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Environmental Assessment

Bessey Pedestrian Bridge

**Bessey Ranger District, Nebraska National Forest
Thomas County, Nebraska**

T. 22 N., R 26 W., Section 2, 6th Principle Meridian

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INTRODUCTION

Document Structure

The Forest Service has prepared this Environmental Assessment in compliance with the National Environmental Policy Act (NEPA) and other relevant Federal and State laws and regulations. This Environmental Assessment discloses the direct, indirect, and cumulative environmental impacts that would result from the proposed action and alternatives. The document is organized into four parts:

- *Introduction:* The section includes information on the history of the project proposal, the purpose of and need for the project, and the agency's proposal for achieving that purpose and need. This section also details how the Forest Service informed the public of the proposal and how the public responded.
- *Comparison of Alternatives:* This section provides a more detailed description of the agency's proposed action as well as alternative methods for achieving the stated purpose. These alternatives were developed based on significant issues. This discussion also includes possible mitigation measures. Finally, this section provides a summary table of the environmental consequences associated with each alternative.
- *Environmental Consequences:* This section describes the environmental effects of the alternatives. This analysis is organized by resource areas.
- *Agencies and Persons Consulted:* This section provides a list of preparers and agencies consulted during the development of the environmental assessment.
- *Appendix A:* Watershed Conservation Practices.

Additional documentation, including more detailed analyses of project-area resources, may be found in the project planning record located at the Bessey Ranger District Office in Halsey, Nebraska.

Background

The Bessey District Recreation Complex consists of the District and Nursery Offices, nursery grounds, campgrounds, picnic areas, and trail heads. Currently, visitors camping or recreating at the Bessey Recreation Complex facilities must walk or ride their bicycles across the State Road 86B bridge, which spans the Middle Loup River, to access the recreational fishing pond located on the north side of the river or, conversely, visitors parking near the fishing pond have to walk (or drive) across the bridge to access facilities on the south side of the river. The current road bridge has narrow shoulders and there are safety concerns with pedestrians or bicycles mixing with large recreational vehicle traffic or livestock trucks that also use the road to access National Forest System or private lands.

Originally, a pedestrian bridge was planned to be part of the eventual widening and replacement of the Spur 86B road bridge crossing the Middle Loup River. However, due to a variety of factors, it was decided that the simpler course of action would be to proceed independently of the road bridge. If this project proceeds, it would be funded as part of a Federal Highway Administration grant applied for by the State of Nebraska to resurface State Highway Spur 86B which provides access from Highway 2 to the Scott Lookout Tower. This grant money is only available through September 2009.

Purpose and Need for Action _____

The purpose and need for the Bessey Pedestrian Bridge is to improve highway safety on Road 86B and provide safe access for foot and/or bicycle traffic between recreation facilities located on both the north and south sides of the Middle Loup River. Installation of a pedestrian bridge would eliminate safety concerns resulting from pedestrian and bicyclists using the same narrow bridge as large motorized vehicles.

Most Forest Plan standards with relevance to this proposed project are the same as the Watershed Conservation Practices specified in Appendix A or are addressed in mitigation under “water quality protection”. Other Forest Plan guidelines that apply include:

- Refrain from building new recreation facilities in riparian areas unless a clear public need can be demonstrated, and no other reasonable alternative exists. **Guideline.**
- Design recreational facilities to blend with the elements found in the natural landscape. **Guideline.**

Proposed Action _____

The action proposed by the Forest Service to meet the purpose and need is to construct a bridge, approximately 6 foot wide, suitable for use by pedestrians and bicyclists that would span the river without constricting the flow of the river: The project would also include short sections of trail on each side of the river to tie bridge access to existing parking lots and sidewalks. After it was determined that the pedestrian bridge should be separate from the Highway 86B Bridge, there were no other viable options to meet the purpose and need. Alternatives considered were based on bridge design options.

Decision Framework _____

Given the purpose and need, the responsible official will use the environmental analysis and supporting documentation to answer the following questions and to decide:

- Will the bridge and trail design and construction proceed as proposed, or not at all?
- Should the bridge be designed as a Single Span or Multi Span bridge?

If the project proceeds:

- Are there additional “design features” that could be incorporated as part of the chosen design that would minimize or eliminate any adverse effects of the project?
- Are there additional environmental protection (mitigation) measures and monitoring requirements that should be included as part of the proposal?
- Is an Environment Impact Statement needed?

Public Involvement _____

The proposal was listed in the Schedule of Proposed Actions on April 1, 2009. The proposal was provided to the public and other agencies for comment during scoping from February 2 to February 27, 2009. The scoping letter was mailed to 92 individuals and organizations, 8 tribal leaders, and 12 elected representatives.

The State had done some environmental analysis for the original combined road-pedestrian bridge proposal; this information and reports completed as part of the Bessey District and Nursery Office construction (2006) were used, as appropriate, to help with the analysis.

No substantive comments were received during scoping. Based on the history of the project and past experience with construction projects in the Bessey Recreation Complex, the interdisciplinary team developed a list of issues to address.

Issues

The Forest Service separated the issues into two groups: non-significant and significant. Non-significant issues were identified as: 1) outside the scope of the proposed action; 2) already decided by law, regulation, Forest Plan, or other higher level decision; 3) irrelevant to the decision to be made; or 4) conjectural and not supported by scientific or factual evidence. The Council on Environmental Quality (CEQ) NEPA regulations require this delineation in Sec. 1501.7, "...identify and eliminate from detailed study the issues which are not significant or which have been covered by prior environmental review (Sec. 1506.3)". The following non-significant issue was identified:

- The approximately 0.5 miles of the Middle Loup River located on National Forest System Lands near the Bessey Recreation Complex was evaluated as to eligibility for designation for inclusion in the National Wild and Scenic River System (NWSRS) during the 2001 Forest Plan revision. This section of river was not recommended for inclusion in the NWSRS and is no longer being managed to maintain this potential (NNFLRMP FEIS, 2002).

Significant issues were defined as those effects directly or indirectly caused by implementing the proposed action. The Forest Service identified the following significant issues:

Issue	Measurement Indicator	Mitigation Measure #
1) Improved public health & safety	Bridge & trail design to standard	#1, 2, 3
2) Effects on recreation opportunities	Persons at One Time (PAOTs)	#4, 5, 6, 7, 8
3) Effects on scenic integrity	Scenic Integrity Objective	#18, 19, 20, 23
4) Effects on water quality	Sediment entering river	#12, 13, 14, 15, 16, 17
5) Effects on wetlands	Acres of Wetlands impacted	#5
6) Effect on Federally listed species	Effect on individuals & population viability	#10
7) Effect on Regional Sensitive species	Effect on individuals & population viability	#11
8) Effects on the historic nature of Bessey Ranger District & nursery facilities	Consultation with State Historic Preservation Office	#20, 21
9) Construction cost of the bridge	Dollars	
10) Maintenance costs over the life of the bridge	Dollars	

ALTERNATIVES CONSIDERED

This section describes and compares the alternatives considered for the Bessey Pedestrian Bridge project. This section also presents the alternatives in comparative form, defining the differences between each alternative and providing a clear basis for choice among options by the decision maker and the public. Some of the information used to compare the alternatives is based upon the

design of the alternative and some of the information is based upon the environmental, social and economic effects of implementing each alternative.

Alternatives ---

Alternative 1 - No Action (no change from current condition)

Under the No Action Alternative, the current situation would continue in the project area. No bridge or connecting trails would be constructed. The current transportation system would remain, requiring pedestrians from the main Bessey Recreation Complex to use the current highway bridge and mix uses with vehicular traffic when accessing the fishing pond or other facilities on the north side of the river.

Alternative 2 – Single-Span Bridge

This alternative design would consist of a single, clear span bridge that would have no intermediate support piers set into the river. For structural stability, this bridge would require a truss height of approximately 10 feet with approximately 7 feet of the truss above the deck surface and the remaining 3 feet below the deck surface.

Alternative 3 – Multi-Span Bridge

This alternative design would have intermediate support piers that would be set into the riverbed. Each of the three spans would be of equal width (estimated at 80' each). The additional support under the bridge segments would permit a lower truss height. Truss height would be 5 to 6 feet in total height with 3 to 4 feet of truss above the deck surface and the remaining 2 feet below the deck. Bridge supports would consist of capped metal piles.

Activities Common to All Action Alternatives ---

Since the alternatives considered focused on bridge design options, many features or activities would be common to either action alternative. These include:

Bridge Construction

- Total structure length of both bridge alternatives would be approximately 240 feet, extending beyond the floodplain, and either bridge would be built on the same alignment.
- Construction time could extend approximately 4-5 months to complete all activities.
- Bridges would be constructed out of weathered steel to minimize long-term maintenance.
- All bridge decking would be Ironwood (aka IPE) planks to reduce maintenance needs.
- Reinforced concrete substructures would have an air entrainment additive to increase durability and above ground concrete would be sealed.
- One or two cranes would be used to erect the bridge depending on equipment availability and bridge weight.
- A temporary earthen platform is expected to be constructed into the river for pier installation and/or erection of the bridge superstructure. The earthen construction platform would cross the riparian area on the north bank and extend about 58 feet into the channel waterway.
- Required fill would be obtained from the north side of the three lagoon ponds near the campground and/or from a commercial source. Material by the lagoons is sandy and may require a binder material to provide cohesion. Commercial sources of fill material would be required for the earthen platform construction.

- Excavate and dewater excavations for abutment foundations; all water pumped out while foundations are being set would be piped through a sediment basin or equivalent prior to being discharged back into the river.
- Pipe piles similar in appearance to the Highway 86B road bridge timber piles would be used for the foundations of all abutments and piers (if present).
- Pipe piles would be driven in with a crane-mounted pile driver.
- Backfill, compact, and grade soil around abutment and wing walls.
- All excess construction materials shall be removed from the site and disposed of lawfully.
- The site would be cleaned and disturbed areas stabilized. The earthen construction platform would be removed and impacted reclaimed as part of the construction contract.
- If the south revetment wall is disassembled during bridge construction, the revetment wall would be reassembled with historic accuracy in order to maintain its historic integrity.

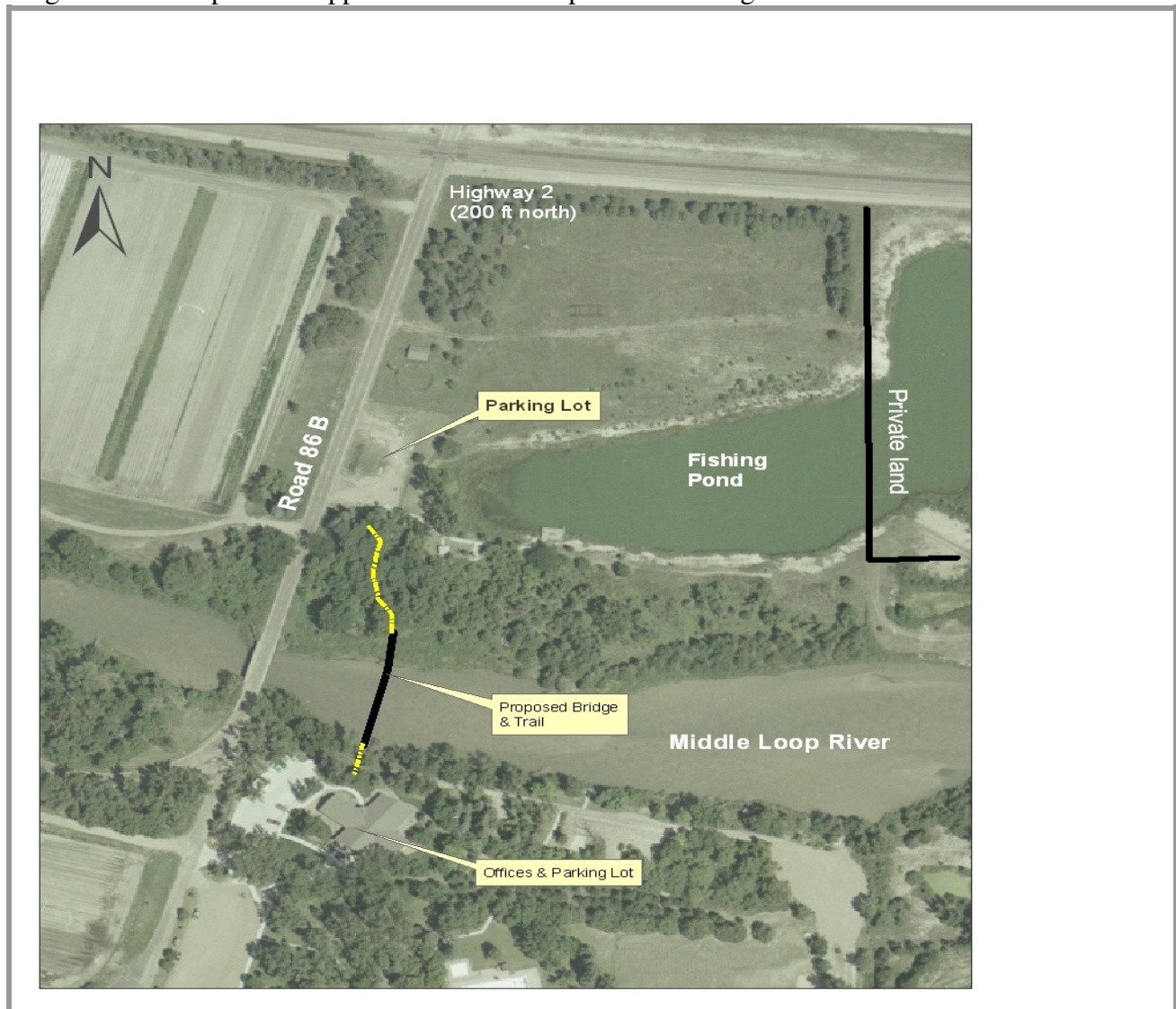
Trail Construction

- The southern approach trail would connect to the sidewalk east of the office parking lot and the old roadway that parallels the river.
- The trail surface would be constructed and leveled surface and embankments would be seeded and mulched.
- Surface of the trail would be approximately the same width as the bridge deck.
- Clear and grub vegetation along the trail alignment and within the bridge abutment sites. Clearing would include an access route for the crane(s).
- The northern trail would be constructed within the clearing limits for the crane and material access from the parking area west of the fishing pond.

Design Features Common to All Action Alternatives _____

- All abutments shall have wing walls that are sloped back at 45 degrees to reduce visibility.
- The front face of all abutments and wing wall shall be faced with a stone form liner treatment that approximately matches the recreation area's entrance pilasters stone pattern.
- Surfaces of the bridge, supports, abutments, etc., should be of a color and finish so as not to reflect sunlight and to minimize visibility. In this case, a brown to blend with adjacent vegetation and historic structures.
- The overall design and cosmetic nature of the bridge should attempt to accurately reflect and tie into the historic nature of the Bessey Ranger District and Nursery.

Figure 1. Aerial photo of approximate trail and pedestrian bridge location.



Mitigation Common to All Action Alternatives _____

During project analysis for the proposal, mitigation measures were developed to address some of the potential impacts of the Action alternatives. The mitigation measures may be applied to either of the action alternatives.

Public Health & Safety

1. Appropriate warning signs would be installed to inform the public of any dangers or hazards present during construction activities.
2. Appropriate safety signing will be installed along the river above the highway bridge and on the pedestrian bridge structure to warn water recreationists of low clearance height and piers, if present.
3. Warning signs would be kept to an appropriate minimum in size, quantity, color and reflectivity and should fit within the context of the surrounding landscape.

Recreation

4. The bridge would be constructed to allow for water recreation activities. It would be designed to provide a minimum of 5 foot clearance height above the water surface at flood level to allow for passage of floating vessels such as canoes/kayaks.
5. Bridge structure should allow for the lowest possible height on hand rails/structures to allow for unobstructed viewing from the bridge.
6. The bridge and trail designs and construction would meet ADA (Americans with Disabilities) guidelines for accessibility.
7. Construction activities, including temporary highway closures, would be coordinated with the Bessey Ranger District so as to avoid high recreation use periods such as previously planned water based recreation events, hunting season opening days, etc., when possible.
8. Options for providing interpretive information/signing for recreationists regarding the construction activities would be provided as appropriate.

Wetland Protection

9. Prior to building the earthen platform or other disturbance, place Geotextile fabric over the undisturbed ground and vegetation adjacent to the river on the north side to protect wetland vegetation. Remove fabric, earthen platform and fill material as soon as possible after no longer needed.

Wildlife protection

10. Follow U.S. Fish and Wildlife conservation measures for American Burying beetle (ABB) clearing which includes a Capture and Relocate (CR) Conservation Measure- trapping for relocation must be conducted for a minimum of 5 consecutive nights. For an area to be "cleared" the last three consecutive nights must have no captures. Any captured ABB must be moved to suitable habitat areas located at least 2 miles from the area of construction. The CR Conservation Measure should take place after September 15 then the area would be considered cleared until the following April. At that time construction activities should stop until additional clearing occurs.

Fisheries and water quality protection

11. Prohibit construction activities during the periods of April thru August to reduce any impacts to aquatic species spawning activities. Prohibiting construction activities during this time period would also reduce impacts to migratory bird nesting activities during the spring and early summer.
12. Follow the Watershed Conservation Practices (USDA Forest Service, 2006) as listed in Appendix A
13. Install erosion control measures as needed, including a silt fence between disturbed areas and the Middle Loup River to minimize sediment and prevent material from entering the river.
14. Upon completion of the work, all disturbed areas would be seeded and mulched to reestablish vegetation and prevent erosion. Erosion control fabric would be used on disturbed areas within 100 feet of the waters edge (Water Influence Zone, WIZ).
15. Follow the requirements of the 404 permit for temporary fill placed into the Middle Loup River for the earthen platform allowing fill to remain in place only as long as necessary.
16. Store all petroleum products out of the riparian areas and WIZ.
17. Fill used in river for the earthen platform would be clean rock with no fines.

Historic integrity and scenic quality

18. Preserve as much existing vegetation as possible during construction to reduce the visual impact on the fishing and picnic/camping site, and minimize the appearance of a cleared corridor from the parking area or highway.
19. Development should be the minimum functionally necessary. No material, obsolete or unneeded equipment should be stored on or near the site.
20. The bridge structure would be constructed above the existing revetment wall structure on the south bank of the river. If it becomes necessary to disassemble the revetment timbers, the structure should be carefully reassembled after the bridge installment is complete to maintain its historic integrity.
21. If, during the course of the project and its associated ground-disturbing activities, there was an inadvertent discovery of potentially significant archaeological deposits or existing historic properties were damaged, work would be immediately halted and the Nebraska National Forest Supervisor's Office would be notified. Work would not resume until the find or damage can be inspected and assessed.

Vegetation

22. Flush cut stumps at ground level of all woody plants cut during any clearing for crane access.
23. Chemically treat stumps of hardwoods in areas where excessive re-sprouting would not be desirable.
24. Re-seeding to stabilize disturbed areas would be done with a Forest Service approved seed mix.
25. Dispose of cut trees, limbs and other cleared vegetation in an agreed upon location.
26. Following construction, develop a detailed re-vegetation plan to meet long-term desired conditions for the site. If used, planted shrubs or trees should be native species, suitable to the site. Trees or shrubs would be planted in such a manner as to reduce the appearance of a corridor from the parking area to the river. Large diameter trees may be planted to reduce the impact to visual character of the area.

Monitoring

- During construction activities, monitor the effectiveness of erosion control measures for keeping sediment out of the river.
- Inspect every 5 years to determine required maintenance. Periodic maintenance activities could include cleaning the deck of dirt and debris, cleaning the abutment of dirt and debris, adding fill to level trails, repairing any erosion of the trail or embankments, and removing hazard trees.
- If the revetment wall is impacted during construction, an archaeological monitor should be present during disassembly and reassembly of the revetment wall.

Comparison of Alternatives _____

This section provides a summary of the effects of implementing each alternative. Information in the table is focused on activities and effects where different levels of effects or outputs can be distinguished quantitatively or qualitatively among alternatives.

Table 1. Comparison of Alternatives.

Issue	Alternative 1	Alternative 2	Alternative 3
1) Improved public health & safety	No	Yes	Yes
2) Effects on recreation opportunities	- 100 PAOTs permanent loss caused by eventual closure of fishing site due to safety concerns with pedestrian access.	Temporary, short-term PAOT loss due to construction closures; May lose overnight camping spot, but improve long-term fishing & picnic sites.	Temporary, short-term PAOT loss due to construction closures; May lose overnight camping spot, but improve long-term fishing & picnic sites.
3) Effects on scenic integrity	No effect	Decrease to Very Low-large bridge structure would dominate landscape; Loss of vegetation would decrease scenic integrity in short-term.	Maintain –smaller bridge structure more likely to blend with landscape character. Loss of vegetation would decrease scenic integrity in short-term
4) Effects on water quality	No effect	Minimal short-term impacts due to effective mitigation. No long-term impacts.	Minimal short-term impacts due to effective mitigation. No long-term impacts..
5) Effects on wetlands	No effect	No acres lost; protected with mitigation	No acres lost; protected with mitigation
6) Effect on Federally listed species American Burying Beetle----- Whooping Crane -----	-No effect -No effect	-May affect; not likely adversely affect -No effect	-May affect; not likely adversely affect -No effect
7) Effect on Regional Sensitive species	No effect	All species - May adversely affect individuals, but not affect population viability	All species - May adversely affect individuals, but not affect population viability
8) Effects on the historic nature of Bessey Ranger District & nursery facilities	No effect	This structure would be less likely to tie into the historic nature of the Bessey District because of its complexity and more massive size. It will also negatively affect the overall historic nature of the property.	This structure would be more likely to conform to the existing historic nature of the Bessey District.
9) Construction cost of the bridge	N/A	\$685,000	\$432,000
10) Maintenance costs over the life of the bridge	N/A	\$45,000	\$ 53,000

ENVIRONMENTAL CONSEQUENCES

This section describes the affected project area and the potential changes due to implementation of the alternatives. It also presents a brief summary of the scientific and analytical basis for comparison of alternatives presented in the chart above. Complete detailed reports are located in the Project Record.

Alternative 1- No Action

Public Health & Safety: The current transportation system has not resulted in any documented accidents involving pedestrians and vehicles; however, the potential is high. The current pedestrian access to the fishing pond developed recreation site from the main Bessey Recreation Complex presents an unsafe situation due to the mixing pedestrian or bicycles with vehicular use on the current road bridge.

Implementation of this alternative would potentially adversely impact public health and safety within the project area, but would have little effect on the other resource uses.

Recreation: No new direct or indirect impacts to recreation opportunities including water based recreation, scenic integrity or facility accessibility would occur under this alternative. There would be no long or short term impacts to water based recreation opportunities on the Middle Loup River

However, if safe pedestrian access to the site is not provided, closure of the fishing pond area in the future or access by vehicle only should be considered. Closure of the area, or restricted pedestrian access would have long term effects upon the quality of developed camping and picnicking. Should the fishing pond area be closed, there would be a loss of the 100 Persons at One Time (PAOT's) associated with the site.

Cumulative Effect: The effect of implementation of the no action alternative would be a continued lack of improvement in highway safety, a potential loss of the 100 PAOT's associated with the fishing pond and a reduction in the quality of the dispersed recreation, but taken cumulatively would have little effect on the other resource uses in the project area. One other developed recreation site closure has taken place in the cumulative effects analysis area within the last year, the Bessey Swimming Pool. The potential loss of 100 PAOT's at the fishing site, should the site be closed because of inadequate pedestrian access, plus the 125 PAOT's lost at the swimming pool would constitute a 26% reduction in developed recreation site capacity within the Bessey Complex.

Water Quality & Wetlands: The Highway 86B road and bridge has constricted the channel and floodplain, changing the flood elevation above the bridge. There are small patches of wetland vegetation along the north bank of the river. Riparian ecosystems are along the both banks of the river. Riparian areas have been altered over time with the office and campground, primarily from thinning or elimination of the vegetation. Soils in the area are sandy and can easily erode if water is concentrated on them. The Middle Loup River is a sand bottom stream. This is the primary sediment of the river. The sand is constantly moving and shifting in the river. The stream banks are currently generally stable. The South bank has had some instability in the past (likely after the installation of the narrow Highway 86B Bridge) and a revetment was built to stabilize and protect the bank. It appears to be working.

Federally listed species:

Scientific Name	Common Name	Status	Expected Occurrence	Suitable habitat present?
<i>Nicrophorus americanus</i>	American burying beetle	Endangered	Possible	Potentially suitable
<i>Grus Americana</i>	Whooping crane	Endangered	Yes	No

American Burying Beetle: This carrion feeding beetle has been found within the administrative complex in the early 1990s' and most recently just outside the project area in 2004. The project area does contain suitable habitat for the American burying beetle along the Middle Loup River and

within the forested areas of the district. No designated critical habitat for the American burying beetle is presently located on lands administered by the Nebraska National Forest (Biological Assessment, pg. 10).

Whooping cranes: use shallow, sparsely vegetated streams and wetlands with good horizontal visibility for roosting and feeding sites. The Middle Loup River is fairly deeply cut (about three feet) and has a swift current with thick cover (dense tall grass, sedge, and rushes) that decrease visibility and make these areas mostly unsuitable for cranes. Whooping cranes have been observed on three different occasions on the Middle Loup River during the spring migration (April 1 to May 15). The last known confirmed sighting occurred on April 15, 1992 on the south shore of the Middle Loup River about one mile west of the Bessey Nursery beds. No designated critical habitat for the whooping crane is presently located on lands administered by the Nebraska National Forest (Biological Assessment, pg. 12).

R2 Sensitive Species

Sensitive species are those plant and animal species identified by the Regional Forester for which population viability is currently of concern. The table below lists only wildlife and fish species known or likely to occur in the Bessey Geographic Area. Other sensitive species were not analyzed in detail due to lack of habitat and/or suspected occurrence in the immediate project area.

Forest Service Region 2 Sensitive Species Evaluated				
Scientific Name	Common Name	Expected Occurrence NNF	Suitable habitat present?	
Invertebrates				
<i>Hesperia ottoe</i>	Ottoe skipper	No	Yes	
<i>Speyeria idalia</i>	Regal fritillary	Yes	Yes	
Fish				
<i>Hybognathus placitus</i>	Plains minnow	Yes	Yes	
<i>Platygobio gracilis</i>	Flathead chub	Yes	Yes	
Amphibians				
<i>Rana pipiens</i>	Northern leopard frog	No	Yes	
Birds				
<i>Haliaeetus leucocephalus</i>	Bald Eagle	Yes	Yes -winter	
<i>Coccyzus americanus</i>	Yellow-billed cuckoo	Yes	Yes	
<i>Asio flammeus</i>	Short-eared owl	Yes	Yes	
<i>Lanius ludovicianus</i>	Loggerhead shrike	Yes	Yes	

Ottoe skipper –Ottoe skipper habitat consists of relatively non-degraded native mixed-grass and dry-mesic tall grass prairie with rolling topography or hilltops. When portions of Bessey Ranger District were surveyed in 1996 for regal fritillary there were no reports of Ottoe skipper, though the survey was not conducted in likely habitat for this species. Preferred nectar plants (blazing star, hoary vervain, and purple coneflower) and larval plants (big bluestem, little bluestem, sideoats grama, and fall witchgrass) are common. There are no known observations in or near the project area.

Regal fritillary - Adult females lay eggs near violets and larvae feed exclusively on violet leaves; juveniles require a continuous source of nectar-producing flowers (coneflowers, fleabanes, and thistles). Three regal fritillaries were observed in wet meadows along the Dismal River (about 9 miles south of the project area) on the District during a 1997 survey. The low numbers observed and low densities of *Viola spp.* at the survey site indicate there may be a small or transient population in the area. Detailed information on quantities and distribution is unknown at this time.

Flat head chub and plains minnow – Flathead chub have been documented in the Middle Loup River downstream of the intersection with Highway 97 near Mullen, Nebraska (40 miles west of project area). Recent fish surveys in the Middle Loup River near Halsey, Nebraska indicate low densities of flathead chub.

Plains minnow has been documented in the Middle Loup River between Boelus and Dunning, Nebraska. Like flathead chub, plains minnow have been sampled at low numbers in the Middle Loup River near Halsey.

The low numbers of both species are thought to be due in part to downstream dam/diversion structures acting as migration barriers and non-native species (i.e. largemouth bass) competition and predation.

Northern Leopard Frog - The northern leopard frog occurs in a wide variety of habitats including creeks, lakes, ephemeral wetlands, and ponds and is thought to be the only leopard frog in the marshes and ponds in the Sandhills. Habitat within the Sandhills has not been extensively researched. Wet areas with rooted aquatic vegetation are especially favored. Northern leopard frogs overwinter underwater in streams, rivers, and ponds. Seasonally flooded habitat adjacent to the Middle Loup River may provide some habitat for northern leopard frogs. Threats include habitat loss, commercial overexploitation, and in some areas, probably competition/predation by bullfrogs or other introduced species.

Bald Eagle – The bald eagle is mainly a migrant or winter visitor through Nebraska and is usually found near water (river, reservoir, lake) with a good supply of fish and waterfowl. No nesting attempts have been recorded on the project area, but bald eagles have been observed using the Middle Loup River during the fall and winter. Incidental sightings of bald eagles flying over the district have been observed in the winter, and a Christmas Bird Count for 2001 reported 3 bald eagles along the Middle Loup River between Thedford and Dunning.

There are minimal fisheries potential on the District and other food resources (especially carrion) are seasonal (during big game hunting season) or very limited. Minimal forage may be the reason for lack of nesting and sightings in the project area.

Yellow-billed cuckoo –The yellow-billed cuckoo is considered a riparian obligate species and is a summer breeder in the Sandhills. No records from the District indicate any sightings within the project area. Damming of rivers and construction of impoundments has led to altered hydrology, with more stable flow patterns and more well-developed riparian woodlands. The project area does not contain suitable habitat.

Short-eared owl –Short-eared owls nest in open habitats including open grasslands, sagebrush, and marshes. They are listed as a rare resident in the Sandhills. Nesting records across the region suggest that typical nesting habitat is Conservation Reserve Program (CRP) grasslands. Continuation of the CRP likely contributes to the maintenance of suitable habitat for this species.

Loggerhead shrike- The loggerhead shrike is a common summer resident of the Bessey District and nesting has been observed. Population and trends in the project area are unknown. They utilize a variety of habitats. Shrubs and lookout perches near feeding areas are important. The analysis area does contain loggerhead shrike habitat, but total suitable acres are not known.

Historic Nature: The existing Bessey Ranger District and Bessey Nursery is currently listed on the National Register of Historic Places as a Historic District and most of the facilities that make up the nursery operation and recreational facilities are considered eligible contributing elements of the historic district. Under the no action alternative, this historic integrity would be maintained. In addition there would not be any ground disturbing activity that could potentially affect significant cultural resources.

Cumulative Effects: With this alternative there isn't expected to be any direct, indirect or cumulative effects to historic and cultural resources.

Alternative 2 - Single-span Bridge

Public Health & Safety: This alternative would have short term effects on public health and safety due to increased traffic and noise caused by heavy equipment and workers associated with the construction project, but the entire project area, including the Middle Loup River would be closed to the public during construction. In the long term, public health and safety would be enhanced by providing a pedestrian bridge connecting the main Bessey Recreation Complex to the fishing pond and eliminating the mixed use on the highway bridge, thereby improving highway safety.

Although public health and safety of the water based recreationists using the Middle Loup River for canoeing, kayaking, etc. may be reduced because of the addition of a low clearance bridge over the river. The relatively steady and slow moving current of the Middle Loup River would help to minimize this impact, along with appropriate signing to warn users of the low clearance.

Cumulative Effects: Historic uses occurring in the project area include both developed and dispersed recreation and nursery activities and are the same as those described under the cumulative effects for recreation. These past, present and reasonably foreseeable activities would not have a substantial cumulative effect on the public health and safety in the area when combined with bridge and trail construction. Public health and safety within the project area would be positively impacted by implementation by bridge and trail construction.

Recreation – Implementation of this alternative would have direct short term effects on recreational opportunities and scenic integrity of the project area. Recreational opportunities for camping and picnicking within the developed site would be eliminated due to closure of the area during construction activities for up to 10 days, resulting in a temporary loss of availability. The quality of adjacent developed recreation opportunities may be reduced due to noise and increased traffic associated with the construction.

Overnight camping opportunities at the site may be eliminated due to the trail location. However, conversion of the Bessey fishing pond site to a day use area would be in keeping with the master plan developed for the site.

Water based recreation opportunities on the Middle Loup River would be eliminated during construction activities for up to 10 days. Water based recreation opportunities would be impacted by an additional low clearance structure in place over the Middle Loup River. Warning signs would mitigate the situation somewhat, but this would create another obstacle.

The scenic integrity of the project area would be temporarily reduced by the disturbance along the trail and river, removal of vegetation, ground disturbance associated with placement of the bridge and by the fill placed at the bridge abutments. These impacts would be evident on less than two acres and would not be dominant for an unreasonably extended term if successfully re-vegetated so as to blend naturally into the surrounding landscape. Since this alternative would require a truss height of 10 feet with approximately 7 feet of the truss above the deck surface and the remaining 3

feet below the deck surface, this would also reduce the scenic integrity of the project area. Placement of such a large structure that would dominate the valued landscape character would move the site closer to a scenic integrity value of very low.

Cumulative Effects: Developed recreation sites within the project area include the Bessey fishing pond, Hardwoods, Cedars and Bessey Group Campgrounds and the Bessey Family Picnic Site. Dispersed recreation consists of hiking, biking and fishing in the area and water based recreation activities on the Middle Loup River.

The Bessey Nursery is an active nursery within the project area, and nursery activities will continue. There are no nursery activities planned within the project area.

These past, present and reasonably foreseeable activities would not have a substantial cumulative effect on the recreation opportunities in the area when combined with either of the action alternatives. Outside of the Bessey fishing pond, developed and dispersed recreation opportunities within the project area would remain the same.

Water Quality & Wetlands: All permanent structures would be placed outside the 100-year floodplain so there would be no impact to the floodplain from this project. Effective erosion control measures should prevent additional sediment from entering the Middle Loup River. Bank stability would be maintained because the new bridge would be designed to span the river and abutments would be located beyond the current banks.

Wetlands on the north side of the river should generally be protected and/or avoided. The bridge and abutments would be above and outside the wetlands. Impacts that could occur would be short-term and minimal. Geotextile fabric placed over the approximately 0.02 acres of wetland vegetation prior to any fill being added during construction along with following 404 permit requirements would protect these areas.

Soil erosion would be prevented after construction is completed by seeding and mulching all disturbed areas. Soil compaction would not occur because the soils are not easily compactable and if they are compacted, the precipitation and freeze/thaw cycle would eliminate it.

Riparian ecosystems would be affected short-term by removing vegetation to accommodate the trail and construction equipment. The vegetation is expected to grow back or be planted back, except on the area occupied by the trail. There would be no effect to the floodplains because the bridge would span the river, above the floodplain.

Cumulative Effects- No cumulative impacts are expected to occur from sediment, bed/bank stability, soil erosion, soil compaction, floodplains or wetlands. There would be cumulative impacts to the riparian ecosystem in the loss of area where the trail and bridge is located (estimated at 2 acres).

Based on analysis for the watershed resource, this action would not create an irretrievable or irreversible commitment of resources and there are no significant environmental effects and it is not biased by the beneficial effects of the action. There would be no significant effects on wetlands of the area, because they would be left intact and in place.

Federally Listed Species

American Burying Beetle - Determination: May affect, not likely to adversely affect. The project would take place within the boundaries of the Recreation Complex. Due to maintenance activities associated with the recreation area it is unlikely any habitat for this species exists on the

south river bank. The north bank of the river would support more suitable habitat. Clearance protocols would be implemented and the likelihood of an individual beetle being impacted is very low to unlikely.

Cumulative Effects - No cumulative effects are anticipated. Since there would be little to no direct or indirect effects on the American burying beetle, there would be no incremental impacts added under this alternative.

Whooping crane - Determination: No effect. None of the areas affected by the alternative or areas within the Recreation Complex provides suitable habitat for whooping crane use. The relative lack of historic use, the physical structure of the river and the intensity of the activity associated with the site, makes it unlikely that this area would ever be preferred crane habitat.

Cumulative Effects

No cumulative effects are anticipated. Since there would be no direct or indirect effects on whooping crane, there would be no incremental impacts added under all action alternatives.

Wildlife - R2 Sensitive Species

Regal Fritillaries – Determination: May adversely impact individuals, but not likely to cause a trend to federal listing or loss of viability in the planning area. Based on the few observations ever recorded and the limited amount of suitable habitat, this analysis supports this determination due to a potential to impact individuals during construction. The species has been determined to likely occur on the Forest. Loss of habitat from the construction of a pedestrian bridge is expected to be minimal to none. Effects on habitat condition and trend are expected to be minimal to none. Direct mortality from construction activity is very unlikely.

Cumulative Effects -No cumulative effects are anticipated. Since there would be no direct or indirect effects on fritillaries, there would be no incremental impacts added under all action alternatives.

Ottoo Skipper- Determination: May adversely impact individuals, but not likely to cause a trend to federal listing or loss of viability in the planning area. Based on the few observations ever recorded and the limited amount of suitable habitat, this analysis supports this determination only due to the potential to impact individuals during construction. The species has been determined to likely occur on the Forest. Loss of habitat and effects on habitat condition and trend from the construction of a pedestrian bridge would be minimal to none. Direct mortality from construction activity is very unlikely.

Cumulative Effects -No cumulative effects are anticipated. Since there would be no direct or indirect effects on the skipper, there would be no incremental impacts added under all action alternatives.

Plains Minnow and Flathead Chub – Determination: May adversely impact individuals, but not likely to cause a trend to federal listing or loss of viability in the planning area. The determination of “no impact” could have been made for these two species due to the minimal sedimentation and alteration of the immediate aquatic ecosystem. However, small isolated areas immediate to the construction site could potentially be impacted and thus adversely impact an individual fish. Impacts to individuals are most likely to occur from indirect effects that degrade the suitability of aquatic habitat on the south river bank should high flood waters occur, but this is very unlikely.

There are no direct impacts anticipated to flathead chub and plains minnow populations and/or habitat resulting from this project. Construction work may cause insignificant amounts of sediment into the river but should not impact the aquatic ecosystem in the project area. Further, minimal direct effects are anticipated because inwater construction activities would occur outside the breeding season, thereby avoiding adverse effects to eggs and young-of-the-year fish that are more vulnerable. Inwater construction activities occur at a slow enough pace that adult fish would be able to swim away to avoid injury.

Cumulative Effects - Sedimentation into the Middle Loup River naturally occurs due to erosion. Developments along the river (i.e. structures) can alter natural runoff and thus increase sedimentation to the river, unless the runoff is diverted and filtered in some manner. Other land management activities may result in aquatic/riparian habitat loss and/or sediment input into streams and reservoirs. For Forest Service activities, the implementation of Forest Plan standards and guidelines, regional watershed conservation practices (WCPs) and State Best Management Practices (BMPs) mitigate these impacts, but may not completely eliminate them. Since the addition of sediment from the project is minimal or nonexistent, there would be little to no cumulative impacts to the river or aquatic resources from sediment.

Sediment delivery (resulting from exposed/non-vegetated areas during construction) and its affects to water quality is a concern during construction operations. Fine sediment sources can potentially impact individuals and affect habitat. Most of the potential effects resulting from sedimentation during construction activities would be mitigated.

Construction of the earthen platform would modify aquatic habitat, but because it is short-term in duration, localized (<1 acre?) in scope and does not dam the river, negligible adverse effects are predicted. Other potential indirect effects during construction activities could occur from either overland runoff or a flood event (i.e. 5 – 10 year magnitude or greater) inundating the project site. Short term/high intensity precipitation events would be the cause of such effects being exacerbated. Flood frequencies within the project area have been shown to be consistent (typical with spring fed systems) making the likelihood of such an extreme event low.

Northern Leopard Frog -Determination: May adversely impact individuals, but not likely to result in a loss of viability or cause a trend toward federal listing. Based on the unlikelihood of leopard frogs, with exception of an isolated individual, over-wintering in the construction zone, this analysis supports this determination due to potential to impact overwintering individuals during construction. It is possible that some individuals may be impacted during winter month construction activities, but highly isolated to a very small spot at the river's bank. Direct mortality from construction activities would be very minimal to none.

Cumulative Effects - Northern leopard frogs would be affected by additional management activities within riparian areas. Other impacts could include use of frogs for commercial purposes, wetland drainage and filling, and water pollution. Incremental impacts to habitat quantity are expected to be minimal for all action alternatives because direct and indirect impacts are expected to be minimal. No cumulative effects are anticipated. Since there would be no direct or indirect effects on frogs, there would be no incremental impacts added.

Bald Eagle – Determination: May adversely impact individuals, but not likely to cause a trend to federal listing or loss of viability in the planning area. Based on 1) lack of known nesting and lack of winter roosts in the area; the one mile stretch of the Middle Loup River on the Bessey District is in a well developed, high use recreation area; 2) Infrequent and irregular observations of bald eagles in the area; 3) No changes to any potential eagle roosting or nesting habitat. The proposed action is not expected to affect bald eagles or their habitat. Bald eagles have been

observed off forest in the fall and winter along portions of the Middle Loup River, but there are no known nesting attempts or winter roosts in the project area.

Some trees would be cut down to accommodate construction of the bridge. However, construction activity such as cutting overgrown branches or removing hazard trees and would be completed in a very short period during construction. No suitable habitat would be affected by the proposed action; therefore, no direct or indirect effects for bald eagles are expected due to the proposed management action.

Cumulative Effects - Past impacts to the riparian ecosystem are primarily from the roads, campground and office site. These areas tend to eliminate or reduce the riparian vegetation. This project would add to the cumulative impact to the riparian area by eliminating some riparian vegetation where the trail and bridge abutments are located. Minimal cumulative effects are anticipated. Since there would be no direct or indirect effects on eagles, there would be no incremental impacts added under all action alternatives.

Yellow-Billed Cuckoo – Determination: May adversely impact individuals but is not likely to cause a trend to federal listing or loss of viability in the planning area. Some negative impacts to individuals may occur under this alternative; however, negative impacts beyond temporary displacement are not expected. The proposed action would have no direct impacts on yellow-billed cuckoos that may potentially inhabit riparian areas adjacent to the project area. Some trees would be cut down to accommodate construction of the bridge. However, construction activity such as cutting overgrown branches or removing hazard trees, and would be completed in a very short period during construction. In the long,-term woody vegetation re-growth (or re-planting) is expected. Occasional displacement is possible due to loud machinery operation during construction activity.

Cumulative Effects - Impacts to cuckoo habitat also occur on non-National Forest System lands and include grazing, agricultural development, dam construction, road construction, and urban sprawl. Loss, degradation, and fragmentation of riparian habitat; drought and prey scarcity (linked at least in part to pesticide use) also impact this species. There could be some incremental impacts from disturbance. Incremental disturbance impacts would continue to accrue if recreation use levels increase.

Short-eared Owl – Determination: May adversely impact individuals but is not likely to cause a trend to federal listing or loss of viability in the planning area. It is recognized that immediate impacts to individuals could occur but are unlikely because of the small construction area. Loss of individuals is highly unlikely due to this species high mobility, but temporary displacement may occur. This alternative would have no direct impacts on short-eared owl that may potentially inhabit nearby open grassy areas. Occasional displacement is possible due to loud machinery operation during should an owl be nearby.

Cumulative Effects -No cumulative effects are anticipated. Since there would be no direct or indirect effects on short-eared owls, there would be no incremental impacts added under all action alternatives.

Loggerhead Shrike – Determination: May adversely impact individuals, but is not likely to cause a trend to federal listing or loss of viability in the planning area. Some negative impacts to individuals may occur under this action alternative; however, negative impacts beyond temporary displacement are not expected. This species prefers riparian habitats, second-growth woodlands, areas of moderately dense shrubs and brush, and avoids dense woods. Some trees would be cut down to accommodate construction of the bridge. However, construction activity such as cutting

overgrown branches or removing hazard trees, and would be completed in a very short period during construction. In the long-term woody vegetation re-growth is expected. Occasional displacement is possible due to loud machinery operation during construction activities.

Cumulative Effects- Loss of grasslands on private lands and lack of management involving prescribed fire and grazing to promote adequate vegetative structure diversity are likely to continue. Additional threats that may be affecting this species in the project area and across its range include habitat fragmentation, vehicle collisions, pesticides, increased human disturbance, climate change, and interspecific competition. These activities would likely occur on private lands as well. Incremental impacts to habitat quantity are expected to be minimal because direct and indirect impacts are expected to be minimal.

Historic Nature: The buildings and infrastructure that make up the Bessey Ranger District and Nursery were largely constructed in the 1930's by the Civilian Conservation Corps. Although there have been significant modifications to the district and its buildings, the complex has been able to maintain its historic integrity. The site is listed on the National Register of Historic Places as a Historic District. The substantive structure required by this bridge design would not fit into the historic nature of the district and would have a substantial negative impact on its historic integrity.

Cumulative Effects – There would be a reduction in the historic integrity of the Bessey Ranger District as a whole.

Alternative 3 - Multi-span bridge

The effects of Alternative 3 would be the same as those described under Alternative 2 for most resources, except as described below:

Public Health & Safety: Public health and safety and highway safety would be as described in Alternative 2, except for the presence of additional piers in the middle of the river. The relatively steady and slow moving current of the Middle Loup River would help to minimize this impact as well as appropriate signing to warn users of the low clearance.

Cumulative Effects-Historic uses occurring in the project area include both developed and dispersed recreation and nursery activities and are the same as those described under the cumulative effects for recreation opportunities.

Recreation: This alternative would require a truss height of 5 to 6 feet in total height with 3 to 4 feet of truss above the deck surface and the remaining 2 feet below the deck. Placement of this smaller structure would not dominate the valued landscape character and would be more compatible or complimentary to the character. It would maintain the scenic integrity value of low. Other effects would be as described under Alternative 2.

Cumulative Effects – Same as Alternative 2.

Water Quality & Wetlands: Alternative 3 would have two piers in the middle that would support shorter spans, but would have no effect on the floodplain or flood flow. The wetlands on the north bank would not be impacted in the long-term as the bridge would span them. The construction of the bridge would require that the wetlands be crossed, but they would be protected by laying fabric under the fill needed for the equipment (see mitigation).

Cumulative Effects – Same as Alternative 2.

Wildlife - Federally Listed Species: See Alternative 2.

Cumulative Effects – Same as Alternative 2.

Wildlife - R2 Sensitive Species: See Alternative 2.

Cumulative Effects – Same as Alternative 2.

Historic Nature: The pedestrian bridge proposed under this alternative would tend to fit into the historic nature of the Bessey District and would therefore not have a significant impact to historic resources. There is no foreseeable direct or indirect impacts under this alternative. .

Cumulative Effects – There would be no reduction in the historic integrity of the Bessey Ranger District as a whole under this alternative.

CONSULTATION AND COORDINATION

The Forest Service consulted the following individuals, Federal, State, and local agencies, tribes and non-Forest Service persons during the development of this environmental assessment:

Laws and Regulations Considered

E.O. 11988 – Floodplain Management

This project, either alternative, would meet the requirements of the Executive Order for Floodplain Management. It would have no impacts on the floodplains or flood way as they currently exist. Past impacts have occurred to the floodplain and flood flow with the construction of Highway 86B. The bridge span is short and it narrowed up the width of the river and seriously constricted the floodplain. This is planned to be fixed or remedied in the future when the bridge is replaced. There is no time table at this point in time.

E.O. 11990 – Wetlands

This project, either alternative, would meet the requirements of the Executive Order for Wetlands. The amount of wetlands would remain the same, because the bridge and abutments will be away from the wetlands.

Clean Water Act

The requirements of the Clean Water Act would be met with this project with either alternative. In particular Sections 401 and 404 would be addressed. Section 401 is the Water Quality Certification and the contract would require the contractor to submit and obtain certification from the appropriate state agency. Section 404 address the discharge of dredged or fill material into the waters of the United States. This project should fall under Nationwide Permit #14, for linear transportation projects. All required notification would be required by the contractor.

The National Historic Preservation Act

The National Historic Preservation Act of 1966 (NHPA), as amended, provides requirements for consideration of historic properties by Federal agencies. Section 110 of the NHPA requires federal agencies to develop and implement plans for the identification, management, and nomination of cultural resources. Section 106 of the NHPA requires federal agencies to take into account the effects of their undertakings on historic properties and consult with preservation agencies regarding these effects and possible mitigating actions before spending federal funds on the undertaking.

Historic properties are those properties that are either listed on, or are eligible for listing on, the National Register of Historic Places (HRHP).

ID TEAM MEMBERS:

Lisa Heiser, Recreation, Public Health and Safety, Scenic Integrity
Shari Counce, Heritage
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FEDERAL, STATE, AND LOCAL AGENCIES:

Nebraska Department of Roads, North Platte and Lincoln Offices
Nebraska Department of Roads, Environmental Permit Unit
Federal Highways Administration, Denver
U.S. Fish and Wildlife Service, Grand Island Field Office
U.S. Fish and Wildlife Service, Nebraska Field Office
Army Corps of Engineers
Nebraska Game and Parks
Nebraska State Historic Preservation Office

Appendix A

Watershed Conservation Practices (WCP) Bessey Pedestrian Bridge

Below are the WCP that would apply to installation of a Pedestrian Bridge across the Middle Loup River. Under each WCP are the Design Criteria that apply.

WCP 2 - Manage land treatments to maintain enough organic ground cover in each activity area to prevent harmful increased runoff (Also Forest Plan Standard, B.2).

- a. Maintain the organic ground cover of each activity area so that pedestals, rills, and surface runoff from the activity area are not increased. The amount of organic ground cover needed will vary by different ecological types and should be commensurate with the potential of the site.

WCP 3 - In the water influence zone (WIZ) next to perennial and intermittent streams, lakes, and wetlands, allow only those actions that maintain or improve long-term stream health and riparian ecosystem condition (Also Forest Plan Standard, B.3).

- c. Keep heavy equipment out of streams, swales, and lakes, except to cross at designated points, build crossings, or do restoration work, or if protected by at least 1 foot of packed snow or 2 inches of frozen soil. Keep heavy equipment out of streams during fish spawning, incubation, and emergence periods.
- m. Do not excavate earth material from, or store excavated earth material in, any stream, swale, lake, wetland, or WIZ.

WCP 4 - Design and construct all stream crossings and other instream structures to provide for passage of flow and sediment, withstand expected flood flows, and allow free movement of resident aquatic life (Also Forest Plan Standard, B.4).

- a. Install stream crossings to meet Corps of Engineers and State permits, pass normal flows, and be armored to withstand design flows.
- b. Size culverts and bridges to pass debris. Engineers work with hydrologists and aquatic biologists on site design.
- c. Install stream crossings on straight and resilient stream reaches, as perpendicular to flow as practicable, and to provide passage of fish and other aquatic life.
- d. Install stream crossings to sustain bankfull dimensions of width, depth, and slope and keep streambeds and banks resilient. Favor bridges, bottomless arches or buried pipe-arches for those streams with identifiable flood plains and elevated road prisms, instead of pipe culverts. Favor armored fords for those streams where vehicle traffic is either seasonal or temporary, or the ford design maintains the channel pattern, profile and dimension.

WCP 6 - Maintain long-term ground cover, soil structure, water budgets, and flow patterns of wetlands to sustain their ecological function (Also Forest Plan Standard, B.6).

- b. Keep roads and trails out of wetlands unless there is no other practicable alternative. If roads or trails must enter wetlands, use bridges or raised prisms with diffuse drainage to sustain flow patterns. Set crossing bottoms at natural levels of channel beds and wet meadow surfaces. Avoid actions that may dewater or reduce water budgets in wetlands.

WCP 10 - Construct roads and other disturbed sites to minimize sediment discharge into streams, lakes, and wetlands (Also Forest Plan Standard, B.9).

- a. Design all roads, trails, and other soil disturbances to the minimum standard for their use and to "roll" with the terrain as feasible.
- b. Use filter strips, and sediment traps if needed, to keep all sand-sized sediment on the land and disconnect disturbed soil from streams, lakes, and wetlands. Disperse runoff into filter strips.

WCP 11 - Stabilize and maintain roads and other disturbed sites during and after construction to control erosion (Also Forest Plan Standard, C.2).

- a. Do not encroach fills or introduce soil into streams, swales, lakes, or wetlands.
- b. Properly compact fills and keep woody debris out of them. Revegetate cuts and fills upon final shaping to restore ground cover, using certified local native plants as practicable; avoid persistent or invasive exotic plants. Provide sediment control until erosion control is permanent.

WCP 12 - Reclaim roads and other disturbed sites when use ends, as needed, to prevent resource damage (Also Forest Plan Standard, C.3).

- a. Site-prepare, drain, decompact, revegetate, and close temporary and intermittent use roads and other disturbed sites within one year after use ends. Provide stable drainage that disperses runoff into filter strips and maintains stable fills. Do this work concurrently. Stockpile topsoil where practicable to be used in site restoration. Use certified local native plants as practicable; avoid persistent or invasive exotic plants.
- d. Establish effective ground cover on disturbed sites to prevent accelerated on-site soil loss and sediment delivery to streams. Restore ground cover using certified native plants as practicable to meet revegetation objectives. Avoid persistent or invasive exotic plants.