



National Park Service
U.S. Department of the Interior
Yellowstone National Park
Idaho, Montana, Wyoming

Yellowstone River Bridge Replacement Environmental Assessment

February 2020



Existing Yellowstone River Bridge

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TABLE OF CONTENTS

| | |
|--|-----------|
| PURPOSE AND NEED..... | 1 |
| Purpose and Need for Action..... | 1 |
| Impact Topics Retained for Further Analysis..... | 2 |
| Impact Topics Dismissed from Further Analysis..... | 3 |
| ALTERNATIVES..... | 11 |
| Alternatives Carried Forward..... | 11 |
| Alternative A - No Action/Continuation of Current Practices | 11 |
| Alternative B (NPS Preferred)..... | 20 |
| Alternative C..... | 22 |
| Alternatives Considered and Dismissed | 26 |
| Mitigation Measures..... | 27 |
| AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES..... | 33 |
| Geothermal Resources..... | 33 |
| Visitor Use and Experience..... | 38 |
| Vegetation..... | 44 |
| Wetlands..... | 47 |
| COMPLIANCE REQUIREMENTS, CONSULTATION, AND COORDINATION | 52 |

PURPOSE AND NEED

Purpose and Need for Action

The National Park Service (NPS), in conjunction with the Federal Highway Administration (FHWA), is proposing to replace the Yellowstone River Bridge located 0.64 miles east of Tower Junction on the Northeast Entrance Road within Yellowstone National Park. Construction is anticipated to begin in summer/fall of 2022 and continue through 2024 depending on funding availability. In addition to replacing the bridge, about 1 to 1.5 miles of the Northeast Road, from Tower Junction to the Yellowstone River Picnic Area, would be reconstructed to a 30-foot paved width. The picnic area would also be expanded to at least double the number of sites.

The Yellowstone River Bridge was constructed in 1963, is over 50 years old, and has exceeded its intended design life. Consequently, it is in poor condition. It is one of eight maintained bridges on the park's Northeast Entrance Road. This bridge is 604 feet long and crosses the Yellowstone River 80 feet above the water, providing access to the Lamar Valley and other scenic areas in the Northeast corner of the park. A nearby parking area, commonly known as Wrecker Road, on the east side of the bridge provides fishing access to the river below. A popular picnic area is located approximately 1/3 mile east of the bridge. The park's Northeast Entrance Gate is located 27 miles further east along this road.

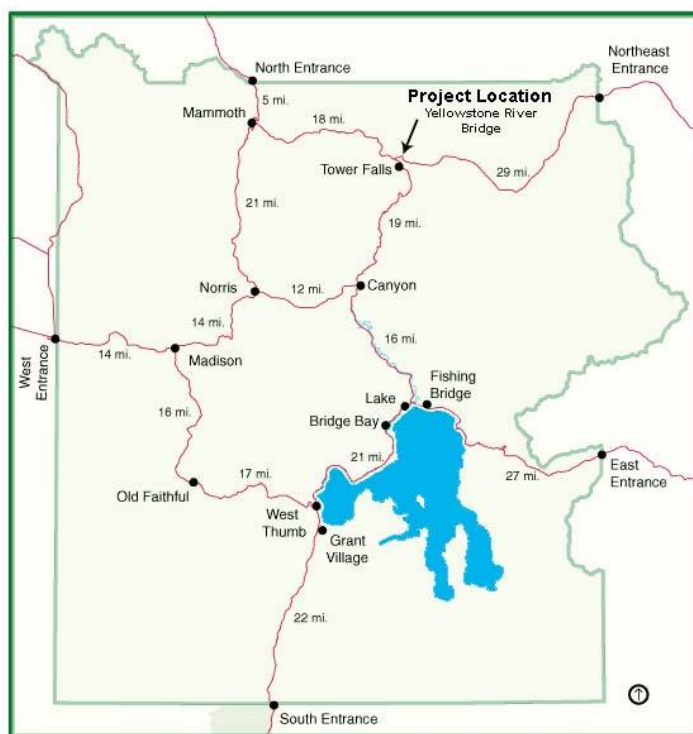


Figure 1. Project location.

The Northeast Entrance Road is open to traffic year-round and provides access to and from Cooke City, MT. The road is plowed during winter and the curve on the bridge's eastern approach exceeds a 7% grade, which during inclement weather presents a hazard for travelers and plow operators.

The purpose of this project is to replace the Yellowstone River Bridge in order to preserve safe visitor access to and from the Northeast Entrance, and improve the visitor experience.

This project is needed because:

- Yellowstone River Bridge is listed as a Priority of Improvement Category B (Major) in the latest bridge safety inspection (9/21/18). Category B means “Structure is seriously deficient or presents a safety hazard, but can remain in service at reduced loads or with frequent inspections.”
- The bridge has widespread deterioration of the concrete deck, sidewalks, and parapets. The stream alignment is directed toward the east upstream channel bank, causing severe bank sloughing and scour at the east pier.
- Because of the year of construction and type of bridge (spread footings, tall piers, short bearing seats, etc.), it is reasonable to assume it would perform poorly during a high seismic event, potentially leading to complete failure and collapse.
- The bridge has 3-foot sidewalks, which are a sub-standard width, do not meet accessibility requirements, and could be a safety hazard.
- The bridge serves the only road open in winter to the communities of Silver Gate and Cooke City, Montana.
- The area is popular for wildlife viewing, leading to heavy congestion along the road.
- The coating system (paint) on the existing steel girder superstructure has also failed, with areas of minor section loss from corrosion.
- In the late 1990s, it was determined the footings for the bridge were scour critical (meaning the footings are vulnerable to failure during flood events).



Figure 2. Yellowstone River Bridge looking east, located on the Northeast Entrance Road.



Figure 3. Spalling concrete of the bridge deck and undermining of the safety rails with exposed rebar.

Summary of Project Objectives

- Provide a bridge crossing of the Yellowstone River in excellent condition for the long term.
- Improve pedestrian and driver safety.
- Reduce localized vehicle congestion.

Impact Topics Retained for Further Analysis

The following topics are carried forward for further analysis in this Environmental Assessment (EA):

- Geothermal
- Visitor Use and Experience

- Vegetation
- Wetlands

Impact Topics Dismissed from Further Analysis

The following impact topics were dismissed from further analysis because they are not of critical importance to this project, do not exist in the project area, would not be affected by the proposal, or through the application of mitigation measures there would be no measurable effects from the project.

Air Quality & Green House Gas Emissions - Yellowstone National Park is designated as a Class I air quality area under the Clean Air Act; meaning, this area receives the highest level of protection with only a small amount of additional air pollution allowed. Air pollutants, from vehicle emissions, directly impact Yellowstone by reducing visibility, contaminating vegetation, soils, and surface waters, as well as disrupting lifecycle and behavior patterns of certain wildlife species.

Use of construction equipment would result in a limited increase of Green House Gas emissions (GHGs) with the production of carbon dioxide, nitrous oxide, and methane in the project area. Traffic delays in the project area would also result in vehicle idling. Both of these activities would result in a localized increase of vehicle exhaust, emissions, and fugitive dust throughout the three construction seasons. Periodic use (i.e., hourly) of various types of equipment (excavators, backhoes, cranes, pavers, and material delivery trucks) during the construction period would produce emissions that would be very small relative to those produced from visitor travel throughout the park and would make an inconsequential contribution to the park's overall emissions profile. Any increase in GHGs would cease once construction is complete; therefore, no lasting effects from the contribution of GHGs would occur under any alternatives discussed in this EA.

Archeological Resources - Archeological surveys of the Yellowstone River Bridge project area have been conducted. Five National Register Eligible archeological sites have been located in the vicinity of the Yellowstone River Bridge project area; all alternatives outlined in this Environmental Assessment have been designed so as to avoid impacts to these Historic Properties.

Appropriate steps would be taken to protect any unknown archeological resources inadvertently discovered through the implementation of either alternative discussed in this Environmental Assessment (EA; see Mitigation Measures).

Ethnographic Resources - The NPS has previously consulted with Yellowstone's 26 associated tribes regarding the location of any ethnographic resources within the park. The NPS has not been made aware of any ethnographic resources in the project area. The park will continue to consult with the associated tribes and will share this EA with them for comment. The park has no knowledge of any ethnographic resources that would be affected by the proposed project, therefore this topic has been dismissed from further analysis.

Floodplains - Temporary piles needed for work bridges would not impact the Yellowstone River floodplain or inhibit its function due to the small cross section of the piles in the river. While these temporary bridge piles could increase turbulence in the immediate area, they would not affect floodplain function. Additionally, each action alternative proposes a single pier near the shore of the river at the water's edge for a permanent bridge. The proposed permanent pier would not be located in the main river channel and would not change the flow characteristics or

the water surface elevation of the Yellowstone River. This permanent bridge pier would not affect hydrology or river function due to its position in the river. Neither action alternative would change floodplain function therefore this topic has been dismissed from further analysis.

Fish - The Yellowstone River supports populations of Yellowstone cutthroat trout, with non-native species of rainbow trout and brook trout. Yellowstone cutthroat trout are the primary species in the river in this location. The Elk Creek Complex consists of a complex of streams, Elk Creek, Lost Creek, and Yancey Creek. These streams were fishless due to natural cascades or fish barriers until the early 1920s when they were stocked with cutthroat trout. In 1942, the streams were stocked with brook trout which resulted in the complete loss of cutthroat trout. The Elk Creek Complex was treated with rotenone annually from 2012 to 2014 to remove brook trout. Once clear of brook trout, reintroduction of native Yellowstone cutthroat trout began. The cutthroat trout typically spawn from late-May through June. The lower portion of Lost Creek is cut off from the upper stretches due to underground flow through wetlands. Cutthroat trout fry are present in the lower Lost Creek drainage from May through October. Alternative C would temporarily reroute a portion of this waterbody through segments of pipe during construction. Depending on the length of pipe needed and the duration of placement, young cutthroat trout fry could be impacted. There could be some mortality of cutthroat trout due to decreased habitat in this limited area of the creek, and lower spawning success during the three year construction project. While this would likely lower recruitment numbers during construction, because these fish are expected to continue using this stream at current levels post construction, there would be no lasting effects to cutthroat trout due to this project.

Presently fish cannot enter the Elk Creek Complex from the lower segment of Lost Creek as this portion of the creek is fed by subsurface flow from wetlands and only becomes a surface creek near the area of the existing culvert crossing of the existing road. However, further upstream, Lost Creek has jumped its bank in the past allowing surface water uphill of this point, and creating the potential for nonnative fish to enter the Elk Creek Complex. To prevent this from happening in the future, a fish barrier would be installed above the lower Lost Creek segment as part of this project, which would ensure pure cutthroat fish populations of the Elk Creek complex would not be affected by this project. Additionally, because fish cannot migrate upstream of the culvert presently, a fish barrier would not impact the trout species using Lost Creek.

Additional fish protection measures to be used on this project include coffer dams and erosion control devices. These measures would be employed when needed in order to avoid large releases of sediment downstream. Cofferdams would allow work activities to occur on bridge piers by providing a water-free environment directly around the pier location that would prohibit fish entry. They would help avoid sedimentation of the gravel river bottom needed for fish spawning by containing any bottom sediment stirred up during pier construction. Other construction activities that could cause sediment in the river would be timed to avoid the late-May through June timeframe to avoid impacts to native spawning fish populations. Any water pumping operations for dewatering of coffer dams would use strainers to protect fish from inadvertently entering pumping equipment. Cofferdam removal would entail removal of material to create the dam, such as sandbags, concrete barriers, metal sheet piles, or water bladders. Removal of these items would likely have no impact to fish in the river.

Scheduling of in water work and monitoring of turbidity levels would occur to ensure sediments do not have adverse impacts to spawning fish. Permits for working in a Class I waterway would be obtained on behalf of Yellowstone National Park by FHWA prior to construction and all stipulations of that permit would be followed. These permits stipulate turbidity levels cannot

exceed predetermined levels at a given distance downstream from the project. These stipulations are in place to keep water quality at a level that would not impact fish species in the river.

Any effects on fish would be likely not be measurable after mitigation measures are implemented. Therefore, this topic has been dismissed from further analysis in this document.

Geological Resources - Reconstruction of a portion of the Northeast Entrance Road and the Yellowstone River Bridge would not cause any measurable impacts to the geology of the area. Geologic structure, mineralization patterns, and rock chemistry would not be affected by implementation of any of the alternatives. Because geological resources would not be impacted by the project, this topic has been dismissed from further analysis.

Historic Structures - The Yellowstone River Bridge is not eligible for inclusion on the National Register and is not a contributor to the proposed Northeast Entrance Road Historic District. The current structure was completed in 1963 and is a steel two-girder bridge with a concrete-cast in-place deck and bituminous wearing surface. The most recent FHWA, Office of Bridge and Structures Report on the bridge indicates it is in poor condition, primarily due to progressive deterioration of the concrete deck, sidewalks, and parapets, along with moderate to severe deterioration of the structural steel paint system and rusting of the structural steel on localized area with minor section loss over the piers. The stream alignment directed towards the east upstream channel bank has caused bank sloughing and scour of up to 5 feet at the east pier.

A program comment from the Advisory Council (Program Comment issued for streamlining Section 106 review for undertakings affecting post-1945 concrete and steel bridges. Federal Register Vol. 77, No. 222, Pg. 68791) indicates bridges of this design and vintage are generally ineligible for inclusion on the National Register, unless located within an historic district. The Yellowstone River Bridge is located within the proposed Northeast Entrance Road historic district (48YE821), however the bridge is considered non-contributing to the district. In *A Context for Common Historic Bridge Types*, this type of bridge is considered to be of low significance. In *The History of the Construction of the Road System in Yellowstone National Park, 1872-1966* (1994), Mary Shivers Culpin considers the bridge to be ineligible for inclusion on the National Register. The 1993 *Programmatic Agreement Among National Park Service, the Advisory Council on Historic Preservation, the Wyoming State Historic Preservation Officer, the Montana State Historic Preservation Officer for Principal Park Road System Improvement, Yellowstone National Park* stipulates that Historic American Building Record documentation be completed prior to demolition of historic bridges that are determined to be contributing structures to the overall eligibility of the road system as a mitigation measure (§IV.a.). The bridge is not a National Register eligible structure, nor is it a contributing element of the proposed Northeast Entrance Road historic district, or any other historic district; rather, the integrity of the road lies within its association with Franklin D. Roosevelt's New Deal Federal Emergency Relief and Works Progress Administration programs (Criterion A) and with the design philosophy of the National Park Service with features that embody a park-like setting that lays lightly on the land and evokes a connection to nature (Criterion C).

The replacement of the bridge proposed in Alternatives B and C, and the realignment of the road proposed in Alternative B would maintain a park-like setting with the road corridor realignment proposal, and the bridge, though somewhat taller, would maintain the existing general aesthetic of the current bridge and would not diminish from the overall park-like setting of the road. The bridge proposed in Alternative B would connect two natural features going from cliff-top to cliff-top, and would remove the existing bridge from the deep road cuts within

the Lost Creek channel and across the Yellowstone River from Lost Creek that were made to accommodate it. The road cuts would be rehabilitated to closely match their natural states, improving the natural setting and bringing the road more in-line with the design philosophy that park roads should lay lightly on the land. The road in this area has been realigned, and the bridge replaced, numerous times since the original Northeast Entrance Road was constructed, and the alignment of the road is not a defining characteristic of the historic district. Because proposed alternatives outlined in this EA would cause no adverse effect to the integrity of the proposed Northeast Entrance Road historic district, this topic has been dismissed from further analysis.

Indian Trust Resources and Sacred Sites - Trust resources are those natural resources reserved by or for Indian tribes through treaties, statutes, judicial decisions, and executive orders, which are protected by fiduciary obligation on the part of the United States. The federal Indian trust responsibility is a legally enforceable fiduciary obligation on the part of the United States to protect tribal lands, assets, resources, and treaty rights, and it represents a duty to carry out the mandates of federal law with respect to American Indian and Alaska Native tribes.

No trust resources would be affected by this project. The park will continue to provide access to the extent practicable, and permitted by applicable law, and not clearly inconsistent with essential agency functions.

Sacred sites are those places having established religious meaning and as locales of private ceremonial activities. Through previous consultation efforts with tribes, the park has not been made aware of any Indian sacred sites at or near the project site. In summary, no Indian Trust Resources nor Sacred Sites would be impacted as a result of implementing the action alternatives discussed in this EA. Therefore, the issue of Indian Trust Resources and Sacred Sites was dismissed from further analysis.

Lightscares - Temporary lighting would be used in the project area to allow night-work during certain periods of construction. Downward lighting fixtures would be used to reduce unwanted illumination of skies. Existing vegetation and topography would screen this light from visitors using the Roosevelt developed area. Night lighting would be visible from very limited areas along the Northeast Entrance Road. Once construction is complete there would be no change compared to current conditions, therefore there will be no lasting impacts on lightscares.

Natural Soundscapes - Natural sounds (e.g., flowing water, wind blowing through trees, birds calling) predominate in Yellowstone. Construction projects, often geared toward visitor use improvements, occur periodically throughout the park. Sounds in the project area are a mix of natural and man-made, including those generated from wildlife, humans, vehicular traffic, generators, motorized equipment, moving water, and wind.

Human-caused sounds would increase during the construction season (generally April-November, though no restrictions on winter work would occur if weather allows) in the project area over three years. Various types of equipment (pavers, tampers, rollers, etc.) would be used periodically (i.e., hourly) during this time, and along with vehicular traffic and construction crews, would produce sounds that could be heard up to one mile away. This would include sounds of pile-driving for temporary work bridges that could be heard from the Roosevelt developed area for up to three months (July – September), including noise from irregular night work that could be heard from the overnight areas in Roosevelt.

However, it is expected the existing topography of the surrounding area would preclude much of the noise from exiting the 0.05 to 0.25 mile wide valley in which most of the project area is

located. In addition, most construction noise from this project would occur during daylight hours, which would coincide with the times of day when most man-made sounds within the project area (e.g., vehicular traffic noise along the Northeast Entrance Road, and activities in the Yellowstone Picnic River Picnic Area) currently occur. In addition, any increase in construction noise would cease once construction is complete; therefore, no lasting impacts to the soundscape would occur under either alternative discussed in this EA. As a result, natural soundscapes have been dismissed from further analysis.

Water Quality and Quantity - The Yellowstone River obtains most of its flow from Yellowstone Lake which can remain frozen as late as June, creating runoff episodes during late spring and early summer. Water quality in the river inside the park is extremely high, and it is categorized as an Outstanding Natural Resource Water under the Clean Water Act.

Water for dust control and compaction of road base materials (estimated need is 1,500-2,500 gallons per day) would be drawn from the Yellowstone River or Lost Creek. Hydrants within developed areas such as Roosevelt and Tower Fall would be used for concrete and mortar for masonry. The 1,500 to 2,500 gallons of water drawn per day would be minimal and flow regimes in Yellowstone River and Lost Creek would not be measurably affected. According to a USGS gauging station, the Yellowstone River in early January at the outlet of Yellowstone Lake has a flow of about 500 cubic feet per second. The amount of water used per day for this project would be 0.40 to 0.66 seconds worth of river flow. More information on water for dust control and compaction is contained in the alternatives chapter. Water used would not be allowed to migrate back to the river or creek, and all equipment used for pumping and hauling would be decontaminated prior to use to prevent the potential spread of aquatic invasive species. Fueling of equipment would occur at least 150 feet from surface waters. No contamination of park waters would occur from proposed activities. Some river bed sediment could be stirred up during operations to remove the existing bridge's abutments and piers causing limited, localized to a few hundred feet downstream, and temporary turbidity lasting only a few hours or days.

Construction vehicles have the potential to introduce pollutants and increase sedimentation into the river and decrease water quality; however, mitigation measures and best management practices, such as checking equipment for leaks prior to use, working in seasonally wet areas during the dry periods, and containing pile driving activities, would be used and no change in water quality would occur.

It is estimated two coffer dams of about 20 by 40 feet in size could be needed during the removal of the piers of the Yellowstone River Bridge. During installation and eventual removal of coffer dams, construction equipment would disturb bottom sediments. This may cause a localized increase in suspended sediments during these activities, which would be complete within a few weeks, at which point these impacts would cease. While they are in place, coffer dams would contain any sediment generated by the use of construction equipment within the confines of the coffer dam, thus preventing increased turbidity in the river. If dewatering of the coffer dams is required, it would be removed via a vacuum truck, or pumped via a pipe or hose to one or more of the upland areas as shown on figures 9 and 10. These upland areas are natural depressions that would allow water to percolate into the soil and be naturally filtered.

Much of the work done to remove the existing piers would be accomplished from two proposed work bridges. The removal of bridge piers, the installation and later removal of work bridges, and installation of new bridge piers can disturb bottom sediments as these structures are pulled from/installed in the river bottom. This may cause a localized increase in suspended sediment

while these activities are occurring which would be complete within a few weeks, at which point these impacts would cease. While in place, work bridges would allow excavators to pull these structures without the need to enter the river channel. By using the work bridges, bottom sediments of the river are not disturbed by the equipment needed to remove the piers, and thus, these activities are not expected to increase turbidity downstream.

Some in-water work could occur for removal of the existing piers, for pile-driving for the work bridges, and for new pier construction. Potential impacts to water quality would include increases in suspended sediments that would last only as long as these in-water activities occur, which are expected to last for a few weeks.

Mitigation measures described above are expected to reduce any impacts to water quality and quantity. As there would be no lasting effects on water quality or quantity, there would be no lasting impacts on the Yellowstone River's status as an Outstanding Natural Resource Water under the Clean Water Act.

In light of the above, the water quality and quantity topic has been dismissed from further analysis.

Wildlife – The Park has roughly 2.2 million acres of habitat. The project would permanently affect approximately 15.7 to 16.5 acres. Yellowstone's diverse habitat is currently home to a wide variety of wildlife, including large mammals such as bison, elk, moose, big horn sheep, deer, antelope, grizzly and black bears, mountain lions, coyotes, and wolves. A variety of birds and other small animals are also present in the region. Wildlife is often present near Tower Junction and the Yellowstone River Bridge, and is accustomed to the presence of vehicles and visitors.

The Northeast Entrance Road is the only park road plowed in winter and is open for travel year round, so wildlife using this area are accustomed to people and vehicles. No blasting is anticipated for this project. Equipment would generally operate from as early as April through November, though no restrictions on winter work would occur if weather permits. The project is expected to take three years to be completed.

Bighorn sheep (*Ovis Canadensis*) are often observed in the area east of the Yellowstone River Bridge. A small resident band of 10-20 bighorn sheep frequent the cliffs east of Calcite Springs east of the Yellowstone River and have their lambs there. Both resident and migratory sheep use the area. Most bighorn sheep in Yellowstone are migratory, wintering in lower-elevation areas along the Yellowstone, Lamar, and Gardner rivers, and moving to higher-elevation ranges from May through October. Typical habitat for Bighorn Sheep is steep rocky cliffs. In the Tower-Roosevelt area, this habitat exists along the Grand Canyon of the Yellowstone River. During the autumn, ewes are observed near the Tower Fall Trailhead location, where they graze and move along the road as they migrate from Mount Washburn to Mount Everts (NPS 2019). A portion of the project area east of the bridge to the Yellowstone River picnic area lies within winter range for the species. Bighorn sheep in Yellowstone are relatively tolerant of human presence and would be expected to continue to use these areas in spite of construction activities, though some individuals may be displaced from the immediate area while construction equipment operates (Dan Stahler, personal communication). While some localized displacement of sheep may occur, there are many nearby areas that offer similar habitat, grazing opportunities, access to water, as well as cover and shelter. It is estimated that less than five percent of the winter range in close proximity to the project area would not be used due to displacement. Thus, there would be negligible adverse effects on sheep at the individual or population level.

Bison (*Bison bison*) use the existing bridge as a movement corridor. Under both action alternatives in this EA, the existing bridge would remain in operation to allow traffic flow during construction, and hence, bison movement on the bridge would continue as it currently exists. Once a replacement bridge is completed, bison would likely use it as they do the current structure. Many non-manmade routes also exist for bison movement in this vicinity.

Wolves (*Canis lupus*) have not typically used habitat within the project area in the past.

The grizzly bear (*Ursus arctos horribilis*) and Canada lynx (*Lynx canadensis*) are protected pursuant to the Endangered Species Act (ESA) of 1973, as amended. The Yellowstone River Bridge project area lies outside of designated Critical Habitat for the lynx and no known lynx occupy the project area or nearby areas; therefore, this project would have no effect on the lynx. Grizzly bear are present within the proposed project area. Grizzly bears have been observed in the vicinity of the Yellowstone River Bridge and have on occasion used the bridge to cross the Yellowstone River.

Grizzly bears travelling through the project area occasionally, and could be disturbed or displaced by increased human activity and noise associated with the three year reconstruction project for the Yellowstone River Bridge. However, no permanent loss of key grizzly bear habitat, for foraging or denning, would occur in either of the action alternatives, and Alternative B could improve habitat for bears in the riparian area of Lost Creek. The project area is not located within, or adjacent to any bear management area within the park. The project area is considered to be of low to medium habitat quality for bears based on vegetation characteristics. Because all contractor employees would be required to attend and abide by the park's grizzly bear orientation sessions which focus on proper food and garbage storage, how to avoid disturbing or encountering bears, and how to minimize unavoidable effects or encounters, potential adverse effects on grizzly bears would be greatly reduced. Strict enforcement of food storage and disposal procedures at the construction sites and the contractor housing camp would minimize the potential for bears to obtain food. If an animal carcass is observed within the project area, NPS bear management staff would be notified and the carcass would be moved in order to reduce the potential for human-bear interactions.

This project may affect, but would not likely adversely affect grizzly bears because mitigation measures would be implemented to reduce the chance of bear-human conflict (e.g., food and garbage storage, bear safety, bear encounters), the project occurs in an area with high levels of visitor use, and much of the project area is a previously disturbed road corridor. Reducing the vehicle speed limit in this area would be considered. Because the project area is not located within critical bear habitat and contractors would be educated on working in bear country, adverse impacts on grizzly bears would be limited to individual bears being displaced from the immediate area of project activities during the 3 year construction period. As there is abundant foraging habitat for bears adjoining and surrounding the project area, bears would not need to expend additional energy to find suitable habitat. No population effects would occur to bears in or near the project area.

The Yellowstone River Bridge project is included as part of a Parkwide Roads Program for which Section 7 has been completed. The Parkwide Road Biological Assessment was submitted to U.S. Fish and Wildlife Service (USFWS) in 2008 and the subsequent Biological Opinion (B.O.) prepared by the USFWS was completed in 2009 for the Yellowstone Park Roads Program. The B.O. still applies as it was prepared for the Yellowstone Park Road Reconstruction and Maintenance, 2008-2028 Plan that is still in effect. Also, there have been no additional species the park is required to consult on, and effects on species have not changed.

Other wildlife and bird species currently utilizing the area are acclimated to high volumes of vehicle and visitor use as a result of the nearby developments in the area (i.e., Roosevelt, Tower Falls, and the Yellowstone River picnic area). Wildlife species are expected to continue to use these areas in spite of construction activities, though some may be displaced from the immediate area of operating construction equipment for three construction seasons. Because most construction activities would occur in the same areas and during the season of highest visitor use, most animals have already been displaced from the immediate project area. Only individual animals and birds would be displaced from the immediate construction area, and no population level effects would occur. Equipment would generally operate from April through November until expected project completion. No blasting is anticipated for this project. Native revegetation efforts with grasses and forbs would reestablish habitat for the species noted above.

Construction noise in the project area has the potential to impact nesting birds, and wildlife, reaching at maximum the Roosevelt Lodge and cabins. Bird vocalizations when trying to find mates could be muffled and potential nesting sites near this activity may not be used. Nesting bird surveys in the project area would be conducted prior to construction to ensure that no nesting birds would be impacted. Birds that choose to nest within the project area after construction activities begin would be aware of those activities and unlikely to abandon nests. Both birds and wildlife may choose sites further away to bear young. Noise would essentially cause a habitat loss in the immediate project area during construction; however, habitat along the Northeast Entrance Road is abundant for both birds and wildlife. Any nests on the existing bridge would be removed outside of breeding season prior to the bridge's removal.

Since habitat restoration efforts would occur prior to the project being completed, and because past projects have had success with vegetation cover being reestablished within about two years of completion, this project would not have lasting effects beyond the three-year construction period for wildlife and birds.

The impacted habitat type is abundant in the project areas and throughout YNP, so no lasting effects on wildlife and birds are expected. Since no population level effects to wildlife are expected, and because habitat in the project areas is tiny compared to what is available in the surrounding areas and the park as a whole, wildlife as an impact topic has been dismissed from further analysis.

ALTERNATIVES

An interdisciplinary team of National Park Service employees in conjunction with employees of the Federal Highway Administration developed the alternatives described in this chapter. A total of two action alternatives and the no-action alternative are retained for impact analysis. A number of alternate designs were also considered and dismissed; those dismissed are discussed in more detail in the section Alternatives Considered and Dismissed.

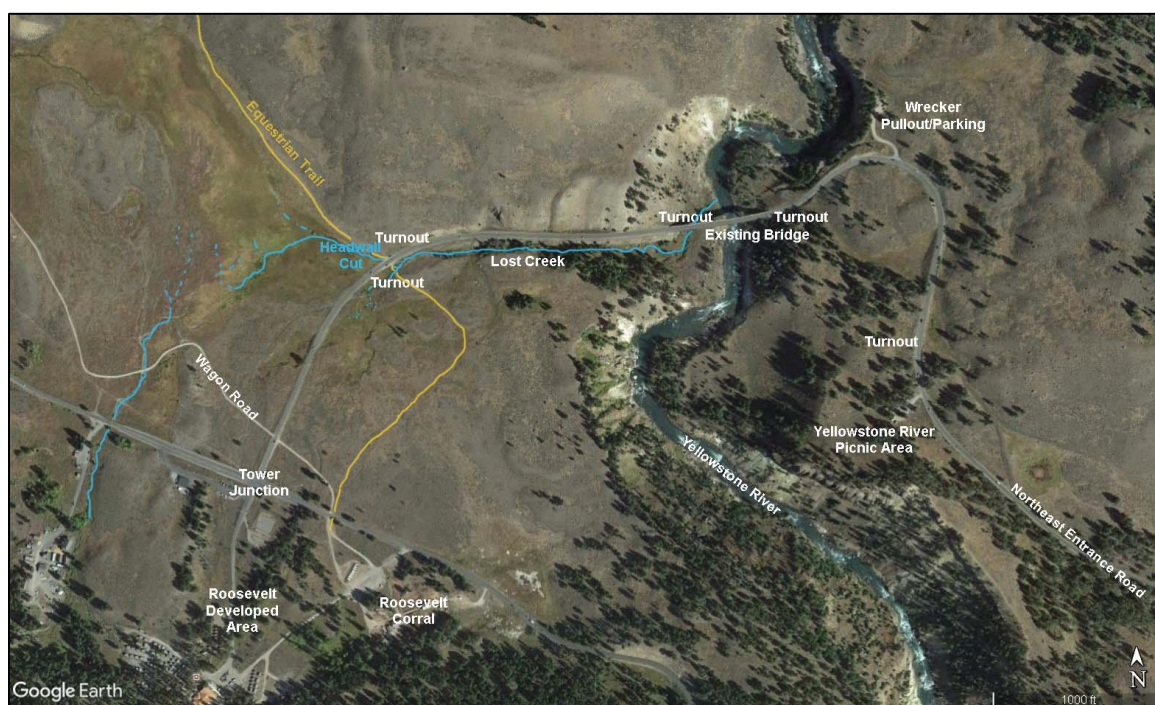


Figure 4. Existing conditions.

(Note that on this and all following map images, north is at the top of the image, unless otherwise indicated)

Alternatives Carried Forward

The three alternatives carried forward for impact analysis are:

- Alternative A—No Action/Continuation of Current Practices
- Alternative B—Replace Bridge in New Alignment 500-feet South of Existing Bridge
- Alternative C—Replace Bridge on Alignment directly North of Existing Bridge

These alternatives are based on preliminary designs and the best information available. Specific distances, areas, and layouts are only estimates. The estimates used are at the upper limits of the expected impact for resources. If changes during final site design are inconsistent with the analysis documented in this EA, then additional compliance documentation would be completed.

Alternative A: No Action/Continuation of Current Practices

Under this alternative the current alignment would remain unchanged. Periodic maintenance would be performed by park staff to maintain the road and bridge. The road width would remain at its existing 19-24 feet in width. The travel speed would remain at 45 mph throughout

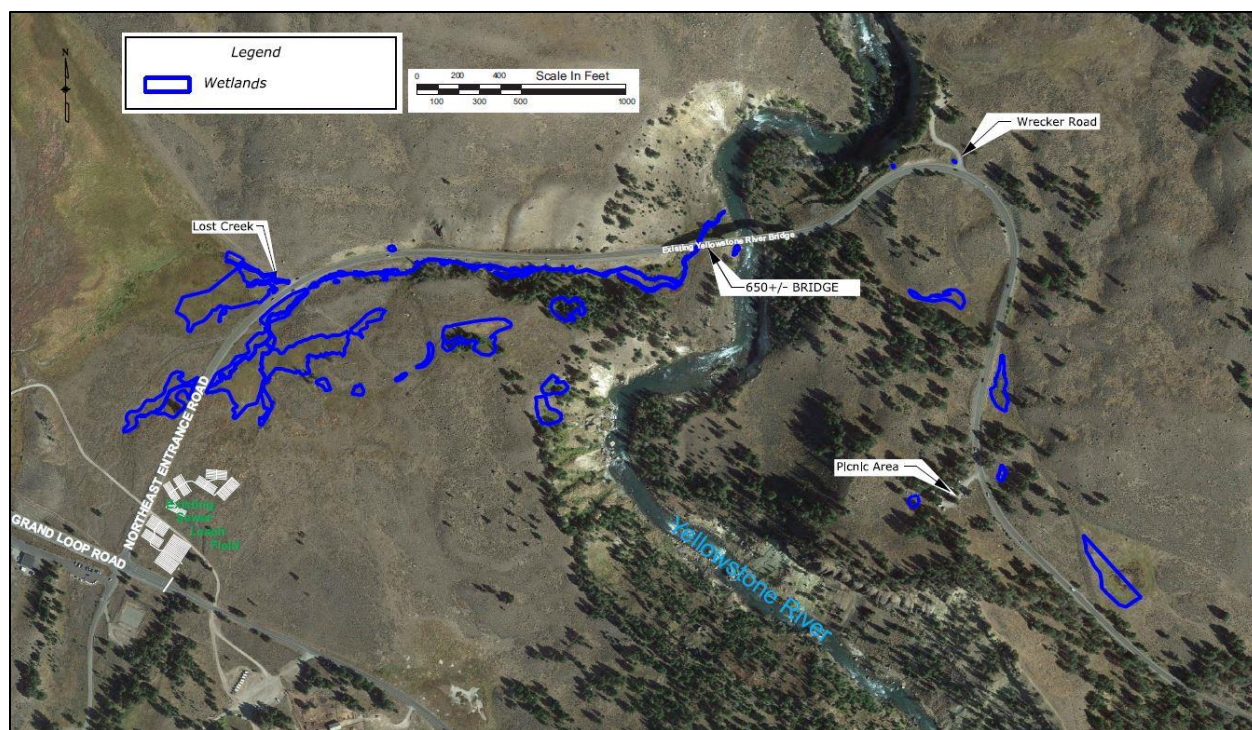


Figure 5. Alternative A-No Action.

the corridor with 35 mph through Yellowstone River Bridge and curve east of the Bridge. This road would likely need increasing amounts of maintenance as the road surface condition declines. Maintenance repairs would include repaving, pothole repairs, and road shoulder and ditch cleaning requiring days to weeks to complete. These road maintenance projects would require traffic delays and closures to complete the work. Safety issues such as substandard horizontal and vertical curvature, vehicles stopping in road to view wildlife, and narrow road surface would not be addressed.

The 604-foot-long Yellowstone River Bridge would not be reconstructed or rehabilitated. Issues related to the aging of the existing bridge would not be addressed. The NPS would continue to complete short-term and periodic minor/emergency repairs and/or improvement activities for continued operation of the bridge, such as concrete patching, rail maintenance, replacement of joints and repair of the deck. Deferring reconstruction would increase the amount of maintenance to maintain the existing bridge.

The bridge superstructure is supported by only two large steel girders and is classified as “fracture critical” or non-redundant. This higher risk bridge type requires more detailed and costlier periodic inspections, which would continue to be required.

Parking and Turnouts – No changes to any of the five formal paved turnouts that currently exist along this portion of the Northeast Entrance Road segment between Tower Junction and the Yellowstone River picnic area would occur in this alternative.

Wrecker Road / Confluence Fishing Access - This gravel parking lot, located at the northeast end of the Yellowstone River Bridge, is used by visitors to access trails to the Yellowstone River, and the confluence with the Lamar River downstream of this site. No changes are proposed with this alternative, and the area would continue to be used as it is presently.

Yellowstone River Picnic Area – This area is located one half mile drive east of the Yellowstone River Bridge. No changes to this picnic area would occur from this alternative.

Project Elements Common to All Action Alternatives

The action alternatives consist of replacing the Yellowstone River Bridge and reconstructing a portion of the Northeast Entrance Road from an inconsistent pavement width (ranging from 19 to 24 feet) to the park standard 30-foot paved width. The new width is based upon the NPS “Park Road Standards” per *Parkwide Road Improvement Plan EA* (NPS 1992). The 30-foot width would consist of two 11-foot travel lanes and two 4-foot paved shoulders. The design speed would be 45 mph, though exceptions could occur with speed reductions in congested areas, or pavement width variations to address traffic calming, or design needs of pedestrians. Sidewalks on the bridge would be widened from the existing 3 feet on both sides of the bridge to meet accessibility standards. The typical cross section of the proposed road is shown on page 18 of this EA.

Key Design Elements:

Sensitive natural and cultural resources are present in the project area and in adjacent areas. In addition to designing the roadway to fit the landform (i.e., lay lightly on the land), there are several key design elements that are incorporated into this project to protect resources and improve visitor safety.

Thermal Design - In order to dissipate or vent subsurface heat if encountered, both the road and bridge footings may have design features to enable this function. Coarse rock and/or pipes could be placed under the structure as necessary to allow heat to dissipate and/or vent, which would prevent heat buildup below the roadbed or footing. Curbs, roadside ditches, and/or small berms would be used within the project area to direct runoff from paved areas away from thermal features. No additional vegetation removal would be necessary as all of these drainage features would be located within the area that would become the new, wider road prism.

As the project progresses, if additional thermal design is needed or innovative solutions are identified as a result of further research, these also could be used; however, additional compliance may be required before these could be implemented.

Tower Junction - FHWA evaluated the traffic and safety needs of the corridor and concluded an additional 10 foot wide right-turn lane is required for the south-bound Northeast Entrance Road approaching the intersection. The lane would be approximately 250 feet long. No other auxiliary, acceleration or deceleration lanes are required at this intersection on either roadway. The intersection could change to an all-stop condition, adding stop signs to all approaches.

Stage/Chuck Wagon Equestrian Crossing (Stagecoach Road) - Stage coach and equestrian rides for visitors cross the Northeast Entrance Road multiples times each day during summer. Currently there is signage but no pavement markings. Pavement markings to notify motorists would be added as each alternative allows.

Lost Creek - Lost Creek is fed by Lost Lake, a narrow, scenic pond. The lake is a good place to see wildlife, especially beaver, moose, black bears, and various types of birds.

This project would repair resource damage near the existing road where there is evidence of head cutting (figure 4) through the wetlands near the culvert crossing on the Northeast Entrance Road. This head cut was first observed in 2013, likely as a result of the creek jumping a bank during high spring runoff. The original flow channel was restored, though the headcut incision continues to drain a portion of the adjoining wetland. Hydraulic analysis, design and

construction would occur to correct this condition. The invert elevation (bottom of culvert) near the culvert crossing under the Northeast Entrance Road would likely be raised (1-2 feet), thereby allowing the upstream channel to fill in as sediment falls out from ponding in advance of the higher inlet. In addition, the creek banks would be restored by planting native vegetation (see Reclamation and Revegetation Details section for further information).

Fish Barrier Installation near Lost Creek Culvert – A fish barrier, weir or similar structure would be installed to protect the Yancy's Hole and Elk Creek drainages from non-native fish species (rainbow and brook trout) that could migrate up Lost Creek from the Yellowstone River. The structure would be designed with input from the park fisheries biologist. It would likely include a 6-foot vertical barrier and hardened bottom (e.g., flagstone) to prevent pool formation to prevent fish from jumping the barrier. The fish barrier would likely be constructed using natural stone from the banks of the existing stream to avoid instream work. No permanent impacts to wetlands would occur. See the *Environmental Impacts* section of this EA for further information on temporary wetland impacts.

Project Components:

Abutments – Cast-in-place concrete abutments would be constructed on site. The exact configuration would be determined by the span layout requirements of the bridge. These abutments would be set outside the ordinary high water mark of the Yellowstone River. Wingwalls would likely be constructed and could be of masonry or have masonry elements. Depending upon existing topography, excavation of approximately 30x45 feet and 10 feet deep would be required to construct each of the two bridge abutments.

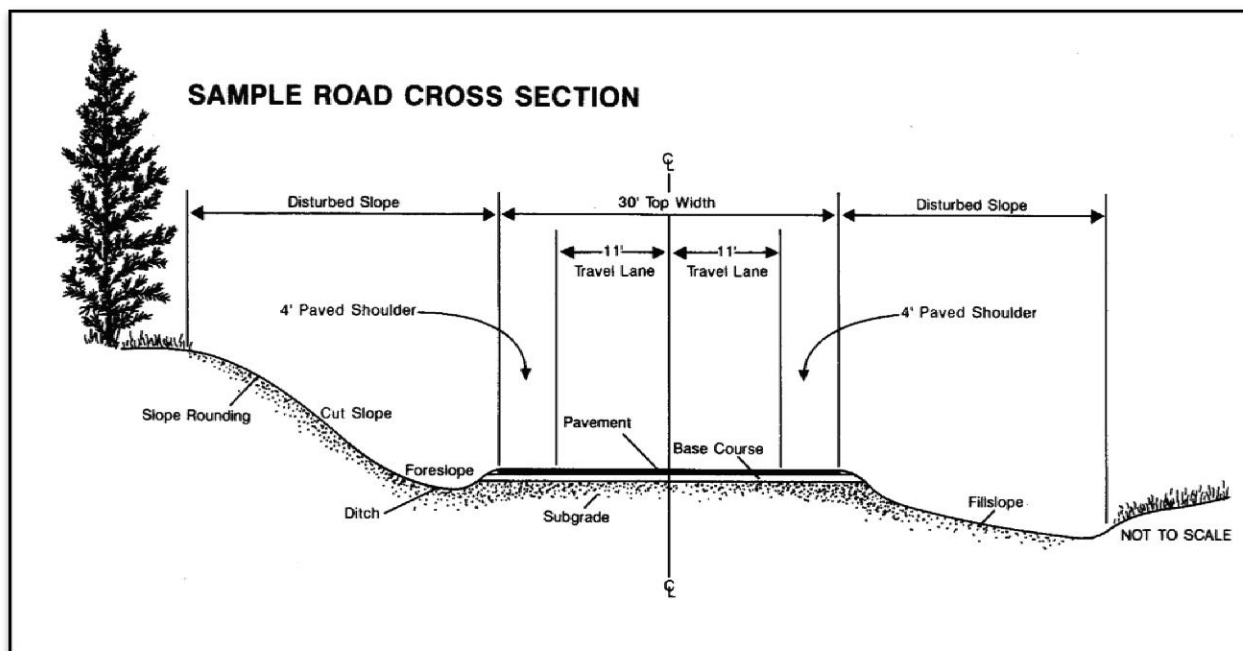
Piers – The three to four piers of the bridge would be reinforced concrete. Piers would be designed to avoid the active river channel when possible. If a pier is necessary in the water, it would be located near the river bank. The foundations for these piers would typically be a drilled or driven shaft filled with reinforced concrete to a typical depth of 50 to 75 feet deep. Diameter of these shafts would be in the range of 10 feet. Foundations for these piers would be designed according to the subsurface conditions encountered at each location. If hot ground is present, these foundations would be designed to be shallow while still meeting the structural and safety needs for the structure. Hot ground would be avoided when possible through changes in design location of the piers. If hot ground is extensive or otherwise cannot be avoided, pier designs with shallow footings would be used. Shallow foundations would usually have a bigger surface "footprint," with a concrete cap over multiple smaller drilled shafts. These would be in the range of 20x25 feet to 25x30 feet in area and much shallower depending on subsurface conditions. A spread footing bearing on soil would need to be in the range of 50x60 feet to 60x70 feet in area. The thickness of this type of footing would be approximately 8 to 10 feet. In the future, other innovative foundation solutions or designs may be identified as a result of further research and these also could be used to address hot ground; however, additional compliance may be required before these could be implemented.

Rails – The bridge rails would be made of steel in a picket-style similar to other bridges in the park. They would be located at the outer edges of the walkway, while a curb would separate traffic from pedestrians without trapping wildlife. Some masonry elements could be incorporated into their design.

Deck – The deck would be supported by weathering steel girders with a cast-in-place concrete deck. This deck structure would be supported by the abutments and piers. The bridge deck would have a stormwater drainage system designed into it, which would allow water to be transported through pipes, located within the bridge deck and structure, to the end of the bridge

where it would be discharged into catchments. The catchments are shallow rock-lined ditches up to 150 feet in length and approximately 4 feet wide. They would slow the velocity of surface runoff and improve water quality via ground infiltration prior to entering any surface waters in the area.

Removal of Existing Bridge – The existing bridge would be removed and material would be disposed of outside of park boundaries. The construction contractor would likely remove the existing bridge by working from one end to the other. Removal of the existing bridge would require a work bridge and confinement techniques to prevent construction debris from entering the Yellowstone River. Potential bridge demolition techniques that minimize environmental



impacts, and prevent debris from falling in the river, include raised netting, tarps or other materials suspended beneath the removal area, and use of construction equipment. Removing old abutments and piers would be accomplished by equipment working from the temporary work bridges, and not from within the river itself. Piles to support the temporary work bridge would likely be metal piles driven into the river bed for the duration of bridge construction. These piles would be removed when the work bridges are no longer needed. In rare cases a pile may need to be cut off below the river bed elevation when traditional vibratory methods for removal are not successful.

Road Construction/Reconstruction – The existing road from the Tower Junction intersection to the Yellowstone River picnic area would be reconstructed to the parkwide standard of a 30-foot paved width, for which a cross section is shown below. Depending on the alternative selected, between 1 and 1.5 mile of road would be constructed.

Parking and Turnouts – Paved trailhead parking would be constructed for two trails: Garnet Hill Trail, and Yellowstone River Trail. Each would be built for 6 to 10 cars and designed to allow for safe and adequate parking and set further back from the mainline road, allowing maneuvering out of spaces without backing onto the main road. Additional parking information is in the Alternatives Chapter. These new trailhead parking areas would require short natural surface trail extensions from the existing trails of about 500 and 100 linear feet respectively.

Yellowstone River Picnic Area –

Improvements as part of this project would include at least doubling the number of parking and picnic sites to a range of about 25 to 30 sites. The sites would be paved and the area would be designed to accommodate RVs. Two access/egress points to the Northeast Entrance Road would be provided if the final design warrants it. An additional vault toilet could also be added. The expanded area would not exceed three acres. Mature trees would be protected to the extent possible. The



Figure 6. Existing Yellowstone River Picnic Area.

Yellowstone River Hiking Trail also begins from here, yet there is currently no dedicated parking for this function.

Driving Surface – The segment of road in the project area, from Tower Junction to the Yellowstone River picnic area—approximately 1.0 to 1.5 miles—would be reconstructed from an existing width of approximately 24 feet to the park standard 30-foot paved width. The new width is based on the NPS Park Road Standards. The 30-foot width would consist of two 11-foot travel lanes and two 4-foot paved shoulders. The bridge would have sidewalks on each side that meet accessibility standards. The posted speed of 45 mph through the project area could be lowered in some congested portions.

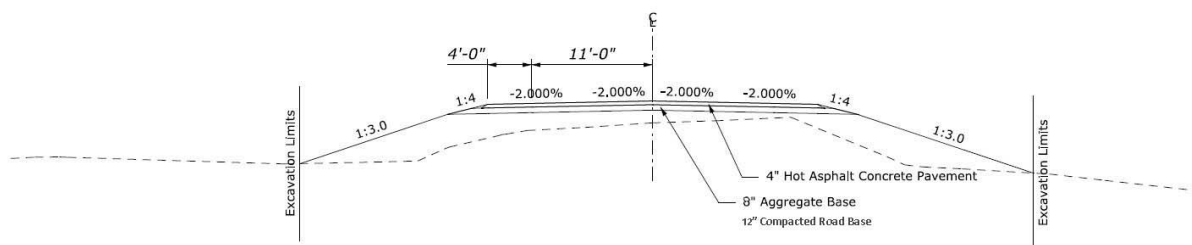


Figure 7. Typical road section to be used.

Culverts and Headwalls – There are no historic stone masonry headwalls within the project area to be reconstructed as part of this project. Any new culverts that may need to be installed would have about 30 square feet of face and would be installed within the disturbed area of the road prism. If visible to visitors, they would be constructed of stone.

Utilities – A CenturyLink telephone line, and a Northwestern Energy power line are located within or adjacent to the roadway in the project area. Any improvements to the corridor or replacement of the bridge would require coordination with CenturyLink and Northwestern Energy to relocate these utilities 18-24 inches deep within the new road prism.

Blasting – No blasting is anticipated.

Construction Details:

Geotechnical Exploration – Additional geotechnical investigation of subsurface conditions is needed to support design and minimize resource impacts during construction. The purpose of the investigation is to conduct geotechnical exploration of subsurface conditions in support of

design including a new bridge (piers, abutments, and approaches), retaining walls, parking areas, and roadway alignment (including cuts), as appropriate. Drilling equipment would be used to complete these investigations. Access would likely be from the existing road, from within a proposed alignment and associated construction limits, or placed via a helicopter. If access is over undisturbed land, then measures would be taken to reduce impacts to vegetation and wetlands by accessing when ground is frozen or using mats to drive on if ground is saturated. Holes are typically drilled within the alignment of the road, near structures such as bridge abutments, piers, retaining walls, or suspected problem areas such as poor draining soils. Hole depth is usually 10 to 50 feet, though it could be deeper depending on the structure to be built. Diameter of drill holes is usually between 8 to 12 inches. Drill fluid is usually water and would be captured and properly disposed of.

Pile Driving – Pile driving would likely be needed for constructing the bridge piers for temporary work bridges. The duration of pile driving would last approximately 50 days for each work bridge and would be timed so as not to impact any nearby nesting birds.

Closures – The following areas would likely be closed for the duration of the construction project: the Yellowstone River Picnic Area, the Wrecker Pullout, and associated parking turnouts along the Northeast Entrance Road. The pullouts located on the northwest and northeast sides of the bridge would also be closed for the same timeframe.

Construction Staging, Stockpiling – Various areas along the Northeast Entrance Road segment would be used for construction staging, material stockpiling, and equipment storage. Staging and stockpiling could occur within existing pullouts, at the Wrecker Road parking area, at the Yellowstone River Picnic Area, and at the Frog Rock Pit. Areas where road realignment or shifts occur, or new or changed parking areas within the project limits could also be used. The Frog Rock Pit is between 4 and 5 acres in size and would likely be used as a concrete or asphalt batch plant during some phases of the project. Other staging areas further from the project that could be used include the Grebe Lake and Norris pits, either of which could accommodate an asphalt batch plant. These areas would require the space to accommodate semi-trucks, deliveries of materials, and placement of temporary propane tanks for fuel to heat materials to produce asphalt. Propane tanks would be protected with barriers such as concrete “Jersey Barriers”. No washing of materials would occur at any of these sites. No excavation at any of the potential staging or stockpiling sites would be required. Additional information on staging/stockpile areas can be found in the description of each action alternative.

Contractor Housing and Temporary Office – During construction, project contractors would be housed at the established contractor camps in the park or required to secure lodging outside the park. No housing at the job site would be allowed. An office



Figure 8. Looking south from under the existing Yellowstone River Bridge.

trailer would be located either within an already disturbed site (on existing asphalt) within the project area or adjacent to Tower Junction near the existing vault toilets to provide office space for employees during construction. Short segments of trenching (likely less than 50 feet) for utility extensions may occur. This trailer would be removed following completion of the project.

Temporary Work Bridge – Two temporary work bridges would be constructed on driven piles (likely not more than 10 feet deep, and approx. 10' spacing) adjacent to the alignment of both the new and existing bridge. The work bridges would be constructed to facilitate construction of the replacement bridge. The work bridges would limit the need for equipment to operate within adjacent wetlands and river channel. They would be removed when no longer needed for this project. Removal of these bridges would require much less work than for the removal of the existing Yellowstone River Bridge. The decking (likely thick wooden planks) of the work bridges would be removed, then the metal or wood piles would be vibrated back up and out of the river bed.

Water Source and Water Disposal – Water would be used for dust control, compaction of base material, asphalt and concrete production, and incidental needs related to construction. Water for dust control and compaction would be drawn from the Yellowstone River or Lost Creek. Water for concrete or masonry work from hydrants in the Roosevelt or Tower Fall developed areas. Use of these water bodies has the least risk of introduction of any aquatic invasive species (AIS) into the Yellowstone River watershed. Any water pulled from water sources within the project area would be pulled through a strainer and not used where it could potentially run into tributaries outside the watershed. Any water transport equipment used would be decontaminated prior to use. Approximately 1.5 (Alternative B) to 2.5 (Alternative C) million gallons would be needed over the duration of the three-year project. Average daily water requirements are not expected to exceed about 1,500 to 2,500 gallons per day, respectively.

It is anticipated that two cofferdams, 20 by 40 feet in size, are required for both Alternative B and Alternative C. Cofferdams and dewatering operations are necessary to remove and construct a pier for both the existing and new bridge. Cofferdams would be constructed as tight as possible to reduce the need to dewater them. If dewatering is done, a vac-truck or water line and pump would be employed to transport water to disposal sites from the dewatering operation. This water would be disposed of at an upland site, options are shown on figures 9 and 10 for each action alternative, within the vicinity of the proposed bridge. If dewatering is needed, areas would be chosen to ensure that water would infiltrate into the soil, no surface runoff would reach existing water bodies, and existing soil slopes do not slough downhill. Sandbags or water bladders would likely be used to dam/dike natural depressions and enhance water infiltration into the soil.

In-Water Work – If needed, any in-water work or working within a wetland or below the high water mark would occur during low flow times of the year. Typically, work within a water body or wetland would be completed from a work bridge. Equipment working in water would likely only occur to remove abutments and cut off piers below streambed level if they cannot be removed by other means. It would be timed to occur during low flow periods, typically from August to November. Cofferdams may be used during these periods to reduce turbidity.

Material Sources – Materials for stone masonry, road base aggregate, asphalt mix, Mechanically Stabilized Earth (MSE) retaining wall backfill, and riprap would be needed for this project. Road base material would be required to allow for drainage under the road. All materials would be from an approved certified weed-free source outside the park or an existing material stockpile within the park. If suitable stone or aggregate materials are generated from

proposed excavations within the job site these materials would be used within the job. Much of the material would be processed for use at the Frog Rock Pit or one of the other pits within the park presently used for this purpose and would be hauled from the source, the pit, and the job site. All loads would be tarped and no engine brakes would be used in or near developed areas or campgrounds.

Table 1 lists estimates of materials required for the job for each proposed action alternative.

Table 1. Material needs.

| | Alternative B Replace Br. in New Location | Alternative C Replace Br. Just North of Current Location |
|---|---|--|
| Approximate loads of aggregate needed | 2,625 | 3,125 |
| Approximate loads of concrete needed | 675 | 475 |
| Approximate specialty truck loads (stone/rock) | 500 | 2,000 |
| Approximate loads (bridge steel/fabrications) | 55 | 35 |
| Approximate material truckloads (TOTAL) | 3,900 | 5,700 |

(Note: all loads = 10 cubic yards)

Material Disposal – Unsuitable soils or aggregate fill material would be disposed of at an approved location outside the park, or if needed, deposited as fill material at existing pits within the park. Materials from the existing bridge not deemed beneficial to the park would be removed and disposed of properly outside of the park boundaries. Any excess usable embankment material generated would be stored for later use at any of the existing maintenance pits within the park. Unsuitable and waste material is anticipated to be approximately 5,000 cubic yards.

Reclamation and Revegetation Details:

Reclamation Plan – A reclamation/revegetation plan would be developed and implemented by NPS staff, FHWA staff, and consultants with the overall goal of creating a self-sustaining, diverse vegetation community composed of species native to the park in sufficient species density and diversity to closely approximate natural, undisturbed vegetation potential. This plan would address actions before, during, and after construction in locations identified for restoration in the action alternatives in this EA. The plan would specify short-term (1-2 years) and long-term (5 years) reclamation goals and success criteria. See the mitigation measures for revegetation at the end of this chapter for additional information.

Alternative B: Replace Bridge on New Alignment South of Existing Bridge (NPS Preferred)

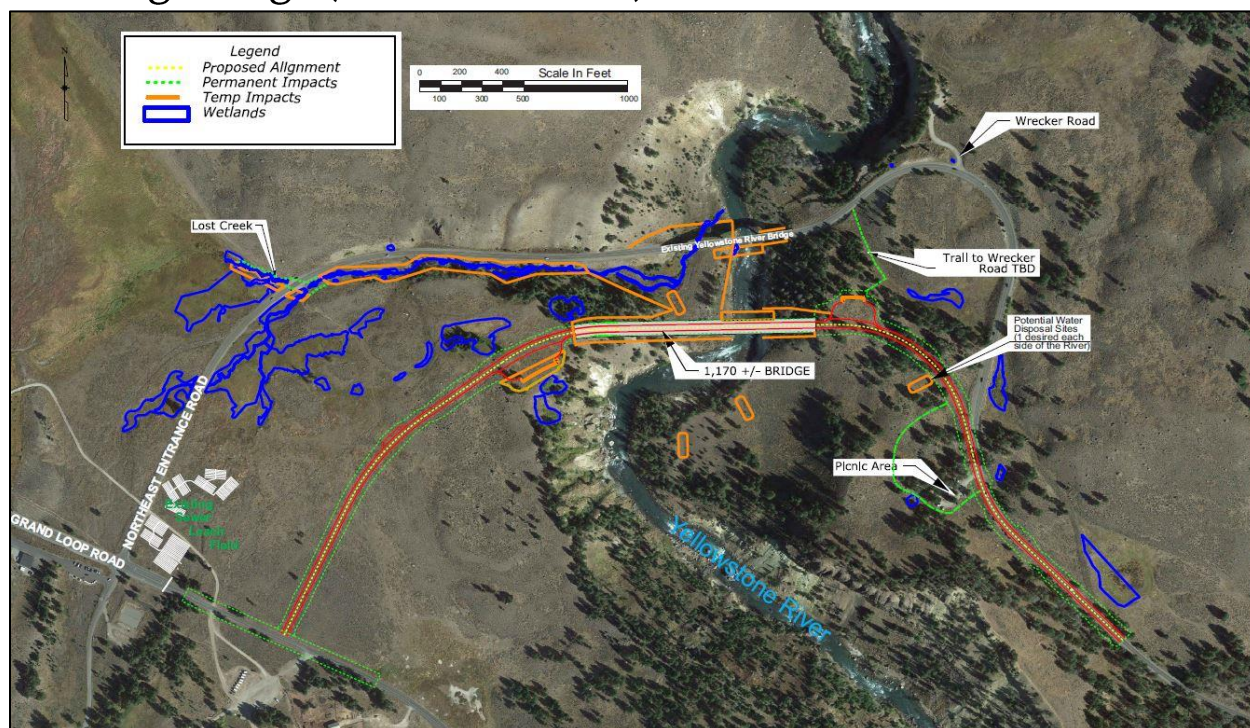


Figure 9. Alternative B-Replace Bridge on New Alignment South of Existing Bridge (NPS Preferred).

This action alternative consists of everything under Project Elements Common to Action Alternatives, and several additional elements. One mile of the roadway would be reconstructed on a new alignment (figure 9). The road would originate 700 to 1,000 feet east of the existing Grand Loop Road/Northeast Entrance Road Intersection and terminate near the current Yellowstone Picnic Area. Total road length after the road is realigned would be approximately 5,960 linear feet, which would reduce road length from the existing by approximately 1,500 feet. The proposed new bridge length is 1,175 feet long and 176 feet in height. Once the new alignment and bridge are complete, the existing roadway (3.6 acres) and bridge, including Wrecker Road, would be obliterated and restored by removing the asphalt, road base materials, recontouring and revegetating the area.

The proposed new road alignment in this alternative is designed to avoid wetlands, cultural resources, and a drain field serving the Tower-Roosevelt Area. The existing roadway bisects wetlands, and realignment thus provides an opportunity for some wetland/wet meadow restoration and some restoration of the Lost Creek drainage. Specifically, removal of 1,020 feet of roadway would allow for about 3.1 acres of wet meadow restoration. No wetland mitigation would be required with this alternative. Corrections to eliminate current erosion of the embankment-fill north and east of the current bridge would be addressed at the time of bridge removal and roadway obliteration, by recontouring these areas to reduce erosion potential.

The Wrecker Parking Area and access road would be removed and rehabilitated after construction is complete. Approximately 1,200 feet of natural surface 18-inch-wide trail would be constructed from the new parking area, located at the northeast end of the new bridge (described below in the parking and turnouts section of this alternative), to join the existing trail

to the river confluence.

The project is proposed to be constructed in three construction seasons (April through November, and winter work as weather allows) as one construction contract. The Yellowstone River Bridge substructure would be constructed in the first year with the superstructure constructed in second and existing bridge demolition in the third.

Traffic Impacts - The flow of vehicle traffic on the existing road and bridge would be maintained during the construction period. Traffic would continue to flow in its normal pattern until the new road and bridge are constructed. Traffic would then be diverted to the new roadway and bridge, and finally the existing roadway and bridge would be obliterated and restored to natural conditions. This alternative has minimal traffic disruption.

Parking and Turnouts – In addition to the new trailhead parking described previously, two other paved parking areas would be constructed under this alternative, one each located on either side of the new bridge: one would be on the southwest side and one on the northeast side. These areas, along with the approaches to the new bridge from both sides, would be used for contractor staging and stockpiling of materials and could support a concrete batch plant during construction.

The parking area located on the northeast side of the bridge would be designed for approximately 12 cars and 4 buses. This parking area would be located either directly adjacent to the Northeast Entrance Road, or within a few hundred feet via a short spur road. Care would be given to protect several old growth Douglas fir trees that dot the area. The existing Wrecker Road Parking area would be removed and rehabilitated in this alternative.

Paved trailhead parking would also be constructed approximately 750 feet east of the bridge, utilizing disturbance from the old road alignment to the maximum extent possible. This parking area would provide access to a trail leading to the confluence of the Yellowstone and Lamar Rivers. The confluence is popular for fishing and is frequented by educational groups. The parking area would be designed to accommodate up to 12 cars and 4 buses, and would be far enough from the mainline road to allow safe maneuvering out of spaces without the need to back onto the main road. Approximately 1,200 linear feet of natural surface trail would be constructed to connect this parking area to the existing trail.

Additionally, as part of this project three turnouts would be constructed within the project limits along the main road. These turnouts would be approximately 1,600 square feet in size, paved, and sized for 3-5 cars each. They would improve opportunities for wildlife viewing, orientation, and resting and passing areas.

Wrecker Road / Confluence Fishing Access - This gravel parking lot, located at the NE end of the Yellowstone River Bridge, would be used as a staging/stockpile area for construction. Post construction, the area would be restored to natural conditions. A hiking trail adjacent to this parking area would remain for recreational use.

Culverts and Headwalls - Inside the project area, Lost Creek flows under the Northeast Entrance Road through two corrugated metal pipe culverts that are cast in a concrete slab headwall. Neither the culverts nor headwall are historic. This alternative would remove all roadway infrastructure, including the pipes and roadway which presently restricts the natural meandering of the Lost Creek drainage. Impacted portions of the creek bank would be restored as described under the Reclamation and Revegetation section above.

Retaining Walls - No retaining walls or subsequent masonry are proposed for this alternative.

Alternative C: Existing Alignment and New Bridge Parallel to the Existing Bridge on the North Side.

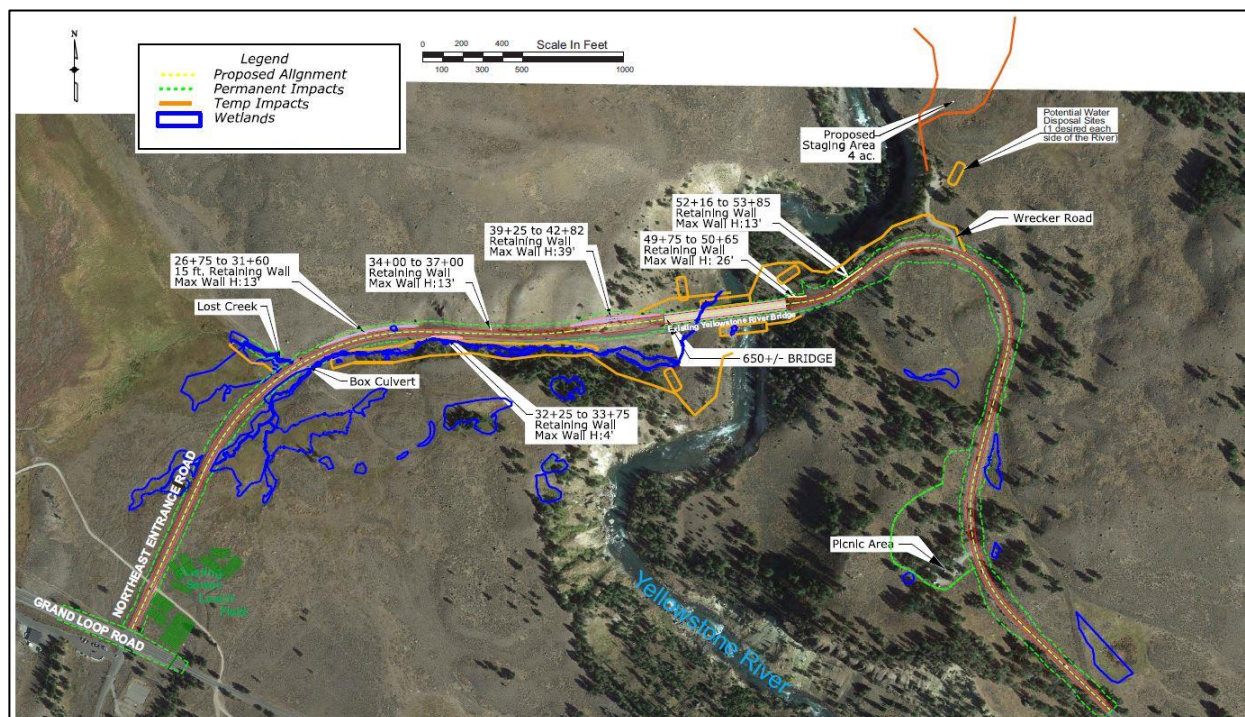


Figure 10. Alternative C-existing alignment, new bridge parallel to the existing bridge on the north side (steel girder bridge).

This action alternative (figure 10) consists of everything under Project Elements Common to Action Alternatives and reconstructs the roadway largely in place to a width of 30-paved feet. Slight shifts in the centerline of the road would occur to accommodate the wider road and to avoid sensitive resources.

The maximum grade of the road segment would continue to be a steep 7.2% (same as existing) directly east of the bridge and there would also be no improvement to horizontal or vertical curvature of the road. Vehicles traveling west would need to keep their speed under control on the downhill approach to the bridge. Guardrails, signs, and other measures would likely be constructed to minimize the potential for traffic accidents and for drivers to lose control and go off the road.

A new bridge would be constructed immediately north of the existing bridge and parallel, with a 47-foot shift of the bridge centerline. The proposed new bridge length is 650 feet long and 82 feet high. Total impacts to new, undisturbed area are 12.9 acres. The total road length within this proposed alternative is 7,490 feet. A 1,600-foot section of roadway would be realigned to construct a safe approach on each side of the new bridge. Slight shifts in the road alignment may be used in other sections to avoid or minimize impacts to resources such as wetlands or sensitive flora or fauna. Traffic would remain on the existing bridge until the parallel structure is completed then all traffic would be diverted to the new parallel structure.

Temporary work bridges would be constructed north and south of the existing to facilitate construction of a replacement bridge, and deconstruction of the existing bridge. After the new bridge is constructed, traffic would be diverted to the new and the old bridge would be

demolished. Finally, the temporary work bridge/s would be removed and all work areas restored to natural conditions.

Approximately 400 feet east of the existing Yellowstone River Bridge, there are two drainage outfalls on the north side of the Northeast Entrance Road and east of the existing bridge. Both need corrections to eliminate current erosion of the embankment fill. Improvements in this alternative would include construction of a catchment by either placing riprap on the existing swale or construction of a catchment/flume (rock lined ditch). These catchments would be similar to the catchments described earlier for the bridge deck drainage for either alternative. The catchments would be shallow rock lined ditches up to 150 feet in length and approximately 4 feet wide. They would slow the velocity of surface runoff and improve water quality via ground infiltration prior to entering any surface waters in the area.

The final design would address mitigating the erosion at both of these sites. Wetland mitigation for this alternative would occur through uncommitted wetland credits from an ongoing separate project at Pelican Creek. See the wetland mitigation section later in this chapter for additional information.

For staging, the Wrecker Road Parking area would be closed during construction for all public access. This alternative would also require creation of an expanded staging area north of the pullout for staging, stockpiling, and potentially a material production or disposal area.

Approximately four acres (table 2, temporary impacts)

of newly disturbed area is required for staging. After construction, the staging area would be rehabilitated to natural conditions, and there would be no change in size or location of the existing Wrecker Road parking area.



Figure 11. Potential staging and stockpile area for Alternative C.

Traffic Impacts - To construct a new bridge adjacent to the existing, traffic would be reduced to one lane for the duration of construction. A single lane would require alternating traffic. A traffic light and/or a flagger would be present throughout the duration of construction to manage vehicle flow.

Full closures of approximately 2-4 hours periodically during construction seasons would be needed while steel, rebar, piles, and other construction materials are unloaded and staged. Unloading would happen during daytime for safety. Unloading would require a crane and a large semi-truck. The contractor would be required to give a two-week notice for closures to allow time for public notification. These 2-4 hour closures would likely occur at least a dozen times during each construction season. The contractor would be restricted from closing the roadway during highest traffic volume periods. Cooke City/Silver Gate communities, and affected concessioners, would be notified in advance.

Parking and Turnouts – Currently five formal paved turnouts (each averaging 1,600 square feet in size) exist along the portion of the Northeast Entrance Road segment between Tower Junction and the Yellowstone River picnic area (see figure 4). As part of this project, all five of

these turnouts would be reconstructed, paved, and sized for 3-5 cars. The turnouts along the road would improve opportunities for wildlife viewing, trail and fishing access, and also function as resting areas.

In addition to the five existing turnouts that would be reconstructed, two or three new paved vehicle pullouts would be added within the project limits along the main road, near the Tower Junction intersection, for wayfinding, wildlife viewing, or vehicle passing. Each turnout would be approximately 1,600 square feet in size, providing parking space for approximately 3-5 cars.

Additional changes in parking and turnouts under alternative C are described in the common to all alternatives section.

Wrecker Road / Confluence Fishing Access - This gravel parking lot, located at the NE end of the Yellowstone River Bridge, would be used as a staging/stockpile area for construction. Post construction, the area would continue to be used as it is presently. A hiking trail would remain for recreational use leading to the confluence of the Lamar and Yellowstone Rivers.

Culverts and Headwalls – Inside the project area, Lost Creek flows under the Northeast Entrance Road through two corrugated metal pipe culverts that are cast in a concrete slab headwall. Neither the culverts nor headwall are historic. A new culvert, properly sized for normal storm events, would replace the existing corrugated metal culverts with this alternative. Construction of the new culvert would require a temporary diversion of the Lost Creek waterway. Water would be pumped to a ditch, or diverted via a pipe, along the northern side of the road and occur during low flow season.

Retaining Walls – A goal of this project would be to eliminate or reduce where possible, road-related impacts to wetlands and archeological resources. Retaining walls can reduce the amount of cut or fill required to widen a road. Approximately 1,550 linear feet of retaining walls would be installed. Retaining walls would be constructed according to the provisions of the 1992 road programmatic agreement with the Wyoming State Historic Preservation Office, the Advisory Council on Historic Preservation, and the NPS. This alternative requires retaining walls to accomplish widening on existing alignment. The retaining walls would be needed in areas of steep slopes adjacent to the road. Excavation of 30 to 40 feet into the hillside would be required to accommodate the width of the widened road, new alignment near the bridge, and to remove fill slopes along the existing road near Lost Creek. The retaining walls would be faced with stone masonry. The tallest retaining walls would be up to 45 feet in height. Retaining walls would be faced with stone masonry veneer. Stone wall design would incorporate similar architectural features such as materials, stone patterns, surface finishes, and color as those found on other structures of the road. If other situations are encountered within the project limits where a wall could lessen or eliminate resource impacts, one would be considered; however, additional compliance may be needed.

Stage/Chuck Wagon Equestrian Crossing (Stagecoach Road) - The current crossing would be improved with better signage and pavement markings.

Table 2. Alternatives comparison.

| | Alternative B | Alternative C |
|------------------------------------|---|---|
| Description | New Roadway Alignment New Grand Loop Intersection Steel Girder Bridge | Existing alignment Bridge Parallel to Existing Bridge on North Side |
| Temporary Traffic Control | <ul style="list-style-type: none"> Mimimal impacts to traffic. | <ul style="list-style-type: none"> One lane traffic for three years. Require closure time for construction of abutments of up to 4-hour durations periodically through construction. |
| Estimated Cost (millions) | \$37-\$42 (Bridge \$18.5) | \$38-\$43 (Bridge \$13.3) |
| Road Length (incl. Bridge) | 5,530 ft | 7,490 ft |
| Approximate Bridge Length | 1175 ft | 650 ft |
| Approximate Bridge Height | 176 ft | 82 ft |
| Height above existing bridge | 92 ft higher | Same height, generally. West end may be raised to lower cut side wall heights. |
| Safety | <ul style="list-style-type: none"> Maximum road grade: 5.9% Improvement to horizontal curvature (45 mph design speed) | <ul style="list-style-type: none"> Maximum road grade: 7.2% No improvement to horizontal curvature. Design exception must be approved by the Park and FHWA. |
| Wetland Impacts | <ul style="list-style-type: none"> Temporary = 0.08 ac Permanent = 0 ac Can reestablish additional wetlands due to encroachment of existing road on Lost Creek (estimate 0.2 acre gain). No wetland restoration mitigation required. Removal of road fill encroaching on Lost Creek. | <ul style="list-style-type: none"> Temporary = 0.07 ac Permanent = 0.3 ac Mitigation from unobligated wetland credits from Pelican Creek wetland restoration, which is currently in progress as a separate project. |
| Visitor Use and Experience Impacts | Little impact to traffic flow as construction takes place off existing alignment. New impacts visible during construction, rehabbed area will take time to reestablish and appear natural. Picnic area closed during construction though expanded picnic area by project completion, Wrecker pullout could remain open during construction though function would move to parking at east end of new bridge at project completion with existing area removed and restored. Removes conflict of two equestrian road crossings. New trail alignment to fishing access would be longer. | One lane of traffic for three years, picnic area closed during construction though would be expanded by project completion, Wrecker pullout closed during construction (impacts fisherman) but remains after construction; regular users, such as Silver Gate/Cooke City residents, would be affected more due to frequency of use. |
| Geothermal Impacts | Likely constructing bridge piers near or on hot ground. Employ foundations solutions such as spread footings on short drilled shafts to mitigate adverse impacts. | Likely constructing bridge piers near or on hot ground. Employ foundations solutions such as spread footings on short drilled shafts to mitigate adverse impacts. |
| Vegetation Impacts | New impact to vegetation for new road alignment, mostly sagebrush. Revegetation of old road alignment would increase amount of ground susceptible for weed establishment. Construction staging area repurposed to new vehicle pullouts/parking. | Four acres of mostly sagebrush vegetation lost to staging area north of Wrecker parking area. Widening of road would add additional acres. |
| Temporary Impacts | Construction access to bridge: 5.4 ac Lost Creek (incl. stream cleanup): 1.2 ac Total: 6.6 acres | Construction access to bridge: 6.5 ac Staging Wrecker Rd: 4.0 ac Lost Creek (incl. stream cleanup): 1.2 ac Total: 11.7 acres |
| Permanent Impacts | Roadway and turnouts: 14.1 ac Picnic area: 2.4 ac Trail to confluence fishing access: 1.2 ac Total: 17.7 acres | Roadway and turnouts: 12.9 ac Picnic area: 3.0 ac Lost Creek wetland area: 0.2 ac Total: 16.1 acres |

Alternatives Considered and Dismissed

The following project alternatives were considered but dismissed from further consideration. Reasons for dismissal are included below.

Option 1- Remove and replace the existing deck.

This alternative would repair the existing bridge in place and utilize a temporary bridge/detour route, constructed under the existing bridge. The existing structure would require painting and seismic retrofitting. Traffic would be diverted onto the temporary bridge while the existing bridge deck is replaced and then moved back upon completion of repair work. Access to the temporary bypass route would have a steep 11-12% alignment grade, which the park considered too steep to safely plow, meaning the road would have to be closed for long periods during winter. There would be no reasonable detour.

Due to steepness and inability to plow a temporary bypass road, this alternative was removed from further consideration as technically infeasible.

Option 2- Retrofit the existing bridge.

A parallel, one-lane structure would be constructed adjacent to and south of the existing structure. Traffic would be detoured to the new structure while the deck is replaced on the existing structure. Then the two structures would be connected yielding a final bridge width of 32 ft-8 inch curb to curb. The existing structure would require painting and seismic retrofitting.

Two-way traffic would remain on the existing bridge until the parallel structure was completed. All traffic would then be diverted to the new parallel structure under alternating one-way traffic, while the existing bridge would be repaired. Traffic would utilize both structures. The two bridges would appear as one structure but would not be connected. The existing deck structure would be replaced but the park would be left with the same seismically upgraded substructure and painted steel superstructure. The expenditure of capital funds to upgrade the existing structure and build a new structure adjacent has the cost equivalent of an entirely new upgraded structure.

Option 2 was dismissed from further consideration because it is not practical to have a single structure in which the major elements have different life cycles. The older structure would need to be replaced sooner. Future construction for a replacement of the older structure would be made more difficult and costly. Therefore, this alternative was dismissed as duplicative with other, less environmentally damaging or less expensive alternatives.

Option 2B- Stay on existing alignment with 11-foot shift – staged bridge construction.

This action alternative is similar to Alternative C. This alternative would have constructed a new single-lane bridge parallel and south of the existing bridge. When traffic is placed on this new bridge, the existing bridge would be deconstructed and a second half bridge would have been completed on the north side of the first half bridge. Traffic would be reduced to one lane for the duration of construction. Full closures of approximately 2-4 hours periodically throughout the construction season would have been needed.

This alternative consists of everything under *Project Elements Common to all Action Alternatives* and reconstructs the roadway and bridge approximately in place with an 11-foot shift to accommodate the new, wider bridge structure. The proposed new bridge length would be 650 feet long and at the same height as the existing bridge. There is no opportunity to modify the vertical grade of the bridge. The total road length within this proposed alternative is 7,490 feet. Total proposed impacts to new areas total 12.8 acres.

This alternative would have taken four construction seasons to complete, the longest construction period of any of the alternatives. This alternative also did not address this substandard horizontal and vertical curvature in the roadway. Therefore it was dismissed as duplicative with other, less environmentally damaging or less expensive alternatives.

Option 3- Replace the bridge and east side road alignment off the existing corridor.

This alternative identifies a new steel structure adjacent to the existing bridge structure with road re-alignment on the east end to flatten the existing hairpin curve. Improvement of ditches and drainage would be required on the west end, impacting wetlands adjacent to the road. To minimize the impact to wetlands, tall retaining walls would be needed. The new bridge would be constructed at a 2% grade, 35 feet higher than the existing bridge and 840 feet in length. A road closure would be necessary when placing girders on the new bridge. This alternative did not meet the project purpose and need for improving visitor safety.

Option 4- Replace the bridge 400 feet south of the existing bridge.

This alternative considered construction of a new bridge 400 feet south of the existing alignment. A maximum of 6% road grade and flatter curves were explored. The existing hairpin curve on the east side of the bridge would be obliterated and a flatter curve constructed. This alternative required extensive cuts and a steeper grade than existing. Maintaining the flow of Lost Creek drainage during construction would be a complicated design challenge. The new alignment on the east side of the bridge would impact the picnic area.

This alternative was dismissed from further evaluation because of the large masses of embankment and walls needed, and the wetland / waterway impacts. Therefore it was dismissed as duplicative with other, less environmentally damaging or less expensive alternatives.

Options 5 & 6- Construct new roadway alignment and replace the bridge to the south of existing location, no change in intersection location.

These alternatives are very similar to Alternative B (NPS Preferred) with the exception of the road alignment near the Tower Junction intersection—the road would begin in the existing location, rather than shifting 700 feet to the east. Total road length after the road is realigned would be approximately 5,960 linear feet, which would reduce road length by approximately 1,500 feet from the existing bridge. A new steel girder bridge would have been 1,175 feet long and 92 feet taller than the existing bridge.

Two major drawbacks of the alignment are it would impact known archeological sites, and require movement of a leach field for the Tower-Roosevelt developed area. A new leach field would need to be constructed, and the current one would have to be removed and the area restored. This would have added substantially to the project cost and lengthened the duration of construction. Therefore, this alternative was dismissed as duplicative with other, less environmentally damaging or less expensive alternatives.

Mitigation Measures

The following mitigation measures would minimize the degree and/or severity of adverse impacts and would be implemented during the project.

General Construction

- Construction workers and supervisors would be informed about the special sensitivity of park values, regulations, and appropriate housekeeping.

- Contractors would coordinate with park staff to reduce disruption in normal park activities (i.e., facilitate emergency traffic, hauling material to avoid quiet hours, allow for visitor use in areas where no conflicts or safety concerns exist).
- To minimize the amount of ground disturbance, staging and stockpiling areas would be located within the limits of construction, in existing parking areas or pullouts, and away from visitor use areas, except where specifically noted in the description of alternatives. All staging and stockpiling areas would be returned to pre-construction conditions following completion of the project.
- Construction zones would be identified and critical areas may be fenced with construction tape, snow fencing, or some similar material prior to any construction activity. The fencing would define the construction zone and confine activity to the minimum area needed. All protection measures would be clearly stated in the construction specifications and workers would be instructed to avoid conducting activities beyond the construction zone.

Air Quality

- To reduce noise and emissions, construction equipment would not be permitted to idle for more than 10 minutes while not in use according to the Superintendent's Compendium, based on CFR 36 §5.13 Nuisances.
- All motor vehicles and equipment would have mufflers conforming to original manufacturers' specification that are in good working order and are in constant operation to prevent excessive or unusual fumes or smoke.
- All haul loads would be tarped.
- Dry conditions can cause dust to be generated by construction activities. This dust would be controlled by spraying water on the construction site, if necessary.

Geothermal

- If unknown conditions or problems (steam, water, heat, or voids) are encountered during construction, the park geologist would be notified before the drilling to allow the opportunity to observe sediment layers during the process. The geologist would be able to stop or change the operation due to potential resource or safety concerns.
- Spread footings or innovative foundation solutions would be used anytime traditional footings (drilled or driven shafts) may threaten subsurface geothermal resources.

Soils

- In an effort to avoid introduction of exotic plant species, no hay bales would be used. Hay often contains seed of undesirable or harmful alien plant species. Therefore, on a case-by-case basis the following materials could be used for any necessary erosion control: wood bark mulch, straw, sand bags, coir logs, and silt fences. Wood bark mulch would be used to reduce surface erosion, help retain soil moisture, and promote seed generation of native plants. Standard erosion control measures such as silt fences and/or sand bags would be used to minimize any potential soil erosion.
- Although soil side-cast during construction would be susceptible to some erosion, such erosion would be minimized by placing silt fencing, or other erosion control, around the excavated soil. Excavated soil may be used in the construction project; excess soil would be stored in approved areas.
- Construction would take advantage of previously disturbed areas wherever possible. Soils would be susceptible to erosion until revegetation takes place. Vegetation impacts and

potential compaction and erosion of bare soils would be minimized by conserving topsoil in windrows and reapplying after construction and not allowing equipment to drive on once placed. The use of conserved topsoil would help preserve micro-organisms and seeds of native plants. The topsoil would be re-spread in as near as original location as possible. To reduce construction scars and erosion, mulching, seeding, and/or planting with species native to the immediate area. Scarification of compacted soils would occur as necessary to improve revegetation.

Vegetation and Revegetation

- Construction equipment would be cleaned before entering the park to minimize the transportation of exotic seeds to the site. All equipment entering the park would be inspected and may be required to be pressure washed to remove foreign soil, vegetation, and other materials that may contain non-native seeds or vegetation.
- Weed control methods (previously approved in the park's 2013 *Invasive Vegetation Management Plan and Environmental Assessment*) such as spraying herbicides and mechanical removal would be implemented to minimize the introduction of noxious weeds. Preconstruction: 1) Spot treat weeds as soon as possible in advance of any ground disturbance, 2) apply a pre-emergent for controlling exotic annual species, 3) apply a post-emergent for exotic perennials, and 4) seed with desirable native species. During construction: 1) conserve topsoil in windrows and cover with weed barrier cloth to prevent weed seeds from contaminating, 2) treat disturbed areas for exotic species. Post Construction: 1) treat new disturbance with a cover crop such as slender wheatgrass, 2) seed disturbed areas with native seed at a rate of 18-20 pounds of pure live seed (PLS)/acre (unless a different rate is identified), 3) selectively treat exotic weeds such as alyssum and cheatgrass.
- A reclamation/revegetation plan would be developed and implemented by NPS staff, FHWA staff, and consultants. Revegetation and recontouring of disturbed areas would take place during, and following construction. Revegetation efforts would strive to reconstruct the natural spacing, abundance, and diversity of native plant species using native species. All disturbed areas would be restored as nearly as possible to pre-construction conditions shortly after construction activities are completed.
- This project would follow Topsoil Retention/Vegetation Guidelines developed for previous projects within the park (NPS 2002). Any disturbed topsoil would be salvaged and used to restore areas near its original location. Topsoil storage and placement protocols would be followed.
- To increase the chances of success in reestablishing sagebrush communities, local plant stock could be grown in nurseries and then planted post-construction.

Wetlands

- Mitigation for wetlands destroyed would be done through restoration of disturbed wetlands located within the park at a minimum 1:1 ratio. Wetland restoration would occur through an ongoing separate project which removes road embankment and constructs a viaduct over the Pelican Creek drainage. Wetland mitigation would entail the removal of existing road fill (embankment) used for the present Pelican Creek causeway. Removal of this soil, which acts as an earthen dike across the Pelican Creek wetland, would restore wetland functions such as water flow, infiltration, and habitat value.

Ethnographic Resources

- The park would continue to work with tribes to document and evaluate the ethnographic resources within the park ascribed with native significance and give protective measures for these resources.

Archeological and Paleontological Resources

- All contractors and subcontractors would be informed of the procedures to follow in the event of archeological, and paleontological resource discovery, as well as the penalties for illegally collecting artifacts or intentionally damaging paleontological materials, archeological sites, or historic properties.
- During construction, specifically activities involving earthwork or digging, qualified park staff would monitor work zones to confirm the presence or absence of significant archeological, or paleontological resources. Should construction activity unearth previously unknown historic or prehistoric cultural remains or artifacts, work would be stopped in the area of the discovery and the branch of cultural resources would be notified. In accordance with the Inadvertent Discovery Procedures of the 1993 Road Programmatic Agreement, the cultural remains would be assessed and the Wyoming SHPO notified. If the cultural remains are assessed as significant and retain integrity for the archeological information they may provide, the site would be avoided and protected. If avoidance is not possible, data recovery excavations would be conducted prior to any construction activity resuming in the area. If Yellowstone National Park, with the concurrence of the Wyoming SHPO, determines the artifacts or remains are not sufficient to meet the definition of a National Register eligible site or the archeological information with the site is not significant, all cultural remains would be collected and construction activity may commence with the archeological monitoring. In the event that human remains are recovered, all work on the project will stop immediately, an NPS coroner and the branch of cultural resources shall be contacted immediately, and the stipulations of the Native American Graves Protection and Repatriation Act (25 U. S. C. 3001-3013) shall be followed prior to recommencement of any work, as outlined in The Road Programmatic Agreement.

Historic Structures

- In order for this bridge and site design to be as compatible with the historic architectural characteristics on the Northeast Entrance road segment, the design would incorporate similar architectural features such as materials, stone patterns, surface finishes, and color as those found on other structures of the road.

Natural Soundscapes

- Equipment would not be allowed to idle longer than 10 minutes when not in use.
- All motor vehicles and equipment would have mufflers conforming to original manufacturers' specification that are in good working order to prevent excessive noise.

Visitor Use and Experience

- Signs, alerts, press releases, and notifications would be issued to inform visitors of traffic delays prior to and throughout the duration of construction.
- Construction zones would be identified (i.e., flagging, construction tape, fencing, etc.) to prevent visitors from entering the construction zone unknowingly.
- Construction materials staging would be restricted to areas that would not impede vehicle traffic of visitors, contractors, or park staff.

- Traffic flow would be maintained through the construction zone over the existing bridge. Speed limit through the construction zone would be posted at 15 mph. Depending on the alternative chosen, delays would vary.
- Equipment would not be allowed to idle longer than 10 minutes when not in use. All haul loads would be tarped if required and no engine brakes would be used in or near developed areas and campgrounds.
- To minimize the potential for impacts to park visitors, variations on construction timing may be considered. One option may include implementation of daily construction activity curfews, such as not operating construction equipment on busy holiday weekends. The NPS would determine this in consultation with the FHWA.
- All work would be planned to reduce construction noise to visitors as much as possible by timing activities to avoid noisy activities at night when sound could carry to the Roosevelt Developed Area which includes visitor cabins and employee housing. The use of sound curtains may be employed to help reduce noise from pile driving activities.

Wildlife

- Ensure all project-related employees, such as contractor's employees, would be given orientation on how to avoid disturbing or encountering bears and how to minimize unavoidable effects or encounters. Orientation would include information about park regulations regarding food storage, disposal of garbage and other bear attractants, and approaching or harassing wildlife.
- The location and height of cut and fill slopes, retaining walls, and guardrails should be designed to allow wildlife that attempt to cross or travel the road to rapidly escape if threatened by on-coming vehicles. This could include short openings in the guardrail, and slopes that allow wildlife to move up- or down-slope to get off the road.
- Construction site and staging areas would be monitored by park natural resource staff throughout the project in case any special status species unexpectedly appear in the project area. Should any appear and if park staff become concerned about potential adverse impacts on the species from construction or other project related activities, work would stop and not resume until necessary protective steps are taken to avoid any impacts to the special status species.
- Construction workers and supervisors would be informed about special status species. Contract provisions would require the potential cessation of construction activities if a species were discovered frequently inhabiting the project area, until park staff can evaluate the situation. This would allow modification of the contract for any protection measures determined necessary to protect the discovery.
- All project-related employees, such as contract and government construction employees, would be given orientation on how to avoid disturbing or encountering bears and how to minimize unavoidable effects or encounters. Orientation would include information about park regulations regarding food storage, disposal of garbage and other bear attractants, and approaching or harassing wildlife.
- Within the proposed construction areas the typical period for nesting birds is between March 1 and August 15. Per the Migratory Bird Treaty Act, no cutting of trees, vegetation clearing, grubbing, or other site preparation and construction activities which could affect nesting birds would occur between those dates unless qualified biologists from Yellowstone National Park survey them prior to any of these listed activities and find no birds present or using the area. Inactive nests would be removed from the existing bridge outside of nesting season.

- Blasting is not anticipated for this job, but if needed it would occur outside of the migratory nesting bird period (between March 1 and August 15) or if a survey for nesting birds finds none in the area.

Water Resources

- Filter barriers, sedimentation ponds, berms, coir logs, and other best management practices would be used to protect existing water sources and maintain turbidity and sedimentation at the lowest practical level during construction activities. A storm water pollution prevention plan and a water quality monitoring plan would be required before implementation of the project. Best Management Practices (BMPs) such as water bladders, sand bags, coffer dams, or sediment curtains, would be used if needed within the river around any in-water work areas, such as abutment and pier removal and placement.
- Silt fencing fabric would be inspected weekly or after every major storm. Accumulated sediments would be removed when the fabric is estimated to be approximately 50% full. Silt removal would be accomplished in such a way as to avoid introduction of fine particle materials into any wetlands or flowing water bodies.
- To minimize possible petrochemical/fuel leaks from construction equipment, the contractor would regularly monitor and check construction equipment to identify and repair any leaks. Refueling and servicing equipment would be done within the turnouts and away from water bodies when feasible. Spill kits would be required at the construction site at all times.
- Equipment would not be allowed to operate within the stream/river during critical periods such as during fish spawning (late-May through June). If any pumping of water is required, it would be discharged to an upland site.
- The removal of the existing bridge would require confinement techniques to prevent construction debris from entering the Yellowstone River.
- A Section 404 Permit of the Clean Water Act, and 401 water quality certification would be obtained prior to construction.

AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

This chapter describes the affected environment (existing setting or baseline conditions) and analyzes the potential environmental consequences (direct, indirect, and cumulative impacts or effects) that would occur as a result of implementing the alternatives.

Cumulative impacts are defined as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions" (40 CFR 1508.7). Cumulative impacts are considered for both the no action and action alternatives.

Past Actions

- **2013** – Reconstruction of the road from Roosevelt to the Tower Fall store – Yellowstone National Park in conjunction with FHWA reconstructed 2.5 miles of road to a 24-foot width and improved parking and turnouts along the road.

Foreseeable Future Actions

- **2020** – Reconstruction of the road from the Tower Fall Store to the Chittenden Road – This road is a portion of the Dunraven Road from the Tower Fall store to the intersection with the Chittenden Road. This road segment will be reconstructed to a 24-foot paved width, consisting of two 10-foot lanes and two 2-foot paved shoulders. It is the last portion of the Dunraven Road in need of reconstruction. The road would be closed to visitor traffic for two years while construction occurs.
- **2020** – Reconstruct the Roosevelt Lodge parking lot and roads – The existing parking lot for the lodge will be reconstructed in a new location and the existing location restored to a meadow. Circulation for both vehicles and pedestrians will be reconfigured to enhance safety and the visitor experience.
- **After 2022** – Northeast Entrance Road Reconstruction – The Northeast Entrance Road is the road segment from the intersection at Tower Junction heading east to the Northeast Entrance of the park. The Yellowstone River Bridge is located on this road segment. The 1992 Parkwide Road Improvement Plan for Yellowstone National Park stated that much of the principal park road system would receive major reconstruction. The typical road section for these reconstructed roads is a 30-foot paved width, consisting of two 11-foot lanes and two 4-foot paved shoulders. The existing Northeast Entrance Road is approximately 22-24 feet wide.

Geothermal Resources

Affected Environment

The park is a geologically active area that is world-renowned for its geothermal activity, which includes hot springs, geysers, mud pots, and fumaroles.

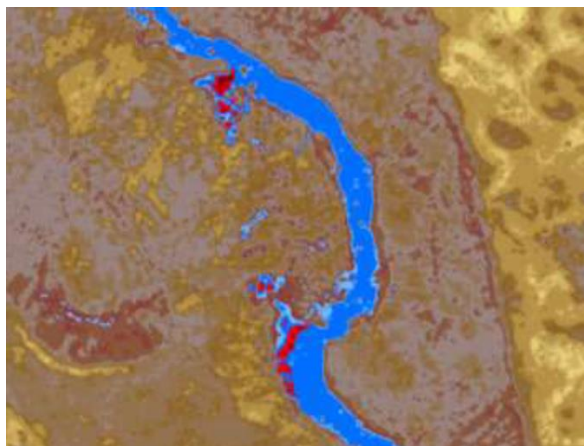


Figure 12. TIR image shows identified hotspots approximately one mile upstream of the existing Yellowstone River Bridge.

Within the project area, volcanic rocks, basalt lava flows, and hydrothermally altered areas—including Calcite Springs—can be seen. Hydrothermal areas and small seeps follow a zone of northwest-trending faults and fractures that roughly parallel the Grand Loop Road and Yellowstone River. Hydrothermal features located in the general vicinity of the road corridor at Calcite Springs are created by the movement of hot fluids and gases along fractures and faults that emerge at or near the bottom of the canyon of the Yellowstone River. Hydrothermal features present include fumaroles and springs. The features are located below road grade along the west river bank. Hydrothermal activity and alteration also occur along the road

corridor and throughout the area, but they are small and show little activity.

An airborne survey was conducted of the area on October 17, 2018, during which thermal infrared (TIR) imagery data was collected for 1,828 acres of the northeast corner of Yellowstone National Park. The survey was conducted at an altitude of 6,200 feet above ground level (AGL) with a ground resolution of ≤ 3 feet.

The goal of the survey was to identify and delineate features with thermal signatures of interest. Two sites of geothermal activity were identified: one along the western bank of the Yellowstone River, approximately one mile upstream of the existing Yellowstone River Bridge along the banks of the Yellowstone River, and a minor hot spring 1,700 feet west of the Yellowstone River. The thermal infrared data did not show any identifiable hotspot near the bridge (Diabat, Miwa. 2018, pg. 10). Neither of the sites identified in the aerial survey would be impacted by any of the proposed locations for a replacement bridge.

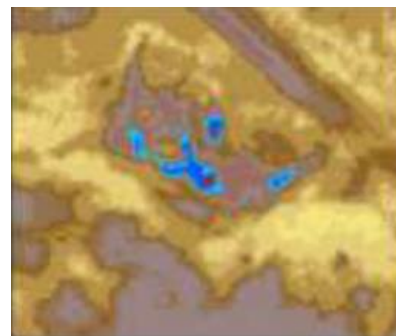
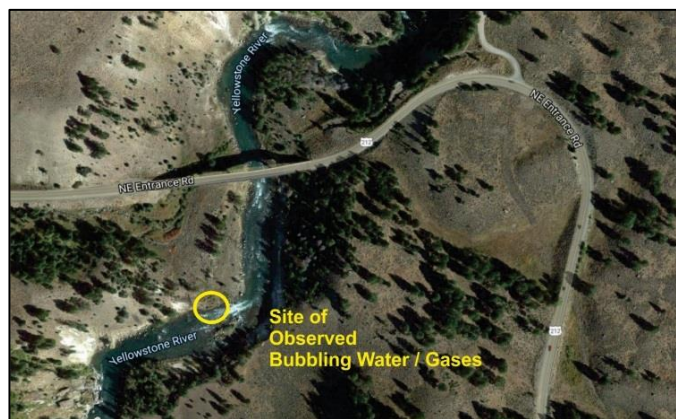


Figure 13. Secondary hotspots 0.35 miles east of Tower Junction.

Following the aerial survey in the summer of 2019, four boreholes were drilled to determine preliminary subsurface conditions. All holes indicated the presence of hot ground beneath the surface for the two action alternatives presented in this EA. A borehole on the bench just west of the river (on alignment with alternative B) was hot and also had hot water at shallow depth. This preliminary geotechnical investigatory drilling also found elevated ground temperatures in the area of the existing bridge and the potential location for Alternative C. Bridge designs would strive to avoid these thermal areas if possible, though



Surface-level thermal feature near project area

additional geotechnical investigation would be needed to inform further design. If geothermally active substrate is encountered and cannot be avoided, spread footings or innovative foundation solutions would be employed to minimize impacts.

There are hot areas adjacent to the existing Yellowstone River Bridge, but the bridge and roadway have had no observable impacts on the dynamics of these features such as unnatural changes in temperature, sudden dewatering, or other physical changes such as alteration of depth, color, or movement of water.

Impacts of Alternative A—No Action

The no-action alternative would not have any new impacts on geothermal resources within the project area. Runoff from the road surface is unlikely to enter into surface thermal features after rain and snow events as the majority of these features are along the Yellowstone River banks and upstream of the project area. Hot ground has been observed in the location of the current bridge but no adverse impact to any thermal features has been observed. While the existing bridge is located in an area where hot ground has been recorded, no impacts in this area, or to any geothermal features near the existing bridge, have been observed.

Cumulative Effects and Conclusion

There would be no new direct or indirect effects on geothermal resources under Alternative A; therefore, there would be no cumulative effects.

In conclusion, the main thermal features with closest proximity to the project area are the features associated with Calcite Springs. This area is approximately one mile from the site and would not be affected by this alternative. Hot ground is common along the Yellowstone River in the project area, and the existing bridge and associated footings have not caused a loss of heat that is measureable.

Impacts of Alternative B— Replace Bridge on New Alignment South of Existing Bridge (Proposed Action and NPS Preferred)

In this alternative the bridge design and location would avoid active thermal areas on the surface, including those shown in figures 12 and 13 and the popular visitor destination known as Calcite Springs. A borehole drilled near the west edge of the river on this alignment in summer 2019 revealed the presence of both hot ground and hot water below the surface. Additional subsurface investigation would occur prior to construction to inform final design and pier locations for the bridge.

The hot areas discovered during subsurface geotechnical investigations that align with Alternative B may be avoided by relocating piers, or if they cannot be avoided, pier designs with shallow footings for use in thermal areas would be used. Use of this type of footing would likely avoid changing the dynamics of geothermal processes in the project vicinity. Additional geotechnical investigation of subsurface conditions would require drill holes usually 10 to 50 feet in depth, or possibly deeper depending on the structure to be built. Diameter of drill holes is usually between 8 to 12 inches. Drill fluid is usually water and would be captured and properly disposed of. Results obtained during the drilling process would dictate the depths of borings. The geologist for the park would be consulted on the process and would have authority to stop drill operations if needed for safety or resource concerns.

While subsurface hot areas do exist beneath the alignment for Alternative B, including the bridge location, there is negligible potential for adverse impact on geothermal features largely because: 1) the project has been sited to avoid the most active thermal areas, 2) road realignment is largely a “surface” disturbance that does not result in deep subsurface alterations; and 3)

runoff from paved areas would be routed to avoid thermal features. In addition, ongoing road maintenance activities, as well as visitor and administrative use of the road would be largely confined to “paved areas” and poses negligible risk of adverse impacts to geothermal resources. These risks would likely not be measurable, and would not result in any change to any surface geothermal feature.

Presently, no known thermal resources are located along the proposed road portion of the alignment for this alternative. If any unknown thermal resources are found, additional “thermal design” for the road would address these areas. Bridge footings for the piers would be constructed using drilled piers 10-foot in diameter and 50-75 feet deep. If hot ground is encountered, shallow spread footing designs would be used that would range in depth from 8-25 feet and would be 20-70 feet across depending on the type used.

In order to dissipate or vent subsurface heat if encountered, both the road and bridge footings may have design features to enable this function. Coarse rock and/or pipes could be placed under the structure as necessary to allow heat to dissipate and/or vent, which would prevent heat buildup below the roadbed or footing. The bridge piers themselves would likely dissipate some heat from the ground to the air, though any impact from heat loss would not be measureable.

Thermal design would not only protect infrastructure components, but would avoid disrupting the normal dynamics of thermal features. Thermal design elements would be incorporated as necessary during the final stages of design. Depending on the action, additional compliance may be necessary before these could be implemented. The road realignment is largely a surface disturbance that does not result in deep subsurface alterations. No thermal features have been identified along the road for this alternative and there would be no effects on thermal resources due to the road.

Cumulative Effects and Conclusion

There have been no adverse impacts on geothermal features from past projects such as the road reconstruction from Roosevelt to the Tower Fall Store, or anticipated impacts from the upcoming road reconstruction from the Tower Fall Store to the Chittenden Road, and future road reconstruction of the Northeast Entrance Road, because all were routed, or are being designed, to avoid impacts to thermal features. Mitigation measures to vent heat would be employed in these road projects if avoidance of hot ground is impractical, or if the full extent of thermal features was unknown. Runoff from paved areas would be directed away from thermal features at the surface, and has not directly influenced thermal features in the project area or in the projects previously described. Because there are no impacts to geothermal resources from past or future road projects listed, and this alternative would avoid or mitigate any impacts to this resource, there are no cumulative effects.

In conclusion, no thermal features have been identified along the road for this alternative and there would be no effects on thermal resources due to the road. While hot ground has been recorded beneath the existing bridge and on the alignment of the new bridge, thermal design would likely allow for construction of new bridge piers in this area without impacting the heat source that drives the thermal features of Calcite Springs or other smaller features closer to the project area. The potential impacts of this project are thus limited to heat dissipation from the ground to the air through the bridge piers, and the amount would likely not be measureable.

Impacts of Alternative C— Existing alignment and new bridge parallel to the existing bridge on the north side

This alternative would construct a bridge on a new alignment north of the existing bridge, with only very slight adjustments to the current road alignment. The adjustment to the road alignment would require retaining walls, as previously described. Their installation would require cutting back into the hillside in this area approximately 30-40 feet. No hot ground has been located on the affected hillside, and these walls would have no effect on geothermal resources.

Secondary hot spots were identified in the area just south of the Tower to Canyon Road near the outer extent of the project area. These hotspots would be avoided during all phases of the project.

A borehole drilled on the west side of the river and north of the existing bridge in summer 2019 revealed the presence of hot ground below the surface. This area, if used for a bridge pier, would require a shallow footing design described in the impact discussion of alternative B. Impacts to geothermal resources from a pier in this location would be limited to heat dissipation from the ground to the air through conduction of the bridge pier. The amount of heat would likely not be measurable, and no affects to any geothermal feature in or adjacent to the project area would occur.

Additional geotechnical investigation of subsurface conditions would require drill holes usually 10 to 50 feet in depth, or possibly deeper depending on the structure to be built. Holes would be drilled in the existing road, within the new portion or realigned road, and near the replacement bridge. Holes would be between 8 to 12 inches in diameter. Drill fluid is usually water and would be captured and properly disposed of. Results obtained during the drilling process would dictate the depths of borings. The park geologist would be consulted on the process and would have authority to stop drill operations if needed for safety or resource concerns.

Cumulative Effects and Conclusion

Because there are no impacts to geothermal resources from past or future road projects listed, as described under Alternative B, and this alternative would likely avoid any impacts to this resource, there would be no cumulative impacts.

In conclusion, hot ground has been recorded at the bridge location for this alternative. As in Alternative B, thermal design would likely allow for construction of new bridge piers in this area without impacting the heat source that drives the thermal features of Calcite Springs or other smaller features closer to the project area. The potential impacts of this project are thus limited to heat dissipation from the ground to the air through the bridge piers, and the amount would likely not be measureable.

Visitor Use and Experience

Affected Environment

People from around the world come to Yellowstone each year to experience its wonders. Park visitation in each of the past four years has exceeded 4 million and is up over 30% from visitation averages in the early 2000s (figure 14). This trend is expected to continue. Visitation is highly seasonal (figure 15). June, July, and August are the months of highest use, with 50% of the park's visitors arriving in July and August. The shoulder-season months of May and September receive less use, but volume remains substantial. During the summer season, average daily traffic on the Northeast Entrance Road is 2,030 vehicles per day (OTAK 2017). When people-per-vehicle averages are incorporated, it is likely over 4,600 people per day use the Northeast Entrance Road during summer. This is also one of the only routes in the park open during winter, providing access to the communities of Silver Gate and Cooke City, Montana, which have approximately 140 permanent residents. Cooke City is a popular destination for winter sports such as snowmobiling and skiing.

The Tower-Roosevelt area is a haven for wildlife-watching enthusiasts, with open meadows providing excellent opportunities for viewing wildlife year round. Black bears are particularly abundant due to the diverse habitat types. Bear sightings, and the consequent “bear jams,” are a

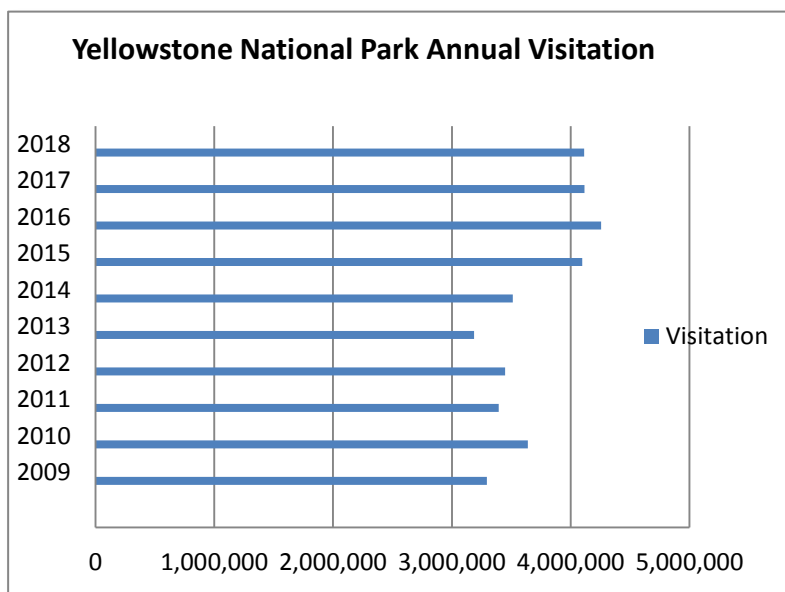


Figure 14. Annual park visitation for past 10 years.

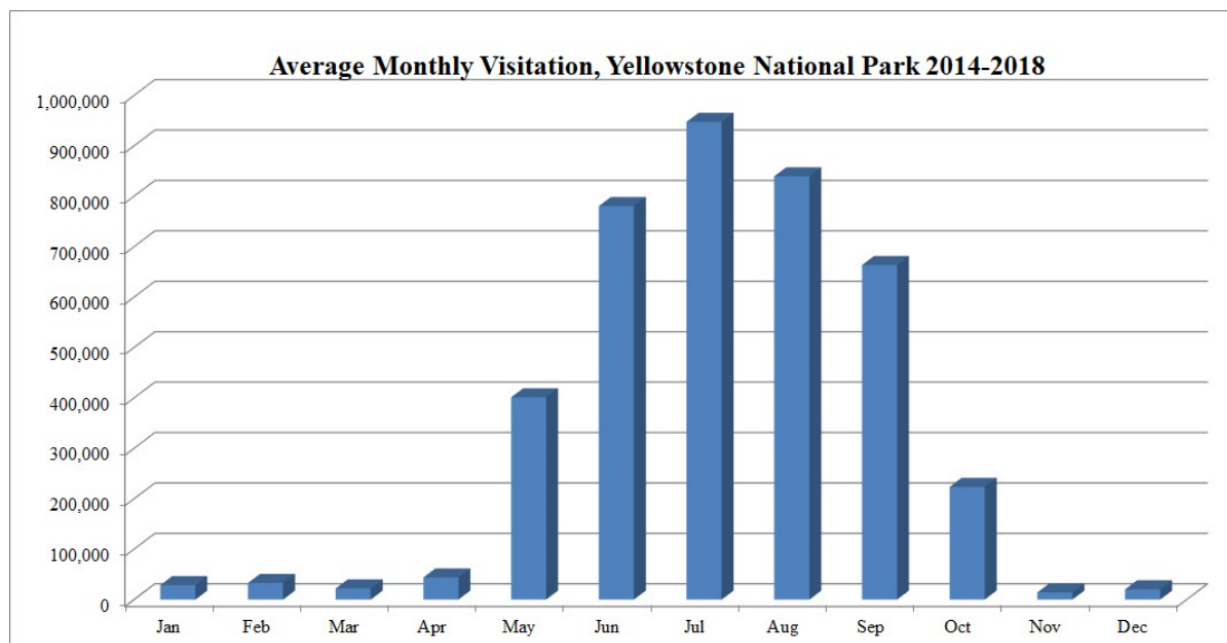


Figure 15. Average monthly visitation in Yellowstone National Park, 2014-2018.

frequent occurrence during summer. Hiking is also popular in the area. Lost Lake Trail, Lost Creek Falls Trail, Garnet Hill Trail, and Tower Fall Trail are commonly used. Nearby streams and rivers are well known to anglers, especially Slough Creek and the Lamar River. Cross-country skiing is popular in the winter, with several groomed ski and snow shoe trails in the vicinity including Lost Lake trail, Blacktail Deer Plateau, and the Tower Fall Road and Chittenden Loop.

Organized concession activities in the summer include horseback rides along designated trails and stagecoach rides and wagon rides to Yancey's Hole. These activities launch from the Roosevelt Corral and are very popular with visitors. Accommodations at the Roosevelt Lodge location are small rustic cabins. The Roosevelt Lodge dining room provides meals for both guests and day-use visitors on a first-come first-served basis.

The Wrecker Parking Area on the east side of the bridge provides fishing access to the river below and access to a trail that leads to the confluence of the Yellowstone and Lamar rivers. The area is also frequently used by educational groups since it accommodates bus parking, provides trail access and is off the main road. 240 groups use the site annually, bringing a total of 3,400 participants.

Currently just east of the existing Yellowstone River bridge there is a tight curve in the road, with steep drop offs to the river side (north), and a steep grade of 7%. In winter months slick roads demand driver attention in this area. A Federal Highways study in 2019 determined this area was a potential hazard for drivers.

The Yellowstone River Picnic Area is located one half mile drive east of the Yellowstone River Bridge. The picnic area consists of a small loop road with about 10 picnic sites and parking spaces. There is a single vault toilet. The picnic area is very popular; generally, all the spaces are filled from 10 a.m. to 3 p.m. daily for most of the summer. This picnic area is highly used and undersized, with parked vehicles regularly spilling onto the Northeast Entrance Road.

Impacts of Alternative A—No Action

Under Alternative A, there would be no action and no new impacts on visitor use and experience in the project area. Thousands of visitors per day would continue to enjoy use of the road and river views from the existing bridge, unless and until the bridge becomes inoperative. Short closures of the bridge for repair work (less than a day for any given project) would occur until such time as the bridge may have to be closed for safety reasons. At that time, a closure would be required but because the timeframe for that is hard to predict, the impacts of that closure are not reasonably foreseeable and are not analyzed further.

Improvements would not be made to the existing pullouts or nearby picnic area, which would continue to be undersized for current use. No dedicated trailhead parking would be constructed for the Yellowstone River Trail. Therefore, visitors seeking trailhead parking would continue to use undersized pullouts or spaces in the inadequately-sized Yellowstone Picnic Area. The trail north of Wrecker Pullout would continue to be used and accessed as it is presently and no changes would occur there.

Cumulative Effects and Conclusion

Because visitor use and experience impacts would not change under this alternative in the foreseeable future, there would be no cumulative impacts.

Impacts of Alternative B— Replace Bridge on New Alignment South of Existing Bridge (Proposed Action and NPS Preferred)

Construction of this alternative would take about three years to complete. Construction of a new bridge on a new alignment would mean the existing roadway and bridge would continue to be used until completion of the new bridge. When construction of the new bridge and road are complete, traffic would then use the new alignment. The old roadway, bridge, and Wrecker Parking area would then be removed and the old alignment restored to natural conditions. During removal of these elements, visitor traffic would be on the new road alignment and bridge, and thus, no delays to visitor traffic would occur. Some equipment noise would be heard from Roosevelt, though due to distance, topography and normal visitor road noise, it's unlikely to affect the visitor experience.

Visitor services at Tower-Roosevelt would continue to be available during project construction. Hiking trails would remain open, including the Yellowstone River Trail, though access to these trails from within the project area would be restricted because pullouts at these trailheads, the Wrecker Parking area, and the picnic area would be closed to parking and vehicles during the 3-year construction period. While visitors could still have access by parking at Tower Junction and hiking cross country to points along these trails, it is unlikely that many visitors would do so, given the other hiking and sight-seeing opportunities in the vicinity, such as Lost Lake, Slough Creek, and Mount Washburn, which offer similar experiences. An increase in use of these other trails could diminish the experience of those hikers seeking more solitude.

Three to four parking spaces near the vault toilets at Tower Junction would be used for a construction office trailer for three years. The vault toilets and parking for approximately 20-25 vehicles in this area would remain open and available for public use.

The pullouts at each end of the existing bridge would remain open to use as long as this road segment and bridge carry traffic. Therefore fisherman and hikers would still be able to use them until the old road and bridge are removed, and traffic is switched to the new road alignment. When construction in these areas begins, fishing access to the Yellowstone River south of the existing bridge within the construction zone would likely be closed for the duration of the project. Fishing to the north of the bridge would likely continue until the existing bridge is deconstructed, which would occur during the third year of construction. Closing the area south of the bridge would likely increase fishing pressure north of the bridge, resulting in some crowding that could displace some visitors to other nearby areas for fishing, and/or affect solitude during fishing. Upon completion of the project, visitors seeking fishing access to the Yellowstone River near the bridge would need to hike a longer trail to get to the river's edge, requiring about 1,800 feet of additional hiking each direction. This is not expected to change angler use of this area.

Currently equestrian crossings occur on the Grand Loop Road and the Northeast Entrance Road in the project area. While this use would continue, in this alternative, a hazardous crossing of the Northeast Entrance Road would be eliminated by moving the alignment to the east, eliminating the need for horses to cross a busy vehicular road. This would eliminate the potential for conflicts between equestrian users and vehicles at this crossing and provide for a safer equestrian experience.

The Yellowstone Picnic Area would be closed during construction, eliminating a picnicking opportunity in this part of the park. There is only one other picnic area where visitors could enjoy similar experiences nearby. As a result, some visitors may be displaced to the picnic area that remains open, and not all visitors may be able to find a picnic site during summer. Some

visitors may feel their experience is degraded by increased use of the single open picnic site. These impacts would last during the three summers that the Yellowstone Picnic Area is closed. During construction, the facility would be expanded by approximately 10-20 parking spaces, increasing its current capacity when it is reopened following project completion. Six to ten new parking spaces would be dedicated to the Yellowstone River hiking trail, thus reducing the potential for spillover parking on the roadway and consequent congestion.

The new alignment for the road would resolve the existing safety concern of having a tight curve on the east side of the existing bridge by eliminating it. As the new bridge would also be a little over twice the height of the existing bridge, the steepness of the road from both the east and west approaches to the bridge would be constructed to a lesser grade, making the road safer in slick winter driving conditions.

The existing Wrecker Parking area and access road would be removed in this alternative. A pullout/parking area at the east end of the new bridge would be constructed to accommodate both cars and oversized vehicles for this existing use.

A new 1,800-foot natural surface trail extension would be constructed to meet the existing trail that provides access to the confluence of the Yellowstone and Lamar rivers. A parking area at the west end of the bridge would also be constructed. Dedicated trailhead parking (6-10 cars each) would improve and expand access to both the Garnet Hill Loop Trail and the Yellowstone River Trail. This would give a greater number of visitors the opportunity to hike these trails, but could also increase crowding and possibly degrade the experience of those visitors seeking more solitude. These new trailhead parking areas would require short natural surface trail extensions from the existing trails of about 500 and 100 linear feet respectively.

Alternative B would increase visitor accessibility at the Yellowstone River Bridge, improve traffic flow and safety by reducing grades on the bridge approaches, and expand the capacity for picnicking and trailhead parking; all small but permanent beneficial impacts for the visitor experience. There would be minimal traffic delays because the current bridge and roadway would remain open throughout construction, which is a considerable beneficial impact for visitors.

Over the next 50 years (the lifespan of a new bridge), tens of millions of visitors would enjoy the benefits of a bridge replacement, associated parking and picnic area improvements, and widened pedestrian walkways. A new fishing access trail would continue to allow visitors to hike to the shore of the Yellowstone River. The widened walkways on the new bridge would provide access to views of the river for visitors with disabilities.

Cumulative Effects and Conclusion

Widening of the Northeast Entrance Road and the Tower Fall to Chittenden Road Reconstruction projects would impact a narrow corridor along the existing roads. Removal of vegetation and modification of the cuts and fills along the road edge, resulting in slightly altered local topography, would occur during these projects. Road widening would make the road easier to drive for visitors, and thus enhances their safety, but also has a drawback of introducing additional or expanding road cuts and further separating visitors from roadside vegetation, which could make the drive less enjoyable for some. During reconstruction, some visitor traffic would be impacted from short-term delays of up to 30 minutes or potential late-season closures of up to four weeks. These projects would involve construction-related delays, noise, and potential closures of roadside attractions, all of which would impact park visitors. Closures of features along the road would be in segments where construction along the road is occurring in a given year, and could last from one to three years. Closures and delays would continue to be

advertised in advance to allow visitors to make any desired adjustments in their itinerary.

When the direct/indirect impacts of Alternative B are combined with these other past, present and reasonably foreseeable future impacts, the cumulative impact on visitor use and experience would continue to be adverse. The incremental impacts of this alternative would add only a few minor delays as traffic would not be impacted by construction on a new alignment. Altogether, the Northeast Entrance Road project (27.5 miles) would improve just under 9 percent of the paved road in the park, while the Tower Fall to Chittenden Road project (6 miles) would improve about 2 percent. This amount of road construction in the park in a given year is not unusual, as annual projects are necessary to balance visitor traffic impacts with on-going maintenance and upgrades of park roads.

In conclusion, Wrecker Pullout, trailhead parking, and the Yellowstone River picnic area would all be closed for the 3-year duration of the project. Following completion of the project, an enlarged picnic area, dedicated trailhead parking, and universally accessible walkways on the new bridge would benefit visitors for the next 50-years or beyond. As there are only one other picnic area on the Northeast Entrance Road, closing the Yellowstone Picnic area for three years would inconvenience those looking for this service. Fishing opportunities are found in all portions of the park and are readily available, so closure of a portion of this river would not have a widespread affect.

Impacts of Alternative C— Existing Alignment and New Bridge Parallel to the Existing Bridge on the North Side

Construction of this alternative would take about three years to complete. Most of the trailheads and turnouts within the project area, including the Wrecker Pullout and Yellowstone River Picnic Area, would be closed to visitors during construction, as these areas would be needed for staging. This would eliminate a visitor's opportunity to begin their hikes at some trailheads, such as Garnett Hill and the Yellowstone River Picnic Area, during the 3-year construction period. Visitors could still access area trails, albeit with a much longer approach, or use other trails nearby, such as Lost Lake, Slough Creek, and Mount Washburn, which offer a similar experience. An increase in use of these other nearby trails could diminish the experience of those hikers seeking more solitude. In addition, closure of the picnic area would have the same impacts as described under alternative B.

During the three-year construction period, single lane traffic would be necessary in much of the project area, resulting in delays up to 30 minutes and longer delays of up to 4 hours during work on bridge abutments and piers. A traffic light would be installed and would operate day and night. A flagger may also be present during peak traffic periods. Regular users of the road, such as residents of Cooke City and Silver Gate and park employees, would be adversely affected more frequently than one-time visitors because many of these residents use the road on a daily basis.

Further, full closures of the road lasting 2- 4 hours periodically throughout the construction season would be needed to unload steel, rebar, piles, and other construction material. Longer delays would be required to offload and set bridge girders due to the confined space for construction with this alternative. Several thousand visitors could be delayed or may choose another route during the multi-hour closures. Construction noise would occur throughout the construction phase spanning three seasons (generally April-November, though no restrictions on winter work would occur if weather allows). This noise would be intermittent and would generally not be audible beyond the Yellowstone River Valley, a distance of 0.05 to 0.25 miles wide. In some instances such as for pile driving and construction of work bridges, noise would

likely be heard in the Tower-Roosevelt area. This may affect a visitor's ability to hear natural sounds and could cause some wildlife to avoid the area, for up to 100 days total during the three year project. Visitors will still have opportunities to experience natural sounds and see wildlife in this area during the rest of the construction period, and these impacts would cease once construction is complete.

The maximum grade of the road segment directly east of the existing bridge would continue to be a steep 7.2% (same as existing) and there would also be no improvement to horizontal or vertical curvature of the road, meaning there would be a continued potential for traffic accidents in this area. Vehicles traveling west would need to keep their speed under control on the downhill approach to the bridge. Guardrails, signs, and other measures would likely be constructed to minimize the potential for traffic accidents and for drivers to lose control and go off the road, which would improve safety.

The retaining walls that would be constructed on the north side of the road and west of the bridge would be up to 40 feet in height and visible from approximately 0.60 mile of road within the project area. Some visitors may feel that these walls negatively impact the visual and aesthetic qualities where they are visible, which may detract from their experience.

No change to equestrian crossings in the area would occur. As a result, there would continue to be two hazardous crossings where the potential for equestrian and vehicle conflicts would remain. These crossings occur up to 6 times per day and usually are completed within 5 minutes for each crossing. No accidents have occurred to date. The Yellowstone River Picnic area would be expanded by 10 to 20 sites. As with alternative B, dedicated paved trailhead parking for 6-10 cars each would be added for both the Garnet Hill Loop and Yellowstone River Trails. This would give a greater number of visitors the opportunity to hike these trails, which could also increase crowding and possibly degrade the experience of visitors seeking more solitude.

Cumulative Effects and Conclusion

The impacts of other road projects are the same as described under Alternative B. When the direct/indirect impacts of Alternative C are combined with these other past, present and reasonably foreseeable future impacts, the cumulative impact on visitor use and experience would continue to be adverse. The incremental impacts of this alternative would add additional traffic delays of 30-minutes throughout the length of the 3 year project with regular closures of 2-4 hours, with some longer delays for deliveries of bridge components and setting bridge girders. Altogether, the Northeast Entrance Road project (27.5 miles) would improve just under 9 percent of the paved road in the park, while the Tower Fall to Chittenden Road project (6 miles) would improve about 2 percent. This amount of road construction in the park in a given year is not unusual, as annual projects are necessary to balance visitor traffic impacts with on-going maintenance and upgrades of park roads.

In conclusion, Wrecker Pullout, the Yellowstone River picnic area, and trail access points within the project area for the Yellowstone River Trail and Garnet Hill Trail, would be closed for the 3-year duration of the project. This could cause increased use of other nearby trails and picnic areas, which could degrade the experience for visitors seeking more solitude. These impacts would cease once construction is complete, at which point an enlarged picnic area, dedicated trailhead parking, and universally accessible walkways on the new bridge would benefit visitors for the next 50-years or beyond. Fishing opportunities are found in all portions of the park and are readily available, so closure of this stretch of the Yellowstone River to angling would not have a widespread affect.

Vegetation

Affected Environment

The vegetation in the Tower-Roosevelt area is a complex mosaic of forest, wetlands, meadows, and sagebrush steppe. Roosevelt Lodge and nearby cabins are nestled in an open mature Douglas-fir (*Pseudotsuga menziesii* var. *glauca*) forest, with trees continuing to the south. Stretching to the north and east towards the Roosevelt Corral location, is a mosaic of small stands of trees including both Douglas-fir and lodgepole pine (*Pinus contorta* var. *latifolia*), meadows, and small shrub areas dominated mostly by black chokecherry (*Prunus virginiana* var. *melanocarpa*).

Sagebrush steppe becomes the dominant vegetation type in the vicinity of the Tower Junction location and in much of the project area, with mountain big sagebrush (*Artemisia tridentata* var. *vaseyana*) as the most conspicuous species. These plant communities provide grazing opportunities for bison and other ungulates, which are often found in large numbers in the project area. Small aspen (*Populus tremuloides*) stands and riparian wetlands are found immediately adjacent to Lost Creek. The Yancey's Hole location is on the ecotone between the meadow/sagebrush steppe in Pleasant Valley and a forested wetland dominated by Engelmann spruce (*Picea engelmannii*).

Insufficient facilities and spillover parking lead to a number of adverse impacts on vegetation near roads and developed areas, including compaction, social trail development, trampling, and eventually loss of ground cover, which in turn can lead to increased infestations by non-native plants and noxious weeds. Additionally, existing trail use from both horses and visitors adversely impacts trail edges, leading to churned up mineral soils that can become toe holds for weed establishment.

Impacts of Alternative A—No Action

The Yellowstone River Bridge would not be replaced for the foreseeable future, and no portion of the Northeast Entrance Road would be reconstructed. Insufficient facilities and parking would continue to lead to increased infestations by non-native plants and noxious weeds. These adverse impacts on vegetation would also continue along road, turnout, and parking area edges. Weed establishment would also continue along existing horse and visitor trail edges caused by churned up mineral soils that can offer toe holds for weed establishment.

Cumulative Effects and Conclusion

There would be no new direct or indirect effects on vegetation resources under Alternative A; therefore, there would be no cumulative effects.

Impacts of Alternative B— Replace Bridge on New Alignment South of Existing Bridge (Proposed Action and NPS Preferred)

This alternative would construct the bridge and road segment on a new alignment. The new road segment would require removal of mature, intact native sagebrush and Douglas-fir communities. Once the new alignment is finished, the current road segment and bridge would be removed, recontoured, and seeded to reestablish healthy native plant communities. Reestablishment of sagebrush is often a challenge during reclamation projects in this environment, due to the length of time required for establishment.

Alternative B would have temporary adverse impacts on sagebrush and Douglas-fir communities. Additional geotechnical investigation of subsurface conditions would require truck-mounted drilling equipment accessing areas from within the proposed alignment and associated construction limits, or placed via a helicopter. Sagebrush within the proposed

alignment would be driven over and would exhibit broken branches and visible disturbance. To reduce impacts to vegetation and wetlands, areas would be either accessed when ground is frozen or using mats to drive on if ground is saturated. Construction access to both the existing and new bridge sites would disturb 5.4 acres, which would need to be revegetated. In order to construct a fish barrier on Lost Creek and repair erosion damage at the headwall cut on the lower end of the wetland west of the existing road, an additional 1.2 acres of vegetation would be impacted. Total temporary disturbance from this alternative would be 6.6 acres. It is estimated that revegetation efforts would not be deemed fully successful for a period of three to five years or longer.

Permanent impacts to vegetation would come from construction of the new roadway and its associated turnouts. A replacement parking area/turnout for the Wrecker Parking area would require the permanent loss of between one and two acres of sagebrush community. In total, road realignment and parking turnouts would result in permanent loss of approximately 14.1 acres of sagebrush and Douglas-fir communities. Additionally, 2.4 acres of these communities would be lost in the expansion of the Yellowstone River Picnic Area. A new trail from the pullout on the east end of the new bridge would require 1.2 acres of new permanent loss, and a fish barrier and repairs to the Lost Creek headcut and streambank damage would temporarily impact 0.2 acres until it reestablishes in 1 to 3 years. Total permanent impacts to sagebrush and Douglas-fir communities from this alternative would be 17.7 acres. Total permanent plus temporary impacts would equal 24.5 acres.

Rehabilitation of the existing roadway (removal of road asphalt, road base material, and recontouring of topography) would include 3.9 acres on the west side of the bridge and 2.7 acres on the east side, for a total of 6.6 acres of land disturbed but restored to natural condition. As restoration is a difficult process, and weeds are difficult to eradicate once established, it should be noted that restoration can take years to be successful. When the existing road is removed, the old roadway scar would be visible for a number of years. Restoration actions are expected to take 3-5 years after construction is complete. The net loss of sagebrush and Douglas fir vegetation would result in inconsequential permanent impacts, given it represents about 0.7% of the Yellowstone River drainage habitat located within one mile of the bridge site.

Cumulative Effects and Conclusion

Widening the 28-mile Northeast Entrance Road, along with the Chittenden to Tower Road Improvements, would lead to permanent loss of about 24 acres of sagebrush and Douglas-fir community vegetation, and temporarily impact another 50 acres of the same. Restoration actions to address temporary impacts would likely lead to successful reestablishment of native plants within 3-5 years. The Roosevelt parking project would move a parking area of approximately 30,000 square feet to an area just west of its current location. The parking footprint would expand by no more than 10,000 square feet. The existing parking would be rehabilitated to a natural looking meadow. Additional temporary impacts to sagebrush and Douglas-fir community vegetation are likely during and after construction for both of these project. Reestablishment of native plants would take three-five years.

In total, other past, present and reasonably foreseeable projects would result in loss of 25 acres of sagebrush and Douglas fir community vegetation. Alternative B would result in an additional loss of 17.7 acres of sagebrush and Douglas fir community vegetation, for a total loss of 43 acres. Therefore, when the direct/indirect impacts of Alternative B are combined with other past, present and reasonably foreseeable future impacts, the cumulative impact on vegetation would be adverse. Alternative B would contribute to less than half of this cumulative effect, which would be inconsequential in the context of the 1.2 million-acre Yellowstone River watershed

within the park.

In conclusion, Alternative B would result in the temporary loss of 6.7 acres of sagebrush and Douglas fir vegetation communities, and 17.7 acres of permanent loss of these vegetation types. The net loss of sagebrush and Douglas fir vegetation would result in inconsequential permanent impacts, given it represents about 0.7% of the Yellowstone River drainage within one mile of the bridge site.

Impacts of Alternative C— Existing Alignment and New Bridge Parallel to the Existing Bridge on the North Side

This alternative would construct the new bridge and road segment generally on the existing alignment, though the new bridge would be located adjacent to, and north of the existing bridge, a shift requiring cutting into the hillside west of the existing bridge, and north of the Northeast Entrance Road. While this would result in the loss of some vegetated area, the hillside is primarily grassland vegetation that has never fully reestablished from the original road cut. The new cut would extend about 40 feet into the hillside, requiring a series of retaining walls, some reaching about 40 feet in height. Standard erosion control measures and the construction of retaining walls would allow the hillside slope to remain at its existing angle and avoid grassland losses due to erosion. Revegetation of these slopes would occur prior to project completion.

Additional geotechnical investigation of subsurface conditions would require truck-mounted drilling equipment accessing areas mostly from the existing road. Some drill sites nearer the river may require drilling equipment placed via a helicopter. Some sagebrush within the proposed alignment would be driven over and would exhibit broken branches and visible disturbance. To reduce impacts to vegetation and wetlands, areas would be either accessed when ground is frozen or using mats to drive on if ground is saturated.

As a result of construction activities, approximately 6.5 acres of sagebrush and Douglas-fir community vegetation between the existing road and the river's edge would be lost during the 3 year construction period. In addition, constructing a replacement bridge in the confined space of the existing bridge would not allow for all required construction and staging activities. As a result about 4 acres of land, north of the Wrecker Pullout and east of the Yellowstone River, would be cleared and leveled for construction staging and materials storage. This area would be vital to the receiving, storing, and launching of new bridge girders. As a result, 11.7 acres of sagebrush and Douglas fir vegetation would be lost during the 3 year construction period. These areas would be revegetated after construction. Reestablishment is expected to take 3-5 years.

Permanent loss of sagebrush and Douglas fir vegetation—from widening the existing roadway to the park's 30-foot standard, and constructing turnouts and parking areas—total about 12.9 acres. Expanding the Yellowstone River Picnic Area would impact up to 3 acres. Restoration of the Lost Creek Headcut and installation of a barrier to protect the park's native fish population would impact 0.2 acres. In all, permanent loss of vegetation from Alternative C would total 16.1 acres. The net loss of sagebrush and Douglas fir vegetation would result in inconsequential permanent impacts, given it represents about 0.7% of the Yellowstone River drainage within one mile of the bridge site.

The temporary plus permanent adverse impacts to vegetation of Alternative C total 27.7 acres.

Cumulative Effects and Conclusion

Past, present, and reasonably foreseeable future actions and their impacts would be the same as those described for Alternative B.

Alternative C would result in a permanent loss of 16.1 acres of sagebrush and Douglas fir community vegetation. When the direct/indirect impacts of Alternative B are combined with other past, present and reasonably foreseeable future impacts, the cumulative impact on vegetation would be adverse. In total, a cumulative loss of approximately 41 acres of sagebrush and Douglas fir vegetation community is expected. Alternative C would contribute to less than half of this cumulative effect, which would be inconsequential in the context of the 1.2 million-acre Yellowstone River watershed within the park.

In conclusion, Alternative C would result in the temporary loss of 11.7 acres of sagebrush and Douglas fir vegetation communities, and 16.1 acres of permanent loss of these vegetation types. The net loss of sagebrush and Douglas fir vegetation would result in inconsequential permanent impacts, given it represents about 0.7% of the Yellowstone River drainage within one mile of the bridge site.

Wetlands

Affected Environment

Wetlands within the 148.6 acre survey area for this project (including 1.45 miles of linear roadway) were delineated in 2017 and 2018 by Yellowstone's wetland biologist and revisited in 2019 for additional species verification. Wetland boundaries were determined using the 1987 U.S.

Army Corps of Engineers Wetland Delineation Manual and 2010 Western Mountains, Valleys, and Coast Regional Supplement. A total of 67 wetlands (8.615 acres), including the Yellowstone River, were identified in the delineation process.

Within the Cowardin hierarchical classification (Cowardin et. al. 1979), four systems were found: palustrine forested (PFO), palustrine scrub-shrub (PSS), palustrine emergent (PEM), and riverine (R). Each classification exhibited slightly different water regimes.

Table 3. Wetland information.

| Wetland Classification | Number | Acres |
|------------------------|-----------|--------------|
| PEM | 44 | 3.579 |
| PFO | 1 | .266 |
| PSS | 18 | 2.553 |
| R2 | 1 | 1.898 |
| R3 | 1 | .091 |
| R4 | 2 | .228 |
| TOTAL | 67 | 8.615 |

| Wetland Classification | Common Species |
|------------------------|---|
| PEM | Water Sedge (<i>Carex aquatilis</i>), Inflated Sedge (<i>Carex Vesicaria</i> , Beaked sedge (<i>Carex utriculata</i>), Baltic rush (<i>Juncus balticus</i>), Meadow Grass (<i>Poa paulustris</i>), Blackcreeper sedge (<i>Carex praegracilis</i>) |
| PFO | Inflated Sedge (<i>Carex Vesicaria</i> , Englemann spruce (<i>Picea engelmannii</i>), Common horsetail (<i>Equisetum arvense</i>) |
| PSS | Inflated Sedge (<i>Carex Vesicaria</i>), Drummond willow (<i>Salix drummondiana</i>), Coyote willow (<i>Salix exigua</i>), Planeleaf willow (<i>Salix plantifolia</i>), Baltic rush (<i>Juncus balticus</i>), and Bebb willow (<i>Salix bebbiana</i>) |

The PFO depression within the study area boundary likely receives hydrology from groundwater flow and snowmelt. The observed PEM systems consist of snowmelt fed wet meadows, a spring mound, and a geothermal wetland. The PSS systems form a riparian buffer within the floodplain of Lost Creek.

Forty-four of the 67 wetlands identified were classified as PEM. The palustrine wetlands within the Yellowstone River Bridge study area serve the following functions to the Greater Yellowstone Ecosystem: temporary surface water storage, water filtration and sediment retention, nutrient storage and transformation, shoreline stabilization and retention, and habitat for fish, waterfowl, amphibians, reptiles, and other wildlife.

Table 3 lists the delineated wetlands and the sum acreage in each of the Cowardin classification system delineated within the survey area.

Notable within the survey area was one thermally influenced wetland (labeled YRB_007 in the full report) located under the current Yellowstone River Bridge just at the edge of the Yellowstone River. Thermally influenced wetlands are rare in the park and extremely rare in the National Park System. This particular wetland was occupied by 65% standing water in 2017 with the dominate vegetation of *Deschampsia cespitosa*. Another rare occurrence within the survey area was wetland YRB_013 just across the road from the Garnet Hill Trailhead as it supports a very well-developed spring mound. Spring mounds are groundwater upwellings, a feature that is unusual in the park. There were also three wetlands including one forested fen with organic soil identified in the area. Wetlands with developed organic soil take a long time to form and require various environmental processes over time to develop the necessary hydric and chemical properties that support the formation of organic soil matter. These high functioning wetlands providing unique habitats, store water, abate flooding, and mineralize pollutants. Palustrine forested wetlands (PFO) by themselves are rare in the park. The PFO wetland found in the survey area was considered very special because it was forested and had organic soil. Forested wetlands also require a long time to form due to the requirement for the trees to be a certain size. These wetlands are instrumental in supporting and maintaining broad ecosystem function across the entire Yellowstone landscape. In addition to the wetlands with developed organic soil, there were six other wetlands noted for their highly intact plant communities across the survey area.

A few wetlands also had highly impacted vegetation, including some invasive species as well as a significant lack of plant community diversity.

The existing bridge has two piers located in the river channel. These piers speed up water by narrowing the usable channel, which accelerates erosion and scour of the streambed. Scour of the streambed at this location would continue due to the existing piers in the channel, which has a small adverse effect on wetland function in the area, because it makes waters of the U.S. more turbulent (the river's water surface is considered a wetland).

Also of note in the Yellowstone River Bridge Survey area is the Lost Creek drainage which begins near Tower and flows past the Garnet Hill Trailhead, passing through a culvert under the road and flowing continuously on the south side until it reaches the Yellowstone River. This drainage supports a variety of wetlands (PEM, PSS, and Riverine systems). Many of these wetlands are inundated at high water and stay wet all year. The Grand Loop Road bisects the Lost Creek Drainage separating the drainage flow and isolating the wetlands on the south side of the road. Use and maintenance of the road over decades has left the area highly impacted.

Impacts of Alternative A—No Action

Under Alternative A, no action would be taken to reconstruct the existing bridge. There would be no new wetlands impacts because the existing bridge's piers and abutments would not be replaced and a temporary work bridge/s would not be constructed. The current bridge would remain as is, though routine maintenance such as stabilization activities, repaving the deck or addressing spalling, and limiting loads would continue until safety concerns force the eventual

closure of the bridge. During any required maintenance of the existing bridge, protective measures would be implemented to limit or avoid impacts on wetlands such as placing mats or plywood to drive over wet areas.

The amount of wetland impacted by road maintenance and reconstruction projects, usually totaling only a few tenths of an acre per project, is a fraction of the hundreds of acres found near road edges in the park. Also, NPS policy states that any wetland impacts be mitigated through restoration of degraded wetlands, ensuring there is no net loss of wetlands within the park. Therefore, under the no-action alternative, on-going road maintenance activities would result in no adverse effects to wetland function and value in the immediate area of the bridge.

Accelerated erosion and scour would continue under the no-action alternative, causing a small adverse effect on wetland function adjacent to the bridge, by not allowing some wetland vegetation to establish.

Cumulative Effects and Conclusion

There would be no new direct or indirect effects on wetlands under Alternative A; therefore, there would be no cumulative effects.

In conclusion, under Alternative A, the amount of wetland impacted by road maintenance and reconstruction projects, usually totaling only a few tenths of an acre per project, is a fraction of the hundreds of acres found near road edges in the park. Also, NPS policy states that any wetland impacts be mitigated through restoration of degraded wetlands, ensuring there would be no net loss of wetlands within the park under Alternative A.

Impacts of Alternative B— Replace Bridge on New Alignment South of Existing Bridge (Proposed Action and NPS Preferred)

Under alternative B, the road alignment was designed to avoid all scrub-shrub wetlands near the proposed route. In areas where fill material is needed for constructing the road prism, sediment fencing and other erosion-control best practices would be used to avoid temporary or permanent impacts to nearby wetlands.

Construction of a temporary work bridge, access roads, and staging areas would affect 0.07 acres of PEM wetlands from river shore disturbances below the existing bridge, temporarily increasing turbidity during the three-year construction period. Turbidity and sediment can settle on wetland vegetation, stressing or reducing plant density depending on the depth of sediments accumulated.

If in-water work is required, this could also result in temporary increases in turbidity as described in the dismissal of water quality and quantity in chapter 1, which would further contribute to the temporary wetland impacts described above. In addition, the removal of existing bridge piers, the installation and later removal of work bridges, and the installation of new bridge piers can disturb bottom sediments as these structures are pulled from/installed in the river bottom (see the dismissal of water quality and quantity in chapter 1). This would also contribute to similar effects on wetlands as described above.

While there would be localized impacts to wetlands while these activities are occurring, these activities would be complete within a few weeks, at which point impacts would cease. In addition, increased turbidity would not have lasting effects on wetlands as the next snowmelt cycle, typically in May and June annually, will cause high water to flush built up sediment from these wetland areas.

Alternative B would not result in the permanent loss of wetlands, and no wetland mitigation would be required. Instead, in this alternative, approximately 0.2 acres of wetlands in the Lost Creek drainage would be reestablished due to removal of a fill slope along the existing road, which is encroaching into Lost Creek. When the road is re-aligned, this encroachment would be eliminated, resulting in a very small increase in wetland acreage and associated functions and values in the project area.

Cumulative Effects and Conclusion

Proposed future widening of the Northeast Entrance Road would likely result in adverse impacts to wetlands (typically PEM), namely direct loss due to widening, shifting road alignment, or adding culverts or shoreline erosion control measures. Wherever possible during design, permanent loss of wetlands would be avoided by widening to a side of the road where no wetland is present. In a few complex areas, it's possible that not all wetlands can be avoided. In the few instances when wetlands cannot be avoided, mitigation for wetland impacts is required by NPS policy, which typically requires restoration of already impacted wetlands to offset losses.

While there would be some adverse effects on approximately 0.08 acres of wetlands during the three-year construction period, this would cease once construction is complete, and implementation of Alternative B would result in a beneficial impact on wetlands from re-establishing 0.2 acres of wetland in the park. When added to other past, present and future actions (no net loss), overall cumulative impacts to wetlands would be small but beneficial. Alternative B would be the driver for this overall beneficial impact.

In conclusion, there could be some temporary disturbance of wetlands and increased turbidity during the three year construction period that would cause some wetland vegetation to be stressed from sediment and soil covering portions of the plant. However once construction is complete, these impacts would cease, and there would be no permanent loss of wetlands from this alternative, and no wetland mitigation would be required. Once complete, the project would increase existing wetland acreage (currently just over 8.6 acres in the 148.6 acre survey area for this project) by approximately 0.2 acres or 2.3 percent.

Impacts of Alternative C— Existing Alignment and New Bridge Parallel to the Existing Bridge on the North Side

The road alignment under alternative C would be constructed so that impacts to natural resources generally only occur on one side of the road. The centerline of the road would be shifted to help minimize these impacts. Thus, if wetlands exist on one side of the road, and not the other, then the road would be widened to the side without the wetlands. In areas where fill material is needed for widening of the road prism, sediment fencing and other erosion-control best practices would be used to avoid temporary or permanent impacts to nearby wetlands. Retaining walls would be constructed to hold back the fill-side embankment at the edge of Lost Creek. Fill to widen the road just north of Tower Junction would encroach into existing wetlands that abut the road. Fill from road widening would result in the permanent loss of 0.3 acres of existing palustrine emergent wetlands immediately adjacent to the road. As there were just over 8.6 acres of wetlands in the 148.6 acre survey area for this project, this would represent a loss of approximately 3.5 percent.

Compensatory mitigation for the permanent loss of 0.3 acres of palustrine emergent wetlands would be accomplished through unobligated wetland credits obtained through the removal of 1.86 acres of road fill that is presently located within the lower Pelican Creek drainage system. By removing road fill in former wetlands and removing the existing Pelican Creek causeway, approximately 1,300 linear feet of causeway would be removed and 1.86 acres of floodplain and

wetland functions restored. The Pelican Creek causeway would be replaced with a new viaduct, which would span the width of the creek.

Construction of a temporary work bridge, access roads, and staging area would temporarily disturb the river shore below the existing bridge and temporarily generate increased turbidity for up to the three year construction period, affecting up to 0.07 acre of PEM. This would have the same impacts as described under alternative B.

In addition, during removal of the existing bridge and construction of the new bridge no heavy equipment would operate within the river. Equipment would be located on shore or on the existing bridge, or work bridge, for all in-water work required to remove existing bridge piers and install and remove temporary bridge piles. Any in-water work required would also result in temporary increases in turbidity and associated wetland impacts described under alternative B during the three-year construction period. Removing the bridge piers, the installation and later removal of work bridges, and installation of the new piers can also disturb bottom sediments as these structures are pulled out/installed in the river bottom. This would have the same impacts to wetlands as described under alternative B.

As described for alternative B, localized impacts to wetlands would cease once these activities are complete; and increased turbidity would not have lasting effects on wetlands as the next snowmelt cycle will cause high water to flush built up sediment from these wetland areas.

Cumulative Effects and Conclusion

The types of cumulative impacts of other projects, as well as duration and scale, are the same as those described for alternative B.

There would be some adverse effects on approximately 0.07 acres of wetlands during the three-year construction period, as well as adverse impacts from the loss of 0.3 acres of wetland in the project area. Therefore, when added to other past, present and future actions (no net loss), there would be a small but overall adverse cumulative effect to wetlands, which would be driven by alternative C.

In conclusion, there could be some temporary disturbance of 0.07 acres of wetlands and increase in turbidity during the three-year construction period that would have the potential to temporarily cover some portion of wetland plants with sediment. As the sediment would likely not be extensive and no lasting effects would occur due to sedimentation. Although these impacts would cease once construction is complete, Alternative C would result in permanent loss of 0.3 acres of wetlands. This would represent a loss of approximately 3.5 percent of the 8.6 acres of wetlands in the 148.6 acre survey area for this project. This loss would be mitigated by use of unobligated wetland credits from the Fishing Bridge to Indian Pond Road Reconstruction Project, specifically wetland restoration in the Pelican Creek area.

COMPLIANCE REQUIREMENTS, CONSULTATION, AND COORDINATION

Agencies, organizations and persons consulted in development of this document are below:

- Federal Highways Administration, Office of Federal Lands Highway, Vancouver, Washington
- Wyoming State Historic Preservation Office, Cheyenne, Wyoming
- United States Fish and Wildlife Service, Wyoming ES Field Office, Pinedale, Wyoming
- Yellowstone's 26 associated tribes:

Assiniboine & Sioux Tribes, Fort Peck
Blackfeet Tribe
Cheyenne River Sioux Tribe
Coeur d'Alene Tribe
Comanche Tribe of Oklahoma
Confederated Salish and Kootenai Tribes
Confederated Tribes of the Colville Indian Reservation
Confederated Tribes of the Umatilla Indian Reservation
Crow Creek Sioux Tribe
Crow Tribe
Eastern Shoshone Tribe
Flandreau Santee Sioux Tribe
Gros Ventre and Assiniboine Tribes
Kiowa Tribe of Oklahoma
Lower Brule Sioux Tribe
Nez Perce Tribe
Northern Arapaho Tribe
Northern Cheyenne Tribe
Oglala Sioux Tribe
Rosebud Sioux Tribe
Shoshone-Bannock Tribes
Sisseton-Wahpeton Sioux Tribe
Spirit lake Sioux Tribe
Standing Rock Sioux Tribe
Turtle Mountain Band of Chippewa Indians
Yankton Sioux Tribe

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