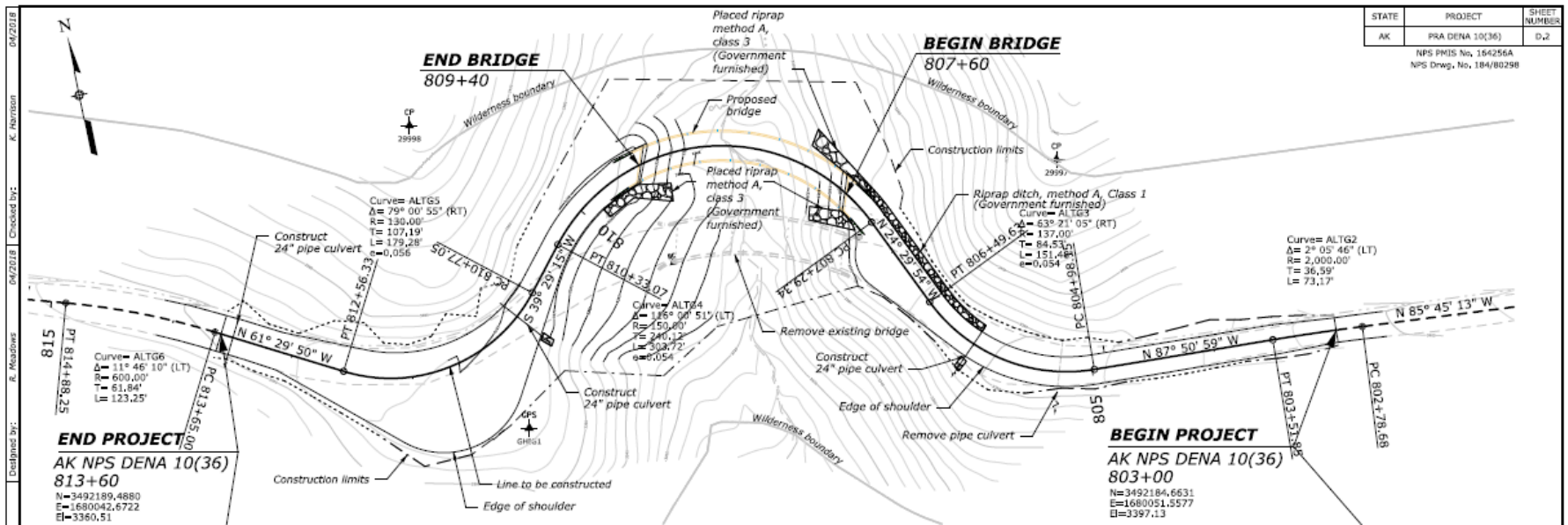
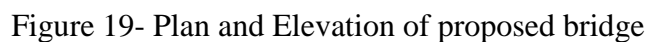


Figure 18- Overview of proposed bridge



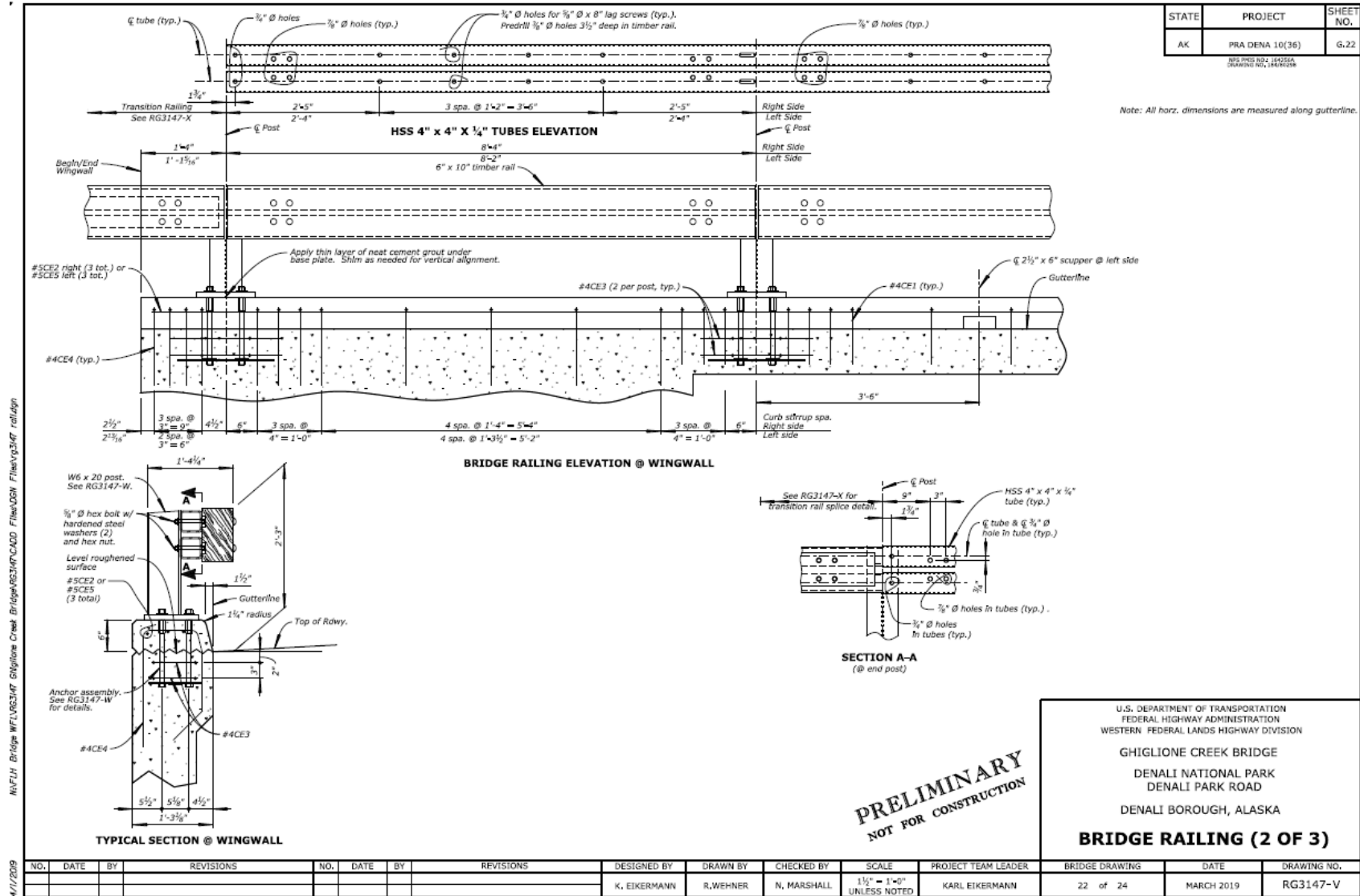


Figure 20- Detail of proposed railing.

7 References

NPS

2016a Denali Park Road Historic District DRAFT National Register of Historic Places Registration Form., edited by U. S. D. o. t. Interior. National Park Service, Denali National Park and Preserve.

2016b Value Analysis DRAFT: Ghiglione Bridge Replacement, edited by U. S. D. o. t. Interior. National Park Service, Denali National Park and Preserve.

Mathews, L., Melnick, R.Z., Edmonds, R., San Filippo, E., Murthy, M.

2019 Cultural Landscape Report for Mount McKinley National Park Road Historic District: Denali National Park and Preserve. Cultural Landscape Report. Denali National Park and Preserve, Alaska.

Johnson, Erik

2017 National Register Nomination for the Historic Kantishna Roadhouse. Denali National Park and Preserve, National Park Service, AK.

Mathews, L., Melnick, R.Z., Edmonds, R., San Filippo, E., Murthy, M.

2019 Cultural Landscape Report for Mount McKinley National Park Road Historic District: Denali National Park and Preserve. Cultural Landscape Report. Denali National Park and Preserve, Alaska.
