National Park Service
U.S. Department of the Interior

Wind Cave National Park

South Dakota

Project to Rehabilitate Highway 87 and Visitor Center Access Roads

Environmental Assessment

December 2005

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ENVIRONMENTAL ASSESSMENT

Project to Rehabilitate Highway 87 and Visitor Center Access Roads
Wind Cave National Park, South Dakota

Summary

The National Park Service (NPS) and the Federal Highway Administration are proposing to rehabilitate and resurface 1.4 miles of the Visitor Center access roads and 7.2 miles of South Dakota State Highway 87 within the boundaries of Wind Cave National Park. The overall goal of this project is to improve the structural integrity and safety of the main north-south access highway within Wind Cave National Park.

Highway 87 connects Hot Springs, to the south, and Custer State Park, immediately adjacent to the north. This route includes two historic bridges constructed in 1929 and 1930, the arched concrete Beaver Creek Bridge and the unusual "corkscrew" Pigtail Bridge, in addition to numerous historic stone culvert headwalls that were constructed during the Civilian Conservation Corps era. The Visitor Center access road provides the only vehicular access to Wind Cave, the Visitor Center, and park administrative facilities.

The travel surfaces of these roads are aging and in poor condition. In addition, the bridges have suffered damage from large vehicles. Regular maintenance is no longer sufficient to address the deterioration. Resurfacing and rehabilitation would reduce the park's maintenance burden and maintain the roads as a safe travel route through the park.

Two alternatives are analyzed in this environmental assessment:

Alternative A, the No Action Alternative: This alternative is the continuation of current management. Should the No Action Alternative be selected, the National Park Service would respond to future needs and conditions associated with maintenance of the highway, historic bridges, and Visitor Center access roads without major actions or changes from the present course.

Alternative B, the Preferred Alternative: This alternative includes rehabilitating the surface of 7.2 miles of Highway 87 and 1.4 miles of the north and south access roads to the Visitor Center parking lot, improving the Beaver Creek Bridge and Pigtail Bridge, and resurfacing and improving pullouts along the highway's corridor. The picnic area located along the north Visitor Center access road would also be resurfaced and improved, and damaged guardrails and culverts would be replaced as needed.

The alternatives analyzed in this environmental assessment would not result in major environmental impacts or impairment to park resources or values.

Public Comment

If you wish to comment on the environmental assessment, you may mail comments to the name and address below. This environmental assessment will be on public review for 30 days. Comments may also be submitted through the National Park Service planning website: http://parkplanning.nps.gov/wica. Please note that the names and addresses of people who comment become part of the public record. If you wish us to withhold your name and/or address, you must state this prominently at the beginning of your comment. We will make all submissions from organizations, from businesses, and from individuals identifying themselves as representatives or officials of organizations or businesses available for public inspection in their entirety.

This document will be available for comment for 30 days. Please address written comments to:

Superintendent
Wind Cave National Park
26611 US Highway 385
Hot Springs, SD 57747-9430

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PURPOSE AND NEED

PURPOSE OF AND NEED FOR THE PROPOSED ACTION

The primary purposes of the project are to provide the public with safe and structurally sound driving surfaces and to protect the structural integrity of the historic Beaver Creek and Pigtail Bridges. The proposed rehabilitation measures would meet several objectives directly related to the mandates for the establishment of Wind Cave National Park. These objectives were identified by NPS and Federal Highway Administration staff in initial project planning phases and must be achieved in order for the project to be considered a success.

- The project would protect public health, safety, and welfare by providing safe, reliable driving surfaces on the roadways and by correcting deficiencies in the bridges.

- The project would provide for visitor enjoyment and natural resource protection by enhancing surfaces on roadways, interpretive pullouts, and parking areas.

- The project would protect and preserve important cultural resources through the rehabilitation and stabilization of the historic Beaver Creek Bridge and other historic roadway features such as stone culvert headwalls.

The shortcomings described in the following need statements must be addressed for the project to be considered a success.

- Several sections of Highway 87 and the north and south access roads to the Visitor Center parking lot are in poor condition and maintenance activities cannot keep up with the necessary repairs.

- Erosion, deterioration, stress cracking, vehicle damage, and spalling threaten the structural integrity of the historic Beaver Creek Bridge.

- Vehicle impacts damage the safety railings and threaten the structural integrity of the historic Pigtail Bridge. Inspection and testing of the structure has indicated that the existing structure is deficient and functionally obsolete.

PURPOSE AND SIGNIFICANCE OF THE PARK

Description of the Park

Wind Cave National Park is located in western South Dakota, on the southern edge of the Black Hills. The park was established in 1903 to set apart the land as a public park to “reserve from settlement, entry, sale, or other disposal” (16 U.S.C. 141). Wind Cave National Park encompasses 28,295 acres of prairie ecosystem, underlain by one of the world’s longest caves. The cave is well known for its outstanding display of boxwork, an unusual cave feature

composed of thin blades of calcite that resemble honeycombs (NPS 2001b). In addition, the park contains over 40 other smaller caves (NPS 2001b).

Since the original designation, the purpose of the park has been expanded from cave preservation alone to protection of both surface and subsurface resources. The primary feature of the park remains the cave, recognized worldwide as a significant site. The Visitor Center receives about 110,000 visitors annually, with approximately 90,000 entering the cave by ranger-led tours.

The surface features of the park include expanses of mixed-grass prairie, ponderosa pine and riparian ecosystems. The gently rolling landscape of the park is a transition zone between plains and mountains, and supports a great diversity of plant and animal species (NPS 1994). The park is well known for its resident bison herd, as well as for opportunities to view mule deer, pronghorn, elk, prairie dogs, wild turkey, raptors, and a variety of small mammals (see Figure 1).

FIGURE 1. PARK VISTA WITH BISON

The cultural resources of Wind Cave National Park include evidence of prehistoric and protohistoric Indian cultures, homesteading, records of early cave exploration and tourism, and Civilian Conservation Corps and other early 20th century structures. Several of these historic properties (including the two bridges addressed by the project and the Wind Cave National Park Administrative and Utility Area Historic District) are listed on the National Register of Historic Places.

The park is 7 miles north of Hot Springs, South Dakota, and is bounded by Custer State Park on the north, Black Hills National Forest on the west, and by private property on the south and east. The park is one of a variety of destinations for Black Hills visitors. Attractions in the immediate

area include Mount Rushmore National Memorial, Jewel Cave National Monument, Crazy Horse Monument, the Mammoth Site in Hot Springs, and Badlands National Park (Figure 2).

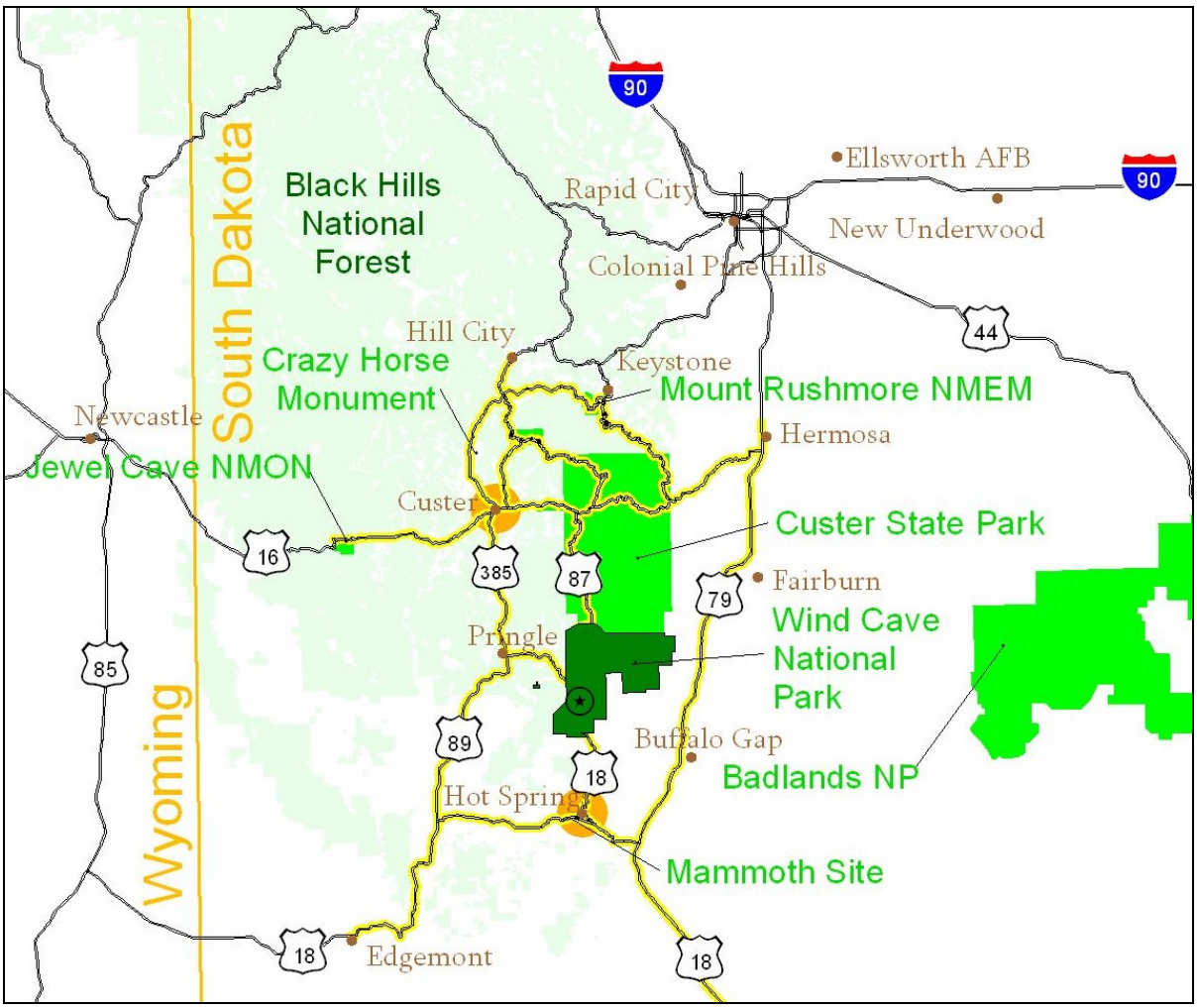

FIGURE 2. REGIONAL MAP OF WIND CAVE NATIONAL PARK

Significance and Legislation

Wind Cave National Park was established in January 1903 (32 Statute 765) as a 10,532-acre area to protect Wind Cave and the underground resources of this unique site. It was the eighth national park and the first created to protect a cave. The original legislation applied only to the cave and surface developments needed for the management and care of the cave (NPS 1994). The parklands at that time were small and there were no bison, elk, or pronghorn antelope. These big game species were introduced later, as park boundaries expanded.

The purpose of Wind Cave National Park has evolved from cave preservation to protection of both subsurface and surface ecosystems. In 1912, establishment of the Wind Cave National Game Preserve provided a permanent range for bison and "such other native American game animals as may be placed therein." Herds of bison and elk were re-established as the need to

preserve and protect big game species was realized. In 1935, management of the game preserve was transferred from the Department of Agriculture to Wind Cave National Park. The park has since been expanded to its current size of 28,295 acres to maintain a viable population of a variety of big game animals (NPS 1994).

Project Background

The Wind Cave National Park road system represents the combined efforts of state and federal agencies to develop connections between the park and the surrounding Black Hills (NPS 2000c). Motor tourism became important in the region in the 1920s, and during that period, unpaved roads provided seasonal access to the park.

In 1929, the Beaver Creek Bridge was completed by the State Highway Commission to provide passage over Beaver Creek along Highway 87. In 1929 or early in 1930, the Pigtail Bridge was constructed near Reaves Gulch. By the 1950s, Congress realized the need for a permanent, all-season road between Wind Cave and Custer State Park. The resulting project established Highway 87, which incorporated the two historic bridges and included roadside exhibits to educate the public about the prairie ecosystem (NPS 2000c). Highway 87 opened for travel in 1956. (For a more complete overview of the history of Wind Cave roadways, see the "Cultural Resources" section of this document.)

Today, the main routes for vehicular travel within the park are US Highway 385 in the southwestern corner of the park and State Highway 87 (see Figure 3). Since Highway 87 was constructed, it has undergone cyclic maintenance involving periodic chip and seal coats. This roadway has not received any overlays (new surfacing) and is currently in generally poor condition. The road surface has extensive rutting, settling, and cracking. Sections of the roadway have required substantial, repeated patching to correct surface failures, and these areas are deteriorating at rates faster than park maintenance staff can repair them.

Wind Cave, the Visitor Center, and park headquarters are accessed by a paved, two-lane park road that branches off Highway 385 to the west, about 2½ miles inside the park's southern boundary. The road continues north for a distance of about 1½ miles past the Visitor Center, and reconnects to Highway 385 about ½-mile south of the intersection with Highway 87 (Figure 3). This road was constructed prior to 1957, and suffers from the same deterioration and surface failures.

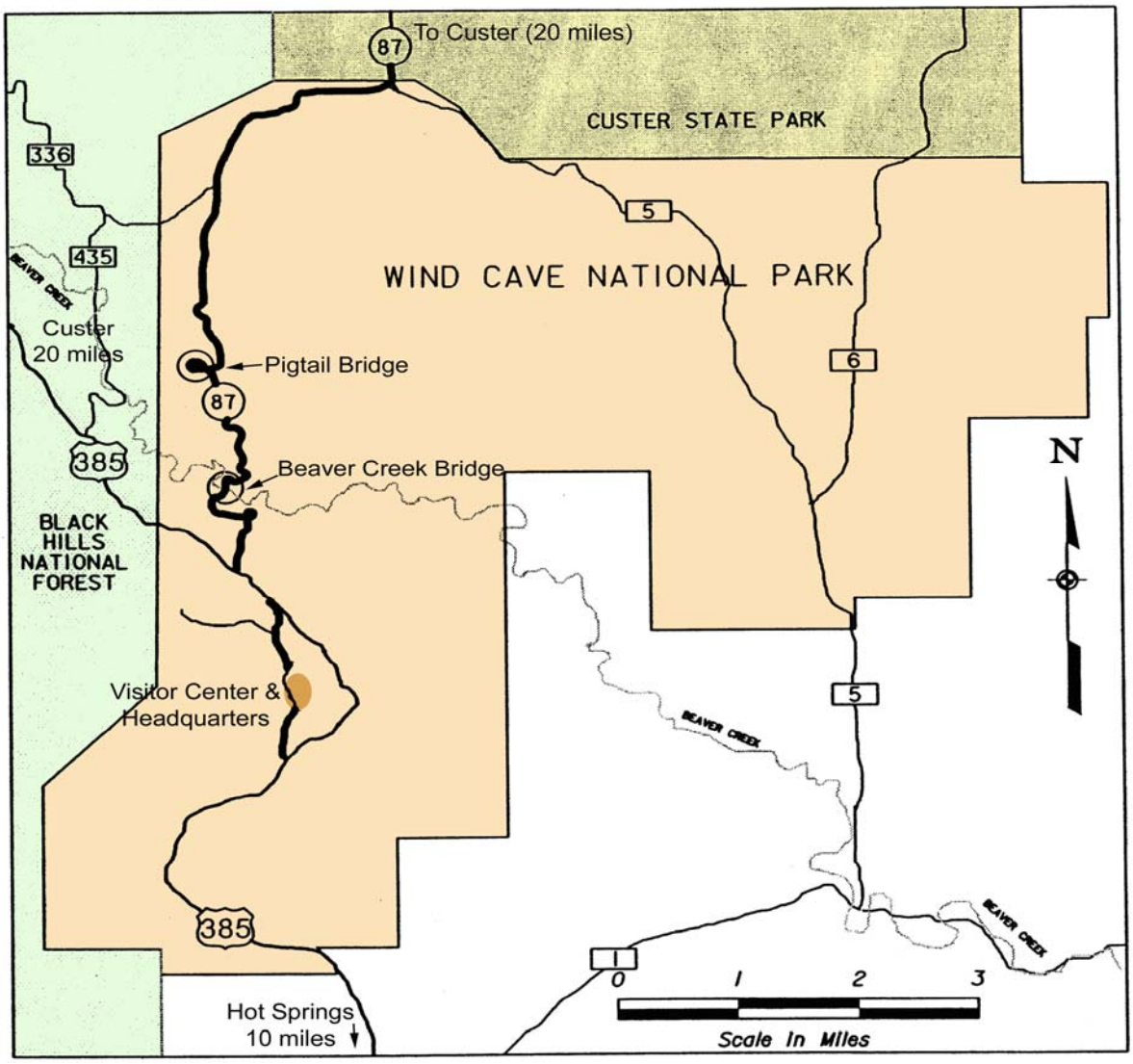

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FIGURE 3. PROJECT AREA MAP

Recent inspection of the historic Beaver Creek and Pigtail Bridges identified deficiencies in the deck surfacing, structure, and guardrails. Specific deficiencies noted in the Beaver Creek Bridge included: the north abutment that supports the bridge has been undermined by erosion; bridge decking and curbs exhibiting extensive scaling, spalling (flaking-off of concrete), and deterioration; and the presence of detached guardrails (NPS 2000a). Similarly, load rating and inspection of the Pigtail Bridge indicated that the bridge did not meet current load capacities, the guard railing did not meet crash-test requirements, and the northern approach required realignment. Large vehicles hitting the bridge and approach railing due to poor alignment are also damaging the one-lane Pigtail Bridge.

There are 33 culverts located along Highway 87 of varying ages and condition. Several of the older culverts are in poor condition or are inadequately designed, which has led to clogging and ponding in areas and has contributed to highway deterioration.

With the goal of providing the public with a safe, level driving surface, enhancing visitor experience, and improving the structural integrity and safety of the Beaver Creek and Pigtail Bridges, the park and Federal Highway Administration are proposing to make improvements to the bridges and rehabilitate the surfaces of Highway 87, pullouts along the highway, and the north and south Visitor Center access roads.

Description of the Project Area

The project area includes terrain that primarily consists of mixed-grass prairie and ponderosa pine ecosystems (Figures 4 and 5). Overall, Highway 87 is critical to the overall visitor experience as it offers visitors an excellent opportunity to view the dramatic, picturesque landscape and abundant wildlife. Where Highway 87 begins at Highway 385, the prairie landscape supports a mix of native grasses and forbs. The highway then begins to moderately curve and climb into the hills, surrounded mainly by ponderosa pines, and then curves through rocky gulches and forested areas. The highway then gradually declines into Reaves Gulch, an area with steeper ravines, before gradually descending back into grassland prairie.

FIGURE 4. HIGHWAY 87 CORRIDOR (FROM INFORMAL PULLOUT)

FIGURE 5. VIEW FROM HIGHWAY 87 AT NORBECK DAM

Specific natural resource areas of interest in the project area include black-tailed prairie dog colonies located adjacent to the highway, low-lying drainage areas and natural springs that occur along Reaves Gulch, and the abundant wildlife that occurs along the entire highway corridor.

Related Projects and Plans

The 1993 *Wind Cave Resource Management Plan* and the 1994 *Final General Management Plan/Environmental Impact Statement* outline the direction for proposed actions that would protect park resources and enhance visitor experiences. The *Wind Cave National Park Cultural Landscape Report* identified important landscape features within the park and provided

suggestions for future management direction for the park's landscapes (NPS 2004e). Specific plans that relate to the actions proposed in this environmental assessment are summarized in Table 1.

The project to rehabilitate Highway 87 and the Visitor Center access roads represents a continued commitment to preserve valuable park resources and meet established standards of public health and safety. The proposed action alternative would not conflict with any ongoing or planned management activities within the park.

TABLE 1. PROJECT'S RELATIONSHIP TO OTHER PLANS

Management Activity/Plan	Relationship to Proposed Action
1994 *General Management Plan/Environmental Impact Statement*	The park's general management plan does not provide specific management direction for Highway 87, but states that an engineering study would be conducted to determine detailed rehabilitation alternatives. The plan states that the character of the road would be retained (NPS 1994).
Construct a new Visitor Center parking lot and associated stormwater management system. This project has been implemented.	The park replaced the deteriorated asphalt parking lot and constructed a new stormwater collection and treatment system to prevent polluted runoff from entering the cave. This new concrete parking lot lies between and connects with the north and south access roads proposed for rehabilitation in this environmental assessment. This action was recommended in the park's general management plan.
Develop and implement park infrastructure/ facility improvements, including Wind Cave lighting, wastewater treatment plant (WWTP), Elk Mountain Campground improvements, etc.	The park is developing and implementing various infrastructure/facility improvements. These plans and projects are or will be managed under separate plans and compliance and will involve movement of construction equipment and materials. These plans and projects are in general agreement with the park's general management plan.
Develop an interpretive concept plan for the park. This project is currently underway.	The park is developing an interpretive wayside exhibit plan for surface resources that will include installing and improving interpretive displays and exhibits. The park plans to either replace or add interpretive displays to several trailheads and wayside exhibits, and a number of these will occur in pullout areas along Highway 87 included in this highway rehabilitation project. Improvements to the surface and railing of existing exhibits (waysides) and pullouts would be consistent with the interpretive concept plan.

TABLE 1. PROJECT'S RELATIONSHIP TO OTHER PLANS

Management Activity/Plan	Relationship to Proposed Action
In cooperation with other regional park units, Wind Cave has recently completed a programmatic, comprehensive, exotic vegetation management plan and accompanying compliance documentation to manage exotic plant species within the park.	Disturbance in the park has led to increased presence of exotic plants in the developed area. After rehabilitation measures are complete, park staff would evaluate the need to implement exotic plant control measures to ensure regrowth of native vegetation in disturbed areas. This action was recommended in the park's Resource Management Plan.
Wind Cave National Park Cultural Landscape Report.	Includes Wind Cave National Park Road and associated features in a future South Dakota 87 road corridor historic district.

Scoping

Scoping is the effort to involve agencies and the public in determining the issues to be addressed in the environmental evaluation. Among other tasks, scoping determines important issues and eliminates issues that are unimportant; allocates assignments among the interdisciplinary team members and other participating agencies; identifies related projects and associated documents; identifies permits, surveys, or consultations required by other agencies; and creates a schedule which allows adequate time to prepare and distribute the environmental document for public review and comment before a final decision is made.

Internal scoping began for the project with a meeting held at the park in July 2003, which identified the main issues, impact topics, and alternative concepts to be addressed in this environmental assessment. The public was invited to comment on the project in a press release issued on April 5, 2004. A copy of the press release can be found in Appendix A. No new issues were identified by the public as a result of the request for public input. In August 2004, a workshop and Value Analysis workshop was held with an interdisciplinary team consisting of Federal Highway Administration engineers, park resource specialists, Midwest Region, and Denver Service Center, and participation from the South Dakota State Historic Preservation Officer (SHPO), which focused on design options for specifically addressing issues associated with the Pigtail Bridge. Ongoing communication then continued between the team and SHPO to develop guardrail designs for the Pigtail Bridge that are presented in this environmental assessment.

At a minimum, National Park Service agency scoping includes input from the State Historic Preservation Officer, the U.S. Fish and Wildlife Service, and Native American tribes affiliated with the park. During development of this environmental assessment, the park contacted the South Dakota State Historic Preservation Officer (SHPO), the U.S. Fish and Wildlife Service, and interested tribes by letter. A summary of the scoping activities undertaken prior to development of this environmental assessment is located in the "Consultation and Coordination" section, and copies of consultation letters are in Appendix A.

Issues

Issues and concerns regarding this proposed project were identified from past National Park Service planning efforts, input from state and federal agencies, and through internal scoping. The major issues include the following.

- Several sections of Highway 87, the north and south access roads to the Visitor Center parking lot, and paved pullouts are in poor condition, and maintenance activities cannot keep up with the necessary repairs.

- Erosion, deterioration, stress cracking, vehicle damage, and spalling (spontaneous chipping, fragmentation, or separation of a surface or surface coating) threaten the structural integrity of the historic Beaver Creek Bridge.

- Vehicle accidents are relatively common at the Pigtail Bridge and damage the timber railing on this historic bridge. These accidents often involve large recreational vehicles and threaten the structural integrity of the bridge.

- Inspection of the Pigtail Bridge has identified that the bridge superstructure (steel beams, deck, and railing systems) require replacement to correct deficiencies and unsafe conditions.

- Pullouts along the highway are difficult to distinguish and often result in visitors creating new informal or social pullouts.

- The road has caused ponding in one drainage that now supports wetland vegetation and is used as a water source for wildlife. Disturbance to this site should be minimized.

- The historic features and fabric of the Beaver Creek and Pigtail Bridges should be preserved and protected to the greatest extent possible.

- Road improvements should be accomplished with minimal disturbance to natural resources, including water resources, vegetation, wildlife, and soils.

- Use of the road and a high-quality visitor experience should be maintained throughout project implementation.

- Public and employee health and safety should be maintained throughout project implementation.

- The structural adequacy of the existing Pigtail Bridge and the timber railing may affect transportation access for construction equipment and materials for the proposed project.

Impact Topics

Derivation of Impact Topics

Impact topics were used to focus the evaluation of the potential environmental consequences of the alternatives. Candidate impact topics were identified based on legislative requirements, executive orders, topics specified in *Director's Order #12 and Handbook* (NPS 2001a), NPS *Management Policies 2001* (NPS 2000b), guidance from the National Park Service, input from other agencies, public concerns, and resource information specific to Wind Cave National Park. A brief rationale for the selection of each impact topic is given below, as well as the rationale for dismissing specific topics from further consideration.

Impact Topics Included in this Document

Public health and safety, visitor use and experience, and park operations are managed in accordance with the Organic Act of 1916 and NPS *Management Policies 2001*. These topics were retained because of the potential effects that may occur from implementation of both the No Action and Preferred Alternative. In addition, the project's primary objectives are to protect public health and safety and enhance visitor enjoyment within the park.

Cultural resources, including archeological resources, ethnographic resources, historic resources, and cultural landscapes, were retained due to potential effects to important cultural resources within the park, some of which listed or eligible for listing on the National Register of Historic Places, and due to potential effects to Native American tribes associated with the park. The regulations and policies relevant to cultural resources include the National Historic Preservation Act; 36 CFR 800 and 36 CFR 68; American Antiquities Act; Archaeological Resources Protection Act; Archaeological and Historic Preservation Act; National Environmental Policy Act; Executive Order 11593; Executive Order 13007; Executive Order 13175; Director's Order 28; NPS *Management Policies 2001*; and Native American Graves Protection and Repatriation Act.

Wetlands and water resources are managed in accordance with the Clean Water Act, Executive Order 12088; Executive Order 11990; NPS *Management Policies 2001*, and Director's Order 77-1. These resources exist near proposed project activities and have the potential to be affected by construction activities, and were therefore retained for analysis. These resources were combined in the impact analysis because they would be affected in the same manner by the action alternative.

Geology and soils are managed in accordance with NPS *Management Policies 2001* and were retained because of effects on soils under the No Action Alternative and long-term impacts on soils and rock formations along the highway corridor and Visitor Center access roads.

Vegetation and wildlife resources were retained for analysis. Vegetation is managed in accordance with NPS *Management Policies 2001*, Executive Order 13112, Invasive Species, and Federal Noxious Weed Act of 1974. Wildlife is managed in accordance with NPS *Management Policies 2001*, Fish and Wildlife Coordination Act, Migratory Bird Treaty Act, and Bald and Golden Eagles Protection Act. Vegetation and wildlife were retained due to effects in the highway's right-of-way on these resources from vehicles creating informal pullouts under

current conditions, as well as the potential effects from vegetation loss or disturbance from construction and noise.

Natural soundscape was retained due to the concern that noise activities associated with construction activities have the potential to adversely affect this resource. The regulations and policies applicable to this topic include NPS *Management Policies 2001* and Director's Order #47: Soundscape Preservation and Noise Management.

Endangered and threatened species are managed in accordance with the Endangered Species Act of 1973 and NPS *Management Policies 2001*. This topic was retained for analysis due to the potential for the black-footed ferret, bald eagle, American burying beetle, and state-listed Hopi tea to occur in the park.

Impact Topics Dismissed from Further Analysis

The resource topics described in this section will not be further analyzed in this environmental assessment. There were little or no concerns associated with impacts to these resources. Additional reasons for their dismissal are provided below.

Air quality: During the Highway 87 rehabilitation project, there would be short-term, localized, negligible impacts to air quality because of construction activities. Effects would be negligible because best management practices (described in Table 3) would be used to minimize fugitive dust and emissions from construction equipment.

Cave resources: Wind Cave is significant because it contains the most boxwork of any known cave, is the fifth-longest cave in the world, and is also one of the largest barometric wind caves in the United States. The Highway 87 stretch traverses across Tertiary and Holocene deposits, the Deadwood Formation and the crystalline Precambrian schists, granites and pegmatites (NPS 2003a). The 1.4 miles of the Visitor Center access roads traverse the Tertiary and Holocene deposits and the Minnelousa and Pahasapa Limestone Formations. Highway 87 does not cross above the Pahasapa Limestone Formation. For this reason, the cave resources associated with the Pahasapa Limestone, and Wind Cave in particular, would not be affected by the rehabilitation project along Highway 87. Cave resources could potentially be affected during roadwork activities for the north and south access roads to the Visitor Center parking lot, since the Visitor Center access roads do occur above the cave. However, no effects are anticipated because project activities in this area would likely not exceed a depth of three feet. Mitigation measures would be employed to ensure that no impacts would occur.

Conflicts with land use plans, policies, and controls: Whenever actions taken by the Park Service have the potential to affect the planning, land use, or development patterns on adjacent or nearby lands, the effects to these activities must be considered. During implementation of the proposed action, travel between Custer State Park and the town of Hot Springs (south of Wind Cave National Park) would be delayed or obstructed during the construction period. Visitors and travelers using the route would need to plan for extra travel time or use an alternative route (such as Highway 385 to the west). An analysis of effects to visitors is included in the "Visitor Use and Experience" section.

Park staff would coordinate education and interpretation information with Custer State Park, the Black Hills National Forest, and local communities to assure that travelers are made aware of the road passage conditions on the route. For those willing to use them, there are unpaved roads that connect the park to Custer State Park. These are located east of the Highway 87, and provide access to lesser-used portions of the park and spectacular scenery. Over the long-term, improvements to Highway 87 would be of benefit to local travelers, and would not be in conflict with any local land use policies. Because the route is not changed or expanded, the proposed action would neither encourage nor deter development or land use changes outside the park.

Ecologically critical areas or other unique natural resources: The proposed action would not affect any designated ecologically critical areas, wild and scenic rivers, or other unique natural resources, as referenced in the Wild and Scenic Rivers Act, NPS *Management Policies 2001* (NPS 2000b), 40 CFR 1508.27, or the 62 criteria for national natural landmarks.

Economics: Council on Environmental Quality regulations for implementing the National Environmental Policy Act (NEPA), 40 CFR 1500, direct economic analyses of federal actions that will affect local or regional economies. None of the alternatives described in this environmental assessment would have notable effects on local or regional economic activities.

Energy requirements and conservation potential: The National Park Service reduces energy costs, eliminates waste, and conserves energy resources by using energy-efficient and cost-effective technology. Energy efficiency is incorporated into the decision-making process during the design and acquisition of buildings, facilities, and transportation systems that emphasize the use of renewable energy sources. The action alternative would not appreciably change the park's short- or long-term energy use or conservation practices. The energy (primarily gasoline and diesel fuel) required for the highway rehabilitation project would not be detectable on a daily or annual basis compared to energy use in Wind Cave National Park and surrounding area.

Environmental justice: Executive Order 12898, General Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, requires that all federal agencies address the effects of policies on minorities and low-income populations and communities. None of the alternatives analyzed in this assessment would have disproportionate effects on populations as defined by the U.S. Environmental Protection Agency's 1996 guidance on environmental justice.

Floodplains: Executive Order 11988, Floodplain Management, requires analysis of impacts on floodplains and regulated wetlands. None of the alternatives would occur within or affect a floodplain. Because the Visitor Center lies along Wind Cave Canyon, a small portion of the building is located within the 100-year floodplain. However, the west side of the Visitor Center, the parking lot, and access roads are all located on a terrace above Wind Cave Canyon, and, therefore, are not located within the floodplain.

Museum collections: The National Historic Preservation Act, 36 CFR 800, American Antiquities Act, Archaeological Resources Protection Act, Archaeological and Historic Preservation Act, Secretary of the Interior's Standards and Guidelines for Archeology and Historic Preservation, Director's Order 28, and NPS *Management Policies 2001* (NPS 2000b)

guide the analysis of effects on museum collections under NEPA. None of the park's museum collections would be affected by any of the alternatives under evaluation.

Indian trust resources: Indian trust assets are owned by American Indians but are held in trust by the United States. Requirements are included in the Secretary of the Interior's Secretarial Order 3206, American Indian Tribal Rites, Federal – Tribal Trust Responsibilities, the Endangered Species Act, and Secretarial Order 3175, Departmental Responsibilities for Indian Trust Resources. According to Wind Cave National Park staff, Indian trust assets do not occur within the park. Therefore, there would be no effects on Indian trust resources from any of the alternatives.

Natural or depletable resource requirements and conservation potential: The use of fuel was addressed under the category "Energy requirements and conservation potential."

Prime and unique agricultural lands: The Council on Environmental Quality 1980 memorandum on prime and unique farmlands states that prime farmland have the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops. Unique agricultural land is land other than prime farmland that is used for production of specific high-value food and fiber crops. No such agricultural sites are found in Wind Cave National Park due to the rocky terrain, arid environment, and short growing season.

Wilderness: Wind Cave National Park does not contain nor is it adjacent to any designated or proposed wilderness areas. Approximately 96.5 percent of the park's surface is included in the "natural zone" (NPS 1994). Within this area, signs of human use and development are widely present and easily visible. Highway 385 transects the park, and is traveled by over one million people each year. Wind Cave National Park is not under consideration for wilderness designation under the 1964 Wilderness Act, Director's Order 41, or NPS *Management Policies 2001*.

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ALTERNATIVES

The alternatives analyzed in this assessment include one action alternative and an alternative of no action/continue current management. The issues related to the rehabilitation of Highway 87 and the Visitor Center access roads that the action alternative was designed to address were described in the "Purpose and Need" section.

As part of the design analysis and project planning, a range of alternatives was considered. Those actions or alternatives that were not realistically feasible, did not adequately meet the project purpose and need, or did not protect the historic nature of the bridges were dismissed. A discussion of the actions or alternatives that were eliminated from further consideration follows the description of the No Action Alternative and the Preferred Alternative.

TABLE 2. ALTERNATIVE DESCRIPTIONS

Alternative	Description	Acres of New Disturbance
A	Continue current management/no action.	0
B	The Preferred Alternative includes resurfacing 7.2 miles of Highway 87, 1.4 miles of Visitor Center access roads, improving Beaver Creek and Pigtail Bridges, resurfacing and improving the picnic area loop road along the north access road, and resurfacing and improving about 14 of the existing 20 formal and informal pullouts and/or parking areas along Highway 87.	Up to 20

THE NO ACTION ALTERNATIVE (ALTERNATIVE A)

Alternative A, the No Action Alternative, is defined as continuation of current management of Highway 87, Beaver Creek Bridge and Pigtail Bridge, and the north and south Visitor Center access roads.

The No Action Alternative provides a basis for comparing the management direction and environmental consequences of the action alternative. Should the No Action Alternative be selected, the National Park Service would respond to future needs and conditions associated with maintenance of the highway, historic bridges, and Visitor Center access roads without major actions or changes from the present course.

Routine maintenance and cyclical activities that would continue under Alternative A include periodic chip and seal coats (which is a process to fill and seal cracks or seal the surface of old pavement to minimize the effects of aging), and annual pothole repairs. Under Alternative A, the surfacing would continue to deteriorate and the maintenance burden on park staff would continue to increase. The rutting, settling, and cracking of the pavement would increase over time, and

would eventually deteriorate to unsafe and uncomfortable driving conditions for park staff and visitors.

Existing formal pullouts and parking areas along Highway 87 and the picnic area turn-around and parking area along the north Visitor Center access road also would be maintained and repaired with chip and seal coats as needed, although no improvements to formalize or enhance additional pullouts would be included in the No Action Alternative. Currently, several informal pullouts are created by vehicles pulling onto the unpaved shoulder because the designated pullouts are often difficult to distinguish.

The Beaver Creek and Pigtail Bridges were constructed in 1929 and circa 1929 or 1930, respectively. These bridges are historically unique and important to the visitor experience. Inspection of these bridges has identified deficiencies in the deck surfacing, structure, and guardrails. In the case of the Beaver Creek Bridge, structural deficiencies were found in relation to fastening of the guardrails (see Figure 6), fill failure of the north abutment, and in the cracking and spalling and subsequent exposure of steel rebar in the concrete superstructure. Recent load rating on and inspection of the Pigtail Bridge's wooden deck and underlying steel girders indicated that the bridge did not meet current legal load capacities and would need to be replaced within ten years (Meng personal communication 2004). Additionally, the existing log approach guardrail had a height of 23 inches, short of the safety standard of 27 inches, and did not meet current crash test safety standards. Due to poor alignment, the Pigtail Bridge is being damaged by large vehicles hitting the bridge and approach rails. The Pigtail Bridge suffered considerable damage to the railing in June 2004, and then after being repaired, was once again struck by a school bus in May 2005 (see Figure 7). During rehabilitation activities from 1999 to 2000, the park repaired damage to the concrete abutment to the Pigtail Bridge and repainted the steel superstructure as part of lead abatement actions.

The No Action Alternative would include ongoing maintenance patching to deck surfaces of the bridges; however, no substantial corrections to the structural integrity, road/bridge alignment, or railing systems would occur. Damage to the bridge and approach rails from large vehicles would continue to occur under the No Action Alternative, and the deck, curbs, and guardrails of the historic bridges would continue to deteriorate over time. The inadequate backfill under the north abutment of Beaver Creek Bridge would not be replaced nor would the stone slope pavement be stabilized. Additionally, damage to areas on the Beaver Creek Bridge caused by spalling and cracking concrete that exposes underlying rebar would worsen, and the damage would be visually intrusive.

The 33 culverts located along Highway 87 are of varying ages and states of condition. Several of the older culverts are in poor condition or were inadequately designed, which has led to clogging and ponding in areas and has contributed to highway deterioration. Under the No Action Alternative, no improvements would be made to any of the drainage structures.

FIGURE 6. UNSECURED METAL RAILING AT BEAVER CREEK BRIDGE

FIGURE 7. JUNE 2004 DAMAGE TO PIGTAIL BRIDGE RAILING

THE PREFERRED ALTERNATIVE (ALTERNATIVE B)

Alternative B was developed by the National Park Service and Federal Highway Administration to provide the public with a safe, smooth driving surface and an enhanced visitor experience and to improve the structural integrity of the Beaver Creek and Pigtail Bridges. The South Dakota State Historic Preservation Officer (SHPO) was consulted regarding design improvements to the Pigtail Bridge to help ensure that the character-defining historic features of the bridge would be retained under Alternative B.

National Park Service road design standards were utilized in development of the bridge and road improvements outlined in Alternative B. The Park Road Standards are the standards developed and adopted by the National Park Service to address the safety requirements of the Federal Safety Program Standards. The Park Road Standards (1984a) accommodate current or planned park road use, while continuing to preserve the natural and cultural values of the NPS areas. These standards address the requirements of Standard 12 of the Federal Highway Safety Program Standards (23 CFR 1230; 23 U.S.C. 402) and provide design guidance for projects under the Federal Lands Highways Programs for Park Roads and Parkways compatible with appropriate sections of the Federal Highway Administration Direct Federal Manual. The Park Road Standards are utilized in the planning, design, and construction of park roads and bridges. The design process is multi-disciplinary in order to address aesthetic, historical, and environmental considerations (NPS 1984a) as illustrated by SHPO consultation on the Pigtail Bridge modifications.

In conjunction with the Park Road Standards, the National Park Service and Federal Highway Administration also refer to the American Association of State Highway and Transportation Officials (AASHTO) design guidelines (2001) for the design and construction of public roads, including local and rural roads and bridges. Like the National Park Service road design standards, the AASHTO guidelines include road and bridge function, design and operating speed, traffic volumes, road and shoulder width, criteria for intersection sight distance, stopping sight distance, and access management techniques. Several of these standards and guidelines have been developed for the protection of health and safety of traveling vehicles and construction personnel. The Preferred Alternative would consider these standards and guidelines in the design and implementation of highway, bridge, and drainage improvements.

Roadway Improvements

Alternative B would rehabilitate 7.2 miles of Highway 87 and 1.4 miles of the north and south access roads to the Visitor Center parking lot. This rehabilitation would involve pulverizing and compacting the surface of the existing asphalt pavement and applying a new road surface overlay. The specific depth of pulverized asphalt and surface treatment would vary depending on the repair needs of road segments; however, any excavation would likely not exceed a depth of three feet. The width of the existing highway and Visitor Center access road corridors would remain the same at 22 feet. New striping would be applied to the highway and Visitor Center access roads after the asphalt is replaced. The majority of the pulverized asphalt would be re-used as new road base, and additional reclaimed material would be disposed of outside the park.

In areas where there are existing guardrails or where guardrails may be necessary, new guardrails would be installed that meet current crash test standards. The design and color of these guardrails would be compatible with the park's historic features.

Several pullouts and parking areas exist along Highway 87, as well as a turnaround and parking area associated with the picnic area along the north access road to the Visitor Center parking lot. Several of the pullouts and parking areas that are currently paved would be included in the project and would be improved (pulverized and resurfaced) in a manner similar to the highway improvements. In addition, there also are informal or social pullouts that would be formalized and potentially paved to be easily recognized, in order to minimize resource damage from visitors creating new pullouts. Specific parking areas and/or pullouts to be improved would be determined as their condition is assessed; however, the larger areas likely to be rehabilitated include the picnic area turnaround, "Little Houses on the Prairie" parking area, "American Elk" parking area, "Ancient Foundations" parking area, and "East Meets West" parking area. Two interpretive parking areas would be reconfigured to provide better parking conditions for visitors. These include "Little Houses on the Prairie" and "Ancient Foundations" parking areas. Existing timber curbs and bollards that have been treated with wood preservatives such as creosote and pentachlorophenol would be removed and replaced with new concrete curb and gutter. New concrete sidewalks would be constructed adjacent to parking areas to provide accessible access to interpretive exhibits. Informal pullouts that are not intended to be used would be restored and revegetated with native plants. In total, one new paved parking area would be established, one would be removed, and seven existing parking areas would be rehabilitated. Three of the previously unpaved pullouts would be paved, three of the existing paved pullouts would be

refurbished and upgraded, and two would remain unpaved. Portions of two former roadways along Highway 87 would be reclaimed and revegetated with native plants.

Bridge Improvements

Beaver Creek Bridge

Under Alternative B, the existing concrete bridge deck would be rehabilitated so that its historic appearance would be maintained. The top surface of the existing concrete deck would be stripped and subsequently covered with a Latex Modified Concrete Overlay (Parsons Brinkerhoff 2005). Latex Modified Concrete Overlay is concrete in which part of the cement binder of the concrete mix is replaced by a latex polymer, thereby producing a more ductile, less permeable concrete that exhibits excellent bonding to steel reinforcing and existing concrete. This overlay process would entail removal of the existing surface of the concrete deck by means of hydro-demolition, a method of concrete removal using jets of highly pressurized water. Depth of concrete removal may vary depending on the condition of the existing concrete. Water and debris generated by this process would be containerized and disposed of per applicable federal, state, and local disposal regulations in order to eliminate pollution and protect park resources.

The existing deck expansion joints located at the end of each arch span would be cleaned and replaced with a pourable elastomeric joint (Parsons Brinkerhoff 2005). The new joints would not be highly visible (due to joint width of 3/8 inch) and would reduce accumulation of debris and the need for park maintenance cleaning.

Damaged stone curbing would be replaced in kind. Several areas on the bridge railing, curbs and soffit of deck that exhibit spalled concrete would be repaired by patching with concrete. In areas where steel reinforcing has been exposed, the surrounding concrete would be chipped away and repaired by patching with concrete. Concrete used for repair patches would be colored to match the existing concrete.

New metal approach rails would be attached to the bridge through small concrete walls constructed at each corner of the bridge (Parsons Brinkerhoff 2005). These walls would be colored to match the existing concrete and connected to the bridge by drilling holes into the existing curved end blocks for steel reinforcing dowels that would be set with epoxy.

The north approach roadway to the Beaver Creek Bridge has been experiencing settlement due to failure of some dry laid slope protection paving below the concrete abutment wall. The slope paving was meant to retain the abutment embankment material. With the slope protection not in place, water draining through the abutment backfill material has caused erosion of this material and subsequently, settlement of the roadbed. Under Alternative B, the stone slope protection and the backfill material that has eroded away near the north abutment would also be repaired. This work would include: stabilizing the roadway embankment retained behind the north abutment by injecting grout through holes drilled through the roadway surface, rebuilding the stone slope paving below the abutment using existing or similar stone, and installing a catch basin near the northwest corner of the bridge to collect roadway runoff that may exacerbate the erosion (Parsons Brinkerhoff 2005).

Pigtail Bridge

Under Alternative B, the existing 4-inch thick wooden deck of the Pigtail Bridge would be replaced with either 5-1/8-inch thick glue laminated wood deck panels or 5-1/2-inch thick nail laminated timber deck in order to ensure a crashworthy rail/deck connection (Parsons Brinkerhoff 2005). The final choice of building option would be determined upon final review by the NPS and Federal Highway Administration. The new bridge deck would maintain the existing single lane passage, with a width of 20 feet between the bridge rails, and would have its load capacity upgraded to meet current design criteria.

To provide a less severe transition onto the northern end of the Pigtail Bridge, a slight adjustment to the horizontal alignment of the roadway would be made (Parsons Brinkerhoff 2005). Under this alternative, the centerline of the bridge approach roadway would be extended, and the curve would be slightly straightened by excavating the protruding bedrock and thereby alleviating safety concerns with the approach (see Figures 8 and 9). This would require adding some fill and extending one of the culverts 20 feet and resetting the stone at the headwall (see Appendix B).

FIGURE 8. EXISTING BRIDGE APPROACH ROADWAY ALIGNMENT

FIGURE 9. PROPOSED BRIDGE APPROACH ROADWAY ALIGNMENT

A new guardrail system would be installed to improve bridge and roadway safety. The new guardrail configuration, as designed by the NPS and Federal Highway Administration in consultation with the SHPO, would consist of a double rail configuration constructed from glue laminated timber rails and posts. The proposed bridge and approach rail designs were developed from successfully crash tested bridge rail systems. Rail and post dimensions were modified to obtain a system that matched the appearance of the existing rails. The new rails and posts would be formed by rounding glue laminated timber members. The bridge rail heights and post spacing would match the existing configuration. Steel hardware would connect the rails to the posts, and the posts to the timber deck (see Figure 10). New crashworthy timber approach railing would be constructed at all four corners of the bridge. The materials for the approach railing would be the same as that used for new bridge rail, but the approach rail would have a single rail at a height of 28-inches. Transition railing would be installed at the end of the bridge between the approach

railing and the bridge railing to span between the single 28-inch high approach rail and the double 36-inch high bridge rail. The proposed railing system would be designed to meet current crash test standards, and would be compatible in style and materials with the historic bridge. (A draft design of guardrail structure transition railing for the Pigtail Bridge is included in Appendix B.)

FIGURE 10. NEW PIGTAIL BRIDGE RAIL DETAIL

The eleven underlying steel girders of the middle and south spans would be replaced in kind with new higher tensile strength steel. The new girders would have the same dimensions and appearance as those currently supporting the deck. The original steel girders under the north span would be refurbished and reused as originally installed (Parsons Brinkerhoff 2005). The new bridge components would be finished to match the original bridge components.

The original bridge abutments and piers with their original masonry would remain untouched. The sandstone bases of the abutments that currently constrict passage between the bridge piers would be widened slightly by shaving the rock face (see Figures 11 and 12). Shaving the rock faces beneath the bridge and at the northern bridge approach would be done in a manner that would maintain the natural appearance of the stone so that modifications are not readily apparent.

Overall, the multidisciplinary design process for alternatives development addressed aesthetic, historical, and environmental concerns, which would preserve and maintain the structure to the extent possible and yet incorporate current design and safety factors (Parsons Brinkerhoff 2005).

The improvements made to the Pigtail Bridge would increase its vehicle weight limit to allow legal truck traffic (AASHTO Type 3, Type 3S2, and Type 3-3 vehicles) to travel over the bridge (Parsons Brinkerhoff 2003). Vehicles that could utilize the bridge under these upward revised restrictions would include the park's sand/snow truck, water tenders used for fire-fighting, bison hauling vehicles, and construction equipment. The upgraded load capacity for the Pigtail Bridge under this alternative would not limit the timing or order of highway and road rehabilitation activities.

It is expected that the entire project would be completed in one season, with a possible closure of up to six to eight weeks for improvements to Beaver Creek and Pigtail Bridges. Information

regarding delays, re-routing, or possible closures would be disseminated to park visitors and nearby towns.

FIGURE 11. PASSING BENEATH EXISTING PIGTAIL BRIDGE

FIGURE 12. PASSING BENEATH REHABILITATED PIGTAIL BRIDGE

Drainage Improvements

During the rehabilitation project, areas identified as having inadequate or damaged drainage designs would be improved, reducing the likelihood of future premature deterioration of the rehabilitated highway. Thirty-three culverts of varying age and levels of function exist along Highway 87. If necessary, culverts would be replaced where problems are identified. Other possible drainage improvements could include the removal of silt and sediment, clearing of vegetation, culvert realignment, replacement of corrugated pipe, or repairing damaged headwalls and support structures. Where culvert replacement and/or drainage modifications are necessary, historic stone culverts that retain integrity of materials and design would be recorded, disassembled, and reconstructed in the same design, using appropriate techniques and salvaged materials (and compatible materials if needed). In areas where natural springs or wetlands occur,

or drainage areas provide ecological benefit, drainage modifications would be limited to prevent any adverse effects to the cultural and natural resources.

RESOURCE PROTECTION MEASURES OF THE ACTION ALTERNATIVE

Under the Preferred Alternative, best management practices and mitigation measures would be used to prevent or minimize potential adverse effects associated with the project. These practices and measures would be incorporated into the project construction documents and plans.

Resource protection measures undertaken during project implementation would include, but would not be limited to, those listed below in Table 3. The impact analyses in the "Affected Environment and Environmental Consequences" section were performed assuming that these best management practices and mitigation measures were implemented as a part of project implementation.

TABLE 3. RESOURCE PROTECTION MEASURES

Public Health and Safety
Measures to reduce effects of road repair and construction on visitor safety and experience would be implemented (e.g., flagmen, speed reduction/directional signage, night reflectors when equipment is left onsite overnight, etc.). Visitors, contractors, and park personnel would be safeguarded from hazardous activities. A barrier plan indicating locations and types of barricades would be used to protect public health and safety.
Visitor safety would be ensured both day and night by fencing the construction limits in areas that may pose safety risks. Unsafe conditions would be inspected for and corrected as soon as practicable to minimize the potential for staff or visitor injury.
Care would be taken to ensure that rerouting could safely accommodate all sizes of vehicles that are legally allowed to use the park roads.
All trucks hauling demolition debris and other loose materials that could spill onto paved surfaces would be covered or would maintain adequate freeboard.
Federal Highway Administration staff would monitor contractor activities to ensure compliance with safety standards.
Visitor Experience
The NPS and the contractor would manage rerouting and closures (e.g., reduce traffic speed, directional signage, flagmen, etc.) to reduce the inconvenience to park visitors as much as possible.
The length of roads to be resurfaced at any one time would be minimized, and road closures would be avoided where possible and keep the length of road detours as short as possible.
The number of wayside exhibit pullouts that would be closed at any one time would be minimized.
When possible, road resurfacing on the Visitor Center access roads would be scheduled to coincide with the low visitor season because these two roads carry the majority of visitor traffic.
Information on road closures or bridge closures would be disseminated to visitors. Road rerouting and closure information would be provided on the internet, local newspapers, local Chambers of Commerce, the park's Traveler's Information Station (TIS), a low-wattage radio station, and at the Visitor Center to alert visitors to road conditions within the park.

Visitor information would be developed and distributed to park visitors, to minimize adverse effects to visitors, such as changes in parking availability.

All paved areas subject to vehicular and pedestrian traffic would be kept clear of construction debris.

Cultural Resources

While working near/at historic walls, bridges, or other historic features, care would be taken to avoid undermining structural stability.

Bridge repairs would be conducted in an unobtrusive manner that does not diminish the integrity of the structures, which are included on the National Register of Historic Places. Work would be guided by the Secretary of the Interior's Standards for the Treatment of Historic Properties (NPS 1998) to minimize damage to historic resources.

Damaged or deteriorated stone culvert headwalls would be repaired in a manner that would maintain their historic appearance and integrity and would follow the Secretary of the Interior's Standards for the Treatment of Historic Properties (NPS 1998).

Undamaged stone curbing or other historic fabric would be salvaged for reuse.

Ground-disturbing actions would be designed to avoid known archeological sites and historic features, and resource sensitive areas would be identified in the construction operations plan without calling attention to the specific type of resource.

Work limits would be established and clearly marked to protect resources, and all protection measures would be clearly stated in the construction specifications. Areas for contractor activities include but are not limited to staging areas, turnarounds, equipment parking, and materials storage. These would be clearly delineated (staked) on the ground to ensure that activities occur only in designated areas. Workers would be instructed to avoid conducting activities beyond the construction zone and their compliance would be monitored by the project contracting officer's technical representative. Construction documents would include stop-work provisions, should archeological or paleontological resources be uncovered, and the contractor would be apprised of these protective measures during the pre-construction conference.

All project documentation, including but not limited to plans, photographs, and notes, would be permanently retained in the park's museum collection.

To reduce unauthorized collecting, construction personnel would be educated about cultural resources in general and the need to protect and report any cultural resources encountered. Work crews would be instructed regarding the illegality of collecting artifacts on federal lands to avoid any potential Archeological Resources Protection Act violations.

New landscape features would be compatible with the original design and character of the Wind Cave National Park Administrative and Utility Area Historic District and other historic features along the park road.

If previously unknown archeological resources or human remains were discovered, work would be stopped in the area of the discovery and the park would consult with traditionally associated peoples, the South Dakota State Historic Preservation Officer and the Advisory Council on Historic Preservation, as appropriate. Procedures outlined in 36 Code of Federal Regulations 800 and the Native American Grave Protection and Repatriation Act (NAGPRA) would be followed.

Discovered resources would be evaluated for their significance, and if needed, mitigation measures would be developed in consultation with the South Dakota State Historic Preservation Office. Best

management practices would emphasize changes in project design to avoid and protect sites and features, and/or could include archeological monitoring of the project and data recovery.

Cave Resources

Although it is extremely unlikely the cave would be encountered because road excavation would not exceed a depth of three feet, construction activities would be monitored and stop-work provisions would be included in construction documents should cave resources be encountered.

Wildlife and Habitats

A defined work area perimeter would be maintained to keep all construction-related impacts within the affected area in order to minimize adverse impacts to wildlife habitats. The five-foot boundary along the highway would be strictly adhered to and there would be no physical disturbance outside the project corridor.

Construction workers would be educated about the dangers of intentional or unintentional feeding of park wildlife, and on inadvertent harassment through observation or pursuit.

Construction would be expected to occur during daylight hours only. However, if night lighting ever became necessary on an isolated basis, lighting would be minimal, directed downward, and shielded.

Air Quality

Contractors shall implement vehicle emissions controls such as keeping equipment properly tuned and maintained in accordance with manufacturers' specifications and implementing best management construction practices to avoid unnecessary emissions (e.g., engines would not idle).

To the degree possible, impacts would be mitigated by the use of best management practices to reduce generation of dust, such as covering loose soil and watering activities, and by limits on the types of chemicals (low Volatile Organic Chemicals [VOC] ratings) used in new construction and the rehabilitation work.

The contractor would be encouraged to use carpooling and other techniques that would minimize the trip generation of the construction activity. Shipment of materials in full loads would also be encouraged and heavy equipment and vehicles would be maintained to minimize pollution generation.

Natural Soundscape

If deemed necessary, demolition work on weekends or federal government holidays may be authorized, with prior written approval. To the extent possible, all on-site noisy construction work above 76 A-weighted decibels (dBA) (such as the operation of heavy equipment) would be done between the hours of 7:30 A.M. and 5:00 P.M. This would minimize impacts to the natural soundscape during quieter morning and evening hours.

All construction equipment would be equipped with mufflers kept in proper operating conditions, and when possible, equipment would be shut off rather than allowed to idle. Standard noise abatement measures would include the following elements: a schedule that minimizes impacts to adjacent noise-sensitive areas, use of the best available noise control techniques wherever feasible, use of hydraulically or electrically powered impact tools when feasible, and location of stationary noise sources as far from sensitive public use areas as possible.

Soils and Vegetation

To minimize disturbance to the surrounding prairie and forest, the construction limits would be

TABLE 3. RESOURCE PROTECTION MEASURES

marked prior to beginning any work under the proposed contract. Construction limits would remain marked until completion of the contract to ensure no disturbance to native vegetation beyond the narrowly defined area.

Areas disturbed during the project would be revegetated with native plants.

To reduce the potential of topsoil losing its important biological components, topsoil would be stripped from within the construction limits and stockpiled in a designated staging area for use in revegetation efforts.

Imported soils and other materials would be specified sterile and weed free. Erosion control would be in the form of sterile matting. No seeding of exotic materials would be permitted. To prevent accidental introduction of exotic seed, only certified weed free straw bales would be used. Washing of heavy equipment would occur prior to importation to the park to minimize the potential for non-native or exotic seed to be spread through the park. Such equipment would also be inspected regularly to ensure that no oil or fuel leaks are present that could result in contamination of the park environment.

Water Resources and Wetlands

Silt fencing would be used to prevent siltation from heavy runoff during rainstorms or snowmelt. Stockpiling of materials would occur on pavement or in areas of previous disturbance. Other materials with the potential to cause sedimentation would be stored similarly. Adequate erosion control or drainage structures would be installed and maintained.

A defined work area perimeter would be maintained to keep all construction-related impacts within the affected area. When appropriate, fencing would be used to demarcate construction limits from sensitive natural resources such as wetlands.

An adequate hydrocarbon spill kit, with such items as absorbent pads and material, gloves, and disposal bag, would be available on site to contain any unexpected spills.

ALTERNATIVES CONSIDERED BUT DISMISSED

Analysis of all design options led to the dismissal of five alternatives. These alternatives included components that failed to meet the project objectives, actions that generated unacceptable levels of resource impacts, or were generally unacceptable under the terms of alternative elimination found in Director's Order 12, Section 4.5.E.6. The nature of the dismissed alternatives and the rationale for their rejection are outlined below.

Widening the Road. The park initially considered widening the highway to better accommodate large recreational vehicles and truck traffic that use the park roadway. Installation of a paved shoulder was also considered to allow ample room for visitors to safely pull over for viewing opportunities. This alternative was dismissed because such alterations to the roadway would negatively affect the historic and cultural nature of the original highway design and the amount of disturbance to soils and vegetation required for implementation was not acceptable to park staff and management.

New Route to Bypass Pigtail Bridge. An alternative was initially considered to abandon the use of the Pigtail Bridge and build a new section of highway in order to bypass the bridge and protect this important historic structure. This alternative would have required about 0.5 miles of new road to be constructed in previously undisturbed areas. It was therefore dismissed due to the magnitude of impacts to natural resources and the cultural landscape, as well as the impacts from eliminating this interesting and unique historic feature from the visitor experience.

Replace Wooden Components of Pigtail Bridge. One of the alternatives initially considered was to replace the existing wooden bridge deck and guardrail with new timber deck and guardrail to match in kind the existing wooden components. This alternative was dismissed as the vehicle load limit would not have been upgraded to meet current needs.

Total Replacement of Pigtail Bridge. Initially, an alternative to demolish the existing Pigtail Bridge and reconstruct a modern 2-lane bridge that would accommodate all road traffic and meet current safety standards was considered. Under this alternative, new abutments would be faced with stone veneer salvaged from existing masonry, and the narrow roadway between the bridge piers would be widened by shaving the rockface. Total bridge replacement was dismissed because of the loss of the historic bridge and negative changes in the character of the landscape.

Resurface Pigtail Bridge. An alternative was considered to resurface the asphalt roadway over the bridge without replacement or upgrading of bridge features. The new surface overlay option was dismissed because this alternative would not have upgraded the vehicle load limit on the bridge deck.

THE ENVIRONMENTALLY PREFERRED ALTERNATIVE

The environmentally preferred alternative is the alternative that will best promote national environmental policy expressed in the National Environmental Policy Act. The environmentally preferred alternative would cause the least damage to the biological and physical environment, and would best protect, preserve, and enhance historical, cultural, and natural resources.

Section 101(b) of the National Environmental Policy Act identifies six criteria to help determine the environmentally preferred alternative. The act directs that federal plans should:

1. Fulfill the responsibilities of each generation as trustee of the environment for succeeding generations;

2. Assure for all Americans safe, healthful, productive, and esthetically and culturally pleasing surroundings;

3. Attain the widest range of beneficial uses of the environment without degradation, risk to health or safety, or other undesirable and unintended consequences;

4. Preserve important historical, cultural, and natural aspects of our national heritage, and maintain, wherever possible, an environment that supports diversity and variety of individual choice;

5. Achieve a balance between population and resource use that will permit high standards of living and a wide sharing of life's amenities; and

6. Enhance the quality of renewable resources and approach the maximum attainable recycling of depletable resources.

Continuing the current conditions under Alternative A would be least effective in meeting these criteria. Without rehabilitation of the historic Beaver Creek and Pigtail Bridges and historic culvert headwalls, the National Park Service would be unable to preserve, to the greatest extent possible, important historic resources that are part of the cultural landscape of Wind Cave National Park. Alternative B would be preferred over the No Action Alternative, because with the implementation of this alternative, the National Park Service would be better able to:

Protect and rehabilitate some of the park's important cultural resources and improve the NPS' ability to "preserve important historical, cultural, and natural aspects of our national heritage." The Beaver Creek and the Pigtail bridges are listed on the National Register of Historic Places, and the stone culvert headwalls along the highway are part of the park's historic resources and contribute visually to the historic landscape of the highway (Criteria 1 and 4).

Protect the health, safety, and welfare of the public by improving the condition of the road surface and structural stability of the Beaver Creek and Pigtail Bridges (Criterion 2).

Enhance the visitor experience and provide "safe, healthful . . . surroundings" (Criterion 2).

Therefore, Alternative B, the Preferred Alternative, is also the environmentally preferred alternative.

COMPARISON OF ALTERNATIVES

Table 4 summarizes the objectives of the project and presents the ability of the alternatives to meet them.

TABLE 4. OBJECTIVES AND THE ABILITY OF THE ALTERNATIVES TO MEET THEM

Objective	Alternative A, the No Action Alternative	Alternative B, the Preferred Alternative
Protect public health, safety and welfare by providing safe, reliable driving surfaces on the highway and roadways and correcting deficiencies of the bridges.	Alternative A would not meet this objective because the surfaces of Highway 87 and Visitor Center access roads would continue to deteriorate beyond the park's maintenance capabilities. Additionally, the deck, curbs, and railing would continue to spall and the north abutment on the Beaver Creek Bridge would become more compromised because of erosion.	The rehabilitation project would resurface Highway 87 and the Visitor Center access roads; define pullouts; and upgrade the bridge decking, structure, railing, and approaches of the Beaver Creek and Pigtail Bridges. This would protect health and safety by improving driving surfaces and bridges and would provide defined areas for visitors to safely

TABLE 4. OBJECTIVES AND THE ABILITY OF THE ALTERNATIVES TO MEET THEM

Objective	Alternative A, the No Action Alternative	Alternative B, the Preferred Alternative
	The Pigtail Bridge would continue to fail to meet current load capacities, and fail to meet guardrail crash and height standards. Bridge approach alignments would continue to cause accidents.	pull over for viewing opportunities.
Provide for visitor enjoyment and natural resource protection by enhancing surfaces on the highway and roadways and interpretive pullouts and parking areas.	Alternative A would not meet this objective because over time, driving surfaces would deteriorate even further and become rutted and cracked. Without defined pullouts, visitors pull onto the shoulder and damage natural resources.	Alternative B would promote visitor enjoyment with comfortable, reliable driving surfaces. It would also allow visitors to enjoy the historic bridges and define areas for vehicles to pull over and experience scenic views.
Protect and preserve important cultural resources through the rehabilitation and stabilization of the historic culvert headwalls and Beaver Creek and Pigtail Bridges.	Alternative A would not meet this objective because the historic culvert headwalls and Beaver Creek and Pigtail Bridges would not be rehabilitated and would continue to deteriorate and the bridges would continue to be damaged by vehicles.	Alternative B would rehabilitate historic features of the Beaver Creek Bridge, structurally stabilize its north abutment, and reattach its guardrails. The bridge deck, guardrails and approaches for the Pigtail Bridge would be rehabilitated to minimize damage from vehicles. Historic culvert headwalls would be preserved and rehabilitated.

SUMMARY OF IMPACTS

Table 5 briefly summarizes the effects of each of the alternatives on the impact topics that were retained for analysis at Wind Cave National Park. More detailed information on the effects of the alternatives is provided in the "Affected Environment and Environmental Consequences" section.

TABLE 5. SUMMARY OF IMPACTS BY RESOURCE TOPIC

Resource Topic	Alternative A, the No Action Alternative	Alternative B, the Preferred Alternative
Public Health and Safety	Under Alternative A, Highway 87 and the Visitor Center access roads and bridge deck surfaces would continue to deteriorate at a rate that exceeds repair, presenting short- and long-term, minor adverse effects on health and safety. However, these adverse effects would be offset by the ongoing maintenance and repair work. The continuation of current conditions at the Beaver Creek and Pigtail Bridges in the short- and long-term would have a minor to moderate adverse effect on health and safety due to railing, decking, structural, and approach deficiencies. In the short- and long-term, continued use of unsigned and undesignated pullouts along Highway 87 would have a minor adverse effect on safety by creating unsafe conditions as vehicles enter and exit the highway.	In the long-term, there would be a minor to moderate, beneficial effect on health and safety because the roadways would be resurfaced and interpretive pullouts improved, reducing the potential for traffic accidents related to poor road conditions and merging traffic. Rehabilitation of the deficient railing, concrete decking, and abutment of the Beaver Creek Bridge and upgrading the guard railing, strengthening the deck structure and realignment of the northern approach and shaving rockfaces at the Pigtail Bridge would have a long-term, minor to moderate, beneficial effect on health and safety. However, long-term, moderate, adverse effects at the Pigtail Bridge due to the overall traffic situation would be anticipated to persist. During construction, the effects of the proposed action on health and safety would be localized, minor to moderate, and adverse. Traffic would have to be re-routed around road construction activities, and the Beaver Creek and Pigtail Bridges could be closed for up to six to eight weeks.
Visitor Use and Experience	In the long-term, as more of the road and bridge deck surfaces continue to deteriorate, there would be a moderate, adverse effect on the visitor experience, requiring visitors to focus more on driving, thus limiting their ability to experience the park's scenery and wildlife. In the short-term, continued deterioration of the highway and roads would have a minor, adverse effect on the park experience because the current approach of "piecemeal patching" of the	Once bridge rehabilitation is complete and the road surfacing on Highway 87 and both Visitor Center access roads has been finished, there would be a long-term, minor, beneficial effect on the park experience. This is because visitors would be able to drive comfortably on newly surfaced roads with increased opportunities to stop at new wayside exhibit pullouts and view scenery and wildlife without having to continually focus on road conditions.

TABLE 5. SUMMARY OF IMPACTS BY RESOURCE TOPIC

Resource Topic	Alternative A, the No Action Alternative	Alternative B, the Preferred Alternative
	road creates uncomfortable driving conditions for the visitor.	In the short-term, highway and road resurfacing and bridge rehabilitation would have a moderate, adverse effect on the visitor experience because visitors would have to contend with being rerouted where road construction is occurring along Highway 87 and the Visitor Center access roads. During the period of construction, visitors would also be denied access to some of the wayside exhibit pullouts, diminishing their ability to learn more about those park resources that are visible from Highway 87.
Park Operations	The increasing rate of park highway/road/bridge deterioration would have a short- and long-term, minor to moderate, adverse effect on park operations. This effect would result from increased maintenance and repair needs as the road surface continues to deteriorate and in the case of the Pigtail Bridge, limits the routes the heavy snow/sand trucks and bison hauling rigs take. Also, in the long-term, the increasing commitment to highway/road/bridge repair would adversely affect the park's ability to provide adequate maintenance for other infrastructure facilities.	In the long-term, there would be a minor to moderate, beneficial effect on park operations because road/bridge maintenance would be substantially reduced once the rehabilitation work is completed and would not limit the use of their heavy equipment. The project action of resurfacing major portions of the Visitor Center access roads and Highway 87 and rehabilitating the Beaver Creek and Pigtail Bridges would have a minor, short-term, adverse effect on park operations. This impact would occur because during the year-long period of construction, the park would have to assist the contractor in managing and rerouting visitor traffic on those road sections being resurfaced and around bridges. In the short-term, the park would also have increased responsibilities in monitoring rehabilitation work to ensure the protection of park resources.

TABLE 5. SUMMARY OF IMPACTS BY RESOURCE TOPIC

Resource Topic	Alternative A, the No Action Alternative	Alternative B, the Preferred Alternative
Cultural Resources	Continuation of existing conditions under the No Action Alternative would have a negligible, adverse effect on the park's archeological and ethnographic resources. As the rate of repair fails to keep pace with the rate of deterioration of the culvert headwalls and the Beaver Creek and Pigtail Bridges, a long-term, moderate, adverse effect to historic resources and cultural landscapes would occur. Alternative A would not result in impairment of cultural resources or values in Wind Cave National Park.	With mitigation, rehabilitation of the existing highway and roadways would have a negligible to minor, adverse effect on archeological and ethnographic resources. In general, the rehabilitation of the roadway, its landscape, and its historic features (bridges and culverts) would have a long-term, moderate, beneficial effect by extending life expectancy and preserving integrity. Adverse effects of installing and attaching approach rails at the Beaver Creek Bridge would be minor and long-term, but the attachment would also help protect the bridge from vehicle crashes, a minor benefit. Other rehabilitation work at the Beaver Creek Bridge would be beneficial and long-term. Renovation of culvert headwalls and their associated stone alignments would be a long-term, moderate, beneficial effect. Replacement in kind of the deck and girders, installation of new guardrails and approach rails at the Pigtail Bridge would have long-term, negligible to minor, adverse effects on the bridge and the landscape, but these renovations would help protect the bridge during vehicle encounters and help ensure its long-term preservation. Shaving the bedrock on the north Pigtail Bridge approach and on bedrock beneath the bridge would have a minor adverse effect on the landscape and a moderate benefit for the bridge. Effects to the roadway segments would be negligible. Alternative B would not result in impairment of cultural resources or values in Wind Cave National Park.

TABLE 5. SUMMARY OF IMPACTS BY RESOURCE TOPIC

Resource Topic	Alternative A, the No Action Alternative	Alternative B, the Preferred Alternative
Water Resources and Wetlands	Alternative A would continue to produce long-term, negligible to minor, adverse effects on water quality from sediment loading in runoff. There would also be long-term, negligible, adverse effects from the potential for particulate and sediment delivery into surface and groundwater from deteriorated asphalt. There would be no impairment of park water or wetland resources or values under the No Action Alternative.	Long-term benefits of negligible to minor intensity would result from improved drainage and reduced sediment loading in runoff. The construction, demolition, and rehabilitation activities associated with Alternative B would produce short- and long-term, localized, negligible, adverse effects on water resources and wetlands. There would be no impairment of park water or wetland resources or values under the Preferred Alternative.
Geology and Soils	Alternative A would produce negligible, long-term, adverse effects on geology and soil resources on and near Highway 87 and the Visitor Center access roads. These effects would be due to the continued effects of rock and soil disturbance, soil compaction from off-road visitor and maintenance vehicle parking, and bridge abutment erosion. There would be no impairment of geologic or soil resources or values as a result of the implementation of Alternative A.	The construction activities and disturbance associated with Alternative B would produce localized, adverse, minor, short- and long-term term effects on soil resources and long-term, minor adverse effects on geologic resources. Long-term, negligible, beneficial effects would occur from reduced compaction along unpaved formal and informal traffic pullouts and bridge abutment erosion at Beaver Creek Bridge. The reclamation of the former traffic pullouts would produce a long-term, localized, minor benefit. There would be no impairment of geologic or soil resources or values because of the implementation of Alternative B.
Vegetation	Effects to vegetation under the No Action Alternative would be long-term, negligible, and adverse from disturbance to vegetation in the Highway 87 and Visitor Center access roads right-of-ways. There would be no impairment of vegetation resources or values under this alternative.	Alternative B would produce short- and long-term, minor, local, adverse effects on the vegetation along the Highway 87 and Visitor Center access roads corridors. Development of recognizable pullouts, turnarounds, and optimizing parking areas would have a long-term, negligible, beneficial effect on vegetation. There would be no impairment of vegetation resources or values under this alternative.

TABLE 5. SUMMARY OF IMPACTS BY RESOURCE TOPIC

Resource Topic	Alternative A, the No Action Alternative	Alternative B, the Preferred Alternative
Wildlife and Habitats	The No Action Alternative would have a continued short-term, local, negligible, adverse effect on wildlife as a result of vehicle traffic and the introduction of humans into wildlife habitats. There would be no impairment of wildlife or wildlife habitat resources or values as a result of the implementation of Alternative A.	Implementation of Alternative B would have short- and long-term, local, negligible to minor, adverse effects on wildlife, due to disturbance and possibly displacement from the construction areas. There would be no impairment of wildlife or wildlife habitat resources or values as a result of the implementation of Alternative B.
Natural Soundscape	The transient effects of the No Action Alternative on the natural soundscape would be long term, local, negligible to moderate, and adverse, depending on the specific location and time of day. There would be no impairment of the natural soundscape or soundscape resources or values as a result of the implementation of Alternative A.	Effects associated with Alternative B would be short-term, local, minor to moderate, and adverse, as a result of the operation of construction machinery. A short-term increase in traffic from construction personnel accessing the project sites would lead to negligible, adverse effects to the natural soundscape. There would be no impairment of the natural soundscape or soundscape resources or values as a result of the implementation of Alternative B.
Endangered and Threatened Species	The No Action Alternative would have no effect on endangered and threatened species. There would be no impairment of endangered or threatened species or critical habitat resources or values under this alternative.	Black-footed ferrets would not be affected because they are not likely to occur within the park at this time. However, in the event that black-footed ferrets are found in a prairie dog colony adjacent to the project corridor, formal consultation would be initiated with the U.S. Fish and Wildlife Service and appropriate mitigation measures would be instituted ensuring the action would have no effect on this species. Alternative B would have no effect on the American burying beetle or the bald eagle because these species are not likely to occur in the project area. The state sensitive plant species, Hopi tea, would not be affected by Alternative B. There would be no impairment of endangered or threatened species or critical habitat resources or values under Alternative B.

AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

This section describes the affected environment, and explains the environmental consequences that the no action and action alternative would have on that environment. It is organized by impact topic, which allows a standardized comparison between alternatives based on issues. Consistent with NEPA, the analysis also considers the context, intensity, and duration of impacts, indirect impacts, cumulative impacts, and measures to mitigate impacts. National Park Service policy also requires that "impairment" of resources be evaluated in all environmental documents associated with resource analysis.

METHODOLOGY

General Evaluation Methodology

For each impact topic, the analysis includes a brief description of the affected environment and an evaluation of the effects of implementing each alternative. The impact analyses were based on information provided by park staff, relevant references and technical literature citations, and subject matter experts. Relevant references and technical literature citations are presented in the "References" section of this EA. The impact analyses involved the following steps.

- Define issues of concern, based on internal and external scoping.
- Identify the geographic area that could be affected.
- Define the resources within that area that could be affected.
- Impose the action on the resources within the area of potential effect.
- Identify the effects caused by the alternative, in comparison to the baseline represented by the No Action Alternative, to determine the relative change in resource conditions.

Characterize the effects based on the following factors:

- Whether the effect would be beneficial or adverse.
- Intensity of the effect: negligible, minor, moderate, or major. (Impact-topic-specific thresholds for each of these classifications are provided in Table 6.) Threshold values were developed based on federal and state standards, consultation with regulators, and discussions with subject matter experts.
- Duration of the effect: short-term or long-term, with specificity for each impact topic.
- Context or area affected by the proposed action: site-specific, local, parkwide, regional.
- Whether the effect would be a direct result of the action or would occur indirectly because of a change to another resource or impact topic. An example of an indirect

impact would be increased mortality of an aquatic species that would occur because an alternative would increase soil erosion, which would reduce water quality.

Cumulative Effects

The Council on Environmental Quality regulations, which implement NEPA (42 USC 4321 et seq.), require assessment of cumulative effects in the decision-making process for federal projects. Cumulative effects 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 effects are considered for both the No Action and Preferred Alternative. The cumulative impacts analysis is presented at the end of each impact topic analysis.

Cumulative effects were determined by combining the effects of the alternative with other past, present, and reasonably foreseeable future actions in the vicinity. Therefore, it was necessary to identify other past, ongoing, or reasonably foreseeable future actions within Wind Cave National Park and the region. Other projects and plans with the potential to contribute cumulative effects to the proposed action are described in the “Related Projects and Plans” section of this document. In the case of cultural resources, impacts that occur outside the park could contribute to the overall loss of archeological, ethnographic, and historic resources. Therefore, for this impact topic, regional contributions to the damage or loss of resources are considered for the cumulative analysis.

Impairment of Park Resources or Values

The fundamental purpose of the National Park System, established by the Organic Act and reaffirmed by the General Authorities Act, as amended, begins with a mandate to conserve park resources and values. National Park Service managers must always seek ways to avoid or minimize to the greatest degree practicable adverse impacts on park and monument resources and values. However, the laws do give NPS management discretion to allow impacts to park resources and values when necessary and appropriate to fulfill the purposes of a park, as long as the impact does not constitute impairment of the affected resources and values. Although Congress has given NPS management discretion to allow certain impacts within parks, that discretion is limited by statutory requirement that the NPS must leave park resources and values unimpaired, unless a particular law directly and specifically provides otherwise.

NPS Management Policies 2001 (NPS 2000b) provides guidance on addressing impairment of park resources. Impairment is an impact that, “in the professional judgment of the responsible National Park Service manager, would harm the integrity of park resources or values, including those that would otherwise be present for the enjoyment of those resources or values. Whether an impact meets this definition depends on the particular resources that would be affected, the severity, duration, and timing of the impact, the direct and indirect effects of the impact, and the cumulative effects of the impact in question with other impacts.”

Any park resource can be impaired, but an impact would be more likely to result in impairment if it affects a resource or value whose conservation is:

- Necessary to fulfill specific purposes identified in the establishing legislation or proclamation of the park;

- Key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park; or

- Identified as a goal in the park's general management plan or other relevant National Park Service planning documents.

An impact would be less likely to result in impairment if it is an unavoidable result, which cannot reasonably be mitigated, of an action necessary to preserve or restore the integrity of vital park resources.

Park operations, public health and safety, visitor use and experience, and conflicts with other land use plans, policies, or controls are not considered park resources or values for which Wind Cave National Park was established to protect. Therefore, impairment findings are not included as part of the impact analysis for these topics.

Neither Alternative A (the No Action Alternative) nor Alternative B (the Preferred Alternative) would produce major adverse impacts or impairment of park resources or values.

Methodology for Assessing Impacts on Cultural Resources

Potential effects. Potential effects are described in terms of type, context, duration, and intensity. Because definitions of intensity vary by impact topic, intensity definitions are provided separately for each cultural resource impact topic analyzed in this environmental assessment.

Effects to Cultural Resources and Section 106 of the National Historic Preservation Act. In this environmental assessment, effects to historic archeological resources, historic structures and cultural landscapes, and traditional cultural properties are described in terms of type, context, duration, and intensity, which is consistent with the regulations of the Council on Environmental Quality that implement NEPA. These impact analyses are intended, however, to comply with the requirements of both NEPA and Section 106 of the National Historic Preservation Act (NHPA). In accordance with the Advisory Council on Historic Preservation's regulations implementing Section 106 of the NHPA (36 CFR 800, Protection of Historic Properties), effects to cultural resources were identified and evaluated by (1) determining the area of potential effects; (2) identifying cultural resources present in the area of potential effects that are either listed in or eligible to be listed in the National Register of Historic Places; (3) applying the criteria of adverse effect to affected cultural resources either listed in or eligible to be listed in the National Register; and (4) considering ways to avoid, minimize or mitigate adverse effects.

Under the Advisory Council's regulations, a determination of no adverse effect, or adverse effect must also be made for affected, National Register-eligible cultural resources. An adverse effect occurs whenever an effect alters, directly or indirectly, any characteristic of a cultural resource that qualifies it for inclusion in the National Register, e.g. diminishing the integrity of the resource's location, design, setting, materials, workmanship, feeling, or association. Adverse effects also include reasonably foreseeable effects caused by the Preferred Alternative that would

occur later in time, be farther removed in distance or be cumulative (36 CFR 800.5, Assessment of Adverse Effects). A determination of no adverse effect means there is an effect, but the effect would not diminish the characteristics of the cultural resource that qualify it for inclusion in the National Register.

The Council on Environmental Quality regulations and the National Park Service's Conservation Planning, Environmental Impact Analysis and Decision Making (Director's Order 12) also call for a discussion of the appropriateness of mitigation, as well as an analysis of how effective the mitigation would be in reducing the intensity of a potential effect, e.g. reducing the intensity of an effect from major to moderate or minor.

A Section 106 Summary is included in the impact analysis sections for historic archeological resources, historic structures and cultural landscapes, and ethnographic resources. The Section 106 Summary is intended to meet the requirements of Section 106 and is an assessment of the effect of the undertaking (implementation of the alternative) on cultural resources, based upon the criterion of effect and criteria of adverse effect found in the Advisory Council's regulations.

Durations of effects on cultural resources. Effects on virtually all cultural features other than vegetation components would be long-term effects because most cultural resources are non-renewable. These would include any effects on archeological, historic, or ethnographic resources, and on non-vegetation elements of a cultural landscape.

Short-term effects would involve such things as treatment effects on the natural elements of a cultural landscape that would extend for no more than about five years. Examples would include the restoration of historic plantings or the regrowth of vegetation.

Geographic area evaluated for effects. The right-of way corridor for Highway 87 and both north and south Visitor Center access roads were the areas evaluated for potential effects to resources.

Methodology for Assessing Effects on Threatened and Endangered Species

The impact analysis involved the following steps:

- Identify the listed species or species proposed for listing that occur in the area of potential effect.
- Determine how each species uses the resources within the area of potential effect.
- Identify the intensity and duration of the effects on species and their habitats for each alternative, both as a result of the proposed action and from a cumulative effects perspective. The analyses' determinations use language specific to Section 7 of the Endangered Species Act. The impact threshold definitions (i.e., negligible, minor, moderate, major) used for other impact topics are not used for the endangered and threatened species analyses. Rather, the effects are described using the terms presented for Endangered and Threatened Species in Table 6.

TABLE 6. IMPACT TOPIC THRESHOLD DEFINITIONS

Impact Topic	Negligible	Minor	Moderate	Major	Duration
Public health and safety	Public health and safety would not be affected, or the effects would be at low levels of detection and would not have an appreciable effect on the public health or safety.	The effect would be detectable, but would not have an appreciable effect on public health and safety. If mitigation were needed, it would be relatively simple and likely successful.	The effect would be readily apparent, and would result in substantial, noticeable effects on public health and safety on a local scale. Changes in rates of accidents or injuries could be measured. Mitigation measures would probably be necessary and would likely be successful.	The effects would be readily apparent, and would result in substantial, noticeable effects on public health and safety on a regional scale. Changes could lead to changes in the rate of mortality. Extensive mitigation measures would be needed, and their success would not be assured.	Short-term – Occurs only during the duration of the project. Long-term – Persists beyond the duration of the project.
Visitor use and experience	Visitors would not be affected or changes in visitor use and/or experience would be below or at the level of detection. The visitor would not likely be aware of the effects associated with the alternative.	Changes in visitor use and/or experience would be detectable. The visitor would be aware of the effects associated with the alternative, but the effects would be slight.	Changes in visitor use and/or experience would be readily apparent. The visitor would be aware of the effects associated with the alternative and would likely be able to express an opinion about the changes.	Changes in visitor use and/or experience would be readily apparent and have important consequences. The visitor would be aware of the effects associated with the alternative and would likely express a strong opinion about the changes.	Short-term – Occurs only during the treatment action. Long-term – Occurs after the treatment action.
Park operations	Park operations would not be affected or the effect would be at or below levels of detection, and would not have an appreciable effect on park operations.	The effect would be detectable but would not be of a magnitude that it would appreciably change the park operations. If mitigation were needed to offset adverse effects, it would be relatively simple and likely successful.	The effects would be readily apparent and would result in a substantial change in park operations in a manner noticeable to staff and the public. Mitigation measures would probably be necessary to offset adverse effects and would likely be successful.	The effects would be readily apparent and would result in a substantial change in park operations in a manner noticeable to staff and the public and be markedly different from existing operations. Mitigation measures to offset adverse effects would be needed, and their success would not be assured.	Short-term – Occurs only during the duration of the project. Long-term – Persists beyond the duration of the project.

TABLE 6. IMPACT TOPIC THRESHOLD DEFINITIONS

Impact Topic	Negligible	Minor	Moderate	Major	Duration
Archeological resources	Effects of the action are at the lowest levels of detection – barely measurable with no perceptible consequences, either adverse or beneficial, to archeological resources. For purposes of Section 106, the determination of effect would be *no effect on historic properties.*	Adverse effect- the action would affect an archeological site(s) with modest data potential and no significant ties to a living community's cultural identity. The site disturbance is confined to a small area with little, if any, loss of important information potential. For purposes of Section 106, the determination of effect would be *no adverse effect.* Beneficial effect - the action would result in preservation of a site in its natural state. For purposes of Section 106, the determination of effect would be *no adverse effect.*	Adverse effect- the action would affect an archeological site(s) with high data potential but with no significant ties to a living community's cultural identity. Disturbance to the site would be modest, but would cause some a loss of integrity. The determination of effect for §106 would be *adverse effect.* Beneficial effect - the action would enable stabilization of the site. For purposes of Section 106, the determination of effect would be *no adverse effect*	Adverse effect- the action would affect an archeological site(s) with exceptional data potential and that has significant ties to a living community's cultural identity. Disturbance of the site may be substantial, resulting in the loss of most or all of the site and its potential to yield import information. The determination of effect for §106 would be *adverse effect.* Beneficial effect - active intervention occurs to stabilize the site and develop future preservation measures that would foster conditions under which archeological resources and modern society can exist in productive harmony and fulfill the social, economic, and other requirements of present and future generations. For purposes of Section 106, the determination of effect would be *no adverse effect.*	Short-term – See below Long-term – Because archeological resources are non-renewable, any effects on either prehistoric or historic archeological resources would be long-term.

TABLE 6. IMPACT TOPIC THRESHOLD DEFINITIONS

Impact Topic	Negligible	Minor	Moderate	Major	Duration
Historic structures	The action would not have the potential to cause effects on historic structures, buildings, or districts that would alter any of the characteristics that would qualify the resource for inclusion in or eligibility for the National Register of Historic Places. For purposes of §106, the determination would be *no historic properties affected*.	Adverse effect - the action would affect a feature(s) of a National Register of Historic Places-eligible or -listed structure, building or district, but would not alter its character-defining features, nor would the action diminish the overall integrity of the property. For purposes of §106, the determination of effect would be *no adverse effect.* *Beneficial effect:* The action would maintain the character-defining features of a National Register of Historic Places-eligible or -listed structure, building, or district in accordance with the *Secretary of the Interior's Standards for the Treatment of Historic Properties* (NPS 1995b) For purposes of §106, the determination of effect would be *no adverse effect*.	Adverse effect - the action would alter a character-defining feature of the structure or building but would not diminish the integrity of the resource to the extent that its National Register eligibility is jeopardized. For purposes of Section 106, the determination of effect would be *adverse effect*. *Moderate beneficial effect*: Positive actions would be taken to help preserve character-defining elements of a structure, building, or district in accordance with the *Secretary of the Interior's Standards for the Treatment of Historic Properties (*NPS 1995b). For purposes of §106, the determination of effect would be *no adverse effect*.	Adverse effect - the action would alter a character-defining feature(s) of the structure, building, or district, seriously diminishing the overall integrity of the resource to the point where its National Register eligibility may be in question. For purposes of §106, the determination of effect would be *adverse effect*. *Major beneficial effect*: The action would noticeably enhance the character-defining features of a structure or a building that represent important components of the nation's historic heritage, and would foster conditions under which these cultural foundations of the nation and modern society could exist in productive harmony and fulfill the social, economic, and other requirements of present and future generations. Enhancement would be in accordance with the *Secretary of the Interior's Standards for the Treatment of Historic Properties* (NPS 1995b). The §106 determination of effect would be *no adverse effect*.	Long-term – Because historic structures are non-renewable, any effects on these resources would be long-term.

TABLE 6. IMPACT TOPIC THRESHOLD DEFINITIONS

Impact Topic	Negligible	Minor	Moderate	Major	Duration
Cultural Landscapes	Effects of the action would be barely perceptible and would not affect cultural landscape resource conditions either beneficially or adversely. For purposes of §106, the determination would be *no historic properties affected*.	Adverse effect - the action would alter a pattern, feature, or vegetation in the cultural landscape but would not diminish the overall integrity of the landscape. For purposes of §106, the determination of effect would be *no adverse effect*. Beneficial effects of the action would help maintain existing landscape patterns and features in accordance with the *Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for the Treatment of Cultural Landscapes*. For purposes of §106, the determination of effect would be *no adverse effect*.	Adverse effect - the action would alter a character-defining feature of the cultural landscape but would not diminish the integrity of the landscape to the extent that its National Register eligibility is jeopardized. For purposes of Section 106, the determination of effect would be *adverse effect*. Beneficial effect - the action would improve the cultural landscape in accordance with the *Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for the Treatment of Cultural Landscapes.* For purposes of §106, the determination of effect would be *no adverse effect.*	Adverse effect - the action would alter patterns or features of the cultural landscape, seriously diminishing the overall integrity of the resource to the point where its National Register eligibility may be in question. For purposes of §106, the determination of effect would be adverse effect. Beneficial effect - the action would actively enhance and improve the landscape in accordance with the *Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for the Treatment of Cultural Landscapes*. For purposes of §106, the determination of effect would be no adverse effect.	Short-term - Effects on the natural elements of a cultural landscape may be comparatively short-term (less than a year) until new vegetation grows or historic plantings are restored. Long-term – Structural elements of the landscape are non-renewable, so many effects on landscape resources would be long-term, e.g. effects on the cultural landscape would persist for more than a year.

TABLE 6. IMPACT TOPIC THRESHOLD DEFINITIONS

Impact Topic	Negligible	Minor	Moderate	Major	Duration
Ethnographic resources	Effect(s) would be barely perceptible and would neither alter resource conditions, such as traditional access or site preservation, nor alter the relationship between the resource and the affiliated group's body of practices and beliefs. For purposes of Section 106, the determination of effect on Traditional Cultural Properties (TCPs) would be no adverse effect.	Adverse effect – effect(s) would be slight but noticeable and would neither appreciably alter resource conditions, such as traditional access or site preservation, nor alter the relationship between the resource and the affiliated group's body of practices and beliefs. For purposes of Section 106, the determination of effect on TCPs would be no adverse effect. Beneficial effect – would allow access to and/or accommodate a group's traditional practices or beliefs. For purposes of Section 106, the determination of effect on TCPs would be no adverse effect.	Adverse effect – effect(s) would be apparent and would alter resource conditions. Something would interfere with traditional access, site preservation, or the relationship between the resource and the affiliated group's practices and beliefs, even though the group's practices and beliefs would survive. For purposes of Section 106, the determination of effect on TCPs would be adverse effect. Beneficial effect – would facilitate traditional access and/or accommodate a group's practices or beliefs. For purposes of Section 106, the determination of effect on TCPs would be no adverse effect.	Adverse effect – effect(s) would alter resource conditions. Something would block or greatly affect traditional access, site preservation, or the relationship between the resource and the affiliated group's body of practices and beliefs, to the extent that the survival of a group's practices and/or beliefs would be jeopardized. For purposes of Section 106, the determination of effect on TCPs would be adverse effect. Beneficial effect – would encourage traditional access and/or accommodate a group's practices or beliefs. For purposes of Section 106, the determination of effect on TCPs would be no adverse effect.	Long-term – Because ethnographic resources are essentially non-renewable, any effects on these resources would be long-term.

TABLE 6. IMPACT TOPIC THRESHOLD DEFINITIONS

Impact Topic	Negligible	Minor	Moderate	Major	Duration
Water resources and wetlands	Effects would not be detectable. Water quality parameters would be well within all water quality standards for the designated use of the water. Water quality would be within historical conditions.	Effects would be measurable, but water quality parameters would be well within all water quality standards for the designated use. Water quality would be within the range of historical conditions.	Changes in water quality would be readily apparent, but water quality parameters would be within all water quality standards for the designated use. Water quality would be outside historic baseline on a limited basis. Mitigation would be necessary to offset adverse effects, and would likely be successful.	Changes in water quality would be readily measurable, and some quality parameters would periodically be exceeded. Extensive mitigation measures would be necessary and their success would not be assured.	Short-term – Following completion of the project, recovery would take less than one year. Long-term – Following completion of the project, recovery would take more than one year.
Geology and Soils	Soils and geologic features would not be affected, or effects would not be measurable. Any effects to soil productivity or fertility would be slight and short-term, and would occur in a relatively small area. .	Effects on soils or geologic features would be detectable, but would affect a small area. If mitigation were needed to offset adverse effects, it would be relatively simple to implement and would likely be successful.	Effects to soils or geologic features would be readily apparent, and would occur over a relatively large area. Mitigation would probably be necessary to offset adverse effects and would likely be successful.	Effects on soils or geologic features would be readily apparent, and would substantially change the soil or geologic characteristics over a large area in and out of the park. Extensive mitigation would be needed to offset adverse effects, and its success would not be assured.	Soil, short-term– Following completion of the project, recovery would take less than one year. Soil, long-term – Following completion of the project, recovery would take more than one year. Geology - Because rock formations are essentially non-renewable, any effects on these resources would be long-term.

TABLE 6. IMPACT TOPIC THRESHOLD DEFINITIONS

Impact Topic	Negligible	Minor	Moderate	Major	Duration
Vegetation	Individual native plants may be affected, but measurable or perceptible changes in plant community size, integrity, or continuity would not occur.	Effects on native plants would be measurable or perceptible, but would be localized within a small area. The viability of the plant community would not be affected and the community, if left alone, would recover.	A change would occur to the native plant community over a relatively large area that would be readily measurable in terms of abundance, distribution, quantity, or quality. Mitigation measures to offset or minimize adverse effects would be necessary and would likely be successful.	Effects on native plant communities would be readily apparent, and would substantially change vegetative community types over a large area. Extensive mitigation would be necessary to offset adverse effects and their success would not be assured.	Short-term – Following completion of the project, recovery would take less than one year. Long-term – Following completion of the project, recovery would take more than one year.
Wildlife and habitats	Wildlife and their habitats would not be affected or the effects would be at or below the level of detection and would not be measurable or of perceptible consequence to wildlife populations.	Effects on wildlife or habitats would be measurable or perceptible, but localized within a small area. While the mortality of individual animals might occur, the viability of wildlife populations would not be affected and the community, if left alone, would recover.	A change in wildlife populations or habitats would occur over a relatively large area. The change would be readily measurable in terms of abundance, distribution, quantity, or quality of population. Mitigation measures would be necessary to offset adverse effects, and would likely be successful.	Effects on wildlife populations or habitats would be readily apparent, and would substantially change wildlife populations over a large area in and out of the national park. Extensive mitigation would be needed to offset adverse effects, and the success of mitigation measures could not be assured.	Habitats and populations: Short-term – Recovers in less than one year after project completion. Long-term – Takes more than one year to recover after project is complete.

TABLE 6. IMPACT TOPIC THRESHOLD DEFINITIONS

Impact Topic	Negligible	Minor	Moderate	Major	Duration
Natural soundscape	Natural sounds are predominant. Noise effects would not be audible in most of the project area. Where noise is audible, it would be for a short duration with significantly lengthy periods of time that are noise-free.	Natural sounds usually predominate. Noise effects would not be audible in most of the project area. Where noise is audible, effects occur for short durations frequently during the day, and would be occasionally audible between sunset and sunrise.	Natural sounds compete with human-caused sounds. Noise effects would be commonly audible in some areas of the park for up to half the daylight hours. In locations where noise is commonly audible, it occurs occasionally between sunset and sunrise. Noise would sometimes be audible at places outside of the project area.	Natural sounds would be dominated by human-caused sounds throughout the daytime hours. Natural sounds in the project area would be commonly affected by noise during extended periods of time, and frequently, between sunset and sunrise. Noise would frequently be audible outside of the project area.	Short-term – Occurs only during the duration of the project. Long-term – Persists beyond the duration of the project.
Endangered and threatened species (Note: Section 7 of the Endangered Species Act requires use of the indicated specific wording when quantifying potential effects to listed species.)	No Effect: Effects would not affect listed or protected species or designated critical habitat.	May Affect/Is Not Likely to Adversely Affect: Effects on special status species or critical habitat would be discountable (i.e., adverse effects are unlikely to occur or could not be meaningfully measured, detected, or evaluated) or completely beneficial.	May Affect/Likely to Adversely Affect: Adverse effects to a listed species or critical habitat might occur as a direct or indirect result of the proposed action and the effect would either not be discountable or completely beneficial. Moderate effects to species would result in a local population decline due to reduced survivorship, declines in population, and/or a shift in the distribution; no direct casualty or mortality would occur.	Likely to jeopardize the continued existence of a species/Adversely modify critical habitat: Effects could jeopardize the continued existence of a listed or proposed species or adversely modify designated critical habitat within and/or outside the park boundaries. Major effects would involve a disruption of habitat and breeding grounds of a protected species such that direct casualty or mortality would result in removal of individuals of a protected species from the population.	Plants Short-term – Recovers in less than one year. Long-term – Takes more than one year to recover. Animals Short-term – Recovers in less than one year. Long-term – Takes more than one year to recover.

PUBLIC HEALTH AND SAFETY

Affected Environment

The NPS strives to provide safe and healthful conditions for the visiting public and park employees. This encompasses a wide range of activities, including infrastructure function and condition, law enforcement services, wildlife management, and minimizing visitor conflict. To protect visitors and staff during construction activities, NPS *Management Policies 2001* directs the use of best management practices for all phases of construction, including traffic control, signage, and restrictions on access. For this analysis, public health and safety addressed the condition of the park and the effects of the proposed implementation plan on visitors and staff.

The continuing level of deterioration associated with Highway 87 and the Visitor Center access roads represents a potential threat to visitor and park staff safety. Both roadways accommodate two-way traffic. However, the two historic bridges on Highway 87 are one-way and require vehicles to cross one at a time. Trucks, recreation vehicles, and cars use both Highway 87 and the Visitor Center access roads. Highway 87 provides approximately eight designated, exhibit pullouts, as well as undesignated, informal pullouts where visitors pull off the road to photograph both scenery and wildlife.

The park has recorded four guardrail-strike accidents at the Pigtail Bridge in the past five years. Most recently, the historic railing was struck in May of 2005 by a school bus that scraped the railing. In June of 2004 the same area was struck, with notable damage occurring to the railing. The accident was a hit-and-run, with no injuries or vehicle damage reported to the park or local law enforcement authorities.

The Federal Highway Administration reports that the average accident rate on a 2-lane rural roadway is 2.4 accidents per million vehicle miles. This number would be appropriate for use on Highway 87 and the Visitor Center access roads. Using the Pigtail Bridge, average daily traffic volume of 312 vehicles per day and the recorded vehicle strikes, the accident rate at this location is calculated to be 17.6 accidents per million vehicle miles – more than seven times the national average.

Impacts of Alternative A, the No Action Alternative

Under Alternative A, Highway 87 and the Visitor Center access roads, parking areas, and bridge deck surfaces would continue to deteriorate at a rate that exceeds repair and would present short- and long-term, minor adverse effects on health and safety due to the unsafe driving conditions caused by the uneven, rutted and cracked pavement. However, ongoing maintenance and repair work would offset these adverse effects by keeping the road and bridge deck surfaces patched and sealed. Accidents may increase if road and bridge surfaces continue to deteriorate over time.

The continuation of current conditions at the Pigtail Bridge would have short- and long-term moderate adverse effects on health and safety because the railing and low-strength deck and its inadequate approach alignment would continue to present a hazard to heavy, over-sized visitor and commercial vehicles and park vehicles such as snow/sand trucks and bison hauling rigs.

Additionally, the deteriorating deck, unacceptable railing detachment, and eroding abutment of the Beaver Creek Bridge would also continue to present hazards to vehicular traffic, perpetuating the unacceptable safety condition and associated short- and long-term, adverse minor to moderate effects to health and safety.

In the short- and long- term, continued use of the unsigned and undesignated, informal pullouts along Highway 87 would have a minor, adverse effect on safety by creating unsafe conditions as vehicles enter and exit the highway. In addition, visitors are sometimes distracted by the presence of wildlife such as elk and bison near these pullouts. The designated pullouts pose less of a problem because they are more visible and are marked with signs, including onsite safety information.

Cumulative effects. Installation of the reconfigured parking lot and upcoming cave lighting project are anticipated to provide long-term benefits to public health and safety, at a minor to moderate level. The No Action Alternative would make no beneficial contribution to the effects of these projects. The minor to moderate adverse effects of the No Action Alternative would offset some of the beneficial effects of other projects; therefore, overall cumulative effects would be long-term, minor, and beneficial.

Conclusion. Under Alternative A, Highway 87 and the Visitor Center access roads and bridge deck surfaces would continue to deteriorate at a rate that exceeds repair, presenting short- and long-term, minor adverse effects on health and safety. However, these adverse effects would be offset by the ongoing maintenance and repair work. The continuation of current conditions at the Beaver Creek and Pigtail Bridges in the short- and long- term would have a minor to moderate adverse effect on health and safety due to railing, decking, structural, and approach deficiencies.

In the short- and long-term, continued use of unsigned and undesignated pullouts along Highway 87 would have a minor adverse effect on safety by creating unsafe conditions as vehicles enter and exit the highway.

Impacts of Alternative B, the Preferred Alternative

In the long-term, there would be minor to moderate beneficial effects on health and safety because Highway 87 and the Visitor Center access roads and bridge deck surfaces would be resurfaced, reducing the potential for traffic accidents related to poor road conditions. Long-term, minor, beneficial effects would be realized through enhancement of existing interpretive pullouts/parking areas. These activities would alleviate merging traffic problems while entering and leaving these areas or for viewing wildlife.

The improved guardrails and rehabilitation of concrete surfaces and abutment associated with rehabilitation of the Beaver Creek Bridge would also decrease the potential for serious traffic related injuries leading to long-term, minor beneficial effects on health and safety. Similarly, railing, structure, and deck upgrades and shaving of the rock faces at the Pigtail Bridge would be anticipated to yield a minor beneficial effect.

During the short-term (one-year construction period), the effects on health and safety would be adverse and minor to moderate, because of highway and road resurfacing activity and bridge

repair. Traffic would have to be re-routed around highway, road, and bridge construction activities, increasing the potential for accidents due to the presence of construction vehicles and changed traffic patterns. Construction activities, including the removal of existing asphalt, repaving, and hauling of materials to and from the sites would all contribute to increased safety risks. The potential for accidents would be highest if construction occurs during the peak season (June through August) when approximately 250,000 vehicles enter the park. The potential for accidents would be lower during the low season (September through October and April through May) when approximately 135,000 vehicles use park roads (NPS 2004d).

During the period of construction, health and safety risks would also increase for road resurfacing crews and NPS and Federal Highway Administration personnel responsible for onsite supervision activities due to the increased potential for vehicle/pedestrian accidents.

Cumulative effects. The long-term, cumulative, beneficial effects of other plans and projects outlined for Alternative A would be increased by the proposed action. The minor to moderate, long-term beneficial effects of the proposed Highway 87 and Visitor Center access road and bridge rehabilitation, in conjunction with other park efforts, would produce long-term, moderate, beneficial effects to public health and safety in the park.

Conclusion. In the long-term, there would be a minor to moderate, beneficial effect on health and safety because the roadways would be resurfaced, and interpretive pullouts improved, reducing the potential for traffic accidents related to poor road conditions and merging traffic. Rehabilitation of the deficient railing, concrete decking, and abutment of the Beaver Creek Bridge and upgrading the guard railing, strengthening the deck structure and realignment of the northern approach and shaving rockfaces at the Pigtail Bridge would have a long-term, minor to moderate, beneficial effect on health and safety. However, moderate, long-term, adverse effects at the Pigtail Bridge due to the overall traffic situation would be anticipated to persist.

During construction, the effects of the proposed action on health and safety would be localized, minor to moderate, and adverse. Traffic would have to be re-routed around road construction activities, and the Beaver Creek and Pigtail Bridges could be closed for up to six to eight weeks.

VISITOR USE AND EXPERIENCE

Affected Environment

NPS *Management Policies 2001* state that the enjoyment of park resources and values by the people of the United States is part of the fundamental purpose of all parks and that the National Park Service is committed to providing appropriate high quality opportunities for visitors to enjoy the parks.

Part of the purpose of Wind Cave National Park is to offer opportunities for recreation, education, inspiration, and enjoyment. Consequently, one of the park's management goals is to ensure that visitors safely enjoy and are satisfied with the availability, accessibility, diversity, and quality of park facilities, services, and appropriate recreation opportunities. The potential for change in visitor use and experience under the proposed action was evaluated along with the duration and degree of these project changes.

The park is one of a variety of destinations for the Black Hills visitors. Attractions in the immediate area include Mount Rushmore National Memorial, Jewel Cave National Monument, Crazy Horse Monument, the Mammoth Site in Hot Springs and Badlands National Park to the east.

Travel to the park is almost entirely by automobile. Visitors can reach the park from the south or west via U.S. Highway 385. Access from the north is via State Highway 87. The primary attraction of the park is the cave; however, an important part of the park experience is tied to scenic and wildlife viewing, especially along Highway 87 that bisects the park from north to south. The surface features of the park include expanses of mixed-grass prairie, ponderosa pine, and riparian ecosystems. The gently rolling landscape of the park is a transition zone between plains and mountains, and supports a great diversity of species. Bison, elk, pronghorn, mule deer, coyotes, and prairie dogs are frequently seen along these two highways, enticing visitors to stop along the eight designated pullouts. Other informal pullouts have been created by visitors who pull to the roadside at various undesignated locations to photograph scenery or wildlife. Eleven different trail systems allow hikers to enjoy the park's backcountry. The park also provides one campground and a picnic area to serve visitor needs.

The cultural history of the park includes evidence of prehistoric and protohistoric Indian cultures, homesteading, records of early cave exploration and tourism, and Civilian Conservation Corps and other 20th century structures. Several of these historic properties are listed on the National Register of Historic Places. The Beaver Creek Bridge and Pigtail Bridge were constructed in 1929 and 1929 to 1930 respectively and are historically unique and important to the visitor experience.

From 1993 to 2003, Wind Cave received on average 767,458 visitors per year. A low visitation number in 1993 was believed to be the result of several major highway and road construction projects in the area immediately outside the park, combined with near record rainfall throughout most of the primary visitor season (NPS 1994). Visitation increased dramatically by 62 percent from 1993 to 1994 when highway and road construction was completed. Between 1994 and 1998, visitation remained relatively constant with an average visitation of 827,985. Recreation visits decreased by 23 percent between 1998 and 2001 (NPS 2004d). Periodic road closures on Highways 385 and 87 during this 4-year period due to highway and road construction within the park may have contributed to decreased visitation along with changes in counting procedures (Street personal communication 2004). Highway 87 closures most likely contributed to decreased visitation in 2001.

Monthly recreation visits in 2003 reflect the normal pattern of visitor use for the park (see Figure 13). Peak visitation occurs between May and September with July and August having 195,724 and 187,019 visits respectively. November through February is traditionally a low use period for the park.

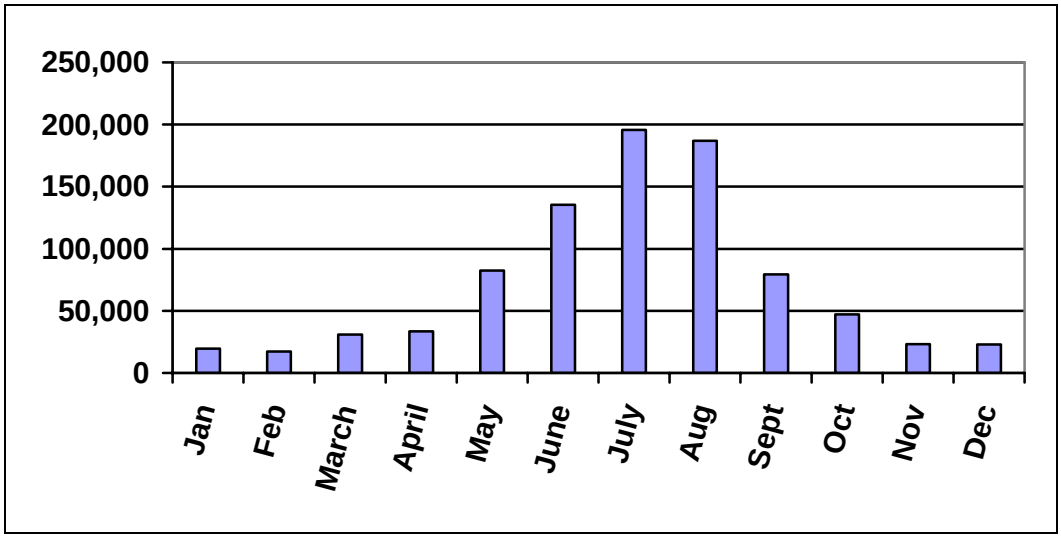

FIGURE 13. 2003 WIND CAVE RECREATION VISITS BY MONTH

The majority of visitors coming into the park used U.S. Highway 385 South and U.S. Highway 385 West. These routes are commonly used for general travel in the park vicinity and not for park visitation alone. The fewest number of vehicles entering the park entered on Highway 87 from the north (Figure 3). Travelers entering from Custer State Park (Highway 87 route) are more likely to be seeking the park to experience its resources. In 2003, approximately 178,000 vehicles entered the park from the west on Highway 385; 161,000 entered from the south on Highway 385, and 47,000 entered on the Highway 87 route from the north (see Figure 14). In 2003, it is estimated that the percentage of recreation visits and non-recreation visits were 60 percent and 40 percent, respectively (NPS 2004d).

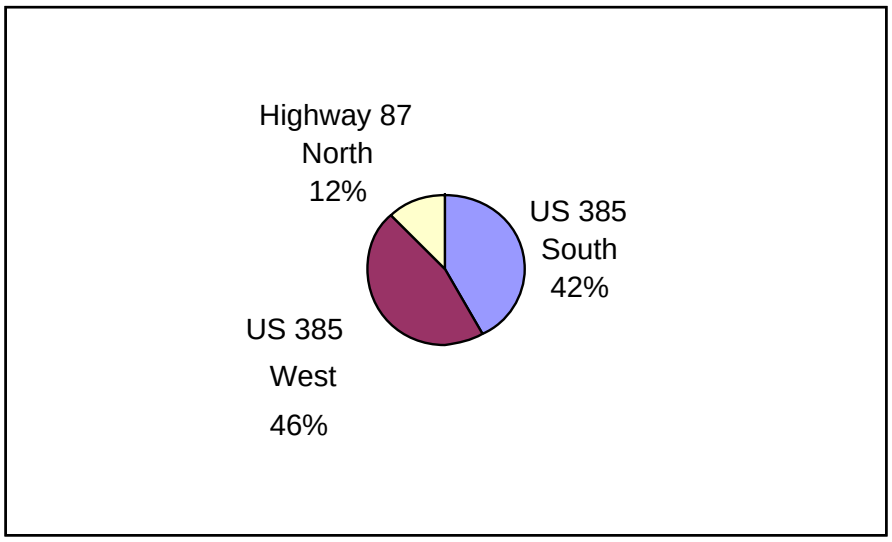

FIGURE 14. 1993 TO 2003 PERCENTAGES OF VEHICLES ENTERING THE PARK ON THE THREE MAIN HIGHWAYS

Impacts of Alternative A, the No Action Alternative

In the short-term, continued deterioration of the road and bridge decks would have a minor adverse effect on the park experience because the current approach of "piecemeal patching" of the road creates uncomfortable driving conditions for the visitor. However, in the long-term, as more of the road surface continues to deteriorate, there would be a moderate adverse effect on the visitor experience, requiring visitors to focus more on driving, thus limiting their ability to experience the park's scenery and wildlife. Also, the continued deterioration of the two bridges would convey the impression that the park is poorly maintained, thus diminishing the overall park experience.

Cumulative effects. The park is in the process of preparing an interpretive wayside exhibit plan that includes upgrading old wayside exhibits, as well as adding new exhibits along Highway 385 and Highway 87. This action, in itself, would have a moderate, beneficial effect, allowing visitors increased opportunities to learn more about park resources and values. However, with the continued deterioration of the road, the cumulative effect on the visitor experience would be negligible because road conditions would continue to detract from the overall visitor experience.

Conclusion. In the long-term, as more of the road and bridge deck surfaces continue to deteriorate, there would be a moderate, adverse effect on the visitor experience, requiring visitors to focus more on driving, thus limiting their ability to experience the park's scenery and wildlife. In the short-term, continued deterioration of the highway and roads would have a minor, adverse effect on the park experience because the current approach of "piecemeal patching" of the road creates uncomfortable driving conditions for the visitor.

Impacts of Alternative B, the Preferred Alternative

Once road surfacing on the north and south Visitor Center access roads and Highway 87 and bridge rehabilitation are complete, there would be a long-term, minor, beneficial effect on the park experience because visitors would be able to drive comfortably on newly surfaced roads with increased opportunities to view scenery and wildlife without having to continually focus on road conditions. Visitors would also have increased opportunities to stop at new and/or rehabilitated wayside exhibit pullouts, allowing for increased onsite opportunities for visitors to learn more about park resources.

In the short-term, road resurfacing and bridge rehabilitation would have a moderate, adverse effect on the visitor experience because visitors would have to contend with being rerouted where road construction is occurring along Highway 87 and the Visitor Center access roads. Also, the increased potential for short-term road closures, increased vehicle and truck traffic associated with highway/road/bridge rehabilitation, and the use of road resurfacing equipment would detract from the natural visual qualities usually associated with national parks. During the period of construction, visitors would also be denied access to some of the wayside exhibit pullouts, diminishing their ability to learn more about those park resources visible from Highway 87.

Highway/road/bridge construction activities that occur during the peak visitor use season would have a greater effect on the visitor experience than during those months when visitation is low.

Because of the project's one-year duration, NPS should expect that the quality of the visitor experience would be adversely affected to a moderate degree when construction is occurring during the peak use season.

Cumulative effects. The park is in the process of preparing an interpretive wayside exhibit plan that includes upgrading old wayside exhibits, as well as adding new exhibits along Highway 385 and Highway 87. This action would have a minor beneficial effect on the quality of the visitor experience by increasing the visitors' understanding of park resources and values. This action in combination with road resurfacing would have a minor, cumulative beneficial effect on the quality of the visitor experience, providing visitors with a comfortable driving experience and increased opportunities to learn more about the park's significance.

Conclusion. Once bridge rehabilitation is complete and the road surfacing on Highway 87 and both Visitor Center access roads has been finished, there would be a long-term, minor, beneficial effect on the park experience because visitors would be able to drive comfortably on newly surfaced roads with increased opportunities to stop at new wayside exhibit pullouts and view scenery and wildlife without having to continually focus on road conditions.

In the short-term, highway and road resurfacing and bridge rehabilitation would have a moderate, adverse effect on the visitor experience because visitors would have to contend with being rerouted where road construction is occurring along Highway 87 and the Visitor Center access roads. During the period of construction, visitors would also be denied access to some of the wayside exhibit pullouts, diminishing their ability to learn more about those park resources that are visible from Highway 87.

PARK OPERATIONS

Affected Environment

The park superintendent is responsible for managing the park, its staff, all its programs, and relations with persons, agencies, and organizations, facilities management, and fee collection. For the purpose of analysis, the term "park operations" refers to the quality and effectiveness of maintaining the park's infrastructure, including highways, roads, and bridges, while ensuring adequate protection of vital resources and providing for an effective visitor experience. Wind Cave National Park has 41 onsite personnel who provide functions and activities that accomplish the park's management objectives. These personnel meet requirements of law enforcement, road maintenance, emergency services, interpretation and education, community services, utilities, and fee collection.

Responsibility for routine maintenance of highways and roads within the park boundary includes those portions of Highways 87 and 385, the two historic bridges and the Visitor Center access roads. Park road maintenance is limited to pothole repairs and sealing of road surface cracks to minimize the effects of aging. Several person-days each year are required to repair potholes and surface cracks. This has resulted in "piecemeal patching" of the road, creating varying road surfaces and inconsistent driving conditions for the visitor.

When road conditions warrant larger scale maintenance, the Federal Highway Administration undertakes “chip-and-seal” surface treatment repairs to the entire asphalt road surface. This process generally occurs every five to ten years. The roadway has not received a major rehabilitation since its construction in 1957. Presently, park roads have deteriorated to the point where park maintenance cannot keep pace with the rate of deterioration. The two historic bridges also require maintenance patching of their deck surfaces. Based on these conditions, the National Park Service, with assistance from the Federal Highway Administration, has determined that removal of the existing asphalt surface, upgrade and repair of the road base, and installation of a new asphalt surface is needed.

Impacts of Alternative A, the No Action Alternative

The increasing rate of park highway/road/bridge deterioration would have a minor to moderate, short- and long-term adverse effect on park operations. This effect would result from increased maintenance and repair needs as the road surface continues to deteriorate. Additionally, the weight limit restriction for the Pigtail Bridge limits the routes of the park’s snow/sand trucks and bison hauling rigs. The current level of several person-days per year necessary to maintain the existing roads and two historic bridges would increase substantially over time. In the long-term, the increasing commitment to road and bridge repair would adversely affect the park’s ability to provide adequate maintenance for other infrastructure facilities. As the road deteriorates, the park also would have an increasing responsibility to monitor highway/road/bridge conditions in an effort to plan, schedule, and prioritize short-term repairs.

Cumulative effects. The park has completed installation of a new Visitor Center parking lot and an associated stormwater management system. In addition, the park has begun planning to replace the aged cave lighting system with a modern, energy saving system. These two projects would likely result in moderate, long-term, beneficial effects to park operations. The increasing rate of deterioration and necessary repair under the No Action Alternative would have short- and long-term, moderate, adverse effects on park operations, which would offset the beneficial effects of other projects to some degree. Overall, cumulative effects would be long-term, minor, and beneficial.

Conclusion. The increasing rate of park highway/road/bridge deterioration would have a minor to moderate, short- and long-term adverse effect on park operations. This effect would result from increased maintenance and repair needs as the road surface continues to deteriorate and in the case of the Pigtail Bridge, limits the routes the heavy snow/sand trucks and bison hauling rigs take. Also, in the long-term, the increasing commitment to highway/road/bridge repair would adversely affect the park’s ability to provide adequate maintenance for other infrastructure facilities.

Impacts of Alternative B, the Preferred Alternative

In the long-term, there would be a minor to moderate, beneficial effect on park operations because road/bridge maintenance would be substantially reduced once the road/bridge work is completed. However, over the long-term, cyclical road/bridge maintenance would still be required, but on a less frequent basis. Also, once the roads are resurfaced and bridges are

rehabilitated, the number of person-hours and annual funding for road/bridge repairs would substantially decrease and would not limit the use of their heavy equipment.

The project action of resurfacing major portions of Highway 87 and the Visitor Center access roads and bridge rehabilitation would have minor, short-term, adverse effects on park operations. This result would occur because during the construction period of up to one year, the park would have to assist the contractor in managing and rerouting visitor traffic on those road sections being resurfaced and bridges being rehabilitated. Highway, road and bridge closures and rerouting could potentially delay or restrict park vehicle access to specific areas of the park. In the short-term, the park would also have increased responsibilities in monitoring construction of the road to ensure the protection of park resources.

Cumulative effects. The moderate, long-term benefits of the new parking lot and cave lighting system described under Alternative A would be further enhanced by the beneficial effects of the proposed action. In concert, these projects would result in moderate, long-term, beneficial effects to park operations.

Conclusion. In the long-term, there would be a minor to moderate, beneficial effect on park operations because road/bridge maintenance would be substantially reduced once the rehabilitation work is completed and would not limit the use of their heavy equipment. The project action of resurfacing major portions of the Visitor Center access roads and Highway 87 and rehabilitating the Beaver Creek and Pigtail Bridges would have a minor, short-term, adverse effect on park operations. This impact would occur because during the year-long period of construction, the park would have to assist the contractor in managing and rerouting visitor traffic on those road sections being resurfaced and around bridges. In the short-term, the park would also have increased responsibilities in monitoring rehabilitation work to ensure the protection of park resources.

CULTURAL RESOURCES

Affected Environment

Seventy-one archeological sites have been recorded within the present boundaries of Wind Cave National Park. Of these, 60 are prehistoric sites, seven are historic sites, and four have both prehistoric and historic components. Historic period sites are related to pre-park homesteading, roads, bridges, and other transportation-related structures, Civilian Conservation Corps presence during the 1930s, and early National Park Service facilities. Properties included in the National Register are described below.

Prehistoric and Historic Archeological Resources

The Black Hills are one of the 24 archeological regions defined by the South Dakota Historic Preservation Center. Early people were attracted to the Black Hills because they offered shelter in the winter, the climate was slightly cooler than surrounding areas in the summer, and good hunting and sources of quality stone for tools were available here.

The earliest archeological sites in the park are assigned to the Early Archaic period between circa 6,000 and 3,500 B.C., a time when small, dispersed groups of hunters and foragers occupied this

part of the Black Hills, seasonally gathering for communal hunting. Local lithic and mineral sources provided excellent material for tools. These uses continued through the Middle and Late Archaic periods, as prehistoric groups continued communal bison hunting while relying somewhat less upon foraging activities.

By 1,500 years before present (B.P.), camps and semi-permanent villages were present in the Black Hills (Late Prehistoric and Plains Village Period), along with a continuation of bison hunting. During Protohistoric times (ca 1600 to 1800 AD), mounted Plains bison hunters moved through the Black Hills in a nomadic fashion.

Important types of prehistoric (and possibly protohistoric) sites found in Wind Cave National Park include stone circles and tipi rings, rock shelters, artifact scatters and open occupation sites, quarry sites, burials, and stone alignments. The project area was surveyed for historic and archeological resources in 2004, and the survey documented two sites (one prehistoric site and one multi-component site) along with a number of isolated finds (NPS 2005a). The prehistoric site is outside of the area of potential effect. No diagnostics were found at this site to allow dating but the site contains ground stone and a variety of chipped stone materials. The multi-component site, a can dump with a single prehistoric artifact, may have been associated with construction of the Beaver Creek Bridge. Both sites are field recommended as eligible for the National Register of Historic Places for their potential to yield additional information important in the nation's history (NPS 2005a).

Ethnographic Resources

A number of Native American tribes used the project area before and during the time of Euro-American exploration and settlement.

A number of American Indian tribes have aboriginal, historical, and cultural ties to the land within the Black Hills, which includes Wind Cave (for a comprehensive list, see "Consultation and Coordination"). The Black Hills occupy a very special place in the history, creation stories, and religious beliefs of these groups. Centuries-old American Indian stories tell of a "hole that breathes cool air" near the Buffalo Gap (NPS 2004a). This "Wind" cave was regarded by Lakota peoples as the site of their origin, and they have many stories about the role the cave played in their culture.

A study of the history of tribal and European American occupancy of the Black Hills and adjacent areas has been completed for the park, but no ethnographic resources have been specifically identified within the area of potential effect for this project (Wind Cave is outside of the project area). However, there are prehistoric archeological sites along the roadway corridor, and many American Indians have concerns about the preservation and protection of these types of cultural sites. For this reason, the cultural resource impact analysis will combine the discussion of archeological and ethnographic resources.

Historic Resources and Cultural Landscapes

Creation of Wind Cave National Park and the game preserve helped the development of motor tourism in the Black Hills. The main road through Wind Cave was part of the Denver-Deadwood "Triangle D" highway noted for its panoramic scenery, and each year more vehicles traveled through the area. By 1919, the road through the park was 6-miles long (NPS 2004b). Within two

years there had been a “remarkable” increase of motoring tourists, with more than 92 percent of the park’s visitors arriving in private automobiles (NPS 2004b).

The park received funding in 1928 to construct a new roadway to connect the north end of Wind Cave with Highway 87 through Custer State Park. In 1929 the “Park road” was reconstructed and new gravel added. That same year, a contract was let to the Northwest Engineering Company of Kadoka, South Dakota to build a bridge to span Beaver Creek Canyon, 2 miles north of the visitor center (NPS 2004b).

The Beaver Creek Bridge (Figure 15) was constructed as an open spandrel, double arch, reinforced concrete and steel bridge. The two parallel arches carry the 20 support struts of the deck, which curves in a gentle “S” 120 feet above the deep, narrow ravine below. The arches end in two main piers, which rest on the rock walls of the ravine. The north end of the bridge has a 20-foot approach that curves 60 degrees to the northwest. A 40-degree curve connects the 23-foot southern approach. (NPS 1984b).

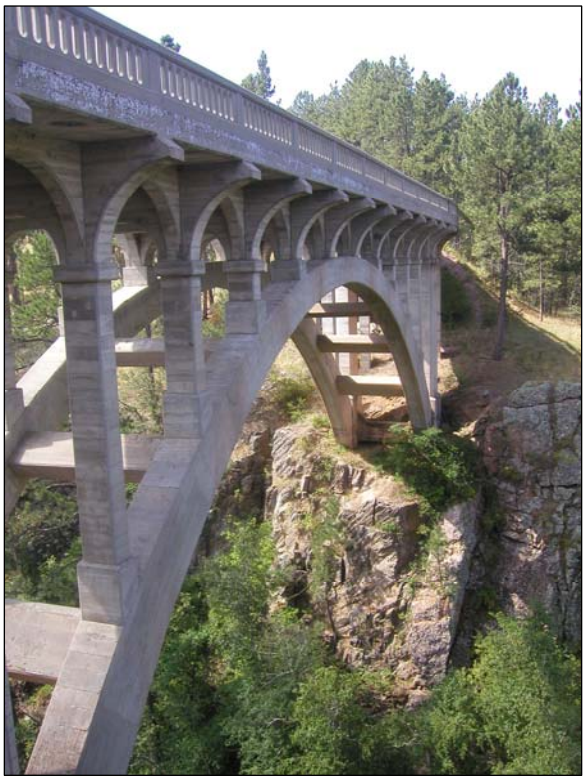

FIGURE 15. THE BEAVER CREEK BRIDGE

The 225-foot-long bridge quickly “became a scenic Black Hills attraction” (NPS 2000g). Bridge engineer Morris E. Adelstein had been able to “create the illusion that the concrete arches rise naturally from the rock walls” on opposite sides of Beaver Creek Canyon, which was an incredibly difficult building site (NPS 2004b). The bridge was in keeping with the National Park Service’s design philosophy of “complimentary and unobtrusive design” that lay lightly upon the land (NPS 2004b). Its historical significance lies in the fact that at the time, it was the “largest

and most complex reinforced concrete bridge of its size in the state" and among the recorded bridges, it is unique (NPS 1984b). It is the only bridge of its particular arch type in the state of South Dakota. At the time, it was only one of three "most significant bridges" in the Rocky Mountain region of the National Park System.

A second bridge, known as the Pigtail Bridge, was built along the same roadway at about the same time. A 1930 newspaper article noted that the "pigtail bridge and the scenic windings of Reaves Gulch add to the interest of the route" (SD Highway 87), affirming that this bridge was in place by 1930 (NPS 1995a).

Located 3.2 miles north of the visitor center on South Dakota State Highway 87, the Pigtail Bridge spans SD Highway 87, "which, after crossing the bridge, makes a 360 degree loop and comes back under the bridge on the approach to Reaves Gulch" (NPS 1993a). The rationale for using this type of bridge is to permit the road to negotiate sharp changes in topography in limited space (see Figure 16).

The "post and lintel" design consists of three simple spans totaling 77 feet in length. The asphalt-covered, laminated wooden deck rests on steel I-beams, which in turn rest on concrete and stone masonry piers. There is one abutment at each end of the bridge, and two intermediate piers (40-feet apart) on each side of the roadbed as it passes beneath the bridge. The concrete bases to the abutments were poured on outcrops of native rock (NPS 1993a). Regularly spaced log uprights along the outside edge of the deck support two log rails, one above the other, to form the bridge rail. The log railing extends beyond the bridge ends to form an approach rail. Some of these log posts and rails were replaced in 1990 after being damaged in a truck accident (NPS 1993a). Another vehicle-bridge encounter occurred in the spring of 2004 and again in 2005, necessitating further repairs to the guardrails.

FIGURE 16. THE PIGTAIL BRIDGE

The “pigtail” design followed a style of architecture commonly used in the Black Hills during the Depression, and is an excellent example of a bridge built according to NPS Rustic Design principles. This design philosophy reflects the incorporation of natural landscape elements into planning and design, using native materials such as log and stone in proper scale. Rather than modifying the land to accommodate buildings and roadways, structures and landscape elements were settled gently onto the natural landscape. Rigid, straight lines were avoided, and the simple but sturdy designs gave the feeling of having been built by pioneer craftsmen with hand tools.

Also in 1934, Civilian Conservation Corps (CCC) workers arrived at Wind Cave and established a camp. As part of their conservation efforts, CCC workers further developed Highway 87, using rustic National Park Service landscaping standards (NPS 2000c). They quarried stone locally and built or renovated many of the structures within the park’s Administrative and Utility Area Historic District, which is listed on the National Register of Historic Places.1

It is not clear whether the stone culvert headwalls along Highway 87 were built as part of the initial road construction, or were built by the CCC. Records indicate that the CCC sloped more than 35,000 square yards of road shoulders (NPS 2004c). They also obliterated several old roads and borrow pits. Most of the stone headwalls present along Highway 87 today are of mortared cut stone in a Rustic design typical of that used by the CCC in national parks. In 1956, the North Entrance Road (old Route 2) was constructed to link Custer State Park to Wind Cave National Park with a modern, surfaced roadway (NPS 2004b). Not long after this, interpretive signs were installed at six parking areas on the new entrance road. Mission 66 projects included completion of roadside trail signs with stone bases. These signs remain in place today (Figure 17).

Since its construction, no major work has been done on Park Road 87 or the visitor center roads. For most of its length within the park, present-day Highway 87 follows much of the same alignment as had the earlier gravel or oiled roads that conveyed tourists into the park, and that crossed over the Pigtail and Beaver Creek bridges.

Small scattered segments of old, partially obliterated roadbed that generally parallel the existing road remain and were mapped during the 2004 archeological survey (NPS 2005a). These road segments reflect revised alignments of at least two highways – U.S. Highway 385 and South Dakota State Highway 87. The north-bound section of U.S. Highway 385 south of the park follows the early tourist and national park roads that joined the town of Hot Springs with the park. Within the park, Highway 385 was realigned in the 1950s to route through traffic around and away from the cave area. Highway 385 also was rerouted south and away from the Beaver Creek Bridge area.

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1 Civilian Conservation Corps landscaping features include the 1-½ mile-long section of two-lane (27-foot wide), asphalt-surfaced historic road through the administrative area, which is part of the original “oiled-surface” roadway through this area (NPS 1992). Unlike earlier wagon roads in the vicinity, the present entrance road is assumed to have been constructed using a cut and fill technique to create a more level roadbed.

FIGURE 17. PRAIRIE DOG TOWN INTERPRETIVE SIGN AT INTERSECTION OF HIGHWAYS 87 AND 385

Several of the abandoned road segments had associated guard walls (one or more courses of dry-laid stones along the road edge) that are still visible in places along the present roadway. One of these linear "walls" is present east of the road, in the vicinity of the cattle guard north of the picnic area, and the other on the west side of the highway towards the north end of Highway 87 within the park.

In several areas, fill was added during construction of the present highway, burying the old road as much as 6-feet deep. In at least one area, linear "guard walls" also can be seen along the fill slope of the present highway. These "guard walls" appear to be remnants of a line of rocks laid along the edge of the old road on a steep, sharp curve to prevent vehicles from accidentally going over the embankment.

Twenty-six stone headwalls from 33 culverts were documented along the project area during the 2004 survey (NPS 2005a). When Highway 87 was improved in the 1950s, many of the old culverts were left in place. Some of the stone headwalls are deeply buried below the existing road surface, while others are only a few inches below. Most of the older culverts have cut stone and mortar headwalls, but several in Reaves Gulch have only dry-laid cobbles and crudely shaped or unshaped stones.

Three of the stone headwalls have associated retaining walls extending out to one or both sides of the culvert. The headwall/retaining wall at the picnic area is in relatively good shape and is perhaps a foot below the present road surface. This retaining wall stretches for quite some distance south from the culvert on the east side of the road. Two combined headwall/retaining walls are present along wet areas in Reaves Gulch; both are on the west side of the road. The retaining walls are only from one to four courses high, are embedded in the road shoulder or edge of the ditch, and are generally in very poor shape. The standing water in the ditches

adjacent to the culverts is regularly used by bison as watering holes, and the constant trampling has dislodged many of the stones, greatly diminishing the integrity of the remaining walls.

The 2004 archeological survey documented the roadway and its features, including the historic resources discussed above. The roadway and associated features also were discussed in a recently completed cultural landscape report (NPS 2004e). Both reports recommend that the roadway and its features be included in a future cultural landscape historic district that would extend the length of SD 87, beginning from the current northern boundary of the park and extending to the intersection with U.S. Highway 385 [north of the Wind Cave National Park Visitor Center]. The boundary of the district would include the environs of the road. The terrain features and plant communities that define the spatial character of the road would define the edges of the district, and important scenic views away from the roadway and of the road features such as bridges would be part of the historic district.

The roadway and its features are recommended as eligible for the National Register of Historic Places (NPS 2004e and NPS 2005a). The linear road corridor—including the road itself, structures, terrain, associated plant communities—is significant for its association with:

- early twentieth century tourism and recreational development within the Black Hills;
- early twentieth century state and federal roads programs;
- the establishment of the first national park to protect a subterranean resource and early federal cave conservation efforts, and as one of the earliest national parks pre-dating the creation of the National Park system;
- its association with the Civilian Conservation Corps and Works Projects Administration; and
- as an exemplary representation of New Deal-era park road design and construction and National Park Service Rustic Style of landscape architecture and engineering.

The design and materials of Highway 87 and the Visitor Center access roads followed the National Park Service's Rustic Design philosophy, resulting in a roadway that fits into the natural landscape. Set against the backdrop of the rugged terrain of the adjacent hills and ravines, it conveys a special sense of place and history to the visitor.

It is not only the built or natural environment of this roadway that lends this landscape its intrinsic value. This scenic drive links places and things that visitors have come to Wind Cave to see; it reflects the changes in transportation modes and American recreational patterns over the past century. The road is an integral part of the park experience that visitors come to view as "what a National Park should be."

Because features associated with the roadway, and the roadway itself, are both historic resources and part of the cultural landscape, these topics have been combined in the following impact analyses.

Previous Investigations

Numerous individual archeological surveys, most project-related, have been conducted at Wind Cave National Park over the past quarter century. These past surveys are summarized in the *Wind Cave Archeological Inventory Project: Research Design* (NPS 2000e), and the extensive listing will not be repeated here.

Wind Cave National Park provided detailed maps and records for this project, and a file search was conducted by the South Dakota State Historical Society Archaeological Research Center in Rapid City, South Dakota in April 2004. The file search indicated that 30 sites are located within 1 mile of the road project. Previously recorded sites within the Area of Potential Effect include Beaver Creek Bridge (84003254 [17-285-196] HS-99) and the Pigtail Bridge (HS-98). The Wind Cave National Park Administrative and Utility Area Historic District (84003259) and the Beaver Creek Rockshelter archeological site are outside of the Area of Potential Effect of this project.

Impacts of Alternative A, the No Action Alternative

Archeological and Ethnographic Resources. Under a continuation of existing conditions, no new ground disturbance would be proposed in the vicinity of the park's known archeological and ethnographic sites, so there would be no new effects on these cultural resources, resulting in a negligible adverse effect for archeological and ethnographic resources.

Historic Resources, Including Cultural Landscapes. As previously described, both the Beaver Creek Bridge and the Pigtail Bridge are suffering from age, weather, and vehicle effects. Both bridges have undergone a variety of repairs and maintenance over the years, and routine and cyclic maintenance (application of periodic chip and seal coats and other minor repairs) would continue.

Without intervention, the unstable slope and the inadequate backfill under the north abutment of the Beaver Creek Bridge would continue to undermine the road surface. As moisture enters cracks in the bridge deck and railings, metal rebar embedded in the concrete would oxidize, causing an expansion that would loosen and spall pieces of concrete. Freezing and thawing exacerbate this process, threatening the viability, integrity, and stability of the bridge.

Nearly three-quarters of a century of wear and tear also have taken their toll on the Pigtail Bridge. The weight of large vehicles would continue to place stress on the bridge deck, and because of its approach alignment, future vehicle collisions with the side rails of the bridge would be expected.

Weather and age would continue to affect the historic stone culvert headwalls. The mortar is failing in some of the headwalls, and a few have lost capstones or have eroded away along the sides. The same snow, rain, freeze, and thaw cycles that affect the bridges would hasten deterioration of the culvert headwalls. Eventually the rate of repair would fail to keep pace with the rate of deterioration on the culvert headwalls and on the Beaver Creek and Pigtail Bridges, resulting in a long-term, moderate, adverse effect on the road and its character-defining features.

Under the No Action Alternative, the road and its associated structures would continue to receive routine maintenance. Over time, however, deterioration of the road structures (bridges and culverts) and rutted, broken pavement on road surfaces and edges would diminish the integrity of the cultural landscape.

Cumulative effects. Overall, activities such as construction and unauthorized artifact collecting outside of the park continue to have minor, cumulative, adverse effects on archeological and ethnographic resources regionally. The contribution of the park's ongoing infrastructure improvements to these cumulative effects would be negligible because the park projects are relatively small-scale and are performed using best management practices. Thus, the cumulative adverse effects on archeological and ethnographic resources would be minor.

Regionally, historic bridges and culverts continue to be replaced with modern structures, are damaged by vehicles, deteriorated by weather, or are abandoned. The park's historic culverts and the Beaver Creek and Pigtail Bridges are a vital part of this regional historical resource base as well as its cultural landscapes. If these park resources continue to deteriorate and are lost to weather and human actions, the cumulative effects of the No Action Alternative would be adverse and moderate.

Conclusion. Continuation of existing conditions under the No Action Alternative would have a negligible, adverse effect on the park's archeological and ethnographic resources. As the rate of repair fails to keep pace with the rate of deterioration of the culvert headwalls and the Beaver Creek and Pigtail Bridges, a long-term, moderate, adverse effect to historic resources and cultural landscapes would occur.

Alternative A would not produce major adverse impacts on cultural resources or values whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of the park, (2) key to the natural or cultural integrity of the park or opportunities for enjoyment of the park, or (3) identified as a goal in the park's general management plan or other National Park Service planning documents. Consequently, there would be no impairment of cultural resources or values as a result of the implementation of Alternative A.

Impacts of Alternative B, the Preferred Alternative

Archeological and Ethnographic Resources. Two archeological sites (one prehistoric site and one multi-component site) and several abandoned road segments and associated stone alignments have been identified within the vicinity of the roadway project (NPS 2005a). The prehistoric site (a lithic procurement area) is outside of the area of potential effect for this project and would not be affected by construction. The site is unobtrusive and is unlikely to be disturbed by unauthorized collecting. Implementation of Alternative B would have a negligible effect on this site. Because the site would remain undisturbed, there also would be a negligible effect on ethnographic resources.

The multi-component site contains historic materials (primarily metal food containers) and a single piece of chipped stone. It is located some distance away from the road, but in an area that could receive secondary effects from vehicle parking, materials storage, or unauthorized collecting. A variety of mitigation measures such as avoidance, establishment of work limits, and

contractor employee education would be employed to protect the site, which has been recommended as eligible for the National Register (see Table 3 ”Resource Management Measures”). With mitigation, minor long-term adverse effects to this multi-component archeological site would be expected.

Historic Resources, Including Cultural Landscapes. Implementation of Alternative B would affect the roadway and its associated culverts and walls, the Beaver Creek and Pigtail Bridges, abandoned roadway segments, and the cultural landscape. Rehabilitation of the roadway itself would have a long-term moderate beneficial effect by helping to protect and preserve the road structure, and extend its life expectancy. The basic design of the road would remain unchanged, retaining the connections and the linear flow of the road as it was initially designed. The work on the historic culverts, walls, and bridges would be guided by the Secretary of the Interior’s Standards for the Treatment of Historic Properties (NPS 1998) to protect resource integrity.

Implementation of Alternative B would include repair of aging and damaged roadway culverts, including replacement in kind of missing stones and mortar in the headwalls, cleaning of the corrugated drain pipes, and replacement of components where necessary. This would produce a long-term, moderate, beneficial effect on the structures and the roadway landscape.

Replacement in kind of the broken curbing at the south end of the Beaver Creek Bridge would help restore the structural and visual integrity of the structure. Repairs to the bridge deck and railings would halt or slow the oxidation of the metal rebar and subsequent loss of concrete that threatens the integrity and visual appearance of the bridge. Improvements at the unstable stone slope at the north end of the Beaver Creek Bridge would help stabilize the bridge approach, and correct a serious, on-going roadway problem. These repairs would have a long-term moderate beneficial effect on the Beaver Creek Bridge, culvert headwalls, and the surrounding landscape.

At the Beaver Creek Bridge, installation of approach rails meeting current crash test standards would help prevent inadvertent vehicle-bridge encounters. Small concrete walls would be built adjacent to, and attached to all corners of the bridge so that the new approach guardrails could be attached in an unobtrusive manner and in a way that would not harm the structural stability or integrity of the bridge abutment, while continuing to meet current crash test standards. The new concrete walls would match the fabric of the bridge, would be unobtrusive, and would not affect any of the bridge’s character-defining elements. The new approach rails also would be compatible in style and material with the historic bridge. The approach guardrails would help prevent large vehicles from affecting the concrete railing, curb, and abutments. The new concrete overlay would replace deteriorated portions of the current concrete deck. The overlay would not change the appearance of the bridge deck, and would improve the durability of the bridge. The new joint seals would protect the structure and reduce maintenance. Overall, the long-term results of the above actions on the Beaver Creek Bridge would be moderately beneficial.

Renovation of the deck of the Pigtail Bridge and replacement of the girders located in the middle and south spans would have a negligible to minor effect on this historic structure because the deteriorated wood timbers and steel girders would be replaced in kind and by higher tensile strength materials, respectively. The existing guardrails have been replaced several times over the years because of vehicle encounters and age-related deterioration of the wood. The new guardrails would meet current crash testing standards and would have the same general

appearance and materials as the existing railings, would comply with current safety standards, and would be more sustainable over time. The spacing of the new approach and transition posts and rails would be slightly different from that of the existing rails, but the overall visual effect would not be altered (compare Figures 10, 11 and 12). As needed, replacement materials such as the girders would be painted to match the existing girders. The resulting long-term minor effects on the historic bridge effect would be both beneficial and adverse, respectively, by prolonging the bridge life and stability while by making modest changes in the materials and configuration of the bridge rails.

New approach railing would be added at the southwest corner and replaced at the other three corners of the Pigtail Bridge to help protect the bridge from vehicle encounters. The approach railing would be designed to meet current crash test standards, and would be compatible in style and materials with the historic bridge. Addition of approach railing would have a minor adverse effect on the cultural landscape and the bridge design by adding a new element, but this would also provide a minor beneficial effect of helping to protect the fabric of the bridge.

Potential vehicle-bridge encounters would be reduced by widening and straightening the northern approach to the Pigtail Bridge; e.g. the bedrock that protrudes into the approach curve to the bridge would be cut back. Beneath the bridge, the original bridge abutments and piers with their original masonry would not be changed, but the rock faces of the sandstone abutment bases would be shaved to enlarge the roadway width. This work would be done in a manner that retains natural contours of the stone, resulting in a minor adverse effect on the landscape but a moderate benefit for the structural integrity of the bridge by helping to prevent crashes. The existing culvert at the north approach to the Pigtail Bridge is in very poor condition. On the north side of the road, the culvert's stone headwall has mostly fallen away, due to the steep drop off and erosion. Most of the integrity of this culvert has been lost, and only a few stones remain of the original headwall. At the south end of the culvert, only the deteriorated end of the corrugated metal pipe is visible (there does not appear to have been a headwall on this side of the road).

To correct these problems, fill would be added, and the culvert extended for 20 feet. Reconstruction of the stone culvert headwall on the north side of the road would be compatible with the rest of the historic headwalls, using the same types of material and design. By helping to retain the area's historic appearance, these improvements and the other improvements noted above would have a long-term, moderate beneficial effect on the roadway.

Most of the pre-1950s roadway segments documented as features along the roadway during the 2004 survey are short, disconnected, and fragmentary. Two of these road segments have associated structural elements consisting of linear, scattered dry-laid stones, but the rest lack associated structural elements. The linear stone features also are fragmentary, have been heavily disturbed, and lack integrity.

Almost all of the segments of old roadway have already had some sort of planned obliteration, including removal of surfacing, scarification, and/or replanting, so that only a level linear area marks their former location. During construction of the present roadway, ditches and borrow pits were inserted between the old road segments and the new corridor. These roadway segments were field recommended as ineligible for the National Register (NPS 2005a).

Cumulative effects. The cumulative effects of other projects, inside and outside of the park, would have much the same effect on archeological and ethnographic resources as described in the No Action Alternative. However, rehabilitation of the roadway and its significant historic features, especially the Beaver Creek and Pigtail Bridges, would have a moderate, long-term beneficial effect, helping to counter the loss of similar historic structures regionally, and reducing the cumulative effect to a minor, long-term adverse effect.

Conclusion. With mitigation, rehabilitation of the existing highway and roadways would have a negligible to minor, adverse effect on archeological and ethnographic resources. In general, the rehabilitation of the roadway, its landscape, and its historic features (bridges and culverts) would have a long-term, moderate, beneficial effect by extending life expectancy and preserving integrity.

Adverse effects of installing and attaching approach rails at the Beaver Creek Bridge would be minor and long-term, but the attachment would also help protect the bridge from vehicle crashes, a minor benefit. Other rehabilitation work at the Beaver Creek Bridge would be beneficial and long-term.

Renovation of culvert headwalls and their associated stone alignments would be a long-term, moderate, beneficial effect.

Replacement in kind of the deck and girders, installation of new guardrails and approach rails at the Pigtail Bridge would have long-term, negligible to minor adverse effects on the bridge and the landscape, but these renovations would help protect the bridge during vehicle encounters and help ensure its long-term preservation. Shaving the bedrock on the north Pigtail Bridge approach and on bedrock beneath the bridge would have a minor adverse effect on the landscape and a moderate benefit for the bridge. Effects to the roadway segments would be negligible.

Alternative B would not produce major adverse impacts on cultural resources or values whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of the park, (2) key to the natural or cultural integrity of the park or opportunities for enjoyment of the park, or (3) identified as a goal in the park's general management plan or other National Park Service planning documents. Consequently, there would be no impairment of cultural resources or values as a result of the implementation of Alternative B.

SECTION 106 SUMMARY

This environmental assessment provides detailed descriptions of two alternatives (including a No Action Alternative), analyzes the potential effects associated with possible implementation of each alternative, and describes the rationale for choosing the Preferred Alternative. Also contained in the environmental assessment are mitigation measures that would help avoid adverse effects on cultural resources.

Archeological, landscape, and historical resources in the Area of Potential Effect have been inventoried (NPS 2004e, NPS 2005a). Two archeological sites (one prehistoric and one multi-component) were identified by the survey but only one of these (the multi-component site) is within the area of potential effect. No traditional cultural properties have been identified within the project area, but consultation with tribes and with the South Dakota State Historic

Preservation Office (SHPO) has been initiated (see correspondence in Appendix A). Because tribes often value archeological resources, these two topics (ethnographic and archeological sites) have been combined in the following discussion.

Archeological and Ethnographic Sites. The newly identified prehistoric site (field recommended as eligible for the National Register) is outside of the Area of Potential Effect, across a drainage and on a hillside where it would be totally unaffected by this project. The site is unobtrusive and it is quite unlikely that it would be disturbed by unauthorized collecting associated with roadwork. However, protective measures such as worker education and work limits would be included in construction documents to ensure continued protection and avoidance of this site, which has been recommended eligible for the National Register (NPS 2005a).

A multi-component site containing a historic can dump and a single piece of chipped stone is thought to have been associated with bridge construction. This site is also located some distance away from the road, but in an area that could conceivably receive secondary effects from vehicle parking, materials storage, or unauthorized collecting. A variety of mitigation measures such as avoidance, establishment of work limits, and contractor employee education would be employed to protect this site, which is recommended eligible for the National Register (NPS 2005a). With mitigation as described in Table 3, there would be *no adverse effect* on archeological or ethnographic resources.

Historic Resources, Including Cultural Landscapes. This project would affect two historic structures that are listed on the National Register of Historic Places (the Beaver Creek Bridge and the Pigtail Bridge). Rehabilitation of the bridges would conform to the *Secretary of the Interior's Standards for Historic Preservation*. Work on the Beaver Creek Bridge would focus on replacement in kind of broken stone curbing, improvements to the surface of the bridge deck, and restoration of the spalled or broken concrete. Repairs to the deck and to the concrete bridge elements would help prevent future spalling and loss of bridge deck and railing elements. At present, as moisture enters cracks in the bridge deck and railings, metal rebar embedded in the concrete oxidizes, causing expansion that tends to loosen and spall pieces of concrete. Freezing and thawing exacerbate this process, threatening the viability, integrity, and stability of the bridge. Repairs to the bridge deck and railings would halt or slow the oxidation of the metal rebar and subsequent loss of concrete.

The failing backfill under the north abutment of the Beaver Creek Bridge is evidenced by an ever-widening depression at the edge of the bridge. Without intervention as described in Alternative B, the unstable stone slope pavement and the inadequate backfill under the north abutment of the Beaver Creek Bridge would continue to undermine the road surface, and could eventually damage the bridge itself. Correction of the unstable stone slope at the north end of the Beaver Creek Bridge would help stabilize the bridge approach, and correct a serious, on-going roadway problem.

The present approach guardrails are not attached to the Beaver Creek Bridge, and thus do not meet current crash test standards. Small, unobtrusive concrete walls would be poured adjacent to and attached to the bridge abutments on all four corners of the bridge, and the new guardrails would be attached to the walls. Thus the new guardrails would not harm the structural stability or integrity of the abutment, while meeting or exceeding current crash test standards. The new

guardrails would be compatible in style and material with the historic bridge. Although the new walls and guardrails would have an effect on the bridge, the approach guardrails would help prevent large vehicles from affecting the concrete railing, curb, and abutments. The result of the above actions on the Beaver Creek Bridge would *not be* adverse.

The timber decking of the Pigtail Bridge would be replaced using slightly thicker wood members, which would match the historic materials and design. The steel bridge girders would be replaced in kind, and would have the same dimensions and appearance as those currently supporting the deck but of a higher tensile strength; these actions would have *no adverse effect*.

The existing bridge rails on the Pigtail Bridge are in poor condition, have been replaced a number of times due to vehicle encounters, and do not meet current safety standards. New bridge rails would be installed; these rails would meet current crash testing standards and would have the same general appearance and exterior materials as the existing railings, but the new rails would meet or exceed current safety standards and would be more sustainable over time. The spacing of the new transition and approach posts and rails would be slightly different than that of the existing, but the overall visual effect would be barely noticeable from vantage points along the road or from the bridge (compare Figures 11 and 12). The resulting long-term effect would be *no adverse effect*.

Approach railing would be added on the southwest corner and replaced at the other three corners of the Pigtail Bridge to help protect the bridge from vehicle encounters. The approach railing would be designed to meet current crash test standards, but would be compatible in style and materials with the historic bridge. Addition of approach railing would have an effect on the bridge design by adding a new element to the historic landscape and to the historic bridge, but this would be offset by the beneficial effect of helping to protect the fabric of the bridge, resulting in *no adverse effect.*

The northern approach to the bridge would be widened and straightened (see Figures 8 and 9) by excavating the protruding bedrock to alleviate safety concerns with the approach. The existing culvert in this area is in very poor condition because the original headwall has lost most of its stone to erosion of the steep north-facing slope. (There does not appear to have been a headwall on the south-facing slope where only the deteriorated end of the corrugated metal pipe is visible.)

Fill would be added in this area to stabilize the road structure and improve the approach to the bridge, and the culvert would be extended for 20 feet. Reconstruction of the stone culvert headwall on the north side of the road would be compatible with the rest of the historic headwalls, using the same types of material and design. These modifications would improve the area's historic appearance, and would have a beneficial effect (*no adverse effect)* on both the culvert and the roadway by helping to improve their integrity.

Beneath the bridge, the original bridge abutments and piers with their original masonry would not be changed. The rock face of the sandstone pier bases would be shaved slightly to widen the passageway beneath the bridge. Stone removal at the northern approach and beneath the bridge would be done in a manner that retains natural contours of the stone, and would have *no adverse effects* on the bridge or the associated landscape.

There are 26 historic stone culvert headwalls within the project area dating to the early part of the 20th century. These headwalls were retained when the current road was built over them in 1956-1957. Some are deeply buried beneath fill added for the present road (but exposed in the roadside slope), while others extend upwards to the road shoulder. Most of these headwalls are of cut native stone, mortared in place around the corrugated metal culvert. Four culverts have associated dry laid retaining walls.

Measurements, descriptions, and photographs documented these headwalls and associated walls during the recent archeological survey (NPS 2005a). Most of the headwalls would be left in place, repaired as needed, and would be protected during the project to ensure no damage occurs. Several culverts may need to be replaced. If these culverts have extant mortared stone headwalls, the stones would be carefully removed and the headwall rebuilt in the same design, using salvaged and/or compatible stone materials. This project would be beneficial to the culvert headwalls (*no adverse effect).* The historic culvert headwalls would be protected and/or rehabilitated in a manner that would preserve their character and integrity, so there would be *no adverse effect.*

Several culverts in Reaves Gulch have only loosely piled cobbles and stones used almost as riprap around the corrugated metal culverts; these have been recommended as non-contributing to the roadway. Two other culverts have a combination of dry –laid cut and native stone associated with dry-laid stones used as a retaining wall along the ditch bank. These “walls” are in very poor condition due to several factors. The culverts are partially clogged, resulting in poor drainage and standing pools of water. In addition, a spring present in the general vicinity also contributes to the slow flow of water in the ditch. Bison visit the area on a daily basis and their constant trampling has displaced many of the loose stones into the stream course. These culverts and the culvert headwalls require rehabilitation or replacement because of their poor condition. New construction would be compatible in design and materials with the existing roadway features so there would be no adverse effect on the structures and the landscape. The above actions would have an effect on these culverts, but that effect would not be adverse (*no adverse effect).*

A number of discontinuous road segments were documented during recent archeological surveys. Most of these road segments—remnants of the roads that were extant in 1956 when the existing road was created – are amorphous, disconnected, and fragmentary, and have no associated structures. Almost all have had (in the past) some sort of planned obliteration—removal of surfacing, scarification, and/or replanting. During construction of the present roadway, ditches and borrow pits were inserted between the old road segments and the new corridor.

Two of these road segments have associated structural elements consisting of linear scatters of dry-laid stones. These concentrations are also fragmentary, having suffered dislocation during road construction. They lack integrity. For these reasons, these road segments were field recommended as ineligible for the National Register.

Given the location(s) of these road segments vis-à-vis the existing roadway, it is unlikely that the resurfacing would have any effect on most. However, obliteration of two segments is planned under this project.

The roadway asphalt itself would be pulverized and compacted and the underlying surface treated. Depth of this work would vary depending on the repair needs of road segments; however, any excavation would likely not exceed a depth of three feet. In areas where there are existing guardrails or where guardrails may be necessary, new guardrails would be installed that meet current crash test standards. The design and color of these guardrails would match the type and color already in use.

The rehabilitation of the roadway's historic features (bridges and culverts) would have a long-term beneficial effect on these structures by giving them many more years of viability. In addition, rehabilitation of the roadway's built environment—the road surface, the bridges, and culverts-- also would improve the visual image of these features, conveying a beneficial effect on the cultural landscape as well. The basic design of the road would remain unchanged, retaining the connections and the flow of the road as it was originally designed. There would be *no adverse effect* on the roadway and its associated features.

Pursuant to 36CFR800.5, implementing regulations of the National Historic Preservation Act (revised regulations effective August 2004), addressing the criteria of effect and adverse effect, the National Park Service finds that the implementation of the roadway rehabilitation, with identified mitigation measures, would have *no adverse effects* to archeological, historic, ethnographic, or cultural landscape resources eligible for or presently listed on the National Register of Historic Places. The proposed project would not adversely affect the Wind Cave National Park Administrative and Utility Area Historic District.

In the unlikely event that cultural resources are discovered during project implementation treatment, work would be halted in the vicinity of the resource, and procedures outlined in 36 CFR 800 would be followed.

This environmental assessment will be used as a vehicle to accomplish Section 106 compliance for this project. A copy of this environmental assessment will be forwarded to tribes, and to the SHPO for review and comment.

WATER RESOURCES AND WETLANDS

Affected Environment

Wind Cave National Park is within the Niobrara River basin, which is part of the greater Missouri River watershed. Flow generally moves southeastward out of the park to join larger tributaries (EPA 2002). Surface water at Wind Cave National Park is relatively scarce. There are five main drainages within the park – Beaver Creek, Highland Creek, Cold Springs Creek, Cold Brook and Wind Cave Canyon (NPS 1994). Beaver Creek is gauged inside the park. Both Beaver Creek and Highland Creek have adequate flow and water quality to support trout populations (NPS 2003b).

The karst geology of the area plays an important role in the hydrology of the park. "Karst" is a landscape underlain by limestone that conducts groundwater well and is gradually dissolved by the water it transports. Karst topography includes streams that may disappear and reappear due to the presence of subsurface channels (Cave Conservancy of the Virginias 1999). This is the case with Beaver and Highland Creeks, which both sink and disappear where they cross the Madison

Limestone (NPS 2003b). It has been noted that surface flows in the park have declined over the past 60 to 70 years. This phenomenon is attributed to expansion of ponderosa pine forests, causing an increase in water use by vegetation, and reducing water available for runoff (NPS 1994). The park contains several seeps and springs, with several developed as dependable water supply, primarily for bison and elk (NPS 1994).

Water resources located within or near the project area include Beaver Creek, which the Beaver Creek Bridge towers 115 feet above, and small natural seeps and springs along the Highway 87 right-of-way. Reaves Gulch, an ephemeral drainage that runs near and somewhat parallel to Highway 87 for a little more than one mile, contains many of these natural springs. Inventories conducted on water sources within the park in 2000 and 2002 identified four natural springs in Reaves Gulch that provide beneficial uses to wildlife (NPS 2000f and NPS 2002). Three of these springs were identified in the immediate area of the Pigtail Bridge and north of the bridge. The springs are used mainly as a water source for bison, and chipmunks and red squirrels were observed in the area at the time of inventory.

Another spring exists in Reaves Gulch further north along Highway 87 near a historic stone culvert headwall, just west of the highway (Figure 18). The spring does not drain freely likely due to the presence of the highway, and is therefore inundated year-round and functions as a wetland. This wetland is about 300 square feet in size and is considered a palustrine emergent wetland according to the U.S. Fish and Wildlife Service's Classification of Wetlands and Deepwater Habitats (Cowardin et al. 1979). The wetland is permanently flooded and hydrophytic vegetation dominates, including duckweed (*Lemna* sp.), American speedwell (*Veronica americana*), and water speedwell (*Veronica anagallis-aquatica*). The vegetation in the upland area surrounding the wetland includes chokecherry (*Prunus virginia*), wild bergamot (*Monarda fistulosa*), goldenrod (*Solidago* spp.), smooth brome (*Bromus inermis*), and sedges. Stoneflies, caddisflies, water striders, and boatman were all observed in the wetland during the park's inventory of water sources (NPS 2000f). Certain organisms are considered excellent biological indicators, whose presence provides information about environmental quality. Stoneflies and caddisflies, in particular, are intolerant to pollution and their presence likely indicates good environmental health (NPS 1993b). Therefore, the presence of these species in this wetland provides indication that it is relatively healthy.

FIGURE 18. SPRING AND HEADWALL ADJACENT TO HIGHWAY 87

Impacts of Alternative A, the No Action Alternative

The north abutment backfill for the Beaver Creek Bridge is inadequate and has been experiencing erosion. Under Alternative A, erosion of backfill would continue and sediment would be discharged into Beaver Creek. This would result in a negligible to minor, adverse effect and would occur during precipitation events. The ongoing pavement deterioration could potentially lead to particulate and sediment runoff into nearby surface and ground water, which would be considered a long-term, negligible, adverse effect.

Silt and sediment build-up has been known to develop in drainages where structures are inadequate or deteriorated. This has caused clogging and ponding in certain areas, interrupting the drainage patterns and facilitating degradation of the highway. This would continue under the No Action Alternative. Sediment loading in runoff also occurs on a small-scale because of vehicles creating social pullouts along the highway shoulder, however because there is minimal surface water flow, the effects would be considered long-term, negligible, and adverse.

Cumulative effects. The park has recently completed a project that replaced the deteriorated asphalt Visitor Center parking lot and constructed a stormwater collection and treatment system to minimize the amount of polluted runoff. This project would result in long-term, negligible to minor, beneficial effects to water resources. The park is also planning to replace the park's wastewater treatment system, which would result in long-term, moderate, beneficial effects to surface water quality and short-term, negligible, adverse effects from potential construction-related sediment delivery into surface water. The negligible to minor, adverse effects associated with Alternative A would offset some of the beneficial effects from other projects occurring in the park; however, overall the effects to water resources would still be minor and beneficial.

Conclusion. Alternative A would continue to produce long-term, negligible to minor, adverse effects on water quality from sediment loading in runoff. There would also be long-term, negligible, adverse effects from the potential for particulate and sediment delivery into surface and groundwater from deteriorated asphalt.

Alternative A would not produce major adverse impacts on water or wetland resources or values whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of the park, (2) key to the natural or cultural integrity of the park or opportunities for enjoyment of the park, or (3) identified as a goal in the park's general management plan or other National Park Service planning documents. Consequently, there would be no impairment of water or wetland resources or values as a result of the implementation of Alternative A.

Impacts of Alternative B, the Preferred Alternative

Under Alternative B, the park would pulverize and remove the old deteriorated asphalt and apply a new surface overlay on the prepared surface. In the short- and long-term, this would reduce the potential for particulate and sediment delivery into surface and groundwater, which would be a negligible, beneficial effect. After several years however, the new pavement would also experience deterioration similar to that which occurs under current conditions, which could potentially lead to particulate and sediment runoff into nearby surface and groundwater, which would be a long-term, negligible, adverse effect. The formalizing and restoring of pullouts would have a long-term, negligible, beneficial effect in reducing sediment runoff; however, impervious surfaces would also be added resulting in a long-term, negligible, adverse effect.

Drainage improvements, such as silt and sediment removal or replacing damaged headwalls, would have a long-term, negligible, beneficial effect, as it would reduce clogging and ponding of surface waters and sediment buildup. In areas where natural springs occur, drainage improvements would be chosen to not affect the spring itself, therefore, adverse effects are not likely. The backfill used at the north abutment of the Beaver Creek Bridge would be stabilized with grout, which would have a long-term, negligible to minor, beneficial effect from the reduction of erosion and sediment runoff.

Construction, demolition, and revegetation activities associated with the Preferred Alternative could generate short-term increases in sediment load in runoff during precipitation and spring snowmelt. This sediment would be unlikely to affect water resources because dense vegetation would buffer any effects to surface waters. To control sediment releases, resource protection measures would be employed to protect water quality. Such measures include: use of silt fencing and sediment barriers, storing materials on pavement or other impervious surfaces, and use of spill control measures for fuels and lubricants (see "Table 3. Resource Protection Measures"). Employment of these protection measures would result in short-term, negligible, adverse effects to water resources.

Sensitive resource areas such as natural springs and the wetland north of Pigtail Bridge would be avoided to minimize adverse effects. The approximately 300-square-foot wetland in Reaves Gulch north of the Pigtail Bridge and immediately adjacent to the highway is considered a valuable resource to wildlife and would be avoided during construction. Activities to restore the culvert and retaining wall to its historic condition, as well as highway resurfacing measures,

subjects this wetland to potential effect. However, because the wetland is located several feet below the protective retaining wall and the mitigation measures discussed above would be employed, the short-term, adverse effects to wetlands would be considered negligible.

Cumulative effects. The cumulative effects of the other projects discussed in Alternative A on water resources would be long-term, minor, and beneficial. There would also be short-term, negligible, adverse effects from construction activities. The construction and demolition activities associated with Alternative B would result in short-term, negligible, adverse effects; however, overall Alternative B would result in long-term, negligible, beneficial effects. These effects, in conjunction with other past, present, and reasonably foreseeable future projects, would result in long-term, minor, beneficial effects.

Conclusion. Long-term benefits of negligible to minor intensity would result from improved drainage and reduced sediment loading in runoff. The construction, demolition, and rehabilitation activities associated with Alternative B would produce short- and long-term, localized, negligible, adverse effects on water resources and wetlands.

Alternative B would not produce major adverse impacts on water or wetland resources or values whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of the park, (2) key to the natural or cultural integrity of the park or opportunities for enjoyment of the park, or (3) identified as a goal in the park's general management plan or other National Park Service planning documents. Consequently, there would be no impairment of water or wetland resources or values as a result of the implementation of Alternative B.

GEOLOGY AND SOILS

Affected Environment

The bedrock geology of Wind Cave National Park consists of a highland core of crystalline rocks made up of granite and schists in the northwest portion of the park surrounded by upturned sedimentary rock layers composed of a series of limestones, dolomites, sandstones, siltstones, mudstones, and shales (NPS 2001b). The mantled soils formed on these rocks are related to the underlying geology, the landforms, relief, climate, and natural vegetation of a given area (Ensz 1990).

Eight soil associations are found in the southern Black Hills (Ensz 1990 and NPS 2000e). Four of the associations are found within Wind Cave National Park. According to Ensz (1990) the Canyon-Rockoa-Rock Outcrop Association consists of shallow to deep, well drained, gently sloping to very steep, loamy soils formed in material weathered from interbedded limestone, sandstone, and shale. The Nevee-Gypnevee-Reikop Association is characterized as deep and shallow, well drained and somewhat excessively drained, gently sloping to very steep, silty and loamy soils formed in material weathered from siltstone, sandstone, silty shale, and gypsum. The Vanocker-Sawdust-Paunsaugunt Association is made up of deep and shallow, well drained, gently sloping to very steep, loamy soils formed in material weathered from limestone and calcareous sandstone. Lastly, the Buska-Mocmont-Rock Outcrop Association consists of rock outcrop and deep, well drained, gently sloping to very steep, loamy soils formed in material

weathered from schists and granites. There are no prime or unique agricultural soils within the park.

Rock formations found along the Highway 87 corridor consist of crystalline granite and schist at the middle and north sections and the sedimentary rock, sandstone along the southern segment. Sandstone, shale and limestone underlie the north and south Visitor Center access roads and parking lot. Soils found along the same routes consist of the Buska-Mocmont-Rock Outcrop and Vanocker-Sawdust-Paunsaugunt soil associations. These soils are generally characterized as well drained deep to shallow loamy soils. The soils are derived from the underlying bedrock on gently sloping to very steep hillsides. These rock formations and soils have been disturbed by previous road development and construction activities. The right-of-way soils and rock formations have been excavated and filled to provide an appropriate grade for the Highway 87 and the Visitor Center access roads, and now contains fill material and road base. In some cut areas, the underlying soil and bedrock are exposed, however, the right-of-way is mostly covered with vegetation with no evidence of substantial erosion.

An impervious layer has covered soils beneath the paved roadways and paved roadside parking pullouts for nearly 50 years. Unpaved roadside parking pullouts (formal and informal) are also present and contain soils that consist of compacted road base material or native soil. Limited amounts of sediment have been deposited in drainage ways associated with the roadways. This has led to a partial filling of at least one culvert and ponding of surface water north of the Pigtail Bridge. At the Beaver Creek Bridge, the abutment backfill consists of a mix of large boulders and various rocks and fines. The very steep slope at this location results in continuous erosion of the slope base.

Impacts of Alternative A, the No Action Alternative

Use of road maintenance equipment can lead to limited soil compaction during operation and staging along the roadway during maintenance activities. Soil and rock disturbance occurs for repair of pavement, road signs, guardrails, bridge abutments and drainage basins, as necessary. Rock and soils in the Highway 87 and north and south Visitor Center access road rights-of-way are occasionally affected by routine maintenance and exotic plant management.

The continued use of the unpaved and informal traffic pullouts contributes to further compaction of underlying sub base and native soils leading to reduced plant cover and increased erosion potential. A lack of defined parking areas along the roadway would lead to an expansion of informal pullout areas leading to an increasingly affected area. Erosion of the Beaver Creek Bridge abutment backfill would continue and would continue to expose the base of the abutment.

Continuation of the No Action Alternative would result in negligible, long-term, adverse effects to geologic and soil resources along side Highway 87 and the Visitor Center access roads as the continued effects of soil and rock disturbance, road detritus sedimentation, soil compaction, and particulate and sediment loading as well as bridge abutment erosion remains.

Cumulative effects. Alternative A would contribute negligible adverse effects to the geologic and soil resources in Wind Cave National Park. Completion of the Visitor Center parking lot replacement and installation of the stormwater management system projects, as well as plans for rehabilitation of the wastewater treatment system also include minor levels of soil disturbance

and compaction associated with construction activities. The No Action Alternative would contribute to the adverse effects, resulting in long-term, minor, adverse effects on the park's geologic and soil resources.

Conclusion. Alternative A would produce negligible, long-term, adverse effects on geologic and soil resources on and near Highway 87 and the Visitor Center access roads. These effects would be due to the continued effects of rock and soil disturbance, soil compaction from off-road visitor and maintenance vehicle parking, and bridge abutment erosion.

Alternative A would not produce major adverse impacts on geologic or soil resources or values whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of the park, (2) key to the natural or cultural integrity of the park or opportunities for enjoyment of the park, or (3) identified as a goal in the park's general management plan or other National Park Service planning documents. Consequently, there would be no impairment of geologic or soil resources or values as a result of the implementation of Alternative A.

Impacts of Alternative B, the Preferred Alternative

Alternative B would disturb up to 20 acres of road right-of-way. The area affected includes the region between the edges of the existing pavement outward to the construction limit. This includes the shoulder, ditch, and area beyond the ditch sloped to meet the existing grade. Soil and rock formations encountered in the corridor have been previously excavated and disturbed for road construction and maintenance. Road rehabilitation would involve pulverizing and reusing the existing asphalt pavement as sub-base, grading soil to meet existing grade beyond the ditch, and applying a new road surface overlay. The specific depth of asphalt pulverization and removal would vary depending on the repair needs of road segments; however, any excavation would likely not exceed a depth of three feet.

The soils in the existing north abutment fill to the Beaver Creek Bridge would be stabilized with grout, and stone blocks would be replaced to match the existing surface. The protruding sandstone bedrock exposed along the northern approach to the Pigtail Bridge would be straightened by excavating and the roadway passage between the sandstone bases of its abutments would be widened slightly by shaving the rock face. Regrading of road and traffic parking pullout shoulders to match the renovated roadway surface and adjacent drainage would disturb the underlying road base. Existing traffic pullouts that have not been paved would be paved over and thus would lead to long-term disturbance of these soils. This would result in long-term loss of productivity in 1 to 2 acres of soil. As the project is carried out, areas identified to have inadequate design or damaged components would be enhanced. This could result in disruption of rock formations and soils during guardrail post replacement, drainage way cleanout, culvert replacement, or headwall rehabilitation. Temporary parking for construction workers and staging areas for construction equipment would be necessary for the duration of the project and would have potential short-term, adverse effects in designated areas. The disturbed areas would be reclaimed and replanted. Native grasses would be seeded where appropriate.

Under the Preferred Alternative, construction activities would produce localized, adverse, minor, short- and long-term term effects on soil resources and localized, long-term, adverse minor effects on geologic resources. Long-term beneficial effects would occur as the potential road

detritus accumulation from continued road maintenance, sedimentation of road drainage ways, particulate and sediment runoff, soil compaction along unpaved formal and informal traffic pullouts and bridge abutment erosion at Beaver Creek Bridge are reduced. These benefits would be negligible and localized. Long-term, minor, adverse effects on geologic resources would occur at the Pigtail Bridge where the exposed sandstone bedrock would be removed during re-alignment of the northern approach and through widening of the roadway beneath the bridge. Other long-term, negligible to minor, adverse effects on geologic resources would occur in those areas requiring grading to match existing slope along roadways bordered with rock formations, guardrail post replacement, drainageway cleanout, culvert replacement, and headwall rehabilitation.

Cumulative effects. As discussed above, other park plans have generated or would generate minor amounts of short- and long-term soil disturbance in the park. These sites would be rehabilitated and revegetated. The cumulative effect of the proposed action on geology and soils, in concert with other existing actions, would be minor, long-term, and adverse.

Conclusion. The construction activities and disturbance associated with Alternative B would produce localized, adverse, minor, short- and long-term term effects on soil resources and long-term, minor adverse effects on geologic resources. Long-term, negligible, beneficial effects would occur from reduced compaction along unpaved formal and informal traffic pullouts and bridge abutment erosion at Beaver Creek Bridge. The reclamation of the former traffic pullouts would produce a long-term, localized, minor benefit.

Alternative B would not produce major adverse impacts on geologic or soil resources or values whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of the park, (2) key to the natural or cultural integrity of the park or opportunities for enjoyment of the park, or (3) identified as a goal in the park's general management plan or other National Park Service planning documents. Consequently, there would be no impairment of geologic or soil resources or values as a result of the implementation of Alternative B.

VEGETATION

Affected Environment

The dominant vegetation types at Wind Cave National Park are the mixed-grass prairie, ponderosa pine stands, and riparian communities. Approximately 75 percent of the park is classified as a prairie ecosystem, dominated by blue grama, (*Bouteloua gracilis*), western wheatgrass (*Pascopyron smithii*), and little bluestem (*Schizachyrium scoparium*). This system also supports a variety of forbs and shrubs. Yucca (*Yucca glauca*), prairie clover (*Dalea aurea*), prickly pear (*Opuntia polycantha)*, black-eyed Susan (*Rudbeckia hirta*), and cinquefoil (*Potentilla hippiana*) add color, fragrance, and variety to the vegetative community (NPS 2001b).

The remaining 25 percent of the park are woodlands. As elevation increases, ponderosa pine (*Pinus ponderosa*) communities dominate. Other conifers include Rocky Mountain juniper (*Juniperus scopulorum*) and common juniper (*Juniperus communis*). Along streams and in canyon bottoms, deciduous trees, including green ash (*Fraxinus pennsylvanica*), boxelder (*Acer*

negundo), bur oak (*Quercus macrocarpa*), plains cottonwood (*Populus deltoides*), American elm (*Ulmus americana*), and paper birch (*Betula papyriferia*) are common.

About 20 percent of the species of 495 species of vascular plants recorded at Wind Cave National Park are exotic, with three of these species classified as noxious weeds by the state of South Dakota or Custer County. Among these exotic plants, Canadian thistle (*Cirsium arvense*), leafy spurge (*Euphorbia esula*), cheatgrass (*Bromus tectorum*), Kentucky bluegrass (*Poa pratensis*), dandelion (*Taraxacum officinale*), smooth brome (*Bromus inermis*), crested wheatgrass (*Agropyron cristatum*), yellow sweet clover (*Melilotus officinalis*), and white clover (*Melilotus lupulina*) are found in disturbed areas, often along highway and road boundaries. Most of the exotics occur as small populations, and park staff have implemented an exotic plant management program to control their presence (Marriott 1999).

Prescribed burns are regularly performed in the park to reduce hazardous buildup of fuels and imitate the natural fire cycle. Approximately 2,000 acres are burned each year. The goal is to treat grasslands every three to seven years, and forested areas are treated every 10 to 20 years. Manual fuels reduction is also performed to reduce the potential for catastrophic fire (NPS 1994).

Vegetation along Highway 87 and the Visitor Center access roads varies somewhat, but is dominated by the native prairie ecosystem. Most of the vegetation adjacent to these roadways consists of grasses and forbs. Where the roadway passes through the ponderosa pine woodlands, trees and shrubs are not found adjacent to the roadway (with the exception of seedlings). A mix of native and exotic grasses grows along the Highway 87 corridor. Much of the vegetation along the highway is derived from the seed mix used to vegetate the highway borders. The seed mix contains a majority of native grass species. Several wildflowers were included in the mix, but these have largely failed to grow in the highway corridor.

Impacts of Alternative A, the No Action Alternative

The No Action Alternative would have long-term, negligible, adverse effects due to the disturbance in the Highway 87 and both Visitor Center access roads right-of-ways from routine road maintenance and repair activities, visitors pulling over while viewing wildlife, sightseeing, or wayfinding. This would either directly damage vegetation or promote the growth of exotic plants. Effects would be considered negligible because there would be no excavation in the previously disturbed highway and roadway corridor area.

Cumulative effects. Other recent or future projects, such as the construction of a new Visitor Center parking lot and development of a new wastewater treatment system, would result in short-term, minor, adverse effects on vegetation. These effects would be due to local disturbance during construction activities. The No Action Alternative would make a negligible contribution to cumulative effects on park vegetation, resulting in short-term, minor, adverse cumulative effects.

Conclusion. Effects to vegetation under the No Action Alternative would be long-term, negligible, and adverse from disturbance to vegetation in the Highway 87 and Visitor Center access roads right-of-ways.

Alternative A would not produce major adverse impacts on vegetation resources or values whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of the park, (2) key to the natural or cultural integrity of the park or opportunities for enjoyment of the park, or (3) identified as a goal in the park's general management plan or other National Park Service planning documents. Consequently, there would be no impairment of vegetation resources or values as a result of the implementation of Alternative A.

Impacts of Alternative B, the Preferred Alternative

Alternative B would adversely affect vegetation immediately adjacent to the roadside as a result of construction activities. The total area affected along the Highway 87 and Visitor Center access roads construction right-of-ways could be as large as 20 acres; this assumes an 18-foot wide construction zone corridor (excludes paved area, includes shoulder and ditch) on each side of the road along the entire work zone. It is likely that vegetation along some portions of this corridor would be unaffected, thus the extent of disturbance would be less than the maximum. This would result in a minor, short- and long-term, adverse effect on vegetation. Additionally, long-term, minor adverse effects would occur as a result of development of about 1 to 2 acres of new pullouts and interpretive exhibits.

Areas where soil and vegetation would be disturbed in the short-term would be regraded and revegetated using stockpiled topsoil and a native seed mix compatible with the local vegetative community. The native seed mix would help limit establishment of exotic plants in the corridor. Although disturbance associated with the highway and road rehabilitation project could provide the potential for the invasion of exotic species, park staff would monitor the area and work to eradicate any exotic species that may become established in the park after the project is complete. The fencing of the work zone would ensure that effects to vegetation would not go beyond the bounds of the project, thus minimizing the area potentially affected. Measures to ensure that imported material and machinery does not contain exotic plant material would be implemented.

Development of recognizable pullouts, turnarounds, and optimizing parking areas would have a long-term, negligible, beneficial effect on vegetation as visitors would be less likely to drive off-road and destroy vegetation when viewing wildlife, sightseeing, or wayfinding. Overall, the effects of Alternative B on vegetation would be short-term, local, minor, and adverse.

Cumulative effects. Other recent or future projects, such as the construction of a new Visitor Center parking lot and development of a new wastewater treatment system, would result in short-term, minor, adverse effects on vegetation. These effects would be due to local disturbance during construction activities. Alternative B would decrease the frequency of road repairs and maintenance, improve drainage, increase safety (thus decreasing the likelihood of accidents and the attendant adverse effects to vegetation when vehicles go off the road surface), and likely reduce the incidence of visitor vehicles traveling on vegetated areas. All these benefits, offset by the adverse effects associated with construction and rehabilitation of Highway 87 and both Visitor Center access roads and bridges, would contribute to an overall negligible beneficial cumulative effect on vegetation.

Conclusion. Alternative B would produce local, short- and long-term, minor, adverse effects on the vegetation along the Highway 87 and Visitor Center access roads corridors. Development of recognizable pullouts, turnarounds, and optimizing parking areas would have a long-term, negligible, beneficial effect on vegetation.

Alternative B would not produce major adverse impacts on vegetation resources or values whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of the park, (2) key to the natural or cultural integrity of the park or opportunities for enjoyment of the park, or (3) identified as a goal in the park's general management plan or other National Park Service planning documents. Consequently, there would be no impairment of vegetation resources or values as a result of the implementation of Alternative B.

WILDLIFE AND HABITATS

Affected Environment

The habitats along Highway 87 and the Visitor Center access roads that would be affected by the proposed action include mixed-grass prairie, ponderosa pine woodlands, and small segments of riparian corridor at the Highway 87 crossings. This mixture of prairie and forest ecosystems at Wind Cave National Park supports a variety of wildlife. Thirty-eight mammals and 130 bird species have been reported in the park (NPS 1999). Large mammals commonly viewed in the park include bison (*Bison bison*), elk (*Cervus elaphus*), mule deer (*Odocoileus hemionus*), white-tailed deer (*Odocoileus virginianus*), and pronghorn (*Antilocapra americana*). The park maintains the bison and elk herds at conservative levels to avoid resource degradation by overgrazing. Surplus animals are managed under the park's 1938 Surplus Animal Disposal Act.

Coyotes (*Canis latrans*) are the primary predator, with bobcats (*Felis rufus*) and badgers (*Taxidea taxus*) also found in the park (NPS 1994). In recent years, mountain lion (*Felis concolor*) sightings have increased in the park, with the likelihood that a lion population has established itself in the area (NPS 2003b).

Numerous reptiles and amphibians inhabit the park, but no lizards have been recorded here. Common reptiles include the snapping turtle (*Chelydra serpentina*), wandering garter snake (*Thamnophis elegans*), and prairie rattlesnake (*Crotalus viridis*). Amphibians include the blotched tiger salamander (*Ambystoma tigrinum*), Woodhouse's toad (*Bufo woodhousei*), and the Great Plains toad (*Bufo cognatus*) (NPS 1994).

Many birds find the park suitable for residence or migratory use. Wrens (family Troglodytidae), swallows (family Hirundinidae), mourning dove (*Zenaida macroura*), meadowlark (*Sturnella neglecta*), and mallard (*Anas platyrhynchos*) are commonly sighted. Raptors, including red-tailed hawk (*Buteo jamaicensis*), golden eagle (*Aquila chrysaetos*), and American kestrel (*Falco sparverius*) prey on the many small mammals in the park. Shorebirds, including killdeer (*Charadrius vociferus*) and spotted sandpiper (*Actitis macularia*), frequent the area in summer months. The western tanager (*Piranga ludoviciana*) and mountain bluebird (*Sialia currucoides*) are also sighted in the park during the summer (NPS 2001b).

Several bat species have been recorded in the park, including: the long-eared bat (*Myotis evotis*), small-footed myotis (*Myotis ciliolabrum*), little brown myotis (*Myotis lucifugus*), fringed myotis (*Myotis thysanodes*), long-legged myotis (*Myotis volans*), big brown bat (*Eptesicus fuscus*), and silver-haired bat (*Lasionycteris noctivagans*). Most of these species use caves for daytime hibernation. However, many also utilize mines, buildings or natural formations such as crevices or holes in trees for resting (Moore 1996, Turner 1974).

The black-tailed prairie dog (*Cynomys ludovicianus*) maintains colonies throughout the park. The prairie dog colonies often occupy land right up to roadway surfaces. These areas provide wildlife viewing of the prairie dogs and their predators, including coyotes and raptors. In addition, the animals that reside here frequently cross the roadways and are occasionally killed by passing vehicles. This species was once was a candidate for listing under the Endangered Species Act, but was delisted by the U.S. Fish and Wildlife Service in August 2004. The park is currently developing a black-tailed prairie dog management plan to determine appropriate population levels and would develop management tools and monitoring guidelines (NPS 2005b).

Those wildlife species that use portions of the project area that could be affected by the proposed action typically do so on a casual and transient basis, with the exceptions of the black-tailed prairie dog, whose colonies are adjacent to Highway 87 in some areas, and bison, which are regularly attracted to the water retained in the drainage along the highway through Reaves Gulch.

The Highway 87 corridor supports native and exotic grass species suitable for forage. However, the presence of the road, traffic, and lack of vegetative cover along many portions of the road makes it undesirable for large mammal species habitat. Deer and pronghorn do forage here occasionally. Small mammals are common along the roadways, and scavengers can be seen scavenging roadkill along the highway.

Impacts of Alternative A, the No Action Alternative

The only effect that current management of Highway 87 and associated pullouts and both Visitor Center access roads would have on wildlife is the continued negligible, short-term, local, adverse effect that vehicles using the roads have on wildlife. Vehicles passing along the road would cause short-term, local disturbance or displacement of wildlife directly in the road corridor, and this would represent a negligible adverse effect. The effects of roads on wildlife are diverse. These effects include mortality, restricted movement, introduction of exotic plants that could affect wildlife habitat, habitat fragmentation and edge effect, and increased human access to wildlife habitats (Findlay and Bourdages 2000, Forman 2000, Forman and Alexander 1998).

The disturbance and potential displacement of small areas of habitat that result from maintenance conducted on the road would be short-lived and generally would not adversely affect wildlife species. There are sporadic interactions between wildlife and vehicles when collisions occur and mortality results. While this represents a severe adverse effect to the individual, the effect would be considered negligible on wildlife species' populations because of the infrequency of the fatal collisions.

Cumulative effects. The construction associated with the park's parking lot and wastewater treatment plant projects would not likely produce long-term effects on wildlife. Proposed wildlife management plans, such as prairie dog management, would have a moderate beneficial cumulative effect on wildlife in the park. The No Action alternative would make a negligible, adverse contribution to these effects, resulting in cumulative, minor, beneficial effects to wildlife and habitats.

Conclusion. The No Action Alternative would have a continued negligible, short-term, local, adverse effect on wildlife as a result of vehicle traffic and the introduction of humans into wildlife habitats.

Alternative A would not produce major adverse impacts on wildlife or wildlife habitat resources or values whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of the park, (2) key to the natural or cultural integrity of the park or opportunities for enjoyment of the park, or (3) identified as a goal in the park's general management plan or other National Park Service planning documents. Consequently, there would be no impairment of wildlife or wildlife habitat resources or values as a result of the implementation of Alternative A.

Impacts of Alternative B, the Preferred Alternative

Compared to the No Action Alternative, implementation of the Preferred Alternative would generate localized, short-term, negligible to minor, adverse effects to wildlife and their habitats. These effects would result from disturbance related to construction work and the presence of people and machines. Construction generated effects would persist for months rather than minutes as for passing vehicles, and the disturbance or displacement effect would take place throughout the typical construction working day (and occasional night construction sessions as needed to minimize disruption of traffic). The distribution of wildlife resources throughout the habitats in and around the road corridor would allow wildlife to use other areas of the local habitats with negligible to minor adverse effects.

The asphalt pulverization, grading, and resurfacing associated with the project would be performed in a manner so that only local areas would be affected at any one time. Generally, the area affected by construction of the road modifications would range from 100 feet or less for small wildlife species (e.g., snakes, rodents, small birds), to 1,000 feet or more for larger, more mobile species (e.g., coyote, deer, bison). Based on the relatively small areas that would be affected and the short-term nature of the effects, construction of the road modifications would have a negligible to minor, local, adverse effect on wildlife and their habitats because of habitat disturbance at the specific project locations. The disturbance and potential displacement of wildlife from small areas of habitat that result from construction of the highway, road, and bridge improvements would be short-lived and generally would not adversely affect wildlife populations beyond temporary displacement.

Over the long term, Alternative B would not change the volume of traffic on Highway 87 or both Visitor Center access roads in the park. As a result, potential effects to wildlife would be related to implementation of the proposed resurfacing project and the development of upgraded parking and pullout facilities. Vehicles passing along the road would cause short-term, local disturbance

or displacement of wildlife directly in the road corridor, and this would represent a negligible adverse effect.

The exception to this would be the local, short-term, minor, adverse effect of expansion of parking areas and development of new pullouts in areas where black-tailed prairie dog colonies are adjacent to the roadway. The bounds of the prairie dog colonies are relatively dynamic and the proposed action would temporarily displace prairie dogs and destroy a small number of burrows and tunnels. No disturbance would take place within colonies between March and May to prevent disturbance to offspring prior to burrow emergence in late spring. This mitigation measure would allow juvenile prairie dogs to be mobile enough to disperse from areas directly affected by the proposed action.

In the long-term, Alternative B would have little effect on wildlife and wildlife habitats as traffic volumes would likely return to normal levels and disturbance would not differ from existing conditions.

Cumulative effects. As discussed for the No Action Alternative, other projects and plans affecting wildlife would be anticipated to yield long-term, minor benefits. Alternative B would not make any substantial contribution to this cumulative effect, either in a beneficial or adverse manner.

Conclusion. Implementation of Alternative B would have local, short- and long-term, negligible to minor adverse effects on wildlife, due to disturbance and possibly displacement from the construction areas.

Alternative B would not produce major adverse impacts on wildlife or wildlife habitat resources or values whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of the park, (2) key to the natural or cultural integrity of the park or opportunities for enjoyment of the park, or (3) identified as a goal in the park's general management plan or other National Park Service planning documents. Consequently, there would be no impairment of wildlife or wildlife habitat resources or values as a result of the implementation of Alternative B.

NATURAL SOUNDSCAPE

Affected Environment

The natural soundscape can be defined as "usually composed of both natural ambient sounds and a variety of human-made sounds." Noise, an element that can degrade the natural soundscape, is defined as "…unwanted or undesired sound, often unpleasant in quality, intensity or repetition… In a national park setting, noise is a subset of human-made noises" (NPS 2000d). Noise may vary in character from day to night, and from season to season. Some human-caused sound can be acceptable if it is associated with purposes and uses for which the park was created. Director's Order 47 (NPS 2000d), requires park units to determine the level of human-caused sound that is necessary for park purposes, and to achieve that level by reducing noise and restoring the natural soundscape to the greatest extent possible.

The natural soundscape is created by natural processes including, but not limited to, sound created by physical and biological components such as wind, weather, birds, and insects. The opportunity to experience the natural soundscape is an important part of a positive park experience for some visitors. Wind Cave National Park provides a unique and rare setting due to its remote location and remarkable environmental makeup, which provides an ambience of natural quiet and solitude.

Sound can be perceived as noise because of loudness, frequency, duration, occurrence at unwanted times, or because it interrupts or interferes with a desired activity. Noise can adversely affect park resources or values, including, but not limited to, natural soundscape, wildlife, and visitor experience. It can directly affect them by modifying or intruding upon the natural soundscape, masking the natural sounds that are an intrinsic part of the environment.

The human-made sounds that are present in the park include traffic, occasional aircraft overflights, voices, and the sounds associated with the use, maintenance and operation of the buildings and facilities. Human-caused sound is typically higher with high park visitation. No ambient sound monitoring was conducted specifically for this project.

Impacts of Alternative A, the No Action Alternative

The actions associated with the Alternative A, namely continuation of current management, would have a continued adverse effect on the natural soundscape in Wind Cave National Park. The primary cause of this adverse effect would be motor vehicles traveling on the park's roads and in parking lots. To a much lesser degree, the natural soundscape is affected by noise as a result of visitor activities, and park infrastructure and maintenance operations. The overall adverse effect on the natural soundscape would be local and minor because the noise associated with vehicle travel in a road corridor is typically considered acceptable. Areas of concentrated vehicle use, such as parking lots or high-traffic areas near prime wildlife viewing locations, would cause a greater effect on the natural soundscape, but the intensity would not likely be greater than a minor to moderate, local, transient, adverse effect. However, because these passing effects occur repeatedly (daily and increasing with high visitation), these effects would be long-term. Traffic volumes typically are low during the early morning or evening hours when awareness of the natural soundscape is at its maximum, and adverse effects at these times would continue to be negligible.

Cumulative effects. Combined with the effects of normal park operations and road maintenance, the No Action Alternative would have continued minor adverse cumulative effects on the natural soundscape as a result of the introduction of vehicle traffic and human-caused sounds into the natural environment. Although this effect is adverse by definition, it is typically considered acceptable so long as the vehicular noise is not excessive or outside the range of what is considered normal for that class of vehicle (e.g., trucks are usually more noisy than passenger cars and that is to be expected).

Conclusion. The transient effects of the No Action Alternative on the natural soundscape would be long-term, local, adverse, and range from negligible to moderate, depending on the specific location and time of day.

Alternative A would not produce major adverse impacts on the natural soundscape or soundscape resources or values whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of the park, (2) key to the natural or cultural integrity of the park or opportunities for enjoyment of the park, or (3) identified as a goal in the park's general management plan or other National Park Service planning documents. Consequently, there would be no impairment of the natural soundscape or soundscape resources or values as a result of the implementation of Alternative A.

Impacts of Alternative B, the Preferred Alternative

Alternative B would have short-term, local, moderate, adverse effects on the natural soundscape during project implementation. The operation of construction machinery would create noise during daytime working hours (and possibly at night if necessary to minimize traffic disruptions) for up to one year during construction of the road improvements. The minor to moderate range of adverse effects would depend on the location of the receptor, whether in a vehicle or using a mode of transportation from which sounds are more easily perceived (e.g., walking or hiking), and the duration of the receptor in the audible noise range of construction. There may be a very small, short-term increase of traffic associated with construction workers accessing the road and bridge improvement work sites. This additional potential short-term adverse effect would be negligible.

Alternative B, like the No Action Alternative, would continue to have long-term, transient, minor, local adverse effects on the natural soundscape as a result of noises introduced by vehicles traveling on the park's highways and roads. Once the project is complete, there would be no change anticipated in the average daily traffic volume on the road.

Cumulative effects. During construction, Alternative B would contribute most, if not all, of the adverse effects to the natural soundscape in the vicinity of the road improvement locations, because other plans and projects being considered would not affect the natural soundscape in the project area. A visitor would expect to hear vehicle and motorized noise when traveling the park's roads. Developments in other parts of the park or other adjacent lands may have local adverse effects on the natural soundscape in those areas, but are unlikely to coincide with implementation of the proposed action. There is potential that a person could experience construction noise at multiple locations in the park, but the adverse cumulative effects on the natural soundscape would be negligible, considering the short-term nature of Alternative B's effect on the natural soundscape.

Conclusion. Effects associated with Alternative B would be local, short-term, adverse, and minor to moderate, as a result of the operation of construction machinery. A short-term increase in traffic from construction personnel accessing the project sites would lead to negligible adverse effects to the natural soundscape.

Alternative B would not produce major adverse impacts on the natural soundscape or soundscape resources or values whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of the park, (2) key to the natural or cultural integrity of the park or opportunities for enjoyment of the park, or (3) identified as a goal in the park's general management plan or other National Park Service planning documents. Consequently, there

would be no impairment of the natural soundscape or soundscape resources or values as a result of the implementation of Alternative B.

ENDANGERED AND THREATENED SPECIES

Affected Environment

Three federally listed threatened, endangered or candidate animal species may reside in the park; refer to Table 7 for details regarding these species. There are no plant species at Wind Cave National Park that are eligible for federal protection. However, one plant monitored as a species of concern by the state of South Dakota, Hopi tea (*Thelesperma megapotamicum*), does grow in the park.

The historical range of the black-footed ferret (*Mustela nigripes*) included Custer County and Wind Cave National Park. This species is one of the most endangered mammals in the United States. Black-footed ferrets are highly dependent on prairie dog colonies for habitat and prey (NPS 1994). The last observation of black-footed ferrets in the park was in 1977. An extensive survey, conducted in 1990, failed to locate members of this species in the park (NPS 2003b). The park is in the process of preparing a management plan and environmental assessment to address the reintroduction of the black-footed ferret to the park. The potential for interaction between ferret reintroduction and the proposed action is addressed later in this section.

In South Dakota, the bald eagle is a migrant and wintering species. No nesting sites are known to occur in the park. Migrating eagles are observed in the park in open valleys and roosting in large trees within floodplains during winter months (NPS 2003b). They are currently regarded as casual and transient visitors to the park. The nearest bald eagle concentration occurs at Angostura Reservoir, approximately 15 miles south of the park (NPS 1994).

The American burying beetle was recorded historically in 35 states, as well as along the southern edges of Ontario, Quebec and Nova Scotia. Records indicate that the decline of the population was underway, if not complete, by 1923. The American burying beetle is now found in five states: Nebraska, South Dakota, Rhode Island, Oklahoma and Arkansas (Ratcliffe 2001). The South Dakota Natural Heritage Program has documented an approximately 1,000 square mile area in southern Tripp and Gregory counties with substantial populations of the American burying beetle (NPS 2003b). One historic siting was recorded 150 miles east of Wind Cave National Park, but there have been no documented occurrences within the park (NPS 1994).

South Dakota State Species of Concern

Hopi tea (*Thelesperma megapotamicum*) is a globally common member of the Aster family that occurs rarely in the state of South Dakota, which is at the northern end of its natural range. Hopi tea is a perennial herb found on dry sandy soils in open sites. At Wind Cave, Hopi tea is found in grasslands and open woodlands, usually on steep westerly or southerly facing slopes. Four occurrences of the plant have been documented at the park. Although the species is not sufficiently rare to warrant active management, existing populations should be left undisturbed (Marriott 1999).

TABLE 7. FEDERALLY LISTED ENDANGERED, THREATENED, AND CANDIDATE SPECIES FOR WIND CAVE NATIONAL PARK, SOUTH DAKOTA

Common Name *Scientific Name*	**Listing Status**	**Designated Critical Habitat?**	**Habitat Requirements**
Black-footed ferret *Mustela nigripes*	Endangered	No	The ferret lives in association with prairie dog colonies.
Bald eagle *Haliaeetus leucocephalus*	Threatened	Yes, but not in the park	The bald eagle ranges over most of the north American continent, from as far North as Alaska and Canada, south to northern Mexico.
American burying beetle *Nicrophorus americanus*	Endangered	No	The American burying beetle is largely restricted to areas most undisturbed by human influence.

Impacts of Alternative A, the No Action Alternative

Under the No Action Alternative, there would be no surface disturbance or construction activities that would affect any listed species. This alternative would have no potential to affect any listed species, species of concern, or designated critical habitats at Wind Cave National Park.

Cumulative effects. The park provides an environment of protection for the wildlife species and ecosystems of the Black Hills region. The cumulative effect of this refuge and habitat preservation on the endangered and threatened species of the area are beneficial, long-term, and of minor intensity. Other park plans and projects, such as rehabilitation of the Visitor Center parking lot and installation of a stormwater management system, do not include effects to habitat for endangered or threatened species. Implementation of the No Action Alternative would not contribute to the cumulative benefits that Wind Cave National Park provides to endangered and threatened flora and fauna.

Conclusion. The No Action Alternative would have no effect on endangered and threatened species.

Alternative A would not produce major adverse impacts on listed species or their critical habitat resources or values whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of the park, (2) key to the natural or cultural integrity of the park or opportunities for enjoyment of the park, or (3) identified as a goal in the park's general management plan or other National Park Service planning documents. Consequently, there would be no impairment of listed species or their habitat resources or values as a result of the implementation of Alternative A.

Impacts of Alternative B, the Preferred Alternative

The black-footed ferret was last seen in the park in 1977, and has been considered extirpated for many years. Informal consultation with South Dakota representatives of the U.S. Fish and Wildlife Service has produced specific actions to be taken to avoid effects to black-footed ferrets. Implementation of the Preferred Alternative would require that prior to work in a prairie dog colony, a night survey would be conducted to determine if ferrets are using the area to be excavated. In the event that ferrets were found near the project area, formal consultation with the U.S. Fish and Wildlife Service would be initiated.

The bald eagle has been reported to use riparian areas of Wind Cave National Park during seasonal migration. No known nests are present in the park. Under the Preferred Alternative, Highway 87, both Visitor Center access roads, and bridge improvements would occur within their respective right-of-ways. Because of the highly developed nature of the project locations, it is unlikely that bald eagles would use the project sites. The short-term nature of the actions proposed under the Preferred Alternative would have no effect on bald eagles.

The American burying beetle has not been recorded in the park, and the closest recorded occurrence was approximately 150 miles to the east. Alternative B would have no effect on this species.

Hopi Tea occurs in one location in the park along U.S. Highway 385, outside the project area. Thus, the proposed action would have no effect on this plant species.

Cumulative effects. Current management of endangered and threatened species at Wind Cave includes protection for species and their habitats. Other park plans that include construction activities would have no effect on listed species or their habitats. Implementation of the Preferred Alternative would also have no effect on listed species and therefore would not contribute to cumulative effects.

Conclusion. Black-footed ferrets would not be affected because they are not likely to occur within the park at this time. However, in the event that black-footed ferrets are found in a prairie dog colony adjacent to the project corridor, formal consultation would be initiated with the U.S. Fish and Wildlife Service and appropriate mitigation measures would be instituted ensuring the action would have no effect on this species. Alternative B would have no effect on the American burying beetle or the bald eagle because these species are not likely to occur in the project area. The state sensitive plant species, Hopi tea, would not be affected by Alternative B.

Alternative B would not produce major adverse impacts on listed species or their critical habitat resources or values whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of the park, (2) key to the natural or cultural integrity of the park or opportunities for enjoyment of the park, or (3) identified as a goal in the park's general management plan or other National Park Service planning documents. Consequently, there would be no impairment of listed species or their habitat resources or values as a result of the implementation of Alternative B.

CONSULTATION AND COORDINATION

Several Native American tribes have demonstrated interest in the areas within Wind Cave National Park. The following tribes were contacted by letter on March 22, 2004, regarding this project. A copy of the letter sent to the tribal representatives can be found in Appendix A.

- Arapaho Business Committee
- Cheyenne River Sioux Tribe
- Cheyenne-Arapaho Tribes of Oklahoma
- Crow Creek Sioux Tribal Council
- Flandreau Santee Sioux Executive Committee
- Fort Belknap Community Council
- Fort Peck Tribal Executive Board
- Lower Brule Sioux Tribal Council
- Northern Cheyenne Tribal Council
- Ponca Tribe of Nebraska
- Ponca Tribe of Oklahoma
- Rosebud Sioux Tribal Council
- Santee Sioux Tribal Council
- Sisseton-Wahpeton Sioux Tribal Council
- Standing Rock Sioux Tribal Council
- Three Affiliated Tribes Business Council
- Yankton Sioux Tribal Business and Claims Committee

The U.S. Fish and Wildlife Service was contacted regarding this project on March 22, 2004. In a letter dated March 29, 2004, the Service agreed with the park's finding of not likely to adversely affect endangered and threatened species. This finding was based on the potential to disturb black-tailed prairie dog (*Cynomys ludovicianus*) burrows, which at the time was a candidate species for listing under the Endangered Species Act. However, in August 2004 the black-tailed prairie dog was delisted by the U.S. Fish and Wildlife Service. The park would have no effect on any other threatened or endangered species, thus there would be no effect on listed species. This environmental assessment will be sent to the U.S. Fish and Wildlife Service for review and comment.

During development of this environmental assessment, the park contacted the South Dakota State Historic Preservation Officer (SHPO) regarding this project on March 22, 2004. A copy of the letter sent to the SHPO can be found in Appendix A. During the design phase of the new guardrail system for the Pigtail Bridge, the SHPO was consulted in order to help ensure that the new guardrails were consistent with the overall historic fabric of the bridge.

This environmental assessment will be sent to the SHPO for review and comment, and their comments will be addressed in subsequent environmental documents.

The public was invited to comment on the project in a press release issued on April 5, 2004. A copy of the press release can be found in Appendix A. No new issues were identified by the public as a result of the request for public input.

PLANNING TEAM PARTICIPANTS

Linda Stoll	Superintendent	Wind Cave National Park
Steve Schrempp, P.E.	Facilities Manager	Wind Cave National Park
Tom Farrell	Chief of Interpretation	Wind Cave National Park
Jim Dahlberg	Maintenance Foreman	Wind Cave National Park
Dan Foster	Chief of Resource Management	Wind Cave National Park
Rick Mossman	Chief Ranger	Wind Cave National Park
Walt Graham	Project Manager	NPS, Denver Service Center
Tracy Cudworth	Job Captain	NPS, Denver Service Center
Patrick Walsh	NEPA Compliance Specialist	NPS, Denver Service Center
Mark Meng	Project Manager	Federal Highway Administration
Derrell Manceaux	Structural Engineer	Federal Highway Administration
Wayne VanderTuin	FLHP Coordination Engineer	NPS, Midwest Office
Tom Hildreth	Design Engineer	Parsons Brinkerhoff
Mike Traffalis	Bridge Engineer	Parsons Brinkerhoff

PREPARERS

Jacklyn Bryant	Environmental Scientist/Project Manager	Parsons
Diane Rhodes	Cultural Resource Specialist	Parsons
Nicole Winterton	Environmental Scientist	Parsons
Don Kellett	Biologist	Parsons
Janice Biletnikoff	Environmental Planner	Parsons
Lee Monnens	Scientist/Geologist	Parsons

LIST OF RECIPIENTS

Federal Agencies and Government

Advisory Council on Historic Preservation
Dept. of Agriculture
    U.S. Forest Service
Dept. of the Interior
    Bureau of Indian Affairs
    Bureau of Land Management
National Park Service
        Badlands National Park

Jewel Cave National Monument
Mt. Rushmore National Park
U.S. Fish and Wildlife Service
U.S. Environmental Protection Agency
Region VIII

U.S. Congressional Representatives from South Dakota

State and Local Agencies and Governments

Custer County Commissioners
Fall River County Commissioners
South Dakota State Historic Preservation Officer
Tribal Historic Preservation Officer(s)

Native American Tribes

Arapaho Business Committee
Cheyenne River Sioux Tribe
Cheyenne-Arapaho Tribes of Oklahoma
Crow Creek Sioux Tribal Council
Flandreau Santee Sioux Executive Committee
Fort Belknap Community Council
Fort Peck Tribal Executive Board
Lower Brule Sioux Tribal Council
Northern Cheyenne Tribal Council
Ponca Tribe of Nebraska
Ponca Tribe of Oklahoma
Rosebud Sioux Tribal Council
Santee Sioux Tribal Council
Sisseton-Wahpeton Sioux Tribal Council
Standing Rock Sioux Tribal Council
Three Affiliated Tribes Business Council
Yankton Sioux Tribal Business and Claims Committee

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REFERENCES

American Association of State Highway and Transportation Officials (AASHTO)

2001 A Policy on Geometric Design of Highways and Streets. Available on the Internet at http://www.transportation.org/aashto/home.nsf/FrontPage.

Cave Conservancy of the Virginias

1999 Living on Karst: A reference guide for landowners in limestone regions. Available on the Internet at http://www.wvcc.net/living_on_karst.htm.

Cowardin, Lewis, M, Carter, Virginia, Golet, Francis C., and LaRoe, Edward T

1979 Classification of Wetlands and Deepwater Habitats of the United States. U.S. Department of the Interior, Fish and Wildlife Service, Washington, D.C. Jamestown, ND: Northern Prairie Wildlife Research Center Online. Available on the Internet at http://www.npwrc.usgs.gov/resource/1998/classwet/classwet.htm.

Ensz, Edgar H.

1990 Soil Survey of Custer and Pennington Counties, Black Hills Parts, South Dakota. United States Department of Agriculture. Soil Conservation Service.

Findlay, C. S. T. and Josée Bourdages

2000 "Response Time of Wetland Biodiversity to Road Construction on Adjacent Lands." Conservation Biology 14 (1): 86-94.

Forman, Richard T. T.

2000 "Estimate of the Area Affected Ecologically by the Road System in the United States." *Conservation Biology* 14 (1): 31-35.

Forman, Richard T. T. and L. E. Alexander

1998 "Roads and Their Major Ecological Effects." Annual Review of Ecology and Systematics 29: 207- 231.

Long, Barbara Beving

1992 Wind Cave National Park Historic Contexts and National Register Guidelines. Done for the National Park Service by Barbara B. Long under contract. Cresco, Iowa: Four Mile Research Company.

Marriott, Hollis

1999 *Wind Cave National Park Floristic Survey Focusing on Rare Plants.*

Meng, Mark

2004 Personal communication between Mark Meng, Project Manager, Federal Highway Administration and Jacklyn Bryant, Environmental Scientist/Project Manager, Parsons. 27 October 2004.

Moore, John, Jennifer Clark, Margaret Heimbrook, and Stephen Mackessy.

1996 Survey of the Biota and Trophic Interactions Within Wind Cave and Jewel Cave, South Dakota. Final Report. University of Northern Colorado.

National Park Service, U.S. Department of the Interior

1984a Park Road Standards National Park Service 1984.

1984b National Register of Historic Places Inventory-Nomination Form for Beaver Creek Bridge. National Park Service, Rocky Mountain Regional Office, Denver, Colorado.

1992 "National Park Service Rocky Mountain Regional Office Historic Buildings and Structures Inventory Form." Denver, CO: Rocky Mountain Regional Office, National Park Service.

1993a National Park Service Rocky Mountain Regional Office Historic Buildings and Structures Inventory Form, Pigtail Bridge. National Park Service, Rocky Mountain Regional Office, Denver, Colorado.

1993b Fishery and Aquatic Management Program in Yellowstone National Park. Technical Report for Calendar Year 2002. National Park Service

1994 *Wind Cave National Park General Management Plan/Environmental Impact Statement.*

1995a National Register of Historic Places Registration Form, Pigtail Bridge, HS-98. National Park Service, Rocky Mountain Regional Office, Denver, Colorado.

1995b Secretary of the Interior's Standards for the Treatment of Historic Properties.

1998 Secretary of the Interior's Standards for the Treatment of Historic Properties (Historic Structures). In: Appendix C of NPS-28, Cultural Resources Management Guidelines.

1999 Draft Environmental Assessment: Construct Interpretive Trail, Wind Cave National Park, South Dakota.

2000a PMIS Project Detail Sheet, Rehabilitate Hwy 87 and the Visitor Center Entrance Roads, Wind Cave National Park (PMIS #62912)

2000b *Management Policies 2001.* National Park Service D1416. Washington, D.C.

2000c *Wind Cave National Park Roads and Bridges* drawings for the Historic American Engineering Record.

2000d Director's Order #47: *Soundscape Preservation and Noise Management.* Washington, D.C. Available on the internet at http://www.nps.gov/refdesk/DOrders/DOrder47.html

2000e *Wind Cave Archeological Inventory Project: Research Design*, by Jennifer Galindo. Lincoln, Nebraska:Midwest Archeological Center.

2000f Report on Water Sources in Wind Cave National Park During the Summer/Fall of 2000, by Tracy I. Clark.

2000g Draft Historic American Engineering Record for Wind Cave National Park Road System, by Claire Tichi, HAER, [Washington, D.C.]

2001a *Director's Order #12 and Handbook: Conservation Planning, Environmental Impact Analysis, and Decision Making*. Washington, D.C.

2001b Wind Cave National Park website. Available on the Internet at http://www.nps.gov/wica/speleothems.htm.

2002 2002 Report on Water Sources in Wind Cave National Park, by Terry S. Liddick.

2003a Preliminary Report on the Geology and Mineralogy of Wind Cave, Wind Cave National Park, South Dakota. Available on the Internet at http://www.nps.gov/wica/NSS_1959_Expedition/Report_on_the_Geology_Regional_Geology.htm

2003b Environmental Assessment: Project to Replace the Failing Waste Water Treatment Facility.

2004a The Early History of Wind Cave. Available on the internet at http://www.nps.gov/wica/Early_History/Winds_of_Wind_Cave.htm.

2004b Wind Cave National Park Timeline. Available on the internet at http://www.nps.gov/wica/WICA_Time_Line.htm.

2004c Slide show, Civilian Conservation Corps at Wind Cave. Available on the Internet at http://www.nps.gov/wica/CCC_at_Wind_Cave.htm.

2004d Public Use Statistics Office: Reports. Accessed on the Internet at http://www2.natur.nps.gov/stats.

2004e *Wind Cave National Park Cultural Landscape Report*. Prepared for Wind Cave National Park and National Park Service, Midwest Regional Office by John Milner Associates, Inc., Charlottesville, Virginia, and Rivanna Archaeological Consulting of Charlottesville, Virginia, in association with Bahr Vermeer & Haecker Architects, Ltd. Lincoln, Nebraska. Task Order T6068020117, November 2004.

2005a Draft Report on Archeological Survey of State Highway 87, North Entrance Road Corridor Through Wind Cave National Park, Custer County, South Dakota. Denver, Colorado: Parsons for the National Park Service.

2005b Black-tailed Prairie Dog Management Plan announcement. Accessed on Internet at http://parkplanning.nps.gov/projectHome.cfm?projectId=11495.

Parsons Brinkerhoff

2003 Scoping Report – Wind Cave National Park SD PRA 11(2) & 12(1) Project, North Entrance Road and Beaver Creek Bridge. Portland OR, November 17, 2003.

2005 Bridge Design Narrative - Wind Cave National Park, SD PRA WICA 11(2) and 12(1) Project North Entrance Road and Beaver Creek Bridge. Portland, OR. September 7, 2005.

Ratcliffe, Brett

2001 *The American Burying Beetle: An endangered species.* Nebraska Game and Parks Wildlife and Habitat website. Available on the Internet at http://ngp.ngpc.state.ne.us/wildlife/wildlife.html.

Street, Butch

2004 Personal communication from Butch Street, Management Analyst, NPS Public Use Statistics Office to Janice Biletnikoff, Environmental Planner, Parsons. November 2004.

Turner, Ronald W.

1974 *Mammals of the Black Hills of South Dakota and Wyoming*. University of Kansas Museum of Natural History, Lawrence Kansas, Publication No. 60.

U. S. Environmental Protection Agency

2002 "Surf Your Watershed"- Middle Cheyenne Spring. Accessed March 7 2002 at http://cfpub.epa.gov/surf.

Western History Research

1994 *Wind Cave National Park Land Study.* Two volumes: Land Study and Compiled Data. Done for the National Park Service by Western History Research under contract. Bozeman, Montana: Western History Research.

APPENDIX A: CONSULTATION LETTERS

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United States Department of the Interior

NATIONAL PARK SERVICE
Wind Cave National Park
RR 1, Box 190
Hot Springs, South Dakota 57747

IN REPLY REFER TO:
H4217(WICA)

March 22, 2004

Mr. Jay D. Vogt
State Historic Preservation Officer
South Dakota State Historical Society
900 Governors Drive
Pierre, South Dakota 57501-2217

Subject:Section 106 Consultation, Rehabilitate Highway 87 within Wind Cave National Park

Dear Mr. Vogt:

Wind Cave National Park is planning to prepare an Environmental Assessment (EA) for rehabilitation of 7.2 miles of Highway 87 through the park and about 1.4 miles of entrance road north and south of the Visitor Center. The road improvement portion of the project would involve replacing the existing asphalt surface with a new asphalt overlay. In addition, two historic bridges – the Beaver Creek arched concrete bridge and the looping Pigtail Bridge – would receive repairs to deteriorated travel surfaces and areas of damage on the guardrails. The main objectives of the project are to enhance public health and safety and reduce the park's cyclic maintenance burden.

Highway 87 was constructed in 1957 and serves as the primary travel link between Wind Cave National Park and Custer State Park on the north. Since the road was built, cyclic maintenance has included chip and seal coating and pothole repair – the highway has not received a major resurfacing. The existing travel surface is deteriorating, and in some locations cracks and heaving are readily apparent. In addition, the roadway does not have adequate pull out spaces to provide safe passage at scenic spots where visitors commonly pull to the side of the road. The approaches and guardrails of the bridges have also been damaged by traffic. Both structures require repairs from vehicle strikes, as well as overall surface repairs.

Although we are just beginning to plan and gather information for the project, we believe that its eventual implementation may have the potential to affect properties included in, or that may be eligible for, inclusion in the National Register. The project area includes the Wind Cave National Park Administrative and Utility Area Historic District, the Beaver Creek ("High") Bridge, and the Pigtail Bridge, all of which are listed on the National Register of Historic Places. Therefore, we are initiating consultation with your office in accordance with 36 CFR 800 and with the 1995 Servicewide Programmatic Agreement among your office, the Advisory Council on Historic Preservation, and the National Park Service.

The National Park Service is aware that American Indians and other traditional groups may have concerns related to cultural sites, so Government-to-Government consultation has been initiated with tribes that have expressed an interest in the park. This consultation is intended to ensure that mutually held goals for management of important natural and cultural resources are met.

In addition to planning work required by Section 106 of the National Historic Preservation Act, we have begun work on an environmental assessment that will study and assess the impacts to natural and cultural resources and determine any required mitigation. The EA will provide detailed descriptions of alternative programs intended to improve the roadway and, as required by law, a No Action Alternative. The EA also will analyze the potential impacts associated with possible implementation of each alternative and will describe the rationale for choosing the preferred alternative. These details will be reiterated in a Section 106 Summary in the EA. Also contained in the EA will be measures that would help avoid adverse effects on cultural resources.

This letter also serves to notify your office that we plan to use the EA for the project to accomplish compliance for both Section 106 and the National Environmental Policy Act (as described in 36 CFR 800.8 (a-c)).

As soon as the policy review draft of the EA is available, we will send it to you for your review and comment. We look forward to your input on the planning process and believe that it will continue to result in better planning for cultural resources management as well as helping to ensure that cultural resources are adequately considered during preparation of the plan and the accompanying EA.
If you have any questions, please contact me or Tom Farrell, our Section 106 Compliance Coordinator. We can both be reached at (605) 745-4600.
Sincerely,

Linda L. Stoll
Superintendent

cc:Parsons-Denver-J. Bryant, D. Rhodes

United States Department of the Interior

NATIONAL PARK SERVICE
Wind Cave National Park
RR 1, Box 190
Hot Springs, South Dakota 57747

IN REPLY REFER TO:
H4217(WICA)

March 22, 2004

«Salutation» «FirstName» «MI» «LastName» «SR», «JobTitle»
«TribeName»
«Address1»
«Address2»
«City», «State» «ZipCode»

Subject: Government-to-Government Consultation, Rehabilitate Highway 87 within Wind Cave National Park

Dear _____:

Wind Cave National Park (WICA) is planning to prepare an Environmental Assessment (EA) for rehabilitation of 7.2 miles of Highway 87 through the park and about 1.4 miles of entrance road north and south of the Visitor Center. The road improvement portion of the project would involve replacing the existing asphalt surface with a new asphalt overlay. In addition, two historic bridges – the Beaver Creek arched concrete bridge and the looping pigtail bridge – would receive repairs to deteriorated travel surfaces and areas of damage on the guardrails. The main objectives of the project are to enhance public health and safety and reduce the park's cyclic maintenance burden.

Highway 87 was constructed in 1957, and serves as the primary travel link between Wind Cave National Park and Custer State Park on the north. Since the road was built, cyclic maintenance has included chip and seal coating and pothole repair – the highway has not received a major resurfacing. The existing travel surface is deteriorating, and in some locations cracks and heaving are readily apparent. In addition the roadway does not have adequate pull out spaces to provide safe passage at scenic spots where visitors commonly pull to the side of the road. The approaches and guardrails of the bridges have also been damaged by traffic. Both structures require repairs from vehicle strikes, as well as overall surface repairs.

The park is aware that American Indians value Wind Cave National Park as a very special place, so we want to be sure that the project would not affect ethnographic resources valued by your tribe. Therefore, this letter is to formally initiate Government-to-Government consultation in accordance with legislation, Executive Orders, regulations, and policy, including sections 101 and 106 of the National Historic Preservation Act of 1966 as amended, 36 CFR 800, National Park Service Management Policies and Director's Order 28, Cultural Resources Management (especially Chapter 10, Ethnographic Resources).

We have begun planning work required by Section 106 of the National Historic Preservation Act, and we have begun work on an environmental assessment that will study and assess the impacts to natural and cultural resources, and determine any required mitigation. In addition, an archeological survey of the area

of potential effect will be conducted prior to development of the final compliance documents. We believe that your participation will result in better planning for cultural resources management, and will help ensure that cultural resources valued by your tribe are adequately considered during the planning and design process and in preparation of the accompanying environmental assessment. As soon as it is completed, a copy of the draft environmental assessment will be forwarded to your tribe for review and comment. We look forward to receiving your input on our plans and any concerns you have about the project. We would be pleased to discuss this project further, either by telephone or in a meeting.

If you have any questions, please contact me or Tom Farrell, our Section 106 Compliance Coordinator. We can both be reached at (605) 745-4600.

Sincerely,

Linda L. Stoll
Superintendent

cc: Parsons-Denver-J. Bryant, D. Rhodes

[List of tribes provided in “Consultation and Coordination”]

National Park Service
U.S. Department of the Interior

Wind Cave National Park

RR 1, Box 190
Hot Springs SD 57747

605-745-4600 phone
605-745-4207 fax

Wind Cave National Park News Release

Release Date: 4-5-2004

For Immediate Release

Tom Farrell 605-745-1130

tom_farrell@nps.gov

Wind Cave Begins Planning Process for Rehabilitation of Highway 87

Wind Cave National Park is initiating a planning process to prepare an Environmental Assessment (EA) for the rehabilitation of 7.2 miles of Highway 87 through the park and about 1.4 miles of road along the North and South Entrance Roads into the Visitor Center. The road improvement portion of the project would involve replacing the existing asphalt surface with a new asphalt overlay. In addition, two historic bridges – the Beaver Creek arched concrete bridge and the Pigtail Bridge – would receive repairs to deteriorated travel surfaces and areas of damage on the guardrails. The main objectives of the project are to enhance public health and safety and reduce the park's cyclic maintenance burden.

During this early planning phase, the park is requesting public input regarding possible alternatives, issues or concerns related to the proposed alternatives, and any new alternatives that should be considered. Please send your comments to Wind Cave National Park Superintendent, RR 1 Box 190, Hot Springs, SD 57747 or via e-mail to wica_planning@nps.gov.

-NPS-

* This news release also appeared in the Hot Springs Star on April 6, 2004.

United States Department of the Interior

RECEIVED NATIONAL PARK SERVICE
WIND CAVE NATIONAL PARK
RR1, BOX 190
MAR 25 2004 HOT SPRINGS, SOUTH DAKOTA 57747

IN REPLY REFER TO:

N1621 (WICA-R

U.S. FISH & WILDLIFE SERVICE

March 22, 2004

The U.S. Fish and Wildlife Service concurs with your conclusion that the described project will not adversely affect listed species. Contact this office if changes are made or new information becomes available.

3/29/04 Scott Larson
Date SD Acting Supervisor
USFWS

Mr. Scott Larson
U.S. Department of the Interior
Fish and Wildlife Service
Ecological Services Division
420 S. Garfield Avenue, Suite 400
Pierre, South Dakota 57501-5408

Subject: Section 7 Consultation, Project to Rehabilitate Highway 87 within Wind Cave National Park

Dear Mr. Larson:

Wind Cave National Park (WICA) is planning to prepare an Environmental Assessment for the project to rehabilitate 7.2 miles of Highway 87 through the park and about 1.4 miles of entrance road north and south of the Visitor Center. The road improvement portion of the project will involve replacing the existing asphalt surface with a new asphalt overlay. In addition, two historic bridges – the Beaver Creek arched concrete bridge and the Pigtail bridge – will receive repairs to deteriorated travel surfaces and areas of damage on the guardrails. The main objectives of the project are to enhance public health and safety and reduce the park's cyclic maintenance burden.

Highway 87 was constructed in 1957, and serves as the primary travel link between Wind Cave National Park and Custer State Park on the north. Since the road was built, cyclic maintenance has included chip and seal coating and pothole repair – the highway has not received a major resurfacing. The existing travel surface is deteriorating, and in some locations cracks and heaving are readily apparent. In addition the roadway does not have adequate pull out spaces to provide safe passage at scenic spots where visitors commonly pull to the side of the road. The approaches and guardrails of the bridges have also been damaged by traffic. Both structures require repairs resulting from vehicle strikes, as well as overall surface repairs.

The road rehabilitation project would take place during summer and fall months (2005) to assure the proper working conditions for materials and men. Heavy equipment would be present along the highway during the daylight hours. These activities would cause wildlife to avoid the construction areas temporarily, but would not change habitat or introduce new barriers to movement over the long-term.

Most soil and vegetation disturbance would be confined to the existing filled roadbed and right-of-way. Where pull-outs are being enlarged or created, resource protection measures would be undertaken, and the sites revegetated with native seed.

According to our records, the following federally listed or proposed species occur within the park.

Name	Status	Expected Occurrence
Bald eagle (*Haliaeetus leucocephalus*)	Threatened	Migration, Winter Resident,
Black-tailed prairie dog (*Cynomys ludovicianus*)	Candidate	Resident (common, @1,855 acres of colonies)

We have determined that this project will not effect the bald eagle population that migrates through the Park.

The proposed action may disturb areas of the "Little Houses on the Prairie" prairie dog colony at the junction of Highways 87 and 385. Burrows adjacent to the existing parking area would likely be disturbed or destroyed. All effort will be made to keep excavation within the barrow area along the highway. No excavation would take place from March – May, prior to the emergence of young.

Wind Cave National Park has determined that this project is not likely to adversely effect the population of prairie dogs, nor is it likely to jeopardize the population.

We hope you concur with our determination. Please call Dan Foster of my staff at 605-745-1190 if you have any questions. Thank you.

Sincerely,

Linda L. Stoll

Linda L. Stoll
Superintendent

United States Department of the Interior

NATIONAL PARK SERVICE
Wind Cave National Park
RR 1, Box 190
Hot Springs, South Dakota 57747

IN REPLY REFER TO:

H4217(WICA)

March 19, 2004

«Salutation» «FirstName» «MI» «LastName», «JibTitle»
«TribeName»
«Address1»
«Address2»
«City», «State» «ZipCode»

Subject: *Section 106 Consultation, Rehabilitate Highway 87 within Wind Cave National Park*

Dear «Salutation» «LastName»:

Wind Cave National Park (WICA) is planning to prepare an Environmental Assessment (EA) for rehabilitation of 7.2 miles of Highway 87 through the park and about 1.4 miles of entrance road north and south of the Visitor Center. The road improvement portion of the project would involve replacing the existing asphalt surface with a new asphalt overlay. In addition, two historic bridges – the Beaver Creek arched concrete bridge and the looping pigtail bridge – would receive repairs to deteriorated travel surfaces and areas of damage on the guardrails. The main objectives of the project are to enhance public health and safety and reduce the park's cyclic maintenance burden.

Highway 87 was constructed in 1957, and serves as the primary travel link between Wind Cave National Park and Custer State Park on the north. Since the road was built, cyclic maintenance has included chip and seal coating and pothole repair – the highway has not received a major resurfacing. The existing travel surface is deteriorating, and in some locations cracks and heaving are readily apparent. In addition the roadway does not have adequate pull out spaces to provide safe passage at scenic spots where visitors commonly pull to the side of the road. The approaches and guardrails of the bridges have also been damaged by traffic. Both structures require repairs from vehicle strikes, as well as overall surface repairs.

Although we are just beginning to plan and gather information for the project, we believe that its eventual implementation may have the potential to affect properties included in or that may be eligible for inclusion in the National Register. The project area includes the Wind Cave National Park Administrative and Utility Area Historic District, Beaver Creek Bridge, and the Pigtail Bridge all of which are listed on the National Register of Historic Places. Therefore, we are initiating consultation with your office in accordance with 36 CFR 800 and with the 1995 Servicewide Programmatic Agreement among your office

The park is aware that American Indians value Wind Cave National Park as a very special place, so we want to be sure that the project would not affect ethnographic resources valued by your tribe A similar letter has been sent to your tribal Chairperson to inform them of the project, to request a response should there be any concerns about ethnographic resources, and to formally initiate Government- to-Government consultation with in accordance with legislation, Executive Orders, regulations, and policy, including sections 101 and 106 of the National Historic Preservation Act of 1966 as amended, 36 CFR 800, National Park Service *Management Policies* and Director's Order 28, *Cultural Resources Management* (especially Chapter 10, Ethnographic Resources).

In addition to planning work required by Section 106 of the National Historic Preservation Act, we have begun work on an environmental assessment that will study and assess the impacts to cultural and natural resources, and determine any required mitigation. The EA will provide detailed descriptions of alternative programs intended to improve the roadway and, as required by law, a no- action alternative. The EA also will analyze the potential impacts associated with possible implementation of each alternative and will describe the rationale for choosing the preferred alternative. These details will be reiterated in a Section 106 Summary in the EA. Also contained in the EA will be measures that would help avoid adverse effects on cultural resources.

This letter also serves to notify your office and the Advisory Council on Historic Preservation that we plan to use the EA for the project to accomplish compliance for both Section 106 and the National Environmental Policy Act (as described in 36 CFR 800.8 (a- c)).

As soon as the EA is completed, we will send it to you for your review and comment. We look forward to your input on the planning process, and believe that it will continue to result in better planning for cultural resources management as well as helping to ensure that cultural resources are adequately considered during preparation of the plan and the accompanying EA.

If you have any questions, please contact me or Tom Farrell, our Section 106 Compliance Coordinator. We can both be reached at (605) 745- 4600.

Sincerely,

Linda L. Stoll

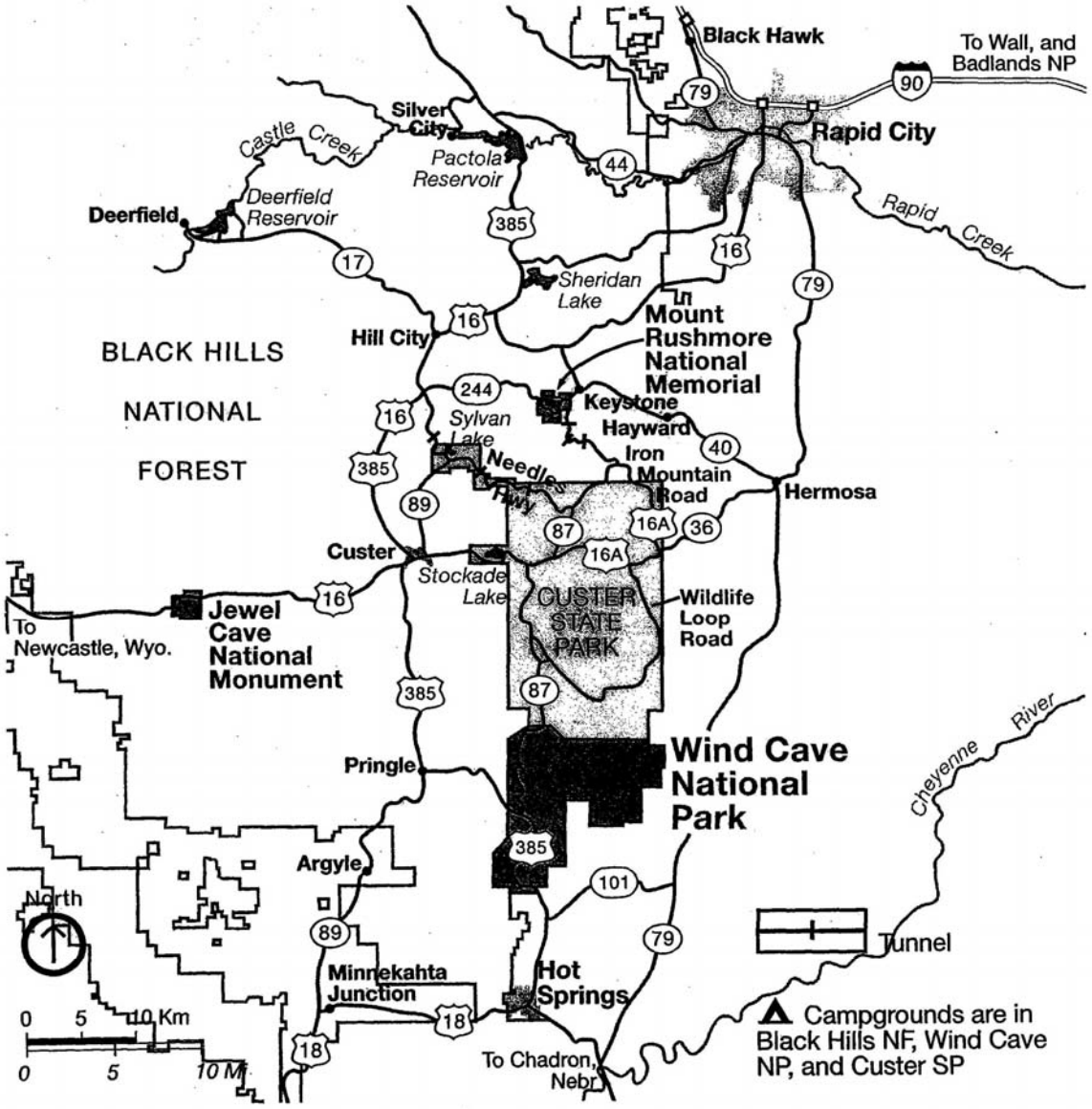
Linda L. Stoll
Superintendent

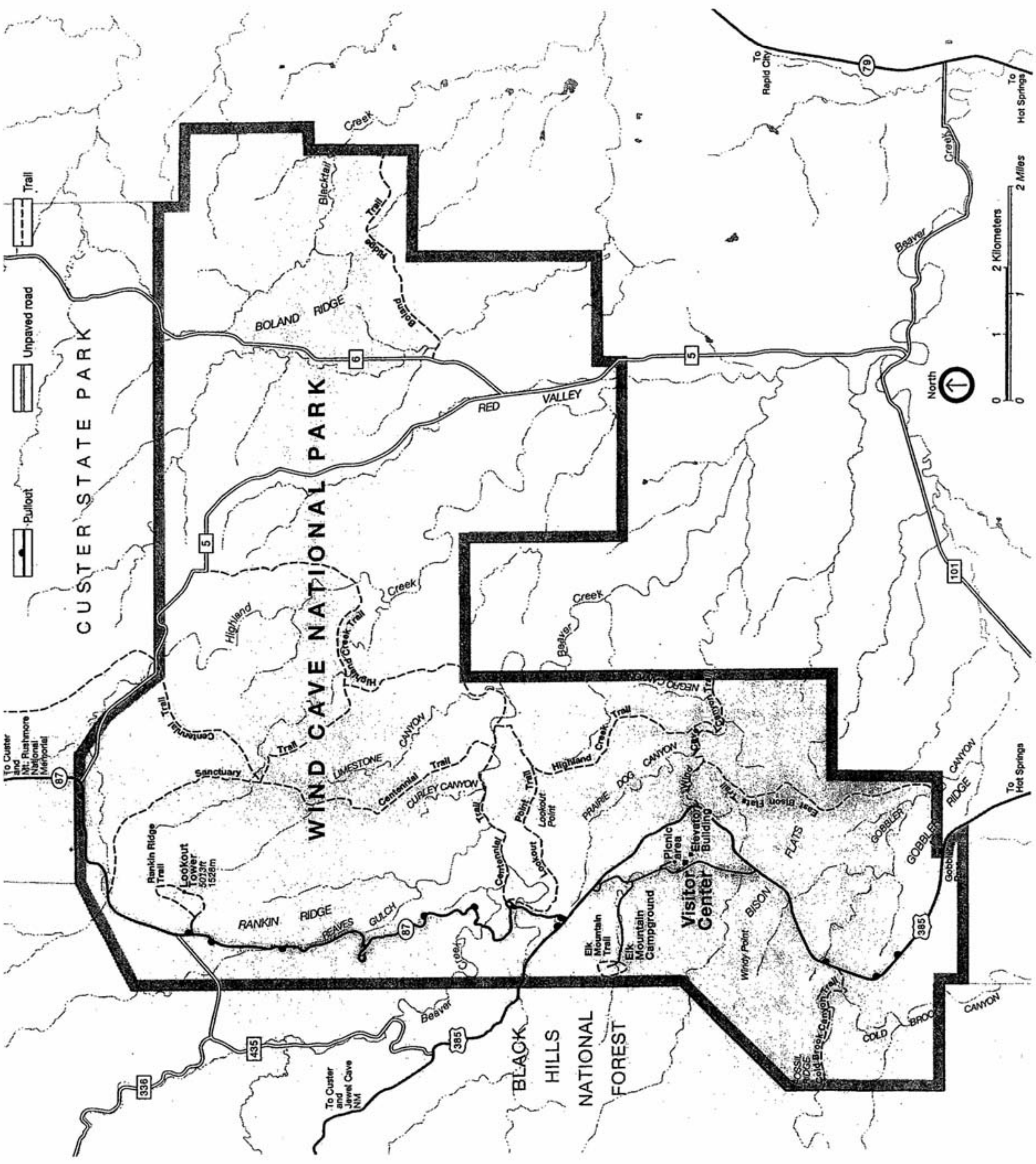
Enclosures (2)

cc: Parsons-Denver-J. Bryant, D. Rhodes

Tim Mentz, Historic Preservation Officer
Standing Rock Sioux Tribe
P. O. Box D
Fort Yates, ND 58538

Jim Picotte, Historic Preservation Officer
Cheyenne River Sioux Tribe
P. O. Box 590
Eagle Butte, SD 57625


Black Hawk
To Wall, and Badlands NP
Silver City
Castle Creek
Pactola Reservoir
Rapid City
Deerfield
Deerfield Reservoir
Rapid Creek
Sheridan Lake
Mount Rushmore National Memorial
Hill City
BLACK HILLS NATIONAL FOREST
Keystone
Hayward
Sylvan Lake
Needles Hwy
Iron Mountain Road
Hermosa
Custer
Stockade Lake
CUSTER STATE PARK
Wildlife Loop Road
To Newcastle, Wyo.
Jewel Cave National Monument
Wind Cave National Park
Pringle
Cheyenne River
Argyle
North
Minnekahta Junction
Hot Springs
Tunnel
0 5 10 Km
0 5 10 Mi
To Chadron, Nebr.
Campgrounds are in Black Hills NF, Wind Cave NP, and Custer SP


WIND CAVE NATIONAL PARK
CUSTER STATE PARK
BLACK HILLS NATIONAL FOREST
Pullout
Unpaved road
Trail
Visitor Center
North
2 Kilometers
2 Miles
To Rapid City
To Hot Springs
To Custer and Mt. Rushmore National Memorial
To Custer and Jewel Cave NM
RED VALLEY
BOLAND RIDGE
RANKIN RIDGE
BISON FLATS
PRAIRIE DOG CANYON
LIMESTONE CANYON
CURLEY CANYON
GOBBLER RIDGE
COLD BROOK CANYON
Beaver Creek
Highland Creek Trail
Centennial Trail
Rankin Ridge Trail
Lookout Tower
Elk Mountain Campground
Picnic Area
Elevator Building

United States Department of the Interior

NATIONAL PARK SERVICE
Wind Cave National Park
RR 1, Box 190
Hot Springs, South Dakota 57747

IN REPLY REFER TO:

H4217(WICA)

March 19, 2004

Mr. Don Kraus, Area Engineer
SD Department of Transportation
P.O. Box 431
Custer, SD 57730

Subject: *Rehabilitate Highway 87 within Wind Cave National Park*

Dear Mr. Kraus:

Wind Cave National Park (WICA) is planning to prepare an Environmental Assessment (EA) for a project to rehabilitate 7.2 miles of Highway 87 through the park and about 1.4 miles of entrance road north and south of the Visitor Center. The road improvement portion of the project would involve replacing the existing asphalt surface with a new asphalt overlay. In addition, two historic bridges – the Beaver Creek arched concrete bridge and the looping pigtail bridge – would receive repairs to deteriorated travel surfaces and areas of damage on the guardrails. The main objectives of the project are to enhance public health and safety and reduce the park's cyclic maintenance burden.

Highway 87 was constructed in 1957, and serves as the primary travel link between Wind Cave National Park and Custer State Park on the north. Since the road was built, cyclic maintenance has included chip and seal coating and pothole repair – the highway has not received a major resurfacing. The existing travel surface is deteriorating, and in some locations cracks and heaving are readily apparent.
The road rehabilitation project would take place during summer and fall months of 2005. The road will generally remain open to traffic during construction, except during major modifications to the two bridges. Details of road closures and traffic control and detour routes will be resolved during the design stages of the project.

As soon as the EA is completed, we will send it to you for review and comment. We look forward to your input on the planning process, and believe that it will result in a better project as well as helping ensure that all issues are addressed. If you have any questions, please contact me or Steve Schrempp, our Facility Manager. We can both be reached at 605- 745- 4600.

Sincerely,

Linda Stoll

Linda Stoll
Superintendent

United States Department of the Interior

NATIONAL PARK SERVICE
Wind Cave National Park
RR 1, Box 190
Hot Springs, South Dakota 57747

IN REPLY REFER TO:

H4217(WICA)

March 19, 2004

Mr. John Twiss, Forest Supervisor
Black Hills National Forest
RR2 Box200
Custer, SD 57730

Subject: Rehabilitate Highway 87 within Wind Cave National Park

Dear Mr. Twiss:

Wind Cave National Park (WICA) is planning to prepare an Environmental Assessment (EA) for a project to rehabilitate 7.2 miles of Highway 87 through the park and about 1.4 miles of entrance road north and south of the Visitor Center. The road improvement portion of the project would involve replacing the existing asphalt surface with a new asphalt overlay. In addition, two historic bridges – the Beaver Creek arched concrete bridge and the looping pigtail bridge – would receive repairs to deteriorated travel surfaces and areas of damage on the guardrails. The main objectives of the project are to enhance public health and safety and reduce the park's cyclic maintenance burden.

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As soon as the EA is completed, we will send it to you for review and comment. We look forward to your input on the planning process, and believe that it will result in a better project as well as helping ensure that all issues are addressed. If you have any questions, please contact me or Steve Schrempp, our Facility Manager. We can both be reached at 605- 745- 4600.

Sincerely,

Linda Stoll

Linda Stoll
Superintendent

Enclosure

United States Department of the Interior

NATIONAL PARK SERVICE
Wind Cave National Park
RR 1, Box 190
Hot Springs, South Dakota 57747

IN REPLY REFER TO:

H4217(WICA)

March 19, 2004

Mr. Rollie Noem, Director
Custer State Park
HC83, Box 70
Custer, SD 57730

Subject: *Rehabilitate Highway 87 within Wind Cave National Park*

Dear Mr. Noem:

Wind Cave National Park (WICA) is planning to prepare an Environmental Assessment (EA) for a project to rehabilitate 7.2 miles of Highway 87 through the park and about 1.4 miles of entrance road north and south of the Visitor Center. The road improvement portion of the project would involve replacing the existing asphalt surface with a new asphalt overlay. In addition, two historic bridges – the Beaver Creek arched concrete bridge and the looping pigtail bridge – would receive repairs to deteriorated travel surfaces and areas of damage on the guardrails. The main objectives of the project are to enhance public health and safety and reduce the park's cyclic maintenance burden.

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As soon as the EA is completed, we will send it to you for review and comment. We look forward to your input on the planning process, and believe that it will result in a better project as well as helping ensure that all issues are addressed. If you have any questions, please contact me or Steve Schrempp, our Facility Manager. We can both be reached at 605- 745- 4600.

Sincerely,

Linda Stoll

Linda Stoll
Superintendent

Enclosure

cc: Parsons- Denver- J. Bryant, D. Rhodes

APPENDIX B: PIGTAIL BRIDGE DESIGN DRAWINGS

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REG	STATE	PROJECT	SHEET NO.	TOTAL SHEETS
16	SD	PRA WICA 1(12) & (21)	H1	H1

GENERAL NOTES:

All material and workmanship shall conform to the Federal HighwayAdministration Standard Specifications for Construction of Roads and Bridges on Federal Highway Projects. FP-03.

Bridge designed in accordance with the AASHTO Standard Specifications for Highway Bridges, 17th Edition, 2002.

Bridge live load design vehicle is HS20-44. Impact = 30%.

All structural steel shall be AASHTO M270 (ASTM A 709) Grade 50 or M270 Grade 50W.

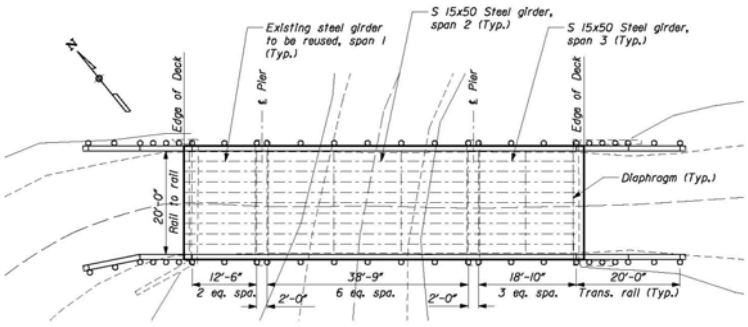
All steel bolts shall conform to AASHTO M164 (ASTM A 325).

Existing steel girders in span 1 shall be removed and reused. All welded rail attachments shall be cut, ground down, and spot painted. All other existing girders shall be removed and salvaged as directed by the Engineer.

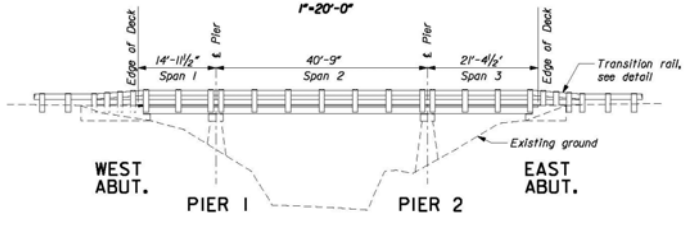
All timber shall be pressure impregnated with waterborne wood preservatives in accordance with AASHTO M133.

All structural steel shall be painted per section X of the SCR's. The color of the top coat shall be as directed by the Engineer.

All structural timber shall be Southern Pine, Grade X or better. All structural timber shall conform to AASHTO M168. Structural glued laminated timber shall conform to AASHTO M168 and the American National Standard Institute ANSI/AITC A-190.1, Specification for glued laminated timber.



PLAN
1"=20'-0"



ELEVATION
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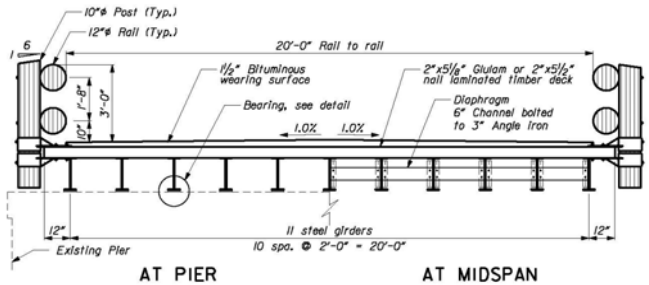
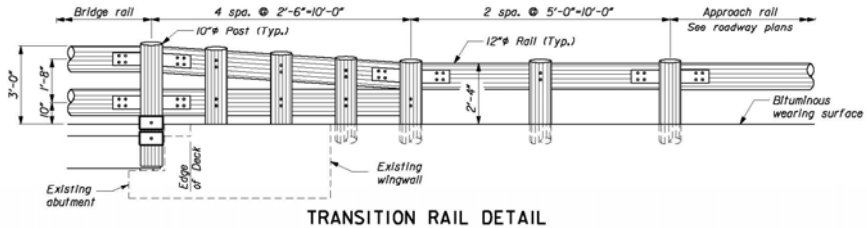
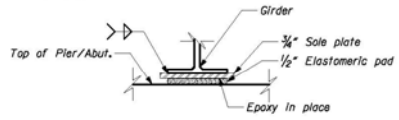


AT PIER AT MIDSPAN

TYPICAL SECTION
1"=4'-0"



TRANSITION RAIL DETAIL
1"=4'-0"



BEARING DETAIL
NTS

EXHIBIT C

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
CENTRAL FEDERAL LANDS HIGHWAY DIVISION

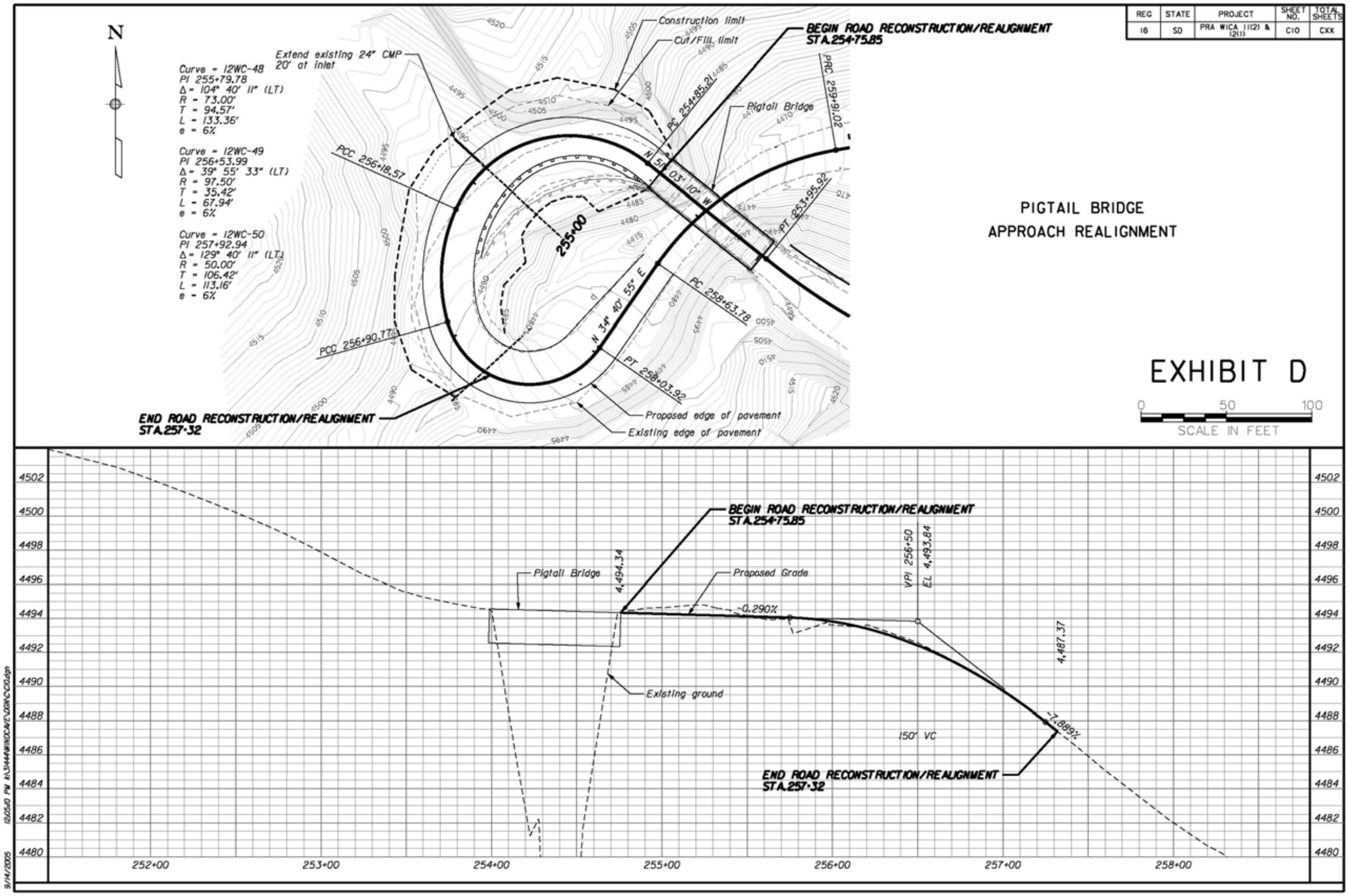
WIND CAVE NATIONAL PARK
PIGTAIL BRIDGE REHABILITATION
HIGHWAY 87
SOUTH DAKOTA

PLAN & ELEVATION

NO.	DATE	BY	REVISIONS

PARSONS BRINCKERHOFF
400 SW 8th Ave. Suite 802 Portland, OR 97204

DESIGNED BY	DRAWN BY	CHECKED BY	SCALE	BRIDGE DRAWING	DATE	DRAWING NO.
MATT MILLER	JAMES BURKE	SUSAN FELL	1"=20'-0" UNLESS NOTED	1 of 1	AUGUST 12 2005	XX-A



PIGTAIL BRIDGE
APPROACH REALIGNMENT
EXHIBIT D
SCALE IN FEET
BEGIN ROAD RECONSTRUCTION/REALIGNMENT STA.254+75.85
END ROAD RECONSTRUCTION/REALIGNMENT STA.257+32
Curve = 12WC-48
PI 255+79.78
Δ = 104° 40' 11" (LT)
R = 73.00'
T = 94.57'
L = 133.36'
e = 6%
Curve = 12WC-49
PI 256+53.99
Δ = 39° 55' 33" (LT)
R = 97.50'
T = 35.42'
L = 67.94'
e = 6%
Curve = 12WC-50
PI 257+92.94
Δ = 129° 40' 11" (LT)
R = 50.00'
T = 106.42'
L = 113.16'
e = 6%
Extend existing 24" CMP 20' at inlet
Construction limit
Cut/Fill limit
Pigtail Bridge
Proposed edge of pavement
Existing edge of pavement
Proposed Grade
Existing ground
-0.290%
-7.889%
150' VC
VPI 256+50
EL 4,493.84
4,494.34
4,487.37

As the nation's principal conservation agency, the Department of the Interior has the responsibility for most of our nationally owned public lands and natural resources. This includes fostering sound use of our land and water resources; protecting our fish, wildlife, and biological diversity; preserving the environmental and cultural values of our national parks and historical places; and providing for the enjoyment of life through outdoor recreation. The department assesses our energy and mineral resources and works to ensure that their development is in the best interests of all our people by encouraging stewardship and citizen participation in their care. The department also has a major responsibility for American Indian reservation communities and for people who live in island territories under U.S. administration.

NPS WICA/D-110 (December 2005)