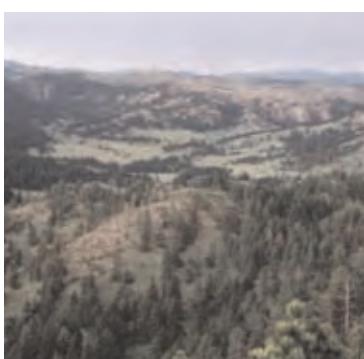


# WIND CAVE NATIONAL PARK

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## CULTURAL LANDSCAPE REPORT



MAY 2005

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WIND CAVE NATIONAL PARK  
CULTURAL LANDSCAPE REPORT

PREPARED FOR  
WIND CAVE NATIONAL PARK  
AND  
NATIONAL PARK SERVICE  
MIDWEST REGIONAL OFFICE

PREPARED BY  
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TASK ORDER – T60680201I7  
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# CULTURAL LANDSCAPE REPORT

## WIND CAVE NATIONAL PARK HOT SPRINGS, SOUTH DAKOTA

MAY 2005

RECOMMENDED: \_\_\_\_\_ DATE: \_\_\_\_\_  
Chief, Cultural Resources, Midwest Region

CONCURRED: \_\_\_\_\_ DATE: \_\_\_\_\_  
Superintendent, Wind Cave National Park

APPROVED: \_\_\_\_\_ DATE: \_\_\_\_\_  
Regional Director, Midwest Region

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**CHAPTER ONE**

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**INTRODUCTION**

# CHAPTER ONE

# INTRODUCTION

## MANAGEMENT SUMMARY

The report that follows is a Cultural Landscape Report (CLR) for Wind Cave National Park (NP), located in the Black Hills region of southwestern South Dakota. This document is intended to provide the park with treatment and use recommendations for specific areas of concern, as well as long-term management of this important natural and cultural resource. As one of the nation's first national parks, Wind Cave encompasses some 28,295 acres, and includes, in addition to a broad expanse of bison range, the spectacular Wind Cave. Prepared by Bahr Vermeer Haecker Architects, Ltd. of Lincoln, Nebraska, in conjunction with John Milner Associates, Inc. (JMA) and Rivanna Archaeological Consulting, both of Charlottesville, Virginia, the CLR addresses several goals identified by the National Park Service (NPS) for the study:

- supplement existing documentation of the historic Civilian Conservation Corps (CCC) landscape, and document and evaluate the cave resources;
- address ways the park can adequately protect and manage historic landscape resources, both above and below ground;
- address protection of historic resources while working to restore natural cave functions;
- evaluate the existing National Register of Historic Places (NRHP) district boundary and possibly suggest a new boundary that encompasses historic CCC landscape boundaries, including the cave;
- document the landscape's physical history and evaluate the physical condition and integrity of all historic landscape features, including the historic cave tour routes developed in the 1890s. While CCC-era buildings have been well documented, documentation and evaluation is needed for associated historic landscapes;
- offer schematic treatment alternatives for the historic CCC landscape and cave tour routes and include cost estimates for implementing treatment; and
- provide guidance on cave restoration activities that could potentially impact historic blast piles and trails.

## DESCRIPTION OF STUDY BOUNDARY

Wind Cave NP, approximately forty-four square miles in size, is situated ten miles north of Hot Springs, South Dakota, and thirty-five miles south of Rapid City, South Dakota, and is administered by the National Park Service. *Figures 1-1 and 1-2* located at the end of this chapter illustrate the park's location, within the broader context of the region.

The boundaries of Wind Cave NP roughly form the shape of an L laid on its side. Much of the park's boundary follows the section lines established in the nineteenth century by Government Land Office (GLO) surveys (see *Figure 1-2*). The park is bounded on the north primarily by Custer State Park, with the Norbeck Wildlife Preserve bounding the northwestern corner and private land the northeastern corner. The northern edge of the park is just over eight miles in length. The park boundary travels due south from its northwestern corner along a north-south section line slightly more than five miles before turning southwest; at the next north-south section line the park boundary turns south again and follows this line for one and one-half miles. The western boundary of the park is edged by Black Hills National Forest for most of its eight and one-half mile length. At the park's southwestern corner, the boundary turns due east and runs approximately two and one-half miles to its intersection with U.S. 385. Along the way, it jogs ninety degrees to the south for a short distance, then continues due east. At its intersection with the highway, the boundary follows the roadway north and west as far as Gobbler Pass, where it cuts to the east along an east-west section line. At the next north-south section line, the boundary turns north for one mile, then east for another mile before heading north again for three and one-half miles. The boundary then turns east, forming the inside angle of the L, over the course of one and one-quarter miles, then turns south one and one-half miles, then east again for one and three-quarters miles. The boundary continues this zigzag pattern with a quarter-mile jog to the north, then one mile to the east, followed by one and three-quarters miles north, one mile east, one mile north, a quarter mile east, and one mile north back to the eastern end of the northern boundary line. Private property adjoins most of its southern and eastern boundaries.

An additional 100-acre parcel of park-owned land lies three miles west of the park headquarters. Although it is not contiguous with the rest of the park, this parcel is included within the study area investigated in the CLR. This area includes a spring and underground pump facilities that provide a backup water supply for the park.

## HISTORICAL SUMMARY

American Indians have been present in Custer County and the surrounding Black Hills region for the past 10,000 years. The unique environment and convergence of diverse physiographic regions have made the Black Hills a prominent natural resource and a cultural place of significant meaning for numerous American Indian groups.

During the Contact Period, and particularly during the first half of the nineteenth century, expanded trade, exploration and prospecting by Europeans led to increased violent encounters with the Lakota and other Indian groups. By mid-century, several geological and military expeditions into the Black Hills paved the way for the establishment of the Dakota Territory in

1861 and subsequent industrial exploitation and settlement in the fourth quarter of the nineteenth century.

Widespread settlement by homesteaders and the initiation of open range stock grazing led to the establishment of county and local governments in the largely arid region that defined Custer County. The natural opening to Wind Cave, when found by Jesse and Tom Bingham in 1881, stimulated only local interest and limited exploration during the next decade. Between 1890 and 1903, Wind Cave was developed as a valuable regional tourist destination. During this period of commercial development, the cave was explored by Alvin McDonald and his family and business partners, specimens were harvested for sale, and named guided tour routes were developed. Aboveground, minimal facilities were built that provided convenient access to the cave and catered to the visiting public. After legal disputes intensified over the ownership of the property in the late 1890s, the GLO examined all claims. Subsequent concerns for the conservation of the cave led to its formal acquisition by the U.S. Government in 1901. On January 9, 1903, President Theodore Roosevelt signed into law legislation creating Wind Cave NP, making it the eighth national park to be established, and the first created to protect a cave resource.

During the years immediately following the establishment of Wind Cave NP, NPS management actions were primarily characterized as “caretaker” activities. The park budget for the first few years was only enough to repair and maintain the cave facilities. While a new Superintendent’s Residence was built and roads maintained, little money was left for additional facilities construction. In 1912, the Wind Cave Game Preserve was established and the first small herds of bison, elk and antelope were subsequently sent to the park. The Game Preserve was managed by the U.S. Biological Survey and a headquarters for the warden on the northern boundary of the park was renovated and improved.

By the late 1920s, the NPS identified a need to improve the layout and design of the aboveground facilities at Wind Cave NP. During the next fifteen years, both underground and aboveground resources within the park were substantially altered. The Game Preserve headquarters was improved and expanded in the early 1930s. In addition, a number of new facilities in the vicinity of the cave opening were begun in 1931 and constructed through Roosevelt’s New Deal work programs. During the same period, concrete structures replaced many of the wooden stairways and bridges within the cave, new electrical lighting highlighted rooms and formations, a shaft and elevator were constructed, and a cave trails betterment and improvement campaign was carried out that included widening and lowering guided tour routes to make them more accessible. By 1935, the park took over administration of the Game Preserve.

The acquisition of adjacent Custer Recreational Demonstration Area (RDA) lands in 1946 substantially increased the acreage of Wind Cave NP. During the second half of the twentieth century, park officials began to focus more attention on the management of its natural resources, initiating revegetation and prairie dog management programs. In addition, Mission 66 planning funded the construction of a new campground, interpretive pull-offs along the main road through the park, and a headquarters bypass road. Formal exploration and survey of the cave system was restarted in the late 1950s.

During the last quarter of the twentieth century, park development emphasized the conservation of cave resources. In 1984, the park's first Natural Resources Management Plan was completed that addressed cave resource management issues. The plan acknowledged a direct link between surface activities and their impact on the cave environment. In 1990, the Cave Restoration Project was initiated, focusing on cleaning and restoring Wind Cave's rooms and trails to their natural appearance. The ongoing project is currently in the process of removing lint and dust accumulations and blast rubble.

## **SCOPE OF WORK**

A CLR is the primary guide utilized by the NPS for treatment and use of a cultural landscape. Based on the historical context provided in a Historic Resource Study (HRS), a CLR documents and evaluates the character-defining features, materials, and qualities that make a landscape eligible for the NRHP. It documents the landscape's development and evolution, modification, materials, construction techniques, geographic context, and use over time. A CLR is generally intended to provide a systematic and cohesive view of a site's historic and existing features through comprehensive documentation, analysis, and evaluation. Using this knowledge as a basis for decision-making, CLRs often provide carefully considered cultural resource treatment recommendations. While CLRs vary in their emphasis and level of investigation, they are typically interdisciplinary in nature, drawing on information developed by historians, landscape architects, ecologists, botanists, architects, archeologists, as well as other related professions and disciplines. The level of investigation conducted for each CLR is determined by many factors, including the historical significance and integrity of the site, identified management objectives, past documentation efforts, and landscape alterations or changes under consideration by the owner.

Typically, a CLR is composed of three parts:

1. Part I includes a site physical history, existing conditions documentation, comparative analysis of historic and existing conditions, and National Register-level significance evaluation and integrity assessment.
2. Part II presents a treatment plan based on the information developed in Part I and on any identified management goals for the site.
3. Part III documents subsequent landscape treatments.

The scope of work for this CLR calls for completion of Parts I and II. As prepared by the NPS in 2002, the scope of work for the Wind Cave CLR includes the following task elements:

1. Develop a site history narrative, illustrated by historic photographs, maps, drawings, and historic period plans. The narrative and supporting graphics should include:
  - A historical context for each major period of development. These periods for Wind Cave NP include indigenous land use, nineteenth century settlement and subsequent cave and recreational development, twentieth century CCC development, and changes to support recreational use under NPS management.

- A chronological description of the development and evolution of both the below- and above-ground historic landscape, including descriptions of the environmental setting, physical layout, spatial organization, pedestrian and vehicular circulation, land use practices and patterns, cultural or ethnic expressions, views and vistas, vegetation related to land use, and other characteristics and features associated with each major period.
  - Historic period plans illustrating the known physical characteristics and features associated with each period and the relative level of confidence in or reliability of the documentation used to illustrate those characteristics and features.
2. Prepare a detailed existing conditions narrative, illustrated by maps or drawings and photographs, describing the existing conditions of contributing landscape features, including the following elements:
- Evaluation of features by landscape characteristic, including, at minimum: natural systems, spatial organization, land use, circulation, topography, vegetation, buildings and structures, views and vistas, small-scale features, and archeological resources.
  - A condition assessment based on the Cultural Landscapes Inventory definitions of condition.
  - An existing conditions map based on Wind Cave GIS data and field observations to indicate the locations of features described in existing conditions.
3. Define a statement of significance and period of significance for the historic landscape. Prepare a narrative, illustrated by maps, photographs, and/or drawings, describing the landscape significance and the integrity of contributing features. Using an analysis map(s), identify areas with low, medium, and high levels of integrity. The contributing, non-contributing, and missing historic features and characteristics will be described to determine how cultural uses have shaped the cave itself and the surrounding landscape.
- The purpose of this chapter is:
    - to develop or confirm a period of significance for the landscape with analysis of integrity;
    - to identify character-defining landscape features for the period of significance; and
    - to summarize the implications of the analysis on future management and interpretation of the property.
4. Develop a narrative proposing several possible treatment approaches for the landscape, such as preservation, restoration, reconstruction, or rehabilitation. Provide a range of schematic alternatives and identify a preferred treatment approach and recommendations, presented in narrative form and supplemented by illustrations. Illustrate the preferred treatment approach and related specific recommendations with a conceptual design/treatment plan.

5. Develop a narrative containing general recommendations for phasing and implementing the preferred treatment approach. Prepare project statements (project description, justification, "Class C" cost estimates) for implementing the individual components of the treatment (in a format similar to the Government's Project Management Information System). Recommend areas and/or topics for future historical research, study, archeological, and/or physical investigation.

## METHODOLOGY

This CLR meets NPS criteria and follows the outline suggested in *A Guide to Cultural Landscape Reports* (1998). This CLR was also produced in accordance with NPS *Management Policies* (2001) and NPS *Director's Order 28: Cultural Resources Management Guidelines* (1997). All preservation, restoration, rehabilitation, or reconstruction treatment recommendations and design work conform to the latest version of *The Secretary of the Interior's Standards for the Treatment of Historic Properties* (1995) with *Guidelines for the Treatment of Cultural Landscapes* (1996), and the *Uniform Federal Accessibility Standards* (UFAS) or the *Americans with Disabilities Act Accessibility Guidelines* (ADAAG), whichever provides greater accessibility.

The following major studies specific to Wind Cave NP were consulted:

- *List of Classified Structures*
- *General Management Plan* (GMP) and *Environmental Impact Statement* (EIS) (1993)
- *Statement for Management* (April 1994)
- *Wind Cave National Park Cave Management Plan* (2000); *Draft Cave and Karst Resource Management Plan* (August 2002)
- *Draft Comprehensive Interpretive Plan* (October 22, 2002)
- *Parkwide Exhibits, Wayside Exhibit Proposal* (March 3, 2003)
- *Wind Cave National Park Scoping Session* (August 27-29, 2002)
- *Environmental Assessment* (March 2002) and *Finding of No Significant Impact* (August 2002), *Project to Prevent Polluted Runoff from Entering Wind Cave*
- *Environmental Assessment, Project to Replace the Failing Wastewater Treatment Facility* (March 2003)
- *Environmental Assessment and Finding of No Significant Impact, Boundary Expansion Study* (June 2002)
- *Hydrogeologic Study of Jewel Cave/Wind Cave* (October 1986)
- *Wind Cave Archeological Inventory Project: Research Design* (2000)
- *Draft The Home of the Bison: An Ethnographic and Ethnohistorical Study of Traditional Cultural Affiliations to Wind Cave National Park* (November 21, 2002)

## HISTORICAL RESEARCH

Historical research in support of this CLR was limited to the archives at Wind Cave NP, and online research of the Denver Service Center Technical Information Center (TIC) archives. A substantial amount of information and resources were provided to JMA by Wind Cave NP prior to the initiation of research. Upon receipt, these documents were reviewed for additional

resources and a short list of directed research leads was compiled. The methodology for all future research was based on and designed around this preliminary body of data and was composed of three stages.

The first stage involved gathering, reviewing and copying all primary and secondary sources relevant to the project area, beyond those already provided. Research was conducted over a five day period in the Library Collection at Wind Cave NP during June 2003. The Wind Cave NP archives were also visited for the purpose of reviewing historic photographs and maps.

The second stage of research involved a thorough online search for project area maps and plats not held at Wind Cave NP, through the University of Virginia, the Library of Congress, and the electronic document collection at the Denver Service Center TIC. A substantial number of maps and plats were requested and received from the Denver Service Center.

The third stage of historical research involved a more thorough review of the primary and secondary data collected in order to begin drafting an outline for the site physical history of the project area.

## PERIOD PLANS

Period plans were developed as part of the documentation of site history. The period plans were based on primary source mapping, each one based largely on a single historic map and enhanced through adding information from other period maps. The map data was then amended based on period photographs, when available, and information contained in the Site History chronology in Chapter 2 of this CLR. Conjectural information was not added to the plans in an effort to avoid misrepresentation.

All the period plans are set on the same base map for ease of comparison. The 2003 CAD existing conditions base map for the park was utilized as base mapping for the period plans. Development of period plans began with the 2003 map. Then, working backwards through time, each period plan was developed: 1966, then ca. 1942, then ca. 1913, then ca. 1892, looking at the presence of features in subsequent mapping to illustrate the period of origin for features that exist today, as well as missing features from each period.

Years were selected that represent a moment in time when defining features existed for a period (boundary, major road changes, etc). One park-wide map was illustrated for each historic period, as organized in the Site History, including 2003, ca. 1966, ca. 1942, ca. 1913, and ca. 1892. Detail maps showing change within the Headquarters Area represent ca. 1942, ca. 1966, and 2003. This area was not depicted for earlier periods due to a lack of detailed primary source information about the Headquarters Area prior to the late 1930s.

## FIELDWORK

Two site visits were conducted to collect field data. JMA landscape architects Rob McGinnis and Matt Whitaker and Bahr Vermeer Haecker (BVH) architects Dan Worth, AIA, and Greg Munn visited Wind Cave NP during the week of November 18, 2003. Senior park staff conducted a tour of the facilities including the cave and support buildings and structures. Various issues

concerning the preservation and interpretation of the cave, grounds and existing buildings were discussed. The project team conducted a two-day physical inspection of all of the buildings and landscape features included within the developed area. A second visit was made by Whitaker and cultural landscape specialist Aaron Cross of JMA during the week of June 16, 2003. They continued field investigations for the rest of the park, and photo-documented the cave interior. Data was recorded via photography, voice recording and handwritten notes. Existing conditions base maps, provided by the NPS in GIS format, were field checked during the visits. JMA personnel also inventoried and photographed all primary landscape features as part of the fieldwork effort. The location of photographic station points and the direction of the views were noted on base drawings in the field and later added to the electronic base map files.

## EXISTING CONDITIONS DOCUMENTATION

The documentation of existing conditions is provided in this report through cross-referenced narrative, graphic, and photographic material. Landscape features are discussed within a framework established in *A Guide to Cultural Landscape Reports* (1998) that identifies various landscape characteristics through which existing features can be organized and presented. Existing conditions documentation was prepared through the review and compilation of information derived from base mapping, field investigations, photographs taken in the field, park planning documents, park files, and natural resource studies.

For buildings and structures the BVH architects assembled the on-site gathered data for inclusion in this report, including a rating of the physical condition of the structures according to the *Guide to Cultural Landscape Reports* standards. JMA provided maps of the area identifying the buildings and their reference identification designations included in the CLR. BVH coordinated with the gathered data. The building and structure exterior condition assessment was prepared in accordance with NPS's *A Guide to Cultural Landscape Reports*.

For the purpose of this CLR, landscape features are described according to the following landscape characteristics: natural systems, spatial organization, land use, circulation, topography, vegetation, buildings and structures, views, small-scale features, and archeological resources.

## MAPPING

JMA created existing conditions base maps in AutoCAD 2002 using GIS data overlaid with DOQQ maps, USGS-NPS vegetation mapping aerial photography, historical maps and a partial AutoCAD survey of the Headquarters Area provided by Wenk Associates of Denver, Colorado. Additions, deletions, and other corrections to the base information was made on field visits, photographs, and historical base maps.

## PHOTOGRAPHIC DOCUMENTATION

Photographs of representative landscape features are included in the existing conditions chapter of the CLR and are referenced in the text. A documentation notebook containing all of the existing conditions photographs, negatives, and electronic copies on CD will be provided to the NPS to supplement the representative photographic coverage included in the report.

## SIGNIFICANCE AND LANDSCAPE ANALYSIS

Wind Cave NP is already listed on the NRHP. The 1982 National Register nomination of the Administrative and Utility Area lists fifteen contributing resources within a district, significant in the areas of architecture and conservation. In 1995, the nomination was amended with additional documentation, and the list of contributing resources was amended. The statement of significance included in Chapter 4 of this CLR draws from these available documents, as well as HAER documentation of two bridges located within the park, and the additional research and documentation prepared on behalf of the project to comprehensively address the issue of park significance. The statement also indicates avenues meriting future evaluation and context development.

## COMPARATIVE ANALYSIS

In order to better understand the relationship between the existing park landscape and the character of the landscape during the identified period of significance, the CLR team prepared a comparative analysis of historic and existing landscape conditions. For the most part, the analysis focused on extant features and their dates of origin. The three primary goals of the comparative analysis were to:

- identify features surviving from the period of significance;
- establish the basis for an integrity assessment; and
- provide an understanding of the similarities and differences between historic and existing conditions that would contribute to developing a well-grounded cultural landscape treatment plan.

Through the development of the comparative analysis of historic and existing landscape conditions, three lists were prepared that identified contributing, non-contributing, and missing features. Contributing features were deemed to be those surviving from the period of significance; non-contributing features were those that originated after the period of significance; and missing features were those that are known or thought to have existed during the period of significance but that are no longer evident except possibly in the archeological record. Conjectural information was indicated as such within the lists.

## ASSESSMENT OF INTEGRITY

The CLR summarizes the site's overall integrity, and then assesses integrity in accordance with the seven aspects—location, design, setting, materials, workmanship, feeling, and association—described in National Register Bulletin 15: *How to Apply the National Register Criteria for Evaluation*.

## TREATMENT

Management issues—identified in the NPS scope of work and through work sessions at the park—were used as the basis for the Treatment Plan. This plan was based upon guidance outlined in *The Secretary of the Interior's Standards for the Treatment of Historic Properties* and *The Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for the Treatment of Cultural Landscapes*, as well as other relevant NPS Guides and Management Policies associated with specific project recommendations.

## SUMMARY OF FINDINGS

### SIGNIFICANCE AND INTEGRITY

The findings of the CLR team include the identification of two potentially-eligible National Register districts.

#### Wind Cave National Park Historic District

The CLR team recommends that a revised and expanded historic district be considered for the current NPS-administered lands including cultural resources and natural features and systems within the original 1903 boundary for Wind Cave NP. This district should include the cave areas that are known to have been accessed and altered for the purposes of tourism during the historic period of significance (1890-1941).

The park area falling within the original 1903 boundary is significant for its association with the following:

- late nineteenth and early twentieth century tourism and recreational development within the Black Hills including the exploitation of Wind Cave for tourism and specimen collection;
- the establishment of the first national park to protect a subterranean resource, and related early federal cave conservation efforts, and as one of the earliest national parks, pre-dating the creation of the National Park system;
- the establishment and development of the Wind Cave National Game Preserve, administered by the U.S. Biological Survey, which protected bison and other endangered large mammals;
- its association with the CCC and Works Project Administration (WPA); and
- as an exemplary representation of New Deal-era park master planning, resource conservation planning, facility and road design, and construction; the NPS Rustic Style of landscape architecture, architecture, and engineering; design and construction of visitor and operational access improvements within a cave; and of a unique collection of Mission/Spanish Colonial Revival park buildings.

In addition, the proposed historic district or resources within the district may be significant for association with the NPS Mission 66 program. This aspect of significance should be addressed through an assessment of the district using a national context for Mission 66 park planning and design.

The period of significance begins in 1890 with McDonald's initial formal development of the cave interior to afford visitor access and ends in 1941 with the completion of CCC construction projects.

This period spans the early cave tourism efforts led by McDonald between 1890 and 1903 when the federal government gained control of the cave and surrounding lands; the establishment of Wind Cave NP and the period of park management and that preceded National Park Service administration between 1903–1916; the establishment of the Game Preserve within the national park that was administered by the U.S. Biological Survey, Department of Agriculture between 1912 and 1935; and the completion of park development including architectural, landscape architectural, and engineering works and improvements between 1931 and 1941.

As more is learned about the context of the Mission 66 program, and the architectural, landscape architectural, and engineering design stemming from it, the recommended district's period of significance should be re-evaluated.

The cultural landscape as a whole retains integrity to the 1941 end date of the period of significance. Although the current NPS-administered lands do not include the entirety of the original park boundary as existed in 1903, the section remaining within Wind Cave NP continues to convey the historic character extant in 1903, and present during the Park's expansion in 1931 and 1946. The major landscape features that survive from the period include vast natural features and systems such as terrain, surface water, vegetation communities and patterns, and the cave itself. From a district-wide perspective, many of the park development features such as roads, buildings, developed area patterns and organization, plantings, and land management regimes remain substantially unchanged from the historic character established during 1931-1941. Many changes that do not detract from the integrity of location, design, setting, materials, and feeling include the addition of buildings and small-scale features. In particular, the loss of facilities associated with the Game Preserve and Mission 66 development are not substantial enough to be intrusive or to reduce integrity when viewing the district landscape as a whole.

### **South Dakota 87 Historic District**

The CLR team recommends that a historic district be considered running the length of SD 87 beginning at the current northern boundary of the park and extending to the intersection with U.S. 385. The boundary of the district should include the environs of the road. The terrain features and plant communities that define the spatial character of the road should define the edges of the district. The district should include important designed scenic views from along the roadway, and views of road features such as bridges.

Consideration should be given to incorporating the historic SD 87 corridor within a larger historic district including all historic scenic roads within the Black Hills that are related to and interconnect with Custer State Park, Mount Rushmore National Memorial, and Wind Cave NP.

Placing the Wind Cave NP section of SD 87 within such a historic district would allow for the evaluation of this section as part of a complete system rather than as an isolated segment.

The linear road corridor—including road, structures, terrain, plant communities, and viewsheds—is significant for its association with the following contexts:

- 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;
- the CCC and WPA;
- New Deal-era park road design and construction; and
- the National Park Service Rustic Style of landscape architecture and engineering.

In addition, the proposed historic road corridor district, or individual resources within the linear district may be significant for association with the National Park Service's Mission 66 program. This aspect of significance should be addressed through an assessment of the district using a national context for Mission 66 park planning and design.

## TREATMENT

In consideration of the need to protect the character-defining qualities of the Wind Cave landscape in order to provide a quality experience for visitors and protect the park's natural and cultural resources, and the need to address future park interpretive and administrative needs, the recommended treatment approach for Wind Cave NP is rehabilitation. This approach will allow the park to meet the goals outlined by its enabling legislation and reaffirmed in its GMP and therefore protect park resources while improving visitor services.

Preservation is a critical component of rehabilitation requiring existing contributing resources to be protected and maintained. This ensures enhancements and repairs are undertaken in as non-intrusive a manner as possible and in such a way that allows little or no resource damage. Inherent in this approach is the protection of historic areas and features that are functional and retain integrity, including certain natural systems, the majority of the spatial organization and land-use patterns at Wind Cave NP, its circulation corridors, and views.

Under this alternative, historic resources contributing to the period of significance would be preserved, while resources that detract from the historic integrity of the park would be removed or mitigated. New development, necessary in order to meet park goals regarding visitor accommodation, accessibility, interpretation, and administration, would be permitted. New design would be differentiated from existing historic resources as a product of its time, but would

be compatible with the historic resources in materials, size, scale and proportion, and massing. A clear differentiation between historic and modern features would be maintained.

The rehabilitation approach should include an emphasis on ecological systems. Contributing features surviving from the period of significance would be protected and maintained, but the overall emphasis would be on natural resource protection and sustaining healthy ecosystems. A vocabulary for new interventions would be established based on principles of ecological design.

## **RECOMMENDATIONS FOR FURTHER RESEARCH**

While the presence of American Indians within the boundaries of Wind Cave NP has been established, little is known about how, if at all, these peoples used the cave resources within the park, and how this use changed over time. Several prominent archeological sites including Beaver Creek Rock Shelter (39CU779), and a human burial (39CU360) suggest extended occupation of the immediate vicinity of the cave and that the area may have been symbolically significant. Based on this information, it is likely that these peoples knew about and had particular uses for or cultural perceptions about caves. Research into the use of cave resources that contain evidence of prehistoric human occupation within and adjacent to the park would add to what is currently known about the park's resources.

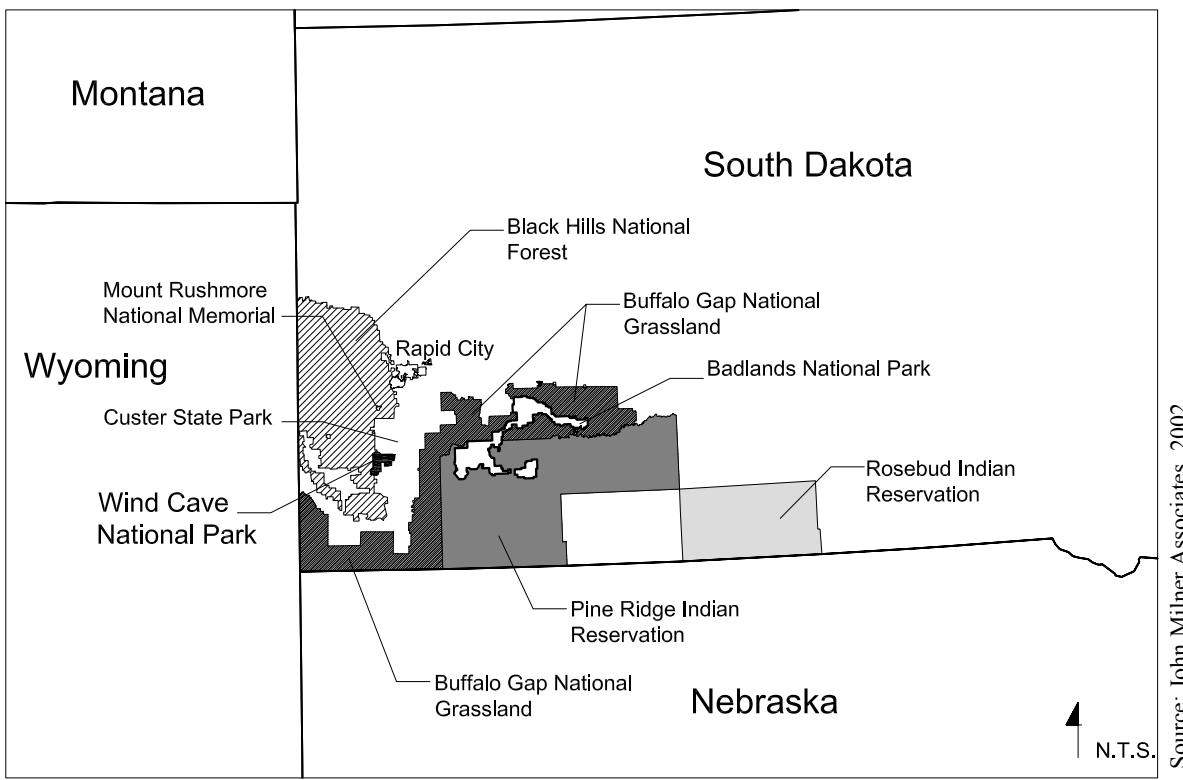


Figure 1-1  
Wind Cave National Park, Location Map

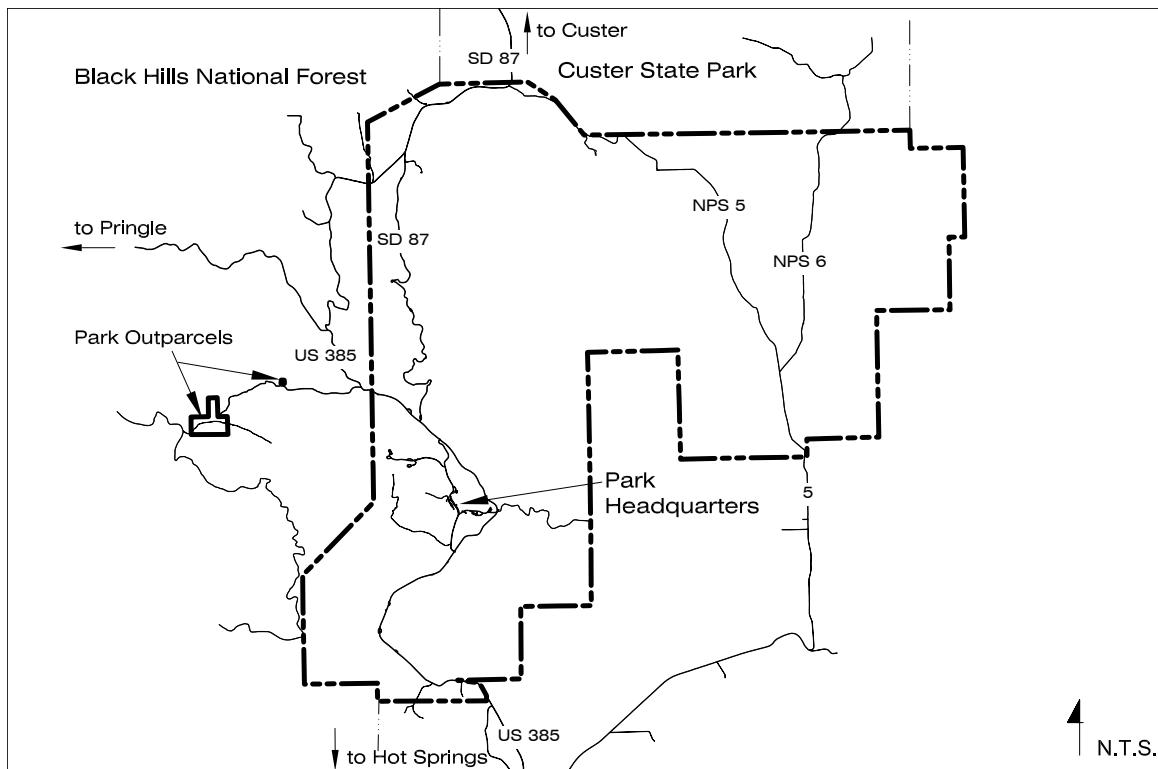
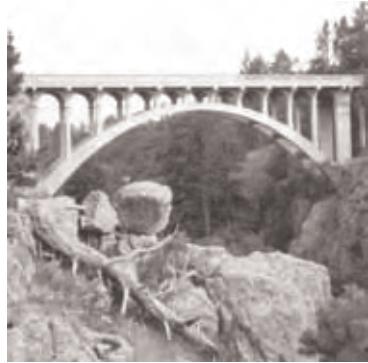


Figure 1-2  
Wind Cave National Park, Vicinity Map.



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**CHAPTER TWO**

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**SITE HISTORY**

## CHAPTER TWO

# SITE HISTORY

### INTRODUCTION

The site physical history comprising this chapter is divided into eleven separate periods. These periods are defined based on guidance from the scope of work and on research conducted on behalf of development of the site physical history. The periods identify significant changes that occurred to the project area, yet also reflect regional and national historical trends. The eleven periods comprising the park history include:

- Period I: PaleoIndian Period ca. 12,000–7,500 before present (BP);
- Period II: Archaic Period, ca. 7,500–1,500 BP;
- Period III: Late Prehistoric Period, ca. 1,500–300 BP;
- Period IV: Contact Period, 1700–1803;
- Period V: European American Trade, Exploration, and Prospecting, 1803–1877;
- Period VI: Open Range Stock Grazing, Homestead Settlement and Rediscovery, 1877–1890;
- Period VII: Active Development of Surface and Subterranean Features, 1890–1903;
- Period VIII: Park Establishment and Federal Development, 1903–1928;
- Period IX: Master Plan Development and the Civilian Conservation Corps, 1928–1946;
- Period X: Land Acquisition and Mission 66, 1946–1966; and
- Period XI: Modern Cave Resource Management, 1967–2003.

From 1877 onwards, the site physical history documents developments associated with both the subterranean environment and the aboveground landscape of Wind Cave National Park as separate but parallel histories due primarily to the importance of the cave and its significant resources. Throughout the document, subterranean resources are defined as all those natural and cultural resources found below the ground surface.

Period plans of the whole park for ca.1892, ca.1913, ca.1942, ca.1966, and ca.2003; and of the Headquarters Area for ca.1942, ca.1966, and ca.2003 follow at the end of this chapter.

## PREHISTORY OF WIND CAVE NATIONAL PARK

The Black Hills region of South Dakota is located at the intersection of three different types of environments, “the Midwest tallgrass Central High Plains to the east, the short grass Bighorn and Powder River basins to the west, and the mixed grass Plains to the north.” Archeologists have identified what they believe to be multiple cultural influences from the surrounding physiographic regions. Because the quantity and types of prehistoric material culture recovered from the Black Hills region does not fit nicely into any known cultural classifications, archeologists have proposed that the indigenous populations who occupied the foothill and mountain areas followed a dichotomous subsistence strategy when compared to their neighbors in the plains.<sup>1</sup>

As of 2003, approximately 18% of the park has been systematically surveyed for archeological sites. A total of seventy-six archeological sites have been formally recorded within Wind Cave National Park, sixty-seven of which are prehistoric and nine of which are historic.<sup>2</sup> Of the variety of prehistoric site types found in Wind Cave National Park, thirty four are occupation sites or artifact scatters (39CU353, 39CU354, 39CU357, 39CU358, 39CU781, 39CU821, 39CU822, 39CU868, 39CU874, 39CU900, 39CU912, 39CU919, 39CU920, 39CU921, 39CU1195, 39CU1234, 39CU1237, 39CU1283, 39CU1284, 39CU1286, 39CU1288, 39CU1761, 39CU3040, 39CU3041, 39CU3043, 39CU3045, 39CU3046, 39CU3049, 39CU3051, 39CU3052, 39CU3061, 39CU3162, 39CU3164, and 39CU3165), fifteen are stone circle or tipi sites (39CU356, 39CU359, 39CU820, 39CU877, 39CU899, 39CU918, 39CU1196, 39CU1197, 39CU2567, 39CU2568, 39CU3042, 39CU3044, 39CU3160, 39CU3161, and 39CU3163), thirteen are stone quarry sites (39CU869, 39CU870, 39CU871, 39CU872, 39CU873, 39CU875, 39CU876, 39CU1194, 39CU1235, 39CU1236, 39CU1238, 39CU1285, and 39CU3048), three are rock shelters (39CU352, 39CU355 and 39CU779), two are cairn sites (39CU2566 and 39CU3047), one is a stone alignment and possible drive line (39CU823), and one (39CU360) is a burial site.<sup>3</sup>

Of the recorded prehistoric sites within Wind Cave National Park, only ten—39CU357, 39CU779, 39CU781, 39CU821, 39CU822, 39CU823, 39CU1196, 39CU1197, 39CU2566 and 39CU3046—possess temporally diagnostic artifacts, have generated verifiable radiocarbon dates, or can generally be dated to a relative time period. As a result, only those archeological sites which could be associated with a definitive chronological period have been listed as landscape features.<sup>4</sup>

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<sup>1</sup> Jennifer Galindo, “Wind Cave Archeological Inventory Project: Research Design,” 19. (National Park Service: Midwest Archeological Center, 2000).

<sup>2</sup> Three of these sites (39CU900, 39CU1284 and 39CU3160) have both prehistoric and historic contexts.

<sup>3</sup> Jennifer Galindo, “Wind Cave Archaeological Inventory Project: Final Report,” Table 3. (Lincoln, Nebraska: Midwest Archeological Center, 2004); William J. Hunt, Jr. NPS-Midwest Archeological Center, Email correspondence, February 4, 2004; Galindo, “Wind Cave Archeological Inventory Project: Research Design,” 5, 9-14.

<sup>4</sup> Galindo, “Wind Cave Archeological Inventory Project: Research Design,” 17.

## PALEOINDIAN PERIOD, CA. 12,000–7,500 BP

### INTRODUCTION

The earliest human occupation of North America can be dated to the PaleoIndian period. PaleoIndian peoples were required to adapt to a rapidly changing environment. Like many of the subsequent occupants of the northwestern Great Plains, PaleoIndian peoples were migratory groups that followed seasonally adaptive subsistence strategies. Based on the scarce material culture left behind, archeologists believe that they were predominantly hunters who relied upon killing large mammals.

### HISTORICAL CONTEXT

Toward the end of the Pleistocene,<sup>5</sup> a general global warming took place as glaciers retreated northward and melting of the expansive ice sheets created a wetter and cooler climate. As a result, water became plentiful and numerous lakes were created. Lush vegetation, including grasses and other steppe plants dominated the valleys and steppe environment. Boreal coniferous forests, dominated by spruce, became more widespread and grew at much lower elevations. It was soon replaced by a deciduous forest and, by about 10,000 to 8,000 years BP, a grassland dominated the region.<sup>6</sup>

Over the approximately 4,500 years that define the PaleoIndian period in this region,<sup>7</sup> the climate changed dramatically. After the glacial retreat, the region gradually began to turn both warmer and dryer with hot-dry summers and cold-dry winters characteristic of the larger region, although the Black Hills received a greater amount of precipitation than the surrounding prairie.<sup>8</sup>

The PaleoIndian period is generally divided up into two distinct cultural entities, early and late, and is characterized by the material culture remains of the peoples who occupied the area. The earliest PaleoIndian complex is characterized by the Clovis and subsequent Folsom cultures.<sup>9</sup> The types of material culture most commonly identified from these cultures are distinctive fluted, lanceolate projectile points found predominantly at Plains kill and butchering sites associated

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<sup>5</sup> The Pleistocene, commonly referred to as the Ice Age, began approximately two million years ago and gave way to the Holocene around 10,000 years BP.

<sup>6</sup> James C. Chatters, “Environment,” in *Handbook of North American Indians*, Volume 12, Plateau, Deward E. Walker Jr., ed. (Washington, D.C.: Smithsonian Institution Press, 1998), 43; Waldo C. Wedel and George C. Frison, “Environment and Subsistence,” in *Handbook of North American Indians*, Volume 13, Plains, Raymond J. DeMalle, ed. (Washington, D.C.: Smithsonian Institution Press, 2001), 46, 48; James C. Chatters and David L. Pokotylo, “Prehistory: Introduction,” in *Handbook of North American Indians*, Volume 12, Plateau, Deward E. Walker Jr., ed. (Washington, D.C.: Smithsonian Institution Press, 1998), 73.

<sup>7</sup> Within the larger U.S., the PaleoIndian period is roughly defined as between 13,000–9,000 BP. However in the Custer County vicinity, strong evidence for PaleoIndian occupation of the area occurs only between 12,000–7,500 BP.

<sup>8</sup> Chatters, “Environment,” 44-45.

<sup>9</sup> Within the project area, there is no material evidence for Clovis or Folsom occupation. In the broader northwestern Plains region, PaleoIndian presence is represented by scattered findings of points. Because of this, the discussion of the PaleoIndian period will necessarily focus to a large degree on the larger northwest Plains region as it speaks to the specific project area.

with extinct megafauna. Archeologists believe that Clovis and Folsom peoples were highly nomadic foragers traveling in small groups and following a generalized subsistence with an emphasis on hunting. Because they depended to a large degree on hunting, they likely followed the migrations of regional fauna. Towards the end of the early PaleoIndian period, as Folsom peoples began to more efficiently utilize native flora, it is likely that specific ecological niches were repeatedly visited on a seasonal basis and that plant gathering may have been initiated on a seasonal basis. Habitations most likely consisted of temporary camps in the open, and in caves and rock shelters. Clovis and Folsom points, however, are found in greater abundance in the plains, and less frequently in the foothill and mountainous regions such as the Black Hills. Mammoth, bison, and pronghorn antelope dominated the larger mammal species hunted by PaleoIndians in the northwestern plains, with less emphasis placed on camel, deer, mountain sheep, musk-ox, and horse.<sup>10</sup>

During the Late PaleoIndian period, subsistence was oriented toward broad spectrum hunting and gathering. Later PaleoIndian cultures are characterized by the Plano complex and are characterized by lanceolate, stemmed, and laterally restricted point styles. PaleoIndian peoples were clearly present in Custer County and the surrounding Black Hills region but there are no documented sites within the Wind Cave National Park project area.

#### LANDSCAPE FEATURES BY CHARACTERISTIC

##### **Response to Environment<sup>11</sup>**

Hunting and gathering

PaleoIndian peoples were intimately familiar with their natural environment. Archeological sites associated with this period are found in a number of diverse environments and are directly related to the particular resource (e.g. lithic, flora, fauna) located there.

Seasonal migration

PaleoIndian peoples were necessarily nomadic, following the migrations and habitats of native fauna and harvesting seasonally selected flora.

Expansion and contraction

PaleoIndian peoples responded to a dramatically changing climate (e.g. milder and wetter, or cooler and drier climates) by altering their subsistence patterns to reflect the abundance or scarcity of available hunting and gathering options.

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<sup>10</sup> Wedel and Frison, "Environment and Subsistence," 50; Chatters and Pokotylo, "Prehistory," 73-74; Tom E. Roll and Steven Hackenberger, "Prehistory of the Eastern Plateau," in *Handbook of North American Indians*, Volume 12, Plateau, Deward E. Walker Jr., ed. (Washington, D.C.: Smithsonian Institution Press, 1998), 123-124.

<sup>11</sup> Throughout this document 'Response to Environment' refers to cultural adaptations as a result of natural systems and features.

## Spatial Organization

Site Location	Archeological sites that represent the PaleoIndian period are located throughout the entire northwestern Plains region, in both mountain and valley contexts.
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## Land Use

Hunting	In general, PaleoIndian (Clovis and Folsom cultural groups) peoples hunted a variety of now extinct animals within the northwestern Plains region including large bison, camel, horse, bighorn sheep, wapiti, deer, and mammoth. Later, herds of bison were trapped and slaughtered as part of a communal activity.
Gathering	PaleoIndian peoples gathered a variety of regional flora for dietary, medicinal, functional, or ceremonial uses.

## Circulation

Valley floors and mountain passes	The circulation networks utilized by PaleoIndian peoples likely followed the natural corridors dictated by regional topography and characterized by valleys and mountain passes. Circulation routes were chosen because of their ability to lead PaleoIndian peoples to selected resources. Many of these circulation routes were used on a seasonal basis.
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## Buildings and Structures

Caves and shelters	PaleoIndian peoples utilized available caves and other permanent shelters throughout the region.
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## PLAINS ARCHAIC PERIOD, CA. 7,500–1,500 BP

### INTRODUCTION

Evidence from archeological sites dating to the Archaic Period on the Northwestern Plains generally reflects a gradual transition from big game hunting to a broader, more diverse subsistence base that included migratory hunting and gathering. Material culture from the Archaic period is characterized by smaller triangular shaped points that were used to hunt bison and other small to medium sized animals. Also during this period, evidence suggests that plant foods became a more important part of the human diet. Within the Black Hills region,

archeological sites representing the Archaic period, particularly during the Middle and Late Archaic, ca. 5,000–1,500 BP, are most numerous.<sup>12</sup>

## HISTORICAL CONTEXT

Material culture characteristic of the Early Plains Archaic period (ca. 8,000–5,000 BP) are larger, triangular, side-notched, and lanceolate unnotched points. The first seed grinding tools and small storage/cache pits date to 8,500 BP, and *manos* and *metates*, grinding slabs, and fire pits first appear ca. 7,500 BP. Cave and rock shelters are typical of Early Archaic period habitation sites, although some house pits are known to exist. Although faunal remains from the Early Archaic period are scarce, medium and small sized mammals including mountain sheep, deer, rabbit, marmot and woodrat are represented. Bison are nearly absent from the faunal record.<sup>13</sup>

Within the project area, the Beaver Creek Rockshelter site (39CU779) is one of the more well known Early and Middle Archaic sites in the larger region that contains intact cultural deposits in the larger region. Although the most intensive use of the site occurred in the Middle Archaic, at least three separate horizons were dated from between 6,720 to 5,500 years BP. In addition, 39CU781, a lithic scatter, is reported to be associated with this period.<sup>14</sup>

During the Middle Plains Archaic (ca. 5,000–3,000 BP), Oxbow type points, and later what is now identified as the McKean complex, a wide assortment of points and tools, are representative of the period. The diversity of the McKean complex appears to reflect adaptations to abundant resources and, generally speaking, a broadened subsistence base that include the communal hunting of bison, and dependence on a variety of small and medium sized animals. The Middle Archaic is also significant in that the first artifacts documenting extensive reliance on plant consumption, groundstone tools, and roasting pits date to this period. “The faunal and floral evidence from known archeological sites of the McKean period indicate a widespread but closely related subsistence strategy that favored ecotonal situations that provided the widest possible range of plant and animal resources.” The earliest evidence of foraging for roots, most likely camas tubers, appears ca. 6,400 BP with the presence of earth ovens or fire pits. During the Middle Archaic, caves and rockshelters continued to be utilized, but house pits also began to appear in increasing numbers. In most of the known Middle Archaic house pits, fire pits and post holes are also present. Frison has also proposed that ‘tipi’ rings or stone circles first begin to appear during the Middle Archaic. Settlement pattern analysis appears to show a transition from terrace and upland utilization early in the Archaic, to increasingly prevalent floodplain and lowland utilization during the middle and later part of the Archaic period. It is thought that this trend may reflect an overall adaptation to migrating fauna. Bison remains appear in larger numbers at Middle Archaic sites suggesting the practice of communal bison hunting.<sup>15</sup>

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<sup>12</sup> George C. Frison, “Hunting and Gathering Tradition: Northwestern and Central Plains,” in *Handbook of North American Indians*, Raymond J. Demallie, ed. Vol. 13, Plains, Part 1 of 2. (Washington, D.C.: Smithsonian Institution, 2001) 131; Glaindo, “Wind Cave Archeological Inventory Project: Research Design,” 19.

<sup>13</sup> Frison, “Hunting and Gathering Tradition,” 133-136.

<sup>14</sup> Galindo, “Wind Cave Archeological Inventory Project: Research Design,” 16.

<sup>15</sup> Chatters, “Environment,” 44-45; Chatters and Pokotylo, “Prehistory,” 74-76; Frison, “Hunting and Gathering Tradition,” 138; Galindo, “Wind Cave Archeological Inventory Project: Research Design,” 20-21; Roll and Hackenberger, “Eastern Plateau,” 125-128, 131-133.

As noted above, the Beaver Creek Rockshelter (39CU779) is a Middle Archaic site. Within the cultural horizons radio carbon dated from 4,710 to 3,870 years BP, archeologists found diagnostic artifacts including two McKean points and a number of other tools, as well as several features including cooking hearths and roasting pits. Other Middle Archaic sites located within the project area include 39CU821, an open occupation site at which three diagnostic points, all McKean type, were identified, and 39CU1196, a tipi ring site based on its association with a Duncan point.<sup>16</sup>

Late Plains Archaic (ca. 3,000–1,500 BP) material culture is characterized by the disappearance of the McKean complex and the presence of corner notched and corner removed points including the Pelican Lake style. Ceramics, coiled basketry and the atlatl and dart also first appear during the Late Archaic period. In addition, the first pictographs and petroglyphs appear in this period. Like former periods, subsistence strategies pursued were broadly diverse and intensified. There is extensive archeological evidence for repeated occupation of some sites, suggesting a seasonally “scheduled, logically organized mode of resource exploitation.” Pit houses are common, and stone circles, or ‘tipi rings,’ begin to appear in large groups on ridges, butte tops, and other prominent topographic rises. Archeological sites dating to the Late Archaic also contain features related to communal game procurement, tool and food caches, and large rock-filled roasting pits.<sup>17</sup>

Sites within the project area associated with the Late Archaic period include 39CU1197, a tipi ring site based on a nearby Late Archaic corner-notched point, and 39CU821 due to the presence of a Late Archaic agate point.<sup>18</sup>

Although it is not known exactly when, it is clear that American Indians were the first to discover Wind Cave, and become familiar with the larger network of caves in the regional vicinity. It is not known how these early American Indians used the caves, however stories about holes that blew wind eventually gained significant cultural importance for tribes that inhabited the Black Hills region.<sup>19</sup>

## LANDSCAPE FEATURES BY CHARACTERISTIC

### Response to Environment

#### Hunting and gathering

Archaic peoples were intimately familiar with their natural environment. Archeological sites associated with this period are found in a number of diverse environments and are directly related to the particular resource (e.g. lithic, flora, fauna) located there.

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<sup>16</sup> Galindo, “Wind Cave Archeological Inventory Project: Research Design,” 16, 17, 20-21.

<sup>17</sup> Frison, “Hunting and Gathering Tradition,” 139-141; Galindo, “Wind Cave Archeological Inventory Project: Research Design,” 120-121.

<sup>18</sup> Galindo, “Wind Cave Archeological Inventory Project: Research Design,” 17.

<sup>19</sup> Throughout this document, European Americans who found Wind Cave in the late nineteenth century have been credited with its re-discovery.

Seasonal migration	Archaic peoples were necessarily nomadic, following the migrations and habitat of native fauna and harvesting seasonally selected flora.
Expansion and contraction	Archaic peoples responded to a dramatically changing climate (e.g. milder and wetter, or cooler and drier climates) by altering their subsistence patterns to reflect the abundance or scarcity of available resources.
Hunting traps	Archaic peoples utilized unique natural features such as cliffs, box canyons, and hunting blinds to surprise and kill herds of bison and other large mammals.

## Spatial Organization

Site location	Archeological evidence for the larger region suggests that Archaic peoples settled near mountain slope resources and high terraces during the early part of the period, but began to settle the floodplain lands adjacent to major drainages more intensively toward the middle and late parts of the period.
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## Land Use

Hunting	Archaic peoples continued to hunt a variety of large game including bison, mountain sheep, and deer. Herds of bison continued to be trapped and slaughtered as part of a communal activity. Smaller mammals such as rabbits, mice, and woodrats supplemented this diet.
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Gathering	Archaic peoples continued to gather a variety of regional flora for dietary, medicinal, functional or ceremonial uses. The archeological record suggests that the gathering of flora resources such as berries, pine nuts, bitterroot, biscuitroot, and camas may have been intensified during this period.
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Burial	The skeletons of at least two individuals recovered from an undated site suggest that the project area was used as a burial ground in prehistoric times.
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## Cultural Traditions

Artwork	While no specific examples have been identified within the park to date, Archaic peoples recorded
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their presence in pictographs, petroglyphs, and painted rocks throughout the northwestern plains region. Their rock art generally took four forms: anthropomorphic figures, zoomorphic figures, tally marks, and geometric figures.

## Circulation

Valley floors and mountain passes

The circulation networks utilized by Archaic peoples likely followed the natural corridors dictated by regional topography and characterized by valleys and mountain passes. Circulation routes were chosen because of their ability to lead Archaic peoples to and from selected resources. Many of these circulation routes were utilized on a seasonal basis.

## Buildings and Structures

Caves and shelters

Archaic peoples utilized available caves and other permanent shelters throughout the region.

Lodge / tipi

Due to their migratory subsistence patterns, Archaic peoples constructed conical shelters called lodges or tipis. Lodges were constructed against saplings or trees, or constructed of poles and were covered with mat, brush, bark, or animal skin. Archeological evidence suggests that these conical lodges were frequently associated with shallow pits and surrounded by small rings of rock. The lodges generally served as nuclear family dwellings.

## Small-scale Features

Stone circles

Several stone circle features are located within the project area. Those that are diagnostic all date to the Archaic period. The stones may have been used as weights to hold down a tipi shelter.

Pit ovens

Archeological evidence suggests that ovens were constructed to roast camas and other flora gathered during the later part of the period, ca. 5,000–6,000 BP. Pit ovens are usually found in association with semi-permanent or permanent camp sites.

Stone cairns

Three stone cairns were identified at 39CU918. It is unknown what purpose these features may have served.

**Stone alignments**

A stone alignment was discovered at 39CU823. This feature may have functioned as a game drive line in communal hunts.

**Archeological Sites****Beaver Creek rockshelter (39CU779)**

The Beaver Creek rockshelter, a site with extensive stratified cultural deposits, dates from the Early to Middle Archaic periods.

**Ghost Stream site (39CU781)**

This lithic scatter contains artifacts associated with the Early Archaic period.

**Wind Cave Canyon site (39CU821)**

This lithic scatter contains three diagnostic McKean complex points associated with the Middle Archaic period.

**Artifact scatter site (39CU822)**

This lithic scatter contains artifacts associated with the Archaic period.

**WICA 5 (39CU356)**

One circle was identified at this site. No diagnostic artifacts were recovered, suggesting that the site may date from the Archaic to the Late Prehistoric period.

**WICA 8 (39CU359)**

Forty-seven circles were identified at this site, some of which were overlapping. No diagnostic artifacts were recovered suggesting that the site may date from the Archaic to the Late Prehistoric period.

**Hidden Valley tipi rings site (39CU820)** Five circles with interior hearths were identified at this site. No diagnostic artifacts were recovered, suggesting that the site may date from the Archaic to the Late Prehistoric period.**Stone circles (39CU877)**

Three to four circles were identified at this site. No diagnostic artifacts were recovered, suggesting that the site may date from the Archaic to the Late Prehistoric period.

**NPS 6-1 (39CU899)**

Three circles were identified at this site. No diagnostic artifacts were recovered suggesting that the site may date from the Archaic to the Late Prehistoric period.

**Valley View site (39CU918)**

A possible stone circle was identified at this site. No diagnostic artifacts were recovered, suggesting that

	the site may date from the Archaic to the Late Prehistoric period.
Stone circles (39CU1196)	Eight circles were identified at this site. Diagnostic artifacts recovered suggest that the site was occupied during the Middle Archaic period.
Stone circles (39CU1197)	Nine circles with interior hearths were identified at this site. Diagnostic artifacts recovered suggest that the site was occupied during the Late Archaic period.
Hawks tipi ring site (39CU2567)	Stone circles were identified at this site. Diagnostic artifacts recovered suggested that the site may date to the Late Prehistoric period.
Only See One site (39CU2568)	One circle was identified at this site. No diagnostic artifacts recovered suggesting that the site may date from the Archaic to the Late Prehistoric period.
Flat Top tipi ring site (39CU3042)	Stone circles were identified at this site. No diagnostic artifacts recovered suggesting that the site may date from the Archaic to the Late Prehistoric period.
Bachelor site (39CU3044)	One stone circle was identified at this site. No diagnostic artifacts recovered suggesting that the site may date from the Archaic to the Late Prehistoric period.
Stone circles (39CU3160)	Stone circles were identified at this site. No diagnostic artifacts recovered suggesting that the site may date from the Archaic to the Late Prehistoric period.
South Side tipi rings site (39CU3161)	Stone circles were identified at this site. No diagnostic artifacts recovered suggesting that the site may date from the Archaic to the Late Prehistoric period.
Loner site (39CU3163)	One circle was identified at this site. No diagnostic artifacts recovered suggesting that the site may date from the Archaic to the Late Prehistoric period.
WICA 9 (39CU360)	The partial remains of two humans were recovered from this site during the CCC era. Although no diagnostic artifacts were recovered during the

1930s, the burials may date from the Archaic to Late Prehistoric periods.

## LATE PREHISTORIC PERIOD, CA. 1,500–300 BP

### INTRODUCTION

Some of the most important characteristics of the Late Prehistoric period are the adoption of the bow and arrow and the expanded use of ceramics. The adaptive strategies of Late Prehistoric peoples were expanded to include a more diverse range of seasonal flora and fauna.

### HISTORICAL CONTEXT

By about 1,500 BP, the bow and arrow was in common use throughout the northwestern plains region. Presence of the bow and arrow is evidenced by small side notched and corner notched points such as the Avonlea and Besant types. Ceramics are seen in greater quantities and stone bowls are first seen during the Late Prehistoric period. In general, throughout the Late Prehistoric period, settlement patterns reflect the gradual increase from smaller hamlets to larger, more permanent village sites, with a continued focus on lowland drainage areas. Large groupings of house sites become common with many containing evidence for storage pits and ovens.

Subsistence during the Late Prehistoric period again reflects a dependence on a broad diversity of local resources with a particular intensification of plant resources. Deer and other medium sized mammals appear to dominate the Late Prehistoric period diet. Bison also begin to become a more reliable faunal resource as their population fluoresced during the later part of the Late Prehistoric period. Bison jump and communal hunt sites are abundant throughout the larger region.<sup>20</sup>

Only one archeological site within the project area—39CU357—an open lithic scatter, appears to be associated with the Late Prehistoric period based on the presence of a small triangular point.<sup>21</sup>

### LANDSCAPE FEATURES BY CHARACTERISTIC

#### Response to Environment

Hunting and gathering

Late Prehistoric peoples were intimately familiar with their environment. Archeological sites associated with this period are found in a number of diverse environments and are directly related to the particular resource (e.g. lithic, flora, fauna) located there.

Seasonal migration

Late Prehistoric peoples were necessarily nomadic, following the migrations and habitats of native fauna, and harvesting seasonally selected flora.

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<sup>20</sup> Chatters, "Environment," 45-46; Chatters and Pokotylo, "Prehistory," 76-80; Roll and Hackenberger, "Eastern Plateau," 132-133.

<sup>21</sup> Galindo, "Wind Cave Archeological Inventory Project: Research Design," 17.

Expansion and contraction	Late Prehistoric peoples responded to a dramatically changing climate (e.g. milder and wetter, or cooler and drier climates) by altering their subsistence patterns to reflect the abundance or scarcity of available resources.
Hunting traps	Late Prehistoric peoples utilized unique natural features such as cliffs, box canyons, and hunting blinds to surprise and kill herds of bison and other large mammals.

## Spatial Organization

Site location	Archeological evidence for the larger region suggests that Late Prehistoric peoples settled predominantly on floodplain lands adjacent to major drainages.
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## Land Use

Hunting	Late Prehistoric peoples continued to hunt a variety of large game including bison, mountain sheep, and deer. While herds of bison continued to be trapped and slaughtered as part of a communal activity, deer remains appear to dominate the faunal assemblages of major archeological sites. Smaller mammals supplemented this diet, including, but not limited to, rabbits, mice, woodrats, fish, and marmots.
Gathering	Late Prehistoric peoples continued to gather a variety of regional flora for dietary, medicinal, functional, or ceremonial uses. The archeological record suggests that the gathering of flora resources such as berries, pine nuts, bitterroot, biscuitroot, and camas constituted a regular part of their seasonal subsistence patterns during this period.
Burial	The skeletons of at least two individuals recovered from an undated site suggest that the project area was used as a burial ground in prehistoric times.

## Cultural Traditions

Artwork	Late Prehistoric peoples recorded their presence in pictographs, petroglyphs, and painted rocks throughout the northwestern plains region. Their rock art generally took four forms: anthropomorphic
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figures, zoomorphic figures, tally marks, and geometric figures.

## Circulation

Valley floors and mountain passes

The circulation networks utilized by Late Prehistoric peoples likely followed the natural corridors dictated by regional topography and characterized by valleys and mountain passes. Circulation routes were chosen because of their ability to lead Late Prehistoric peoples to and from selected resources. Many of these circulation routes were utilized on a seasonal basis.

## Vegetation

Fires set

Archeological and ethnographic evidence suggests that Late Prehistoric peoples may have set intentional woodland and prairie fires for a number of cultural reasons including forest protection, enhancement of edible or medicinal plant species, to facilitate gathering, improve pasture and range productivity, improve the native habitat for animals that were hunted, clear campsites, or for communication or rituals.

## Buildings and Structures

Caves and shelters

Late Prehistoric peoples utilized available caves and other permanent shelters throughout the region.

Lodge / tipi

Due to their migratory subsistence patterns, Late Prehistoric peoples constructed portable conical shelters called lodges or tipis. Lodges were constructed against saplings or trees, or constructed of poles and were covered with mat, brush, bark or animal skin. Archeological evidence suggests that these conical lodges were frequently associated with shallow pits and surrounded by small rings of rock. The lodges generally served as nuclear family dwellings.

## Cluster Arrangements

Floodplain settlement

Archeological evidence for the larger region suggests that Late Prehistoric peoples settled predominantly on floodplain lands adjacent to major drainages.

## Small-scale Features

Stone circles	Several stone circle features are located within the project area. Those that are diagnostic date to the Late Prehistoric period. The stones may have been used as weights to hold down a tipi shelter.
Pit ovens	Archeological evidence suggests that ovens were constructed to roast camas and other flora gathered during the later part of the period, ca. 5,000–6,000 BP. Pit ovens are usually found in association with semi-permanent or permanent camp sites.
Stone cairns	Small stone cairns were identified at 39CU918, 29CU2566 and 39CU3047. It is unknown what purpose these features may have served.
Stone alignments	An undated stone alignment was discovered at 39CU823. This feature may have functioned as a game drive line in communal hunts.

## Archeological Sites

WICA 5 (39CU356)	One circle was identified at this site. No diagnostic artifacts were recovered, suggesting that the site may date from the Archaic to the Late Prehistoric period.
WICA 8 (39CU359)	Forty-seven circles were identified at this site, some of which were overlapping. No diagnostic artifacts were recovered suggesting that the site may date from the Archaic to the Late Prehistoric period.
Hidden Valley tipi rings site (39CU820)	Five circles with interior hearths were identified at this site. No diagnostic artifacts were recovered, suggesting that the site may date from the Archaic to the Late Prehistoric period.
Stone circles (39CU877)	Three to four circles were identified at this site. No diagnostic artifacts were recovered, suggesting that the site may date from the Archaic to the Late Prehistoric period.
NPS 6-1 (39CU899)	Three circles were identified at this site. No diagnostic artifacts recovered suggesting that the site may date from the Archaic to the Late Prehistoric period.

Valley View site (39CU918)	A possible stone circle was identified at this site. No diagnostic artifacts were recovered, suggesting that the site may date from the Archaic to the Late Prehistoric period.
Hawks tipi ring site (39CU2567)	Stone circles were identified at this site. Diagnostic artifacts recovered suggested that the site may date to the Late Prehistoric period.
Only See One site (39CU2568)	One circle was identified at this site. No diagnostic artifacts recovered suggesting that the site may date from the Archaic to the Late Prehistoric period.
Flat Top tipi ring site (39CU3042)	Stone circles were identified at this site. No diagnostic artifacts recovered suggesting that the site may date from the Archaic to the Late Prehistoric period.
Bachelor site (39CU3044)	One stone circle was identified at this site. No diagnostic artifacts recovered suggesting that the site may date from the Archaic to the Late Prehistoric period.
Stone circles (39CU3160)	Stone circles were identified at this site. No diagnostic artifacts recovered suggesting that the site may date from the Archaic to the Late Prehistoric period.
South Side tipi rings site (39CU3161)	Stone circles were identified at this site. No diagnostic artifacts recovered suggesting that the site may date from the Archaic to the Late Prehistoric period.
Loner site (39CU3163)	One circle was identified at this site. No diagnostic artifacts recovered suggesting that the site may date from the Archaic to the Late Prehistoric period.
Stone alignment (39CU823)	A stone alignment at this site may have functioned as a game drive line in communal hunts. No diagnostic artifacts were recovered, however the site may date to the Late Prehistoric period.
WICA 9 (39CU360)	The partial remains of two humans were recovered from this site during the CCC era. Although no diagnostic artifacts were recovered during the 1930s, the burials may date to the Archaic to Late Prehistoric periods.

**WICA 6 (39CU357)**

This site may date to the Late Prehistoric period based on the presence of a small triangular point.

**Real site (39CU3046)**

This site artifact scatter may date to the Late Prehistoric period.

**CONTACT PERIOD, 1700–1803****INTRODUCTION**

American Indians within the larger region began to have indirect contact with Europeans through possession of horses and other trade goods during the first half of the eighteenth century. By mid-century however, this contact was direct as the first European explorers entered the area. Although likely utilized by a number of tribes including the Crow, Kiowa, Plains Apache and Arapaho, the Lakota began to move into the Black Hills vicinity and with their Cheyenne and Arapaho alliance began to dominate the area at the end of the eighteenth century.

**HISTORIC CONTEXT**

In 1743, a French exploring party led by Francois and Louis Joseph La Verendrye reportedly viewed the Black Hills from the banks of the Missouri River.<sup>22</sup>

Albers notes that by the mid-eighteenth century, the Black Hills vicinity was likely claimed by tribal nations that comprised two coherent socio-political blocs; the Crows, Kiowas, Plains Apaches, and Arapahos who occupied the northern and northwestern edges of the Black Hills, and the Padouca Apaches and Comanches who occupied the southern and southeastern margins of the Black Hills. These tribes utilized the Black Hills and their resources much as they had for centuries, conducting hunting and foraging excursions into the vicinity on a seasonal basis. As the eighteenth century progressed, the Arapahos and Kiowas extended their territorial ranges further southward, in the process absorbing and dislocating the Padouca Apaches and Comanches. Based on political alliances, other tribes including the Cheyenne moved into the southern Black Hills vicinity, eventually settling near the forks of the Cheyenne River. By the late eighteenth century, the Lakotas began to migrate westward from the Missouri River toward the Black Hills. The territory they moved into was claimed by the Kiowas and their political allies. An extended conflict between the Lakota and Cheyenne allies, and the Kiowas and their allies developed, resulting in military skirmishes some of which were reported to have been fought near Wind Cave National Park, particularly in the vicinity of Buffalo Gap and Battle Mountain. By the end of the first decade of the nineteenth century, the Kiowas had moved southward and the dominant tribes that controlled the southern and eastern Black Hills vicinity were the Cheyenne, Arapahoe, and Lakota.<sup>23</sup>

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<sup>22</sup> Barbara B. Long, "Wind Cave National Park: Historic Contexts and National Register Guidelines," (Cresco, Iowa: Four Mile Research Company, 1992), 4; Western History Research, "Wind Cave National Park Land Study," Volume I, 18. (Bozeman, Montana: Western History Research, n.d.). Ms. on file at the Library Collection, Wind Cave National Park.

<sup>23</sup> Patricia Albers, "The Home of the Bison: An Ethnographic and Ethnohistorical Study of Traditional Cultural Affiliations to Wind Cave National Park." [November 21, 2002 Draft]. Cooperative Agreement #CA606899103

By the first half of the eighteenth century at the latest, it is documented that horses began to arrive in the Black Hills area via established trade routes from the American southwest. Because of their evident value in both subsistence and warfare, the horse soon evolved into an important trade item for nearly every Plains Indian culture. Albers notes that the position of the Black Hills vicinity made it a logical and convenient trade hub connecting the cultures that traded horses acquired from the southwest with the cultures who acquired other European and non-European goods east of the Missouri River. Areas such as Bear Butte north of the Black Hills, the Forks of the Cheyenne to the east, and Horse Creek to the south became prominent trading centers for indigenous peoples, and subsequently developed as European trading outposts.<sup>24</sup>

The small pox epidemic of 1781 decimated the Plains Indian cultures, particularly along the Missouri River.

#### LANDSCAPE FEATURES BY CHARACTERISTIC

##### **Natural Systems and Features**

###### Hills / Canyons

The Black Hills' unique topography of extreme high and low relief and lack of large animal herds, made it a less desirable place for a permanent settlement.

##### **Spatial Organization**

###### Seasonal camps

American Indians made temporary encampments in the Black Hills. These camps were usually located near a convenient resource such as a spring. These camps are recognized today by the presence of tipi rings and other cultural features.

##### **Land Use**

###### Hunting

American Indians continued to exploit the Black Hills, initiating seasonal hunting forays into the area.

###### Gathering

American Indians continued to exploit the Black Hills, gathering roots, berries, nuts, and other foodstuffs and natural resources.

###### Trapping

Early French and American hunters and trappers exploited the Black Hills for beaver and other animals valued for their pelts.

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between the National Park Service and the Department of American Indian Studies, University of Minnesota. Ms. on file at the Library Collection, Wind Cave National Park, 31, 33, 35, 37.

<sup>24</sup> Albers, "Home of the Bison," 17.

**Exploration**

Early French and American exploring parties knew of the Black Hills.

**Cultural Traditions****Seasonal exploitation**

The Black Hills was a traditional area that Indians depended upon and seasonally exploited for its valuable resources.

**Spiritual significance**

The Black Hills are sacred to the Sioux and many other Indian tribes.

**Circulation****Paths**

A network of pedestrian and equine paths crisscrossed the Black Hills from centuries of use by American Indians.

**Vegetation****Lodge pole pine**

American Indians went to the Black Hills to harvest the lodge pole pine tree for use in constructing their shelters.

**Buildings and Structures****Tipis / lodges**

Temporary shelters, such as tipis and lodges, were erected at seasonal camps.

**EUROPEAN AMERICAN TRADE, EXPLORATION, AND PROSPECTING,  
1803–1877****INTRODUCTION**

After the acquisition of the Louisiana Territory in 1803, the American fur trade prospered. Several European trapping expeditions were led into the Black Hills during this period. By mid-century, the beaver had been supplanted by the bison for its valuable pelt, and active prospecting for minerals had been initiated in the Black Hills. Despite the presence of the Lakota, then the dominant tribe in the region, scientific explorations and military expeditions were conducted in the Black Hills throughout the 1850s. After the Custer Black Hills expedition of 1874, a gold rush led to the formal Custer establishment and subsequent European settlement of the area. The battle of Little Big Horn established United States military supremacy and the eventual concession of the Black Hills, an area sacred to the Lakota.

**HISTORIC CONTEXT**

The United States acquired formal title to the Louisiana Territory from the French in 1803. Just one year later, Meriwether Lewis and William Clark began their western exploration expedition.

Although Lewis and Clark did not explore the Black Hills personally, their expedition notes and maps are the first to record the cultural and biological history of the area from a European perspective. Their notes record that the land between the forks of the Cheyenne and Platte Rivers, including the Black Hills, was the territory of the Arapaho and Cheyenne, and that at least two French trappers, ‘Valle’ and ‘Lapage,’ maintained a presence in the Black Hills, most likely a trading depot.<sup>25</sup>

In the decades that followed, the fur trapping and trading business in the northern Plains continued to flourish. The early nineteenth century saw a number of fur trading expeditions pass through or near the Black Hills. In 1811, a party from the American Fur Company explored the northern slopes of the Black Hills. Shortly thereafter, in 1823, Jedediah Smith led a trapping expedition through the southern Black Hills vicinity, reportedly encountering a drainage that was subsequently named Beaver Creek.<sup>26</sup>

As the trade in and demand for beaver pelts began to diminish due to over-hunting, a new commerce in buffalo robes and other large mammal hides was developing. By the mid-nineteenth century, it became a big business. Increased demand for bison led to increased hunting by Indian tribes, and subsequently European Americans. By the mid-nineteenth century, bison were becoming noticeably scarce in the Plains east of the Black Hills.<sup>27</sup>

It was during the second quarter of the nineteenth century that the Lakota began to assert their presence as the single dominant cultural group in the southern and eastern Black Hills vicinity. As Albers notes, “there is little doubt that the Lakotas had clearly established themselves on the eastern side of the Black Hills by 1830....Indeed, we can begin to say that at this point in history the Lakotas were not only the largest and most dominant group in the region but that the Black Hills had become the center of their territorial universe as well.” As a result they began to establish more permanent settlements in and around the Black Hills. Like the Cheyenne before them, the Lakotas were attracted to the Black Hills vicinity because of its hunting grounds, the presence of prime grazing land for their horses, and its continued role as a central trade hub.<sup>28</sup>

While European-American concern over the potential presence of valuable minerals in the Black Hills (demonstrated by military and exploratory expeditions) began to develop after mid-century, active prospecting began in the second quarter of the nineteenth century. One of the earliest European-Americans to prospect in the Black Hills was Ezra Kind, who entered the area in 1833. Two decades later, in 1852, Thomas Renshaw entered the Black Hills vicinity to prospect for gold. It is presumed, however, that these incursions were few and limited.<sup>29</sup>

In an effort to pacify the indigenous tribes of the upper Missouri and Platte River areas, in 1868 the U.S. Government signed a peace treaty near Fort Laramie with the Arapaho, Arikara, Assiniboin, Cheyenne, Crow, Hidatasa, Sioux, Mandan, and Shoshone tribes. The treaty bound all of the parties to a peaceful future, allowed the United States to construct roads and military posts in tribal territory, and guaranteed the security of all European-American immigrants who

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<sup>25</sup> Western History Research, “Land Study,” 18.

<sup>26</sup> Western History Research, “Land Study,” 18; Long, “Historic Contexts,” 4.

<sup>27</sup> Albers, “Home of the Bison,” 39.

<sup>28</sup> Albers, “Home of the Bison,” 45-47, 49.

<sup>29</sup> Western History Research, “Land Study,” 18; Albers, “Home of the Bison, 74.

passed through tribal lands. The treaty also formally limited and defined Lakota territory on paper. The assigned territory included all of the Black Hills.<sup>30</sup>

Beginning in the 1850s, a period of unprecedented exploration in the Black Hills was initiated by the United States. For many of these expeditions, the primary reason for exploring the Black Hills was to determine the presence of valuable minerals. In 1852, the David Dale Owen geological survey explored the Black Hills. On one of several private expeditions, Dr. Ferdinand V. Hayden, a naturalist, reached Bear Butte. He reported that “gold has been found in places in valuable quantities” and that “in these mountain formations, which border the great plains on the west, are to be found beautiful flowing streams, and small rich valleys covered with fine grass for hay, and susceptible of cultivation by means of irrigation. Fine timber for fuel and lumber, limestone and good stone for building purposes are here abundant.” In 1855, the first military expedition led by Gen. William S. Harney explored the Black Hills. This expedition included Lt. Gov. Kimball Warren and Ferdinand V. Hayden and had as its goal the recordation of geological and physical data regarding mineral resources. In 1859-60, Capt. William Franklin Raynolds led a smaller military expedition that crossed the northern periphery of the Black Hills.<sup>31</sup>

By 1861, the Dakota Territory, encompassing what would later become North and South Dakota and parts of Montana and Wyoming, was established. Only a year after its formation, the governor of the Dakota Territory formally declared that the Black Hills were “rich beyond conception in mineral resources of coal, copper and iron.” The same year, the federal Homestead Act of 1862 was established. This act allowed settlers to obtain a 160-acre homestead on surveyed land in the public domain by living there for five years and subsequently proving that the land had been improved in some form.<sup>32</sup>

As a result of increased conflict with the Lakota, Cheyenne, and Arapaho in the mid-1860s, a second treaty between the United States and the Teton Sioux was signed in 1868. This treaty also formally defined Sioux lands to include the Black Hills and stipulated that, in exchange for U.S. military withdrawal from traditional lands, payments of regular food, clothing and goods, and an assurance that no European-Americans would be allowed to settle on assigned Sioux lands, the federal government would be allowed to construct additional roads and would be ceded all lands outside of those defined as belonging to the Sioux.<sup>33</sup>

After the 1868 peace treaty, pressure on Congress to open up the Black Hills vicinity for mining by both private individuals and organizations was again initiated. In 1872, Charles Collins organized the Black Hills Mining and Exploration Association. A year later, widespread unemployment and bankruptcy caused a general nationwide depression. This, in turn, put more pressure on the government to open up the Black Hills for industrial exploitation and settlement. Ultimately, the government agreed to fund a large military expedition led by Gen. George Custer to explore the Black Hills. The United States neither sought nor received permission from the Sioux to enter the Black Hills.<sup>34</sup>

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<sup>30</sup> Albers, “Home of the Bison,” 58-59; Western History Research, “Land Study,” 18.

<sup>31</sup> Western History Research, “Land Study,” 19; Albers, “Home of the Bison,” 57, 64-65; Long, “Historic Contexts,” 4-5.

<sup>32</sup> Long, “Historic Contexts,” 5.

<sup>33</sup> Albers, “Home of the Bison,” 65-68; Long, “Historic Contexts,” 5; Western History Research, “Land Study,” 20.

<sup>34</sup> Long, “Historic Contexts,” 5, 7; Albers, “Home of the Bison,” 74.

In addition to military personnel, the Custer Black Hills expedition of 1874 included an entourage of engineers, geologists, naturalists, botanists, photographers, newspaper correspondents, and of course miners. As they traversed the Black Hills, the expedition found substantial evidence of foot and horse trails, old camps and recently abandoned camps, and evidence of resource exploitation such as the harvesting of lodge poles. From an American perspective, however, this abundant evidence for indigenous use of the area did not translate into defendable ownership. One Minnesota newspaper reported that “many Indians visit the Black Hills, but they have no permanent villages. Not a single permanent habitation has been found. In all our long line of travel and exploration, we have not seen the slightest evidence of any attempt to cultivate the earth.” At a large base camp established near present day Custer, the expedition discovered gold along French Creek. Upon their return, they announced that gold had been found and that there existed “the possibility of carrying on agriculture in the rich, fertile valleys, or of utilizing the choice grazing lands for the feeding of sheep and cattle.” A September 1874 issue of *Harpers Weekly* noted that the Black Hills were “luxuriant in vegetation, abundant in game, timber and good water. Thousands of acres of fertile land invite settlement. The country, however, is part of the Sioux Reservation, and cannot be made opened to the whites until the Government shall make some satisfactory arrangement with the Indians.” The publicity associated with the discovery of gold in the Black Hills formally sealed the fate of the area. Within a year, the gold rush in the Black Hills had begun. Prospectors poured into the Black Hills to establish mining claims and placer mines and to build roads and camps. By 1875, the town of Custer had been established. Although the U.S. military made a minor effort at restricting immigration by whites into the Black Hills, they had largely given up by 1875.<sup>35</sup>

In 1875, a second military expedition led by Lt. Richard I. Dodge entered the Black Hills to record and report on the “mineral wealth, climate and rainfall and natural resources of the region,” and to assess the area for future compensation. Like the Custer expedition that preceded it, the Dodge expedition also contained an entourage, albeit a smaller one. Geologists Walter P. Jenney and Henry Newton accompanied the Dodge expedition. The expedition explored the southeastern area of the Black Hills in the vicinity of Beaver Creek in Wind Cave National Park. Their party did some prospecting, and recorded evidence of gold in the gravels of Beaver Creek. As they passed eastward, Jenney and Newton described the Red Valley: “It is generally well covered with the common short grass of the Plains but it is entirely destitute of trees, save the occasional hill may sustain a few pines. The immediate valleys of the streams and dry washes which drain across it from the interior of the Hills are narrow and frequently lined with small groves or scattered individual trees. Their principal tree is the cottonwood, but there are occasionally dwarfed and stunted oaks and thickets of willow and wild plum. As already remarked, the majority of the streams sink in the canyons of the Carboniferous, but many of them rise again in the Red Valley in unexpected places as springs or pools of water. They never, however, again become running streams.” In a separate report, Dodge recorded the overwhelming presence of wild fires. “The country is covered with pine timber, in which are many irregular ‘park’ openings....The ‘park’ country already spoken of is almost wholly due to fire....Throughout the Hills the number of trees which bear the marks of the thunderbolt is very remarkable, and the strongest proof of the violence and frequent recurrence of these storms....The woods are frequently set on fire and vast damage is done. There are many broad

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<sup>35</sup> Long, “Historic Contexts,” 5; Western History Research, “Land Study,” 21; Albers, “Home of the Bison,” 75, 84.

belts of country covered with tall straight trunks of what was only a short time before a splendid forest of trees.”<sup>36</sup>

The gold rush in the Black Hills began in late 1874 and peaked by the late 1870s. To support these mining towns and camps, numerous supply depots were established and wagon trails crossing the Black Hills were built. Two trails significant to the southern Black Hills were established by the late 1870s. One trail, a former Indian path, entered the Black Hills at Buffalo Gap and proceeded westward, following Beaver Creek and crossing the Race Track near Wind Cave National Park. A prominent small town along Beaver Creek, Buffalo Gap, was also established during this period. It served as a commercial center and early supply depot.<sup>37</sup>

As gold continued to be discovered in the northern Black Hills, the majority of the emigrating population and the subsequent process of town establishment also shifted to the north. As a consequence, the southern Black Hills remained relatively vacant. Despite the presence of military expeditions in the Black Hills, the Lakota and Cheyenne continued to carry out periodic raids on miners and immigrants through 1876.<sup>38</sup>

While miners and immigrants were streaming into the Black Hills, the U.S. Government continued to place pressure on the Lakota and Cheyenne to cede their territory. After failed negotiations in late 1875, the U.S. issued an order for all Lakota, Cheyenne and Arapaho to return to their established agencies for the winter. The following spring, the U.S. military sent Gen. George A. Custer and a substantial force to make the Indians return to their agencies. In June of 1876, Custer and his forces were defeated by Lakota, Cheyenne and Arapaho warriors at the Battle of Little Big Horn. Shortly thereafter, Congress ordered that all food rations be withheld until the Lakota and Cheyenne relinquished the Black Hills. By the fall of 1876, several bands of Lakota, Cheyenne, and Arapaho were forced to concede the Black Hills. Although most Indians had resigned themselves to reservation life, a few Lakota and Cheyenne bands held out until 1877, when most of them, including Crazy Horse, surrendered to agencies after facing starvation.<sup>39</sup>

The Black Hills have always been a sacred place for the Lakota. The Siouxan word for Black Hills is Pahasapa. The Lakota believe that Wind Cave in particular is a sacred site. In this vicinity, it is believed that all ancestors of the Lakota emerged from an underground cave to live on the earth’s surface. In addition, Sitting Bull’s nephew is quoted as saying that ‘Wind Cave in the Black Hills was the cave from which Wakan Tanka, the Great Mystery, sent buffalo out into the Sioux hunting grounds. Because wind was one of the four sacred deities, the small opening from which the wind blew was very sacred to them.’<sup>40</sup>

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<sup>36</sup> Western History Research, “Land Study,” 23; Albers, “Home of the Bison,” 77-81; Janet R. Schripsema, “Final Report: Ecological Changes on Pine-Grassland burned in Early Spring and Late Spring (Phase I),” Ms. on file at the Library Collection, Wind Cave National Park, 8.

<sup>37</sup> Albers, “Home of the Bison,” 82.

<sup>38</sup> Albers, “Home of the Bison,” 84-85.

<sup>39</sup> Albers, “Home of the Bison,” 85-88; Long, “Historical Contexts,” 5,7.

<sup>40</sup> Jennifer Galindo, “Wind Cave Archeological Inventory Project: Research Design,” 1; Larry W. Frederick, “Wind Cave National Park: Its 75<sup>th</sup> Anniversary, An Historical Perspective.” Early Description of Tour at Wind Cave #19, F Ref., 1. Ms. on file at the Library Collection, Wind Cave National Park.

## LANDSCAPE FEATURES BY CHARACTERISTIC

### Natural Systems and Features

Hills / canyons

The Black Hills' unique topography of extreme high and low relief, and lack of large animal herds, made it a less desirable place for long term permanent settlement.

### Spatial Organization

Seasonal camps

American Indians made temporary encampments in the Black Hills. These camps were usually located near a convenient resource, such as a spring. These camps are recognized today by the presence of stone circles and other cultural features.

Mining camps

Early American prospectors made camps adjacent to areas that they were exploring for valuable minerals. The town of Custer was established as a mining camp as early as 1875.

### Land Use

Hunting

American Indians continued to exploit the Black Hills, initiating seasonal hunting forays into the area.

Gathering

American Indians continued to exploit the Black Hills, gathering roots, berries, nuts, and other foodstuffs and natural resources.

Trapping

Early French and American hunters and trappers exploited the Black Hills for beaver and other animals valued for their pelts.

Mining

Early American miners began to search the Black Hills for valuable minerals beginning in the second quarter of the nineteenth century.

Exploration

American civilian and military exploring parties traveled through the Black Hills vicinity, gathering data on the wildlife and mineral resources.

## Cultural Traditions

Seasonal exploitation  
The Black Hills region was a traditional area that Indians depended upon and seasonally exploited for its valuable resources.

Spiritual significance  
The Black Hills are sacred to many Indian tribes.

## Circulation

Paths  
A network of pedestrian and equine paths crisscrossed the Black Hills from centuries of use by American Indians. Two major Indian trails were also used by European Americans, one entering the Black Hills at Buffalo Gap and proceeding westward following Beaver Creek and crossing the Race Track near Wind Cave National Park.

## Vegetation

Lodge pole pine  
American Indians went to the Black Hills to harvest the lodge pole pine tree for use in constructing their shelters.

## Buildings and Structures

Tipis / lodges  
Temporary shelters, such as tipis and lodges, were erected at seasonal camps.

## OPEN RANGE STOCK GRAZING, HOMESTEAD SETTLEMENT, AND REDISCOVERY, 1877–1890

### INTRODUCTION

*See Figures 2-1 through 2-4, including maps of the region during this period. Also, see Map 2-1 Circa 1892 Period Plan.*

This period may be characterized by increased European settlement of the Black Hills, the establishment of regional and local government within the Dakota Territory, and the initiation of open range stock grazing. Wind Cave was rediscovered by Jesse and Tom Bingham in 1881 and for the next decade stimulated only local interest and limited exploration. The first land claims to the Wind Cave vicinity were established in the late 1880s. The development of the small resort town of Hot Springs was boosted with the arrival of the railroad in 1891.

## HISTORIC CONTEXT

### Surface History

With no legal restrictions to the formal settlement of the Black Hills, immigrants streamed into all parts of the Black Hills. The federal government passed legislation to encourage settlement in arid areas like the Dakotas. In 1877, Congress passed the Desert Land Act. This act allowed any settler to purchase 640 acres of land for twenty-five cents if the land was irrigated within three years of filing. The first homesteaders began to settle in what would become the Hot Springs area in the late 1870s. By 1877, the Dakota Territorial legislature established the counties of Custer, Lawrence, and Pennington in the southern Black Hills.<sup>41</sup>

The decade of the 1880s must be considered the period of the open range in the Black Hills. Since the numerous military expeditions of the mid-1870s brought back news of the endless grass ranges throughout the Black Hills, it was only a matter of time before cattle ranchers took advantage of the resource. Cattle began to be brought into the Black Hills in large numbers in the mid-to-late 1870s largely to supply and support mining camps and small towns. By the 1880s, cattle and sheep were brought into the Black Hills in substantial numbers. Some have estimated that by 1878 there may have been 100,000 head of cattle in the Black Hills. By 1883, this number had increased five-fold to approximately 500,000 head. Sheep, although fewer in number, were also present in large flocks. Within the southern Black Hills, Custer and Fall River Counties contained numerous large cattle ranches including the Anglo-American cattle company, and the Z-Bell Ranch. An important open range for cattle was also established near Buffalo Gap. By the mid-1880s, W.G. Grimes reportedly ran 8,000 cattle in the area.<sup>42</sup>

Predominantly because of its arid environment and lack of reliable water sources, few homesteaders settled in the Wind Cave National Park vicinity in the early 1880s. Most of the larger vicinity was occupied as public domain by regional ranchers. In 1881, however, Tom and Jesse Bingham reportedly rediscovered the natural opening to Wind Cave while searching for lost cattle. Their rediscovery peaked little interest aside from the fact that they noticed an unusually strong current of wind alternately blowing out of, and drawing into the opening.<sup>43</sup>

By 1883, the Dakota Territory was reduced to what would subsequently become the states of North and South Dakota. During the same year, Fall River County was established out of Custer County. The Andreas Atlas for South Dakota of 1884 records the settlement patterns of some of the earliest white homesteaders in the vicinity of current Wind Cave National Park. These settlers included the Scholfield, Charles Valentine, W.H. Rankin, Tumley, Reid, Gordon,

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<sup>41</sup> Long, "Historical Contexts," 10; Western History Research, "Land Study", 28.

<sup>42</sup> Long, "Historical Contexts," 7; Western History Research, "Land Study," 25-26.

<sup>43</sup> Long, "Historical Contexts," 11, 61; John W. Bohi, "Seventy Five Years at Wind Cave: A History of the National Park," *South Dakota Historical Collections* 31 (1962): 365; Robert D. Woodward, "The Early Exploration of Wind Cave," March 1977, 4-5. Ms. on file at the Library Collection, Wind Cave National Park. It is not believed that either of the Binghams entered the cave. Bohi has claimed that Con Donahue, aka 'Lame Johnny,' is reported to have rediscovered Wind Cave in 1877. While Lame Johnny is known to have had a camp along a creek northeast of the park and was subsequently hanged adjacent to it, there is no other evidence to support the fact that he rediscovered the cave in the late 1870s.

Timsley, Griffith, Parker, and the A.D. Ennis families, and the Tarrant Ranch, an unknown ‘Ranch,’ and the 5.5 Mile Ranch. Most of these homesteaders and ranchers had located themselves in the eastern part of the current Wind Cave National Park or were settled adjacent to major drainages or rural wagon roads. Of particular interest is the Charles Valentine property, adjacent to and west of the natural opening of the cave. By 1891 at the latest, Valentine had established a horse ranch in the northeast  $\frac{1}{4}$  of Section 11, a property that was subsequently named the Wind Cave Horse Ranch. By the mid-1890s, he is reported to have had approximately 600 head grazing on his ranch.<sup>44</sup>

The rediscovery of Wind Cave generated only sporadic local interest. Joseph E. Pilcher and several other men led an expedition to explore the cave in 1884. They returned with personal collections of ‘specimens.’ Although not firmly established, Long notes that it was the Pilcher party that possibly made the first ‘improvements’ to the cave by enlarging or blasting out the relatively small blowhole or natural opening. The first location certificates for mineral claims associated with Wind Cave were filed by Frank Horton and Nels Hyde in 1886. There is no evidence that they were followed up on, or that the land was improved in any way, and it is presumed that these claims were subsequently abandoned. Horton and Hyde’s claim stated that “we have made our discovery of mineral under the surface of the earth and in the said Wind Cave. We claim the entrance to the Wind Cave for the mouth on top of our discovery shaft.”<sup>45</sup>

By 1886, the railroad had arrived in Rapid City and Buffalo Gap, two important waystations for stage trips to the southern Black Hills area. Throughout the decade of the 1880s, the small town of Hot Springs experienced tremendous growth, centered around the development of the Evans’ plunge baths and resort spa. The Dakota Hot Springs Company was formed in 1886 and a wood frame hotel—the Minnekahta—was subsequently built. By the late 1880s, Hot Springs was promoted throughout the larger region as a resort area. The railroad also arrived in Hot Springs in 1891. Between 1886 and 1891, visitors to Hot Springs, and consequently the natural curiosity to the north, increased dramatically. By 1890, the early development and success of Wind Cave was tied directly to the resort town of Hot Springs.<sup>46</sup>

The winter of 1886 and 1887 was a turning point in the direction of late nineteenth century settlement and use of the Black Hills. During this period, a harsh winter decimated cattle herds on open ranges throughout the Northern Great Plains. In the years following, ranchers slowly began to change the way they operated, frequently erecting fenced ranges to protect their pastures from overgrazing. Cattle ranching of course continued in the Black Hills after this date, but on a much smaller scale. Simultaneously, homesteaders began to arrive in the Black Hills vicinity in greater numbers during the late nineteenth century. In describing life in the southern Black Hills in the late nineteenth century, Ella E.S. Gay stated that “all the open land was free for his and neighbors cattle. He cut hay out on the open flat that winter to feed the cattle. . .All ran cattle and horses. And these places ran back to Cold Springs on the northwest and were along Beaver Creek and Cold Springs. . .All these people had cattle and horses. Several of the ranchers shipped in Texas Longhorns cattle in there. . .Most of the places are what is in Wind Cave Park.

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<sup>44</sup> Western History Research, “Land Study,” 28; Long, “Historical Contexts,” 7-9.

<sup>45</sup> Tom Farrell, “Following the Wind: The Exploration of Wind Cave,” April 12, 1986, 3. Ms. on file at the Library Collection, Wind Cave National Park; Western History Research, “Land Study,” 32; Long, “Historical Contexts,” 11, 61.

<sup>46</sup> Long, “Historical Contexts,” 6, 11; Albers, “Home of the Bison,” 94.

It was too dry there as a rule. They couldn't raise any crops, just had a lot of hay and was hard to get a little water to water the stock. We had to haul water to use for the places about and springs about very few wells.”<sup>47</sup>

Perhaps the first printed reference to the current name for the cave occurred in the *Hot Springs Star* in September of 1887. “A few miles from town is the ‘Wind Cave’ which has been explored three miles and no bottom found.”<sup>48</sup>

One of the more significant developments of Wind Cave during the late 1880s was performed by Jesse Bingham and another man named Charlie Roe. In 1887, Bingham and Roe reportedly opened up another entrance adjacent to the natural opening of the cave and built a small 8 x 10 foot cabin there “using logs ‘borrowed’ from John Raver, who was planning to build a cabin near the present site of the Game Ranch.” While it will likely never be known whether the Pilcher expedition of 1884 or the Bingham and Roe efforts three years later was the first formal development of Wind Cave, it is clear that some informal effort at improving the entrance and erecting a small shelter above an enlarged entrance was carried out prior to 1890.<sup>49</sup>

Apparently capitalizing on Horton and Hyde’s abandoned claim, in 1889 L.C. Faris filed a location certificate for a mineral claim on the Wind Cave Lode. His certificate stated that “I claim the entrance of the Wind Cave for my discovery shaft as the mineral I have found is under the surface of the ground.”<sup>50</sup>

South Dakota became the fortieth state of the Union in November of 1889.

## LANDSCAPE FEATURES BY CHARACTERISTIC

### Natural Systems and Features

#### Natural springs

The presence of dependent springs and/or drainages often influenced the location of permanent European-American settlement of the Black Hills.

### Land Use

#### Settlement

The Homestead Act of 1862, the Desert Land Act of 1877, and the promise of the open range encouraged European-American settlement of the Black Hills. By the 1884 at the latest, the property that was to become Wind Cave National Park was settled by at least ten families and three ranches.

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<sup>47</sup> Long, “Historical Contexts,” 7; Western History Research, “Land Study,” 28; Ella Elizabeth Scott Gay, [Oral History Transcript], n.d. Early European History #2, F Ref 1880, n.p. Ms. on file at the Library Collection, Wind Cave National Park.

<sup>48</sup> *Hot Springs Star*, September 23, 1887.

<sup>49</sup> Bohi, “Seventy Five Years,” 366.

<sup>50</sup> Western History Research, “Land Study,” 32.

Grazing	Ranches were established in the southern Black Hills on public land adjacent to the lush grassy plains. Cattle, and to a lesser degree sheep, grazed these open ranges.
Agriculture	While the arid environment of the Black Hills and the lack of dependable water resources made it a difficult place to plant crops, many early settlers did cultivate a few fields of crops, predominantly for home consumption and use of livestock.
Mining	European Americans continued to prospect in the Black Hills throughout the last quarter of the nineteenth century.

### **Cluster Arrangement**

Water resources	Location of residential and other features in the landscape was dependent upon convenient water resources such as springs and drainages.
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### **Circulation**

Early wagon roads	By the last two decades of the nineteenth century, GLO survey maps document a number of small dirt wagon roads crossing the lands that would become Wind Cave National Park. Many of these roads followed the natural topography and proceeded in a general northwest / southeast direction. Specific roads known to have crossed Wind Cave NP lands include sections of the Cheyenne to Deadwood Trial (Cheyenne and Black Hills Stage and Express Route), the Sidney to Deadwood Trail, and the Cold Brook Wagon Trail.
Natural Entrance enlarged	The Joseph Pilcher party is reported to have enlarged the original blowhole or Natural Entrance to Wind Cave through blasting in 1884. The enlarged opening allowed easier access to the cave interior.
Second entrance created	Jesse Bingham and Charlie Roe reportedly make a second entrance to Wind Cave and place a small log cabin over it in 1887. The new or second entrance was adjacent to the original Natural Entrance.

## Vegetation

Timber

GLO surveyor's notes from the 1880s to 1890s indicate that the area that would become Wind Cave National Park contained hilly and rolling land with scattered or 'lean' timber, predominantly Norway pine, along minor creeks and drainages.

## Buildings and Structures

Homestead settlement

A typical homestead settlement included a primary residence and one or more outbuildings such as a barn, smokehouse, and springhouse. Most of these early structures would have been constructed out of logs and other materials that were readily available.

Ranch settlement

A typical ranch included a primary residence and sundry outbuildings, plus numerous barns and structures to shelter and manage livestock. Most of these early structures would have been constructed out of logs and other materials that were readily available.

Cave entrance structure built

In 1887, Jesse Bingham and Charlie Roe reportedly built a small 8 x 10 foot log cabin over a new entrance to the cave that they had made. The cave entrance structure was located adjacent to the natural opening of Wind Cave.

Blacksmith shop built

Prior to the McDonald's arrival at Wind Cave in 1890, two structures were reported to have been on-site, the log cave entrance structure, and an "old blacksmith shop." It is not known when the blacksmith shop was constructed. This structure was used for a short time as a residence by the McDonalds in the 1890s.

## Constructed Water Features

Spring improvement

As water resources were important to both human and animal survival, many natural springs and drainages were improved through cleaning and/or the construction of storage features to provide a consistent and reliable water source.

## Small-scale Elements

Fences	Many homestead and ranch settlements contained fenced fields, and pens and/or corrals where animals could be held. After the winter of 1886-87, many ranchers also began to fence pastures for their livestock. Much of the early fencing was of post and wire construction.
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## Archeological Sites

Homestead site (39CU834)	Remains of a stone foundation, rootcellar, and a scatter of bricks dating to the post 1875 era.
Homestead site (39CU900)	Several irregular depressions and an artifact scatter mark this homestead site. More recent sweat lodge structures from the American Indian Movement encampment in the 1970s are also present.
Homestead site (39CU1284)	The ca. 1880 Scott homestead is marked by several depressions, a structural foundation, and a privy depression including a dense scatter of historic material culture.

## Subterranean History

Shortly after its rediscovery, the Binghams told a man named Charlie Crary of the unusual cave. Crary visited the cave soon thereafter and may have been the first European American to enter the cave, exploring its interior to an unknown depth. A second party in 1881 is also reported to have explored Wind Cave. Frank Hebert, Jesse Girelle and wife, two unknown girls and Mayme Sprague visited the cave and reportedly entered it. Both of these early explorations are presumed to have been informal excursions.<sup>51</sup>

Sporadic exploration of the cave rediscovered by Tom and Jesse Bingham continued throughout the mid-to-late 1880s. Much of this exploration can be categorized as leisurely outings and a fascination with what was described as a ‘natural curiosity.’ Two other parties are known to have entered the cave in 1884, including a large group headed by John Well, Ted Petty, Kennett Harris, and a man named Walter. A second group included Charles Stewart and his sister, Kennett Harris and Walter. Possibly the earliest printed reference to the cave appears in an 1884 edition of the *Custer Chronicle*: “Joe Pilcher and several others of the Climax [mine] force visited the cave of the Winds Sunday and returned loaded with brilliant specimens of water formation.”<sup>52</sup>

Between 1886 and 1887, several more exploratory parties entered the cave. In 1886, C.T.C. Lollich, Charlie Estes, a Mr. Swiehart, and a liveryman, all from Buffalo Gap, visited and

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<sup>51</sup> Long, “Historical Contexts,” 11, 61; Bohi, “Seventy Five Years,” 365; Woodward, “Early Exploration,” 4-5.

<sup>52</sup> *Custer Chronicle*, September 13, 1884.

explored the cave. Lollich is said to have stated that they had to squeeze into a very tight hole to get into the cave. During the same year, a large party including Odo Reder and family, C.H. Walker and family, a Miss Parker and others “comprising thirty or forty persons in all, supplied with tents, camping utensils and everything essential to comfort in this place [Custer] left for the Cave of the Wind on Tuesday, where they remained for a day or two exploring the labyrinthine mazes of that attractive wonder, and enjoying the refreshing winds that make that place especially enjoyable when the mercury is seeking the upper levels.” In May 1886, the *Custer Chronicle* again reported upon the ongoing informal exploration of the now regionally known curiosity. “A wind cave near Hot Springs, in Fall River county, has been explored for 700 feet, and the end is not yet. A current of air is continually passing through it with sufficient force to blow one’s hat off—hence its name. Congress ought to meet there.” In 1887, C.T. Martin made several trips into Wind Cave with Arthur Collins, William Noble, and others. During the early twentieth century, he described what he remembered of these early trips. “The original opening was an oblong hole, in the very bottom of the gulch, a bit larger than an ordinary wash boiler. The old hole was smack at the bottom where every drop of water coming down the draw went down and into the cave. While three or four of us were down in the cave one day, a heavy thunder storm struck the area. Torrents of water came through the opening, just at the time we were on the way out. We got a scare of course, but were not endangered. Maybe some wet feet.”<sup>53</sup>

## LANDSCAPE FEATURES BY CHARACTERISTIC

### Natural Systems and Features

#### ‘Ovens’

Many of Wind Cave’s larger rooms or halls were connected by narrow crevasses and/or tunnels. These corridors were called ‘ovens.’ Because many of the ovens were too narrow to allow visitors to pass through comfortably, widening them was the target of early cave improvement.

### Land Use

#### Cave exploration

After the European American rediscovery of Wind Cave by the Bingham brothers in 1881, the cave environment was informally explored by independent parties throughout the 1880s.

#### Specimen collection

The first documented collection of geological ‘specimens’ occurred in 1884 when a party headed by Joseph E. Pilcher “returned loaded with brilliant specimens of water formation.”

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<sup>53</sup> Long, “Historic Contexts,” 13; Bohi, “Seventy Five Years,” 366-368; *Custer Chronicle*, May 22, 1886; July 17, 1886.

## Cultural Traditions

Historical graffiti and autographs

Early explorers of and visitors to the cave left their names, carved, written, or burnt into the cave walls and ceilings. In what was subsequently called the Post Office, visitors left signed calling cards. This tradition was carried on until the early twentieth century when the federal government took over administration and supervision of Wind Cave.

## Cluster Arrangement

Cave entrance cluster

Early construction of buildings and other structures at Wind Cave were focused at the natural cave entrance.

## Circulation

Exploration paths

Early exploration of Wind Cave followed the natural geological formations. Explorers had to descend, ascend and squeeze through narrow crevasses and tunnels to discover new ‘rooms.’ Routes were explored using ladders, ropes, string and candles.

## ACTIVE DEVELOPMENT OF SURFACE AND SUBTERRANEAN FEATURES, 1890–1903

*See Figures 2-5 through 2-8, including photographs of developments associated with visitation at the cave.*

### INTRODUCTION

Between 1890 and 1903, Wind Cave was developed as a valuable regional tourist destination. During this period of commercial development, the cave was explored by Alvin McDonald and related family and business partners, specimens were harvested for sale, and named guided tour routes were developed. Aboveground, minimal facilities were built that provided convenient access to the cave and catered to the visiting public. After legal disputes intensified over the ownership of the property in the late 1890s, the Government Land Office examined all claims. Subsequent concerns for the conservation of the cave led to its formal administration by the U. S. Government in 1901.

### HISTORIC CONTEXT

#### Surface History

With the advent of the new decade, a man named Day filed three mining claims on the land that incorporated Wind Cave. He later sold these mining claims for \$250 to a J.C. Moss and the

South Dakota Mining Company (SDMC) of New York City. The claims were filed and recorded in the Custer County register of deeds. Moss subsequently hired J.D. McDonald to manage and operate his Wind Cave claims. The McDonalds, J.D. and his two sons Elmer and Alvin arrived at Wind Cave in April of 1890.<sup>54</sup>

Upon the McDonalds' arrival, two structures are reported to have been present on the site. "Two wooden buildings were standing—a house built by a man who had previously lived on the property and an old blacksmith shop." Writing years later, Elmer's wife Emma said J. D. McDonald and the two sons were "...located in the old blacksmith shop with a view of prospecting gold." Several newspaper articles from the early 1890s describe a McDonald residence as being located several hundred yards away from the formal cave entrance. It is not clear if this residence is the pre-1890 renovated blacksmith shop as cited in Emma McDonald's memoirs, or a completely new structure.<sup>55</sup>

The years between 1890 and 1903 are classified as the period of formal site development where the Wind Cave property was methodically 'improved' for the benefit of the McDonald, and later Stabler families. By mid-1890, several sources document that J.D. McDonald and sons made initial improvements to the Wind Cave. "One of the first improvements which the McDonalds made at Wind Cave was an enlarged and more accessible entrance to the cavern. ...Over the entrance to the cave, a small story and a half log house was erected and lived in by the McDonalds." An 1892 *Hot Springs Star* article recorded the initial development by McDonald and his predecessors: "Soon after its discovery this hole [Natural Opening to Wind Cave] was enlarged to 18 x 30 inches. Nothing further in the line of development was done until the spring of 1890 when its present owner [J.D. McDonald] made the entrance easy by blasting out the solid rock." Emma McDonald later confirmed this work, claiming that J.D. McDonald "changed the entrance a little, [and] built a larger log house over the new opening." The cave entrance structure was described in early references as "a newly erected log cabin that covers the mouth of the cave;" and "a log house built over the entrance of the cave." Somewhere on the exterior of the cave entrance structure there was "a hole where the wind rushes in and out. There is a kind of windmill over this hole which runs at terrible speed." The inside of the cave entrance structure was fairly plain. Access to the cave was obtained by a trap door in one corner, "where you start down like going into a cellar."<sup>56</sup>

The SDMC's interest at Wind Cave was not limited to its subterranean features. Apparently the McDonald family was instructed to prospect on the property in the hopes of establishing a valid mineral claim. This prospecting was carried out immediately after their arrival. On July 3, 1890, J.D. McDonald deeded to the SDMC "all the right, title and interest owned by said first part in and to those certain lodes on mining claims known as Cave Lode [1-5]...situate near the Wind Cave...and the interest in and to said claims owned by the part of the first part and intended hereby to be conveyed in an undivided one third in each of said claims."<sup>57</sup>

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<sup>54</sup> Bohi, "Seventy Five Years," 369.

<sup>55</sup> Woodward, "Early Exploration," 8; *Hot Springs Star*, August 22, 1890.

<sup>56</sup> Bohi, "Seventy Five Years," 372; Woodward, "Early Exploration," 8; *Hot Springs Star*, August 22, 1890, August 29, 1890, January 29, 1892; John T. Burton, "Trip to the Black Hills in 1891." Miscellaneous #11, F Ref., n.p. Ms. on file at the Library Collection, Wind Cave National Park.

<sup>57</sup> Western History Research, "Land Study," 34; Bohi, "Seventy Five Years," 372.

Other improvement work at Wind Cave performed by the McDonald family during the early 1890s included “work on the road,” presumably the road that passed adjacent to the cave entrance; blasting, digging, and general clearing out of a local spring “situated about 50 rods south of Capt. Willard Spring;” and extracting sandstone from a local quarry. “Having nothing else to do I went down to our stone quarry (about three quarters of a mile below here) and got a load of variegated sandstone of extra quality, but it is not very extra in quality.” The journal also recorded the presence of a barn, presumably built in 1890-91 after the McDonalds’ arrival, somewhere on the property: “Went to the barn to feed the cow;” “Elmer found a steer calf in the barn this morning.”<sup>58</sup>

Recognizing the benefit that positive publicity could bring to his cave operations, J.D. McDonald established an early and mutually beneficial relationship with the *Hot Springs Star*. As early as June 1890, McDonald made regular trips to Hot Springs to report on the work being done at the cave and to promote his interests, frequently leaving behind interesting and unusual geological specimens from the cave. “Mr. McDonald is located at Wind Cave. ...He deposited on our desk an elegant specimen from the cave. ...Mr. McDonald informs the *Star* that a hotel is being erected at the Cave for the accommodation of visitors.”<sup>59</sup>

In 1891, John Stabler moved to Hot Springs. It was shortly thereafter that he visited Wind Cave and was impressed with its potential. He soon made an offer J.D. McDonald couldn’t resist. McDonald and Stabler formed the Wonderful Wind Cave Improvement Company in early 1892 and along with J. George H. Bronte, Charles Stabler and M.V.B. Osmer became its first stockholders. During this period, a free hack between Hot Springs and Wind Cave was provided for all visitors.<sup>60</sup>

Alvin McDonald’s journal records that he regularly visited two neighbors, Charles Valentine on the Wind Cave Ranch to the southwest, and J.C. West to the north. In 1891, McDonald assisted J.C. West in erecting a post and wire fence on “the north [and subsequently west] end of his [West’s] field.”<sup>61</sup>

In May 1892, John Stabler constructed a two-story 22 x 32 foot frame hotel at Wind Cave “for the accommodation of those visiting that justly noted natural attraction.” Katie Stabler, daughter of John Stabler, described the property much later: “The Wind Cave Hotel, as it was called, my father first built on a hill. It was a two-story house and after moving it down off the hill Papa added two wings. One for an office and one for kitchen and two bedrooms. The lower part of the original building we used as a dining room and we served dinner to all who wanted.” Bohi notes that the structure was originally log, and that it was moved downhill closer to the cave “when it was discovered that visitors were loath to climb the hill after a trip.” The construction of the Wind Cave Hotel was followed closely in the papers. “The enterprising proprietors of the Parrott House, Messrs. Stabler and sons, are constructing a hotel at Wind Cave for the accommodation

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<sup>58</sup> Alvin F. McDonald, “Private Account of A. F. McDonald,” 1891–1893 [Journal]. Ms. on file at the Library Collection, Wind Cave National Park.

<sup>59</sup> *Hot Springs Star*, June 20, 1890.

<sup>60</sup> Long, “Historical Contexts,” 12; Bohi, “Seventy Five Years,” 392; *Hot Springs Star*, July 17, 1891.

<sup>61</sup> McDonald, [Journal 1891-1893]. The West property was subsequently acquired by William Rankin, the first superintendent of Wind Cave National Park, and later formed the headquarters of the Wind Cave National Game Preserve.

of those visiting that justly noted attraction. The hotel will be a frame structure 22 x 32 feet, two stories high with a small addition for a kitchen. The building will be so arranged that it may be added to, whenever the business demands such improvements.” A month later, the paper reported that the “work upon the new hotel is progressing finely and that it will be entirely finished and open for the accommodation of guests in about a week.”<sup>62</sup>

By September 1892, the Government Land Office had initiated formal surveys of the land surrounding Wind Cave. The survey of T6S, R5E was completed in October 15, 1892, and approved on July 29, 1893. An analysis of the surveyor maps found that approximately twenty-one structures associated with settlers who were also named on the map, and well over fifty miles of wagon roads were located within the Wind Cave National Park area.<sup>63</sup>

A close examination of the surveyor notes for the Township and Ranges including and surrounding Wind Cave National Park (T5S/R5E; T5S/R6E; T6S/R5E; *[two more here]*) found fairly bleak assessments of the land’s potential. The larger vicinity including and surrounding Wind Cave National Park was repeatedly described as possessing poor soils, primarily third to fourth rate, and ‘mountainous,’ ‘hilly,’ ‘rolling,’ ‘rough,’ ‘uneven’ and ‘broken’ land. The local stone was described as ‘mountainous’ granite, limestone, sandstone, or gypsum formations. Scattered or ‘lean’ timber, predominantly Norway pine, was located primarily along minor creeks and drainages. A number of homesteads were described along the transects surveyed. Most included a primary residence with an adjacent barn. Several homesteads had numerous barns. Within T5S/R6E, J.W. Fusin’s homestead had “4 barns and about 10 acres of breaking near it.” Likewise, B.M. Turnley’s homestead had three barns near it. Some homesteads had wire fenced tracts. Fewer still had cultivated land. Of those that had cultivated fields many were small, frequently two to three acres in size. The large number of barns and few cultivated tracts suggest that many of the homesteads raised stock. On a survey line between Sections 1 and 2 within T6S/R5E, government surveyors noted, T.W. Chamberlain’s house, J.M. McDonald’s house and “entrance to Wind Cave,” Stabler’s house, and Elmer McDonald’s house. The land along the transect was noted to be ‘rough,’ with soil classified as third rate.<sup>64</sup>

After finding out that J.D. McDonald was selling Wind Cave specimens without his permission, Moss and the SDMC sued the Wonderful Wind Cave Company in 1893. This began an extensive and drawn out legal proceeding over the ultimate ownership of the Wind Cave property. During the same year, in a separate dispute with the SDMC, Peter J. Folsom filed a mineral claim lien on the WCNP property.<sup>65</sup>

Alvin McDonald joined his father at the World Columbian Exposition in Chicago in early November of 1893 to assist in the sale of specimens obtained from Wind Cave. Several weeks after his return, he died of typhoid fever in mid-December. He was buried on a bluff overlooking the entrance to Wind Cave; “...Alvah McDonald [sic], layed to rest in the bosom of Mother

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<sup>62</sup> Long, “Historical Contexts,” 12; Bohi, “Seventy Five Years,” 392; Katie Stabler, [Memoirs], n.d. Stabler Family #7, F Ref 1890 B2, n.p. Ms. on file at the Library Collection, Wind Cave National Park; *Hot Springs Star*, May 6, 1892; June 3, 1892.

<sup>63</sup> Long, “Historical Contexts,” 14; Western History Research, “Land Study,” 37, 52, 54-55.

<sup>64</sup> Government Land Office (GLO) Surveyor’s Notes, T6S/R5E, 1892. Ms. on file at the Library Collection, Wind Cave National Park.

<sup>65</sup> Long, “Historical Contexts,” 14.

Earth. ...A beautiful rockery will surmount his grave on the high bank east of the cave entrance.” By early 1894, a statue of Alvin McDonald had been commissioned. “Sculptor Riordan and Mr. McVey have commenced to carve the statue of Alvah McDonald [sic], the late famous Wind Cave guide, from the Evans pink sandstone. It will be full life size and will represent him at ease.” The statue was erected adjacent to Alvin McDonald’s grave during the same year.<sup>66</sup>

Early in 1894, several land claims were filed near the mouth of Wind Cave. The regularly mundane event was reported in the *Hot Springs Star*. “J.D. McDonald, Geo. Stabler, Elmer L. McDonald, and John Stabler went to Rapid City Monday and placed filing upon the Wind Cave property. The three first named placed their homestead filings and the latter placed a stone claim. Others expect soon to file upon land surrounding the cave property. These will be the first filings upon the land recently opened for filing.” The J. D. McDonald homestead claim for the southern ½ of the northwest ¼ of Section 1, T6S/R5E at Wind Cave was recorded on July 15, 1894. Other interested parties in the Wind Cave legal proceedings also made legal claims to the area in the mid-1890s. Peter Paulson made a claim in Section 1 in March 1894, Elmer McDonald made a claim in Section 1 in January 1894, George Stabler made a claim in Section 2 in January 1894, and Thomas Moffit made a claim in Section 1 in July 1896.<sup>67</sup>

In 1894, John Stabler purchased the adjacent Wind Cave Horse Ranch property of C.H. Valentine. Katie Stabler, his daughter, subsequently filed a homestead claim for the ranch property. A year later Susanna McDonald, J.D. McDonald’s mother, patented her homestead directly west of Elmer McDonald’s claim. J.D. McDonald was given a ‘receiver’s receipt’ for his homestead claim at Wind Cave.<sup>68</sup>

The legal claims to the title of the Wind Cave property continued through the late 1890s. In the ongoing case of SDMC vs. J.D. McDonald, the GLO decided in favor of the McDonalds in 1896. The following year, the McDonalds and Stabler and Folsom families sued each other. The local courts awarded the Wind Cave property to Stabler, and the McDonald family was evicted from the site. By 1898, Stabler and Folsom, along with Charles Stabler, Peter T. Paulson, and Fred Whitfield, formed the Black Hills Wind Cave Company.<sup>69</sup>

On a national level, federal policy was also impacting the Black Hills region. In 1891, Congress passed the federal Forest Reserve Act. This act authorized the President to set aside large tracts from the public domain as Forest Reserves. Taking advantage of this act, President McKinley set aside the Black Hills Forest Reserve in 1897, which included a substantial amount of acreage just north of and adjacent to the Wind Cave property.<sup>70</sup>

In order to help his case in the court system, John Stabler hired an independent geologist, Lucius Boyd of the South Dakota School of Mines, to examine Wind Cave. Boyd’s report, issued in 1898 identified the potential for valuable minerals in Wind Cave but failed to locate their

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<sup>66</sup> Long, “Historical Contexts,” 13, 20; *Hot Springs Star*, November 3, 1893; December 22, 1893; March 30, 1894.

<sup>67</sup> *Hot Springs Star*, January 19, 1894; Western History Research, “Land Study,” 37-38.

<sup>68</sup> *Hot Springs Star*, March 9, 1894; Bohi, “Seventy Five Years,” 398; Frederick, “Wind Cave National Park,” 8.

<sup>69</sup> *Hot Springs Star*, May 1, 1896; Long, “Historical Contexts,” 15-16.

<sup>70</sup> Long, “Historic Contexts,” 23; Western History Research, “Land Study,” 30.

presence in paying quantities. Perhaps more importantly, he concluded that Wind Cave would be “of the greatest interest to the public as well as the state.”<sup>71</sup>

The prominence of the legal dispute over the title to Wind Cave also attracted federal interest in 1899. During this year, the GLO sent agent C.W. Greene to examine the surface and subterranean interests of all involved parties. Greene’s report was quite specific. Regarding the conditions for agricultural claims surrounding Wind Cave, he reported that “the soil is coarse gravel and large boulder, unfit for cultivation except in very small patches of from one half to probably three acres, with no water anywhere and no hope of finding it by sinking wells as conditions below show that water is not there. . . . If all the land under consideration was given to one man it would not pay to try and cultivate it, as all he could hope to use would be small plats found in the bottom of these dry ravines.” Greene also meticulously reported on all of the structures present on McDonald’s Wind Cave claim and surrounding properties. On J.D. McDonald’s property he noted a “log house, now cave entrance,” the “Wind Cave Hotel, built of rough pine boards, 64 feet long by 32 feet deep, one part is 18 feet wide, is two story high, partitions are either of rough boards or muslin stretched on studding,” a “shed barn about 14 x 30 feet [that] will hold 8 horses;” “. . . I find the paint mill shown in evidence to be a part of the improvements of the Mineral Claimants was one of those small hand grinders used in small paint shops.” He further elaborated on the McDonald property:

I do not think that this land could be cultivated as nearly all of it lies upon a high gravel ridge; claimant built a good log house 18 x 24 feet with a one story board, shed roof kitchen on the back 10 x 14 feet, a board barn 14 x 30 feet, the kitchen was taken away after claimant lost possession and used for a claim shanty on the SE1/4 of this Section 1, the log house being still used as the cave house, the entrance to the cave being through a trap door in the floor, the land was all fenced with two wires on posts, but of late years has been neglected and now a large part of it is down. When all improvements were in good condition I would say a fair valuation would be about \$400.

On Elmer McDonald’s property he noted, “this land is more broken and has a little more that could be cultivated, but with very doubtful results. This land has a good fence of two wires on posts well built, about five acres broke on the SE 40 acres but not in crop, a one story frame house 16 x 20 with cave at back going into the side hill, a small log barn of little value, all improvements value, say \$275.” On Peter Paulson’s property he noted,

here we find more tillable land than on former pieces but like them it is in small patches only, probably 4 to 5 acres all told, most of it in rye. He has inclosed [sic] about 20 acres, a good frame house 18 x 24 feet, lathed and plastered, and painted; a log barn 16 x 20 feet dirt roof, value of improvements about \$400. This looks more like trying to make a home than any place I examined here, and question of residence on land cannot be doubted.

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<sup>71</sup> Lucius J. Boyd, “Report of Wind Cave Property, Custer County, South Dakota,” 1898. Cave Geology and Surveys, 1898-1906 #18, F Ref 1900, n.p. Ms. on file at the Library Collection, Wind Cave National Park.

On George Stabler's property he noted, "about 3 acres fenced in extreme north east corner, and about 2 acres in crop or corn this year. I don't think he has any more fit for cultivation, frame house 16 x 24 feet, value improvements \$350." At Suzanne McDonald's he noted that it was patented in December of 1895 and subsequently sold to Josie E. Barker in 1899. At Thomas Moffitt's property he noted, "no person on the land, no fence or other improvements except the shed kitchen formerly on the J.D. McDonald claim. Could not learn where the claimant now lives. Regard place as abandoned."

Greene's assessment was similarly disapproving regarding the claimants aboveground mining efforts:

I looked the ground over carefully, but found no evidence of legitimate mining. We found many places, however, where the banks on the sides of the ravines had been dug out and the earth and gravel thrown down the side of the hill, and a few places where some one had gone upon higher ground and dug small holes, all of this work has been done on the claims of J.D. and E.L. McDonald's entries, except three or four places on Geo. A. Stabler's entry, none of which show recent work. ...In a word I find nothing upon the surface that I deem worthy of consideration when looking for legitimate mineral development.

Greene's ultimate summary of the Wind Cave assessment was perhaps most damaging: "I am of the opinion that none of the claimants, either the agricultural or mineral, have fought through the various hearings ordered by your office, would spend a days time or a dollar in money, if the cave were not there, it appears to me that the object to be attained is a patent to the land, and then the cave would be all you would hear of."<sup>72</sup>

Based on Greene's report, in 1899 the GLO decided to deny both mineral and homestead claims to the Wind Cave property, ruling that no claimant was entitled to it. They further recommended that the government hold the cave in reserve as a 'public resort,' removing it from private ownership and exploitation. The following year, the GLO withdrew all of Section 1 and the SE ¼, NE ¼, and Lot 2 of Section 2, T6S, R5E, surrounding Wind Cave from settlement. Additional withdrawals of land surrounding Wind Cave were also made by GLO in July 1901 and April 1902. The decision to remove land was a temporary one "pending final determination of the question of the advisability of recommending the setting of said lands apart as a National Park for the purpose of preserving the beauties of the natural curiosities of the Wind Cave." Despite the fact that he did not formally own Wind Cave, evidence suggests that John Stabler and his family continued to reside on the property from 1900 until his death in March 1901. Ira McDonald, the newborn son of Elmer McDonald, died in February of 1900 and was buried next to Alvin McDonald overlooking the entrance to Wind Cave.<sup>73</sup>

In April 1901, the U.S. Government took formal administrative responsibility for the Wind Cave property, which was closed for a short period of time while the search for a site custodian went on. By the end of the year, C.W. Greene, the GLO agent that examined the cave in 1898, was

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<sup>72</sup> C.W. Greene, "Proposed Wind Cave National Park," December 4, 1899. Cave Geology and Surveys, 1898–1906 #18, F Ref 1900, n.p. Ms. on file at the Library Collection, Wind Cave National Park.

<sup>73</sup> Long, "Historic Contexts," 16, 23; Bohi, "Seventy Five Years," 403, 415, 420; Tom Farrell, personal communication, 2003.

placed in charge of the Wind Cave property. He immediately hired George Stabler, Elmer McDonald, and Peter Paulson to serve as official cave guides. No admission fee was charged during this early period, although the tour guides, as in former times, required payment for their services. George Stabler provided meals to visitors at the Wind Cave Hotel. A stable, utilized by liveryman C.L. Jensen, is also noted to have been in the Headquarters Area during this period.<sup>74</sup>

Initial local reaction to federal administration of Wind Cave was positive and hopes were high for immediate improvements to the property. “To Survey Wind Cave: The Government to improve the famous cavern near Hot Springs. Work to commence at once. ...Col. Greene has been instructed to employ a competent engineer and proceed with the work at once. ...The government has already made a number of improvements and Col. Greene expects that in the near future a complete system of electric lights and an elevator will be put in the many other conveniences provided.”<sup>75</sup>

The first formal government survey of Wind Cave was carried out in 1902. M.A. Meyendorff and Myron Willsie, both with the U.S. Department of Mineral Survey, surveyed the cave. Meyendorff's report from the same year stated that, although unsafe or broken stairs and narrow crawl spaced prevented a complete inspection, the cave possibly extended under as many as fifteen sections of land, and that it could be explored for “the next ten years.” Of particular note was Meyendorff's statement that, between 1892 and 1901, when the property was in private hands, “traffic in the Wind Cave specimens flourished. How many tons of this was carried away only the guides could tell and they won't do it. Most of these specimens were taken from the portions now opened to visitors, but the more rare ones were taken out from more inaccessible chambers.”<sup>76</sup>

In 1902, Captain Seth Bullock, Forest Supervisor for the adjacent Black Hills Forest Reserve, replaced C.W. Greene and was given administrative responsibility for the management of Wind Cave. He immediately placed George Boland, a forest ranger, in charge of the cave. Stabler, McDonald and Paulson continued to serve as cave guides. Stabler and his wife were also allowed to continue serving meals at the Wind Cave Hotel. The *Hot Springs Star* also reported the event noting that Stabler “will refit the hotel and repair the entrance to the cave, the building over the entrance to the cave and the stairway leading down into the cave.”<sup>77</sup>

## LANDSCAPE FEATURES BY CHARACTERISTIC

### Spatial Organization

Wind Cave land claims

After 1890, the McDonald, Stabler, Paulson and other families established claims adjacent to and surrounding the opening of Wind Cave, creating a small condensed settlement.

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<sup>74</sup> *Hot Springs Star*, April 26, 1901; Long, “Historic Contexts,” 23-24.

<sup>75</sup> *Hot Springs Star*, July 26, 1901.

<sup>76</sup> M. A. Myendorff, [Wind Cave Report], May 24, 1902. Cave Geology and Surveys, 1898-1906 #18, F Ref 1900, n.p. Ms. on file at the Library Collection, Wind Cave National Park

<sup>77</sup> Long, “Historic Contexts,” 25; *Hot Springs Star*, September 12, 1902.

## Land Use

Settlement	The Homestead Act of 1862, the Desert Land Act of 1877, and the promise of the open range continued to encourage European American settlement of the Black Hills. By 1884 at the latest, the property that was to become Wind Cave National Park was settled by at least ten families and three ranches.
Grazing	Ranches were established in the southern Black Hills on public land adjacent to the lush grassy plains. Cattle, and to a lesser degree sheep, grazed these open ranges.
Agriculture	While the arid environment of the Black Hills and the lack of dependable water resources made it a difficult place to plant crops, many early settlers did cultivate a few fields of crops, predominantly for home consumption and use of livestock.
Prospecting	Early settlers in the Wind Cave vicinity continued to prospect for valuable minerals during the last decade of the nineteenth century. The McDonald and Stabler families are known to have conducted preliminary surface excavations on their land claims throughout the 1890s in search of valuable minerals. Alvin McDonald established the Lost Cabin lode a few miles north of the cave.
Visitation	Beginning with the McDonalds' arrival at Wind Cave in 1890, a small fee was charged to enter and tour the cave. This period initiated the first commercial use of the cave as a destination for local residents and non-local visitors to the area.
Human burial	With the death and interment of Alvin McDonald in late 1893, the Wind Cave property was used for burial purposes.

## Cluster Arrangement

Water resources	Location of residential and other features in the landscape was dependent upon convenient water resources such as springs and drainages.
Cave opening cluster	Adjacent to the entrance to Wind Cave, several buildings and structures were erected including a

cave entrance building, a hotel, a blacksmith shop, and a barn.

## Circulation

Wagon roads

By the last two decades of the nineteenth century, GLO survey maps documented a number of small dirt wagon roads crossing the lands that would become Wind Cave National Park. Many of these roads followed the natural topography and proceeded in a general northwest/southeast direction. Specific roads known to have crossed WCNP lands include sections of the Cheyenne to Deadwood Trail (Cheyenne and Black Hills Stage and Express Route), the Sidney to Deadwood Trail, and the Cold Brook Wagon Trail.

New cave entrance blasted

Numerous sources report that shortly after their arrival in 1890, the McDonalds created a new opening to Wind Cave through blasting, thereby making it more accessible to visitors.

Road improved

Alvin McDonald reported that he performed ‘work on the road,’ presumably a thoroughfare leading to Wind Cave in 1891.

New access shaft excavated

After their eviction in 1897, Elmer McDonald is reported to have excavated a new entrance shaft to Wind Cave from his property. The shaft was supported by timber framing and placed in the approximate location of the existing elevator.

Bridges built

Prior to the creation of the park in 1903, four wooden bridges spanned narrow canyons on roads leading to Wind Cave. It is not known who built the bridges or what years they were constructed.

## Vegetation

Timber

GLO surveyor notes from the 1880s to 1890s indicate that the area that would become Wind Cave National Park contained hilly and rolling land with scattered or ‘lean’ timber, predominantly Norway pine, along minor creeks and drainages.

Cash crops

A few enterprising homesteaders and ranchers cultivated small fields of cash crops such as corn and rye for domestic consumption. In 1899, the

Elmer McDonald claim had no crop planted but approximately five acres of broken land; the Paulson claim had approximately four to five acres in rye; and the Stabler claim had two acres in corn.

## **Buildings and Structures**

Homestead settlement

A typical homestead settlement included a primary residence and one or more outbuildings such as a barn, smokehouse and springhouse. Most of these early structures would have been constructed out of logs and other readily available materials.

Ranch settlement

A typical ranch included a primary residence and sundry outbuildings, plus numerous barns and structures to shelter and manage livestock. Most of these early structures would have been constructed out of logs and other readily available materials.

J. D. McDonald residence built

Shortly after their arrival in 1890, the McDonalds erected a new 1½ story log and frame cabin over a new entrance to Wind Cave that they had blasted. This cabin was used as a residence and was described in 1898 as “a good log house 18 x 24 with a one story board, shed roof kitchen on the back 10 x 14.” The cave was entered through a trap door in its floor.

J. D. McDonald barn built

As early as 1891, the presence of a barn was recorded at Wind Cave in the Alvin McDonald journal. Presumably this structure was built sometime between 1890 and 1891.

Wind Cave Hotel built

George Stabler erected the Wind Cave Hotel, a 22 x 32 foot two-story structure with a lean-to kitchen addition, in the spring of 1892. The hotel was reported to have originally been a log structure built on an adjacent hill.

Wind Cave Hotel moved / expanded

The Wind Cave Hotel was moved to a more convenient location, adjacent to and above the cave entrance structure, shortly after its construction in 1892. After the move it may have been expanded or added to. In 1898, the hotel was described as built of rough pine boards “64 feet long by 32 feet deep, one part is 18 feet wide, is two story high.”

J. D. McDonald kitchen wing removed	Sometime between 1897 and 1898, J.D. McDonald removed the “one story board, shed roof kitchen” attached to his log and frame residence. The former kitchen was “used for a claim shanty on the SE ¼” of Section 1.
Jensen livery stable built	Sometime prior to 1898, a stable was built in the Wind Cave vicinity by and for the use of liveryman C.L. Jensen. In 1898, the shed barn was described as “about 14 x 30 feet will hold 8 horses.”
Pig pen, cow shed, chicken coop built	Sometime prior to 1903, a pig pen, cow shed and chicken coop were attached to the Jensen barn / stable structure.
Elmer McDonald homestead	The Elmer McDonald homestead was described in 1898 as a “one story frame house 16 x 20 with cave at back going into the side hill, a small log barn of little value.”
Peter Paulson homestead	The Peter Paulson homestead was described in 1898 as “a good frame house 18 x 24 feet, lathed and plastered, and painted; a log barn 16 x 20 feet dirt roof.”
George Stabler homestead	The George Stabler homestead was described in 1898 as a “frame house 16 x 24 feet.”

### **Constructed Water Features**

Spring improvement	As water resources were important to both human and animal survival, many natural springs and drainages were improved by cleaning out and/or the construction of storage features to provide a consistent and reliable water source.
Spring cleaned out	J.D. and Alvin McDonald cleaned out (through digging and blasting) a local spring “situated about 50 rods south of Capt. Willard spring” in 1891.

### **Small-scale Elements**

Fences	Many homestead and ranch settlements contained fenced fields, and pens and/or corrals where animals could be held. After the winter of 1886-87, many ranchers also began to fence pastures for their livestock. Much of the early fencing was of post and wire construction.
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J.C. West fields fenced	Alvin McDonald assisted J.C. West in fencing his north and west fields in 1891.
Valentine horse ranch fenced	GLO surveyor maps from 1892 documented that the C.H. Valentine horse ranch was fenced by this time.
Statue erected	A statue of cave explorer and guide Alvin McDonald was erected above the Natural Entrance to Wind Cave in the spring of 1894, five months after his death. The statue was carved by a man named Riordan out of pink Evans sandstone.
J.D. McDonald claim fenced	Sometime prior to 1899, the J.D. McDonald land claim at Wind Cave was fenced with a post and two wire system.
Elmer McDonald claim fenced	Sometime prior to 1899, the Elmer McDonald land claim was fenced with a post and two wire system.
Peter Paulson claim fenced	Sometime prior to 1899, approximately twenty acres of the Peter Paulson land claim was fenced.
George Stabler claim fenced	An approximately three acre field on the Stabler claim was fenced sometime prior to 1899.
Sandstone quarry	Alvin McDonald extracted sandstone from a local, unknown quarry in 1891. The quarry was located approximately $\frac{3}{4}$ of a mile “below” Wind Cave.

### Subterranean History

The earliest descriptions of trips inside the cave record that visitors had to climb ladders and ropes, slide down precipices, and squeeze through narrow openings and crevices just to reach ‘rooms’ worth viewing. “We were soon told by our guide, ‘now we will go down these ladders for 124 feet.’ ...After passing for some distance, first crawling, then walking, then sliding through narrow chasms, under masses of huge rocks, through dark, deep openings to the regions below....picking our way over huge projecting rocks, then squeezing our way through very narrow passages...Soon we reached the place where we were told: ‘Here is a rope we will have to slide down for 115 feet.’ ...This cave is owned by the South Dakota Mining Company, with R.B. Moss as superintendent and J.D. McDonald manager and guide.” In 1892, a visit to Wind Cave was described by James Morris as “down, down, down, by slopes, by steps, by ladders, by

ropes; stooping, crawling, sliding; face down, face up; now on one side of the body, then on the other, till the first noted space or chamber was reached.”<sup>78</sup>

Beginning in the mid-1880s and continuing to and through the McDonald and Stabler era, many visitors who experienced the cave recorded their presence by leaving messages on cards or on the cave walls and ceilings themselves. “...Here our host showed us some autographs of persons who visited this spot about six years ago [1884]. The paper on which these autographs had been written was not in the least soiled by dampness or mold....‘Monument Hall’ where we all wrote our signatures on a large boulder, where hundreds of others [in 1890] may be found.”<sup>79</sup>

Recognizing that more visitors would enter the Wind Cave if the narrow and sometimes hazardous paths were made more comfortable and less strenuous, the McDonalds initiated formal development of the cave interior in 1890. These changes are documented in numerous articles from the *Hot Springs Star*, and in Alvin McDonald’s journal. Alvin McDonald, and his father, brother, and other colleagues made seasonal improvements to Wind Cave between January 1891 and July 1892. These improvements included drilling, chiseling, hammering, blasting, and subsequent clearing of debris in cave passages to make them wider or taller, and generally more accommodating to visitors. Work on named areas included “the narrow passage between the Church Steeple and Camel’s Back;” the “Snow Ball route;” “the narrow passage between Sparkling Alley and the Camel’s Back;” the “Toboggan Slide;” “Roe’s Misery;” the “path between Roe’s Misery and Red Hall [on the Monument Hall Route];” “between the Post Office and Red Hall;” the path in “Red Hall;” the path in the “Post Office;” a narrow passage “just this side of the Bride’s Chamber;” “Hard Scrabble;” the “small oven;” “between the small oven and Bride’s Chamber;” the “passage at the other end of Snow Ball Room;” and the “north Dressing Room.” By the end of 1893, McDonald had reported that at least fifteen formal ‘routes’ had been explored and named, including the Coliseum, Castle Garden, High, Sampson’s Palace, V.I.A., Upper Specimen, Cataract, Bee Hive, Mausoleum, Crystal, Guide’s Discovery, Monument Hall, Snow Ball, Specimen, and Wind River routes.<sup>80</sup>

Newspaper accounts of the early 1890s record the improvement work accomplished by the McDonalds. “The managers have been working all winter and now have the ways open and the ladders fixed down as far as Roe’s Misery where they are now working making a way so that visitors need not crawl sideways past this place.”

An immense amount of work has been done in enlarging some of the passages thereby making the trip through the cave easier. In its present condition ladies can make the exploration of the cave very easily. Although it by no means resembles a walk over smooth pavement as yet. But compared with the toil and the danger attended upon the trip originally it is now excellent. ...For the last 18 months, Mr. McDonald and his sons have continued explorations and have opened and enlarged passages until they have about 30 miles of cavern explored. A large portion of which can be traversed with comparative ease. ...The course from the entrance is downward, part of the time on ladders and part down steep inclines.

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<sup>78</sup> *Hot Springs Star*, August 22, 1890; August 29, 1890; Long, “Historic Contexts,” 19.

<sup>79</sup> *Hot Springs Star*, August 22, 1890; August 29, 1890.

<sup>80</sup> McDonald, [Journal, 1891-1893].

...Formerly, this [Roe's Misery] was a low narrow passage through which the venturesome sightseer must wiggle his way in a prostrate position as best he could. It was about 30 feet in length. ...This passage has been enlarged so that now it can be traversed with reasonable ease.<sup>81</sup>

The McDonald Journal also records the systematic exploration of the cave and the gathering of its mineral resources. The exploration was carried out with ropes, ladders, and miles of string. Numerous new areas of the cave were discovered this way. If a particular room was significant enough, it was added to the guided tour route. Several inscriptions recording the date that a discovering party identified a new room or feature were also carved, drawn, or “smoked” (using candles) into cave walls and ceilings during this period. The location of many of these historic inscriptions are known today. J.D. and Alvin McDonald also systematically mined Wind Cave, procuring interesting cave ‘specimens’ for local sale by themselves and independent dealers in Hot Springs. The sale of these specimens came to be a significant part of their annual income.<sup>82</sup>

Continued development of the cave interior was carried on each year by the McDonald and Stabler families throughout the early 1890s. Newspaper articles reflect the fact that the work accomplished made subterranean travel easier. “They are working hard this winter developing the passages of the cave and by the time the season opens again will have many of the more difficult passageways enlarged so that the beautiful portions of the cave may be seen with less vexation of spirit and wear and tear of the physical forces;” “...It is easy going here for much work has been done all along, the passage having been enlarged by blasting out the rocks so that one can walk nearly erect instead of crawling upon hands and knees as formerly;” “Extensive improvements are being made at Wind Cave, two shifts being employed in blasting out the narrow passages;” “Wind cave is being developed in a wonderful manner. At present eight men are at work enlarging passages, and making other improvements and it is no longer a trial to go through the cave, but on the contrary a pleasure;” “Messrs. McDonald and Stabler were in from Wind Cave Saturday and report that they opened up passageways in the cave now so that one can walk erect to the Pearly Gates.”<sup>83</sup>

On the season opening in May 1893, the Wind Cave Improvement Company held a grand event. During the celebrations, the interior of the cave was temporarily lit, most likely by candles. “Wind Cave Opening: Last Monday this remarkable place after undergoing a process of improvement involving several thousand dollars was opened with becoming ceremony. ...The darkness of the side passages, domes and chasms is lighted up so as to render additional enchantment to the wonderful scene.”<sup>84</sup>

Approximately three years after active trail development was initiated in Wind Cave, three guided tour routes for visitors—the Garden of Eden, the Fair Grounds, and the Pearly Gates—had been established. Katie Stabler, daughter of John Stabler, reported that in the early 1890s “there were three routes opened the first being the Garden of Eden in the winter of 1891 and

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<sup>81</sup> *Hot Springs Star*, February 23, 1891; September 25, 1891.

<sup>82</sup> McDonald, [Journal, 1891-1893].

<sup>83</sup> *Hot Springs Star*, January 15, 1892; July 22, 1892, January 13, 1893; February 3, 1893; February 23, 1894.

<sup>84</sup> *Rapid City Register*, May 26, 1893.

1892. ...The second route, the Fair Grounds started at the Crossroads. ...The third route the Pearly Gates was opened in 1892.”<sup>85</sup>

By 1893 at the latest, the first formal survey of Wind Cave was drawn by George S. Hopkins. The ten foot square map was displayed during the Chicago World’s Fair. In 1896, a second formal survey of Wind Cave was conducted. In May of that year, the *Hot Springs Star* reported that “Walter Scott has just completed quite an extensive survey of Wind Cave having been engaged in the work about seven days and is now engaged in making an elaborate map of the numerous chambers and passages of the great cavern explored by him.”<sup>86</sup>

As a result of the ongoing legal dispute regarding the ownership of Wind Cave, the McDonald family was evicted from the property in 1897. Several sources indicate that Elmer McDonald then initiated the excavation of a separate shaft on his property to access a portion of the cave. Rufus Pilcher, superintendent for Wind Cave National Park in 1910, reported that he remembered seeing the remains of the shaft during his tenure. “The McDonalds, father and son, sunk a shaft about where the elevator location is now. This was to give them entrance on the property they claimed. The Stablers had possession of the entrance. This shaft entrance gave the McDonalds access to the Garden of Eden. The shaft with timbers fallen in decay was still in evidence during my tenure, and both parties told me of the affair.”<sup>87</sup>

Lucius Boyd’s examination of Wind Cave was not as helpful as George Stabler could have wished. However his report did document the status of improvements within the cave.

The entrance to this Cave is situated at the bottom of a small gulch which leads to Beaver Creek at a distance of about two miles. ...We descended the ladder or stairway which are well made and spacy, and hand-railed all the way. ...We descended to the 125 foot level where the ladder-way ended. ...The passage ways and chambers and all places of interest are carefully looked after and kept in good repair. ...The horizontal fissures are opened up only by what are locally termed ‘ovens’ or lateral passes or tunnels which connect the main vertical fissures and to form a practical reasoning of the whole system.

Boyd’s report identified gold, limestone, magnesia, and paint rock within Wind Cave stating that

certainly extensive bodies of this oxide matter [paint rock] exists in the vicinity and could be worked to a large profit at a very low expense as exposures from bluffs. ...A paint manufactory has been started on these deposits consisting of a grinding mill and mixing pans but I have not learned so far with what success. ...I have fairly demonstrated in this report that although within 500 feet from the surface, the [cave] formation has proven itself to contain the precious metals in paying quantities, I believe at a depth there will also be found the lower

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<sup>85</sup> Bohi, “Seventy Five Years,” 390-391.

<sup>86</sup> *Custer Chronicle*, May 13, 1893; *Hot Springs Star*, May 8, 1896.

<sup>87</sup> Bohi, “Seventy Five Years,” 399; Rufus Pilcher to Editor, *Custer Chronicle*, January 24, 1966. Superintendents Joseph and Pilcher #4, F Ref 1900 B1, n.p. Ms. on file at the Library Collection, Wind Cave National Park.

formations of the potsdams and the gold bearing contacts so well known in the mining districts of the Black Hills.<sup>88</sup>

GLO agent C.W. Greene's report the following year was less glowing regarding the valuable mineral potential of Wind Cave.

Leaving the Hotel we go down forty feet of stairs to the Cave House...the journey downward begins; passing through a trap door in the floor of the cave house, we descend by very steep stairs for about 50 feet feeling our way through the darkness. ...Now as to mineral development in the cave, I find they have done considerable work in opening passages so that tourists can pass through without crawling as they did at first, but I do not find any shafts have been sunk or tunnels driven into the rock as is usually done when in search for precious metals, and I take assessment work to mean mineral development.<sup>89</sup>

## LANDSCAPE FEATURES BY CHARACTERISTIC

### Natural Systems and Features

#### 'Ovens'

Many of Wind Cave's larger rooms or halls were connected by narrow crevasses and/or tunnels. These corridors were called 'ovens.' Because many of the ovens were too narrow to allow visitors to pass through comfortably, widening them was the target of early cave improvement.

### Land Use

#### Cave exploration

During the McDonald and Stabler tenure, the cave environment was systematically explored for new routes, cave rooms, and 'specimens' by Alvin McDonald and other colleagues throughout the 1890s.

#### Specimen collection

Geological 'specimens' continued to be collected from Wind Cave by the proprietors for display purposes and for sale. The sale of Wind Cave specimens was a significant portion of the Wind Cave proprietors' annual income.

#### Guided cave tours

The McDonald and Stabler families and their employees led visitors on guided tours of Wind Cave.

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<sup>88</sup> Boyd, "Report of Wind Cave Property," n.p.

<sup>89</sup> Greene, "Proposed Wind Cave National Park," n.p.

## Cultural Traditions

### Historical graffiti and autographs

Early explorers of and visitors to the cave left their names, carved, written, or burnt into the cave walls and ceilings. In what was subsequently called the Post Office, visitors left signed calling cards. This tradition was carried on until the early twentieth century when the federal government took over administration and supervision of Wind Cave.

## Circulation

### Exploration routes

By 1893, the Alvin McDonald journal had identified and named at least fifteen named routes that he and others explored including the Coliseum, Castle Garden, High, Sampson's Palace, V.I.A., Upper Specimen, Cataract, Bee Hive, Mausoleum, Crystal, Guide's Discovery, Monument Hall, Snow Ball, Specimen, and Wind River routes.

### Guided tour routes

The McDonald and Stabler families and their employees led visitors on specific guided tour routes. By 1893, there were three guided tour routes for visitors including the Garden of Eden, the Fair Grounds, and the Pearly Gates.

### Ladders

Wooden ladders were used to descend from the cave entrance structure down the initial hundred feet of the cave. Ladders were also used in other places in the cave.

### Hand rails

By 1898, Lucius Boyd noted that wooden handrails were used in certain areas of the cave.

### Climbing ropes

Ropes were used to descend particular areas of the cave in the early 1890s.

### Cave improvement

The McDonald and Stabler families made substantial 'improvements' to Wind Cave during the 1890s. These improvements included blasting, drilling, hammering, chiseling, and subsequent clearing of debris in cave passages to make them wider or taller, and generally more accommodating to visitors.

## Small-scale Elements

Cave lighting	During the seasonal opening of the cave in May of 1893, portions of the interior were temporarily lit by candles.
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## PARK ESTABLISHMENT AND EARLY DEVELOPMENT, 1903–1928

*See Figures 2-9 through 2-25, including photographs of development associated with the cave and the park. Also, see Map 2-2 Circa 1913 Period Plan.*

### INTRODUCTION

The years immediately following the establishment of Wind Cave National Park may be characterized under caretaker status. The park budget for the first few years was only enough to repair and maintain the cave facilities. While a new Superintendent's Residence was built and roads maintained, little money was left for additional new facilities construction. In 1912, the Wind Cave National Game Preserve was established and the first small herds of bison, elk and antelope were subsequently sent to the park. The Game Preserve was managed by the U.S. Biological Society, Department of Agriculture, and a headquarters for the Warden on the northern boundary of the park was renovated and improved.

### HISTORIC CONTEXT

#### Surface History

On January 9, 1903, President Theodore Roosevelt signed into law legislation creating Wind Cave National Park, making it the eighth national park to be established, and the first created to protect a cave resource. The property contained in the new park encompassed 16½ square miles or approximately 10,522 acres, and incorporated T6S, R5E Sections 1-3, 10-14; T5S, R5E Sections 34-36; T6S, R6E Sections 6-7; and T5S, R6S Section 31. Included within the boundaries were 320 acres initially set aside for school lands, and approximately 719.39 privately held acres. William A. Rankin was appointed the park's first superintendent.<sup>90</sup>

The first Annual Report for Wind Cave in 1903 describes the deteriorating facilities that the federal government inherited.

I found the entrance to the cave, which is in the bottom of a deep ravine or gulch protected by a good, log house 16 x 12 feet in dimension, and by cracks being pointed and walls whitewashed once a year will keep the building in fairly good condition for years. The dwelling house, or hotel (as it is called) is a one and a half story building 22 x 33 feet with two wings one on either side 18 x 33 feet; there has never been anything done to the house, only boarded and battened with rough lumber on the outside, and the partitions on the inside consist of a few studing [sic] cheese cloth and building paper. The roof on wings leaks badly. A

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<sup>90</sup> Long, "Historic Contexts," 25, 27.

great many of the windows are broken and boards nailed over them. The house had been built about ten years, and was never much of a house. The condition of the building both inside and out is bad. It stands on the brink of the ravine and a worse place for a building would be hard to find. Facing the house less than fifty feet away...an old board stable or barn built about ten years ago attached to it was a pig pen, cow shed, chicken coop, etc. Cattle are allowed to roam at will around the place, as there is no fence to keep them away. The roads through the Park are in bad condition in a great many places being washed out and very rough. The bridges, which are four in number, are all unsafe to drive over, one being broken so teams have to go around a considerable distance. Water is the most difficult thing to contend with here. As all water has to be hauled two and one half miles, none being available nearer.<sup>91</sup>

Immediate work at Wind Cave that was accomplished by Rankin in 1903 combined both necessary repair and aesthetic considerations. A stone 'high water wall' was built adjacent to the opening of the cave to prevent water running down Wind Cave Canyon from pouring in. In addition, "the old barn, which had stood so unpleasantly near the hotel, was moved 500 feet, or about 200 yards from the cave entrance to a location approximately that of the present administration building. The barn and corral were to remain here for a number of years."<sup>92</sup>

Rankin was also given an appropriation of \$2,500 for the fiscal year. This appropriation was slated for

fencing in the buildings now on this park. These buildings consist of the boarding house and a barn. The barn standing there at present is the property of C.L. Jensen of Hot Springs and it is probable that the government will build a stable of its own. It is quite likely that the entire park will be fenced ultimately. The first fences to be built will take in about two or three hundred acres. The grazing of sheep and cattle on the lands of the park are prohibited except under special authority from the Secretary of the Interior.<sup>93</sup>

After George Stabler left Wind Cave National Park in October of 1903, William Rankin and his wife moved into the Wind Cave Hotel building and lived there until 1905 when their own residence was constructed. His wife continued to use the hotel to serve meals to visitors.<sup>94</sup>

Improvements to the surface facilities of Wind Cave National Park continued throughout the first decade of its operation. In 1904, the Headquarters Area was completely fenced. This area included a half square mile area. In addition, a 150-barrel cistern with eaves and a pump was also constructed. Roads and bridges were repaired and minor repairs were made to the cave house. A year later, he opened a small stone quarry and built a six-room superintendent's house. The house was located on a small bluff south of the main road overlooking the Wind Cave Hotel.<sup>95</sup>

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<sup>91</sup> Bohi, "Seventy Five Years," 421-422.

<sup>92</sup> Bohi, "Seventy Five Years," 423.

<sup>93</sup> *Hot Springs Star*, July 31, 1903.

<sup>94</sup> William A. Rankin to Secretary of Interior, May 9, 1906. [Stabler Hotel]. Stabler Claims #7, F Ref 1900. Ms. on file at the Library Collection, Wind Cave National Park.

<sup>95</sup> Bohi, "Seventy Five Years," 423-424; Long, "Historic Contexts," 36.

In 1906, regular maintenance of facilities, including grading of roads and repair of bridges, continued. During the same year, William A. Rankin purchased the J.C. West property, north of and adjacent to the north boundary of Wind Cave National Park. A report on a hydrographic survey of the Wind Cave property stated that "the park is poorly supplied with water. ... There is little opportunity for surface stream flow, and the ground-water level being low, shallow wells are of as little avail as the ravines." Cleophas O'Harra, the report's author, recommended the further development of local springs within the park. Shortly after O'Harra's report was received in 1906, a water line from Beaver Creek was surveyed and excavation of a trench was begun across Rankin's property to the park office (Superintendent's Residence). The water line and reservoir on Beaver Creek was completed in 1907. "A water and pipe system for conveying water from Beaver Creek at the northwest boundary of the park to the superintendent's office and residence building, a distance of about 2 miles, has been completed and will remedy a long felt want, as the geological formation of the land precluded obtaining water by means of artesian wells, and there is no other sources of supply except a spring located on patented land in the park."<sup>96</sup>

Surveyors from the GLO surveyed the new National Park in 1906, providing it with its first formal map. The map portrays limited topography and vegetation, two springs to the west of the cave entrance in Section 2, and an elaborate road system spanning the park (see *Figure 2-9*).<sup>97</sup>

Based on information provided by the park superintendent, the Department of the Interior ruled in 1908 that grazing would not be allowed within the boundaries of Wind Cave National Park. In that year's report, Rankin noted that the "recent order forbidding the grazing of cattle in the park is meeting with little opposition." However in order to enforce the new order, he recommended that "the whole of Wind Cave be fenced...as all or practically all of the park is surrounded by free range and the cost of hiring men to round up and impound stock in the park would be greater than the cost of fencing it." Like the barn before it, the Wind Cave Hotel was quickly becoming an eyesore and the new park did not receive adequate funds to renovate the aging structure. "The old building built in 1893 [sic. 1892] by J. Stabler and sons and which is now used by Mrs. Rankin for a hotel is in a very dilapidated condition and should in my opinion be torn down and removed, it is an unsightly object and tourists often make slighting remarks about it."<sup>98</sup>

In 1909, substantial maintenance and improvement work was accomplished in the Headquarters Area: "The office building has been equipped with eave troughs and tile piping laid to drain water from the building. Native trees have been transplanted to the grounds surrounding the superintendent's office and are doing well. Water has been piped to convenient points on the lawn to water same." In addition, a new roof was put on the north wing of the Wind Cave Hotel and the windows were replaced. The structure covering the opening to Wind Cave was also substantially improved. "The cave house has been remodeled, sealed on inside, ceiling raised 2

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<sup>96</sup> Bohi, "Seventy Five Years," 425-426; Cleophas O'Harra, "Report on a Hydrographic Survey of the Wind Cave National Park, Wind Cave, South Dakota," November 5, 1906. Cave Geology and Surveys, 1898-1906 #18, F Ref 1900, n.p. Ms. on file at the Library Collection, Wind Cave National Park; Superintendent's Annual Report (SAR), Wind Cave National Park, 1907.

<sup>97</sup> Secretary of the Interior, "Report on Glacier, Wind Cave, and Platt National Parks, Sullys Hill Park, Casa Grande Ruin, Muir Woods, Petrified Forest, and other National Monuments" (Washington: Government Printing Office, 1910), 10-11.

<sup>98</sup> SAR, 1908.

feet, weatherboard outside, conveniences for tourists arranged inside, painted outside, etc.” The wooden stairway leading from the hotel down to the cave house was replaced and a new 10 x 10 foot log blacksmith shop was constructed “near the cave house.” The gates on the north and south entrance to the park were replaced, the “old ones so far gone as to make repair impossible.” Road maintenance continued to be a perpetual problem. As Rankin reported, “one abutment of the first bridge south of the cave was washed out requiring a temporary road to be constructed around the same. A new set of piling was put in with new bulkhead, and same repaired in good condition for the season.” Perhaps in response to public outcry, the Department of the Interior reversed its decision of the previous year and permitted the grazing of stock on Wind Cave National Park lands.<sup>99</sup>

In 1909, the GLO resurveyed the Township and Ranges encompassing Wind Cave National Park for the purposes of a boundary study. The new survey maps, some prepared only ten to fifteen years after the original late nineteenth century surveys, show significant changes.<sup>100</sup>

In March 1910, a fire “covering a quarter of the area of the park” swept through the park. Fortunately little damage to the park facilities was reported. During the same year, a stone wall “of rough ashlar construction” was built fronting the road at the Superintendent’s Residence to prohibit “soil washing to such an extent as in the past.” The lawn between the wall and the residence was filled and graded with plans made to seed the area to grass, and to plant a variety of shrubs and trees. Simultaneous with the new wall construction, a concrete walk and steps “leading down from the residence to the driveway in front of it” was completed. The superintendent reported that “all material such as rock, sand, gravel, etc. used in construction of both wall and concrete walk was quarried and dug on the park near the superintendent’s residence.” Additions to the existing water and sewer system included the construction of a concrete water trough “near the storage tank of the water system in the park,” and a privy “built for the convenience of visitors.” A new bridge was constructed to replace an old one south of the cave.<sup>101</sup>

In 1911, Alden Loring, a representative of the American Bison Society, visited western South Dakota in an attempt to find an appropriate range for a new bison herd. His report of the same year concluded that Wind Cave National Park was “suited for buffalo, elk, deer, antelope and mountain sheep, all of which in bygone years lived here.” His report also contained two maps of Wind Cave National Park, the 1906 GLO survey, and a less formal plan map of the park documenting vegetation, water sources, and potential grazing areas (see *Figures 2-9 and 2-13*).<sup>102</sup>

The following year, on August 10, the Wind Cave National Game Preserve was established “for a permanent national range for a herd of buffalo to be presented to the United States by the American Bison Society, and for such other native American game animals as may be placed therein.” The new Game Preserve was to be managed by the U.S. Biological Society which was

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<sup>99</sup> SAR, 1909.

<sup>100</sup> Western History Research, “Land Study,” 57.

<sup>101</sup> SAR, 1910.

<sup>102</sup> J. Alden Loring, *Report on Certain Lands in South Dakota Suitable for a Buffalo and Game Reserve* (Boston: Poole Printing Co., 1911), 11.

part of the Department of Agriculture. Wind Cave National Park, via the Biological Society, received \$26,000 to establish the Game Preserve.<sup>103</sup>

In 1911, two flagpoles were erected within the park, one at the Superintendent's Residence and a second at the south boundary of the park. A new barn "for the use of the superintendent" was built, the existing driveway to the Superintendent's house was widened, and the lawn in front was seeded and a total of fifteen young trees were planted. The following year, three new bridges were built within the park "and one more will have to be built this fall. When this bridge is finished all the bridges in the park will be in good condition, there being only four in the park." For the first time, the road and parking area in front of the Wind Cave Hotel was expanded and drainage improved. "The Wind Cave hill was graded and made enough that 2 hacks or automobiles can pass at any point on it. Ditches were dug on both sides of the road to carry off the water and culverts put in where they were needed." New fences were built surrounding the "intake to the water system and also a spring near the Superintendent's house."<sup>104</sup>

After several years of negotiation with the federal government, South Dakota relinquished all rights to over 60,000 acres of timberland within the Black Hills Forest Reserve in exchange for nearly 50,000 acres of forest in Custer County and about 12,000 acres in Harding County. Together, these two parcels were designated Custer State Forest in 1912. The name was subsequently changed to Custer State Park.

At the Wind Cave National Game Preserve, work in preparation for the arrival of bison and other animals was proceeding. In 1913, work was initiated on a fence to encircle a 3,400 acre pasture. The fence was made of woven wire and stood eighty-eight inches high. Prior to the completion of this fence, a temporary range enclosing approximately fifty-five acres was fenced for the buffalo. "This was in the northern part of the park and west of the main road which passes the entrance to the cave." By late 1913 the temporary range was ready for occupancy." By the end of the year, a herd of fourteen buffalo had come to the Game Preserve from the New York Zoological Society. A year later, the initial herds of twenty-one elk and ten antelope were secured. When it was acquired in 1913 the Game Preserve headquarters, the former Rankin ranch, were dilapidated and included "a ranch house, barn, and a lot of old, broken down fences. The house was the one that was built in early days, by Jonathan West. ...It was made of sawed logs, but had been stripped and weatherboarded by some of the subsequent owners. The barn was constructed of the same material. The buildings are situated upon a bench of nearly level land, surrounded on the north and west by high hills, and open to the east. To the south is Cold Springs Creek and the game inclosure [sic]." Renovations funded by the U.S. Biological Society between 1913 and 1915, however, were substantial. "...Since the government took hold of the property, which was in 1913, the house has been repaired, and one new room built on. A cellar, with cement walls, under the house has been constructed. A cement foundation was put under the house. The fences were all rebuilt, the rock piled up, and everything in general was put in order." Improvements in the larger landscape were also implemented. "There is one small pasture, inclosed [sic] by a four wire fence, containing about eight acres, and the other three are also fenced off with a substantial wire fence. These fields are planted to alfalfa. Other improvements around headquarters are a granary, a milk house, and wagon and implement shed. A good deal of

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<sup>103</sup> Long, "Historic Contexts," 32.

<sup>104</sup> SAR, 1911, 1912.

money has been spent on constructing drift fences to hold the flood waters, but this work has all been in vain, as the volume of water, in time of water spouts, is so great that no fence can be constructed that is sufficient to hold it. A cement tank was constructed near the center of the game pasture, which furnishes some water, but there is not enough flow to make water for everything.”<sup>105</sup>

At the park headquarters, the Wind Cave Hotel was finally razed in 1913. In its place, construction of a new Registration Office and dressing room, “one story high, shingled, painted and sided,” was begun. During the same year, a new telephone line was erected “from the south boundary of the park to the superintendent’s house.” The following year the Registration building was “enlarged and reconstructed,” and a small rectangular open pavilion was constructed north of the cave entrance. The pavilion was built “expressly for the use of long distance tourists, who necessarily have to stop at headquarters and lunch in order to take the time to see the cave.” In addition, the four year old blacksmith shop was moved to the rear of the carpenter’s shop, and a roof was placed over both structures. A mile of new fencing was erected on the east side of main road “on account of [the] new reserve fence.” A new short section of water pipe was laid “from the yard of [the superintendent’s] residence across the road to a trough” in the Wind Cave pasture. During the year, the first permits were issued for grazing on Wind Cave National Park lands. In 1915, an ice house, 12 x 12 and 10 feet high was constructed within Headquarters Area. In addition, a new underground stone reservoir “1 foot thick with capacity of 450 barrels,” was constructed. The reservoir was connected to “a new sanitary drinking fountain, near [the] public building and the former by drains and outlets in yard and residence. ...The new reservoir is located 70 feet above and 300 feet distance from the park residence.” The water line between the Superintendent’s Residence and the pasture, built in 1914, was taken up “due to freezing and busting.”<sup>106</sup>

During the 1910s, the Department of the Interior began emphasizing the improvement of Wind Cave National Park’s existing road system in response to the growing impact of automobiles on park visitation and facilities. Prior to 1907, all passengers had arrived at the park via horse-drawn private carriage or livery. In 1907 the first permit was issued for an automobile to transport passengers to and from the park. Only four years later, statistics reflected that a majority of the visitors who came to Wind Cave arrived by automobile. In 1914, the primary roads in Wind Cave National Park were described: “There is but one main road through the park and this crosses from north to south about through the center and passing headquarters. ...This road is of dirt composition and in fair condition, much better than the public road immediately adjacent to the park either north or south. Traffic is mostly by automobile and is increasing yearly and rapidly.” In the same year, one and a half miles of road “wholly reconstructed upon a 3% grade with ample width for passing traffic,” and three new bridges were constructed. Two years later, a log and plank bridge was built “near [the] north line of park crossing Wind Cave Creek.” In addition, three stone culverts, “8 or 10 more of which should be built,” were constructed at unnamed locations. Following other states, in 1916 South Dakota created the State Highway

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<sup>105</sup> Long, “Historic Contexts,” 32; Kim Mogen, “A History of Animal Management at Wind Cave National Park,” May 1977, n.p. Ms. on file at the Library Collection, Wind Cave National Park; Clara Ruth, “History of the Wind Cave National Game Preserve, South Dakota,” 1921. Reservation History #10, F Ref 1912 B1. Ms. on file at the Library Collection, Wind Cave National Park; A. P. Chambers, “Improvements,” n.d. Reservation History #10, F Ref 1912 B1. Ms. on file at the Library Collection, Wind Cave National Park.

<sup>106</sup> Long, “Historic Contexts,” 36; SAR, 1913, 1914, 1915.

Commission to take advantage of federal monies for highway construction. By 1917, a majority of the major roads within Wind Cave National Park had been improved. This work included shaping and smoothing, reduction of grades, reduction or elimination of curves, and general clearing of loose rock.<sup>107</sup>

At the Game Preserve, the Warden's cottage was fenced and an access road was built from the main road to the barn. An additional 200 yards of barbed wire fencing was erected around a field adjacent to the Warden's cottage "for cropping purposes." On Beaver Creek, a cement causeway was constructed "where the creek runs under the preserve fence." Regular repairs were made to the main preserve fence and a "good fire guard, two rods wide" was cut "along the western boundary of the fence where it passes through the timber. It has been made 8 feet wide on the prairie ground." The following year, a new woven wire hay corral, "7 feet 8 inches high, with cedar posts 12 feet apart," was built adjoining the barn. In addition a pole pen, "consisting of 17 panels, five poles high, built of six inch poles 22 feet long" was constructed around a spring inside the game pasture "to keep game from miring down." The cultivated fields appear to have been quite successful as it was noted that seventeen tons of native hay and three tons of alfalfa were put up in the fall for the Warden's horses and the Preserve's animals.<sup>108</sup>

The National Park Service (NPS) was created on August 25, 1916. As part of the establishing legislation, grazing of live stock was to be permitted on park lands "where such use will not interfere with the primary purpose for which the park was created." The following year, the NPS solicited answers to questions regarding grazing in each park. In response to the NPS's request, the current superintendent of Wind Cave National Park, T.W. Brazell, gave his opinion: "The grazing of stock on the park has not in any way interfered with campers or visitors. Our visitors are mostly to see the cave, and no parties camp anywhere on the park except near headquarters. Range stock is kept away from headquarters by [Forest] Supervisor and do not bother much after being driven away a few times. We have a pasture on east side of and paralleling road, for a distance of half mile, and the Game fence is on the west side of the road, and it is seldom that cattle or horses come within this lane. The Game fence and Park pasture (about 100 acres enclosed) are I think sufficient." During the same year, however, Brazell recommended the construction of a dam to impound water from an unknown spring "on the grazing range in the park," for the benefit of local ranchers. The dam, "which create[d] a lake about 3 miles in extent," was completed in 1918.<sup>109</sup>

Due to a controversy over past management practices by the current superintendent, Wind Cave National Park was inspected by Department of Interior officials in late 1917. The report provided an accurate documentation of the existing facilities. The inspector, C.B. Trowbridge, recorded that the major structures included a

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<sup>107</sup> Long, "Historic Contexts," 38; Historic American Engineering Record (HAER), "Beaver Creek Bridge." No. SD 53, 2003, 3; HAER, "Wind Cave National Park, Roads and Bridges." SD 55, 2003, 15, 17; SAR, 1914, 1916.

<sup>108</sup> U.S. Department of Agriculture, Bureau of Biological Survey, Warden's Annual Report (WAR), Wind Cave National Game Preserve, FY 1916, n.p. Ms. on file at the Library Collection, Wind Cave National Park.

<sup>109</sup> Joseph J. Cotter to T.W. Brazell, April 11, 1917, [Grazing Policy Review]. Grazing Permits #4, F Ref 1914 B1. Ms. on file at the Library Collection, Wind Cave National Park; T. W. Brazell to Superintendent, National Parks, April 17, 1917, [Grazing Policy Review]. Grazing Permits #4, F Ref 1914 B1. Ms. on file at the Library Collection, Wind Cave National Park.

...superintendent's residence: A one and a half story bungalow, constructed of stone, with a shingle roof. An addition constructed of pine and just completed at a cost of \$1,200. House is in good condition. ...Barn: A two story frame barn, nearly new and in good condition. ...Administration Building: In fairly good condition. ...Ice House: A small frame building used as an ice-house and located about 150 feet south of the residence. ...Chicken house and sheds: There are several old shacks and sheds, one of which is used as a chicken house, located near the barn; should be torn down. ...Pavilion for Visitors: This is a small building without sides and is in good condition. It is used by people camping near the headquarters. ...House at cave entrance: Small wooden structure. ...At the present time there is erected in the Park a frame house, dimensions about 12 x 20, with shingle roof, and located about 300 feet from the residence of the superintendent. This building is the private property of Emmett Logue who has been employed at different times during the past year as a laborer and mechanic in connection with the park administration. He resides in this house with his family. ...Mr. Brazell explains the building will be removed in the spring.

The park also apparently had a substantial animal population. "The superintendent has at the present time 100 chickens, 1 horse, 2 calves, 2 cows, 2 yearlings, and a few hogs. During the past year he had 18 head of cattle, which were kept in the park corral. Emmet Logue, temporarily employed as laborer, has seven head of horses and colts which are also kept in this corral. There should be no stock kept on the park territory, except cattle which are kept there under permits and necessary stock for the personal use of the superintendent."

Trowbridge also described the informal area designated as a camping and picnic grounds. This area, he noted, was "situated about 300 feet from the administration building [and] is the location set aside for campers and a small pavilion is constructed at this point. The camping ground is in [a] filthy condition, showing clearly that cattle frequent the place, and in the gully below the pavilion there was an accumulation of old rags, tin cans, and refuse left by campers." The informal camping and Picnic Area was to receive little attention from park officials throughout the 1910s and 1920s. Trowbridge further recommended replacing all of the old wooden bridges with culverts, fencing the Alvin McDonald statue and grave with a new iron railing "in place of the present wood fence," and installing a new bridge "from the administration building across the gully to the location of the grave," to replace an older aging one. Summarizing his concern for the park, Trowbridge noted that "the premises surrounding headquarters resemble more an ordinary farm-yard than a National Park and was not in a condition one would expect to find."<sup>110</sup>

Improvements of the physical facilities continued in 1918. A two-room addition onto the Superintendent's Residence was constructed along with "modern septic sewer vaults." A corral, presumably adjacent to the barn, was also constructed. A new footbridge leading "across the gulch, from administrative building to [the McDonald] statue, was built and painted," an two-rail iron fence was erected around Alvin McDonald's statue on the bluff overlooking the cave entrance, and a similar two-rail iron fence was erected from the Administration Building north to

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<sup>110</sup> C. B. Trowbridge, "Report on Inspection of Wind Cave National Park, South Dakota," January 15, 1918. Investigations #5, Part 1 of 2, F Ref 1914 B1, n.p. Ms. on file at the Library Collections, Wind Cave National Park; SAR, 1926.

a bridge. A cement walk around the Superintendent's Residence, a cement cross walk across the main road, and a cement "driveway or platform" in front of the Administrative Building were also built. Fencing was erected around the Superintendent's Residence yard and a total of 3 miles fencing was erected "on [the] park range." A fire, attributed to lightning, burned approximately fifty acres of Game Preserve pasture. One of the log bridges in the park was replaced by a "permanent earth fill and masonry arched culvert for spillway, and quantities of rock have been hauled for similarly improving other crossings." Between 1922 and 1923, all of the old bridges within the park were replaced. "We have substituted permanent fills and culverts for bridges on our road. The heavy fills were expensive and took most of our road allotment. This leaves our road in poor condition." The lack of adequate funding meant that the culverts, while better than bridges, were still inadequate. "These fills are too narrow and are not up to grade nor are they properly finished to withstand rainy weather conditions."<sup>111</sup>

An inspection report of the Wind Cave National Game Preserve recorded that the Warden, A.P. Chambers, kept two dairy cows, a number of calves, and several "steers for meat." The Paulson and Prather properties were purchased in 1918 to extend the bison range. Of these two new properties, "the buildings on the Prather place are practically in ruins and under existing conditions are not worth replacing. But the buildings on the Paulson place are in good repair." The following year, the fence height surrounding the well on the Ottman property was increased. In 1919, a 250 foot trench was dug from a well to the fenced pasture. By 1920, construction had begun on retaining walls for the installation of floodgates on Beaver Creek. The following year, a cement water tank "at [the] spring near center of game pasture," was constructed. The spring also cleaned out and rewalled. A small spring house was also built at the Headquarters Area. In 1921, the Game Preserve road system was described. "There is but one main road with two or three side branches in the park." Where the roads crossed the creeks, the crossings were cemented.<sup>112</sup>

In 1919, Custer State Park was expanded to encompass former National Forest lands, including Sylvan Lake, Harney Peak, and the Needles. During the same year, construction began on South Dakota Highway 36, a road that subsequently crossed Wind Cave National Park in an east / west direction, and South Dakota Highway 81 or the Needles Highway. The two highways were completed by 1921.<sup>113</sup>

In 1919, the 'Wind Cave' sign on the slope behind the cave entrance was constructed of large white painted rocks. The annual report described it as "a great benefit to the traveling public." A year later, an Executive Order added 480 acres to Wind Cave National Park and Game Preserve "to protect the water supply for Bison range and grazing interests. A drift fence has been erected around these lands." A private telephone line was erected from headquarters "to the home of the warden of the Game Preserve, about 2 miles." During the same year, approximately 811 head of cattle were recorded as grazing on Wind Cave National Park lands.<sup>114</sup>

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<sup>111</sup> Long, "Historic Contexts," 36; SAR, 1918, 1920, 1922, 1923.

<sup>112</sup> U.S. Department of Agriculture, Bureau of Biological Survey, Game Preserve Inspection Report, 1918, 2-6. Inspection Report #4, F Ref. 1912 B2. Ms. on file at the Library Collections, Wind Cave National Park; WAR, FY 1918, FY 1919, FY 1920, FY 1921; Ruth, "Wind Cave National Game Preserve," n.p.

<sup>113</sup> HAER, "Pigtail Bridge," No. SD 54, 2003, 6.

<sup>114</sup> Western History Research, "Land Study," 47; SAR, 1920, 1921; National Park Service, Wind Cave National Park website, Wind Cave National Park Time-Line, ([http://www.nps.gov/wica/WICA\\_Time\\_Line.htm](http://www.nps.gov/wica/WICA_Time_Line.htm)).

Beginning in 1921, work was begun on extending South Dakota State Highway 81 in Custer State Park southward towards the northern boundary of Wind Cave National Park. After the completion of its new road system within Custer State Park, South Dakota began to offer camping facilities that catered to automobile visitors. The construction of improved roads on surrounding non-federal lands had an important impact on road construction within Wind Cave National Park. Between 1924 and 1926, the NPS funded the reconstruction of the entire park road system within Wind Cave National Park. Much of this work included widening, straightening and surfacing the road. In 1925, the annual report noted that “the entire park road is being built this year to conform with roads to north and south of the reserve. It will be finished and in fine condition for season of 1926.” The following year the construction was largely completed. “We now have a road on which all grades have been appreciably lessened, whose curves have their radii greatly lengthened, and which have been materially widened at all points, thus providing a safety factor in the heavy travel we are experiencing.”<sup>115</sup>

Only minor construction took place at park headquarters in the mid-1920s. In 1923, a temporary structure operated by the park concessionaire, Mr. Fuson, was constructed. This structure, “a floored frame structure with a canvas roof,” was located “near the cave entrance on the north side of the superintendent’s office,” and was the park’s first experiment in refreshment concessioning. Despite a lack of funding, in 1924 the superintendent found it necessary to build “a small ranger cabin to house the additional employees required to handle the increased number of visitors.” During the same year, “additional water storage facilities” were also constructed. The following year, “a new house over entrance to the cave” was constructed, presumably replacing the McDonald era log and frame structure.<sup>116</sup>

The mid-1920s marked the beginning of a significant period in the development of the Game Preserve. In 1924, the Game Preserve began selling live surplus buffalo as meat, hides, horns, and other bi-products, based on the success of the bison population and the limited carrying capacity of its pastures. To prepare for the sale, the Warden constructed ‘catching pens,’ a temporary slaughter house, and scaffold for hanging the animals. After completing the pens and associated structures in 1924, the park continued general maintenance on the fence and surrounding preserve. In the same year, cement foundations were put under the barn and other outbuildings.<sup>117</sup>

A 1924 inspection report for the Game Preserve focused on developing an aesthetically pleasing landscape that included native vegetation, with a goal of establishing a more diverse biological habitat.

Advised Chambers to put in an estimate for a horse pasture fence of barbed wire so the horses can be kept out of the small area along Cold Springs Creek opposite the headquarters where it is planned to extend the shrub growth and put in three acres of grain to encourage the presence of quail and other birds. ... Took up needed tree and shrub planting around the headquarters. Went over the location of the proposed chicken house and yard, also an icehouse for meat storage and a

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<sup>115</sup> HAER, SD-54, 6; Long, “Historic Contexts,” 40; HAER, SD-55, 26; SAR, 1925, 1926.

<sup>116</sup> Bohi, “Seventy Five Years,” 442-443; SAR, 1923, 1924, 1925.

<sup>117</sup> WAR, FY 1924, FY 1925.

smoke house for smoking and drying meat. Took up the question of the location of three small loose stone dams in Cold Springs Creek to increase the water area for birds and to develop ice cutting areas where ice can be cut for a small cold storage plant. ...Added cover can be created by planting of three-lobed sumach, gooseberry, buffalo berry, rose, choke cherry and service berry. Clump plantings of these shrubs should be located on the hill opposite the house and a hedge of sumach should be placed along the fence opposite the house. There should be a planting of wild plum and choke-cherry along the fence south of the garden. A wild rose hedge along the fence in front of the house, a gooseberry hedge along the fence east of the house and an asparagus patch should be placed south of the small ditch east of the milk house. ...Materials can be secured from the buildings we own on the Beaver Creek ranches to build a half cellar chicken house on the south exposure east of the barn. Chambers thinks he can get together enough scrap wire for a chicken yard fence. ...I advised Chambers to look up suitable building stone with a view to building the proposed garage of stone.”<sup>118</sup>

By 1925, many of the inspector’s recommendations had been funded and implemented. According to the annual report, over 200 rods of new fence were erected “on Beaver Creek for a horse and cow pasture.” In addition, “a hedge of wild roses was planted on the fence line in front of the warden’s cottage.” The following year, a new smoke house/tool house was completed at Headquarters Area and “two long wings were added to the catching corrals, making it much easier and safer to corral elk.” By 1926, construction was begun on a new large pasture of approximately 3,600 acres for the game animals. Yet another pasture, completed in 1928, was located on the east side of Wind Cave National Park allowing the Warden to increase the number of bison, elk and antelope.<sup>119</sup>

## LANDSCAPE FEATURES BY CHARACTERISTIC

### Spatial Organization

#### Withdrawal of lands

As lands that were to compose Wind Cave National Park were gradually withdrawn from settlement by the GLO, formal occupation of the park lands surrounding Wind Cave significantly decreased.

### Land Use

#### Settlement

The Homestead Act of 1862 and the Desert Land Act of 1877 continued to encourage European-American settlement of the Black Hills.

#### Grazing

In the southern Black Hills, ranches were established on public land adjacent to the lush grassy plains. Cattle, and to a lesser degree sheep,

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<sup>118</sup> U.S. Department of Agriculture, Bureau of Biological Survey, Game Preserve Inspection Report, 1924, 4-6, 8. Inspection Report #4, F Ref. 1912 B2. Ms. on file at the Library Collections, Wind Cave National Park.

<sup>119</sup> WAR, FY 1925, 1926; SAR, 1927; Long, “Historical Contexts,” 44.

grazed these open ranges. These ranches continued to operate during federal tenure of Wind Cave, and the park was required to fence their property to keep cattle from entering the Headquarters Area.

Agriculture	While the arid environment of the Black Hills and the lack of dependable water resources made it a difficult place to plant crops, many settlers did cultivate a few fields of crops, predominantly for home consumption and the use of livestock.
Prospecting	Settlers in the Wind Cave vicinity continued to prospect for valuable minerals during the first quarter of the nineteenth century.
Visitation	Visitation to the park was continued under federal tenure of Wind Cave. No entrance fee was charged, but visitors were required to pay the guides to enter the cave.
Human burial	The Wind Cave property continued to be used for burial purposes.

### **Cluster Arrangement**

Cave opening cluster	The cave opening cluster continued to be developed and improved upon with the primary focus being facilities that served the visiting public. In addition to the McDonald/Stabler era structures, additional buildings were also erected.
Hillside cluster	Beginning with the construction of the Superintendent's Residence in 1905, a new cluster was begun on the hillside above and south of the cave entrance.

### **Circulation**

Wagon roads	A 1906 GLO survey of Wind Cave National Park documents a number of wagon roads crossing the property. Many of these roads followed the natural topography and proceeded in a general northwest/southeast direction.
Bridges repaired and rebuilt	The four wooden bridges that spanned narrow canyons on roads within Wind Cave National Park were regularly repaired and maintained. In 1910, one bridge located just south of the cave was

	entirely rebuilt. In 1912, the three remaining bridges were entirely rebuilt.
Stairway replaced	The wooden stairway connecting the Wind Cave Hotel to the cave house was entirely rebuilt in 1909.
Gates replaced	The gates at the north and south entrances to the park were replaced in 1909.
Walk built	A concrete walk and steps leading from the Superintendent's Residence to the main road was constructed in 1910.
Driveway widened	The superintendent's driveway was widened in 1911.
Parking area and road widened	The road and parking area in the Headquarters Area was widened in 1911 and drainage ditches and culverts were dug along the sides.
Road improved	One and one half-miles of the main road through the park was "wholly reconstructed upon a 3% grade with ample width for passing traffic" in 1914.
Bridges built	Three new bridges were built in the park in 1914.
Log and plank bridge built	A new log and plank bridge was built in 1916 "near [the] north line of park crossing Wind Cave creek."
Access road constructed	A new access road was constructed leading to the barn at the Game Preserve headquarters in 1916.
Cement causeway built	A cement causeway was built "where the creek runs under the preserve fence" at the Game Preserve in 1916.
Footbridge built	A new footbridge leading "across the gulch, from administrative building to statue" was built in 1918 to replace the older footbridge.
Cement driveway and cross-walk built	A cement cross-walk across the main road, and a cement "driveway or platform" in front of the Administration Building were built in 1918.
Culvert built	A permanent earth fill and masonry arch culvert was built to replace a log bridge in the park in 1918.

Culverts built

All of the old bridges within the park were replaced with culverts between 1922 and 1923.

Road improved

The main road through the park was entirely reconstructed between 1924 and 1926. The work included widening, straightening, and surfacing the road.

## Vegetation

Lawn seeded

The area in front of the new Superintendent's Residence was graded and seeded as a lawn in 1909.

Shrubs and trees planted

Native trees "were transplanted to the grounds surrounding the superintendent's office" in both 1909 and 1910.

Trees planted

A total of fifteen 'young trees' were planted on the lawn in front of the Superintendent's Residence in 1911.

Pasture established

A small, eight-acre pasture was fenced at the Game Preserve headquarters in 1913.

Crop fields established

Three small fields were fenced and planted in alfalfa at the Game Preserve headquarters in 1913.

Pasture established

A small pasture was established at the Wind Cave Headquarters Area in 1914 for the use of domestic animals. The pasture enclosed approximately 100 acres and was located on the east side of the main road.

Field established

Two hundred yards of barbed wire fencing was erected around an unknown field adjacent to the Warden's residence "for cropping purposes" at the Game Preserve in 1916.

Fire guard established

A two-rod-wide fire guard was cut outside of and adjacent to the western boundary of the Game Preserve fence "where it passes through the timber" in 1916.

Pasture established

A horse and cattle pasture was fenced in 1925 adjacent to Beaver Creek in the Game Preserve.

Rose hedge planted  
A hedge of wild roses was planted on the fence line in front of the Warden's residence at the Game Preserve in 1925.

## **Buildings and Structures**

- Homestead settlement  
A typical homestead settlement included a primary residence and one or more outbuildings such as a barn, smokehouse, and springhouse. Most of these early structures would have been constructed out of logs and other materials that were readily available.
- Ranch settlement  
A typical ranch included a primary residence and sundry outbuildings, plus numerous barns and structures to shelter and manage livestock. Most of these early structures would have been constructed out of logs and other materials that were readily available.
- Barn / stable moved  
The Jensen barn / stable complex that had formerly stood adjacent to the Wind Cave Hotel was moved “500 feet, or about 200 yards from the cave entrance to a location approximately that of the administration building” in 1903.
- Superintendent’s Residence built  
A new Superintendent’s Residence was built on the hillside south of the main road overlooking the cave entrance in 1905. The structure was a shingled frame residence containing six rooms.
- Blacksmith shop built  
A new 10 x 10 foot blacksmith shop was constructed ‘near the cave house’ in 1909.
- Privy built  
A new frame privy was constructed (location not known) in the Headquarters Area “for the convenience of visitors” in 1910.
- Barn built  
A new barn was built (location not known) at the Headquarters Area in 1911 “for the use of the superintendent.”
- Warden’s residence addition built  
A one room addition was built onto the Warden’s residence at the Game Preserve in 1913.
- Granary built  
The U.S. Biological Survey built a granary at the Game Preserve headquarters in 1913.

Milk house built	The U.S. Biological Survey built a milk house at the Game Preserve headquarters in 1913.
Wagon and implement shed built	The U.S. Biological Survey built a wagon and implement shed at the Game Preserve headquarters in 1913.
Wind Cave Hotel razed	The Wind Cave Hotel was razed in 1913.
Registration office built	A new Registration Office and dressing room was built in the location of the old Wind Cave Hotel in 1913. The new structure was described as “one story high, shingled, painted and sided.”
Registration office enlarged	The Registration office was enlarged and reconstructed in 1914.
Pavilion built	A new open pavilion was built in 1914. The pavilion was located just north of the cave entrance in the Campground and Picnic Area and was built “expressly for the use of long distance tourists, who necessarily have to stop at headquarters and lunch in order to take the time to see the cave.”
Blacksmith shop moved	The four year old blacksmith shop was moved to the rear of the carpenter’s shop in 1914 and a roof was placed over both structures.
Ice house built	An ice house, 12 x 12 feet, was built within the Headquarters Area in 1915.
Frame residence built	Sometime prior to 1917, a 12 x 20 foot frame residence was built “about 300 feet from the residence of the superintendent” by Emmett Logue, a temporary employee of the park.
Frame residence razed	The frame residence of Emmett Logue is razed in the spring of 1918.
Addition, Superintendent’s Residence	A two-room addition was built onto the Superintendent’s Residence in 1918.
Temporary concessionaire structure	The park concessionaire, Mr. Fuson, built a temporary structure at Wind Cave in 1923. The building was described as “a floored frame structure with a canvas roof,” and was located “near the cave entrance on the north side of the superintendent’s office.”

Ranger cabin built

A “small ranger cabin” was built at park headquarters in 1924.

## Views and Vistas

‘Wind Cave’ sign

Between 1919 and 1928, the ‘Wind Cave’ sign on the hillside behind the Administration Building was designed to catch the attention of passing automobiles. The view of this sign, large white painted rocks spelling out “Wind Cave,” was purposefully positioned to present a prominent message to automobiles approaching from the south.

## Constructed Water Features

Cistern built

A 150 barrel capacity cistern was built (location not known) within the Headquarters Area in 1904.

Beaver Creek reservoir constructed

A new reservoir on Beaver Creek was constructed to supply water to Wind Cave National Park in 1906-07.

Water system constructed

A new water line between Beaver Creek and park headquarters was surveyed, excavated, and laid in 1906-07. An associated water storage tank was built (location not known) within the Headquarters Area.

Concrete water trough built

A concrete water trough “near the storage tank of the water system in the park,” was constructed in 1910.

Cement water tank built

The U.S. Biological Survey constructed a cement water tank “near the center of the game pasture,” in 1913 to provide water for the animals.

Water pipe laid

A short new water line was laid from the Superintendent’s Residence to a trough in the Wind Cave pasture in 1914.

Trough built

A trough was placed in the Wind Cave pasture in 1914.

Reservoir built

A new underground stone reservoir “1 foot thick with capacity of 450 barrels” was built in 1915. The reservoir was located “70 feet above and 300 feet distance from the park residence.”

Drinking fountain built	A new sanitary drinking fountain “near the public building” was built in 1915 and connected to the new underground reservoir.
Dam built	A dam was built to impound a spring (location not known) in the “grazing range in the park” in 1918. The dam was built for the benefit of local ranchers and contained a lake three miles wide.
Septic sewer vaults built	‘Modern’ septic sewer vaults were built adjacent to the superintendent’s residence in 1918.
Water line built	A 250-foot trench was dug and a water line laid from a well (location not known) to a fenced pasture at the Game Preserve in 1919.
Flood gate retaining walls built	Work was begun on building retaining walls for a flood gate system at the Game Preserve on Beaver Creek in 1920.
Cement water tank built	A cement water tank was built at the Game Preserve “at [the] spring near [the] center of game pasture” in 1921.
Spring house built	A small springhouse was built at the Game Preserve headquarters in 1921.
Smoke house/tool house built	A new smoke house/tool house was built at the Game Preserve in 1926.

### **Small-scale Elements**

Fences	Many homestead and ranch settlements contained fenced fields, and pens and/or corrals where animals could be held. After the winter of 1886-87, many ranchers also began to fence pastures for their livestock. Much of the early fencing was post and wire construction.
Stone wall built	A low, stone ‘high water wall’ was constructed adjacent to the opening of the cave in 1903 to prevent water from entering it.
Corral built	A corral was built adjacent to the barn after it was moved to its new location approximately 200 yards from the cave.

Park fence built	The Wind Cave National Park Headquarters Area of approximately a half square mile was completely fenced in 1904.
Quarry opened	A small stone quarry was opened by the government in 1905 (location not known) within the park.
Stone retaining wall built	A 200-foot-long, 7-foot-high stone wall ‘of rough ashlar construction’ was built fronting the road in front of the Superintendent’s Residence in 1910 to prevent ‘soil washing’ down the slope.
Flag poles erected	Two flagpoles were erected at the Wind Cave in 1911, one in front of the Superintendent’s Residence, and one at the south boundary of the park.
Fence built	A fence was built surrounding a spring “near the superintendent’s house” in 1911.
Telephone line erected	A telephone line was erected from the south boundary of the park to the Headquarters Area in 1913.
Game Preserve fence built	Work was begun on a fence to enclose a new 3,400-acre pasture at the Game Preserve in 1913. The fence was completed in 1914.
Temporary range fence built	A fence surrounding a temporary range of fifty-five acres was built in the northern part of the Game Preserve in 1913 in preparation for the arrival of bison.
Warden’s residence fenced	A fence was built around the Warden’s residence at the Game Preserve in 1916.
Corral built	A new cedar post and woven wire hay corral was fenced adjacent to the barn at the Game Preserve in 1916.
Pole pen built	A pole pen “consisting of 17 panels, five poles high, built of six inch poles 22 feet long” was built around a spring in a Game Preserve pasture in 1916.
Corral built	A new corral adjacent to the barn was built at Headquarters Area in 1918.

Fence built	Sometime prior to 1918, a wooden fence was built around the Alvin McDonald statue.
Fence built	A two-rail iron fence was built around the Alvin McDonald statue in 1918 to replace the older wooden one.
Fence built	A two-rail iron fence was built from the administrative building north to a park bridge in Headquarters Area in 1918.
Superintendent's yard fenced	The yard surrounding the Superintendent's Residence at headquarters was fenced in 1918.
'Wind Cave' sign constructed	The 'Wind Cave' sign on the slope behind the cave entrance was constructed in 1919 of large white painted rocks.
Telephone line erected	A telephone line was erected from the park headquarters to the Warden's residence at the Game Preserve in 1919.
Catching pens built	In preparation for the sale of bison in 1924, catching pens, a slaughter house and scaffold for hanging animals were constructed at the Game Preserve.
Catching pens improved	Two "long wings" were built onto the catching pens at the Game Preserve in 1926.
Game Preserve range fenced	Fencing of a new 3,600 acre animal range was begun in 1926 and completed two years later. The new range was located on the eastern side of Wind Cave National Park.

### **Archeological Sites**

Tobacco site (39CU3050)	The site consists of an historic artifact scatter dating to the 1920s.
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### Subterranean History

It appears the first formal federal efforts at improving the subterranean resources in Wind Cave National Park began in the winter of 1904-05. During this year, Rankin replaced a majority of the wooden ladders and stairs within the cave and repaired and improved some pathways. In addition, a new route called 'Blue Grotto,' was under development. As Rankin reported,

I have the honor to report that walks and stairways leading to the Cave have been completed as has also the stairways on the three main traveled routes in the Cave, known as the Garden of Eden, Pearly Gates, and Fair Grounds. ... The paths have been widened out and leveled up on the three main routes above mentioned, making travel a great deal easier. We are now working on what is known as the Blue Grotto and have to work on this route about one-third completed; work has been much heavier than we expected, therefore the money set aside for improvements of the Cave is insufficient to complete the work necessary to be done in opening up the Blue Grotto Route.<sup>120</sup>

Work on developing new areas for visitors to see continued through 1908. In 1907, Rankin reported that “repairing the stairs and opening up new chambers in Wind Cave in Wind Cave National Park is progressing as rapidly as possible. I have five men at work on this and they are making rapid headway. ... The new chambers which have been opened in said Cave are known as ‘The Hunting Grounds,’ ‘Coliseum,’ and five others which are yet unnamed there being seven in all.” In October 1907, an earthquake caused a rockfall in the cave. A year later, more money was spent on “opening up new chambers, repairing stairs and leveling up trails in Wind Cave.”<sup>121</sup>

Regular maintenance of cave facilities, such as replacing wooden ladders, stairs, and bridges was required on a nearly annual basis. As was noted in 1909, the “interior of [the] cave requires new stairways in several chambers, as the wood from which they are constructed seems to dry rot in a year or two and become unsafe.” It was not until 1910 that the superintendent recommended the use of a wood preservative to delay the inevitable. The following year he noted that “creosote has been used in the treating of all timber used in connection with cave construction during the past year with very gratifying results, and the continuance of its use will without a doubt lessen the decay of material so used.” A total of two new bridges, eight new stairways were constructed, and three trails were repaired in 1912. While damaging or removing geological specimens from Wind Cave was strictly prohibited after the turn of the century, exceptions were made under special circumstances. Rufus Pilcher reported that, “Professor Mark Ehle and myself spent several days in 1910 taking out a collection for the Mines Museum. ... The Department of the Interior...were reluctant to allow the removal of any part of the cave because it was illegal. However the taking out of formation for educational purposes was legal.”<sup>122</sup>

An early map of Wind Cave subterranean trails published in the 1915 annual report documents two ‘air holes’ adjacent to the cave entrance house. The one northeast of the cave entrance house is presumed to be the existing Natural Entrance, or blowhole. A second one northwest of the cave entrance house may now be covered by the substantial fill that replaced a bridge during the CCC era (see *Figure 2-16*).<sup>123</sup>

<sup>120</sup> Long, “Historic Contexts,” 28; Bohi, “Seventy Five Years,” 426; Frederick, “Wind Cave National Park,” 13; William A. Rankin to Seth Bullock, February 16, 1905, [Cave Renovations]. Cave Operations #4, F Ref 1900. Ms. on file at the Library Collection, Wind Cave National Park.

<sup>121</sup> Bohi, “Seventy Five Years,” 426-427; SAR, 1908; National Park Service, Wind Cave National Park website, Wind Cave National Park Time-Line ([http://www.nps.gov/wica/WICA\\_Time\\_Line.htm](http://www.nps.gov/wica/WICA_Time_Line.htm)).

<sup>122</sup> SAR, 1909, 1910, 1911; Rufus Pilcher to Editor, *Custer Chronicle*, January 24, 1966. Superintendent Joseph and Rufus Pilcher #4, F Ref 1900 B1. Ms. on file at the Library Collection, Wind Cave National Park.

<sup>123</sup> Department of the Interior, *Report to the Secretary of the Interior by the Supervisor of the Wind Cave National Park* (Washington: Government Printing Office, 1915), 8-9. Ms. on file at the Library Collection, Wind Cave National Park.

In February 1916, the first major cave-in during the federal tenure of Wind Cave occurred. Park officials determined that the cave-in was due to frost and cold temperatures. The superintendent's report provides details on the event:

Sometime Sunday, the 26<sup>th</sup> a large rock which we estimate to weigh two tons, dropped from the ceiling in the cave, falling upon and breaking one of the landings and one flight of stairs, and railings thereto attached. The place of the accident was about 75 feet from the entrance to the Cave, on the main trail, and was caused no doubt by contraction and expansion due to the freezing and thawing, and to the water continually soaking through from the surface. This is the first instance in the history of the Cave, so far as I am able to learn, where a rock has become dislodged or any other disturbance occurred, except by workmen employed on the trails within the Cave. Two trips with visitors were made through the Cave after the rock fall.

Portions of walls, "300 feet along from entrance," continued to cave-in through 1917. As previously, the cave-ins were credited to the "inward current of air when weather is excessively cold."<sup>124</sup>

Perhaps in response to criticism from cave visitors, in 1916 the superintendent proposed a major exploration and development campaign. The proposed development, although never carried out, centered on discovering a circuitous route that would eliminate much of the backtracking necessary for exiting the cave. The superintendent recommended that "a feasible cut off from both the Garden of Eden and Pearly Gates routes, to the main trail, at some point nearer the entrance than the Cross Roads," be discovered. "This would open up to the public, some very beautiful and untarnished grandeur, dispense with the monotony of returning as one went in, and appreciably shorten the distance traveled for the round trip."<sup>125</sup>

Very little work other than regular maintenance of the paths and trails was performed in Wind Cave between the late 1910s through the 1920s. In 1918, the cave was temporarily closed due to quarantine of the Spanish Flu. During the same year, "nearly 200 linear feet of new stairs and landings in [the] cave" were constructed. By 1926, the inadequate lighting within the cave was again raised as a serious issue by the superintendent: "The present system of lighting in the cave, viz: candles and lanterns, is far from satisfactory both from the visitor's point of view and from the cost of operations standpoint." The concerns for a new system of cave lighting in the mid-1920s were to lay the groundwork for much needed improvements during the 1930s.<sup>126</sup>

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<sup>124</sup> Bohi, "Seventy Five Years," 436; SAR, 1916; National Park Service, "Cave In," n.d. Card Files, Library Collection, Wind Cave National Park.

<sup>125</sup> SAR, 1916.

<sup>126</sup> SAR, 1918; National Park Service, Wind Cave National Park website, Wind Cave National Park Time-Line, ([http://www.nps.gov/wica/WICA\\_Time\\_Line.htm](http://www.nps.gov/wica/WICA_Time_Line.htm)).

## LANDSCAPE FEATURES BY CHARACTERISTIC

### Natural Systems and Features

‘Ovens’

Many of Wind Cave’s larger rooms or halls were connected by narrow crevasses and/or tunnels. These corridors were called ‘ovens.’ Because many of the ovens were too narrow to allow visitors to pass through comfortably, widening them was the target of early cave improvement.

### Land Use

Guided tour routes

The NPS continued to offer park visitors guided tour routes through Wind Cave.

Specimen collection

A collection of Wind Cave specimens was made by Rufus Pilcher and Professor Mark Ehle for the South Dakota Mines Museum in 1910.

### Circulation

Guided tour routes

Originally developed by the McDonald family, the NPS continued the network of formal guided tour routes throughout the cave.

Regular maintenance performed

Regular maintenance of repairing and replacing the wooden stairs, handrails, and bridges as needed within Wind Cave was carried on throughout the entire period between 1903 and 1928.

Blue Grotto route developed

The new Blue Grotto guided tour route was developed during the winter of 1904-05.

Guided tour routes improved

The paths of the three main visitor guided tour routes—the Garden of Eden, Pearly Gates, and Fair Grounds—were “widened out and leveled up” during the winter of 1904-1905.

New chambers opened

The ‘Hunting Grounds,’ ‘Coliseum,’ and “five others which are yet unnamed” were ‘opened up’ by park employees in 1907.

Stairs and railings replaced

A landing, stairs and railings were replaced after a cave-in fell on them in 1916.

## Buildings and Structures

Cave entrance house improved	The cave entrance house roof was raised two feet and provided with a weather board cover in 1909.
McDonald era entrance house razed	The McDonald era log and frame cave entrance house was presumably razed shortly before the construction of a new cave entrance house in 1925.
Cave entrance house built	A new cave entrance structure was built over the entrance to Wind Cave in 1925.

## MASTER PLAN DEVELOPMENT AND THE CIVILIAN CONSERVATION CORPS, 1928–1946

*See Figures 2-26 through 2-100 for photographs, maps, and plans of the Wind Cave National Park landscape during this period. Also, see Map 2-3 Circa 1942 Period Plan for the whole park and Map 2-6 Circa 1942 Period Plan for the Headquarters Area.*

### INTRODUCTION

By the late 1920s, the NPS identified a need to improve the layout and design of the above ground facilities at Wind Cave National Park. During the next fifteen years, both below ground and above ground resources within the park were substantially altered. The Game Preserve headquarters was improved and expanded in the early 1930s. In addition, a number of new facilities in the vicinity of the cave opening were begun in 1931 and carried out through Roosevelt's New Deal work programs. During the same period, concrete replaced many of the wooden stairways and bridges within the cave, electrical lighting highlighted rooms and formations, a shaft and elevator was constructed facilitating improved circulation, and a cave trails betterment and improvement campaign was carried out that included widening and lowering guided tour routes to make them more accessible. By 1935, the park took over administration of the Game Preserve.

### HISTORIC CONTEXT

#### Surface History

In association with the American Society of Landscape Architects in 1918, NPS planners developed a policy for all new development, including road, trail and building construction in park lands. The policy required all new work to be “devoted always to the harmonizing of these improvements with the landscape.” During the tenure of NPS landscape architect Thomas Vint, this policy was further refined to include utilizing local, native materials and constructing buildings and features in local styles and in an appropriate scale.<sup>127</sup>

In 1928, Vint visited Wind Cave National Park to inspect the facilities and make recommendations. Vint’s report was stern, but reflected what he saw as the incoherent

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<sup>127</sup> Long, “Historic Contexts,” 45.

development of the small but growing park. "The buildings at Park Headquarters compose about the most perfect haywire outfit we have in the Park System. They are a disgrace to the U.S. Government and NPS. They are in a class with the development on one of the many homestead failures typical of the western states. These are rather strong and unqualified statements but they do not require an expert's opinion for verification." Vint recommended a new administration building and a new concessionaire building, with an open porch connecting the two. He advocated locating the building "between 200 and 300 feet south of the present structure (which is to be removed) and that a trail of relatively low gradient be constructed to the cave entrance." He also called for constructing an equipment shed, shop building, warehouse, guide bunkhouse, and messhouse. The new structures were proposed to be laid out in a front row on the west side of the main park road through the Headquarters Area. Behind them, a second row containing the proposed new utility structures, were to be laid out. "On completion of the new layout all buildings except one will be on the west side of the roadway." He also recommended that the road in front of the headquarters be graded to a 60 foot width for 800 feet to accommodate angled parking, and that the 'Wind Cave' sign made of whitewashed stones in large letters on the hillside be removed.<sup>128</sup>

The superintendent of the park at the time, Anton Snyder, agreed with the general scope of Vint's recommendations, but clarified the direction of the development process. In a letter to the NPS Director, Snyder reported that a log tool shed "that for years has been an eye sore" had already been razed and recommended that "until the horse and cow pasture can be definitely moved to the west of the road it must remain where it is, although sections of its fence at park headquarters can be repaired to look much neater." Vint and Snyder had also discussed plans for a proposed expansion of the concession facilities at Wind Cave. The concessionaire, John Fuson, had proposed a new "public camp to be located on a plot of ground approximately ¼ mile below the entrance to the cave [that] will be equipped with light housekeeping and shelter cabins, gasoline filling station, and small garage." As a result of the ongoing master planning for development of Wind Cave National Park, Snyder submitted Fuson's proposal for reduced concessionaire facilities, a lunch counter and gasoline station, and in 1929 recommended its approval to the NPS Director. "You will note that the privilege of selling gasoline and oil has been included. There has been a big demand for these two commodities, and it has been rather difficult at times to turn a visitor away with insufficient or barely enough gasoline to take him to the next station. I have, however, strictly forbidden my rangers to let any one have any Government gasoline. Mr. Fuson proposes to put in a gasoline tank and pump and a small supply of oil. The installation will be of a temporary nature, but I am sure, will be a big accommodation to our visitors." The proposal was approved and, by 1930, the new park concessionaires, a Mr. and Mrs. C.C. Gideon, built a temporary store and lunch building. A map dated May 1934 documents that five (frame?) cabins and a shower house for use as a "temporary employees camp" were built ca. 1932 on the south side of an unimproved access road, and a 'tent cabin' that most likely served as the store and lunch building, was located on the north side of the road. The

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<sup>128</sup> Long, "Historic Contexts," 42, 44; Thomas C. Vint, [Report of Trip to Wind Cave], September 8, 1928. Investigations #6, Part 2 of 2, F Ref 1914 B1. Ms. on file at the Library Collection, Wind Cave National Park. Note: The eclectic nature of the Park buildings and structures at Wind Cave during the first quarter of the twentieth century was partly due to the annual underfunding for operations and maintenance for several years.

access road left the eastern side of the main highway just south of the barn and proceeded in a southeasterly direction towards the concession camp (see *Figure 2-44*).<sup>129</sup>

In 1928 the U.S. Biological Survey, with the support of Senator Peter Norbeck, began construction of a dam and roadway at Cold Spring Creek near the Game Preserve headquarters. The dam, a 34 foot high, 200 foot wide, and 300 foot long earthen structure, was designed to create “a reservoir of sufficient capacity to insure a water supply adequate at all times for the wildlife of the district.” Construction was completed in 1929 and the lake was christened Ta-Tan-Ka. The construction of the lake was considered controversial by the NPS because it was deemed “inconsistent with park policies to permit an artificial lake or reservoir...[and unlikely to] be any improvement on the present naturally pretty stream.” The Superintendent’s Annual Report for 1929 described the Cold Spring Creek dam as creating a scenic lake. “When finished, the dam will provide a connection between the park road and the approach roads from the north” (see *Figure 2-27*).<sup>130</sup>

By the late 1920s, new work on improving the state and federal regional road system throughout the Black Hills was initiated as part of the Good Roads movement. In 1928, work was begun on another southern extension to South Dakota Highway 81 in an area known as Reaves Gulch. This road provided a formal link between Custer State Park and Wind Cave National Park. The northern half of the existing main road through Wind Cave National Park was improved through widening, easing of grades, and elimination of dangerous curves. The following year the south half of the main road was also improved. The NPS also graveled the surface of Highway 85 from Hot Springs to the southern boundary of Wind Cave National Park and reconstructed the same road from Pringle to the western boundary of Wind Cave National Park.<sup>131</sup>

With the support of Sen. Peter Norbeck, in 1929 the South Dakota State Highway Commission began construction of the Beaver Creek Bridge over Beaver Creek Canyon on South Dakota State Highway 81 (now S.H. 87). The road and bridge was described as an effort to develop the State (Custer) Game Park. The Beaver Creek bridge was designed by J. Harper Hamilton as reinforced concrete “open spandrel ...deck arch.” Despite the modern materials, the bridge was also designed to be complimentary with its natural surroundings; the ‘S’ curve softening the rigid appearance of the bridge, and the concrete arches appearing to emerge from the rock walls of the

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<sup>129</sup> Anton Snyder, “Report of the Superintendent of Wind Cave National Park Supplementing Report of Chief Landscape Architect Vint Upon His Inspection of the Park,” n.d. [1928]. Investigations #6, Part 2 of 2, F Ref 1914 B1. Ms. on file at the Library Collection, Wind Cave National Park; John S. Fuson to Director, National Park Service, October, 8, 1928, [Concession Improvement]. Concession Permits #7, F Ref 1914 B2. Ms. on file at the Library Collection, Wind Cave National Park; Anton Snyder to Director, National Park Service, January 9, 1929, [Concessionaire]. Concession Permits #7, F Ref 1914 B2. Ms. on file at the Library Collection, Wind Cave National Park; Long, “Historical Contexts,” 45; Bohi, “Seventy Five Years,” 447; National Park Service, “Wind Cave National Park, Surface Topographical Map in vicinity of Proposed Elevator Site showing relative position of Caves.” May 1934, #4960.

<sup>130</sup> Long, “Historical Contexts,” 44; SAR, 1929; Sumner N. Anderson, “Report on the Norbeck Dam, Wind Cave National Park, South Dakota,” November 1936. Norbeck Lake and Dam #4, F Ref 1931 B2. Ms. on file at the Library Collection, Wind Cave National Park; National Park Service, “Topographic Map, Norbeck Dam,” n.d. [post-1929]. WC 5316.

<sup>131</sup> HAER SD-54, 7; HAER SD-55, 27, 28-29; SAR, 1928, 1929.

canyon. The bridge was finished during the same year and was the largest concrete deck arch in South Dakota when completed.<sup>132</sup>

Circa 1930, the South Dakota State Highway Commission also began construction of the Pig Tail Bridge. The Pig Tail Bridge acquired its name for “the unusual corkscrew design that provides quick elevation changes in a constricted space.” The bridge’s construction and design can be described as rustic, utilizing both native materials and unusual design to “conform to the [then] state and national park aesthetic of naturalistic design.” As originally constructed ca. 1930, the Pig Tail Bridge likely possessed a log stringers and a wooden deck. A recent study of the Pig Tail Bridge describes its current appearance as “a linear post and lintel structure consisting of an asphalt covered laminated wood deck that now rests on steel I-beams. These beams rest on four masonry and concrete abutments. …Although neighboring pig tail bridges have been altered significantly since the 1950s, the Wind Cave Pig Tail Bridge closely resembles its original appearance despite structural modifications undertaken in 1940. These modifications include the replacement of original structural members under the bridge deck with steel I-beams and the addition of concrete caps between the tops of the bridge abutments and deck.” It is believed that the alterations to the bridge in 1940 were carried out by CCC labor.<sup>133</sup>

In 1929, special agent H.E. Williams inspected the facilities at Wind Cave National Park. His report made specific recommendations regarding future development of the buildings and water system. In the process, he also described the extant buildings and features.

At park headquarters there are only two buildings, the home of the superintendent and one other residence, which are permanently located and only one other building, the barn, which is of any real value. Near the entrance to the cave is an old, patched up building which is now used for headquarters, checking station, restaurant, and two very uncertain toilets. It is necessary that this building be removed before the present road contract can be completed, but even if this were not the case, the building should be removed for sanitary reasons. Before this building is removed, however, it is necessary that a new administration building be erected. …I therefore suggest a native two-story building of sufficient size to take care of administration needs, including offices, public rest rooms and upstairs sleeping quarters for temporary rangers. …There are two springs, however on the hillside west of headquarters which will likely be sufficient for the near future needs, provided the water can all be stored and utilized. One of these springs has been developed and is now furnishing the present supply of water to park headquarters. The arrangement at this spring is not good. The concrete box covering the spring is about 4 feet wide, 10 feet long, and 8 feet deep, with a mud bottom and the water coming up through the ground in several places. The pipeline to the small reservoir nearby is so laid that the water must rise in the spring box from 3 to 4 feet in order that it may be carried by siphon over the little ridge to the reservoir. …The other spring, not far distant, has never been developed. Its development may prove of value to the park. There is not sufficient

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<sup>132</sup> HAER SD-53, 3-4; National Park Service, National Register of Historic Places Registration Form, Beaver Creek Bridge (HS-99), 7-1 – 7-5.

<sup>133</sup> HAER SD-54, 3-4; National Park Service, National Register of Historic Places Registration Form, Pig Tail Bridge (HS-98), 7-1 – 7-3.

storage. The two small reservoirs now in use do not have sufficient capacity for park needs. It is necessary therefore that an additional reservoir be provided this fall if possible, that the pipeline from the spring to the upper reservoir be relocated on grade and that the other spring mentioned be developed and if found of value be piped into the reservoirs, thus giving an additional supply of water.

...Parking conditions: ...The barn, which is located on the east side of the road and on the best piece of land near the cave, presents itself first to the visitor coming north. The machine shed, or garage, stands on the west side of the road between the two residences and directly across the road from the only available location for the new administration building. This shed is of little value, answering only as a covering for the two or three old, wornout pieces of machinery which were given to the park, and the privately owned cars of the employees. The barn and garage should be removed to locations less conspicuous.<sup>134</sup>

Substantial improvements and new development were carried out at the Game Preserve Headquarters Area during the early 1930s. In 1930, construction was begun on an exhibition pasture "which will give the visitors to the park a much better opportunity to see and study the animals." Between 1931 and 1932, the hand of NPS landscape architects could be seen as the entire Game Preserve Headquarters Area was redesigned, establishing an aesthetically pleasing landscape, eliminating unsightly structures and features, renovating old structures, and constructing new and more modern facilities. The Warden's annual report for 1931 reported that a back porch was added to the Warden's residence, and a small fountain and pool and a 'lighting plant' were constructed at headquarters. In addition, the "old barn and adjoining sheds have all been removed except for the tool house. This, it will be necessary to keep until the garage is moved and remodeled so as to afford room for the tools and equipment also." The fields and pastures surrounding the headquarters were also planted. "Natural sod back of the headquarters house has been broken up and this as well as the orchard east of the house has been planted to blue grass and lawn clover. ...Spring rye in west orchard." A concrete intake box was built at the McAdam Middle Spring and a pipeline connecting it to headquarters was constructed. The Valentine spring, located in the western pasture, was "thoroughly prospected and tilled but the flow of water was not materially increased." The following year's annual report noted that the garage had been moved and remodeled. "This building now houses the light plant, five cars, mechanics and blacksmith's shop on ground floor, with carpenter and paint shop and storage space for equipment on the second floor." Three new structures including a 16 x 24 foot bunkhouse for hands, a 24 x 36 foot barn, and a 24 x 50 foot machine shed were also constructed in the Headquarters Area. Associated water and sewer lines were built to the bunkhouse and barn. The Warden's residence was substantially renovated during 1931.

The original house was a one story log affair consisting of one room 16 x 20.

...Later an upper story of frame construction was added and the original room partitioned to make one living room 12 x 16 and one small bedroom 8 x 16. Still later an addition was made on the north end of the original building which was used for a bedroom and was 10 x 14 with a shed roof. About the same time a

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<sup>134</sup> H.E. Williams, "General Report on Wind Cave National Park, South Dakota," October 2, 1929. Investigations #6, Part 2 of 2, F Ref 1914 B1. Ms. on file at the Library Collection, Wind Cave National Park.

dining room and kitchen were added on to the west end of the building. ...The kitchen and dining room were each 12 x 16 with four feet of the west end of the kitchen cut off for pantry and cellar stairway. ...A few years later the north bedroom was extended part way across the north side of the kitchen thus forming a back entrance hall four by nine and a bathroom six by nine.

The style of the newly renovated Warden's residence was described in 1931 as "Dutch Colonial which will not conflict with the English type as being used at Park Headquarters." The park superintendent commented on the improved appearance of the Game Preserve Headquarters in 1931. "Mr. Hoyt has improved the area at the headquarters by claying...his residence, by building two barns out of sight of the highway, and by removing old and dilapidated sheds. ...The changing of the highway to its present location around the hill north and west of the headquarters gave the house an appearance from the highway of being entirely surrounded by sheds. ...The house has been rebuilt on Colonial lines and now faces the east. ...A fireplace and a stone top for the kitchen chimney were built." In 1932, a horse pasture fence was constructed "in the north west corner of the park," a sidewalk in an unknown location was laid, and a variety of trees and shrubs were planted in the Headquarters Area (see *Figures 2-30, 2-34, and 2-35*).<sup>135</sup>

Based in part on Vint's recommendations in 1928 and by continued requests by the park superintendent, in 1930 the NPS made a commitment to fund substantial improvements to the existing facilities at Wind Cave National Park. Federal funding to relieve the nationwide depression had already reached the Black Hills by 1931. During this year, federal programs hired local labor to perform banksloping, cutting, and rounding of road shoulders near Cold Spring dam and Beaver Creek Bridge. The following year, a 170-foot section of guardrail was completed near the Beaver Creek Bridge. An additional 900 feet section was erected "along the high road above the dam." Work was also begun on the construction of the Custer-Newcastle approach road to Wind Cave National Park. This road was completed in 1933.<sup>136</sup>

The era of Master Planning was adopted by the NPS between 1931-1932. Between 1930 and 1931, the NPS required all parks to provide outlines of general plans for development. The term Master Plan was subsequently applied a year later. A fully developed plan for each park to be carried out over six years was prepared by a team of architects and landscape architects by the end of 1932. Every Master Plan was based on the uniqueness and understanding of the significance of each park. The goal of the Master Plan was to direct the future use and development of the park.<sup>137</sup>

NPS landscape architects McCarter and Baker made a visit to Wind Cave National Park in the spring of 1931 to finalize the impending development plans. Like Vint, they designated an area "on the hillside south of the superintendent's residence, on the west side of the highway" as a utilities precinct. In order to hide any hilltop development from the highway, they instituted a

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<sup>135</sup> SAR, 1930, 1931; WAR, FY 1930, 1931, 1932; K.C. McCarter and Howard W. Baker, "Report to the Chief Landscape Architect through the Superintendent of Wind Cave National Park," June 1, 1931. Landscape Architect Reports #18, F Ref 1931 B2. Ms. on file at the Library Collection, Wind Cave National Park; H.H. Hoyt, "Wind Cave Game Preserve," Sketch Map, January 29, 1930; H. H. Hoyt, "Headquarters, Wind Cave Game Preserve," February 5, 1930; H.H. Hoyt, "Sketch Map of Headquarters Area," February 11, 1931.

<sup>136</sup> SAR, 1929; HAER SD-55, 30-32.

<sup>137</sup> Linda Flint McClellan, *Building the National Parks* (Baltimore: Johns Hopkins University, 1988) 300-306.

planting program “to screen the entire layout.” The proposed new Ranger’s dormitory was to be located “about 400 feet south of the Power House and on a small knoll.” No development was planned for the ‘temporary’ Campground “with the exception of installing a couple of pit toilets.” The new administrative building was proposed to be located on the present barn site “in an attempt to relieve the Cave entrance of such a compact appearance. This change in location would cause the patrons of the Cave a little longer walk from the building. This distance, however, is only about 600 feet, and very nice trail could be made following up the ravine from the Public Building to the Cave entrance.” They also proposed removing the frame pedestrian bridge to the McDonald statue and transforming the new pedestrian trail into “a nature trail—the statue being one of the points of interest en route.”<sup>138</sup>

New development work within the park Headquarters Area began in 1931. Construction was started on a Power House and a new Ranger’s dormitory. The Power House, located adjacent to an old service road on a small bluff overlooking Wind Cave Canyon, was built to contain a ‘power plant’ transferred from Carlsbad Caverns and reconditioned and installed. The Power House was constructed of “native stone and Spanish stucco, setting the style for all future buildings in the park.” The Ranger’s dormitory also conformed to the “new style of architecture prescribed by Landscape Division. “It too was located on a hill overlooking Wind Cave Canyon. In addition, a small hose house was built “at a location convenient to the fire hydrant,” the wooden bridge crossing the Wind Cave Canyon to the Alvin McDonald statue was removed to be replaced by a “neat trail,” a set of wooden stairs was removed “from the entrance trail” and were replaced by “a gravel trail with an easy grade,” and the “old unsightly wooden platform at the cave entrance” was removed and replaced with fill. The old corral fence adjacent to the barn was removed, as were several “tent platforms used by temporary rangers in view of highway.” A new street lighting system comprised of five poles “bordering the road at the administration area,” and four more “on the service road” was installed. The fence surrounding the Headquarters Area was extended out to include the new and future proposed structures. The water and sewer system was also substantially improved with the construction of a 3-½ mile pipeline trench from the newly acquired Beaver Creek springs to the Headquarters Area, and the laying of approximately 3,160 feet of six-inch vitrified clay pipe that emptied into the disposal ponds near the Utility Area.<sup>139</sup>

The unusual native stone and stucco appearance of the Power House and Ranger dormitory, described as ‘Spanish’ or ‘California,’ was not indigenous to the Black Hills or southwestern South Dakota. Years later, landscape architect Howard W. Baker explained the reasons for choosing this particular style for new development within Wind Cave National Park. “We chose to use the northern Spanish architecture, which harmonized with the landscape, having a not too rustic but pleasing character.” The Spanish style architecture was to dominate development at Wind Cave through World War II.<sup>140</sup>

In early 1931, Robert McAdam agreed with the park to the sale of 100+ acres of land adjacent to the park’s northern boundary. The land contained two valuable springs. McAdam also agreed to allow the NPS to construct a right-of-way for a pipeline through the property he still held. Title

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<sup>138</sup> K.C. McCarter and Howard W. Baker, “Report to the Chief Landscape Architect,” n.p.

<sup>139</sup> Superintendent Monthly Reports (SMR), Wind Cave National Park, 1931; SAR, 1931; National Park Service, “Master Plan, Wind Cave National Park,” 1942. Ms. on file at the Library Collection, Wind Cave National Park.

<sup>140</sup> Long, “Historic Contexts,” 46.

to these lands passed to government October 1931 and pipeline construction began in the same month. To overcome turbidity at the springs, “a slow sand filter was installed...in the main supply line just above the reservoir that serves the Game Ranch headquarters.” The 1932 annual report described the future promise of the new system. “This system provides adequately for all probable increases in the park’s needs for many years to come and is so installed as to deliver any surplus direct to the artificial lake known as the buffalo reservoir.”<sup>141</sup>

An employee’s dormitory, and a new two-car garage attached to the rear of the superintendent’s residence, were both built out of native stone and Spanish stucco in 1932. In addition, a small shower house for the ‘employee campground’ was constructed. The lawns of the new structures were covered with ‘rich black loam’ and seeded. A new cattle guard south of the Headquarters Area was installed. The new cattle guard “completely eliminat[ed] the [problem] of grazing cattle in the Headquarters Area, though such stock is still a source of difficulty on the road between cattle guard and south entrance to the park.” A year later the automobile shelter, described as an “old ramshackle combination car shelter, oil and ice house...located directly across from the headquarters building” was moved to another location (currently not known) because it was considered “a constant eyesore not being in harmony with the landscaping and architecture plans for this park.” The car shelter was proposed to be torn down “with the completion of a new machine shop and shed hoped for under the Public Works.” A 1,500 gallon concrete cooling tank was constructed adjacent to the Power House, and the “old rickety stairs” leading from the Ranger’s office to the comfort station were replaced with new flagstone steps. Perhaps most significantly, the new planting program was initiated in 1933. A total of 143 western yellow pine trees, and many others including cedar, juniper, elm and wild cherry were planted in the Headquarters Area.<sup>142</sup>

In March 1933, President Roosevelt established his New Deal public work programs, hereafter called the Civilian Conservation Corps (CCC), including the Works Progress Administration (WPA), the Civil Works Administration (CWA), and the Emergency Conservation Work (ECW) forces. Wind Cave National Park received funding for a Civil Works labor force. The program was started at the park in December 1933. Much of the work accomplished by this program consisted of cleaning up and sloping shoulders along roads, cleaning drainage ditches, repairing fire roads, and tree planting. The Civil Works program was discontinued in April 1934.<sup>143</sup>

Company 2754, Camp NP-1, an ECW (CCC) labor force was organized at Wind Cave National Park on July 9, 1934. The CCC force lived in a temporary summer camp between July and October. Construction of a permanent campsite was begun on August 2, 1934. The camp was located in Wind Cave Canyon and completed in October and contained a mess hall (kitchen and store room), bath house/laundry, eight barracks, supply/warehouse building, supervisor’s/officer’s quarters, recreational hall, hospital, garage, administrative office, two latrines, coal shed, garbage rack, incinerator, and a tennis court (see *Figures 2-56, 2-64, 2-66*). Further east of the CCC Camp, temporary utility facilities were also built including two separate

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<sup>141</sup> Bohi, “Seventy Five Years,” 448; SAR, 1932; National Park Service, “Master Plan, Wind Cave National Park,” 1942.

<sup>142</sup> SMR, 1932, 1933; SAR, 1932, 1933.

<sup>143</sup> SMR, 1933.

garages ‘A’ and ‘C,’ an oil house, hose house, and gasoline pumps. In addition, a ‘disposal bed’ was also excavated.<sup>144</sup>

Much of the work carried out by the new CCC Camp continued the work of the previous Civil Works program. This work included roadside cleanup and shoulder sloping, construction of truck trails and fire roads, landscaping and tree planting, enlargement of water storage facilities and excavation and installation of new waterlines, erecting new fence-lines, moving old buildings, and planting shrubs and trees. Major building projects initiated during 1934 included the construction of two new employee’s quarters, a machine shop, a temporary elevator building, and a new Administrative Building (Visitor Center). The temporary elevator building was constructed of corrugated iron, and described by the superintendent as “an eyesore. ...It now resembles a California cotton gin or a stamp mill of the type seen in Black Hills mining areas.” During the course of the year, over 800 shrubs and trees including yellow pine, birch, aspen, cottonwood, wild plum, choke cherry, gooseberry and dogwood were planted throughout Headquarters Area. A small house for the fire trailer was built, and a temporary engineer’s office was erected at the site of the proposed elevator shaft. The two new employee residences were completed by the end of the year and the grounds surrounding them were landscaped. The site for the new Administrative Building (Visitor Center) was graded and a new 25,000 gallon water reservoir was constructed.<sup>145</sup>

In 1934, Wind Cave National Park assumed administrative supervision for the newly established Jewel Cave National Monument. The following year, Wind Cave National Park also assumed direct control over the U.S. Biological Survey’s Game Preserve. As a result, the CCC surveyed and subsequently erected a new fence encompassing the entire park. New cattle guards were also installed on the park’s north and south entrances.<sup>146</sup>

In 1934, the Federal Emergency Relief Administration (FERA) was established “to coordinate a program for the reutilization of submarginal lands.” A year later, the FERA established the Custer Recreational Demonstration Area (RDA), a state scenic area extension under the administration of Custer State Park. The Custer RDA contained approximately 20,168 acres of what was identified as ‘submarginal’ lands. Over the next several years, the government began to acquire privately held property. By 1936, the NPS was given administrative control over the RDA program, subsequently employing CCC labor in the development of these areas. The Custer RDA was located just north and east of Wind Cave National Park but was never developed. The reason for this is not currently known although it was most likely because the site was never near a major urban center. By 1939, only two of the former land owners remained within the Custer RDA. According to the park superintendent, “30-40 old buildings remain in area to be razed, approximately 60 miles of old barbed wire fences, some game fence construction, several small earth dams to be constructed to provide more water for wildlife and about 10 miles of truck trails that need repair and improvement.” In May 1939, the “practice of granting grazing permits to ranchers who previously owned land on the area was discontinued ...to prevent erosion and in order that the range may regain its normal condition.” All former residents of the Custer RDA had been forced to move from the area by May 10, 1939. During

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<sup>144</sup> Long, “Historic Contexts,” 49-50.

<sup>145</sup> SAR, 1934; SMR, 1934; Long, “Historic Contexts,” 50; Bohi, “Seventy-Five Years,” 451.

<sup>146</sup> SAR, 1934; SMR, 1935; Long, “Historical Contexts,” 47; HAER SD-53, 3.

World War II, however, the grazing restrictions on Custer RDA were lifted. In May 1941, grazing permits were again issued. In justifying their decision, the NPS stated that “the grazing of this land has compensated, to a certain extent, for the loss of grazing by the rangers living south of Badlands National Monument in the area that has been converted to a bombing range.”<sup>147</sup>

CCC work continued in 1935. Major building projects initiated in 1935 included the construction of a new superintendent’s residence, and “a large portable type storage garage for BPR maintenance equipment.” The old Registration office/Administration Building, described as an “archaic frame structure,” was moved to the ECW Utility Area “to serve as an equipment shed.” The CCC also moved and subsequently remodeled an “old shingle residence”. An additional 5,000 shrubs and trees were planted in the Headquarters Area. General park-wide maintenance, such as sloping road shoulders and the obliteration of old roads and borrow pits, continued. In front of the new Administration Building (Visitor Center) the road was widened and the headquarters parking area was being enlarged. Substantial fill was brought in to expand the artificial terrace, particularly to the north. Approximately 400 feet of crushed rock sidewalks and new stone curbing were completed. Log guard rails were placed on the northern and southern ends of the parking area. On the north end of the parking area, a 100-foot retaining wall was built. Construction of a pedestrian trail from the new Administration Building (Visitor Center) to the cave entrance was also begun. A rustic log bridge spanned a low area along the trail just north of the Administration Building (see *Figure 2-45*). The trail had a stone foundation.<sup>148</sup>

In 1936 a new lighting system was installed in the Headquarters Area. A total of nine new light poles were erected at 125-foot intervals along the entire length of the parking area. These poles were preserved with creosote and extended sixteen feet above the ground. The front lawn of the new Administrative Building (Visitor Center) received fill dirt from Beaver Creek and was seeded with grass. A new small booth or “fire control checking station” was installed at the southern entrance to the park to warn out-of-state visitors of fire hazards. Two miles of telephone line at headquarters were moved back from the main highway for aesthetic reasons. A new addition to the Power House, containing a heating plant and wash room, was constructed and a new addition, stone terrace, and path were added to the old Superintendent’s residence, remodeled as a Ranger’s club house and dormitory. Finally, ground was broken for a new park incinerator. The following year, the retaining wall in front of the Ranger’s club house / dormitory was removed and the bank there sloped. The 200-foot-long, 7-foot-tall retaining wall

was constructed a long time ago to support the road cut in front of the residence and the stone work is radically different from the rest of the rock work in the headquarters area of which there is a great deal. The front lawn area of the dormitory is sufficiently extensive to permit the removal of the wall and the

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<sup>147</sup> Harlan D. Unrau and G. Frank Williss, *Administrative History: Expansion of the National Park Service in the 1930s* (Washington: Government Printing Office, 1983); SMR, 1939; Long, “Historic Contexts,” 53-54; National Park Service, “Special Report Concerning the Ultimate Disposition of the Custer Recreational Demonstration Area in the Black Hills, South Dakota.” Prepared by the Office of the Coordinating Superintendent, Wind Cave National Park, Hot Springs, South Dakota, July 5, 1943. Custer RDA Reports, #1, F Ref 1931 B1. Ms. on file at the Library Collection, Wind Cave National Park.

<sup>148</sup> SMR, 1935; SAR 1935, 1940; HAER SD-55, 37; National Park Service, “Wind Cave National Park Trail Bridge,” May 21, 1935. WC 3027-B(1) and B(2).

flattening and rounding of the cut. After grading, the slope will be resodded and will result in a more natural and pleasing effect than exists at present.

Work was also begun on the construction of a permanent elevator building, a three-stall fire equipment building, and a “natural fill slope in front of the equipment building.”<sup>149</sup>

In 1937, the CCC completed the first permanent Campground and Picnic Area at Wind Cave National Park. The Campground and Picnic Area was located approximately 1,000 feet north of the headquarters building. The permanent facilities located there included an access road and

seven camping spurs...for parking cars. The entire road and parking spur system is outlined with native stone of large sizes and placed in natural groupings.

...Table and bench combinations of rustic character were constructed for the picnic and campground use and fireplaces were built for each of these units.

Garbage pits were constructed in the picnic area in locations most acceptable for use. One pit toilet serves the area. Campground development continued into 1938 and 1939 with the planting of trees, and graveling of the loop road and individual parking areas. While plans for a permanent comfort station were developed and approved in 1938, problems with sewerage connections cancelled its construction.

Additional pit toilets were constructed there in late 1939.<sup>150</sup>

Construction was also begun on new ‘entrance pylons’ at each of the park’s three main entrances—north, south and Pringle. The pylons were fairly large signs constructed of native limestone and log. By the end of 1937, all three entrance pylons had been completed. The sign boards were described as “constructed of wood with incised lettering painted aluminum to increase visibility.”<sup>151</sup>

In 1936, state road crews repaired and improved the Hot Springs and Custer approach roads to the park. The work was predominantly sloping and regrading but also included some realignment. Between 1937 and 1938, CCC road crews obliterated abandoned portions of Highway 85 within and near the southern boundary of the park “made obsolete by the recent construction of new alignment by the State Highway Dept.” The ground contained in the obliterated sections was prepared for seeding.<sup>152</sup>

Only a year after receiving control of the Game Preserve, the park substantially redesigned the Headquarters Area. In 1936, “the old garage and employee’s residence (small residence) were razed, [and the] foundations were removed and the ground leveled up.” A new 20 x 52 foot

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<sup>149</sup> SMR, 1936, 1937; SAR 1936; S. Serrano, “Monthly Narrative Report to Chief Architect on Wind Cave National Park by S. Serrano, Resident Landscape Architect, Branch of Plans and Design,” July 1937. Landscape Architect Reports #18, F Ref 1931 B2. Ms. on file at the Library Collection, Wind Cave National Park.

<sup>150</sup> HAER SD-55, 52; Serrano, “Monthly Report,” July 1937; SMR, 1938, 1939; Howard Baker, “Wind Cave National Park – Report,” June 1938. Landscape Architect Reports #18, F Ref 1931 B2. Ms. on file at the Library Collection, Wind Cave National Park; National Park Service, “Master Plan, Wind Cave National Park,” 1939. Ms. on file at the Library Collection, Wind Cave National Park.

<sup>151</sup> Serrano, “Monthly Report,” July, September and December 1937; National Park Service, “Master Plan, Wind Cave National Park,” 1942.

<sup>152</sup> HAER SD-55, 39; Serrano, “Monthly Report,” September 1937; SMR, 1938.

garage with a concrete foundation and frame superstructure was constructed in its place. Simultaneously, the NPS was trying to determine if the Norbeck Lake and Dam could be fixed. After its construction in 1929, the dam never retained water. An inspection report in 1936 noted that “the dam has never fully impounded water because of leaks, with the result that the reservoir is nearly dry for long periods of each year, failing in its original purpose and presenting an eyesore in full view of the highway that crosses the crest of the dam. …The exact points of leakage have not been satisfactorily delimited.” In an attempt to solve the problem, the NPS excavated ‘pits’ in the upstream and downstream sides of dam to determine the location of leaks. In 1939, improvements were made to the bison “game capturing fences” and corral (see *Figures 2-92, 2-93, and 2-94*).<sup>153</sup>

On the urging of park Superintendent Freeland, by mid-1938 NPS landscape architects had approved changes to the location of the Utility Area at Wind Cave National Park. As described by Howard Baker, “one of Superintendent Freeland’s major problems was the development of a Park Utility Area in a location away from the present residential section. …After a review of the ground it was decided to develop the Utility Area in practically the same location which now contains the temporary buildings. …Within the Utility Area, we are providing a rather sizeable space for storage of materials and we hope, after the Utility Area is constructed, that the materials can be stored in the storage yard in an orderly manner.” By 1939, formal development of the area had begun. A two-story, twelve stall garage for the “storage for trucks, small shop, blacksmith shop, furnace room, etc.” was constructed. Between 1939 and 1940, a new sewage disposal and filtration plant, a second large garage, a coal bunker, an oil house, a carpenter’s shop and a cement storage structure had been constructed in the Utility Area. The new sewage system included an extension of approximately 1,400 feet of eight-inch vitrified clay pipe leading to a septic tank. “A combined concrete septic tank with a capacity of 6,250 gallons and a dosing chamber with a capacity of about 450 gallons” were also constructed. “Effluent from the dosing chamber is conveyed by gravity to a spray field comprising 20 nozzles. …Sludge from the septic tanks is conveyed to an earth sludge bed by gravity. When dried this is spread on the ground in the vicinity of the sludge bed.” In addition, the former old service road into the area was improved, a new service road leading from the south end of the Headquarters Area was built “following the natural draw of Wind Cave creek,” to provide access to the storage area, and a fence surrounding the entire Utility Area was constructed. The service road was proposed to be extended past the Utility Area to the location of the incinerator and sewage disposal plant. Finally, power lines were extended from the Power House to the Utility Area.<sup>154</sup>

The second Master Plan for Wind Cave National Park in 1939 included several guidelines for development. Within the Headquarters Area, the planting campaign was proposed to continue. “Since the main highway passes through the center of the area… it is desirable to do additional planting of trees so that in time the occupants of these homes will not feel the exposed location. It is also desirable to screen the Utility Area and its activities from the visitors. …The trees that are being planted in this area are mostly of the following type – western yellow pine, elm and box elder. The shrubs are dwarf juniper, choke cherry, wild plum, gooseberry, wild rose, buck

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<sup>153</sup> SMR, 1936, 1937; Anderson, “Report on the Norbeck Dam,” n.p.; SMR, 1939; National Park Service, “Wind Cave National Park, Game Ranch Area, Topographical Map,” n.d. [post-1936]. WC 5057.

<sup>154</sup> Howard Baker, “Monthly Report,” June 1938; SAR, 1939, 1940; SMR, 1939, 1940; National Park Service, “Master Plan, Wind Cave National Park,” 1942.

brush and currant.” In 1939, the old log guard rails adjacent to the Visitor Center parking area were removed and replaced with a low stone wall guard rail. A total of 102 shrubs and trees were transplanted in the vicinity of the Headquarters Area. While excavating at Beaver Creek, “several skulls and parts of skeletons have been uncovered that suggest the presence of an early Indian burial ground. No further excavating will be done until funds are available for an archeologist to be assigned to the park to properly carry out the work.” A year later, a substantial addition to the Superintendent’s Residence was constructed, two and a half miles of underground telephone line were laid through the park, and a truck trail to Battle Mountain was constructed. The Master Plan identified several sites of cluster development to date including the Administrative Area, Utility Area, Picnic Area and Campground, Game Ranch Area, and Cave Trail System (See *Figures 2-87 through 2-91*).<sup>155</sup>

The year 1939 marks a significant period in the development of the protection and management of Wind Cave National Park’s natural resources. During this year, grazing permits for Wind Cave National Park and adjacent Custer RDA lands were phased out. In addition, park officials first attempted to obtain native grass seed in an attempt to re-vegetate ‘barren areas’ of the park.<sup>156</sup>

On October 31, 1939, the CCC Camp stationed at Wind Cave National Park was transferred and the camp abandoned. Obliteration of the temporary CCC Camp constructed in late 1934 began in April 1941 and the work was conducted by CCC Camps SP-5 Narrows and SP-4 Lodge. The structures and features were removed, with the exception of the frame officer’s quarters adjacent to the Power House. Maps from the 1940s and 1950s document that this structure was utilized as temporary housing for seasonal employees. Additional work accomplished by these CCC Camps included razing of old structures in the Utility Area, razing of the old buffalo corral and compound in the Game Preserve headquarters, and construction of various check dams there. During this period, a “lookout tower” was also constructed on Elk Mountain, and a new buffalo grading corral and compound was constructed in the same location as the old one. “The corral consists of a system of 6 pens 30 x 40 feet which surround a central hub, all constructed of heavy plank fence with walkways on top.” In addition, the basement of the Superintendent’s Residence at headquarters was enlarged and a new sun porch was added.<sup>157</sup>

Master Plan drawings of the Headquarters Area document the developed landscape at the end of the CCC era. The maps suggest an orderly and efficient landscape that was organized into administrative, residential, picnic/campground, and utility clusters connected by improved circulation routes (see *Figures 2-97 through 2-100*).<sup>158</sup>

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<sup>155</sup> SMR, 1939, 1940; SAR, 1939, 1940; National Park Service, “Master Plan, Wind Cave National Park,” 1939.

<sup>156</sup> Marie Curtin, “Vegetation History, Wind Cave National Park,” n.p. [2003 Draft]. Ms. in possession of John Milner Associates, Inc.

<sup>157</sup> SMR, 1941; SAR, 1941, 1942; Mogen, “History of Animal Management,” n.p.; National Park Service, “Master Plan, Wind Cave National Park,” 1942.

<sup>158</sup> National Park Service, “Utility Area,” Part of the Master Plan for Wind Cave National Park, Jan. 1, 1942. WC 2009-A; National Park Service, “Picnic and Campground Area,” Part of the Master Plan for Wind Cave National Park, Jan. 1, 1942. WC 2010-A; National Park Service, “Headquarters Area,” Part of the Master Plan for Wind Cave National Park, Jan. 1, 1942. WC 3009-H.

Wind Cave National Park acquired additional small parcels of land in 1943 in an exchange with the U.S. Forest Service and Custer RDA. By the early 1940s, a variety of proposals were being studied at both the state and federal level on what to do with the Custer RDA lands. A 1943 study recommended that “the major portion of the Custer RDA, designated as Tract No. 1 on the attached map be added to, and made a part of, Wind Cave National Park, and that the aforesaid area be devoted to the portrayal and interpretation of wildlife, in particular the American bison.”<sup>159</sup>

## LANDSCAPE FEATURES BY CHARACTERISTIC

### Land Use

Settlement	The Homestead Act of 1862 and the Desert Land Act of 1877 continued to encourage European-American settlement of the Black Hills.
Grazing	Ranches were established in the southern Black Hills on public land adjacent to the lush grassy plains. Cattle, and to a lesser degree sheep, grazed these open ranges. These ranches continued to operate during federal tenure of Wind Cave and the park was required to fence their property to keep cattle from entering Headquarters Area.
Agriculture	While the arid environment of the Black Hills and the lack of dependable water resources made it a difficult place to plant crops, many settlers did cultivate a few fields of crops, predominantly for home consumption and use of livestock.
Visitation	Visitation to the park was continued under federal tenure of Wind Cave.
Recreation	A temporary tennis court is erected in the CCC Camp between 1934 and 1937.

### Cluster Arrangement

Cave opening cluster	The cave opening cluster continued to be developed and improved upon with the primary focus being facilities that served the visiting public.
Hillside cluster	The hillside cluster continued to be developed as a residential and temporary Utility Area for park employees.

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<sup>159</sup> SAR, 1943; National Park Service, “Custer Recreational Demonstration Area,” n.p.

CCC Camp cluster	In 1934, construction was begun on a permanent camp for CCC labor. This camp was abandoned on October 31, 1939.
Campground/Picnic Area cluster	In 1937, facilities for a formal Campground and Picnic Area were developed just north of the cave entrance.
Utility Area cluster	The park developed a permanent Utility Area just north of the CCC Camp in 1938. The area consisted of garages and shops to support park operation.

## Circulation

Road realigned	A portion of the main highway passing through the Game Preserve was realigned to run over the new Norbeck Dam in 1929.
Road improved	The northern half of the main road through Wind Cave National Park was improved in 1928 including widening, easing of grades, and elimination of dangerous curves. In 1929, the south half of the main road was improved.
Beaver Creek Bridge built	The South Dakota State Highway Commission built Beaver Creek Bridge, “an open spandrel concrete deck arch” in 1930. At the time of its construction, the bridge was the largest concrete arch in South Dakota.
Pig Tail Bridge built	The South Dakota State Highway Commission built Pig Tail Bridge, “a linear post and lintel structure” with wood deck in 1930.
Sidewalk laid	A sidewalk was laid in the vicinity of the Warden’s residence at the Game Preserve in 1932.
Road improved	Federal funding to relieve national depression was provided for the improvement of roads near Cold Spring dam and Beaver Creek Bridge including banksloping, cutting and rounding of road shoulders in 1931.
Log guardrails built	A 170-foot section of log guardrail was built near the Beaver Creek Bridge in 1932. An additional 900 foot section of log guardrail was built “along the high road above the [Cold Spring] dam” in the same year.

Wooden bridge removed	The wooden pedestrian bridge crossing the Wind Cave Canyon to the Alvin McDonald statue was removed in 1931.
Trail established	A new pedestrian trail leading to the Alvin McDonald statue was established replacing the wooden bridge spanning Wind Cave Canyon in 1931.
Wooden stairs removed	A set of wooden stairs was removed “from the entrance trail” near the cave in 1931.
Trail established	A new “gravel trail with an easy grade” replaced a set of old wooden stairs near the ‘entrance trail’ in 1931.
Roads improved	The Civil Works labor force improved roads within the park including cleaning roads and drainage ditches, sloping shoulders, and construction and repair of truck and fire roads between 1933 and 1934. This road improvement program was continued by CCC labor between 1934 and 1938.
Old road segments obliterated	The CCC obliterated old, unused road segments throughout the park in 1935, and then again in 1937-38.
Road/parking area widened	The road and parking facilities in the Headquarters Area were widened in association with the construction of the new Administration Building (Visitor Center) in 1935. Substantial fill was brought in to create an artificial terrace.
Sidewalks built	Approximately 400 feet of crushed rock sidewalks were constructed in front of the Visitor Center in 1935-36.
Curbing built	New stone curbing in front of the Visitor Center was built in 1935-36.
Log guardrails built	New log guardrails were constructed at the northern and southern ends of the new Visitor Center parking lot in 1935-36.
Pedestrian trail built	A new gravel pedestrian trail with a stone foundation was constructed from the Administration Building (Visitor Center) to the cave entrance in 1935.

Campground/Picnic Area access road An access road leading to the formal camping spurs and Campground/Picnic Area and seven camping spurs were built in 1937.

Utility Area access road improved The old service road in the new Utility Area was improved in 1939. During the same year, a new service road leading from the south end of the Headquarters Area to the old service road was built “following the natural draw of Wind Cave creek.”

## Vegetation

Fields and orchards planted Small fields and orchards adjacent to the Warden’s residence at the Game Preserve were planted in rye, blue grass, and lawn clover in 1931.

Pasture established A new horse pasture was established “in the north west corner” of the Game Preserve in 1932.

Trees and shrubs planted A variety of trees and shrubs were planted in the Headquarters Area of the Game Preserve in 1932.

Lawns seeded The lawns of the new employee residence and garage addition to the superintendent’s house were supplemented with ‘rich black loam’ fill and seeded to grass in 1932.

Planting program initiated A new planting program was initiated in the park Headquarters Area. A total of 143 western yellow pine trees and many others including cedar, juniper, elm, and wild cherry were planted in 1933 by Civil Works forces. The planting program was continued by CCC labor between 1934 and 1938. In 1934, over 800 shrubs and trees including yellow pine, birch, aspen, cottonwood, wild plum, choke cherry, gooseberry, and dogwood were planted in the Headquarters Area. In 1935, an additional 5,000 shrubs and trees were planted in the Headquarters Area.

Lawn seeded The lawn of the new Visitor Center received fill from Beaver Creek and was seeded with grass in 1936.

Trees and shrubs planted Trees and shrubs were planted in the Campground and Picnic Area in 1938-39.

Park revegetation

The park attempted to revegetate ‘barren’ areas with native grasses in 1939.

### **Buildings and Structures**

Tool shed razed

A log tool shed located in the Headquarters Area “that for years has been an eye sore” was razed in 1928.

Concessionaire structure built

The new park concessionaire, Mr. C. Gideon, built a temporary store and lunch building, most likely a tent cabin, in the Headquarters Area southeast of the barn in 1930.

Concessionaire cabins built

Gideon also built five frame tourist cabins in the Headquarters Area southeast of the barn in 1930.

Warden’s residence porch built

A new porch was added onto the Warden’s residence at the Game Preserve in 1931.

Lighting plant built

A ‘lighting plant’ was built at the Game Preserve in 1931.

Barn and sheds razed

An “old barn and adjoining sheds” were razed at the Game Preserve in 1931.

Garage moved

A garage at the Game Preserve was moved and remodeled to contain the lighting plant, five cars, and mechanics and blacksmiths shop in 1932.

Bunkhouse built

A new bunkhouse for employees of the U.S. Biological Survey was built at the Game Preserve in 1932.

Barn built

A new barn was built at the Game Preserve in 1932.

Machine shed built

A new machine shed was built at the Game Preserve in 1932.

Warden’s residence renovated

The Warden’s residence at the Game Preserve was substantially renovated in 1931. The new style for the residence was described as Dutch Colonial.

Power House built

The Power House, of “native stone and Spanish stucco,” was built on a small bluff overlooking Wind Cave Canyon in 1931.

Ranger's dormitory built	A Ranger's dormitory conforming to the new style of architecture in the park was built on a hill overlooking Wind Cave Canyon in 1931.
Hose house built	A small hose house was built at headquarters "at a location convenient to the fire hydrant" in 1931.
Employee dormitory built	A new employee dormitory was built in park Headquarters Area in 1932.
Two-car garage built	A two car garage was added onto the rear of the superintendent's residence in 1932.
Shower house built	A shower house for the 'employee campground' was built in 1932.
Automobile shelter moved	The automobile shelter in the Picnic Area was moved to an unknown location in 1933.
CCC Camp built	A permanent CCC Camp was built in August 1934. The structures included a mess hall (kitchen and store room), bath house/laundry, eight barracks, supply warehouse building, supervisor's/officer's quarters, administrative office, recreational hall, hospital, garage, coal house, two latrines and a tennis court.
Employee's quarters built	Two new employees quarters were built at the Headquarters Area in 1934.
Machine shop built	A machine shop was built in the Headquarters Area in 1934.
Temporary engineer's office built	A temporary engineer's office was built at the site of the proposed elevator shaft in 1934.
Temporary elevator building built	Construction was begun on a temporary elevator building of corrugated iron at the Headquarters Area in 1934.
Fire trailer house built	A small house for the fire trailer was built at Headquarters Area in 1934.
Superintendent's Residence built	A new Superintendent's Residence was built in Headquarters Area in 1935.

Portable garage built	A “large portable type storage garage” was built in the Utility Area in 1935 to house donated Bureau of Public Roads equipment.
Registration Office moved	The old Registration Office/Administrative building was moved to the ECW Utility Area “to serve as an equipment shed” in 1935.
Administration Bldg. (Visitor Center)	Construction was begun on a new Administration Building (Visitor Center) in 1935.
Superintendent’s Residence remodeled	The old Superintendent’s Residence was remodeled as a Ranger’s club house in 1935.
Superintendent’s Residence addition	The old Superintendent’s Residence received a new addition, stone terrace, and path in 1936.
Fire control checking station built	A temporary fire control checking station was built and placed at the southern entrance of the park in 1936 to warn visitors of fire hazards.
Power House addition built	A new addition containing a heating plant and wash room was built onto the Power House in 1936
Park incinerator built	Construction was begun on the new park incinerator in 1936.
Elevator Building built	Work was begun on the construction of a permanent Elevator Building at headquarters in 1936.
Fire equipment building built	Work was begun on the construction of a three-stall fire equipment building in the Utility Area in 1936.
Garage razed	The old garage at the Game Preserve was razed in 1936.
Employee’s Residence razed	The small Employee’s Residence at the Game Preserve was razed in 1936.
Garage built	A new 20 x 52 foot garage was built at the Game Preserve to replace the older garage structure in 1936.
Pit toilet built	A pit toilet was built in the Campground and Picnic Area in 1937.
Buildings razed	Approximately thirty to forty former homestead buildings in the Custer RDA were razed after 1939.

Garage built	A two-story, twelve-stall garage was built in the new Utility Area for the “storage of trucks, small shop, blacksmith shop, furnace room, etc.” in 1939.
Sewage disposal, filtration plant built	A new sewage disposal and filtration plant was built in the new Utility Area in 1939 and 1940.
Garage built	A second large garage was built in the new Utility Area between 1939 and 1940.
Coal Bunker built	A Coal Bunker was built in the Utility Area in 1939.
Oil House built	An Oil House was built in the Utility Area in 1939.
Carpenter’s Shop built	A 1942 map documents that a Carpenter’s Shop had been built in the newly developed Utility Area.
Cement storage shed built	A 1942 map documents that a cement storage shed had been built in the newly developed Utility Area.
Superintendent’s Res. addition built	A substantial addition to the superintendent’s Residence was built in 1940.
CCC Camp obliterated	The CCC Camp constructed in 1934 was completely obliterated in 1941. The only structure to remain standing was the old officer’s quarters adjacent to the Power House.
Elk Mountain Lookout Tower built	A Lookout Tower on Elk Mountain was built in 1940.
Superintendent’s sun porch built	A sun porch addition was built onto the superintendent’s house in 1940.

### **Constructed Water Features**

Ta-Tan-Ka lake / Norbeck Dam built	Construction was begun in 1928 on a dam on Cold Spring Creek near the Game Preserve Headquarters. The reservoir was finished in 1929.
Fountain and pool built	A small fountain and pool were constructed adjacent to the Warden’s residence at the Game Preserve in 1931.
Concrete intake box built	A concrete intake box was built at the McAdam Middle Spring in 1931.

Water pipe line laid	A pipeline from the Valentine Spring to the Game Preserve headquarters was laid in 1931.
Sand filter installed	A slow sand filter was installed at the McAdam springs adjacent to the main water supply line in 1931.
Spring cleared	The Valentine spring in the western pasture of the Game Preserve was cleared and cleaned in 1931.
Water pipe line laid	A pipeline from the McAdam springs was laid to park headquarters in 1931.
Sewer line laid	Approximately 3,160 feet of six-inch vitrified sewer pipe was laid from the Headquarters Area to the disposal ponds in the Utility Area in 1931.
Cooling tank built	A 1,500 gallon concrete cooling tank was built adjacent to the Power House in 1932.
Water reservoir built	A 25,000 gallon water reservoir was built in the Headquarters Area in 1934.
Sewer line extended	The sewer line in the Headquarters Area was extended 1,400 feet to empty into a septic tank in 1939.
Septic tank built	A concrete septic tank and dosing chamber with a capacity of 6,250 gallons was built in 1939.

### **Small-scale Elements**

‘Wind Cave’ sign removed	By the end of 1928, the ‘Wind Cave’ sign on the hillside above the cave entrance had been removed as requested by park landscape architects.
Exhibition pasture fenced	An exhibition pasture was fenced at the Game Preserve in 1930 to “give the visitors a much better opportunity to see and study the animals.”
Wooden platform removed	An “old unsightly wooden platform” near the cave entrance was removed and replaced with fill in 1931.
Corral fence removed	The old corral fence adjacent to the barn at park Headquarters was removed in 1931.

Tent platforms removed	Several small tent platforms “used by temporary rangers” and in view of the highway were removed from the park Headquarters Area in 1931.
Street lighting system erected	A new street lighting system composed of nine light poles was erected in the park Headquarters Area in 1931.
Headquarters fence extended	The fence encompassing the park Headquarters Area was extended out to include the new structures and location of proposed new construction in 1931.
Cattle guard installed	A cattle guard was installed south of park Headquarters Area in 1932.
Boundary fence erected	A new fence that encompassed the entire Wind Cave National Park was erected by CCC labor between 1935 and 1936 after the park assumed administrative control of the U.S. Biological Survey’s Game Preserve lands.
Cattle guards installed	New cattle guards were installed on the park’s northern and southern entrances in 1935.
Borrow pits obliterated	The CCC obliterated (filled) old borrow pits throughout the park in 1935.
Retaining wall built	A 100-foot-long stone retaining wall was built on the north end of the parking area near the cave entrance in 1935-36.
Lighting system installed	A new lighting system composed of nine, 16-foot-tall creosoted light poles was installed in Headquarters Area in 1936.
Telephone line moved	The telephone line at headquarters was moved back out of visibility from the main highway in 1936.
Retaining wall removed	The 200-foot-long, 7-foot-high retaining wall adjacent to and on the west side of the main road at headquarters was removed in 1936.
Table and bench combinations built	Table and bench combinations “of rustic character” were built in the Campground and Picnic Area in 1937.
Fireplaces built	Stone fireplaces were built in the Campground and Picnic Area in 1937.

Garbage pits built	Garbage pits were constructed in the Picnic Area “in locations most acceptable for use” in 1937.
Entrance pylons built	Limestone and log entrance pylons with hanging signs were erected at the park’s three main entrances in late 1937.
Power lines erected	Power lines were erected from the Power House to the new Utility Area in 1939.
Stone guardrail wall built	A stone guardrail wall was built along the northern and southern ends of the Visitor Center in 1939, replacing the older log guardrails.
Telephone line buried	Approximately 2-½ miles of telephone line within the park were buried in 1940.
Buffalo corral and compound razed	The buffalo corral and compound in the Game Preserve was razed by CCC labor in 1941.
Buffalo corral and compound built	A new buffalo corral and compound consisting of “6 pens 30 x 40 feet which surround a central hub, all constructed of heavy plank fence with walkways on top,” was built in the same location as the old one in 1941.

### Subterranean History

As annual cave trail maintenance continued during this period, the park began experimenting with using concrete and stone to construct foundations, bridges, and stairs within the cave. These new materials were initially found to be “very satisfactory from the standpoint of looks and utility.”<sup>160</sup>

In 1929, 500 feet of new cave trail was constructed as a bypass to relieve congestion caused by tours going into the cave meeting those coming out. The new trail was constructed from the Cathedral re-emerging on the existing cave trail about 50 feet up from the trail toward the Walk-in Entrance.<sup>161</sup>

A 1929 Wind Cave National Park inspection led to strongly worded recommendations for lighting the cave’s recesses. “[The] beautiful formations found nowhere else in the world should be exhibited to the best advantage. This can be done only by means of a well arranged lighting system. The only method now available for lighting the cave is by use of gasoline lanterns. This method, we know, is not effective in developing or showing the beauties of the cave.” Based on Williams’ report and numerous past recommendations, the NPS studied the feasibility and cost of electrifying the cave. In 1931, the electrification of the major guided tour routes within Wind

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<sup>160</sup> Frederick, “Wind Cave National Park,” 15.

<sup>161</sup> SAR, 1929.

Cave was achieved. Lighting was indirect and all new wires and fixtures were concealed from view. An inspection of the progress in 1931 reported that "Mr. Montieth is doing a very good job in concealing in every possible way the greatest part of the [lighting] system" (see *Figure 2-43*).<sup>162</sup>

Despite a ban on the collection of geological specimens from the cave, in 1929 the park sent a small specimen collection from Wind Cave to the South Dakota State Highway Commission. The collection was subsequently used for a display advertising the attractions and scenic features of the state.<sup>163</sup>

During the early 1930s, park officials and outside parties all recommended improving the network of cave trails. Justifications for the proposed improvements repeated earlier requests—"to allow visitors to walk upright throughout the traveled routes"—and to have the cave trails "lowered in some places to allow easier access." Some, however, justified the improvements because of the new lighting system.<sup>164</sup>

With the new lighting system in operation, the old narrow stairways, rough, steep trails, and in many places, the low ceilings, are more noticeably inadequate. When talking over the possibility of improving the stairways and trails with Superintendent Freeland, the thought occurred to us that this would be an ideal project for construction during the winter months as a means of relief to some of the many destitute people in that vicinity. ...It seems to me that because of the thousands of people making the trip through the Cave each year, it is deserving of more adequate, safer and more comfortable trails and stairways. ...The wooden stairways, I understand from Mr. Freeland, must be replaced frequently, as the timber quickly rots in the damp air of the Cave. These should all be replaced with either stone or concrete steps with adequate hand railings. ...The natural passages should all be widened to afford sufficient width and head room so that one may walk through without stooping and without rubbing against the side walls. The trails themselves should be smoothed, and where wet, or at times even covered with water, they should be surfaced with some material which probably would have to be brought in from the outside.<sup>165</sup>

In 1933, work began on the cave betterment and improvement program. Within the cave entrance house, the old entryway was torn out and a new "compartment...[with] a neat railing and counterbalanced trap door" was installed. CCC labor was used to improve the cave trails which included extending and widening existing trails, constructing ramps, and filling of areas where bridges had formerly stood. By 1934, this work was considered "done" on some of the roughest and narrowest portions of the trails, and "practically completed" on the short route. A white "fine screened gravel" was installed on all trails to provide a better walking surface. By the spring of

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<sup>162</sup> Williams, "General Report on Wind Cave National Park," n.p.; SMR, 1931; SAR, 1931; K.C. McCarter and Howard W. Baker, "Report to the Chief Landscape Architect," n.p.; National Park Service, "Wind Cave National Park, Schematic Diagram showing present Layout of Electric System in Cave," Nov. 1933. WC 4943.

<sup>163</sup> Bohi, "Seventy Five Years," 446.

<sup>164</sup> SAR, 1931; K.C. McCarter and Howard W. Baker, "Report to the Chief Landscape Architect," n.p.

<sup>165</sup> A.W. Burney, "Memorandum to Mr. Kittredge," November 17, 1932. Cave and Elevator C & D #7, F Ref 1931 B1. Ms. on file at the Library Collection, Wind Cave National Park.

1935, the superintendent summarized the work accomplished to date: “Considerable work was accomplished...widening and smoothing up cave trails and the blasting out of low ceilings.” Three flights of concrete stairs were built “making a decided improvement over the old wooden stairs,” and new hand rails were placed on completed portions of the new stairways the trails. Approximately 1-½ miles of cave trail had been improved during the winter. The improvement project was discontinued temporarily until the winter of 1935-36 (see *Figures 2-28, 2-39, 2-40 through 2-44, 2-48 through 2-54*).<sup>166</sup>

By 1934, work began on excavation for a shaft for a new elevator. Based on a survey performed by CCC crews, the new area selected for an elevator shaft was just south of the location proposed for the new Visitor Center. In association with the construction of the elevator shaft, a new loop trail “connecting the main trail with the upper landing of the elevator shaft” was built. This work consisted of “clearing out...rocks and fallen formation[s] in natural tunnels where [the] trail is located.” By 1935, the shaft was fully excavated and concreting had begun. The new elevator was installed in October 1935.<sup>167</sup>

The improvements to the cave during the early to mid-1930s were not without controversy. On a routine visit in late summer of 1935, NPS geologist Carroll H. Wegemann noted that,

many passages in Wind Cave originally rather narrow were widened or lowered during last period. Considerable blasting for cement stairways to provide easy trail was done at sacrifice of many natural features in floor and sides. ...Question of advisability, feeling that part of cave should remain in its natural condition. The passages are so narrow that all changes are apparent. Preservation of original form of passages equally important with preservation of roof incrustations. ...It is my recommendation that approval of Project No. 4 [cave betterment and improvement] be withheld pending a careful study of the project at Wind Cave.

The concerns over the kinds and degree of work accomplished in the cave raised by Wegemann were echoed in a subsequent letter to the NPS Director: “More blasting has been done than was necessary causing in places unnecessary damage. In some cases floor could have been lowered instead of blasting roof. At other points passageways blasted unnecessarily wide. Closer supervision of work is needed. Most important ECW project at Wind Cave is trail work.” Concerns about the Wind Cave trail work were serious enough to attract attention from the NPS, Branch of Research and Education. In a letter to the NPS Director, the head of Research and Education acknowledged that “more work has been done than contemplated in the original set-up and that more work of similar nature is anticipated” ultimately recommending that “this work be

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<sup>166</sup> SMR, 1933, 1934, 1935; SAR, 1934, 1935; National Park Service, “Plan of Existing Wood Stairway in Cave,” Wind Cave National Park, n.d. [ca. 1934-1935]. WC 5020 (#2); National Park Service, “Proposed Plan, Cave Stairs at Sta. C-21,” Wind Cave National Park, n.d. [ca. 1934-1935]. WC 5020 (#3); National Park Service, “Proposed Plan, Showing New Concrete Cave Stairs,” Wind Cave National Park, n.d. [ca. 1934-1935]. WC 5020 (#4); National Park Service, “Plan Showing Existing Cave Stairs and Trail (F3-F12),” Wind Cave National Park, March 1935. WC 5029 (#1); National Park Service, “Plan Showing Existing Cave Stairs and Trail (F26-L8),” Wind Cave National Park, March 1935. WC 5029 (#2); National Park Service, “Plan Showing Existing Cave Stairs and Trail (L12-L31),” Wind Cave National Park, March 1935. WC 5029 (#3).

<sup>167</sup> SMR, 1934, SAR, 1934, 1935.

held in abeyance pending the appointment of a technical foreman properly trained in geology and capable of supervising this work.”<sup>168</sup>

In response, the NPS sent Conrad Wirth to the park to inspect the trail work. His report played down the impact to the cave. “The actual damage to the cave from my standpoint and I would say from the standpoint of 99 percent of the people who go through the cave was negligible. . . . I can’t help but believe that the cave work contemplated and started, upon plans approved by you is a worthy project and ought to be pushed to completion before we lose the benefit of the CCC. The destruction referred to is very small and almost unnoticeable.”<sup>169</sup>

The NPS geologists defended their position, acknowledging that trails clearly needed to be improved for visitors but insisting that the work in Wind Cave could be done in a manner more sensitive to the original geological formations.

As geologists, we are in favor of constructing a judicious path through the cave, removing any necessary obstructions from the floor and smoothing a path of reasonable width through the area to be traversed. . . . We do however, object to widening the passages to such an extent that the original form is lost and the evidence of jointing and fracturing removed by widening all narrow passages. Excavation in this cave was conducted on such a large scale that an air hose was run underground to permit the use of air drills to expedite the removal of large quantities of rock. . . . If the passageway is examined carefully it will be found that a great many natural projections have been removed in order to give the passageway a trimmed up appearance. . . . In one room where there is a rather general covering of the walls with calcite crystals, these are so heavily covered with dust that they are dull and not as attractive as they would be if the dust were removed. The suggestion was made that since there was an air hose down in this part of the cave, an experiment of removing this dust by washing with water be tried. The water could easily have been supplied through the pipe recently used as an air hose. The answer was given that if this were done it would expose considerable cutting of the walls. . . . The natural state of the cave has been altered to give it more the aspect of a tunnel. . . . If there were occasional points where it was too narrow to get through with comfort, I believe it was entirely justifiable to remove such local conditions but to practically change the general nature of the cave by a rather extensive program of alteration is not so easily justified.<sup>170</sup>

The philosophical impasse was resolved at a meeting of all concerned parties in mid-1936. The meeting was called “to discuss and reach a definite decision on the amount and the type of

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<sup>168</sup> Earl A. Trager to A. Demaray, September 14, 1935. Cave and Elevator C & D #7, F Ref 1931 B1. Ms. on file at the Library Collection, Wind Cave National Park; Earl A. Trager to H. C. Bryant, October 29, 1935. [Cave Trails]. Cave and Elevator C & D #7, F Ref 1931 B1. Ms. on file at the Library Collection, Wind Cave National Park; H. C. Bryant, “Memorandum for Mr. Demaray,” January 18, 1936. Cave and Elevator C & D #7, F Ref 1931 B1. Ms. on file at the Library Collection, Wind Cave National Park.

<sup>169</sup> Conrad Wirth to Director, National Park Service, July 6, 1936. [Trail Work in Wind Cave]. Cave and Elevator C & D #7, F Ref 1931 B1. Ms. on file at the Library Collection, Wind Cave National Park.

<sup>170</sup> Earl Trager to Acting Director, National Park Service, July 16, 1936. Cave and Elevator C & D #7, F Ref 1931 B1. Ms. on file at the Library Collection, Wind Cave National Park.

construction to be accomplished on the stairs and trails in the cave at Wind Cave National Park.” The decision reached at the end of the meeting was to establish formal policy for all future trail development in Wind Cave. “Since the primary purpose of the NPS is to preserve the natural features of an area and yet present them to the public in such a way that the areas will not be duly disturbed, the trails and stairways should follow as nearly as possible the natural existing fault lines and openings. In order to accomplish this it will in some cases, be necessary to construct stairs on a steeper grade than has been previously preferred by the Branch of Engineering.”<sup>171</sup>

Much of the cave work accomplished during the winters of 1935-36 and 1936-37 included continued replacement of aging wooden stairs with concrete, lighting of the “long route,” replacing old pipe hand railings with “a new type of ornamental iron rail,” and “cleaning up debris and materials left from past years of construction and maintenance.”<sup>172</sup>

In March 1936 another cave-in was discovered “on the regular trail.” Approximately two cubic yards of rock had fallen from the ceiling of the main passageway “at the foot of the first straight stairway below the entrance.” The cave-in demolished a flight of wooden stairs some eight feet long and blocked the pedestrian trail. After inspecting the damage, the cave-in was blamed on “the work of frost during and after the severe weather of January and February.” The fallen debris was cleared by a CCC crew “and the wooden stairway was replaced the next morning.”<sup>173</sup>

By the mid-1930s, park officials and landscape architects had proposed a new walk-in entrance for the cave. Proposed plans called for excavating a new entrance where the old cave house entrance was and reconstructing a more ‘naturalistic’ façade. The new tunnel was excavated in late 1936. The following year, landscape architects completed reconstructing the new naturalistic façade. As Landscape Architect Serrano described in a 1937 report “additional weathered stone is being placed around recently constructed cave entrance to obtain a more naturalistic affect. Placing of the necessary additional weathered stone will soon be completed following which it is planned to obtain even a more naturalistic effect by resodding and planting additional native trees and shrubs.” A new “crude wooden” door graced the Walk-in Entrance by 1940. Shortly thereafter, a ten-inch diameter opening was made in the door to restore “the natural whistling effect to the entrance which led to the discovery of Wind Cave.”<sup>174</sup>

General trail maintenance work continued into the early 1940s. The major projects accomplished in 1941 were resurfacing large portions of the cave trail system, and installing 3,000 feet of new electrical cable.<sup>175</sup>

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<sup>171</sup> Howard Baker to Regional Office, National Park Service, July 28, 1936. “Stairs and Trail Constructions within the Cave at Wind Cave National Park,” Cave and Elevator C & D #7, F Ref 1931 B1. Ms. on file at the Library Collection, Wind Cave National Park.

<sup>172</sup> SMR, 1936, 1937; Serrano, “Monthly Report,” July 1937; National Park Service, “Proposed Concrete Stairways in Caves,” Wind Cave National Park, April 1935. WC 5019 (#1 and #2); National Park Service, “Proposed Concrete Stairways in Caves, Crossroads to Fairgrounds,” Wind Cave National Park, June 1935. WC 5028 (#1 -4); National Park Service, “Proposed Concrete Stairways in Caves,” Wind Cave National Park, August 1935. WC 1005.

<sup>173</sup> SMR, 1936.

<sup>174</sup> SMR, 1936; SAR, 1940; Serrano, “Monthly Report,” December 1937, n.p.; Frederick, “Wind Cave National Park,” 17-18.

<sup>175</sup> SMR, 1941; SAR, 1941.

The 1942 Master Plan for the park summarized nearly forty years of federal development of the cave trail system.

The principal trails in the cave were developed by the Stablers and McDonalds prior to the acquisition of the park by the Government in 1903. Improvements which have been made since that time have been limited to those made necessary to provide passage headroom, width, reduced gradient and smoother surfacing to make footing safe and comfortable. The old system included wooden stairways and bridges which were out of harmony with park ideals from the standpoint of both safety and appearance. ... Considerable [work] was accomplished toward replacing the old rickety wooden structures with concrete stairs of random width which in most cases have been carried into the passage sidewalls thus creating a desirable irregularity of outline. ... Improvement of cave trails, stairs and bridges has been completed except the placing of a new type of metal hand rail on the stairways. However considerable improvement is yet necessary on the existing trails on the long route before that portion of the cave can be traversed by visitors with reasonable ease.<sup>176</sup>

The report also provided a plan view of the Cave Trail System documenting the location of existing guided trails and cave features with the relative location of aboveground buildings and features (see *Figures 2-95 and 2-96*).<sup>177</sup>

Cave-ins continued to plague the park during extremely cold winters. In March 1943, a “5 ton rock dislodged by frost motion...blocked [the] cave at [the] foot of first flight of stairs. This was promptly removed.” Only two years later, additional cave decay was noticed. “More than the usual amount of limestone fragments have fallen from the roof of the cave this year. This occurs throughout the zone of frost section which extends a short distance beyond the cave entrance.”<sup>178</sup>

## LANDSCAPE FEATURES BY CHARACTERISTIC

### Natural Systems and Features

#### ‘Ovens’

Many of Wind Cave’s larger rooms or halls were connected by narrow crevasses and/or tunnels. These corridors were called ‘ovens.’ Because many of the ovens were too narrow to allow visitors to pass through comfortably, widening them was the target of continued cave improvement.

### Land Use

#### Guided tour routes

The NPS continued to offer park visitors guided tour routes through Wind Cave.

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<sup>176</sup> National Park Service, “Master Plan, Wind Cave National Park,” 1942.

<sup>177</sup> National Park Service, “Cave Trail System Plan, A Part of the Master Plan for Wind Cave National Park,” Jan. 1, 1942. WC 3006 (F1 and F2).

<sup>178</sup> SAR, 1943, 1945.

**Specimen collection**

A collection of Wind Cave specimens is made by the NPS for the South Dakota State Highway Commission in 1929. The specimens were used to advertise the attractions and scenic features of the state.

**Circulation****Guided tour routes**

Originally developed by the McDonald family, the NPS continued to utilize the network of formal guided tour routes throughout the cave.

**General trail maintenance**

General trail maintenance within the cave was continued between 1928 and 1946. This maintenance consisted of the repair and replacement of all wooden landings, stairs, bridges and handrails.

**New cave trail excavated**

In 1929, 500 feet of new cave trail was excavated from the Cathedral re-emerging on the existing cave trail about 50 feet up from the trail toward the Walk-In Entrance.

**Concrete stairs and bridges built**

In 1929, the park began to experiment with concrete and stone for the construction of foundations, stairs and bridges in the cave. Between 1935 and 1936, and 1936 and 1937, much of the caves old wooden landings, stairs, and bridges were replaced with concrete forms.

**Cave improvement program**

Extensive improvements to the cave trails were carried out between 1933 and 1935, including extending and widening existing trails, blasting low ceilings, constructing ramps, and filling areas where bridges formerly stood. Between 1936 and 1937, debris and materials from past years of construction and maintenance were also cleaned up.

**Trails graveled**

All cave trails were surfaced with a white, fine screened gravel in 1934.

**Elevator shaft excavated**

Excavation of the cave elevator shaft began in 1934 and was completed in 1935.

**Loop trail connection excavated**

In association with the elevator shaft excavation, a new loop trail “connecting the main trail with the upper landing of the elevator shaft” was opened in 1934.

Tunnel excavated	A tunnel was excavated to provide a new walk-in entrance to the cave in 1936.
Door attached	A “crude wooden” door with a ten-inch diameter opening was placed on the walk-in entrance in 1940.
Trail resurfaced	Large portions of the cave trail were resurfaced in 1941.

### **Vegetation**

Trees and shrubs planted	Native trees and shrubs were planted around the new naturalistic façade to the tunnel entrance in 1937.
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### **Buildings and Structures**

Entryway replaced	The old entryway to the cave in the cave entrance house was replaced with a new “compartment ...[with] a neat railing and counterbalanced trap door” in 1933.
Façade built	A naturalistic façade composed of weathered rock and native plants was constructed at the head of the new walk-in tunnel entrance to Wind Cave in 1937.

### **Small-scale Elements**

Cave lighting	The cave was electrified with indirect lighting in 1931. All wiring and light fixtures were concealed from view as much as possible.
Cave lighting	The long route within the cave was lighted in 1937.

## **LAND ACQUISITION AND MISSION 66, 1946–1966**

*See Figures 2-101 through 2-126 for photographs, maps, and plans of the Wind Cave landscape during this period. Also, see Map 2-4 Circa 1966 for the whole park and map 2-7 Circa 1966 for the Headquarters Area.*

### **INTRODUCTION**

The acquisition of adjacent former RDA lands in 1946 substantially increased the acreage of Wind Cave National Park. During the second half of the twentieth century, park officials began to focus more attention on the management of its natural resources initiating a revegetation and prairie dog management programs. In addition, Mission 66 planning funded the construction of a new Campground, interpretive pull-offs along the main road through the park, and a headquarters bypass road. Formal exploration and survey of the cave system was restarted in the late 1950s.

## HISTORIC CONTEXT

### Surface History

Based on recommendations from federal and state officials, in August 1946 President Truman signed legislation that more than doubled the size of Wind Cave National Park, from 11,718.17 to 28,059 acres. The new acreage was added from a portion of former Custer RDA lands to the east of the park. In addition, the National Forest Service also exchanged some land with Wind Cave National Park on its western boundary. A boundary fence encompassing the new lands, including cattle guards and flood gates, was constructed in 1951. In 1947, the Black Hills Power and Light Co. constructed electrical lines to the park, and the park formally acquired S.D. Highway 87, from its old northern boundary to the new northern boundary, and County Routes 65 and 66 (present Routes 5 and 6) on the north and east sides of park.<sup>179</sup>

With the acquisition of the Game Preserve in 1935 and former Custer RDA lands in 1946, park officials began to turn their attention to managing natural resources. In 1946, they initiated a program to vaccinate all buffalo calves to control the spread of brucellosis, and undertook the first study of prairie dog towns within the park. Following the recommendations of William V. Watson, the park began to control the prairie dog population.<sup>180</sup>

In the late 1940s, the Soil Conservation Service (SCS) collaborated with the park on a range restoration and management plan. A 1950 SCS report identified the problems facing the park and blamed them on overgrazing and poor management of the former range. "Of the total soil and moisture conservation needs of park lands, a major portion is of an inherited nature. The accelerated erosion was so advanced in the Red Valley area at time of acquisition for park purposes that usefulness of the soil for agricultural purposes was almost totally destroyed. The accelerated erosion has reached the severe and critical stage in some sections of the valley long before retirement of the land from agricultural pursuits." The same report proposed a targeted four year re-vegetation and treatment program.

The soil and moisture conservation program for Wind Cave National Park will; 1) arrest the accelerated erosion of park lands; 2) provide that land usage will be suited to the physical condition of the soil and prevent the development of additional accelerated erosion areas. ...The problem area...is 7,680 acres in extent. Treatment to arrest the evident severe and critical erosion must be applied on 1,037 acres of the total problem area...and proper usage on the remaining 6,643 acres. ...The proposed procedure in the treatment of the severe and critical erosion is to achieve soil stability by reestablishing an adequate vegetative cover for the soil surface, [and] providing necessary water facilities for wildlife. ...The revegetation will be accomplished by planting grass species indigenous to the area. Pelletized form of seed will be used, when obtainable, in the planting process. ...Species preferably utilized will be buffalo grass, blue gramma, bluestem wheatgrass, and sand drop seed, or other native species. ...Variation of mixture from tall to short grass predominance will be utilized between planting

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<sup>179</sup> HAER SD-55, 41; Long, "Historic Contexts," 54; SAR, 1951, 1952.

<sup>180</sup> Mogen, "History of Animal Management," n.p.; Curtin, "Vegetation History," n.p.

gully bottoms and wind-sheet-eroded hillocks and sites where short grasses naturally predominate. ...In the event pellet form of seed is not obtainable, some seed bed preparation in the planting sites will be necessary. ...The mechanical measures, used to supplement the seeding, will consist of check and diversion dams. ...The restorative measures undertaken will be programmed over a four year period. ...At the conclusion of the four year program, soil stability will be restored to the entire area needing treatment.<sup>181</sup>

By 1950, planning for the construction of a new residential complex between the elevator building and the Utility Area was well underway. A new Master Plan proposed five new individual residences, and three multi-unit buildings in this area (see *Figure 2-104*). In 1952, Wind Cave National Park created a gravel pit to supply aggregate for state road resurfacing. The pit was located adjacent to the north entrance. During the same year, the fire "lookout station" on Elk Mountain was moved to Rankin Ridge. The lookout was proposed to be used for a few years "until a permanent structure could be constructed." It was described as "a 40 foot cedar pole surmounted by a crow's nest." In 1954, a trailer house was purchased to accommodate seasonal rangers, and a 5,000 gallon oil storage tank was installed in the Utility Area.<sup>182</sup>

Park interpretation received increased emphasis throughout the 1950s. "Numerous signs" were installed throughout the park in 1952, and by 1954 a new interpretive sign was placed at the original cave opening, and a new roadside exhibit focusing on prairie dogs was constructed at the Norbeck Prairie Dog Town at the junction of Highways 385 and 87. The exhibit consisted of an incised wood panel. Positive public reaction to the roadside interpretive exhibit led to the construction of six additional ones in 1955. These were mostly located along the northern portion of State Highway 87 in Wind Cave National Park. They included 'What You See,' an explanation of park geology positioned over Beaver Creek; 'Drama of the Land,' a sign showing reversion of old sub-marginal farms to native cover; 'East Meets West,' an interpretation of the overlapping range of trees and shrubs; 'The Buffalo Gap,' an interpretation of a pegmatite dike overlooking the southern hills and the historically significant gap; 'Rankin Ridge,' an explanation of the nearby fire lookout; and the Northern Entrance exhibit 'From the Mountain to the Prairies' that identified wildlife and interpreted natural history values. During the same year, the 'Norbeck Prairie Dog Town' roadside interpretive exhibit was expanded to include a new pullout area, guardrail, and curbing. Small signs explaining prominent trees and shrubs were also placed on the pedestrian path leading from the Visitor Center to the cave entrance. By 1957, the new Master Plan proposed "well designed interpretive signs at appropriate spots on the park road system...[to] greatly enrich visitor experience and serve to increase understanding of the park's significance and possibly thereby to help discourage vandalism." The signs were proposed for the southern end of the main highway through Wind Cave National Park.<sup>183</sup>

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<sup>181</sup> Soil Conservation Service, "Wind Cave National Park, Soil and Moisture Conservation Development Outline," n.d. [1950].

<sup>182</sup> HAER SD-55, 41; SAR, 1952; Bohi, "Seventy Five Years," 464; E. J. Axline, "Project History and Construction Report – Rankin Ridge Lookout Tower and House – Wind Cave National Park, PCP B-17-1," November 27, 1956. Construction of Rankin Ridge Lookout Tower #21, F Ref 1945, #1-23. Ms. on file at the Library Collection, Wind Cave National Park; National Park Service, Wind Cave National Park website, Wind Cave National Park Time-Line, ([http://www.nps.gov/wica/WICA\\_Time\\_Line.htm](http://www.nps.gov/wica/WICA_Time_Line.htm)); National Park Service, "Headquarters Area," Part of the Master Plan, Wind Cave National Park, March 1950. WC 3009-L.

<sup>183</sup> HAER SD-55, 42-43, 50; SAR, 1954.

The mid-1950s also saw continued park road work. In 1953, drainage culverts were installed on State Highway 87 through Wind Cave National Park. Two years later, the North Entrance Road project was initiated. This project paved the last stretch of gravel road on the main route leading to and into the park.<sup>184</sup>

Based on deteriorating facilities at existing parks and their inability to accommodate expected increases in visitation due to increased leisure time and automobile travel, in January of 1956 Director Conrad Wirth and staff implemented a ten-year development program designed to bring the NPS system up to standard. Much of the development carried out addressed the physical facilities including road construction, improvement and expansion of camping and Picnic Areas, sanitary facilities, housing and the construction of new visitor centers. Mission 66 development was targeted to be completed in 1966, the fiftieth anniversary of the NPS.<sup>185</sup>

Two of the first Mission 66 projects to be funded within WCNP were the drilling of an approximately 800-foot deep well, and the erection of the Rankin Ridge Fire Tower. The Rankin Ridge tower was completed in the fall of 1956.<sup>186</sup>

The NPS continued targeted reseeding after the SCS re-vegetation program was terminated. In 1956, between 80 and 100 acres of lands were reseeded. A year later, 50 acres of land were reseeded. An additional 55 acres of park lands were over-seeded in 1958. Approximately 400 lbs of native grass seed were “broadcast in areas in need of vegetation” in 1960.<sup>187</sup>

The first Mission 66-era Master Plan for the Wind Cave was drafted in 1957. This plan recommended the development of several self-guiding trails. At Rankin Ridge, a self-guiding trail was proposed “to lead from the saddle on Rankin Ridge where a parking area is planned. Hikers may then ascend the truck trail to the lookout. …The trail users will be able to visit the lookout and learn something of fire control. It will be self-guiding through numbered stakes and a guide leaflet keyed to the stakes.” The plan also recommended placing a shorter and more informal Nature Trail adjacent to the proposed Campground for the use of campers.<sup>188</sup>

Minor Headquarters Area development continued during the late 1950s. In 1957, new overhead power lines were connected to all residential, headquarters, and Utility Areas, and the former carpenter’s, plumbing and mechanical shops were consolidated under one roof. In addition, new steps were constructed from the south parking area to the elevator trail. A year later, the Utility Area yard was enlarged and fenced and four new roadside exhibit signs were built. Between 1958 and 1959, new entrance signs were installed at each of the park’s three entrances. These signs replaced the old stone entrance pylons. In 1959, bison salting stations and watering tanks were placed in strategic locations throughout the range. A new employee parking area was built adjacent to the elevator building, and a bronze plaque was installed on a rock “restor[ing] the

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<sup>184</sup> HAER SD-55, 42.

<sup>185</sup> McClellan, *Building the National Parks*, 462-469; National Park Service, “Our Heritage: A Plan for its Protection and Use: Mission 66.” National Park Service, Department of the Interior, 1956.

<sup>186</sup> SAR, 1956; Axline, “Project History and Construction Report,” n.p.

<sup>187</sup> Curtin, “Vegetation History,” n.p.

<sup>188</sup> National Park Service, “Master Plan, Wind Cave National Park,” 1957.

Alvin McDonald gravesite marker.” At the Game Preserve Headquarters Area, the CCC-era buffalo corral, and most of the former Game Ranch facilities were obliterated.<sup>189</sup>

The Rankin Ridge access road and parking area was constructed in 1960. At the end of the short access road, several large stone blocks were placed to keep automobiles in the parking area. During the same year, the Rankin Ridge Nature Trail was opened. The trail began at the parking area and contained log benches, directional signs, and a coin box with self guiding leaflets. A temporary Boy Scout Campground was prepared near headquarters (exact location unknown). It included grills, tables, and temporary pit toilets. In addition, the park moved several of its trailer houses to Jewel Cave. These were replaced in 1961 by new sites consisting of concrete pads, parking areas, and water and sewer lines. Five new *transa* houses were installed there in 1962. A road was subsequently built to this new residential area shortly after its construction (see *Figure 2-126*).<sup>190</sup>

The 1961 version of the Mission 66 period Master Plan proposed an eastern bypass to U.S. 385 through the Wind Cave National Park administrative and visitor area. It also proposed expanding the existing parking area to a capacity of 150 to 175 vehicles.<sup>191</sup>

In 1962, construction was begun on the Elk Mountain Campground (see *Figure 2-122*). Selected areas were cleared and grubbed, topsoil stripped, culverts installed, and the main road, loop roads, and parking areas were constructed. A new camp tender’s residence, five comfort stations, and a campfire circle (*amphitheater building and paving*) were constructed. In addition, cattle guards, water gates, timber curbing, side walks, and signage was erected. Four camp loops were built, A through D, containing 100 campsites. A 7,900-foot fence was built completely surrounding the Elk Mountain Campground. The new Campground opened in June 1963. The 1962 Master Plan described the new Campground.<sup>192</sup>

The entrance to the campground leaves the main Park road just northwest of Park Headquarters and generally follows an old existing auto trail. This approach road is 2,300 feet in length leads into the campground ranger station where parking areas are proposed to serve incoming and outgoing visitors at the campground ranger station. Immediately beyond the parking area, Loop ‘A’ one way system, takes off through a tree opening and campsites are located. The main campground road continues westward skirting the edge of a wooded area and provides camping on both sides. Camping here and on loops A and B would serve best the auto with tent type or pickup truck with campers. It appears that loop C would best serve trailers since it is at the west end of the main road where they would be screened from views on the approach road and would be provided with a

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<sup>189</sup> SAR 1957, 1958, 1959; HAER SD-55, 56-57. The Warden’s residence was moved to Hot Springs where it still stands today.

<sup>190</sup> SMR, 1960, 1961, 1962; National Park Service, “Headquarters Area,” Part of the Master Plan, Wind Cave National Park, September 1963. WC 3009-N; National Park Service, “Site Development of Residential Area,” Headquarters Area, Wind Cave National Park, July 1963. WC 3136; National Park Service, “Seasonal Employees Apartments (12),” Headquarters Area, Wind Cave National Park, July 1963. WC 3139A (9).

<sup>191</sup> National Park Service, “Master Plan, Wind Cave National Park,” 1961; HAER SD-55, 49.

<sup>192</sup> SAR, 1962, 1963; HAER SD-55, 53-55; National Park Service, “Elk Mountain Campground,” Part of the Master Plan, Wind Cave National Park, Jan. 19, 1962. WC 3125.

convenient turn around. ...An existing campground of 13 sites is located just north of headquarters area. It is recommended that this area be converted to a picnic area when Elk Mountain Campground is developed for use. Elk Mountain will contain approximately 100 sites with some possible space left for future expansion. Five comfort stations of the smaller type are provided for the 100-site development. The comfort station at loop B will also serve the adjacent Campfire Circle. ...A campground ranger station is located at the entrance of the camping area where a seasonal manager will reside. ...To obtain protection for campers it is recommended that the area be enclosed with a fence.<sup>193</sup>

In 1963, excavation and seeding was completed for two sewage lagoons and a new sewer main. Additional roads and parking areas were also constructed to a new residential area. A year later a small, asphalt paved assembly shelter was constructed immediately north of the Visitor Center "to help relieve the congestion during peak visitor use periods." By 1965, two new employee housing units were constructed, and metal culverts replaced all wooden culverts on park Routes 5 and 6.<sup>194</sup>

In 1964, fire swept through 745 acres of the park including the Headquarters Area. A fire line dug to protect the area was obliterated after the threat passed. Helicopters were used to seed areas impacted by the fire with a mix of native grasses. Approximately ten miles of damaged boundary fence were rebuilt in 1965. In response to the threat of fire, in 1965 the park purchased roadside burning equipment and sprayed its roadsides with a chemical growth retardant. In 1966, a roadside burning project was initiated on a pilot area to determine "the effects of this method for fire pre-suppression, preventing roadside forest fires."<sup>195</sup>

New bison corrals, chutes and holding pens were constructed in December 1965 for use in the annual bison reduction program during which the animals were tested, vaccinated and possibly culled.<sup>196</sup>

The Bureau of Public Roads began constructing a new headquarters bypass road as part of the Mission 66 program. This project provided "additional parking space in front of the Visitor Center building and additional wildlife viewing areas north and south through the park." The existing highway that passed through the Headquarters Area was improved by shifting it westward into the hill and realigning it slightly to provide a better approach. Abandoned sections were obliterated and reseeded with native vegetation. The remodeled Visitor Center parking area was extended southward, increasing the number of parking spaces to 171. The CCC-era stone curbs and guard rails were relocated and the sidewalk was lengthened on both sides of the Visitor Center. A three-foot wide island was built to separate the north and south bound traffic. Parking was provided on both sides. "Other adjustments included the removal of trees, the installation of a low retaining wall in front of existing residences, and the construction of a stone curbed island

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<sup>193</sup> National Park Service, "Master Plan, Wind Cave National Park," 1962.

<sup>194</sup> SMR, 1963, 1964, 1965; National Park Service, "Topographic Map Sheet, Visitor Center, Wind Cave National Park," March 18, 1974. WC 41,001.

<sup>195</sup> SMR, 1964; SAR 1964, 1965, 1966; Curtin, "Vegetation History," n.p.

<sup>196</sup> National Park Service, "Highlight Briefing Statement, 1965 Calendar Year." Recent Reports and Statements #6, F Ref 1960, #1-21. Ms. on file at the Library Collection, Wind Cave National Park; Mogen, "History of Animal Management," n.p.

to cap off the southern half of the parking area.” During the same period, the Visitor Center interior was completely rehabilitated.<sup>197</sup>

Between 1966 and 1967 the roadside interpretive areas were renovated to include pullouts, walkways, and curbs. However “while they differed slightly in scale and capacity, each of the new parking areas shared a similar plan and section, with a basically symmetrical parking area separated from the main roadway by a grassy safety island surrounded by a concrete curb.” The new wayside exhibits included a ‘Buffalo-Antelope’ exhibit (south entrance), ‘Concretions’ exhibit (Headquarters Area), ‘Prairie Dog’ exhibit (north prairie dog town), ‘What You See’ sign (S.D. 87 above Norbeck bridge), ‘Pegmatite’ sign (S.D. 87 below Pig Tail bridge), ‘Buffalo Gap’ sign (S.D. 87 below Pig Tail Bridge), ‘East Meets West’ sign (S.D. 87 in Reaves Gulch above Pig Tail Bridge), ‘Silent Invasion’ sign (S.D. 87 south of Rankin Ridge), and the ‘From Mountains to Prairies’ sign (S.D. 87 near the north entrance).<sup>198</sup>

## LANDSCAPE FEATURES BY CHARACTERISTIC

### Land Use

Visitation	Visitation to the park was continued under NPS tenure of Wind Cave.
Recreation	With the advent of Nature Trails and back country use in the mid-twentieth century, the park began to encourage the recreational use of its lands.

### Cluster Arrangement

Cave opening cluster	The primary cluster of buildings and structures in the park continued to be focused on visitor facilities and centered around the cave opening.
Hillside cluster	A secondary cluster of buildings and structures was centered on the hillside west of the cave opening. This cluster continued to be developed as a residential area for park employees.
Utility Area cluster	Development and expansion in the new Utility Area cluster continued. Several utility buildings were consolidated and the area was enlarged and fenced.

<sup>197</sup> National Park Service, “Highlight Briefing Statement, 1966 Calendar Year.” Recent Reports and Statements #6, F Ref 1960, #1-21. Ms. on file at the Library Collection, Wind Cave National Park; HAER SD-55, 49, 58-60; National Park Service, “Parking Area Topo., Headquarters, Wind Cave National Park,” May 1960. WC 3122; National Park Service, “Proposed Realignment – Main Road,” Headquarters, Wind Cave National Park, May 1962. WC 3133; National Park Service, “Rehabilitation of Visitor Center,” Headquarters, Wind Cave National Park, September 30, 1966. WC 80001.

<sup>198</sup> National Park Service, “Interpretive Prospectus for Wind Cave National Park, South Dakota,” April 1966. Interpretive Prospectus #8, F Ref 1960. Ms. on file at the Library Collection, Wind Cave National Park; HAER SD-55, 59.

Residential cluster	During the early 1960s, a new residential area was developed halfway between the Visitor Center and the Utility Area. The new residential area consisted of temporary <i>transa</i> houses and several permanent employee housing units.
Elk Mountain Campground area cluster	A new, larger Campground was developed at Elk Mountain between 1962 and 1963. The cluster included a camp tender's residence, comfort stations, campfire circle, and 100 campsites.
Picnic Area cluster	With the opening of the Elk Mountain Campground, the old Campground and Picnic Area north of the cave entrance was designated as a Picnic Area in 1962.

## Circulation

Drainage culverts installed	Drainage culverts were installed along the length of State Highway 87 through Wind Cave National Park in 1953.
Roadside exhibit expanded	The Norbeck Prairie Dog Town exhibit was expanded to include a new vehicle pullout area, guardrail and curbing in 1955.
Steps built	New concrete steps were built leading from the south parking area to the elevator trail in 1957.
Parking area built	A new parking area adjacent to the elevator building was built in 1959.
Rankin Ridge road and parking area	A parking area and access road to Rankin Ridge were constructed in 1960. The parking area was encircled by large stone blocks.
Rankin Ridge Nature Trail opened	The Rankin Ridge Nature Trail was opened in 1960. The trail contained log benches, directional signs and a coin box with self guiding leaflets.
Residential area access road built	A road to the <i>transa</i> house area was constructed in 1962.
Elk Mountain Campground roads	The Elk Mountain Campground access and loop roads were constructed in 1962. The loop roads included timber curbing and sidewalks.

Road and parking area built

A road to and parking area in a new residential area was constructed in the Headquarters Area in 1963.

Culverts replaced

All wooden culverts on park Routes 5 and 6 were replaced with metal ones in 1965.

## Vegetation

Soil Conservation Service plan

The park implemented a Soil Conservation Service plan to re-vegetate over 1,000 acres of the park, predominantly former Custer RDA land, by seeding targeted areas with buffalo grass, blue gramma, bluestem wheatgrass, and sand drop seed between 1951 and 1954.

Reseeding program

Beginning in 1956 a reseeding program was initiated to targeted problem areas within the park.

Fire break dug

A fire break was dug around the park Headquarters Area in advance of a fire in 1964.

Roadside burning initiated

A roadside burning project was initiated in 1966 in an effort to curb roadside fires in the park.

Headquarters bypass road built

Construction on the new headquarters bypass road was begun in 1966.

Parking area expanded

The Visitor Center parking area was expanded. The old road through headquarters was shifted westward into the hill and the parking area was extended southward, increasing the number of parking spaces to 171. The CCC-era stone curbs and guardrail wall were relocated and the sidewalks at the north and south ends of the Visitor Center lengthened. A three-foot-wide island built in the parking area separated the north and south bound traffic.

Road obliterated

Portions of the main highway abandoned following bypass road construction were obliterated in 1967.

Roadside exhibits expanded

Between 1966 and 1967, the roadside exhibits along the main highway through the park were expanded to include vehicle pullouts, walkways and curbing

## Buildings and Structures

Elk Mountain fire lookout moved

The Elk Mountain fire lookout station was moved to Rankin Ridge in 1952. The lookout was described

	as a “40 foot cedar pole surmounted by a crow’s nest.”
Trailer house located	A trailer house was purchased by the park and installed (location not known), possibly behind the Power House, to accommodate seasonal rangers in 1954.
Rankin Ridge Fire Tower built	The Rankin Ridge Fire Tower was built in 1956 replacing a previous lookout station.
Structures consolidated	The former carpenter, plumbing, and mechanical shops were consolidated under one roof in 1957.
Game Preserve obliterated	Most of the Game Preserve structures were obliterated in 1959.
Trailer houses moved	Several trailer houses were moved from Wind Cave National Park to Jewel Cave National Monument in 1960.
<i>Transa</i> houses moved	Five <i>transa</i> houses were moved to Wind Cave National Park in 1962.
Camp tender’s house built	A camp tender’s house was built at the entrance to the Elk Mountain Campground area in 1963.
Comfort stations built	A total of five new comfort stations were built in the Elk Mountain Campground area in 1963.
Assembly shelter built	A small open assembly shelter with asphalt paving was constructed just north of the Visitor Center in 1964.
Employee units built	Two new employee housing units were built in 1965.

### **Constructed Water Features**

Well dug	An 800-foot-deep well was constructed at park Headquarters in 1956.
Bison watering tanks installed	Several bison watering tanks were placed in strategic areas throughout the range in 1959.
Sewage treatment system built	Two sewage lagoons were excavated in 1963. A new sewer main was laid and connected to the two sewage lagoons.

### Small-scale Elements

Electrical lines erected	The Black Hills Power and Light Company erected electrical lines to the park Headquarters Area in 1947.
Boundary fence constructed	A new park boundary fence encompassing the recently acquired Custer RDA lands was constructed in 1951.
Gravel pit opened	A new gravel pit adjacent to the north entrance of the park was opened to provide aggregate for state road resurfacing projects in 1952.
Oil storage tank built	A 5,000 gallon oil storage tank was constructed in the Utility Area in 1954.
Sign installed	An interpretive sign was placed at Wind Cave's Natural Entrance in 1954.
Roadside exhibit installed	A 'Prairie Dog' roadside exhibit was constructed at the Norbeck Prairie Dog town in 1954.
Roadside exhibits installed	Six additional roadside exhibits were installed along the main park road in 1955.
Signs installed	A number of interpretive signs identifying native trees and shrubs were placed along the pedestrian trail leading from the Visitor Center to the cave entrance in 1955.
Overhead power lines erected	New overhead power lines were connected to all developed area clusters in 1957.
Utility Area fenced	The Utility Area compound was expanded and re-fenced in 1957.
Entrance signs built	Three new park entrance signs were built between 1958 and 1959.
Bison salting stations installed	Several bison salting stations were placed in strategic range areas in 1959.
Plaque installed	A large boulder and bronze plaque was installed in 1959 "restoring the Alvin McDonald gravesite marker."

Buffalo corral razed	The CCC-era buffalo corral and compound were obliterated in 1959.
Elk Mountain Campground built	Construction on the Elk Mountain Campground was begun in 1962 and completed in 1963. The Campground contained four camp loops labeled A through D, 100 campsites, a campfire circle (amphitheater and paving), cattle guards, and water gates.
Elk Mountain Campground fenced	In 1963, a 7,900 foot long fence was constructed to keep animals out of the Elk Mountain Campground.
Bison complex built	A new bison complex containing corrals, chutes, and holding pens was built in late 1965.
Retaining wall built	During the 1966 expansion of the Visitor Center parking area, a low stone retaining wall was built in front of the residential area.

### Subterranean History

Yet another cave-in was discovered in early 1946: “One large limestone fragment, weighing about 8 tons, broke off and blocked the trail. All such incidents occur close to the entrance and are attributed to the action of frost. Tentative plans for a double cave door are in the making; and should eliminate the danger of further rock falls.” The following year, the cave entrance was flooded “destroying” electrical wires in the cave’s first 500 feet and damaging trail surfaces.<sup>199</sup>

Regular maintenance and improvement of cave facilities continued in the immediate post-WWII period. In 1948, additional concrete stairways were constructed in what were identified as ‘steep sections’ of the cave trail. It is not known if they constituted new construction or replaced existing stairs.<sup>200</sup>

In 1952, the park’s Master Plan published a new cave trails map that showed the existing trail system and cave features in relation to aboveground development (see *Figures 2-109*).<sup>201</sup>

A cave rewiring project was initiated in the spring of 1955 and finished in 1956. All fixtures were replaced with direct and indirect lighting. The new lighting system was described as “a great improvement over the old system.” In addition, a black light was installed in the Fair Grounds area and flood lights were installed in the Temple to make amateur photography possible. During the same year, Wind Cave National Park entered into an agreement with the

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<sup>199</sup> SAR, 1946, 1947.

<sup>200</sup> SAR, 1948.

<sup>201</sup> National Park Service, “Cave Trail System, Part of the Master Plan,” Wind Cave National Park, June 1952. WC 3006 (G and H).

South Dakota School of Mines and Technology “to explore and survey unknown areas of Wind Cave.”<sup>202</sup>

During the early twentieth century, former cave guide Elmer McDonald visited Wind Cave National Park. He recalled that he had found a second Natural Entrance somewhere “up the side draw NW of the cave entrance.” This entrance, subsequently found in the mid-1950s, was located approximately 200 yards up the side draw from the cave entrance.<sup>203</sup>

On August 12, 1957, ten to fourteen tons of rock caved in approximately seventy-five feet from the Natural Entrance. The cave-in destroyed a large section of stairs, lights and handrails. Roughly eight tons or fifteen cubic yards of rock and dirt were removed during the cleanup. Engineering studies were subsequently made to determine the best way to make the cave entrance safer, resulting in the cave entrance and trails reconstruction project was launched in 1958. Concrete columns and braces were installed at strategic points in the entranceway to support the ceiling, and all stairs, handrails and lighting were replaced.<sup>204</sup>

In 1959, three separate trail locations were “reworked to provide sufficient head room for visitors.” Justified as a safety precaution, this work involved “blasting away small projecting rocks,” and cleaning up and removing the debris. Beginning in the same year, the cave steps were painted to increase visibility for visitors.<sup>205</sup>

The formal survey of Wind Cave continued in late 1958 with an expedition into previously explored areas by the Colorado Grotto. Systematic exploration of Wind Cave continued throughout the late twentieth century by such organizations as the National Speleological Society, the South Dakota School of Mines, and the Windy City Grotto, and individuals including Herb and Jan Conn and Dave Schnute. Wind Cave was remapped during this period culminating in Herb Conn’s 1962 detailed plan of known cave routes and features within the Administrative Area. This detailed map also shows subterranean features in relation to aboveground development (see *Figure 2-123*).<sup>206</sup>

In 1960, all cave lights were replaced with ‘Luxor’ light bulbs. Many handrails were sanded and painted, and old handrails were replaced as needed.<sup>207</sup>

During the early 1960s, trail improvements continued to focus on the visitor. In 1961, the cave trail was repaved along the entire short route, and all steps were again striped with white paint. In 1962, the Colorado Grotto members led spelunking tours through the cave. In 1963, trail edges were “built up with [a] bituminous mix,” and problem low areas in the trail were drained. The leading step edges were repainted, a drain installed at the Garden of Eden level “across [the] face of shaft” and a catchment basin was installed to retain dripping water. Between 1963 and 1964,

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<sup>202</sup> Farrell, “Following the Wind,” 6; SAR, 1955, 1956; Bohi, “Seventy Five Years,” 466; Frederick, “Wind Cave National Park,” 18.

<sup>203</sup> Bohi, “Seventy Five Years,” 467.

<sup>204</sup> Frederick 1978:14; SAR, 1958; National Park Service, “Narrative Report: Reconstruct, Cave Entrance and Steps,” n.p.; National Park Service, “Cave Trail Reconstruction, Headquarters Area, Wind Cave National Park,” April 15, 1958. WC 3118.

<sup>205</sup> SAR, 1959.

<sup>206</sup> National Park Service, “Wind Cave, Wind Cave National Park,” March 10, 1962. WC 3143.

<sup>207</sup> SMR 1960.

most of the old iron hand rails remaining in the cave were replaced with stainless steel tube including the “Garden of Eden section.”<sup>208</sup>

In 1964, an earthquake dislodged two rocks from an unknown location in the cave ceiling. The debris was subsequently removed and the cave thoroughly inspected.<sup>209</sup>

By 1965, an “abrasive trail surface material” was applied on portions of the cave trail. The following year, several sheets of corrugated fiberglass were “suspended from [the] ceiling of wet sections of the cave in an effort to divert dripping water from [the] trail.” Both of these actions were justified as safety precautions.<sup>210</sup>

During a flash flood in 1967, over one inch of rain fell in an hour sending a substantial amount of water into the cave’s Natural and Walk-In Entrances. A ‘rock ledge’ was subsequently built around the Natural Entrance and an iron plate was attached to the bottom of the existing gate to prevent the water from entering the cave in the future.<sup>211</sup>

## LANDSCAPE FEATURES BY CHARACTERISTIC

### Land Use

Guided tour routes	The NPS continued to offer park visitors guided tour routes through Wind Cave.
Exploration and Survey	Beginning in the late 1950s, the park initiated systematic exploration and survey of the undocumented cave passages.

### Circulation

Guided tour routes	Originally developed by the McDonald family, the NPS continued to utilize the network of formal guided tour routes throughout the cave.
Cave trail maintenance	General cave trail maintenance, consisting of the repair and replacement of all landings, stairs, bridges, and handrails as needed, was continued between 1946 and 1966.
Concrete stairs constructed	Additional concrete stairs were constructed along ‘steep sections’ of the cave trail in 1948.
Cave entrance and trail reconstructed	After an August 12, 1957 cave-in, a large section of stairs, lights, and handrail were destroyed. In 1958, concrete columns and braces were built at strategic

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<sup>208</sup> SMR 1961, 1963, 1964

<sup>209</sup> Frederick, “Wind Cave National Park,” 14.

<sup>210</sup> SAR 1965, 1966.

<sup>211</sup> Frederick, “Wind Cave National Park,” 20.

points in the entranceway to support the ceiling. All stairs, handrails, and lighting were replaced.

#### Trails reworked

Three separate trail sections were “reworked to provide sufficient headroom for visitors” in 1959. This work involved “blasting away small projecting rocks.”

#### Trail repaved

The entire short route was repaved in 1961.

#### Trail edges built up

The edges of many cave trails were “built up with [a] bituminous mix” in 1963.

#### Handrails replaced

Most of the old iron handrails were replaced with stainless steel tubing between 1963 and 1964.

#### Trail resurfaced

An “abrasive trail surface material” was applied to portions of the cave trail in 1965.

### Constructed Water Features

#### Drain installed

A drain was installed at the Garden of Eden level in 1963.

#### Corrugated fiberglass suspended

Several sheets of corrugated fiberglass were suspended from the ceiling of wet sections along the cave trail in 1966 “in an effort to divert dripping water from [the] trail.”

### Small-scale Elements

#### Cave rewiring

The cave lighting system was completely rewired between 1955 and 1956. A total of 421 light fixtures were replaced.

#### Black light installed

A black light was installed in the Fair Grounds area in 1956.

#### Flood lights installed

Flood lights were installed in the Temple to allow photography in 1956.

#### Rock ledge built

A rock ledge was built around the Natural Entrance and an iron plate was attached to an existing gate in 1967 to prevent flood water from entering the cave.

## MODERN CAVE RESOURCE MANAGEMENT, 1967–2003

*See Figures 2-127 through 2-131 for images of the park during this period. Also, see Map 2-5 ca. 2003 for the whole park and Map 2-8 ca. 2003 for the Headquarters Area.*

### INTRODUCTION

This period may be characterized by an increased emphasis on the conservation of cave resources. In 1984, the park authored its first Natural Resources Management Plan that addressed cave resource management issues. It acknowledged a direct link between surface activities and their impact on cave environment. In 1990, the ongoing Cave Restoration Project was initiated focusing on cleaning and restoring Wind Cave's rooms and trails to their natural appearance. The project is in the process of removing lint and dust accumulations and blast rubble.

### HISTORIC CONTEXT

#### Surface History

In 1972, prescribed burn planning began and was implemented the following year. Between 1973 and 1981, a total of twenty-four prescribed fires were set.<sup>212</sup>

A major expansion of the Administration Building (Visitor Center) began in 1979. A new 14,000 square foot addition was completed after two years. The park also constructed an asphalt vehicle turning bay and retaining wall at the south end of this addition in 1981. During the same year, the Norbeck Lake and Dam were classified as an ‘extreme hazard.’ The buffalo corrals were repaired in 1983 and new catwalks, holding pens, and gates were constructed.<sup>213</sup>

In 1984, the park completed a Natural Resources Management Plan formally acknowledging the growing evidence of the related nature of aboveground and belowground resources with respect to cave management. “There is a growing awareness...that cave resources and environments are much more fragile and sensitive to above ground influences than originally presumed.” The park’s Natural Resources Management Plan also evaluated its existing fire management policy. “A review of the Park’s fire history illustrates the significance of the overall fire suppression and fuels management problems at Wind Cave. For such a relatively small area, the incidence of fires from 1910 – 1979 is notable. ...From 1973 to 1981, 3,299 acres in 24 prescribed fires were burned at Wind Cave under an approved Negative Declaration of Impact, mostly for research purposes. ...To reduce hazardous flash fuels, vegetation has been mowed along Park roadsides and within the Campground since 1965. Additionally, limited mechanical thinning of trees has been done in preparation for prescribed burns. In 1980, an approved Park Fire Management Plan was compiled.” This plan identified a number of exotics present within the park including

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<sup>212</sup> SAR, 1972; Curtin, “Vegetation History,” n.p.; Schripsema, “Ecological Changes,” 10; National Park Service, “Natural Resources Management Plan, Environmental Assessment: Wind Cave National Park, South Dakota,” March 1984. Ms. on file at the Library Collection, Wind Cave National Park.

<sup>213</sup> In the 1989 Annual Report, the Superintendent of WCNP noted that the Norbeck Dam and Lake were classified as an ‘extreme hazard’ in 1981. See SAR, FY 1989; National Park Service, Wind Cave National Park website, Wind Cave National Park Time-Line, ([http://www.nps.gov/wica/WICA\\_Time\\_Line.htm](http://www.nps.gov/wica/WICA_Time_Line.htm)).

Canada thistle, dandelion, down and Japanese brome, Kentucky bluegrass, Russian thistle and crested wheatgrass. Of these, Canada thistle was “viewed as a threat to native plant communities as well as a problem species to ranchers and farmers.”<sup>214</sup>

The Beaver Creek Bridge, a 225-foot-long open spandrel deck arch bridge on South Dakota State Highway 87 spanning Beaver Creek Canyon was listed on the National Register of Historic Places under Criteria A and C for the period 1929-1945 under the areas of Engineering, Politics/Government, and Transportation.<sup>215</sup>

Beginning in 1985 and continuing for several years, the park removed several tons of old barbed wire from remotely located former homestead sites. The Youth Conservation Corps (YCC) assisted with this program and by 1988, made substantial progress with this effort: “In the course of two fall seasons, I have picked up about 26,000 feet of wire. There is still a large amount to go that I know of, and probably more that I am not aware of.”<sup>216</sup>

Pest control and exotic plant management continued in the late 1980s including eliminating several hundred acres of prairie dog towns and initiating a park wide pesticide program to reduce Canada thistle from the Visitor Center area in 1986.<sup>217</sup>

In 1985, the Beaver Creek Rock Shelter site was discovered by the South Dakota School of Mines and Technology who were investigating the shelter for paleontological data. Upon discovery of cultural deposits, the state archeologist was consulted and three consecutive years of fieldwork from 1985–1987 were initiated. A total of 22 stratified cultural horizons were identified dating from between 9,300 to 1,750 years BP. The Beaver Creek Rock Shelter was listed on the National Register of Historic Places in 1984 under Criterion D for its ability to contribute to our knowledge of regional prehistory. In 1986, the park acquired three patrol horses to support its expanded backcountry use program. In addition, the YCC built a new wildlife holding facility, and a water tank placed adjacent to a neighbor on the southern boundary, next to Highway 385. The wildlife holding facility consisted of a crowding alley and pen, an overflow pen, four holding pens, a portable corral for calves, a loading area, and an adjacent fenced pasture, and an equipment building.<sup>218</sup>

Approximately 230 acres adjacent to south boundary were acquired and added to park lands in 1987. After extended investigation, the Gobbler Knob and Beaver Creek (39CU779) archeological sites were nominated to the National Register in 1988. As part of a joint state/park effort, the Black Hills Centennial Trail and trail signs were completed. The trail was dedicated as part of 1989 South Dakota centennial celebration. A horse corral was constructed at the Headquarters Area to make the newly acquired animals more accessible for backcountry and boundary maintenance projects. New redwood Campground signs were installed at Elk Mountain

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<sup>214</sup> Curtin, “Vegetation History,” n.p.

<sup>215</sup> National Park Service, National Register of Historic Places Registration Form, Beaver Creek Bridge (HS-99), 7-1 – 7-5.

<sup>216</sup> Curtin, “Vegetation History,” n.p.; SAR FY 1985; Rod Horrocks, “History of Cave and Karst Resource Management in the Park,” [2003 Draft], n.p. Ms. in possession of John Milner Associates, Inc.

<sup>217</sup> SAR, FY 1986, FY 1987.

<sup>218</sup> Galindo, “Archeological Inventory Project,” 16; SAR, FY 1986; Curtin, “Vegetation History,” n.p.; National Park Service, “Wildlife Handling Facility,” Wind Cave National Park, May 10, 1985. WC 60001.

and a total of three sites were eliminated. A new modular apartment site was constructed adjacent to the existing eight-unit apartment in the residential area. In 1989 and 1990, a new modular housing unit was moved onto the site. Many of the historic rock walls in the parking area were repaired under an historical rock wall rehabilitation program. This program removed spalled rocks and replaced cracked joint materials. One section of wall on the south end of the headquarters building was entirely realigned. The steps leading to the Visitor Center were replaced with two handicapped access ramps, one leading from the road surface to the sidewalk and a second into the building. Three trailer houses were removed from the residential area. New plastic lagoon liners were laid in the sewage lagoons and an eight-foot high chain link fence was erected around the two sewage lagoons to prevent animals from damaging the new lagoon liners and walking on them. The following year, a fee board was placed at Elk Mountain Campground adjacent to the camp tender's residence. Simultaneously, a hazard fuel reduction was carried out in the vicinity of the Campground area. Approximately 2-½ miles of new fence was erected to enclose the newly acquired land adjacent to the parks southern boundary. During the same year, a new concrete culvert was placed in the Norbeck Dam to allow continuous drainage, and the Lake and Dam were officially decommissioned. In addition, a dozen new redwood "prison industry" signs were placed in the headquarters and Campground areas of Wind Cave National Park.<sup>219</sup>

Throughout the early 1990s, an effort was made to promote the regeneration of particular deciduous tree species—Bebb willow and water birch—in natural drainages throughout the park. As part of the program, "mechanical removal of ponderosa pine" was carried out. Selective thinning of ponderosa pine was also carried out at Pig Tail Bridge in 1992 to encourage hardwood growth in that area. In addition, mechanical and chemical treatment of exotic plants and reduction of prairie dog town acreage was continued.<sup>220</sup>

Minor improvements to park facilities were implemented in the early 1990s. A new modular apartment was installed, handicapped accessible additions were built onto two comfort stations in the Elk Mountain Campground, a redwood deck was added onto Quarters 8, and an aerator was installed in the sewage lagoon area in 1990 to increase evaporation and prevent overflow. The following year, six new redwood wayside exhibit signs were installed and a 'warm up' cabin was constructed at the wildlife processing area. In 1992, three miles of the parks southeast boundary fence was electrified, and a bison trap pasture was enclosed adjacent to Route 5.<sup>221</sup>

The Beaver Creek Rock Shelter site was listed on the National Register of Historic Places in 1994. A survey during the same year recorded five additional archeological sites in Red Valley. Three additional archeological sites were discovered but not recorded. A year later the Pig Tail Bridge, a post and lintel 360 degree loop bridge along South Dakota State Highway 87, was

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<sup>219</sup> SAR, FY 1988, FY 1989; National Park Service, Wind Cave National Park website, Wind Cave National Park Time-Line, ([http://www.nps.gov/wica/WICA\\_Time\\_Line.htm](http://www.nps.gov/wica/WICA_Time_Line.htm)); National Park Service, "Modular Housing, Residential Area," Wind Cave National Park, December 1985. WC 80016. The chain link fence surrounding the sewage lagoon was required by state regulations.

<sup>220</sup> Curtin, "Vegetation History," n.p.

<sup>221</sup> SAR, FY 1990, FY 1991 and 1992; National Park Service, Wind Cave National Park website, Wind Cave National Park Time-Line, ([http://www.nps.gov/wica/WICA\\_Time\\_Line.htm](http://www.nps.gov/wica/WICA_Time_Line.htm)).

listed on the National Register of Historic Places under Criteria A and C for 1930 to 1945 in the areas of Engineering, Politics/Government, and Transportation.<sup>222</sup>

The park made substantial improvements in front of the Administration Building (Visitor Center) and the Elk Mountain Campground areas in the mid-1990s. It replaced 725 feet of asphalt sidewalk with concrete and built a ramp to meet accessibility requirements in front of Administration Building (Visitor Center) in 1995. During the same year, the Elk Mountain Campground received its first major improvements since 1962 including the elimination of sixteen sites, the relocation, repair and replacement of sixty campfire grate pads, and the replacement of fifty picnic tables. Several loop parking areas were enlarged, all individual camp site markers and deteriorated parking barriers were replaced, and eroded areas throughout the Campground were reseeded. During the same year, the Pig Tail Bridge was listed on the National Register of Historic Places. In 1996, the concessionaire that had been operating in Wind Cave National Park since the early twentieth century was permanently closed. An old CCC period ‘washing and grease rack’ structure in the Utility Area was converted into a snow and sand storage area. A new ¾-acre sewage lagoon was constructed alongside the two already serving the park. In 1997, a new accessible Romtee SST Vault Toilet replaced an old port-a-potty in the Picnic Area at the Elk Mountain Campground. New concrete walkways were laid throughout the Campground. During the same year, the park burned the Stablestack (B-35) and Air Quality Shed (B-62) structures and constructed a two-car garage for residences Q40 and Q41. Associated sidewalks and paved driveways for the garage were also completed.<sup>223</sup>

During the mid-1990s, the park converted a number of old truck trail/fire roads to hiking and Nature Trails. By 1997, the park also developed the Lookout, Sanctuary, and Highland Creek trails and associated parking areas.<sup>224</sup>

In 1998, a 12 x 14 foot section of dry stack stone wall collapsed between the Natural Entrance and the Picnic Area closing the pedestrian trail in this area until the wall was rebuilt. A new garage addition at the fire cache was built to house a larger water tender. In 1999, a concrete walk replaced the asphalt pedestrian trail between the elevator and the cave entrance. In 2000, all water and sewer lines in the Headquarters Area were replaced with new butt-fused polyethylene pipe. A new fire truck water fill station, and a concrete pad for the prefab Air Quality Monitoring Station were constructed. The following year, a potable water well and Pump House structure was built, and approximately 1-½ miles of sewer line from the Elk Mountain Campground to the headquarters were laid, “eliminating 6 waste water absorption fields, a potential contamination of Wind Cave.” To minimize visual impacts, the fence surrounding the Headquarters Area was realigned and the amount of enclosed area reduced. During the same year, a new well and water line connected Wind Cave Canyon and Maintenance Shop. In addition, NPS Routes 5 and 6 within the park were graded.<sup>225</sup>

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<sup>222</sup> SAR, FY 1994; National Park Service, National Register of Historic Place Registration Form, Pig Tail Bridge (HS-98), 7-1.

<sup>223</sup> SAR FY 1995, FY 1996, FY 1997.

<sup>224</sup> Curtin, “Vegetation History,” n.p.; SAR, FY 1997.

<sup>225</sup> SAR, FY 1998, FY 2000, FY 2001; Curtin, “Vegetation History,” n.p.; National Park Service, Wind Cave National Park website, Wind Cave National Park Time-Line, ([http://www.nps.gov/wica/WICA\\_Time\\_Line.htm](http://www.nps.gov/wica/WICA_Time_Line.htm)).

## LANDSCAPE FEATURES BY CHARACTERISTIC

### Land Use

Visitation	Visitation to the park was continued under NPS tenure of Wind Cave.
Recreation	With the emerging use of Nature Trails and backcountry areas in the mid-twentieth century, the park began encouraging the recreational use of its lands.

### Cluster Arrangement

Cave opening cluster	The primary cluster of buildings and structures in the park continued to be focused on visitor facilities and centered around the cave opening.
Hillside cluster	A secondary cluster of buildings and structures was centered on the hillside west of the cave opening. This cluster continued to be used as a residential area for park employees.
Utility Area cluster	The Utility Area continued to serve the park during this period.
Residential cluster	The Residential cluster, located halfway between the Visitor Center and the Utility Area, continued to see the construction of temporary and permanent housing and associated access roads and parking.
Picnic Area cluster	The Picnic Area continued to serve park visitors during this period.
Elk Mountain Campground area cluster	The Elk Mountain Campground continued to serve visitors to the park during this period.

### Circulation

Vehicle turning bay built	The park built an asphalt vehicle turning bay adjacent to the south side of the Visitor Center in 1981.
Centennial Trail built	The Black Hills Centennial Trail with accompanying signage was built between 1988 and 1989.

Handicapped ramp built	A new handicapped ramp was built onto the front of the Visitor Center in 1989. An additional handicapped ramp was built onto the front of the Visitor Center in 1995.
Handicapped ramps and walks built	Handicapped ramps were built onto two comfort stations in the Elk Mountain Campground in 1990. New concrete walkways were built throughout the Elk Mountain Campground in 1997.
Sidewalk replaced	Approximately 725 feet of asphalt sidewalk in front of the Visitor Center was torn up and replaced with concrete in 1995.
Loop parking areas enlarged	Several loop parking areas were enlarged at the Elk Mountain Campground in 1995.
Trail replaced	An asphalt pedestrian trail between the elevator and the cave entrance was torn up and replaced with new concrete in 1999.
Roads improved	NPS Routes 5 and 6 were regraded in 2001.

## **Vegetation**

Prescribed burn program initiated	The first prescribed burn planning for the park was initiated in 1972. Between 1973 and 1981, a total of twenty-four prescribed burns were conducted.
Pesticide program initiated	A pesticide program to control Canada thistle in the park was initiated in 1986.
Tree thinning	During the 1990s, resource management staff encouraged Bebb willow and water birch regeneration by thinning ponderosa pines in natural drainages throughout the park. In 1992, they also thinned Ponderosa pines in the vicinity of the Pig Tail bridge.
Pasture established	A bison trap pasture, adjacent to NPS Route 5, was fenced in 1992.

## **Buildings and Structures**

Visitor Center expanded	A 14,000 square foot expansion of the Visitor Center was begun in 1979 and completed in 1982.
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Modular unit moved	A new modular apartment was moved to the park in 1989.
Trailer houses removed	Three trailer houses were removed from the residential area in 1989.
Modular unit moved	A new modular apartment was moved to the park in 1990.
Warm up cabin built	The YCC built a warm up cabin in the wildlife processing area in 1991.
Structure converted	An old CCC-era “washing and grease rack” in the Utility Area was converted into a snow and sand storage area in 1996.
<i>Romtee</i> SST Vault Toilet moved	A new accessible <i>Romtee</i> SST Vault Toilet was moved to the Elk Mountain Campground in 1997 to replace an old port-a-potty.
Structures burned	The Stablestack (B-35) and Air Quality Shed (B-62) structures were purposefully burned in 1997.
Garage built	A two car garage for residences Q40 and Q41 was built in 1997.
Garage addition built	An addition was built onto a garage at the fire cache to house a larger water tender in 1998.
Prefab Air Quality Monitoring Station	A new prefab Air Quality Monitoring Station was moved to the park in 2000.

### Constructed Water Features

Sewage lagoon excavated	A new $\frac{3}{4}$ -acre sewage lagoon was excavated adjacent to the two other sewage lagoons in 1996.
Water and sewer lines replaced	Water and sewer lines within the Headquarters Area were replaced with new butt-fused polyethylene pipe in 2000.
Water fill station built	A new fire truck water fill station was built in 2000.
Water well and pump house built	A new potable water well and pump house structure was built in 2001.

Sewer line laid

One and one-half miles of new sewer line were laid from Elk Mountain Campground to the headquarters in 2001.

Well dug

A well was dug in Wind Cave Canyon in 2001.

### **Small-Scale Elements**

Retaining wall built

A stone retaining wall was built adjacent to the south side of the Visitor Center in 1981.

Barbed wire removed

Beginning in 1985, old barbed wire was systematically removed from the former Custer RDA lands. The program of removal continued through the late 1980s.

Wildlife holding facility built

The YCC built a new wildlife holding facility complex in the park in 1986.

Horse corral built

A horse corral was built at Headquarters Area in 1989 to hold three newly acquired horses.

Campground signs installed

New Campground signs were installed at the Elk Mountain Campground in 1989. A fee board was also erected adjacent to the camp tender's residence in 1990.

Rock walls repaired

Historic rock walls in the Headquarters Area were repaired in 1989. The rehabilitation included replacing spalled rocks and repairing cracked joints.

Boundary fence erected

Approximately 2-1/4 miles of new boundary fence were erected in 1990. The fence encompassed the newly acquired land adjacent to the southern boundary.

Wayside exhibits installed

Six new wayside exhibits were installed in the park in 1991.

Campsites eliminated

A total of sixteen campsites were eliminated and sixty campfire grate pads were relocated from the Elk Mountain Campground in 1995.

Wall rebuilt

A 12 x 14 foot section of dry stacked stone wall located between the Natural Entrance and the Picnic Area that collapsed in 1998 was rebuilt.

Headquarters Area re-fenced

The fence surrounding the Headquarters Area was replaced and the new alignment reduced in 2001.

### Subterranean History

The park replaced the old wooden stairs, called the Escape Stairs, in the Garden of Eden Area with new aluminum steps in 1973.<sup>226</sup>

During the last quarter of the twentieth century, it was discovered that the artificial lighting system within the cave was encouraging the growth of mosses and algae. By the late 1970s, chlorine bleach was used to treat these plants. In 1978, the first cave management document, an ‘off-trail access policy,’ was authored by Assistant Chief of Interpretation Larry Frederick. A year later, the cave’s twenty year-old lighting system was replaced with all-fluorescent lighting. The cave Walk-in Entrance was again flooded by spring rains in 1982.<sup>227</sup>

The 1984 Natural Resources Management Plan for Wind Cave National Park addressed a number of cave resource management issues. Primary among these was the basic need to accumulate more research data on cave biology and mineralogy. The plan also directly linked surface activities to potential adverse modification of the subsurface environment. Of particular note, cave lighting was found to have introduced an ‘unnatural’ light source into the cave thereby encouraging the growth of both mosses and algae. “In order to control plant growth a program of eradication, using Clorox, was begun in 1979. ...A new indirect lighting system was installed in 1980.”<sup>228</sup>

Kay Rhode, Assistant Chief of Interpretation was appointed the first ‘Cave Management Coordinator’ in 1984. During the same year, she prepared the first draft of a Cave Management Plan.<sup>229</sup>

Between 1985 and 1986, many of the cave’s asphalt trails were removed and replaced with poured concrete in an effort to eliminate petroleum based products from the cave environment. However asphalt is known to be present under concrete and rubble and blast debris.<sup>230</sup>

In 1988, the first cave debris removal project was initiated. The program removed “tons of blast rubble that formerly blocked passages.” New incandescent lights were installed in the cave to replace older fluorescent lights. In October of the same year, portions of the ceiling adjacent to the Walk-in Entrance caved-in. The following year, the walk-in entrance was shored up with the construction of concrete columns and bolts, ‘repairs’ were made to the ceilings in several cave

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<sup>226</sup> National Park Service, Wind Cave National Park website, Wind Cave National Park Time-Line, ([http://www.nps.gov/wica/WICA\\_Time\\_Line.htm](http://www.nps.gov/wica/WICA_Time_Line.htm)).

<sup>227</sup> Horrocks, “History of Cave and Karst,” n.p.; Frederick, “Wind Cave National Park,” 22; National Park Service, Wind Cave National Park website, Wind Cave National Park Time-Line, ([http://www.nps.gov/wica/WICA\\_Time\\_Line.htm](http://www.nps.gov/wica/WICA_Time_Line.htm)); National Park Service, “Cave Lighting System,” Wind Cave National Park, April 1979. WC 41008 (2 and 3).

<sup>228</sup> National Park Service, “Natural Resources Management Plan,” n.p.

<sup>229</sup> Horrocks, “History of Cave and Karst,” n.p.; SAR, FY 1985.

<sup>230</sup> Horrocks, “History of Cave and Karst,” n.p.; SAR, FY 1986.

rooms, and Jim Nepstad became the first permanent Cave Management Specialist for Wind Cave National Park.<sup>231</sup>

In 1990, the Cave Restoration Project was initiated focusing on cleaning and restoring rooms and trails to their natural appearance. The project removed the century old lint and dust accumulations and rubble from decades of blasting. This represents a continuing resource management effort for park staff.<sup>232</sup>

A revolving door was installed at the walk-in entrance to the cave in 1992 in an attempt to reduce the unnatural air flow into the cave environment.<sup>233</sup>

In 1993, pentaclorophenol, metals, and arsenic were detected in cave water “at a site down dip from the mixing circle.” A recommended cleanup and removal of the facility to a location beyond the known cave environment was carried out two years later.<sup>234</sup>

Throughout the mid-1990s, significant improvements were made to cave facilities to increase safety and maintain a stable cave environment. In 1994, additional handrails were installed “at select locations along cave trail system.” The following year, an old wooden bridge in the Pearly Gates section was replaced with concrete. Between 1996 and 1997, airlock rooms were constructed at each elevator landing within the cave. These were built to mitigate the artificially altered airflow patterns caused by the elevator shaft. In 1997, over one hundred corroded light fixtures were replaced with hard plastic units. A new gate was installed at the Snake Pit Entrance “to prevent unauthorized access to the cave and to restore airflow to historic levels.” During the same year, a dye trace study was initiated in the parking lot area “to map [the] flow of runoff to [the] cave.” A total of fifteen sites within the cave were noted to have traces of dye.<sup>235</sup>

In 1998, portions of the lighting system were removed from the Blue Grotto and Pearly Gates sections. In 1999, Wind Cave National Park’s second largest cave, ‘Coyote Cave,’ was surveyed to 4,250 feet.<sup>236</sup>

Over thirty years of wax accumulations were removed from the candlelight guided tour route in 2002. All artificial fill dump sites along the Natural Entrance and Garden of Eden Tours were mapped, experiments were conducted to determine dust accumulation patterns, and experiments with different cave lighting were begun to reduce moss and algae growth.<sup>237</sup>

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<sup>231</sup> Horrocks, “History of Cave and Karst,” n.p.; SAR, FY 1988, FY 1989.

<sup>232</sup> SAR, FY 1990.

<sup>233</sup> SAR, FY 1991 and 1992.

<sup>234</sup> Horrocks, “History of Cave and Karst,” n.p.

<sup>235</sup> SAR, FY 1994, FY 1996, FY 1997; Horrocks, “History of Cave and Karst,” n.p.; National Park Service, Wind Cave National Park website, Wind Cave National Park Time-Line,

([http://www.nps.gov/wica/WICA\\_Time\\_Line.htm](http://www.nps.gov/wica/WICA_Time_Line.htm)). Several dye tracing experiments were carried out in the 1980s.

<sup>236</sup> SAR, FY 1998, FY 2000; Horrocks, “History of Cave and Karst,” n.p.

<sup>237</sup> SAR, FY 2002.

## LANDSCAPE FEATURES BY CHARACTERISTIC

### Land Use

- |                        |  |
|------------------------|--|
| Guided tour routes     | The NPS continued to offer park visitors guided tour routes through Wind Cave.   |
| Exploration and survey | Throughout the second half of the twentieth century, the park continued systematic exploration and survey of undocumented cave passages. |

### Circulation

- |                                    |   |
|------------------------------------|---|
| Guided tour routes                 | Originally developed by the McDonald family, the NPS continued to utilize the network of formal guided tour routes throughout the cave.   |
| General trail maintenance          | General trail maintenance, consisting of repair and replacement of landings, stairs, bridges and handrails as needed, continued between 1967 and 2003.  |
| Escape Stairs replaced             | New aluminum steps replaced the old wooden Escape Stairs in the Garden of Eden in 1973.   |
| Trail surfacing replaced           | Between 1985 and 1986, all asphalt trails within the cave were removed and replaced with poured concrete.   |
| Cave debris removed                | The first cave debris removal project was initiated in 1988. This program focused on removing the “tons of blast rubble that formerly blocked passages.” Cave debris was removed annually throughout the late twentieth century.        |
| Walk-in Entrance shored            | After a cave-in in 1988, the Walk-in Entrance was shored up with the construction of concrete columns and bolts in 1989.  |
| Cave Restoration Project initiated | The Cave Restoration Project, focusing on the cleaning and removal of accumulated lint and dust along trails and within rooms, was initiated in 1990. The project was continued on an annual basis into the early twenty-first century. |
| Revolving door installed           | A revolving door was installed in the cave’s Walk-in Entrance in 1992.  |

Handrails installed	Additional handrails were installed “at select locations along the cave trail system” in 1994.
Bridge replaced	An old wooden bridge in the Pearly Gates section was replaced with concrete in 1995.
Air lock rooms built	Between 1996 and 1997, air lock rooms were constructed at each elevator landing within the cave.
Gate installed	A new gate was installed at the Snake Pit Entrance in 1997 “to prevent unauthorized access” to Wind Cave and to “restore air flow to historic levels.”
Wax removed	Beginning in 2002, several decades of wax drippings were removed from the candlelight guided tour route.

## Vegetation

Moss and algae control	During the last quarter of the twentieth century, it was discovered that the artificial light system within the cave was encouraging the growth of mosses and algae. In 1979, chlorine bleach was used to treat these plants.
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## Small-scale Elements

Cave lighting installed	A new indirect lighting system was installed in the cave in 1980.
Lights replaced	The fluorescent cave lights installed in 1980 were replaced with incandescent lights in 1988.
Lighting fixtures replaced	Hard plastic lighting units replaced many corroded light fixtures in 1997.
Cave lighting removed	Portions of the lighting system within the Blue Grotto and Pearly Gates sections of the cave were removed in 1998.

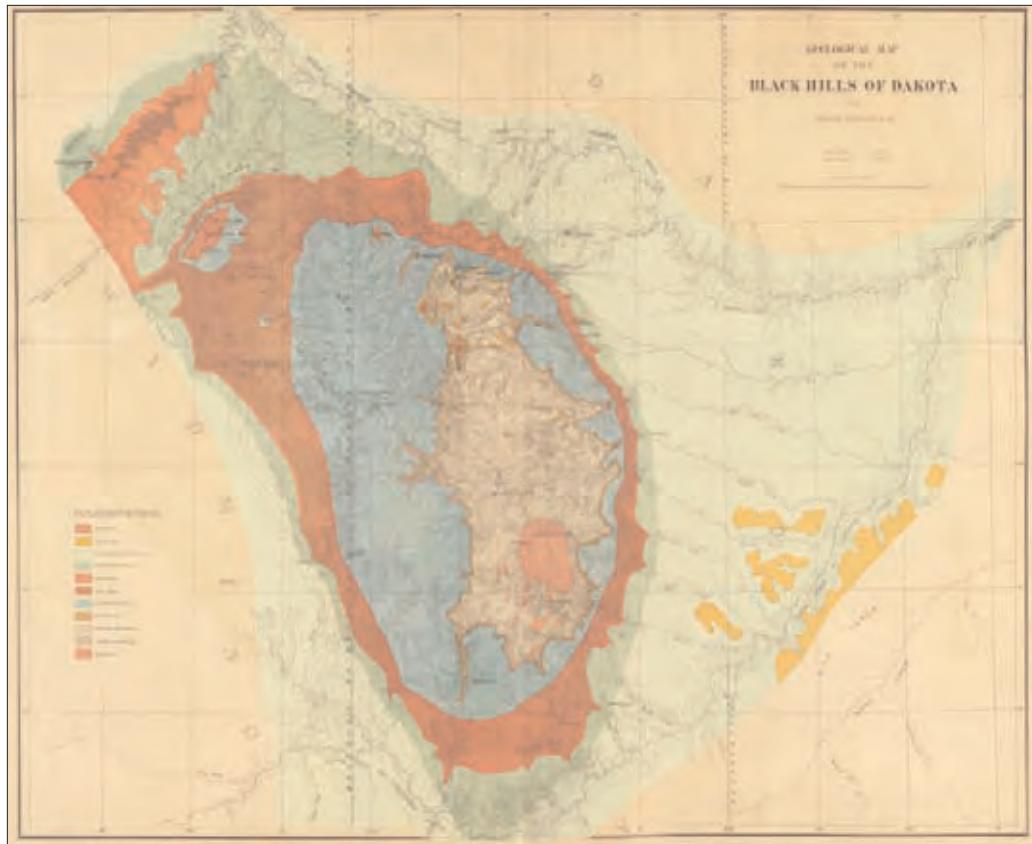


Figure 2-1  
“Geological Map of the Black Hills of Dakota,” by Henry Newton, 1879.

Source: David Rumsey Collection

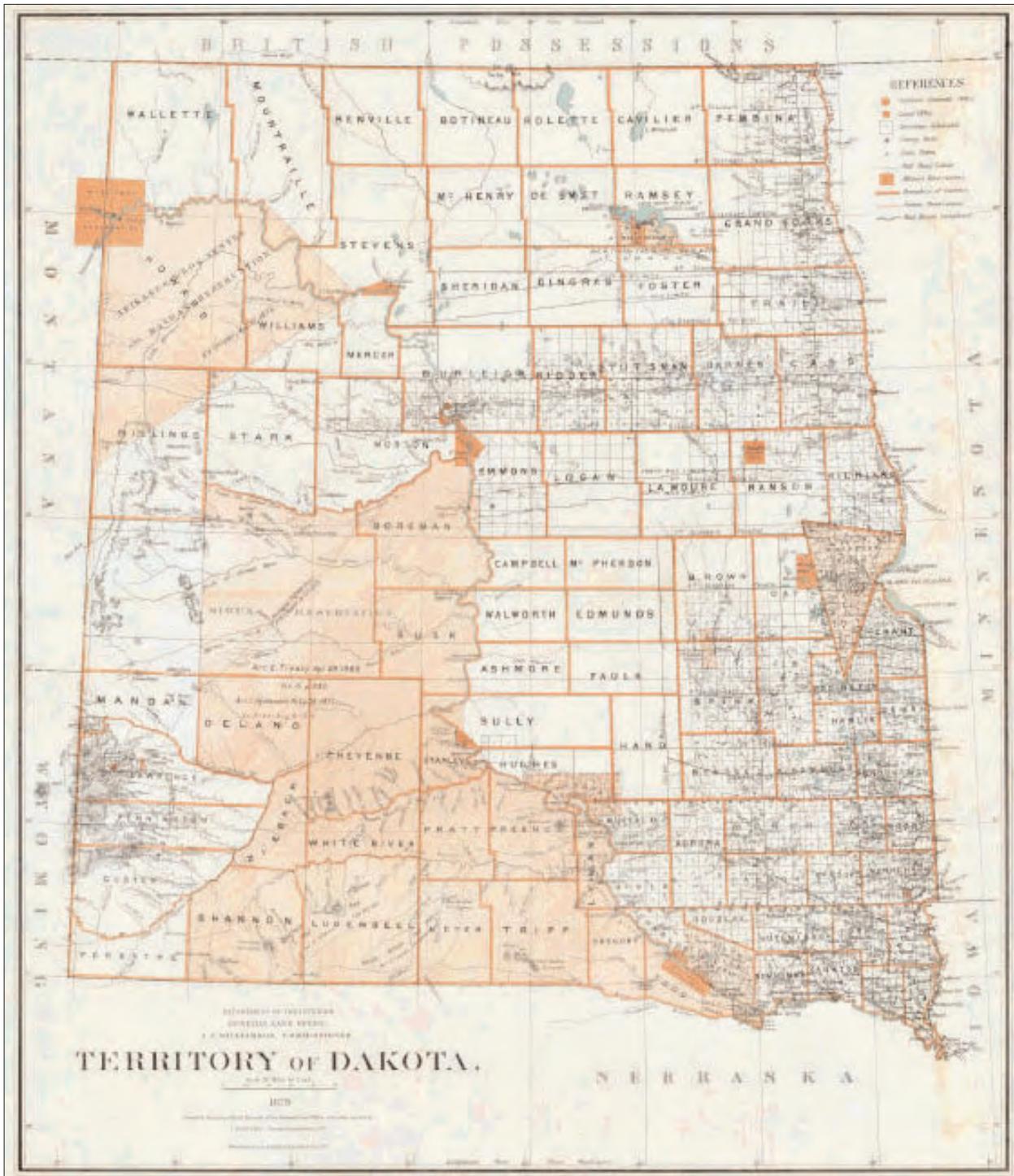


Figure 2-2  
“Territory of Dakota,” U.S. General Land Office, 1879.

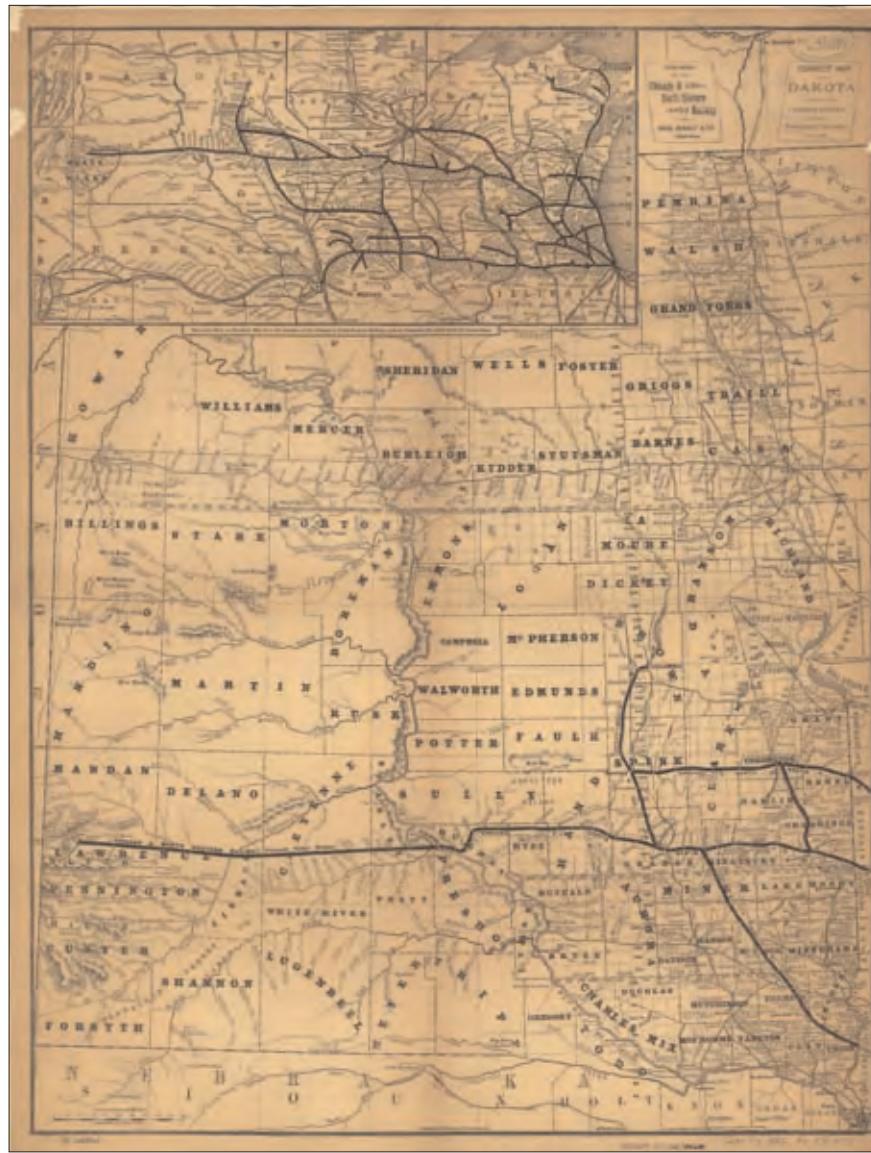
Source: David Rumsey Collection.



Source: Washington, Government Printing Office, 1880.

Figure 2-3

"Bird's eye view of the Black Hills," by Henry Newton, E.M., and Walter Jenny, E.M., Geographical and Geological Survey of the Rocky Mountain Region (U.S.), 1880.



Source: Rand McNally Company, Chicago 1882.

Figure 2-4  
“Correct Map of Dakota Compiled from United States and Territorial Surveys,”  
November 1, 1882.



Source: Wind Cave National Park Archives

Figure 2-5  
Cave entrance house and pedestrian bridge, pre 1903.



Source: Wind Cave National Park Archives

Figure 2-6  
McDonald residence on left and cabin over the blowhole on the lower right, pre 1903.



Source: Wind Cave National Park Archives

Figure 2-7  
Early cave tour with candles, n.d. (early 1900s).



Source: Wind Cave National Park Archives

Figure 2-8  
Wind Cave Hotel and stage coach, pre 1903.

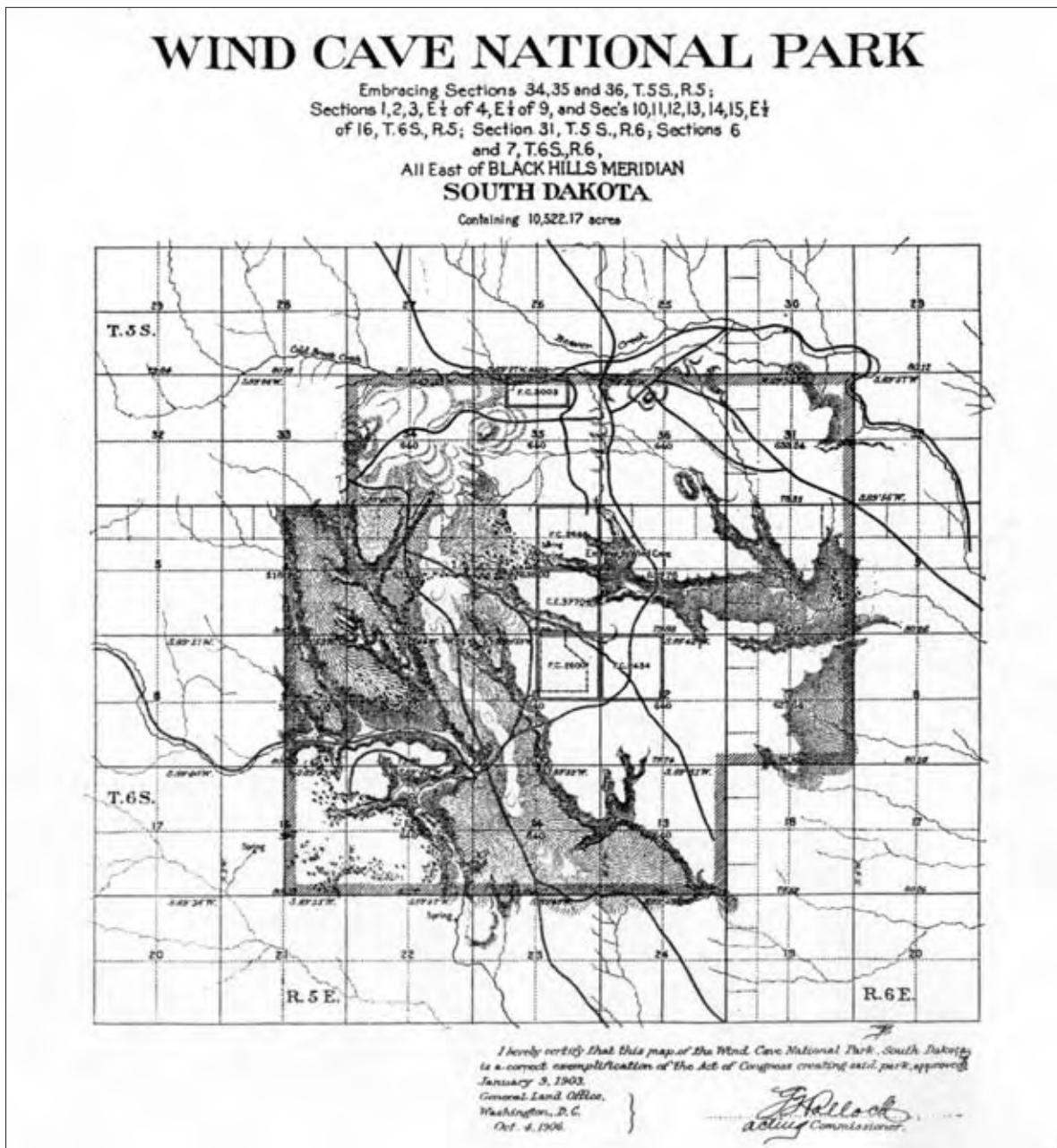


Figure 2-9  
GLO Survey Map of Wind Cave National Park, 1906.

Source: Government Land Office, 1906



Source: Wind Cave National Park Archives

Figure 2-10  
Cave tour in Model Room, 1910s.



Source: Wind Cave National Park Archives

Figure 2-11  
Registration Office, 1928.

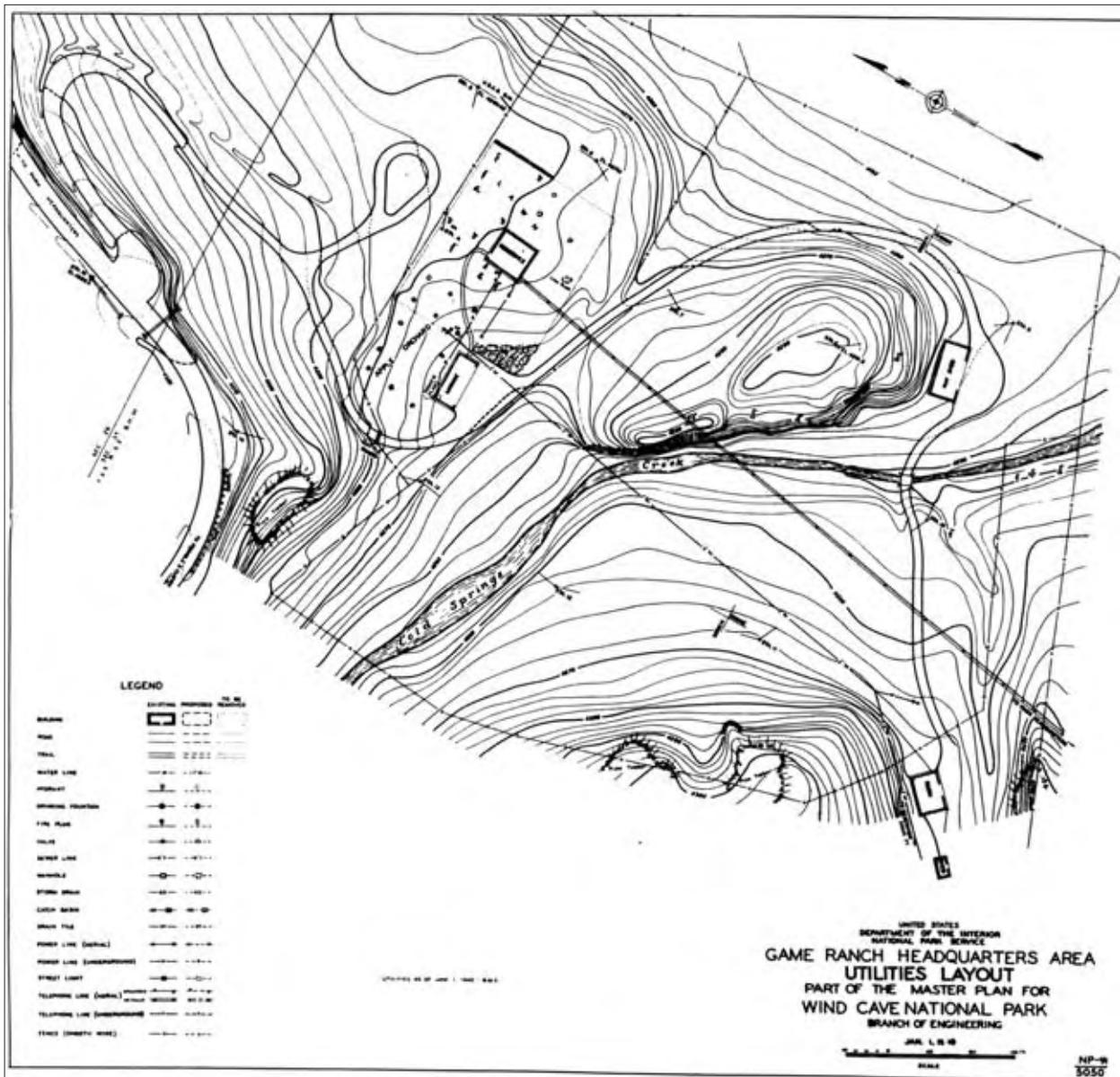


Figure 2-12  
Game Ranch Headquarters Area, Utilities Layout, Part of the Master Plan for Wind Cave National Park, January 1, 1910.

Source: Wind Cave National Park Archives

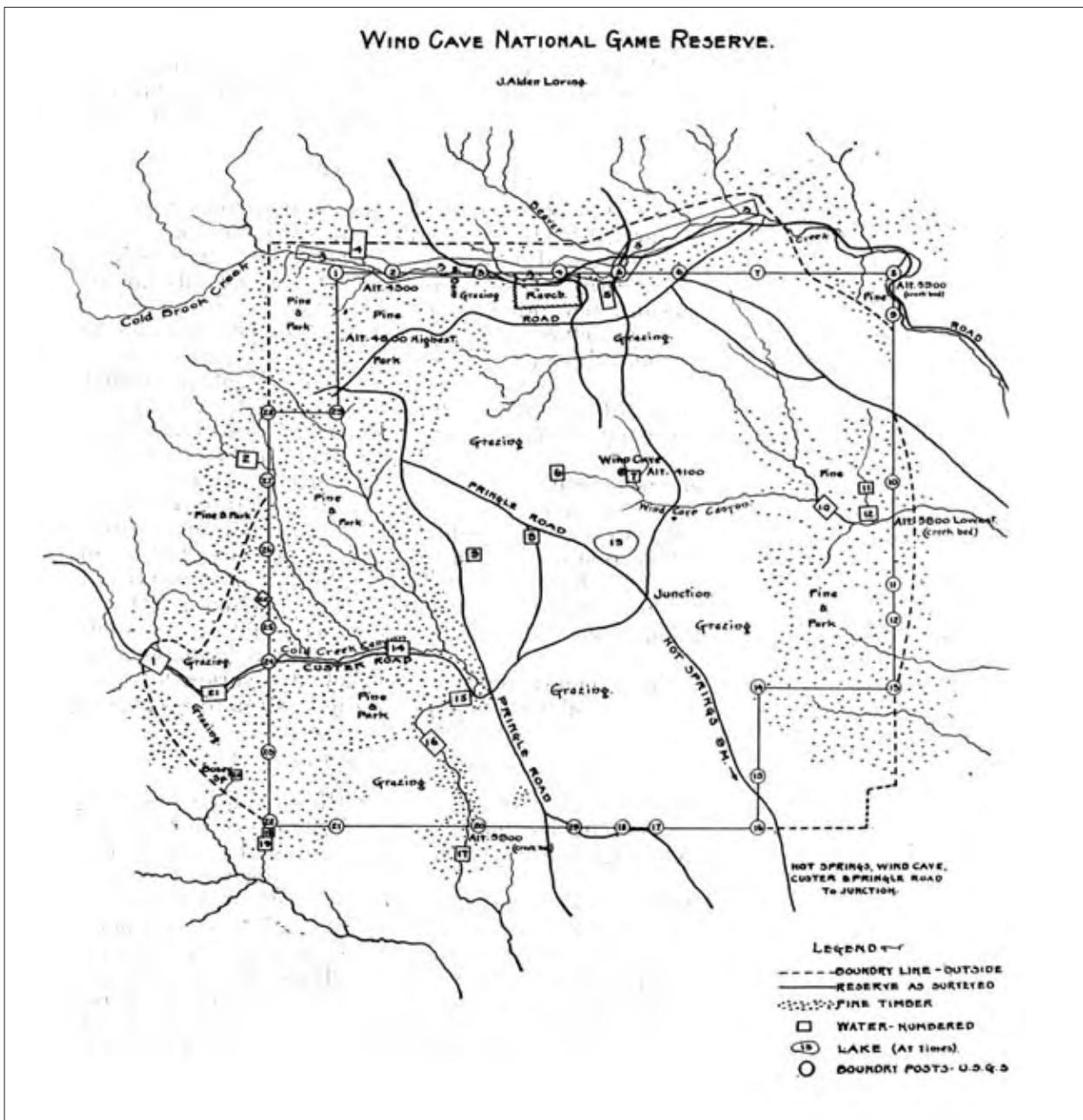


Figure 2-13  
Survey of Wind Cave National Game Reserve, 1911.

Source: Wind Cave National Park Archives



Source: Wind Cave National Park Archives

Figure 2-14  
Superintendent's Residence on the left and Wind Cave Hotel on the right, pre 1913.



Source: Wind Cave National Park Archives

Figure 2-15  
Headquarters area, old Visitor Center and Superintendent's Residence on the left, post 1919.

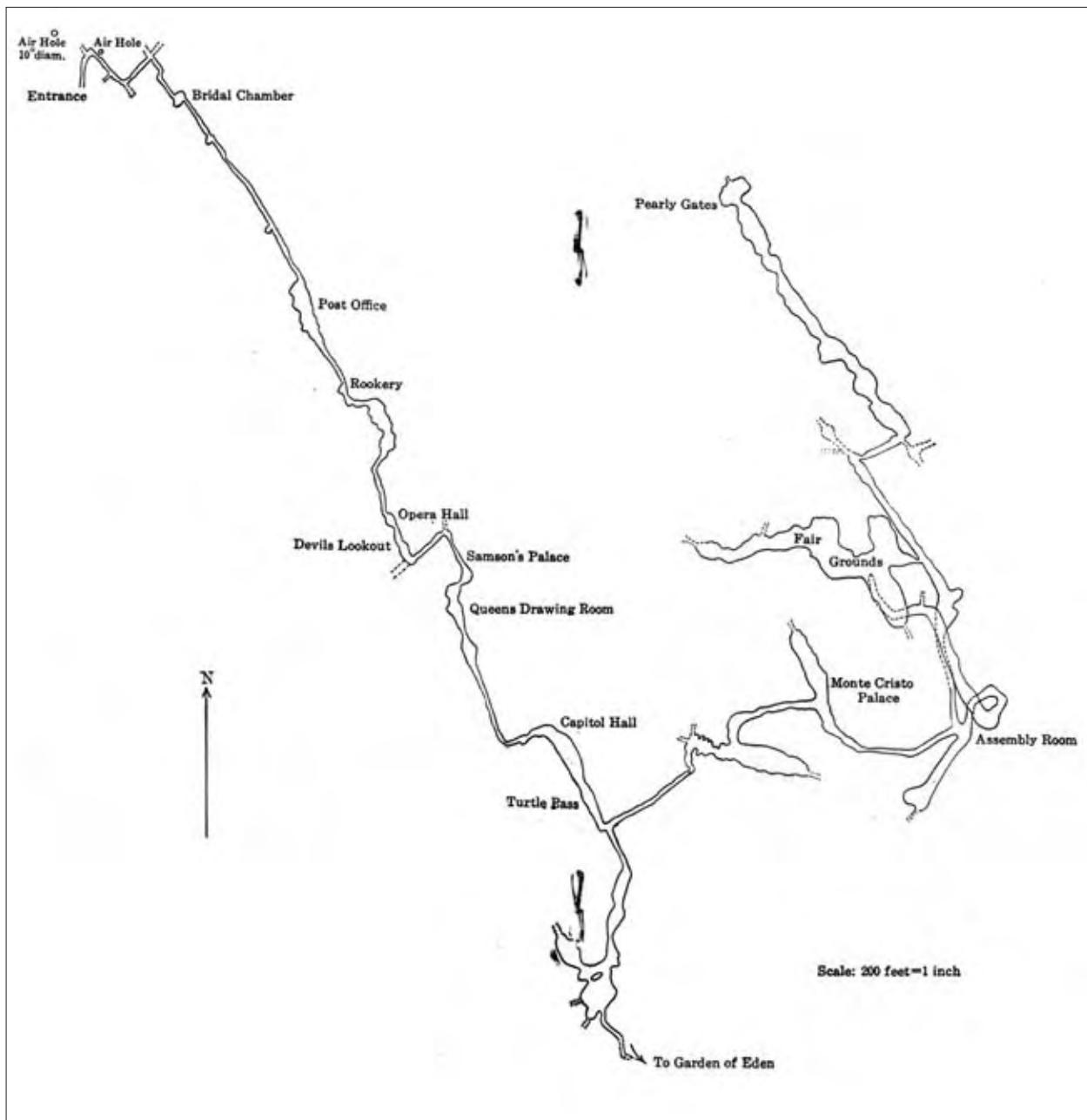


Figure 2-16  
Cave Trail System, Wind Cave National Park, ca. 1915.

Source: Wind Cave National Park Archives



Source: Wind Cave National Park Archives

Figure 2-17  
Alvin McDonald statue and iron railing, post 1918.



Source: Wind Cave National Park Archives

Figure 2-18  
Superintendent's Residence and pedestrian trail to the cave entrance, post 1918.



Source: Wind Cave National Park Archives

Figure 2-19  
Registration Office and 'Wind Cave' sign, ca. 1918-1929.



Source: Wind Cave National Park Archives

Figure 2-20  
Pedestrian bridges, cave entrance house, post 1923.



Source: Wind Cave National Park Archives

Figure 2-21  
Headquarters Area, fill for culvert, post 1923.



Source: Wind Cave National Park Archives

Figure 2-22  
Headquarters Area, looking south, post 1924.



Source: Wind Cave National Park Archives

Figure 2-23  
Cave entrance building and fill, pre 1926.



Source: Wind Cave National Park Archives

Figure 2-24  
Cave entrance house and tour group, post 1926.

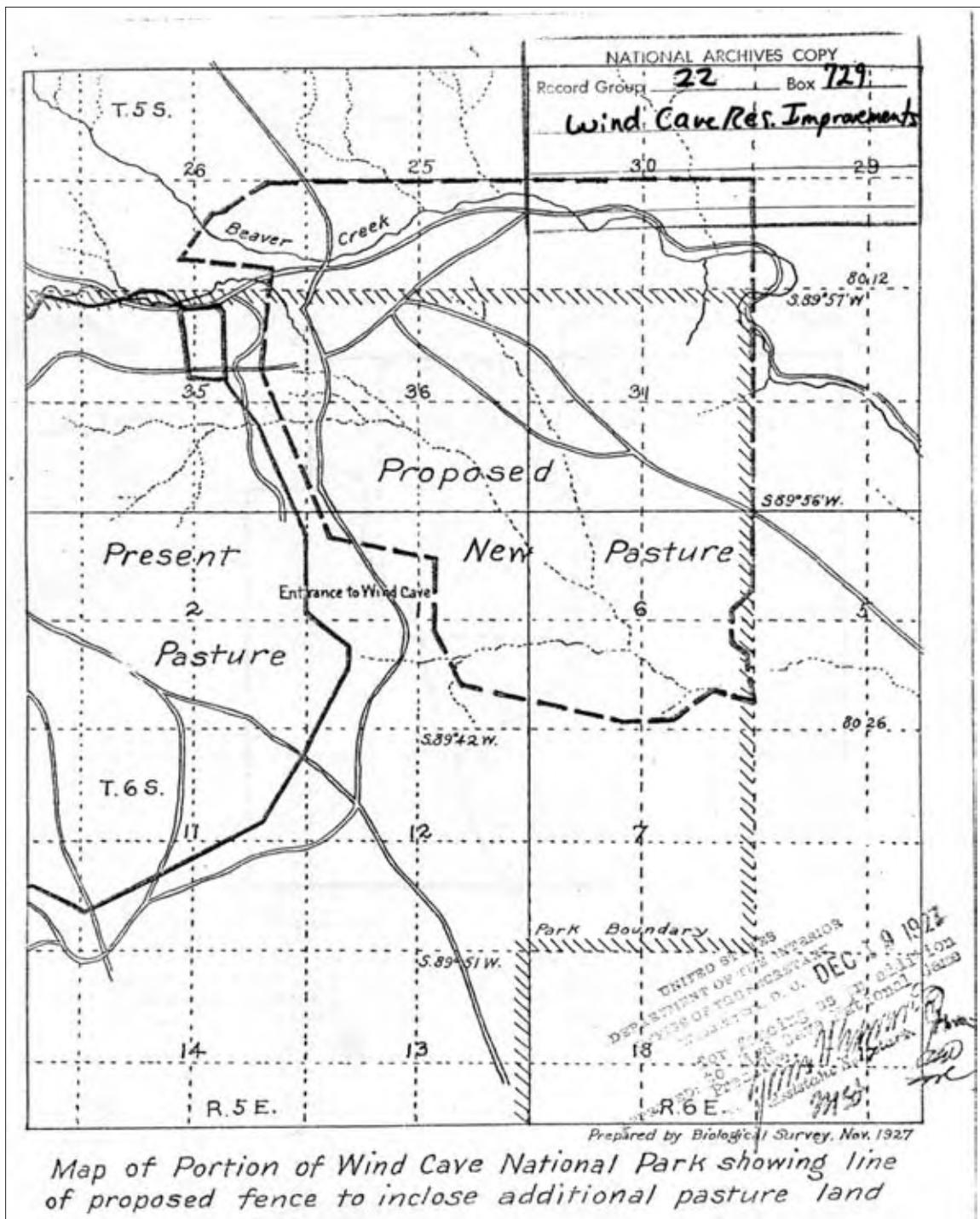


Figure 2-25  
Proposed new pasture, Wind Cave National Park, 1927.

Source: Wind Cave National Park Archives



Source: Wind Cave National Park Archives

Figure 2-26  
Headquarters Area, old visitor center, Superintendent's Residence, 1929.



Source: Wind Cave National Park Archives

Figure 2-27  
Norbeck Dam, n.d. (post 1929).



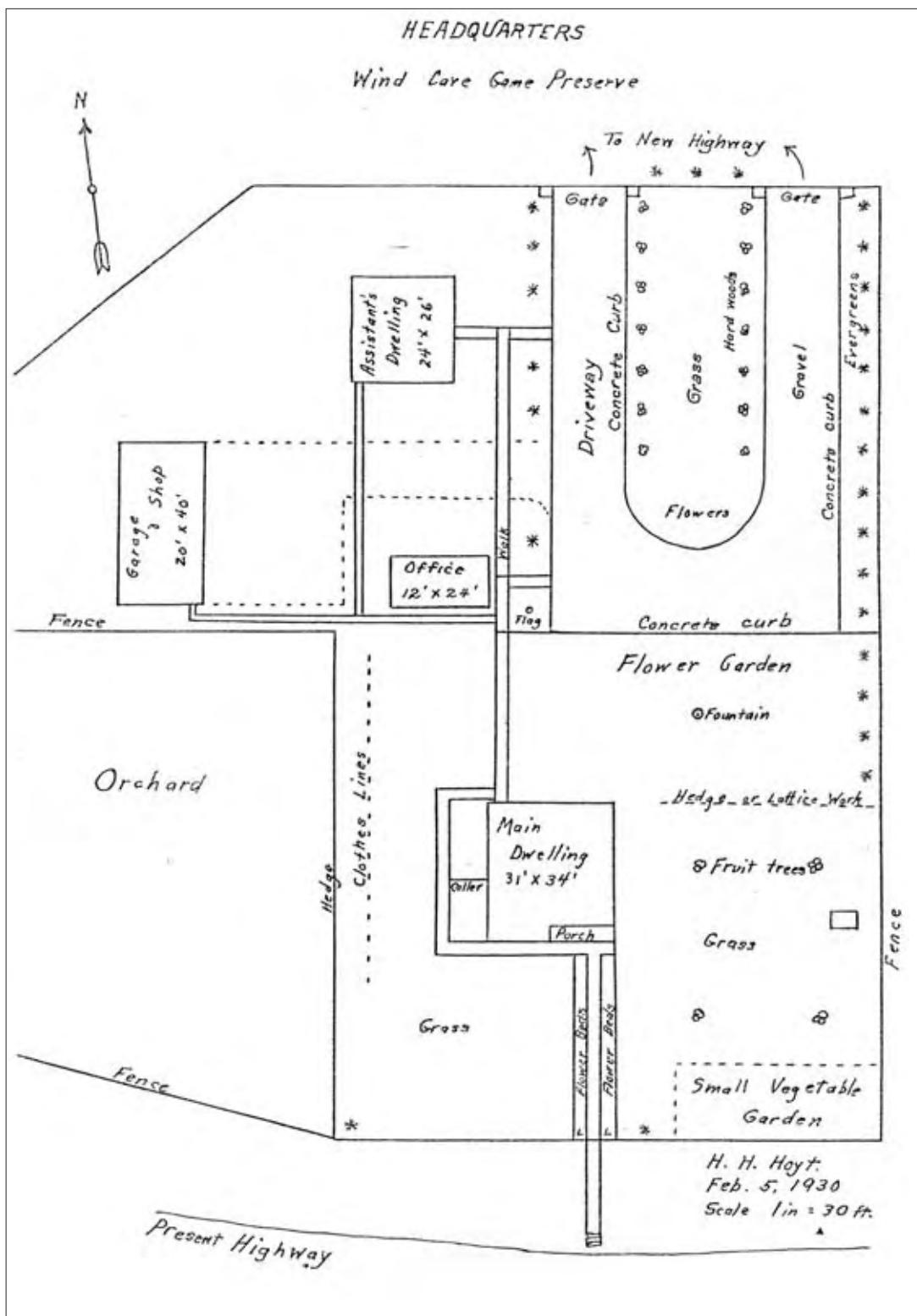
Source: Wind Cave National Park Archives

Figure 2-28  
Wooden stairs in cave, n.d. (pre 1930s).



Source: Wind Cave National Park Archives

Figure 2-29  
Gasoline station near park entrance, ca. 1930s.



Source: Wind Cave National Park Archives

Figure 2-30  
Headquarters, "Wind Cave Game Preserve," 1930.



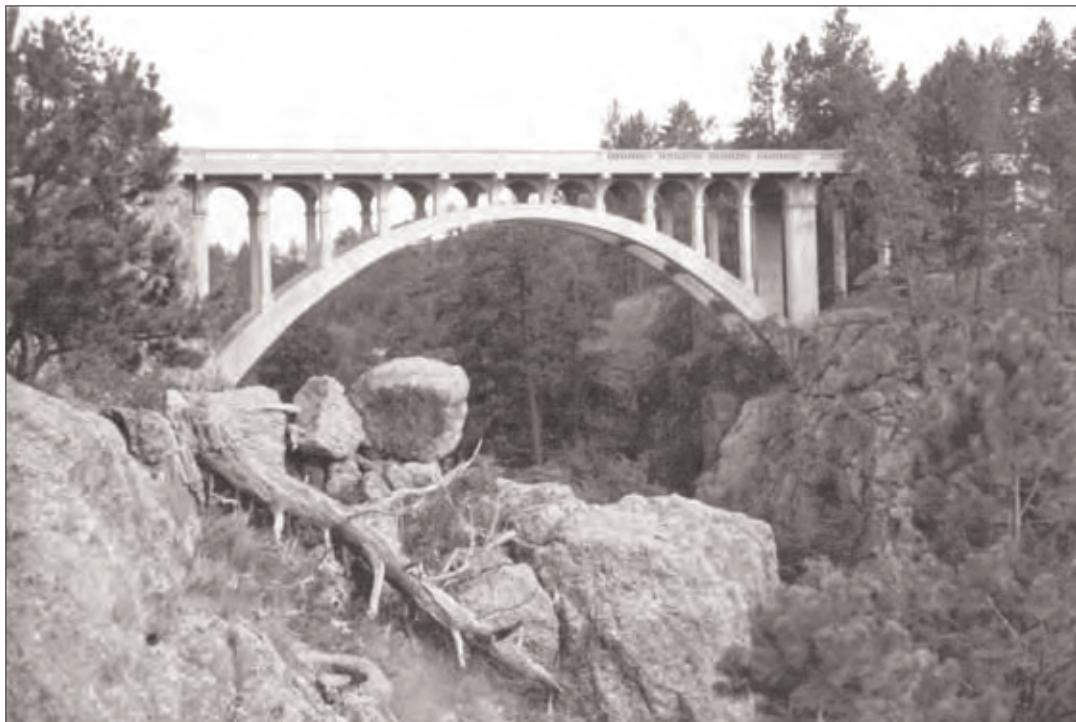
Source: Wind Cave National Park Archives

Figure 2-31  
CCC grading road bank, circa 1930s.



Source: Wind Cave National Park Archives

Figure 2-32  
CCC-era cattle guard, 1930s.



Source: Wind Cave National Park Archives

Figure 2-33  
Beaver Creek Bridge, n.d. (post 1930).

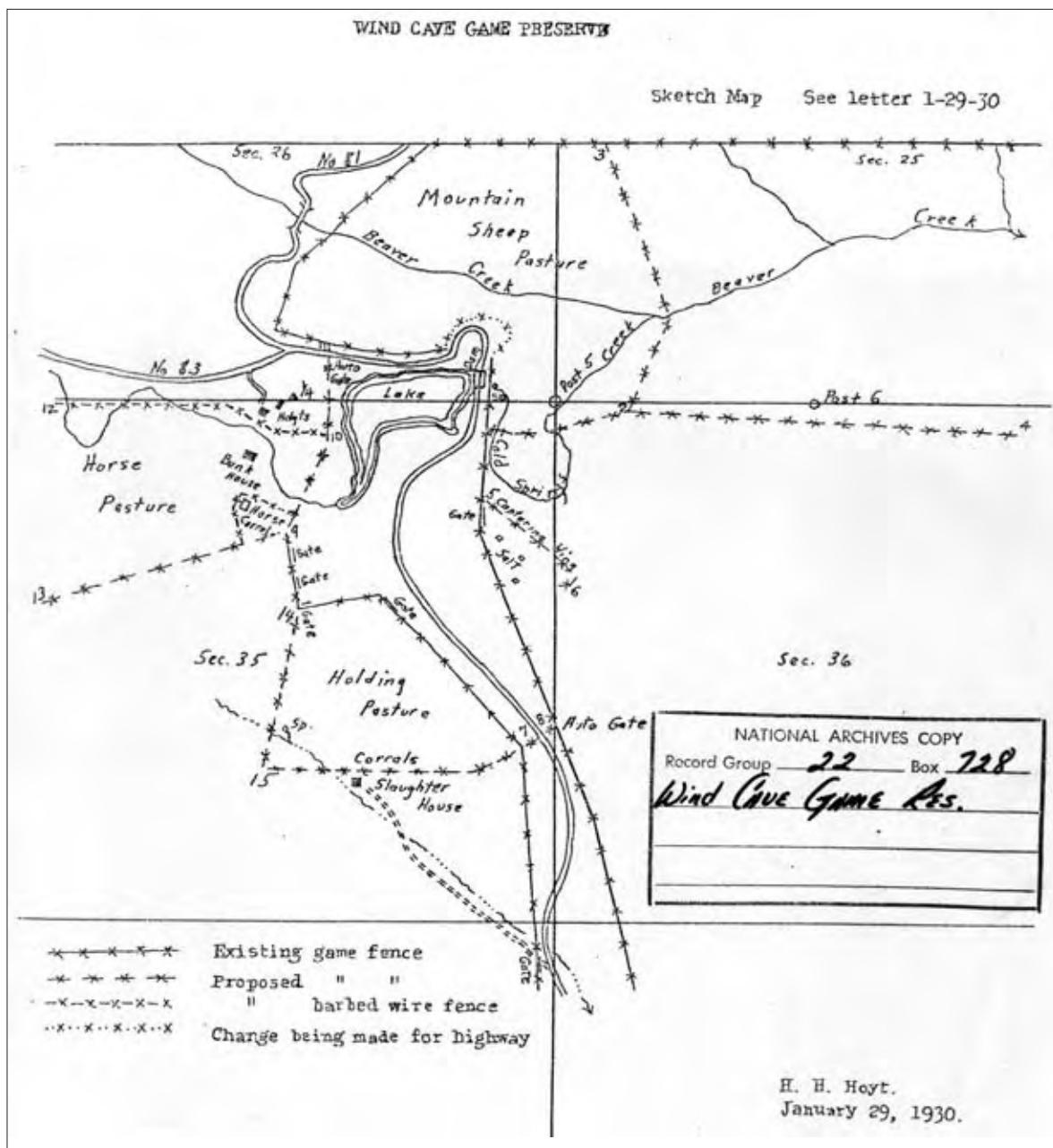
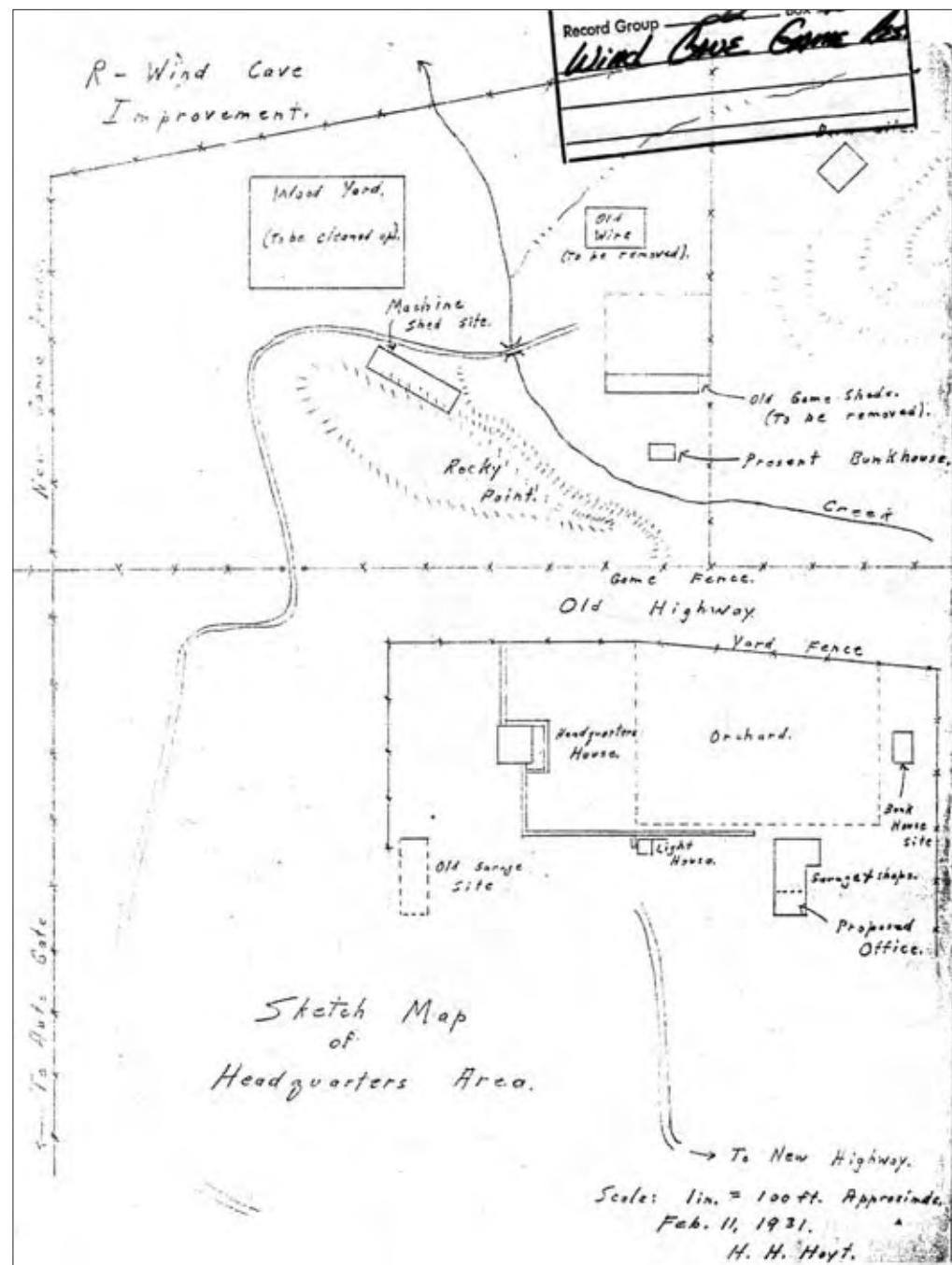


Figure 2-34  
"Wind Cave Game Preserve," 1930.

Source: Wind Cave National Park Archives



Source: Wind Cave National Park Archives

Figure 2-35  
Headquarters, "Wind Cave Game Preserve," 1931.



Source: Wind Cave National Park Archives

Figure 2-36  
Pedestrian path to cave entrance house, circa 1931.



Source: Wind Cave National Park Archives

Figure 2-37  
Power house, post 1931.



Source: Wind Cave National Park Archives

Figure 2-38  
Headquarters Area, post 1931.



Source: Wind Cave National Park Archives

Figure 2-39  
Construction of concrete stairs, n.d. (ca. 1930s)

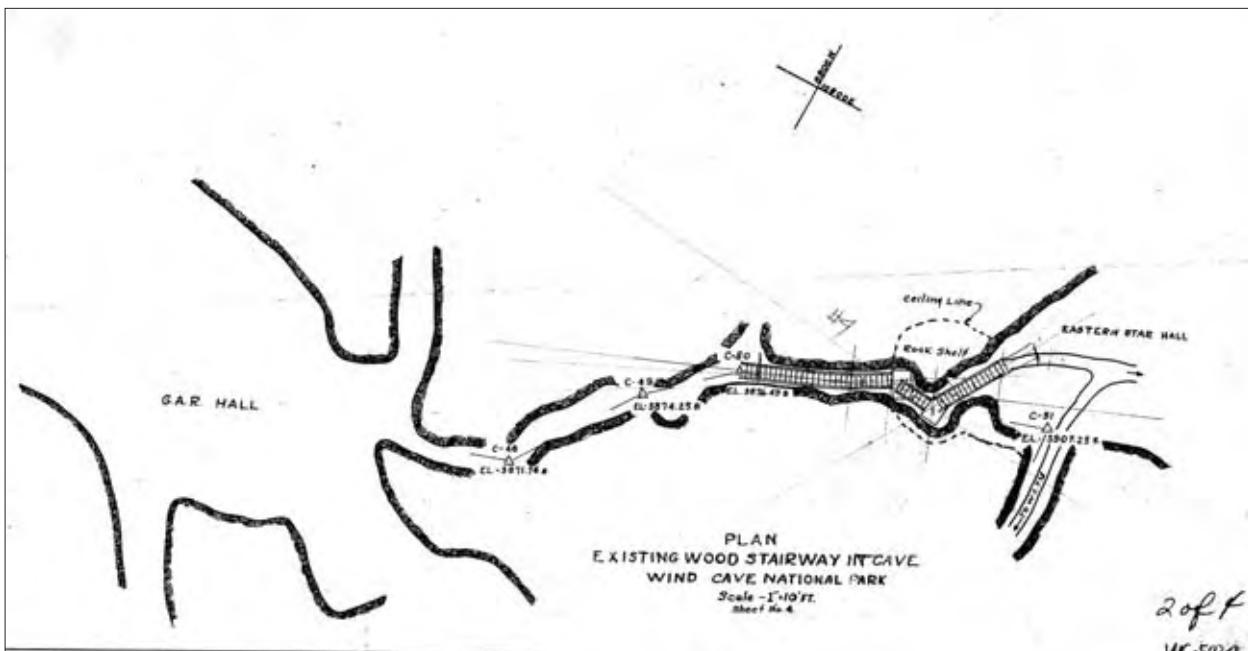


Figure 2-40  
"Plan, Existing Stairway in Cave, Part Two," Wind Cave National Park, n.d.

Source: Wind Cave National Park Archives

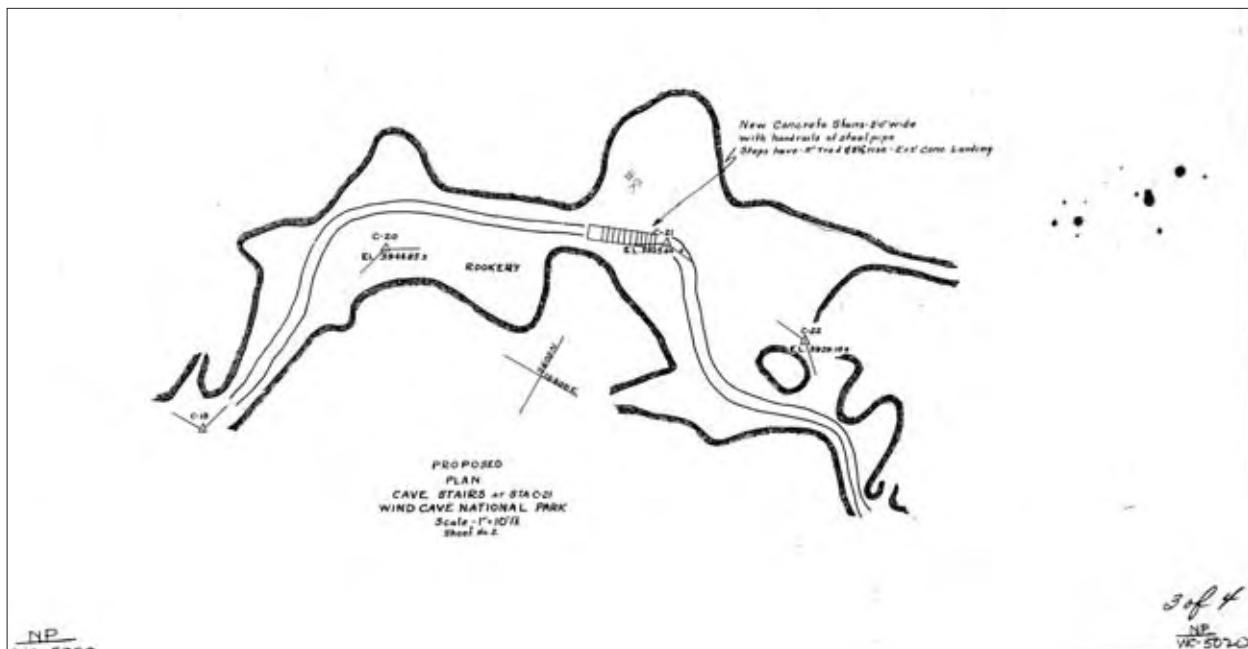
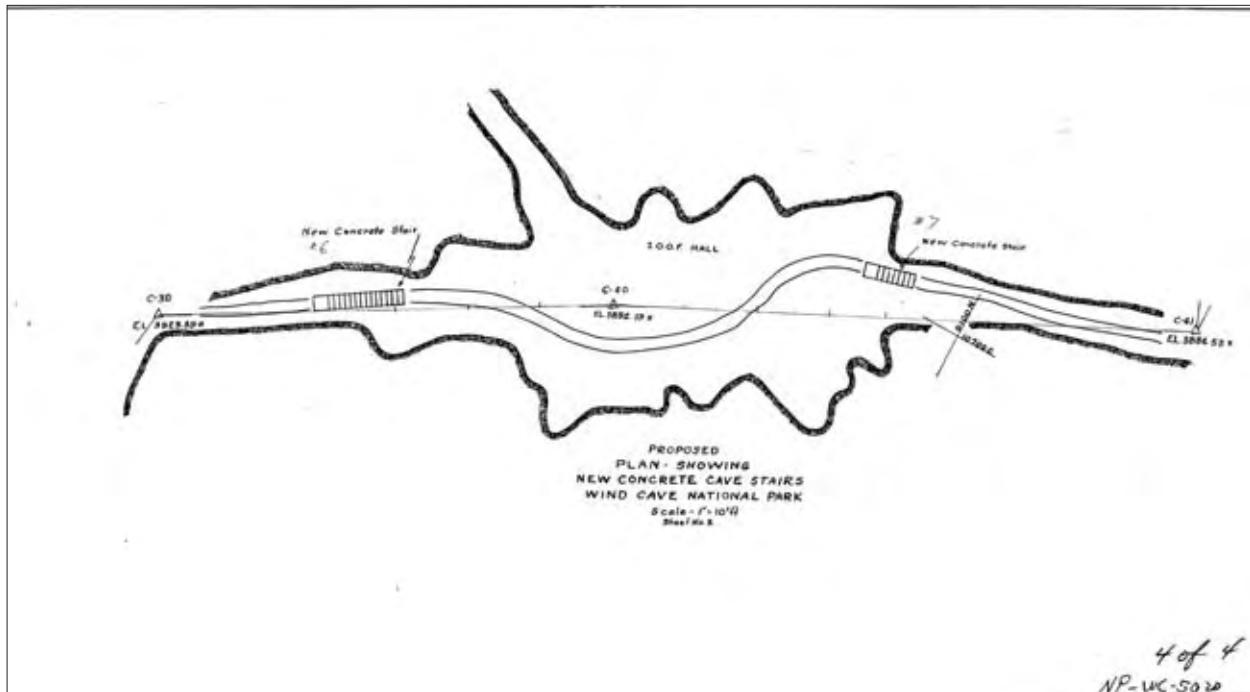


Figure 2-41  
"Proposed Plan Cave Stairs at STA C+21, Part Three," Wind Cave National Park, n.d.

Source: Wind Cave National Park Archives



Source: Wind Cave National Park Archives

Figure 2-42

"Proposed Plan - Showing New Concrete Cave Stairs, Part Four," Wind Cave National Park, n.d.

Source: Wind Cave National Park Archives

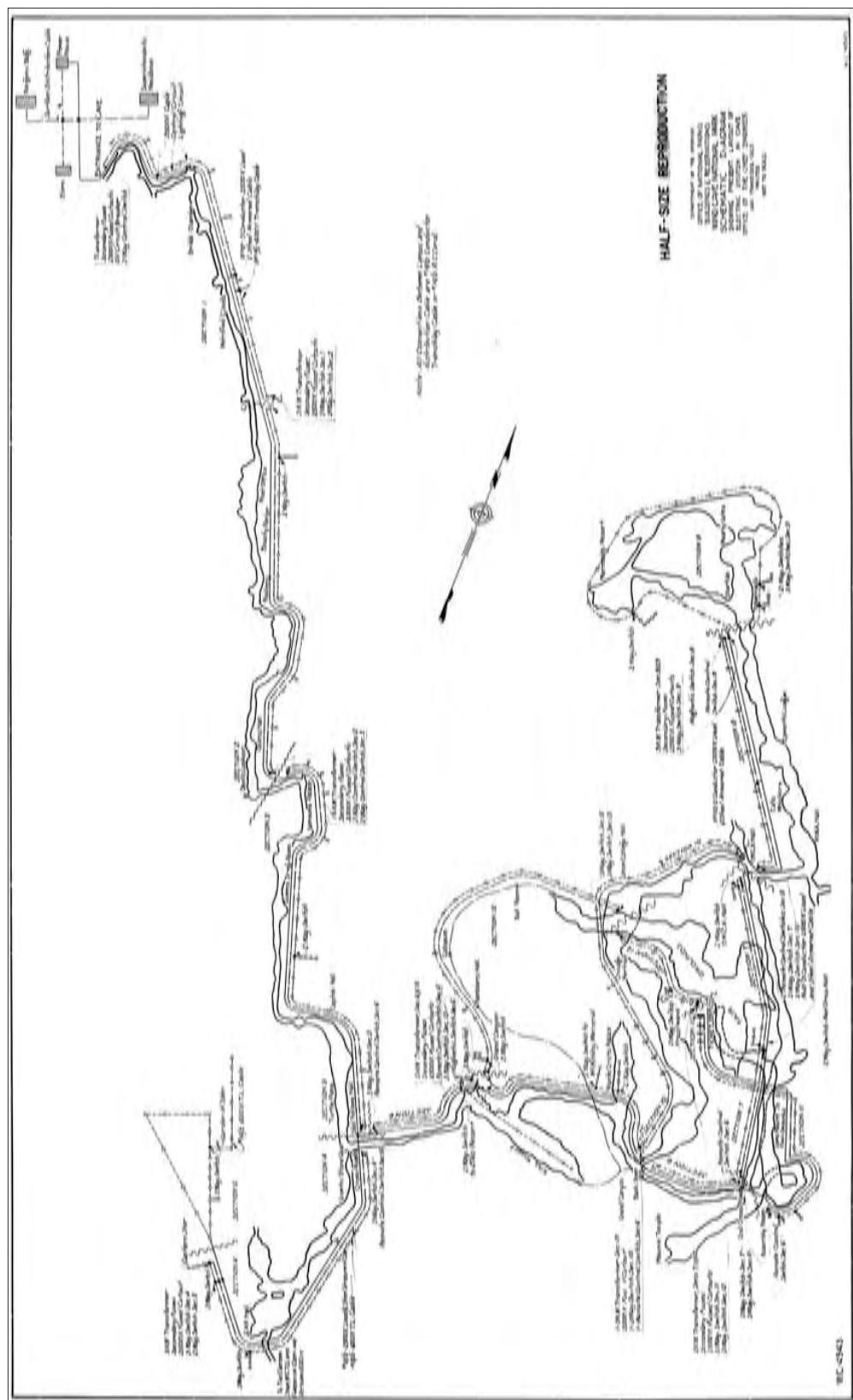


Figure 2-43  
“Schematic Diagram Showing Present Layout of Electric System in Cave,” Wind Cave National Park, November 1933.

Source: Wind Cave National Park Archives

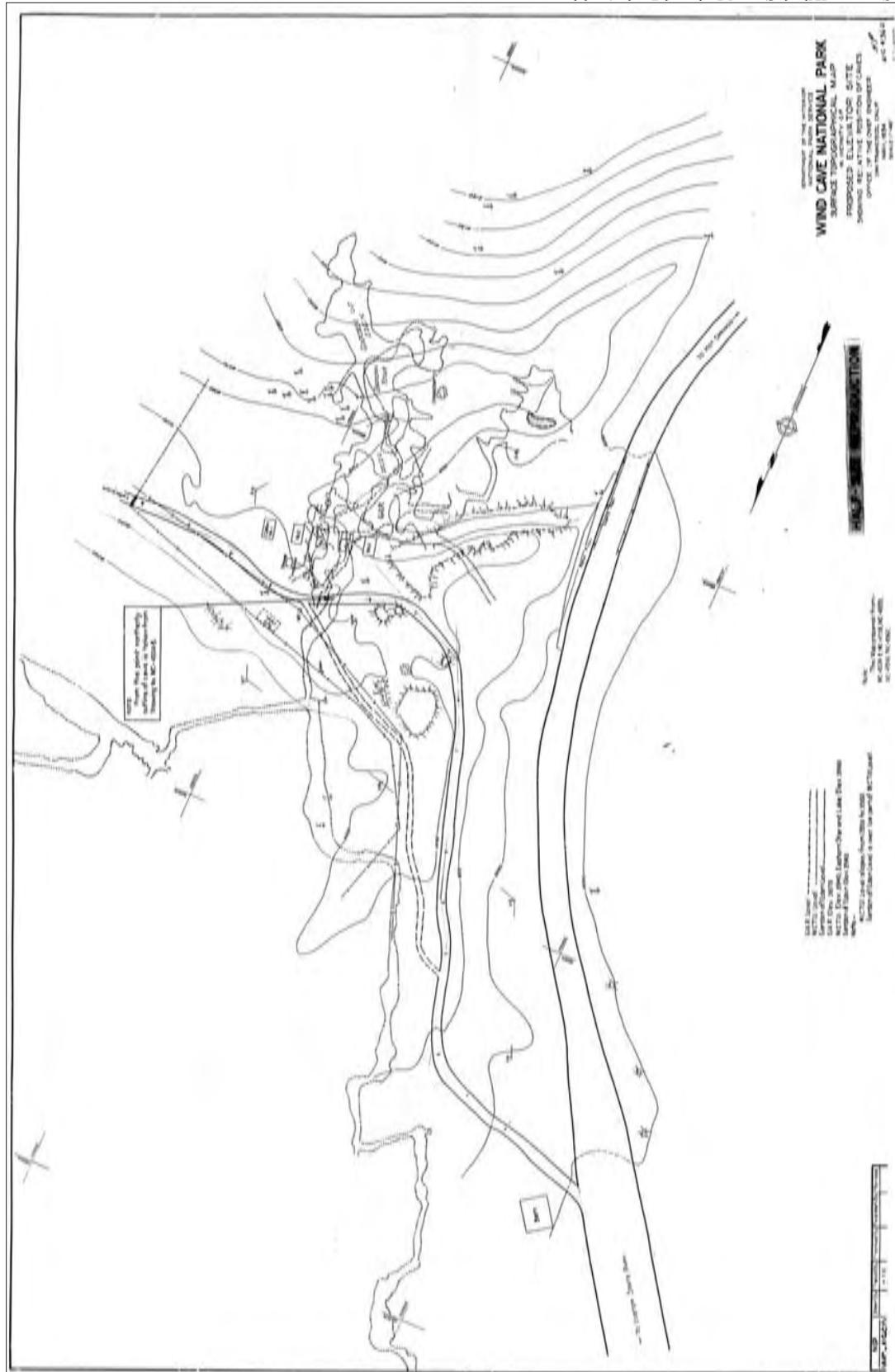


Figure 2-44  
"Surface Topographical Map in Vicinity of Proposed Elevator Site," Wind Cave National Park, May 1934.

Source: Wind Cave National Park Archives

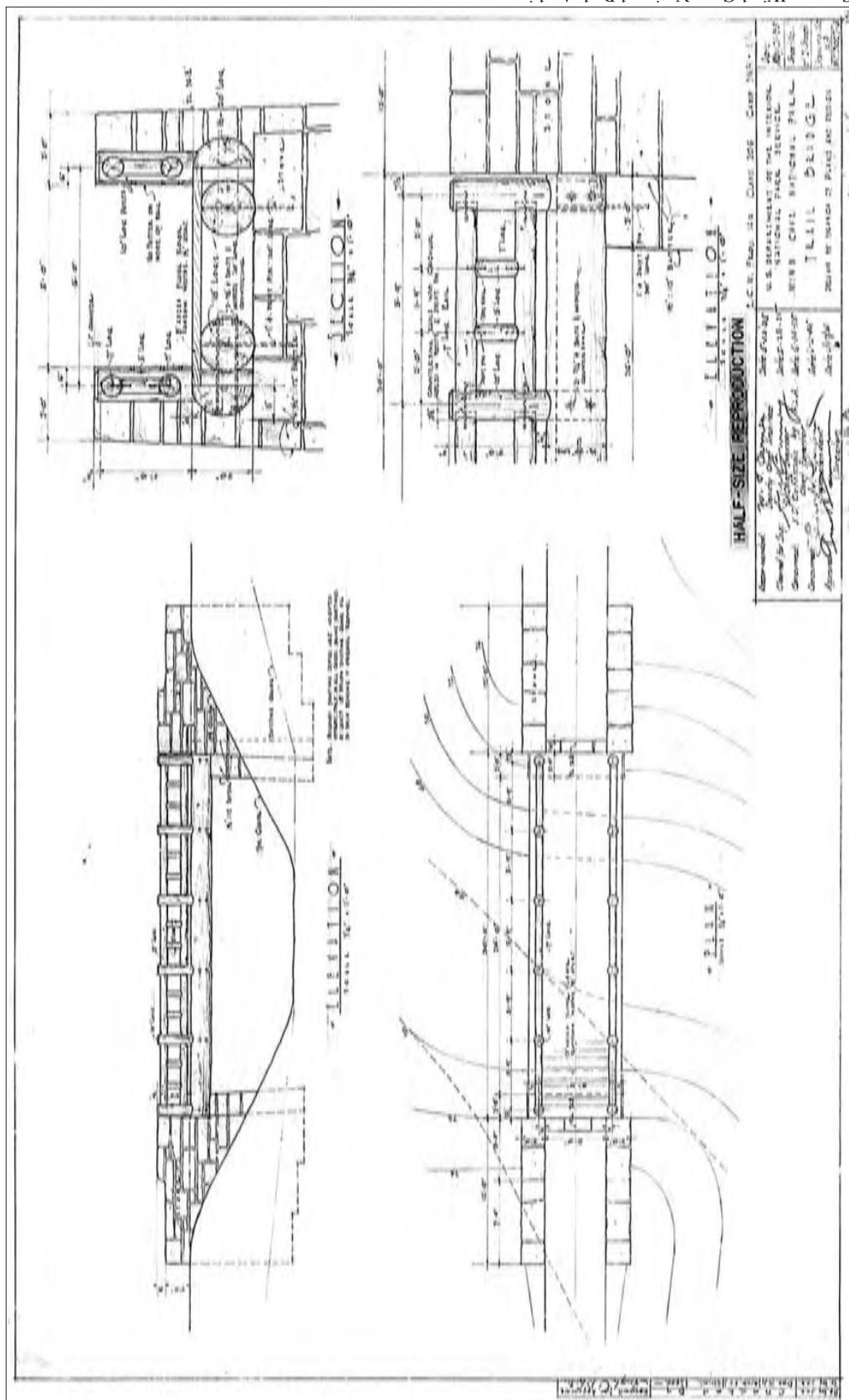


Figure 2-45  
“Trail Bridge,” Wind Cave National Park, May 1935.

Source: Wind Cave National Park Archives

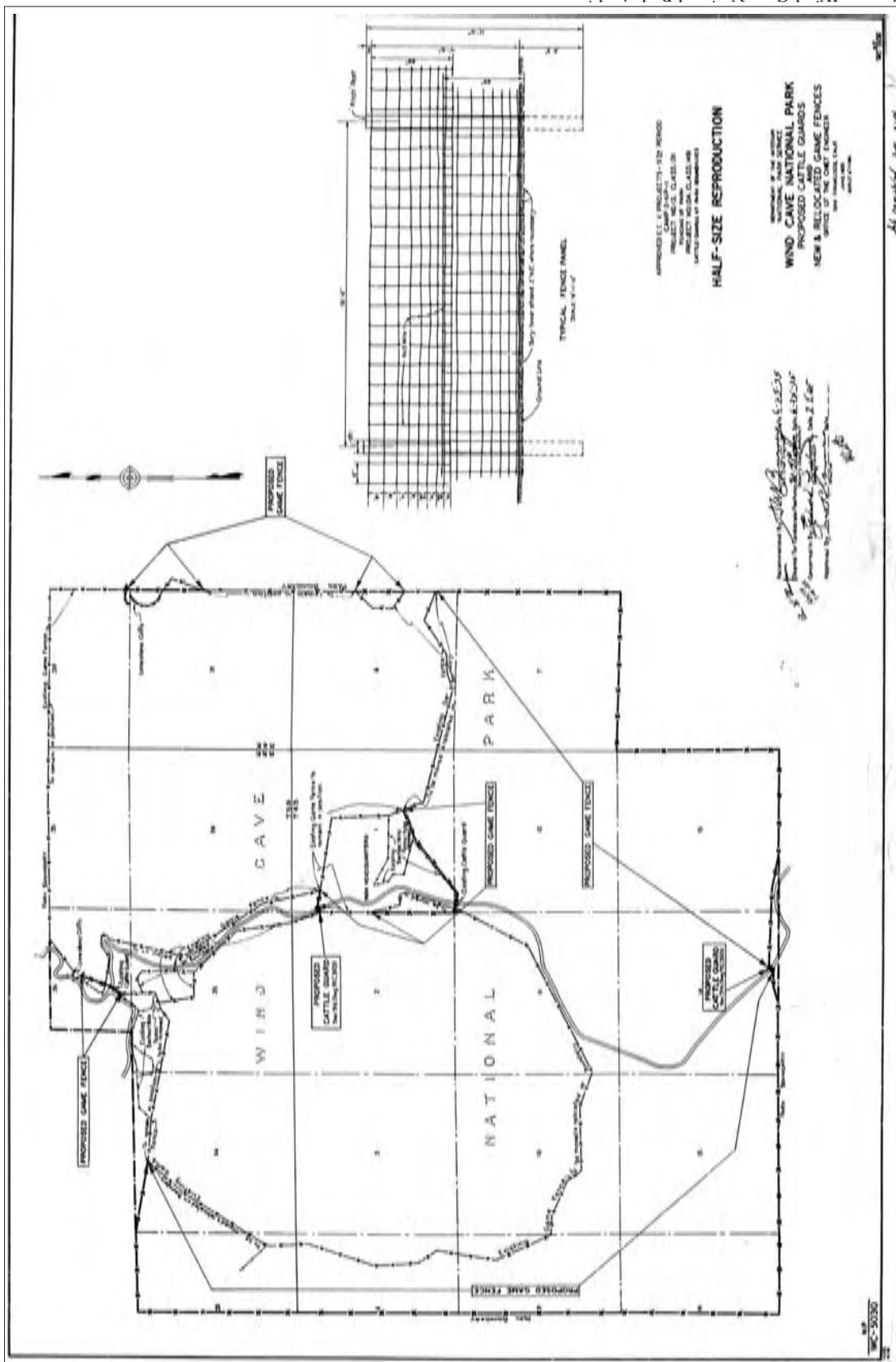


Figure 2-46  
“Proposed Cattle Guards and New & Relocated Game Fences,” Wind Cave National Park, June 1935.

Source: Wind Cave National Park Archives

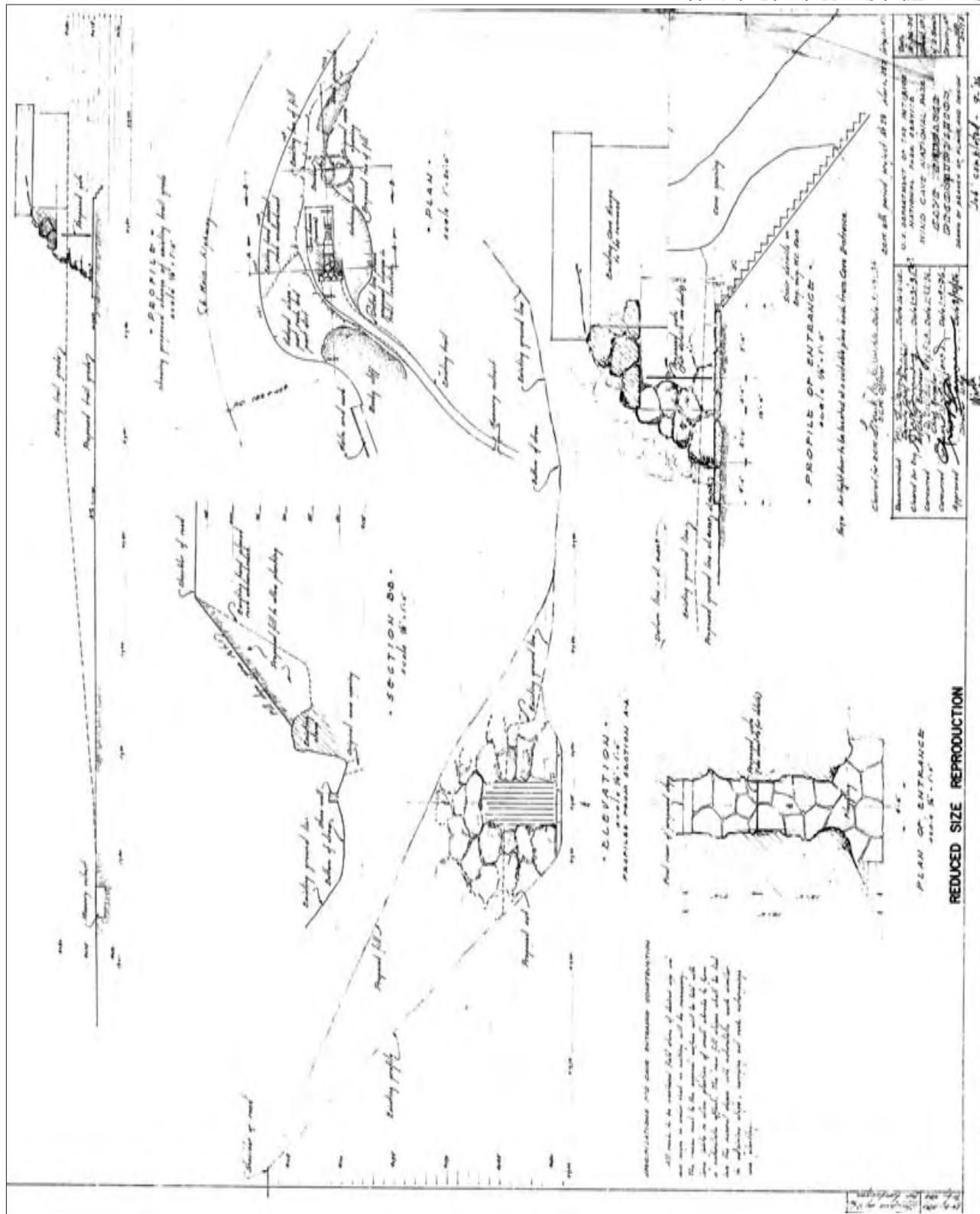
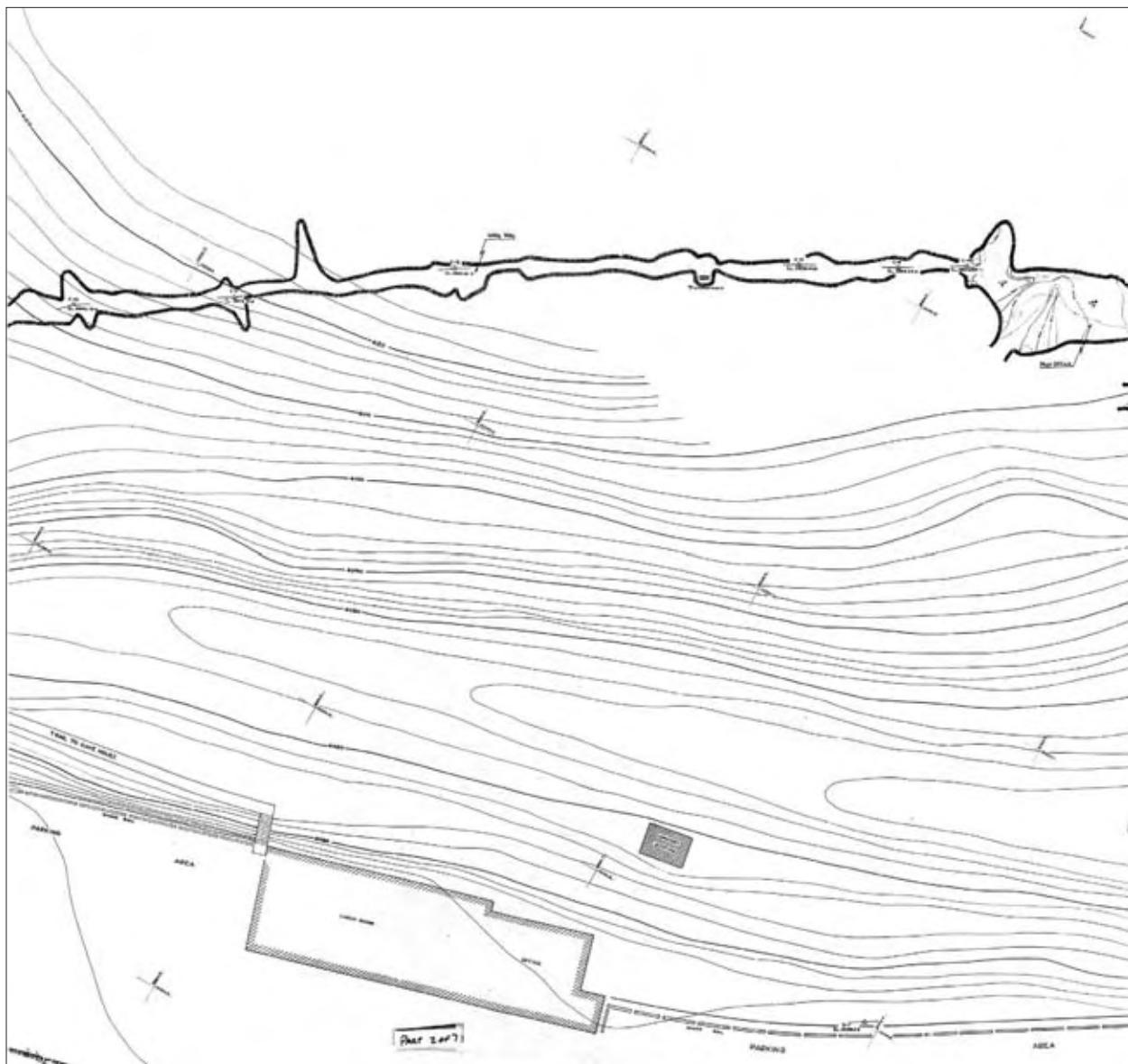


Figure 2-47  
“Cave Entrance Reconstruction,” Wind Cave National Park. November 1935.



Figure 2-48  
“Topographic Map Showing Cave Trail System, Part One,” Wind Cave National Park, ca. 1934-1937.

Source: Wind Cave National Park Archives



Source: Wind Cave National Park Archives

Figure 2-49

"Topographic Map showing Cave Trail System, Part Two," Wind Cave National Park, ca. 1934-1937.



Source: Wind Cave National Park Archives

Figure 2-50

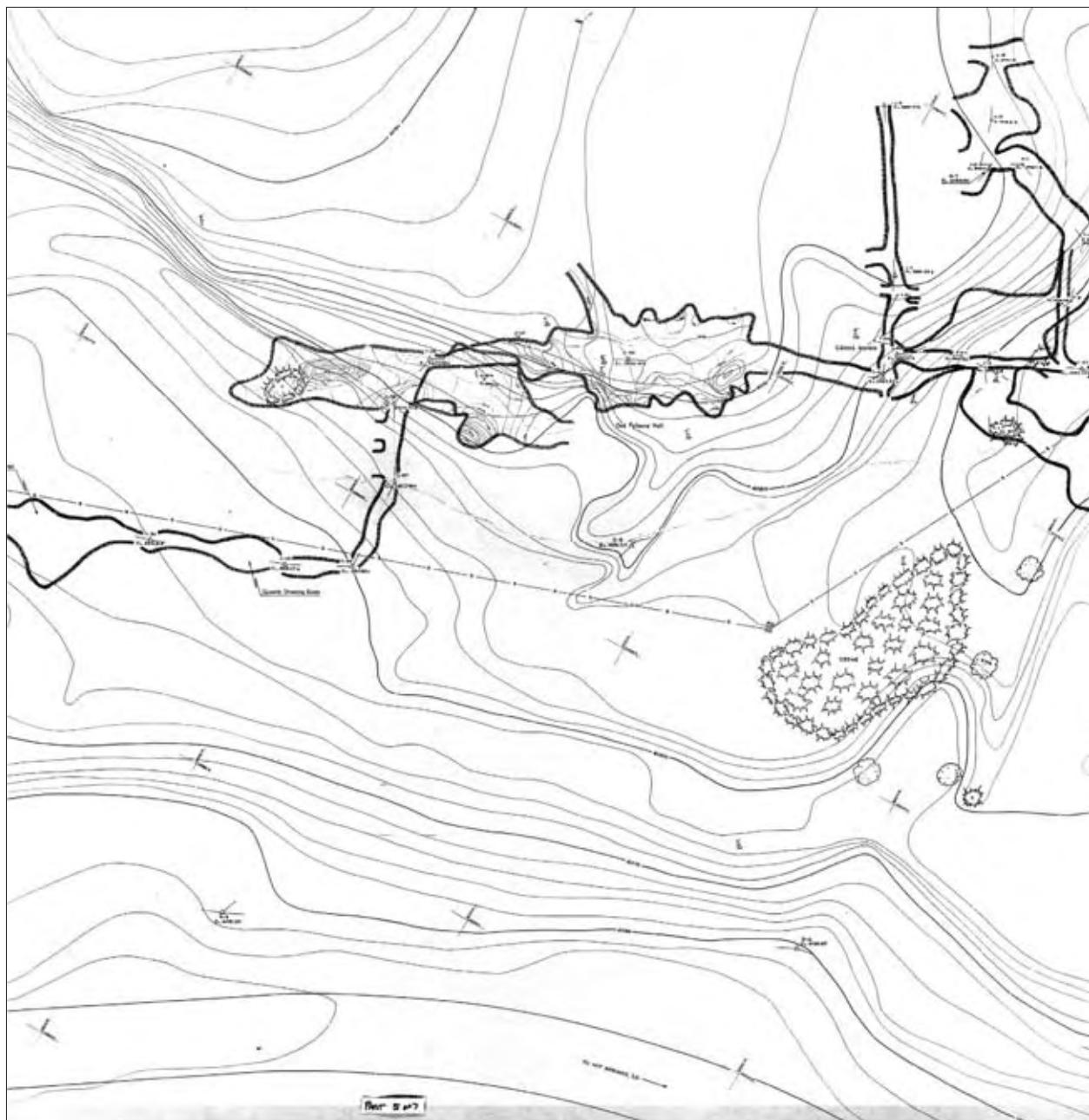
"Topographic Map showing Cave Trail System, Part Three," Wind Cave National Park, ca. 1934-1937.



Source: Wind Cave National Park Archives

Figure 2-51

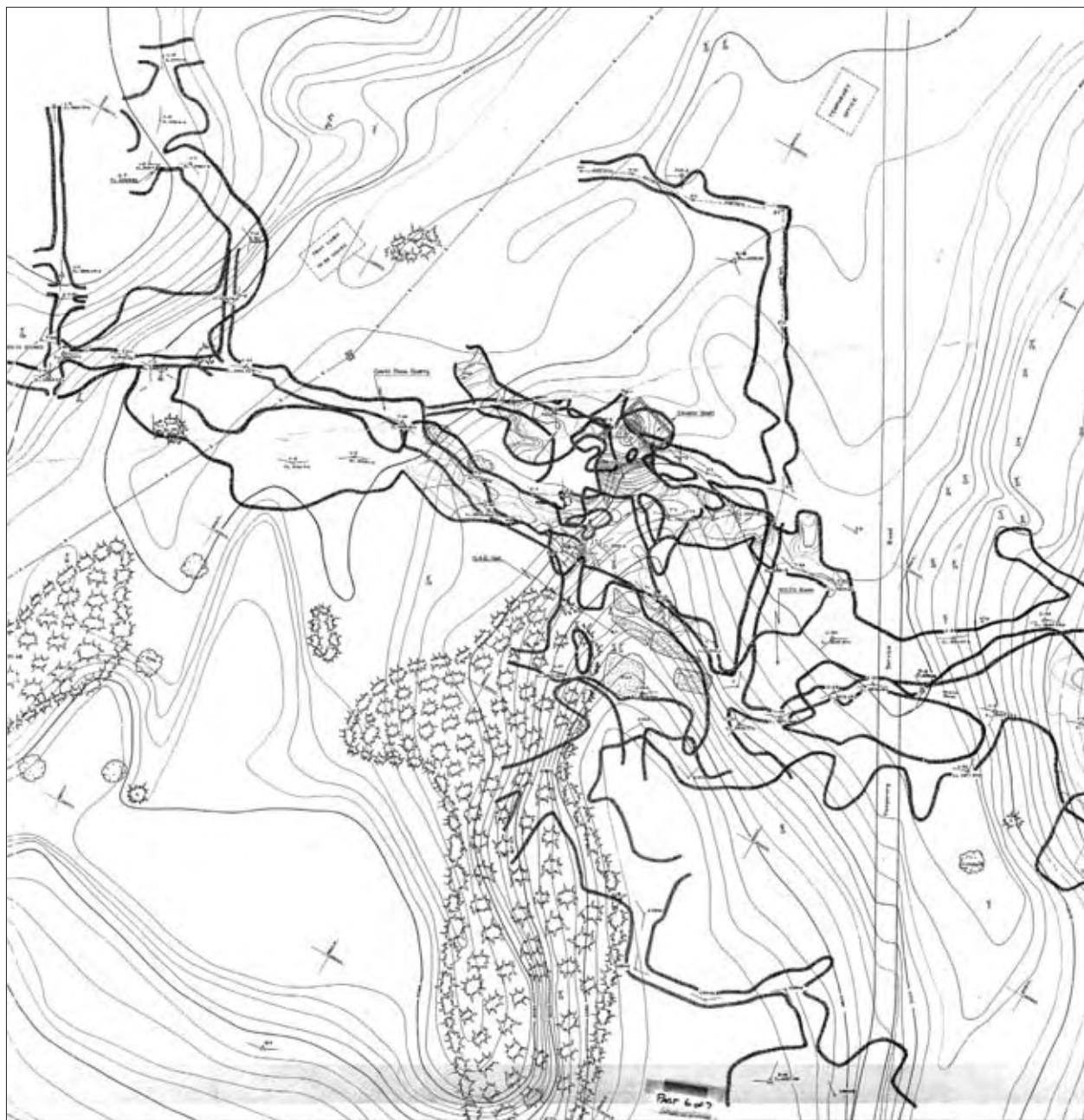
"Topographic Map showing Cave Trail System, Part Four," Wind Cave National Park, ca. 1934-1937.



Source: Wind Cave National Park Archives

Figure 2-52

"Topographic Map Showing Cave Trail System, Part Five," Wind Cave National Park, ca. 1934-1937.



Source: Wind Cave National Park Archives

Figure 2-53

"Topographic Map Showing Cave Trail System, Part Six," Wind Cave National Park, ca. 1934-1937.



Figure 2-54

"Topographic Map showing Cave Trail System, Part Seven," Wind Cave National Park, ca. 1934-1937.

Source: Wind Cave National Park Archives



Source: Wind Cave National Park Archives

Figure 2-55  
CCC-era planting, mid-1930s.



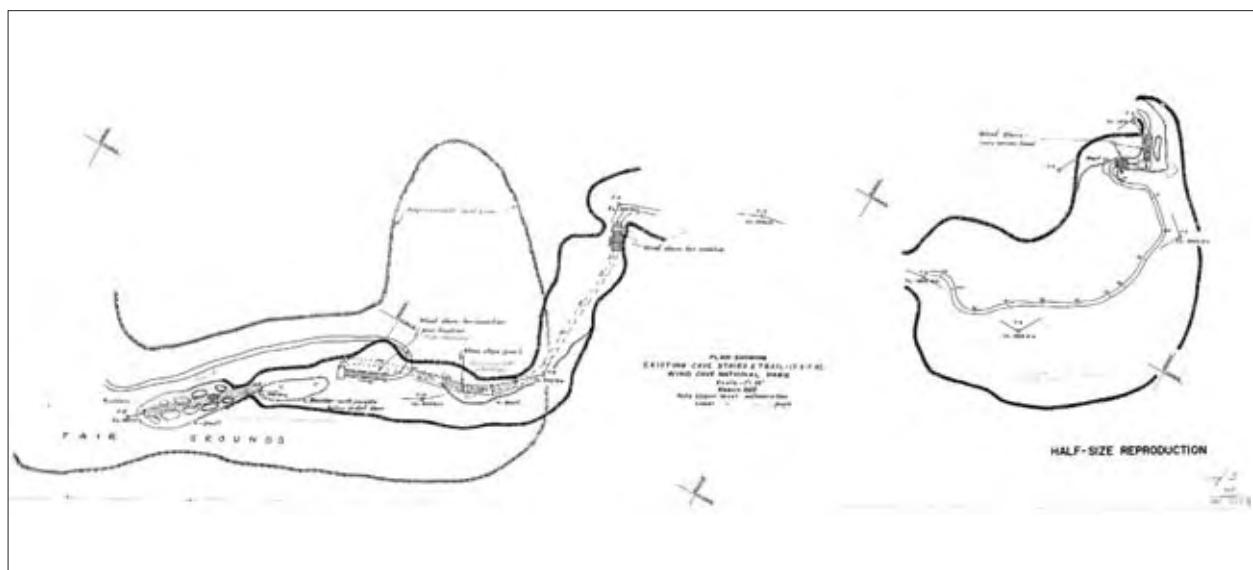
Source: Wind Cave National Park Archives

Figure 2-56  
CCC Camp and Headquarters Area, ca. 1934-1935.



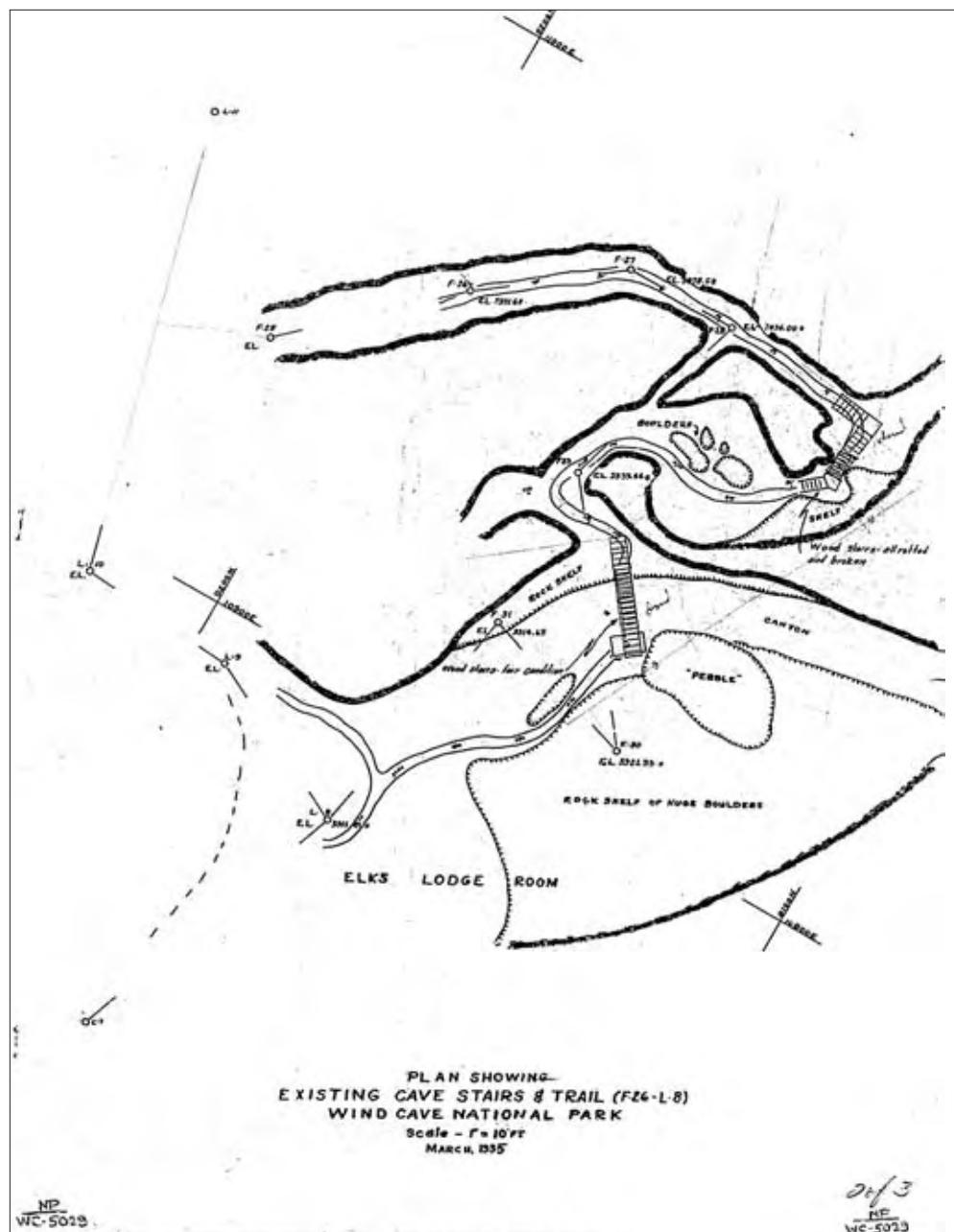
Source: Wind Cave National Park Archives

Figure 2-57  
Bridge on pedestrian path, circa 1935.



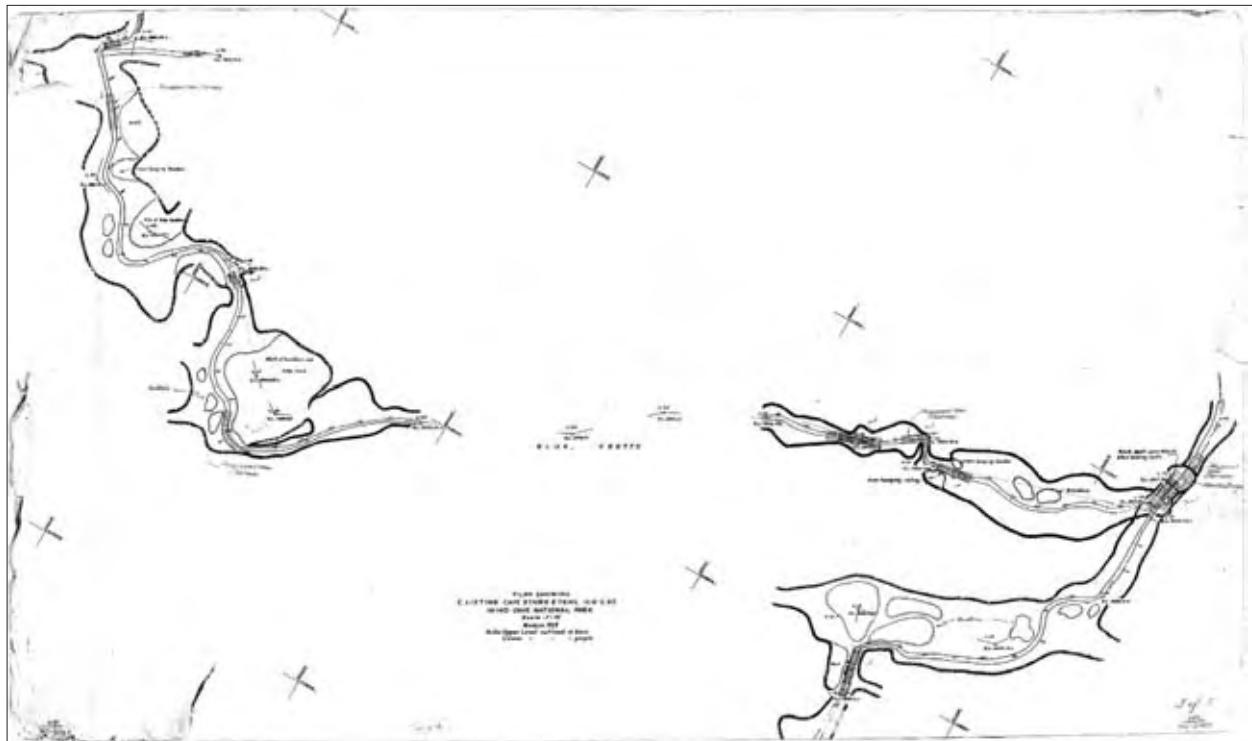
Source: Wind Cave National Park Archives

Figure 2-58  
“Plan Showing Existing Cave Stairs and Trail (F-3 - F-12), Part One,” Wind Cave National Park, March 1935.



Source: Wind Cave National Park Archives

Figure 2-59  
“Plan Showing Existing Cave Stairs and Trail, Part Two,” Wind Cave National Park,  
March 1935.



Source: Wind Cave National Park Archives

Figure 2-60

"Plan Showing Existing Cave Stairs & Trail, Part Three," Wind Cave National Park, March 1935.

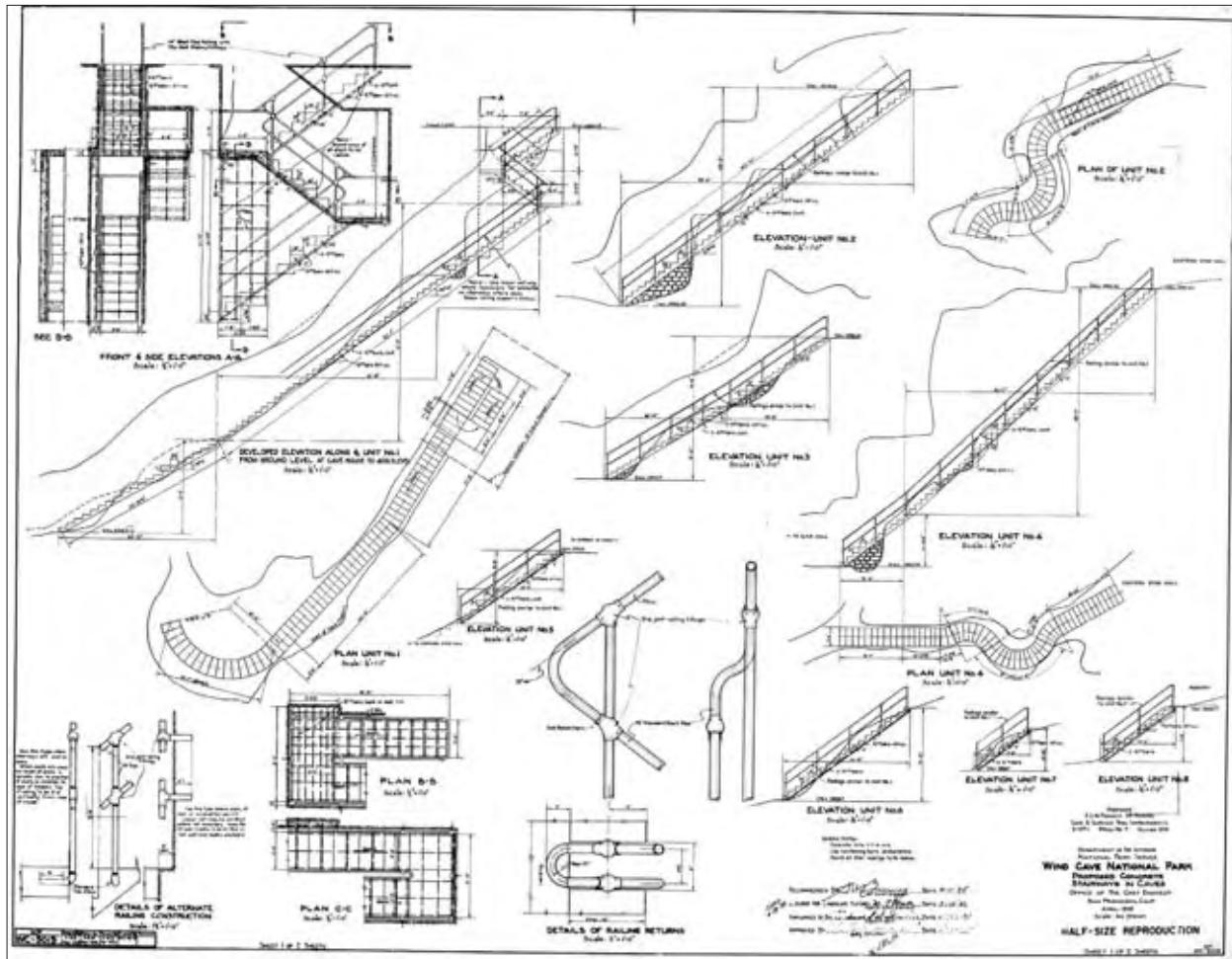


Figure 2-61  
“Proposed Concrete Stairways in Caves,” Wind Cave National Park, April 1935.

Source: Wind Cave National Park Archives

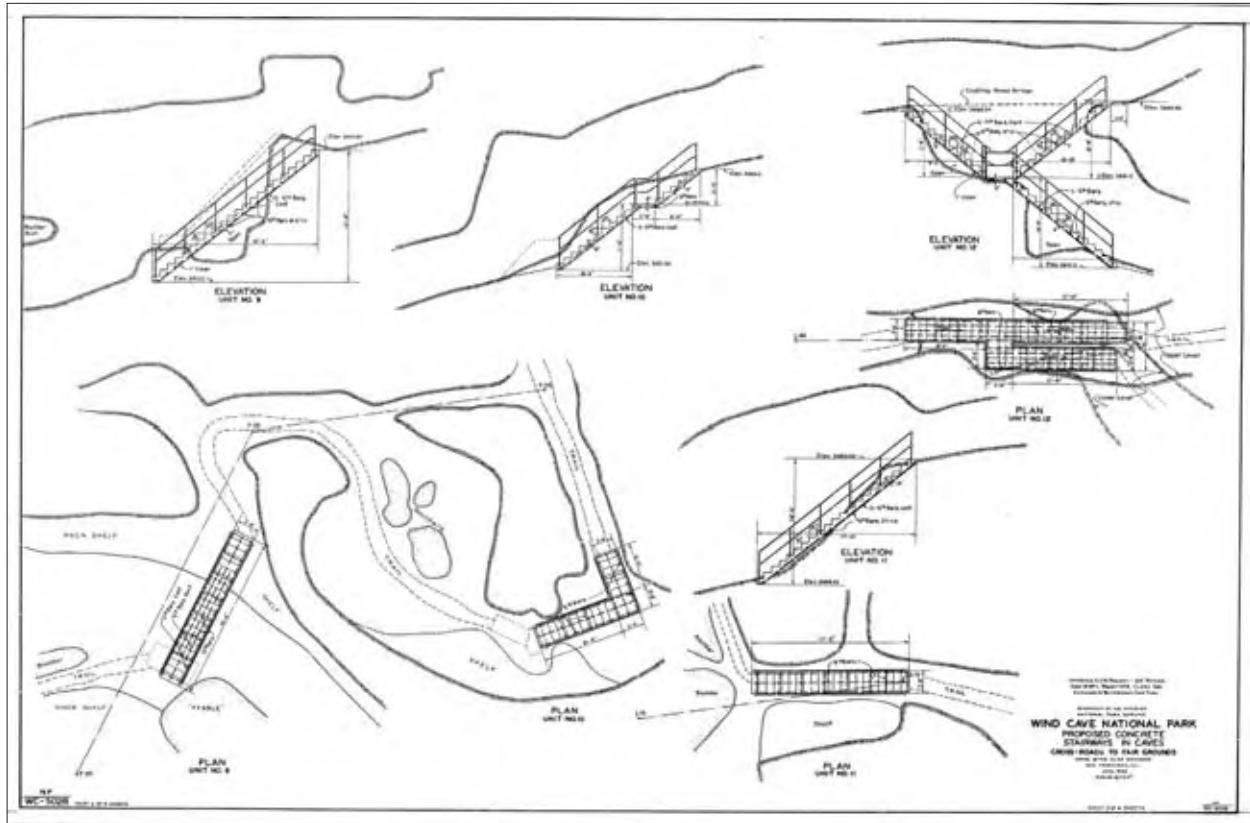


Figure 2-62  
“Proposed Concrete Stairways in Caves, Cross-roads to Fair Grounds, Part Two,” Wind Cave National Park, June 1935.

Source: Wind Cave National Park Archives



Source: Wind Cave National Park Archives

Figure 2-63  
Headquarters Area, post 1935.



Source: Wind Cave National Park Archives

Figure 2-64  
CCC Camp, post 1935.

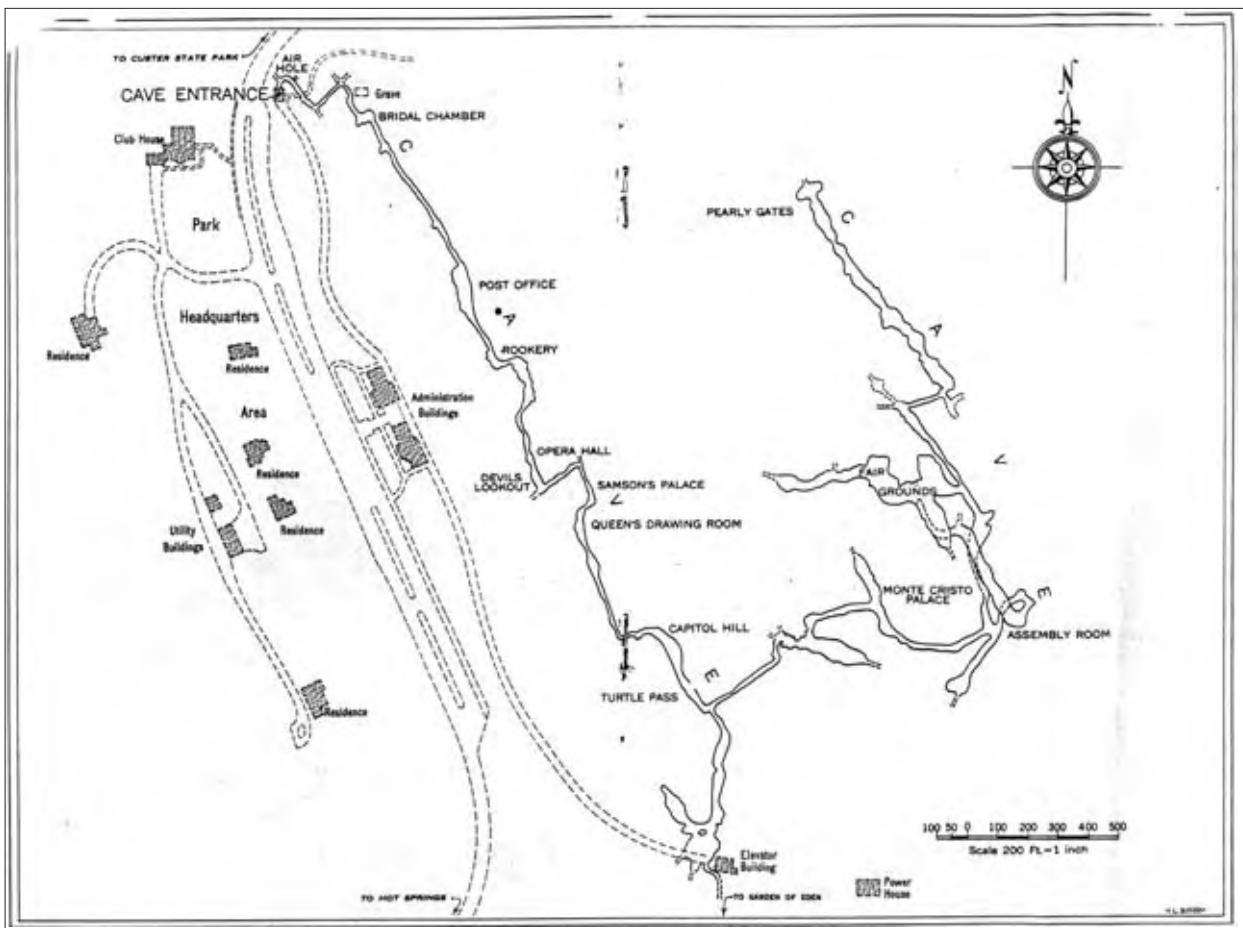


Figure 2-65  
Headquarters Area, Wind Cave National Park, 1936.

Source: Wind Cave National Park Archives



Source: Wind Cave National Park Archives

Figure 2-66  
CCC Camp, circa 1934-1941.



Source: Wind Cave National Park Archives

Figure 2-67  
Residential Area, circa 1936.

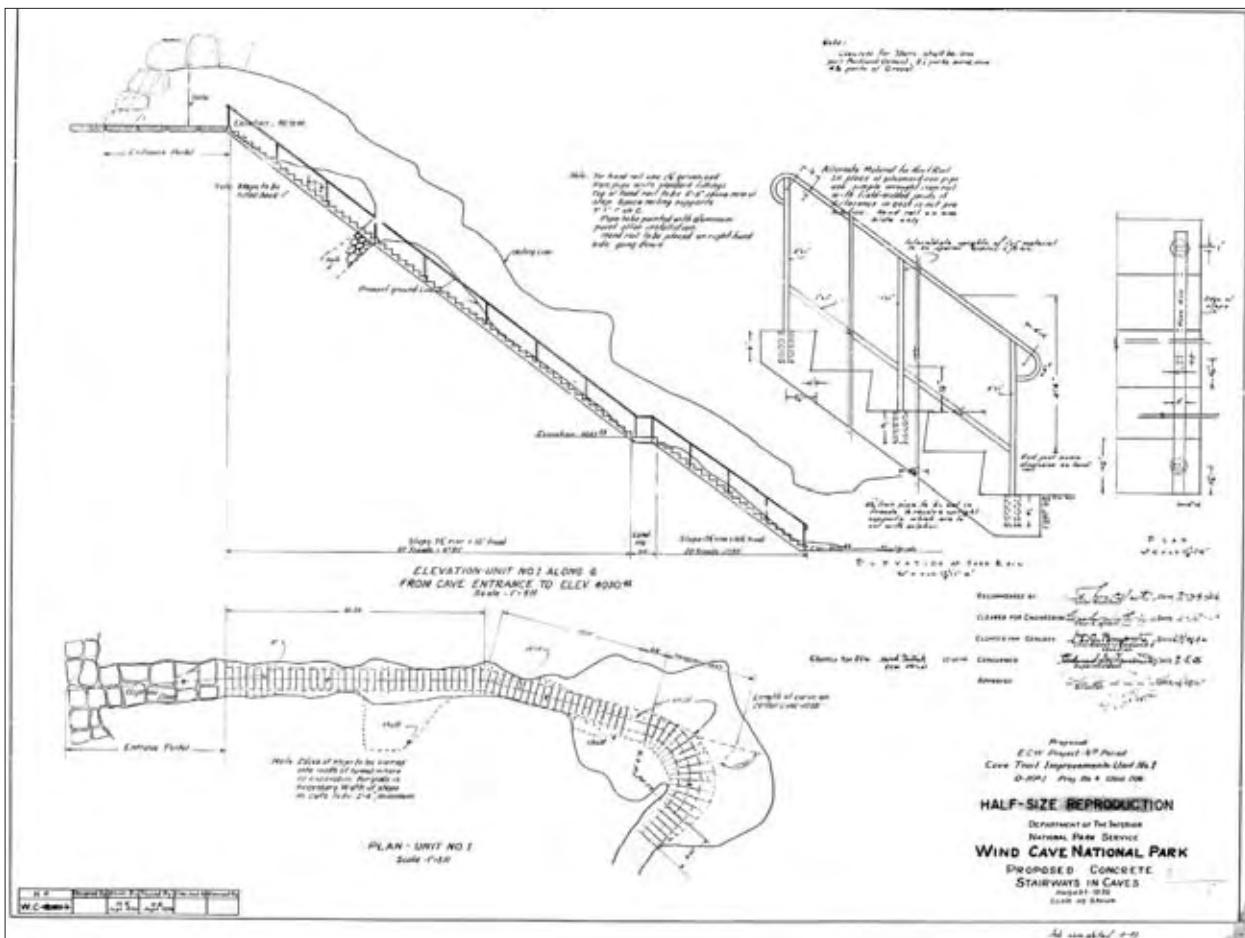


Figure 2-68  
“Proposed Concrete Stairways in Caves,” Wind Cave National Park, August 1936.



Source: Wind Cave National Park Archives

Figure 2-69  
New Superintendent's Residence, circa 1936.



Source: Wind Cave National Park Archives

Figure 2-70  
Old Superintendent's Residence, circa 1936.



Source: Wind Cave National Park Archives

Figure 2-71  
Fire Control Checking Station, circa 1936.



Source: Wind Cave National Park Archives

Figure 2-72  
Headquarters Area, post 1936.



Source: Wind Cave National Park Archives

Figure 2-73  
Elevator Building, post 1938.



Source: Wind Cave National Park Archives

Figure 2-74  
New Visitor Center, post 1936.



Source: Wind Cave National Park Archives

Figure 2-75  
Visitor Center after landscaping, post 1936.



Source: Wind Cave National Park Archives

Figure 2-76  
Naturalized Walk-in Entrance, circa 1938.

Source: Wind Cave National Park Archives



Figure 2-77  
“Topographical Sheets, Sheet Two,” Wind Cave National Park, February 1937.

Source: Wind Cave National Park Archives

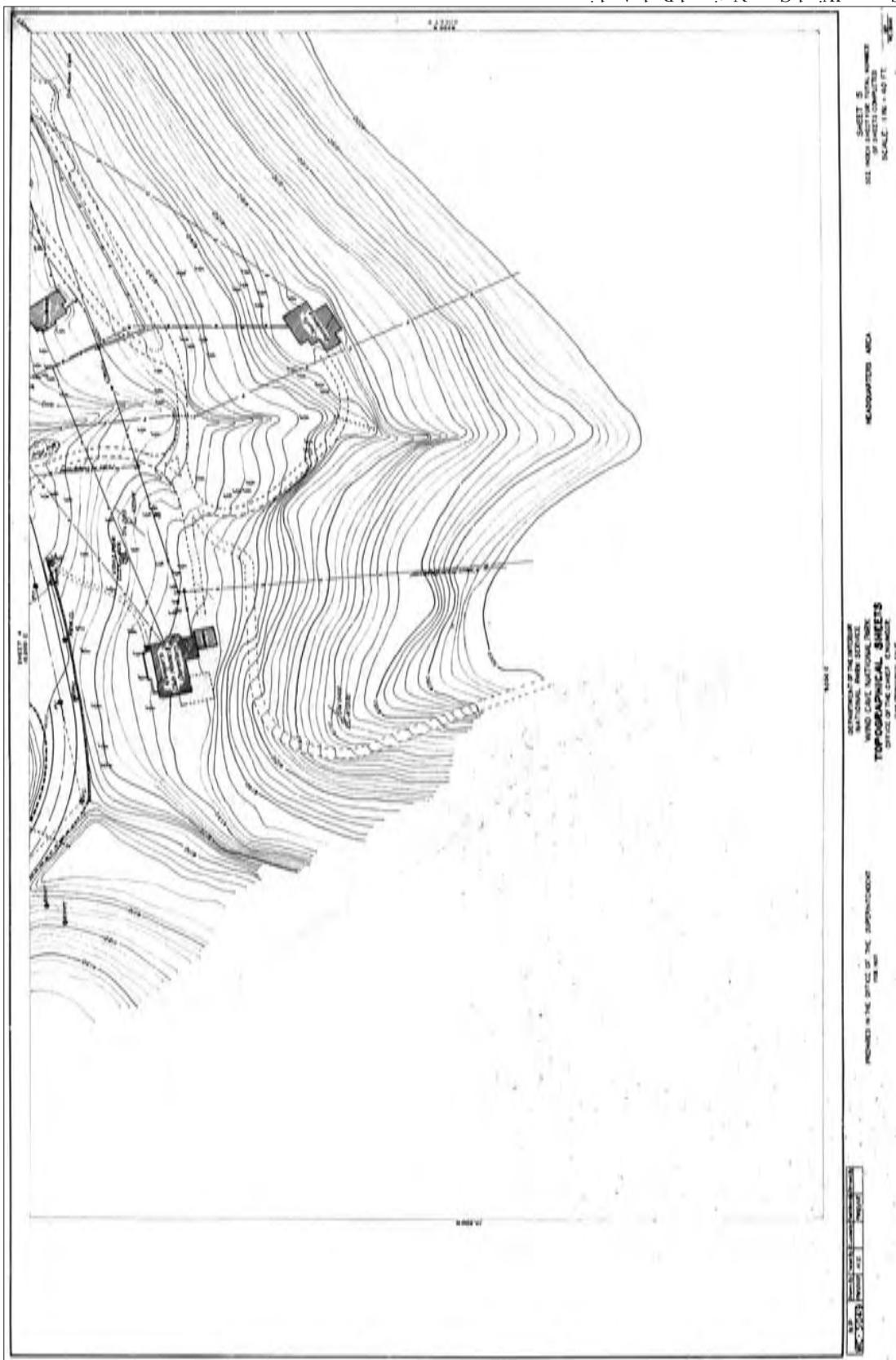


Figure 2-78  
“Topographical Sheets, Sheet Three,” Wind Cave National Park, February 1937.

Source: Wind Cave National Park Archives

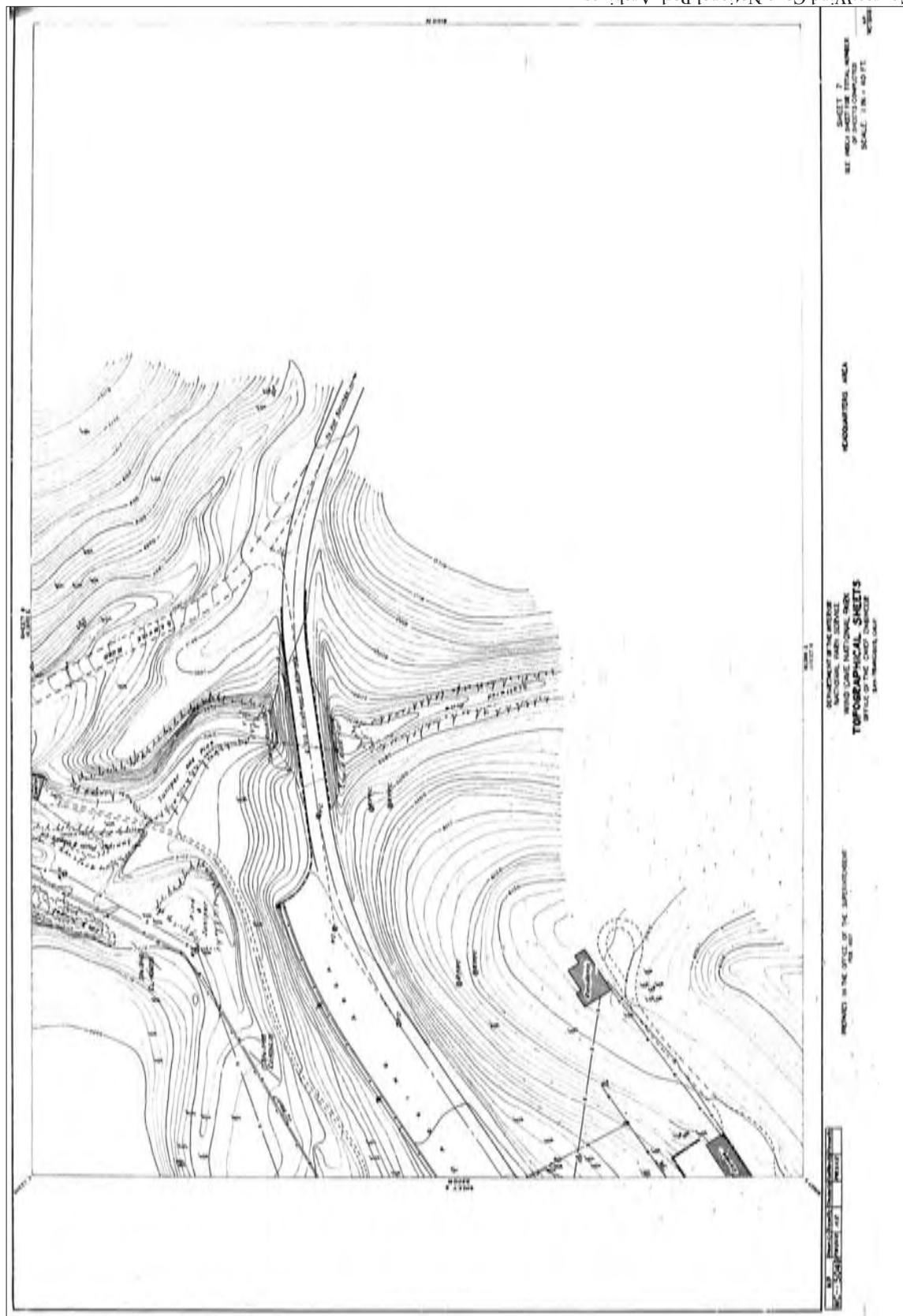


Figure 2-79  
“Topographical Sheets, Sheet Four” Wind Cave National Park, February 1937.

Source: Wind Cave National Park Archives

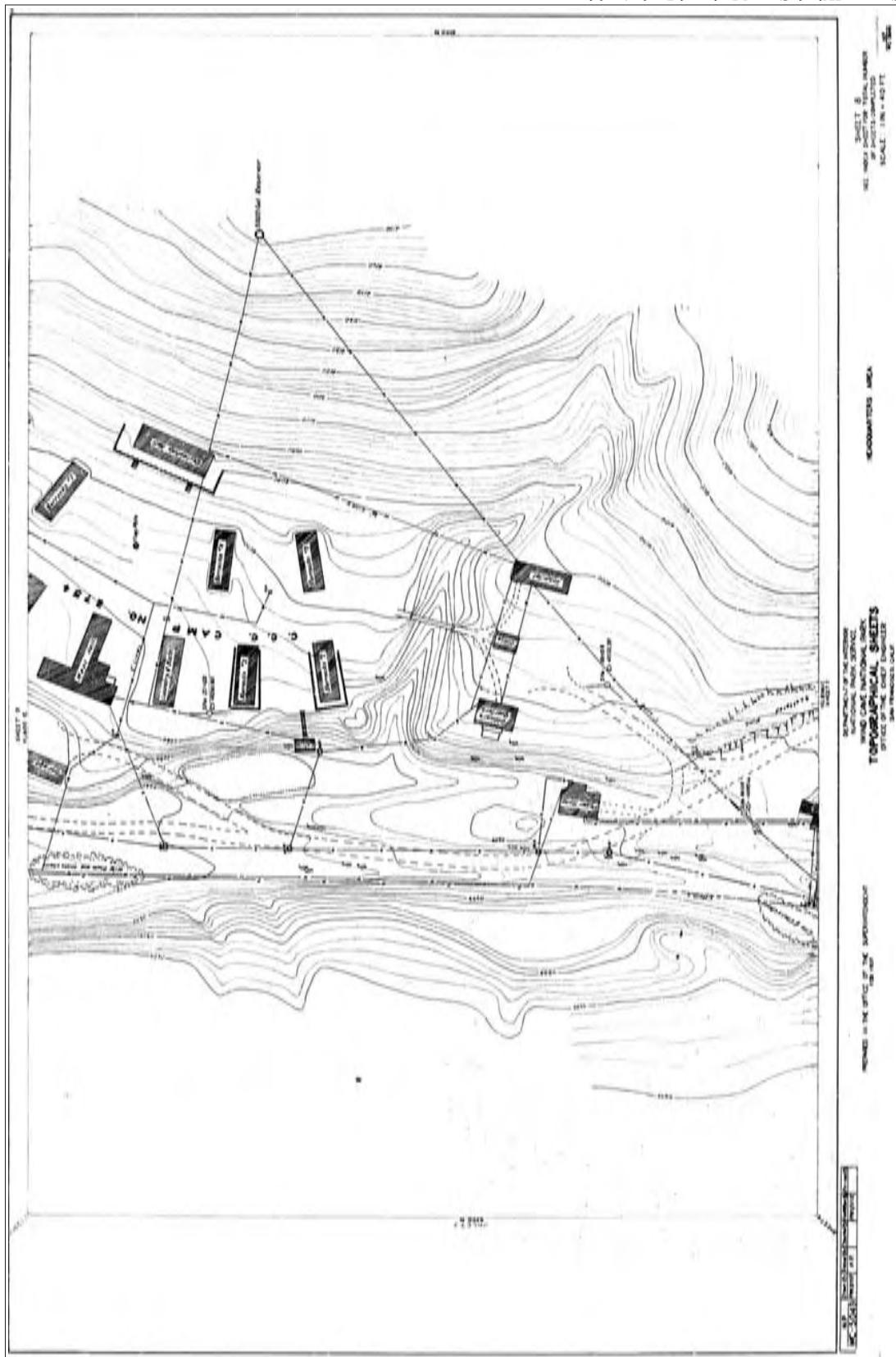


Figure 2-80  
“Topographical Sheets, Sheet Five,” Wind Cave National Park, February 1937.

Source: Wind Cave National Park Archives

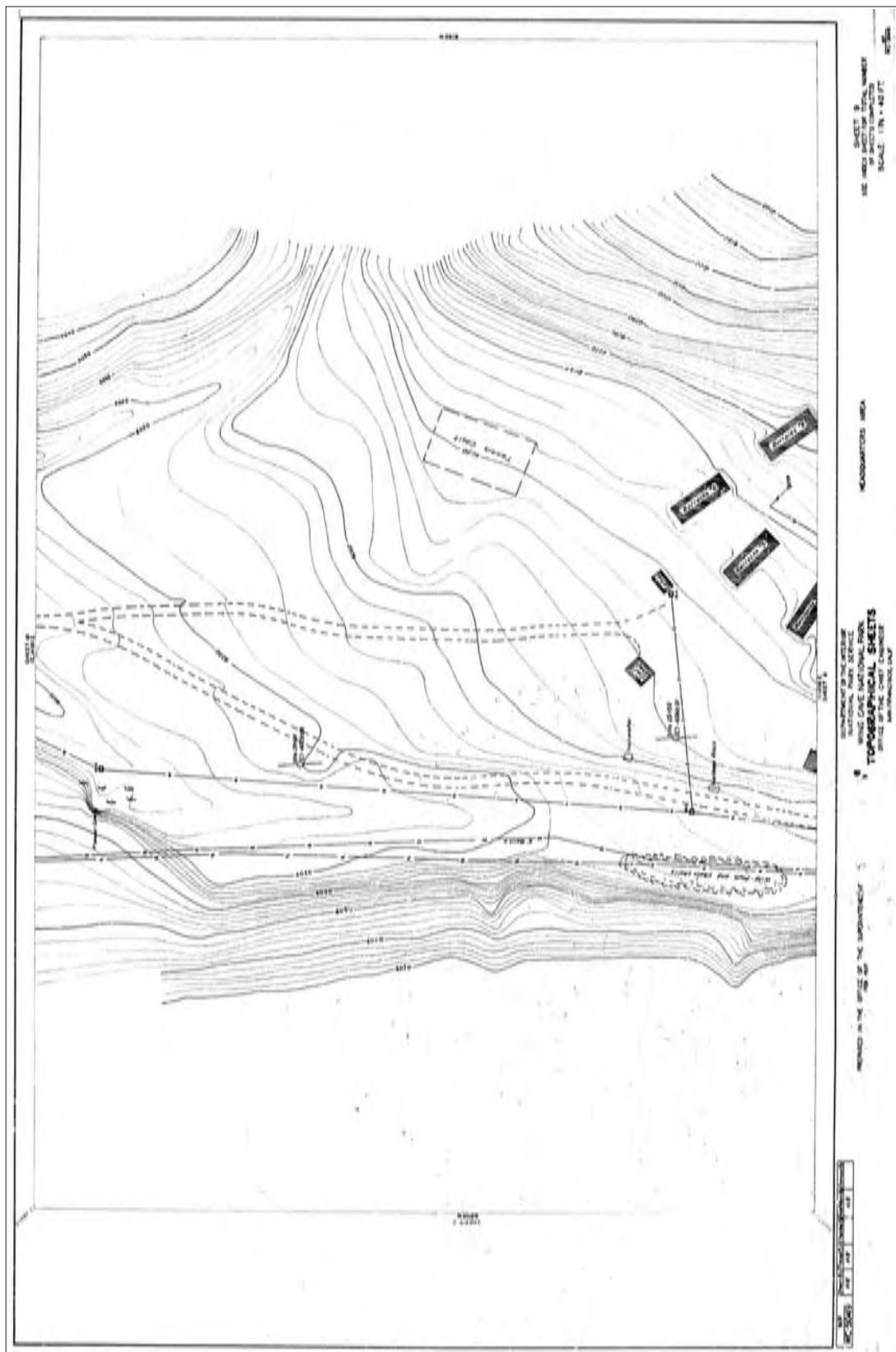


Figure 2-81  
“Topographical Sheets, Sheet Six,” Wind Cave National Park, February 1937.

Source: Wind Cave National Park Archives

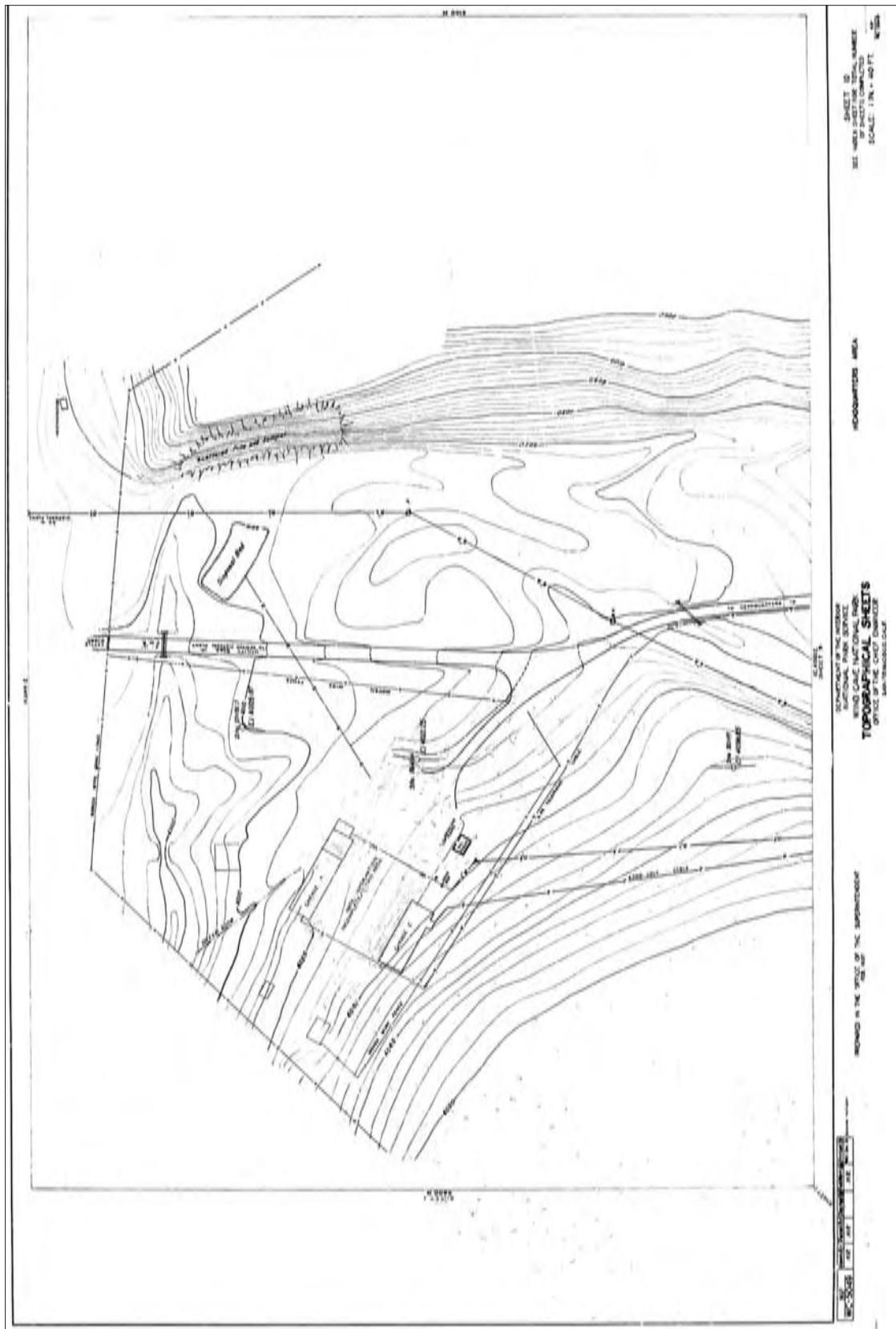


Figure 2-82  
“Topographical Sheets, Sheet Seven,” Wind Cave National Park, February 1937.

Source: Wind Cave National Park Archives



Figure 2-83  
“Giame Ranch Area,” Wind Cave National Park, June 1, 1937.



Source: Wind Cave National Park Archives

Figure 2-84  
Construction of Walk-in Entrance, circa 1938.



Source: Wind Cave National Park Archives

Figure 2-85  
Construction of stone wall guardrails in Headquarters Area, circa 1939.

Source: Wind Cave National Park Archives

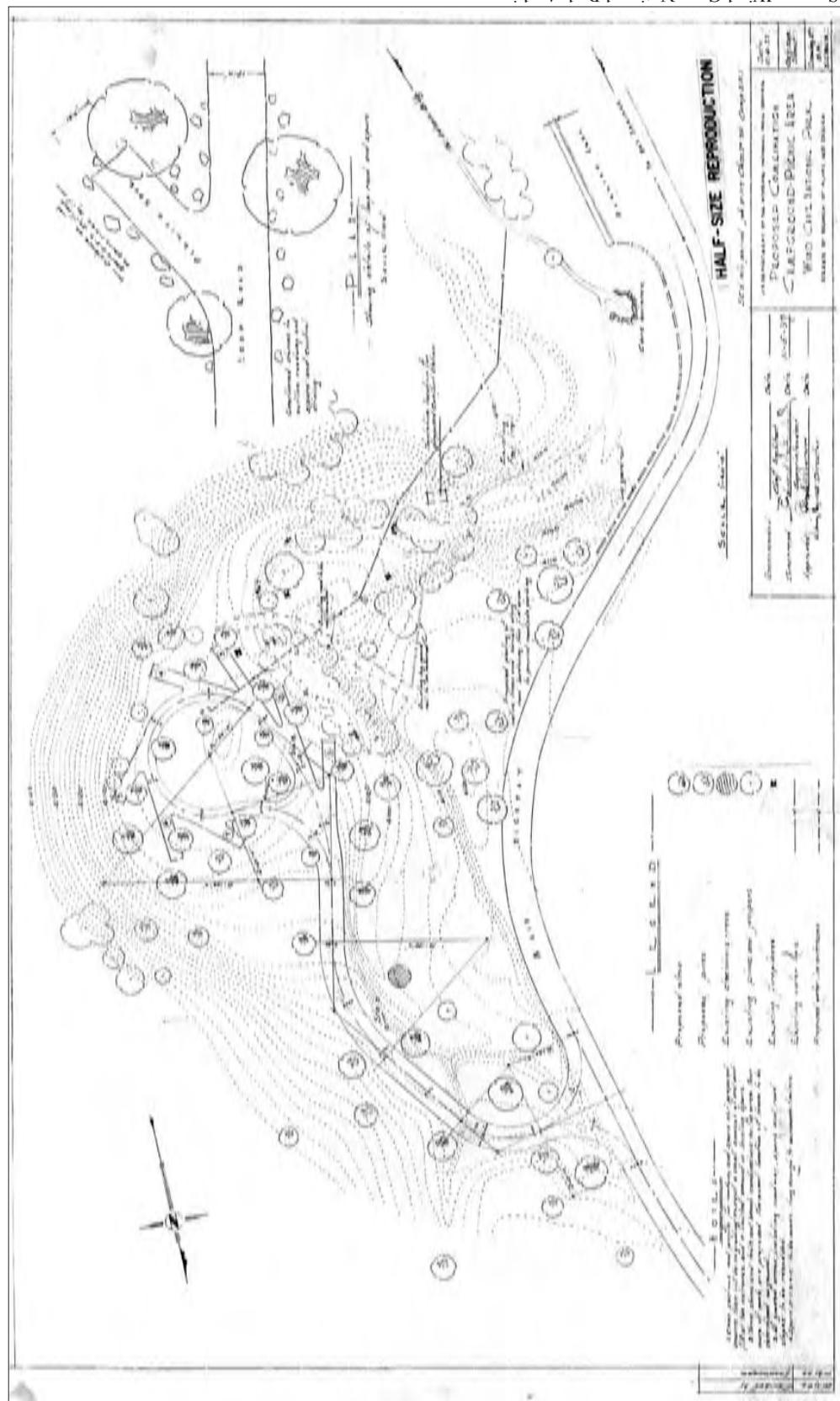


Figure 2-86  
"Proposed Combination Campground - Picnic Area," Wind Cave National Park, November 1, 1937.

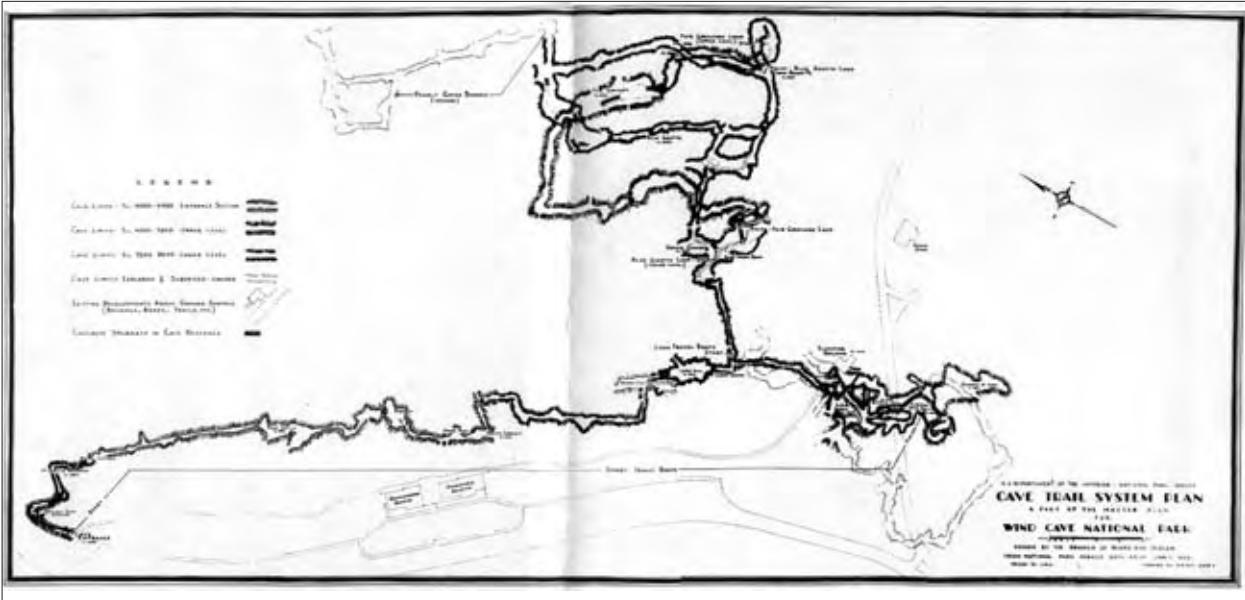


Figure 2-87

"Cave Trail System Plan, A Part of the Master Plan for Wind Cave National Park," January 1, 1939.

Source: Wind Cave National Park Archives

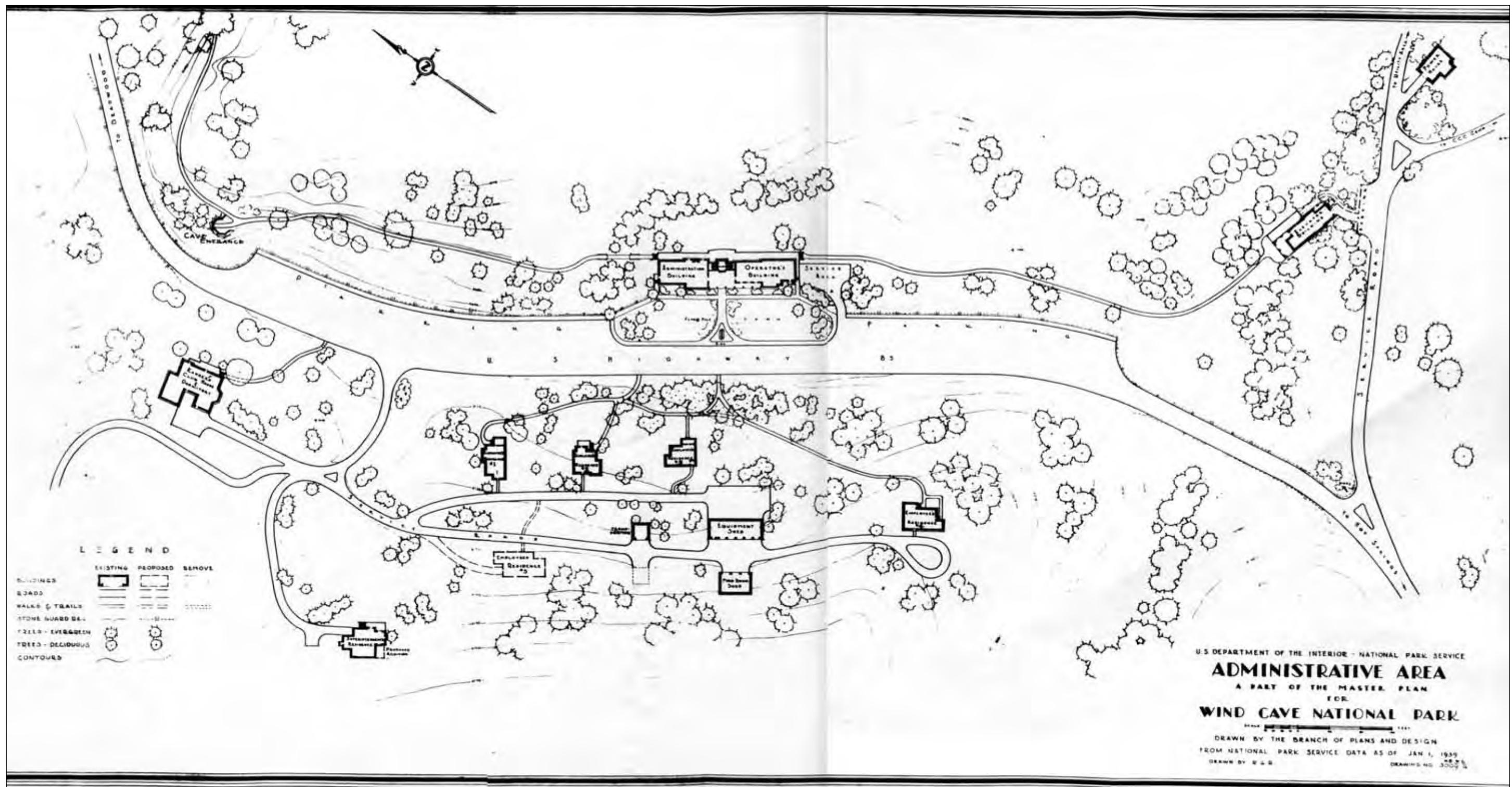


Figure 2-88  
“Administrative Area, A Part of the Master Plan for Wind Cave National Park,” January 1, 1939.

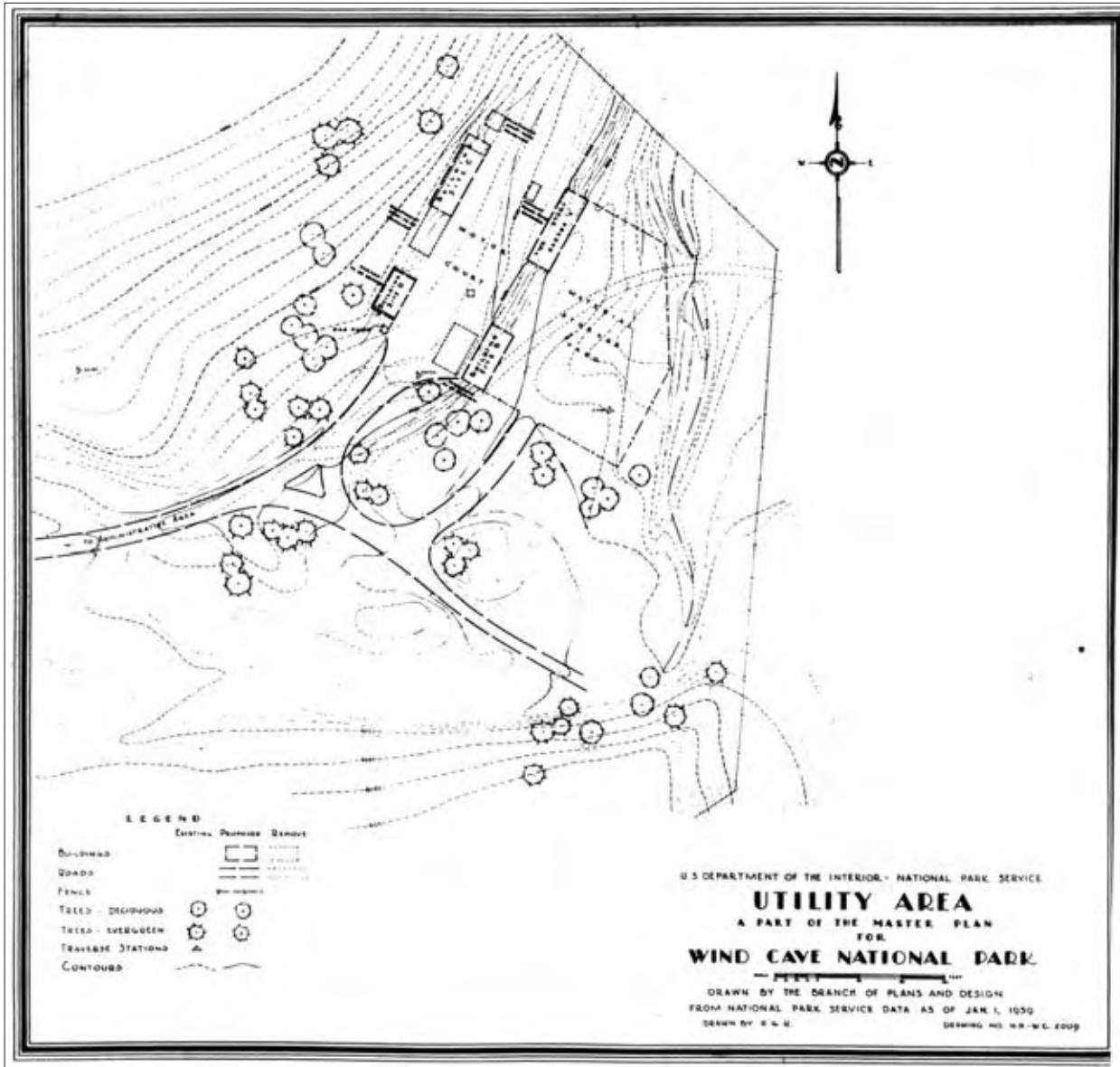
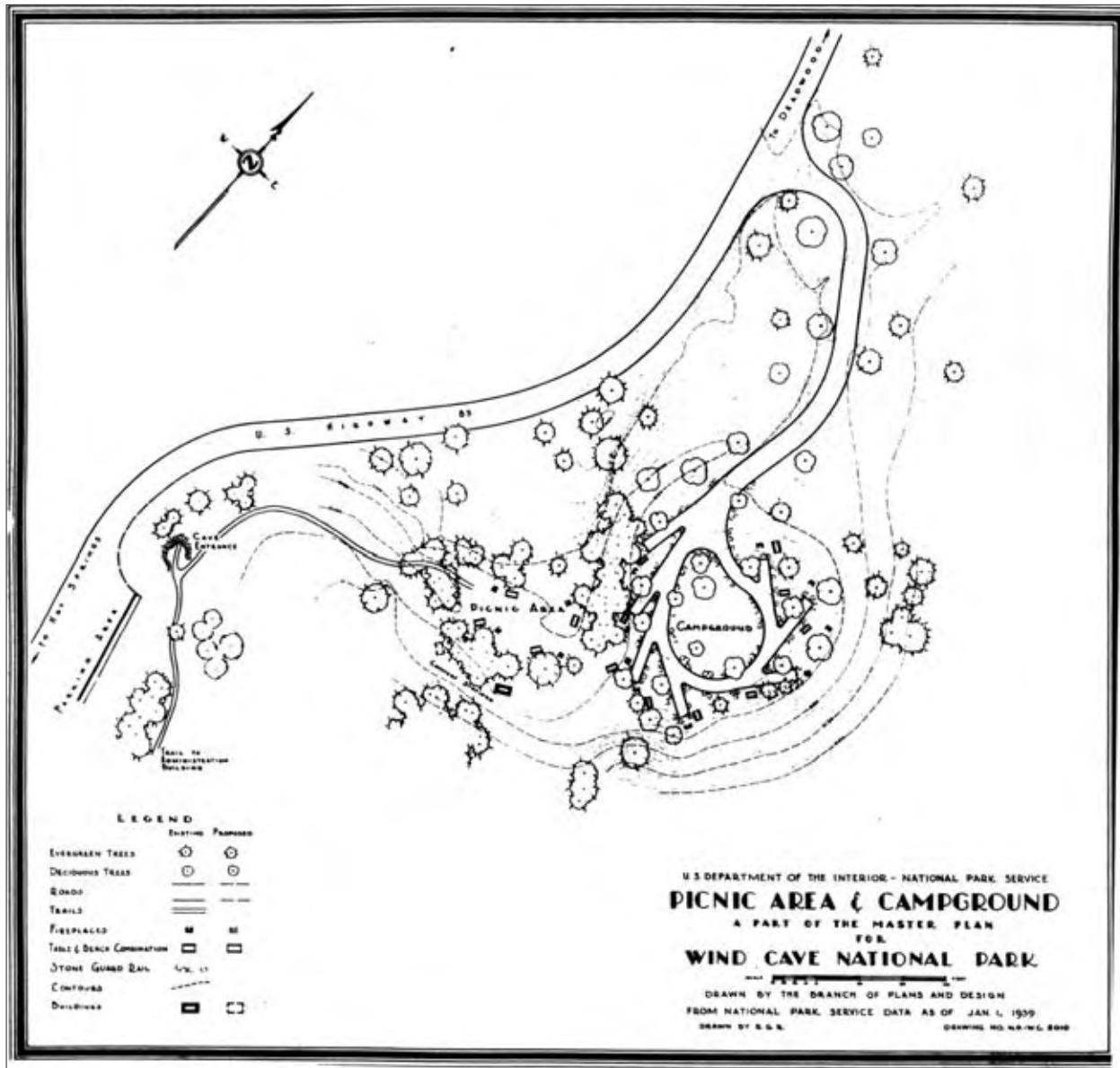


Figure 2-89

"Utility Area, A Part of the Master Plan for Wind Cave National Park," January 1, 1939.

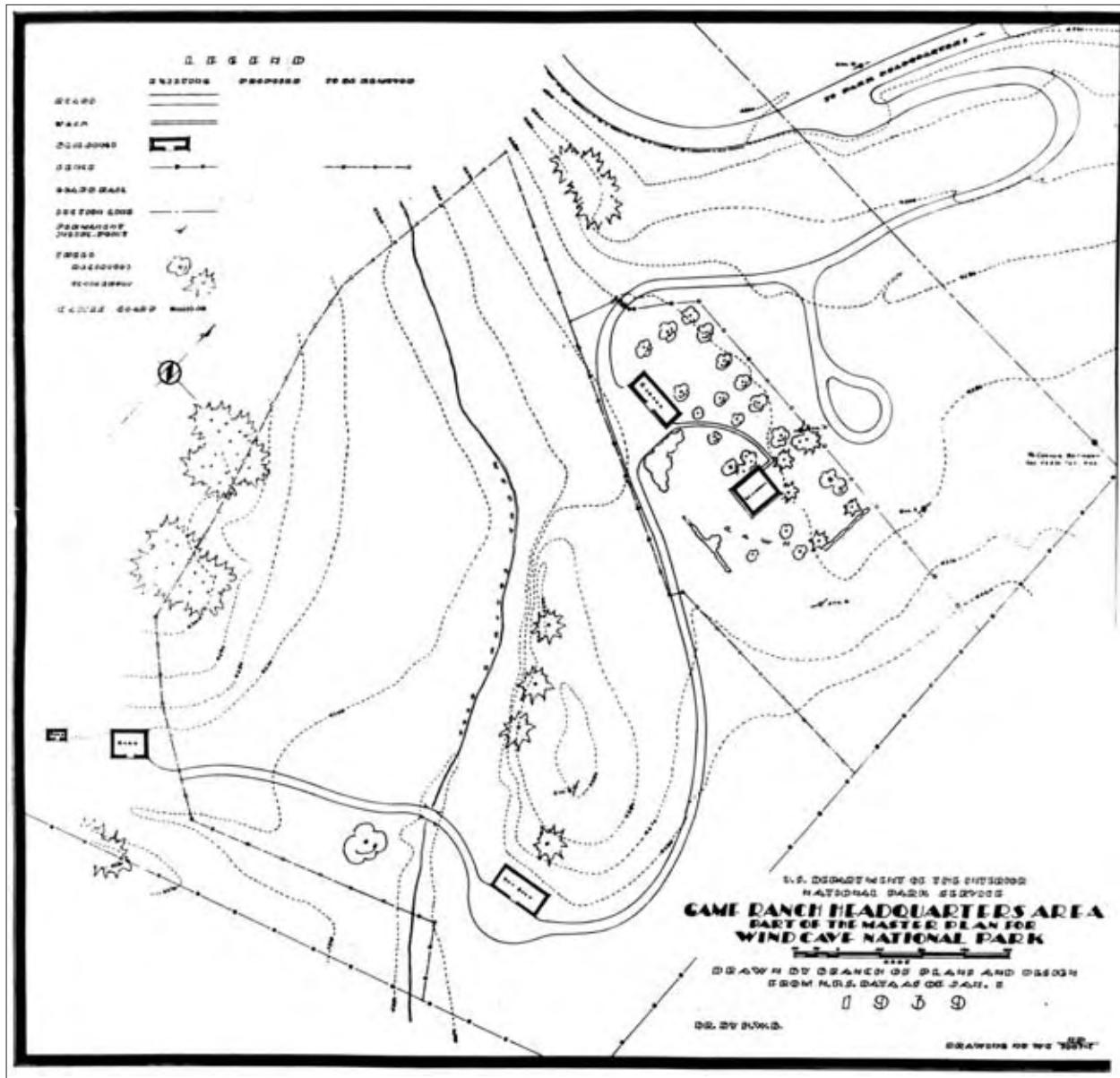
Source: Wind Cave National Park Archives



Source: Wind Cave National Park Archives

Figure 2-90

"Picnic Area and Campground, A part of the Master Plan for Wind Cave National Park," January 1, 1939.



Source: Wind Cave National Park Archives

Figure 2-91

"Game Ranch Headquarters Area, Part of the Master Plan for Wind Cave National Park," January 1, 1939.

Source: Wind Cave National Park Archives

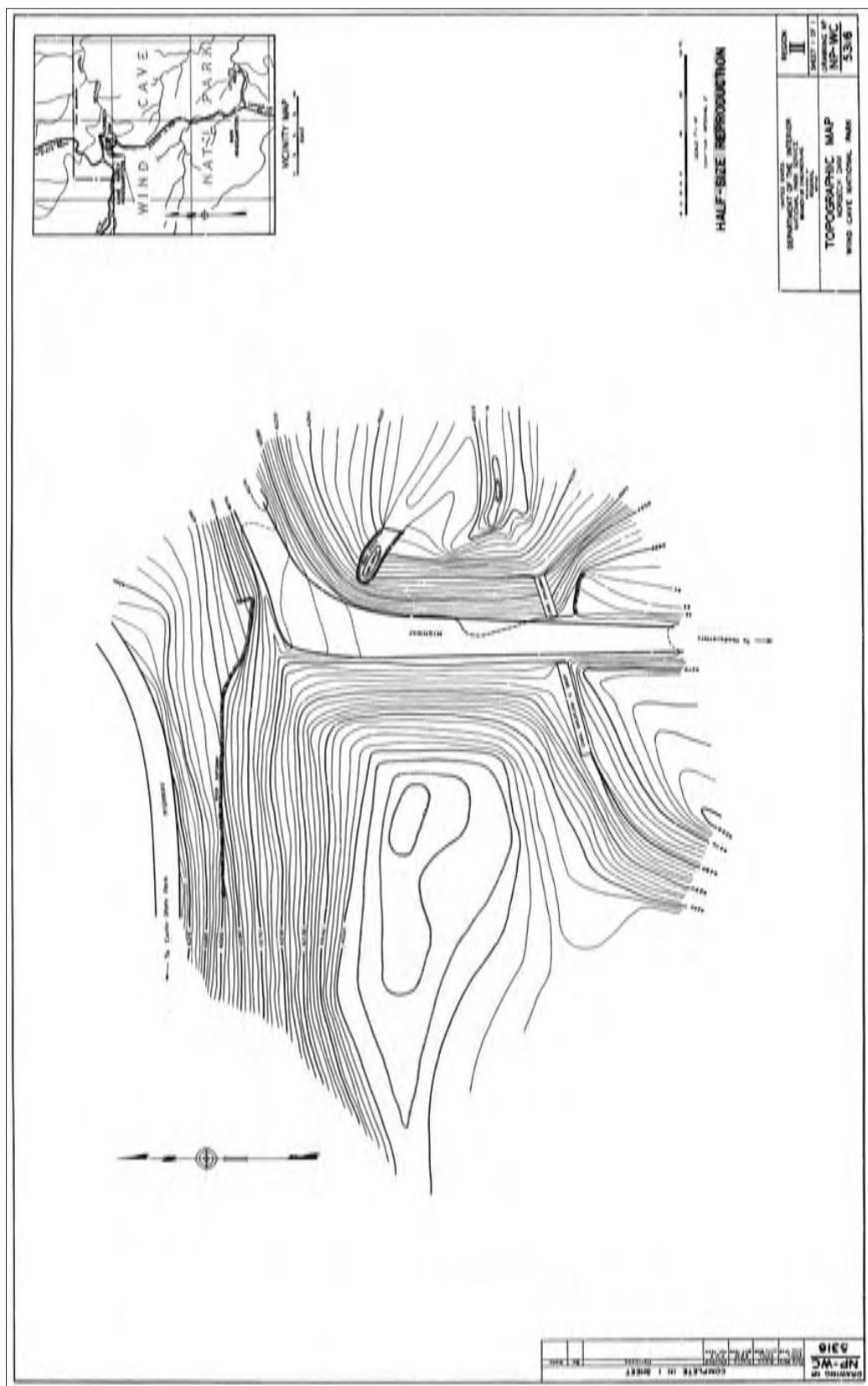


Figure 2-92  
“Topographic Map, Norbeck Dam,” Wind Cave National Park, November, 1940.



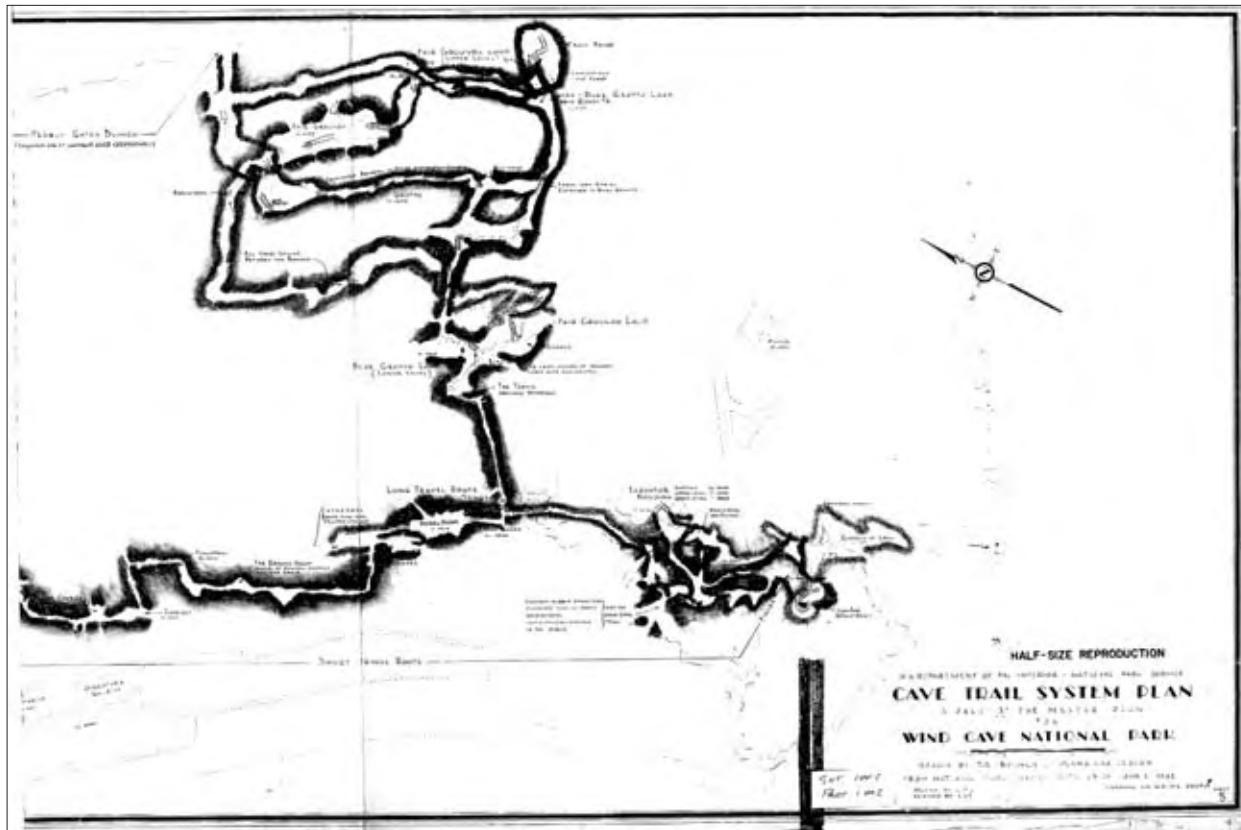
Source: Wind Cave National Park Archives

Figure 2-93  
Roundup, circa 1941.



Source: Wind Cave National Park Archives

Figure 2-94  
CCC area buffalo corrals, circa 1941.



Source: Wind Cave National Park Archives

Figure 2-95

"Cave Trail System Plan, A Part of the Master Plan for Wind Cave National Park, Sheet One," January 1, 1942.

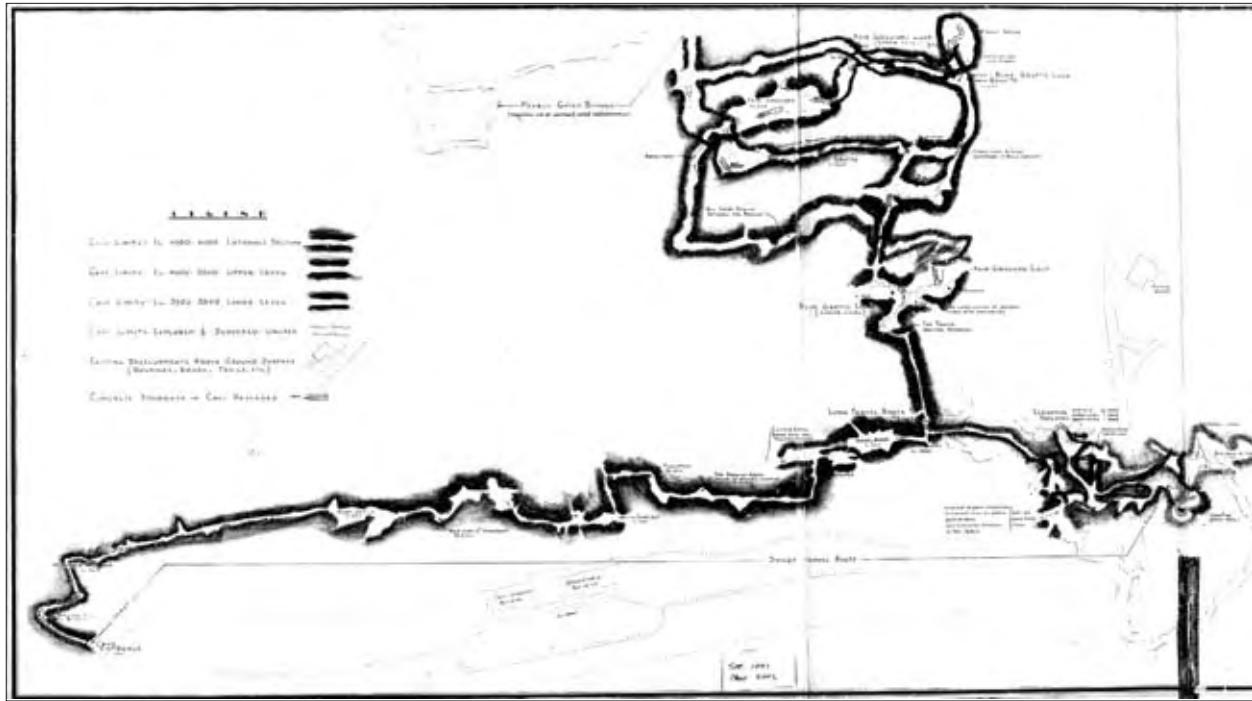


Figure 2-96  
"Cave Trail System Plan, A Part of the Master Plan for Wind Cave National Park, Sheet Two," January 1, 1942.

Source: Wind Cave National Park Archives

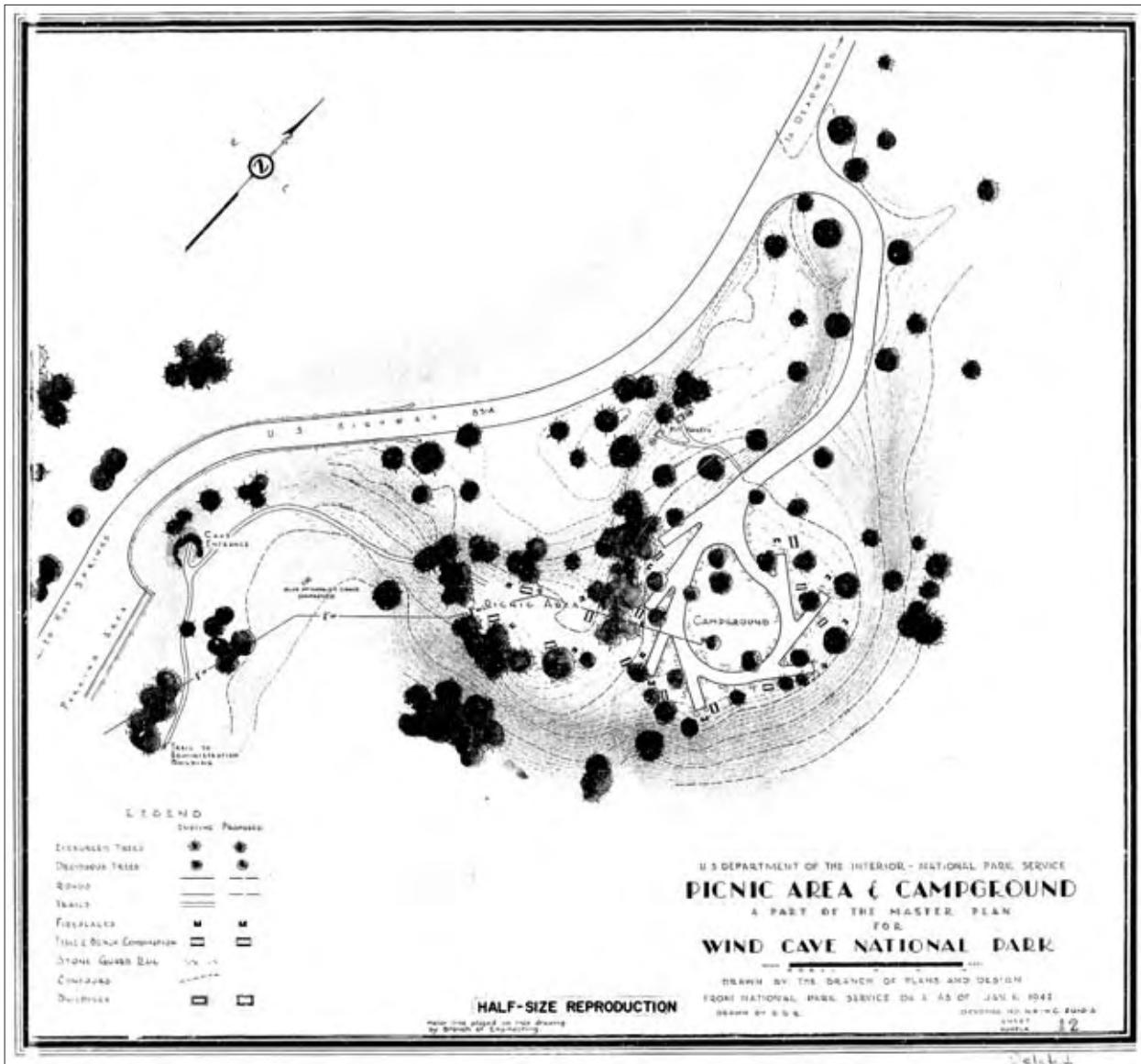
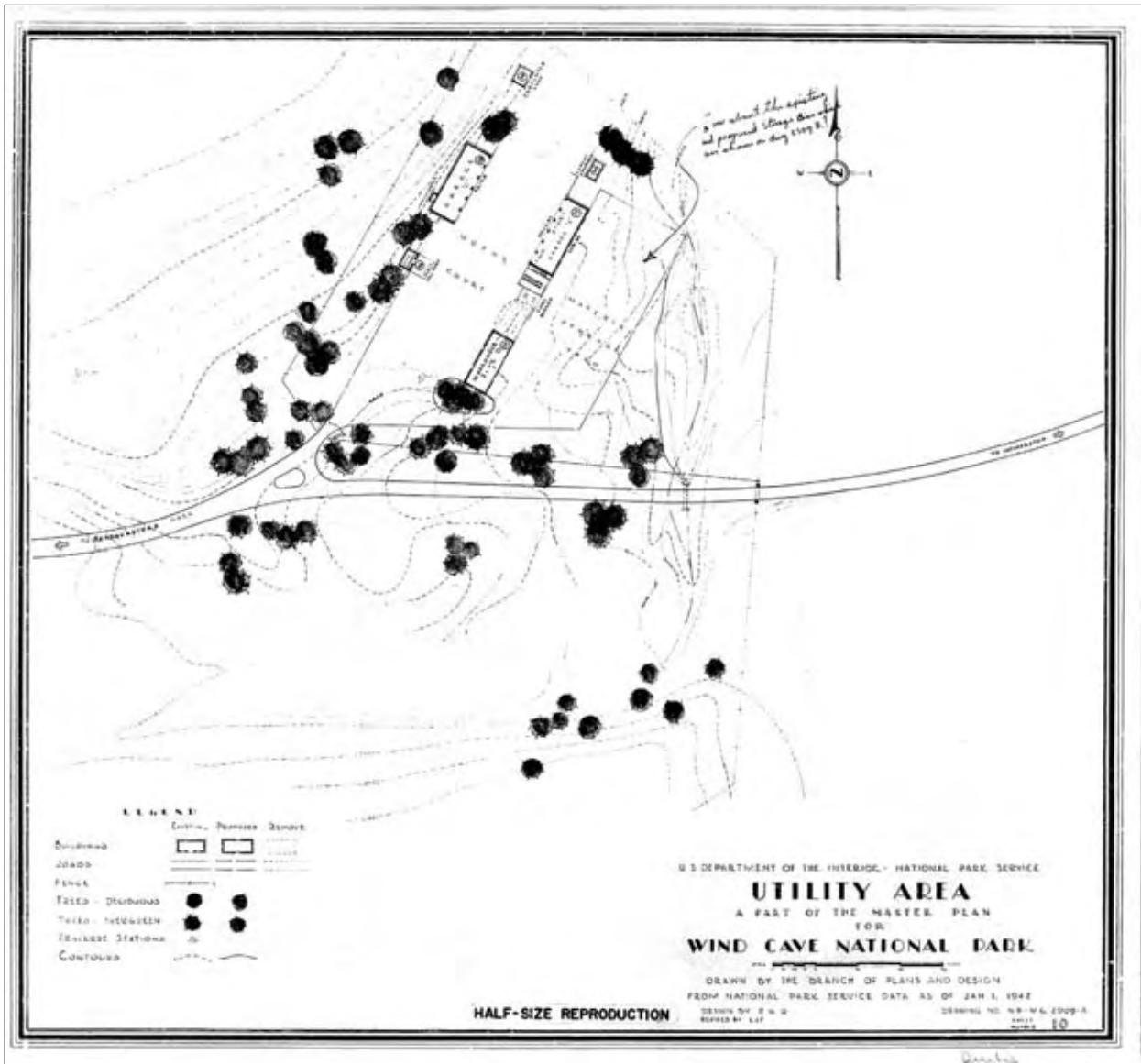


Figure 2-97

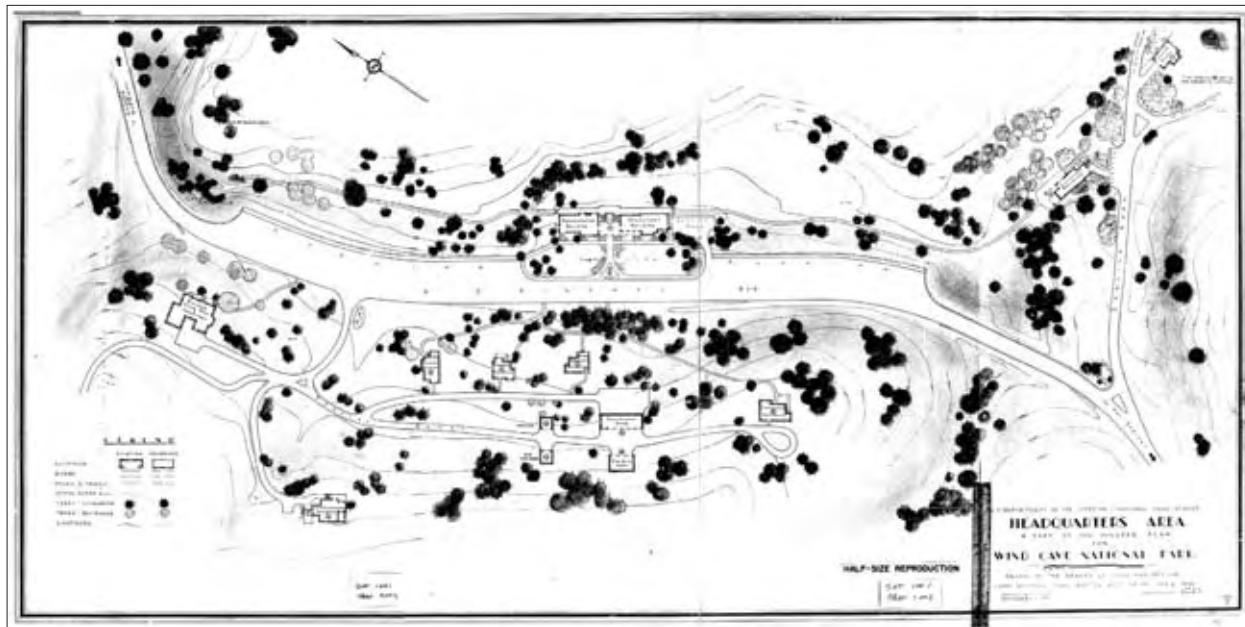
"Picnic Area & Campground, A Part of the Master Plan, Wind Cave National Park," January 1, 1942.



Source: Wind Cave National Park Archives

Figure 2-98

"Utility Area, A Part of the Master Plan, Wind Cave National Park," January 1, 1942.



Source: Wind Cave National Park Archives

Figure 2-99

"Headquarters Area, A Part of the Master Plan, Wind Cave National Park," January 1, 1942.

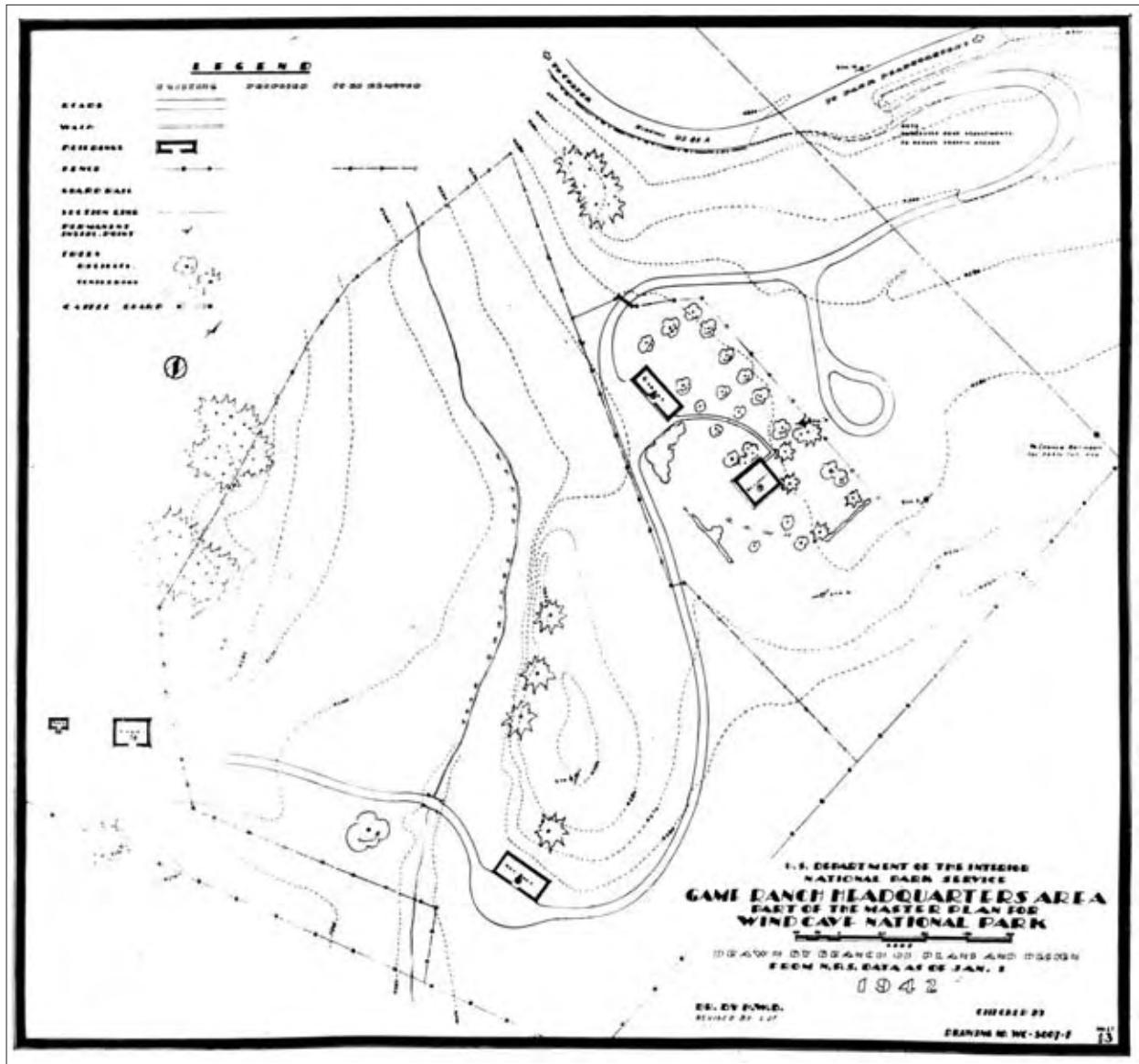
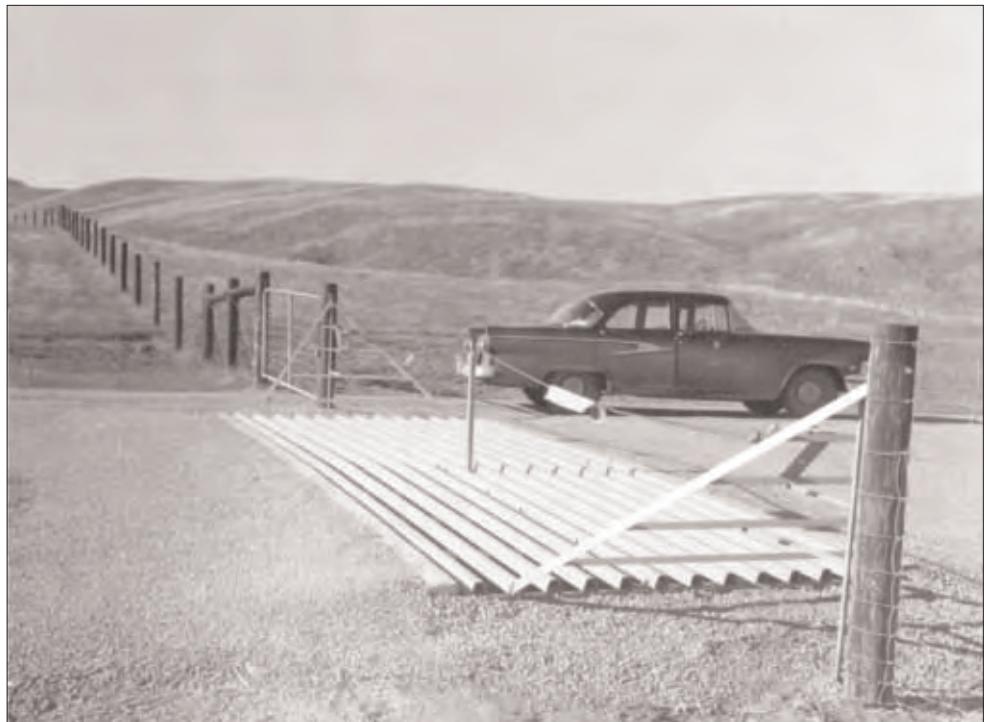


Figure 2-100

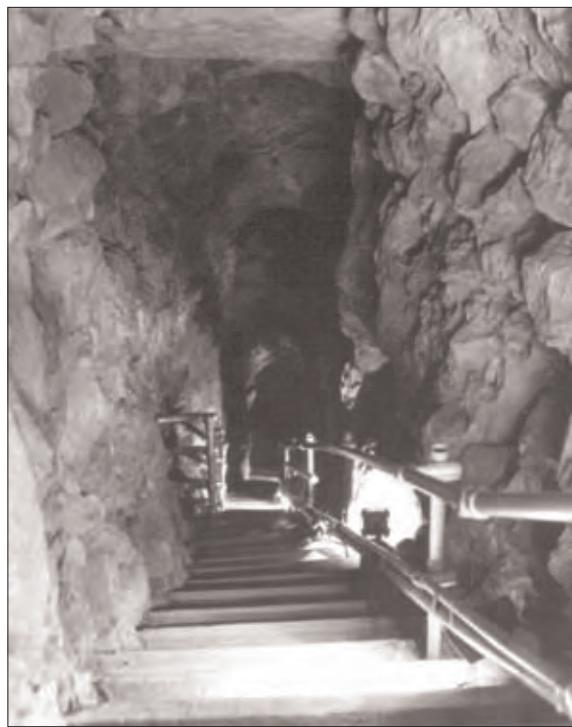
"Game Ranch Headquarters Area, Part of the Master Plan for Wind Cave National Park," January 1, 1942.

Source: Wind Cave National Park Archives



Source: Wind Cave National Park Archives

Figure 2-101  
Cattle guard fencing, n.d. (1946-1966).



Source: Wind Cave National Park Archives

Figure 2-102  
Cave stairs and railing below Walk-in Entrance,  
n.d. (mid 20th century).

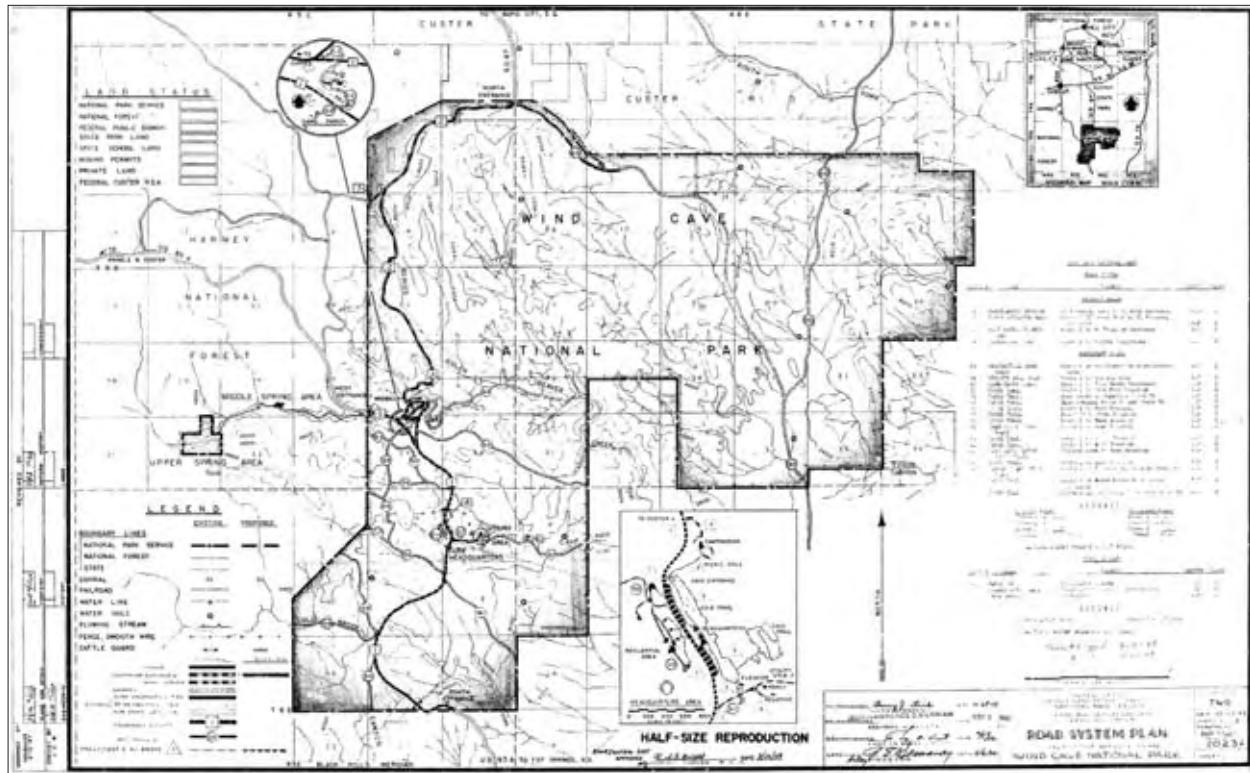
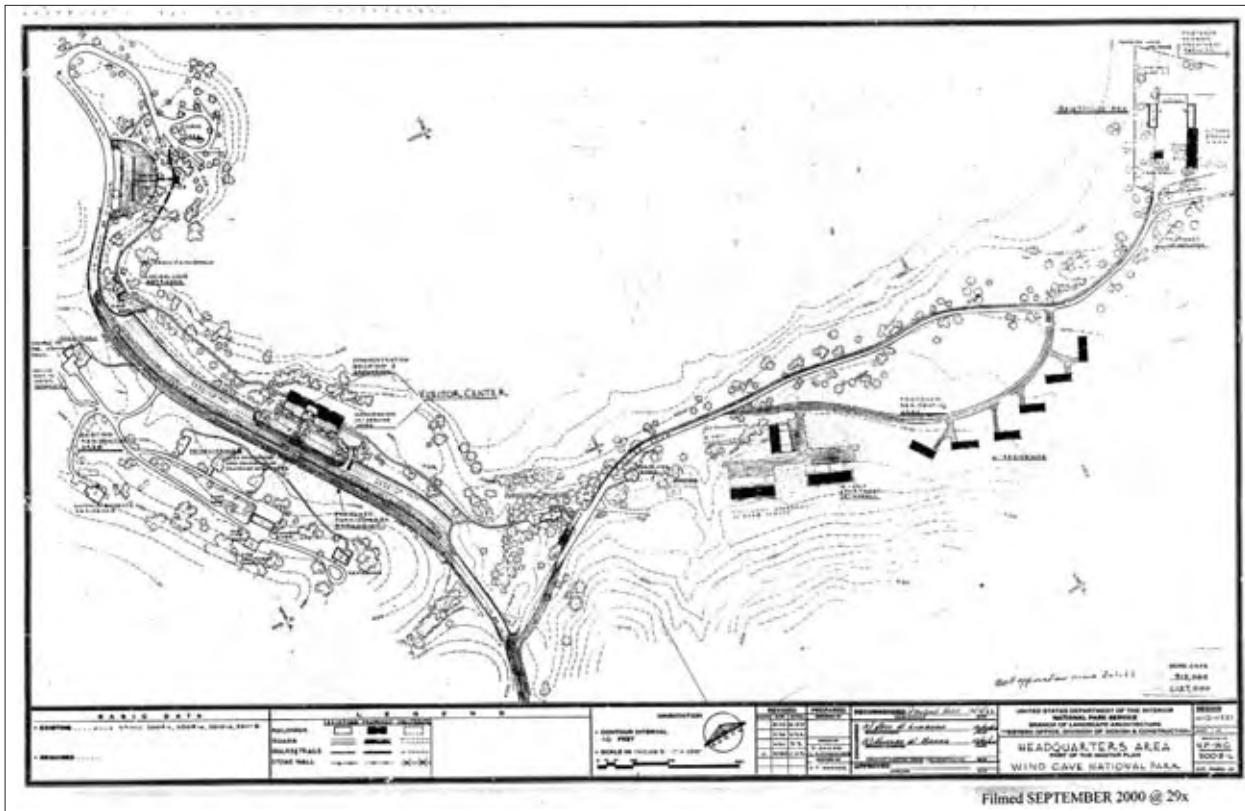


Figure 2-103

"Road System Plan, Part of the Master Plan," Wind Cave National Park, October 17, 1949.

Source: Wind Cave National Park Archives



Source: Wind Cave National Park Archives

Figure 2-104

"Headquarters Area, Part of the Master Plan," Wind Cave National Park, March 1950.



Source: Wind Cave National Park Archives

Figure 2-105  
Spot lighting in cave, post 1956.



Source: Wind Cave National Park Archives

Figure 2-106  
Walk-in Entrance gate and door from inside cave,  
n.d. (mid 20th century).



Figure 2-107

"Game Fence, Park Boundary," Wind Cave National Park, May 5, 1951.

Source: Wind Cave National Park Archives

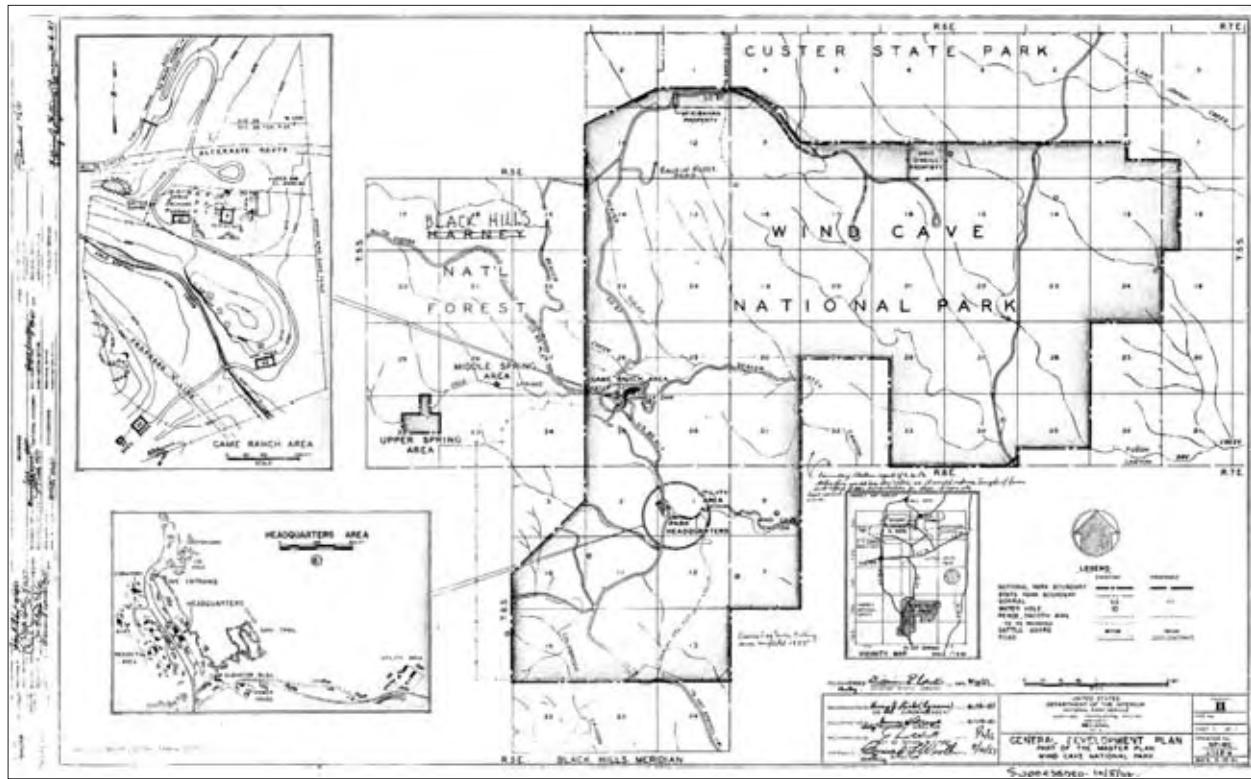


Figure 2-108

"General Development Plan, Part of the Master Plan," Wind Cave National Park, May 16, 1951.

Source: Wind Cave National Park Archives

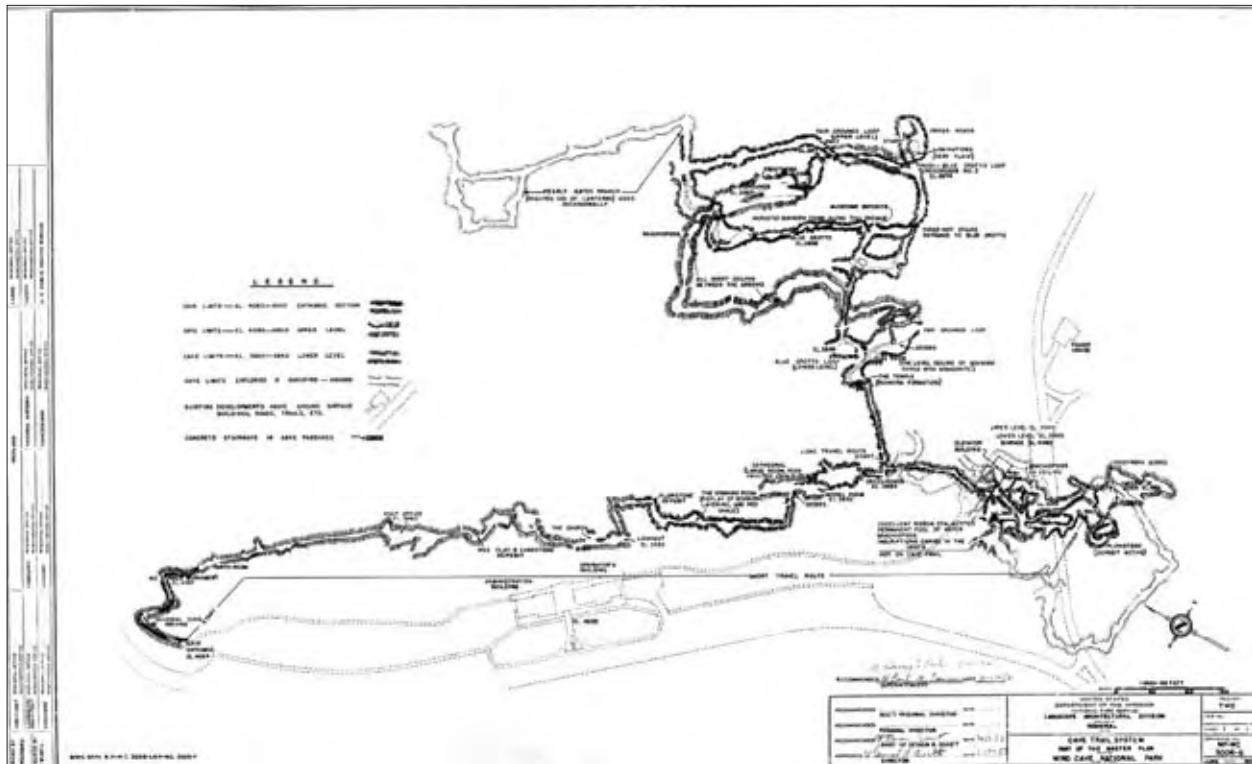


Figure 2-109

"Cave Trail System, Part of the Master Plan," Wind Cave National Park, June 1952.

Source: Wind Cave National Park Archives

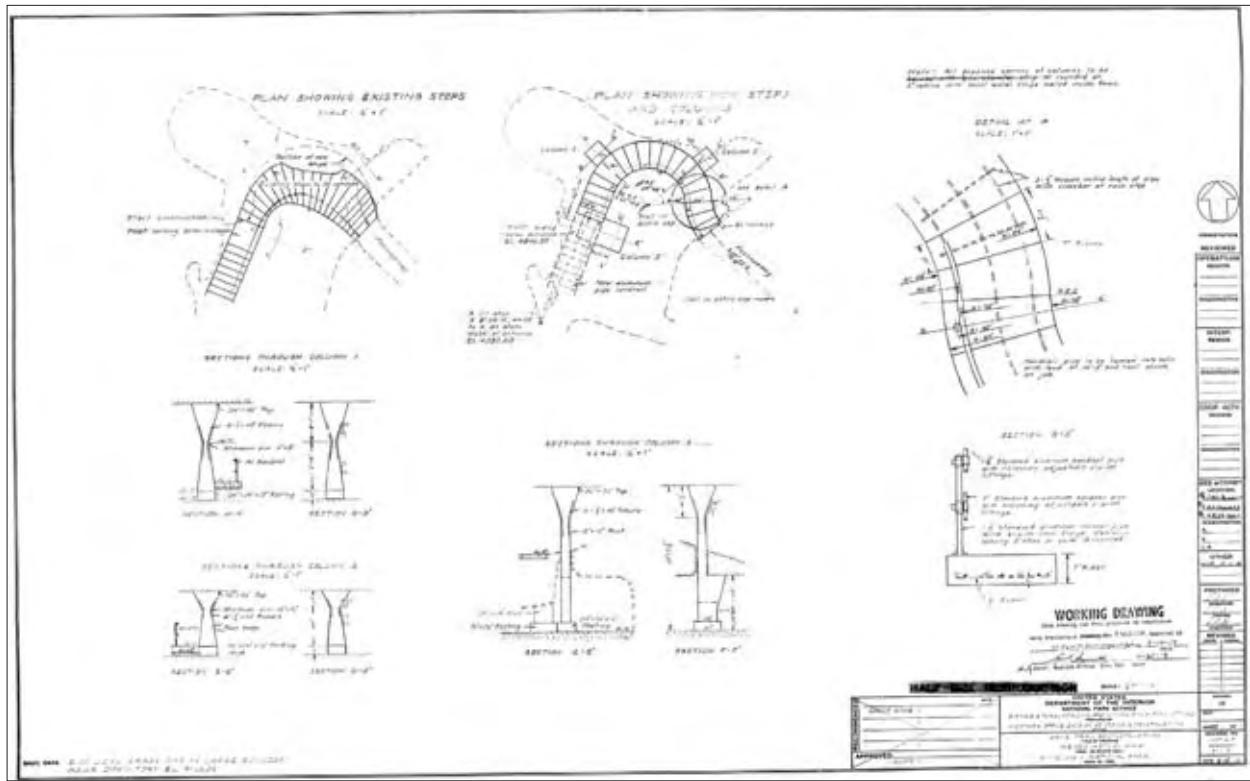


Figure 2-110  
“Bangs & Ferguson, Cave Trail Reconstruction, Headquarters Area,” Wind Cave National Park, April 1953.

Source: Wind Cave National Park Archives

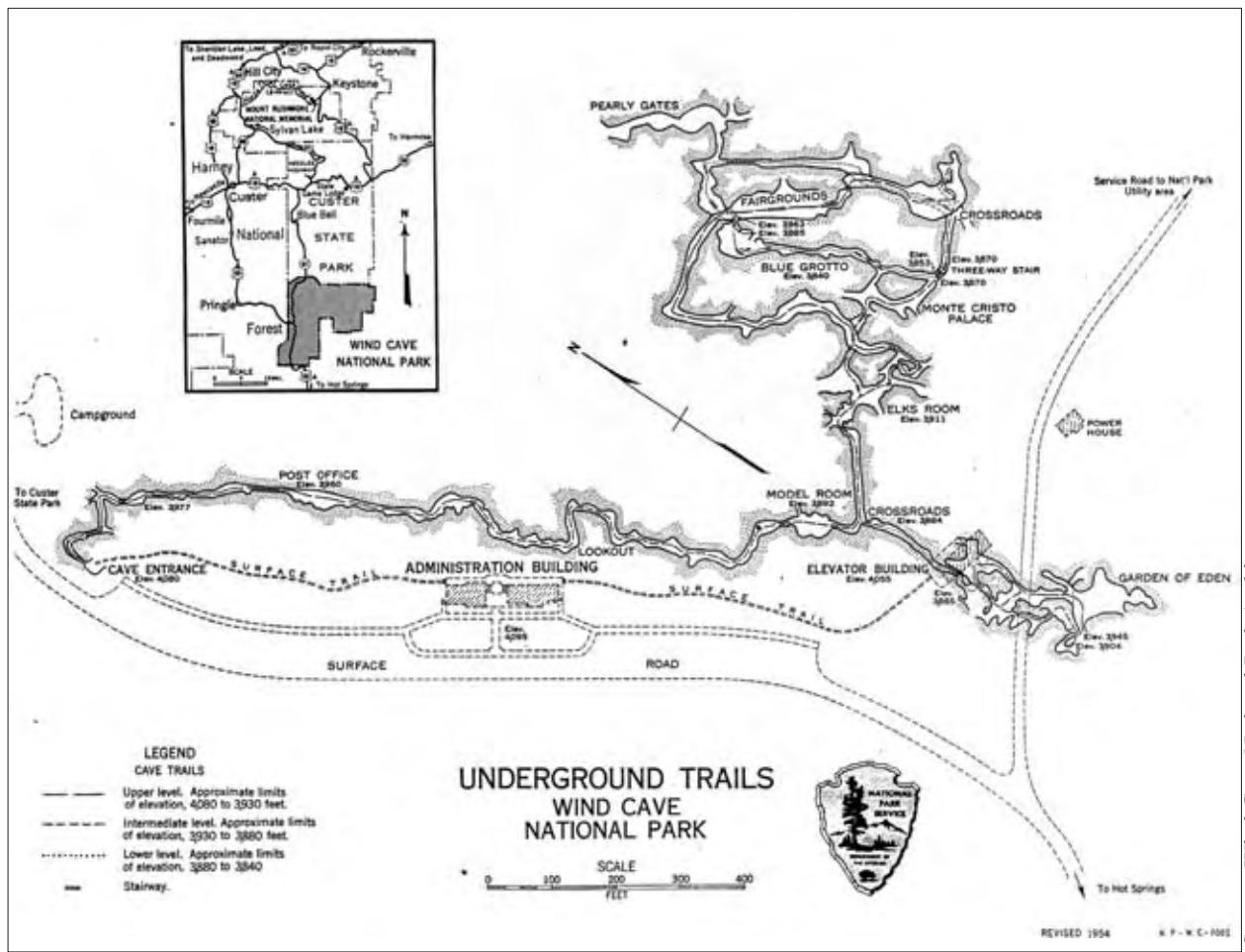


Figure 2-111  
“Underground Trails, Headquarters Area,” Wind Cave National Park, 1954.



Source: Wind Cave National Park Archives

Figure 2-112  
'Prairie Dog Town' interpretive exhibit, circa 1954.



Source: Wind Cave National Park Archives

Figure 2-113  
Rankin Ridge Fire Tower, circa 1956.

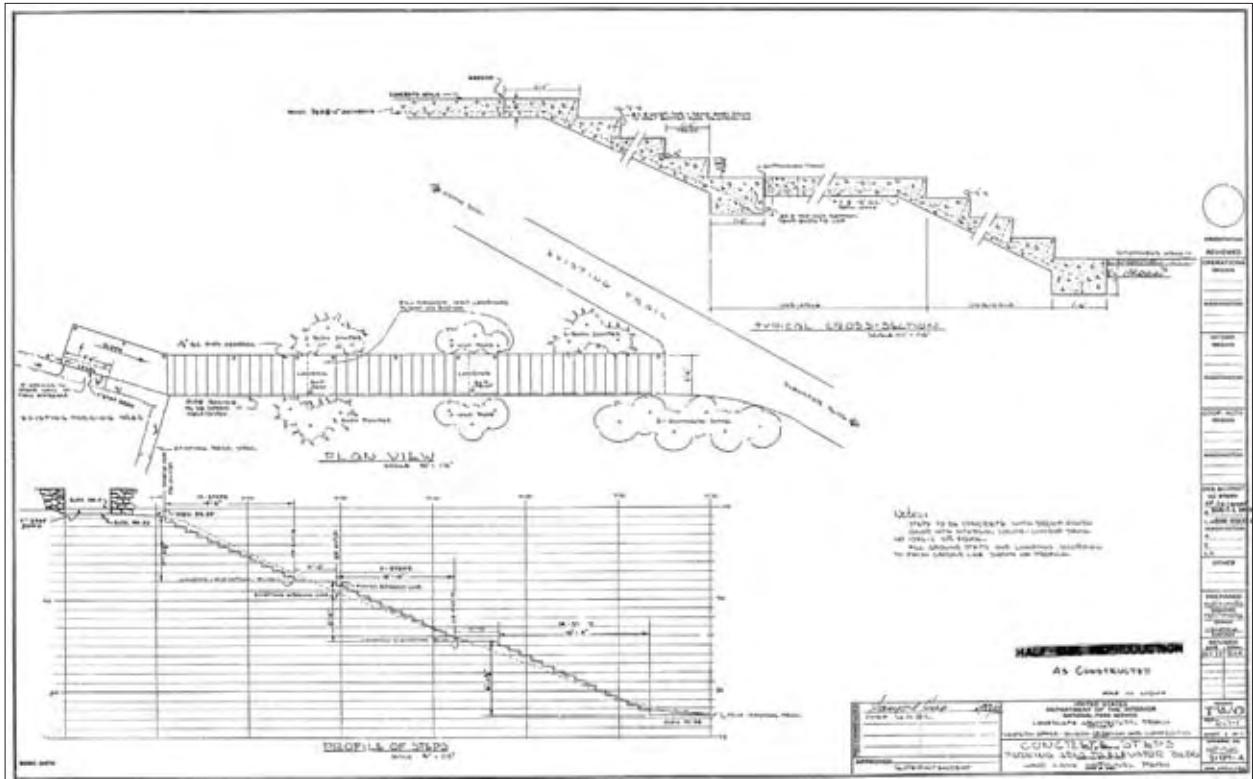


Figure 2-114  
“Concrete Steps, Parking Area to Elevator Building,” May 1956.

Source: Wind Cave National Park Archives

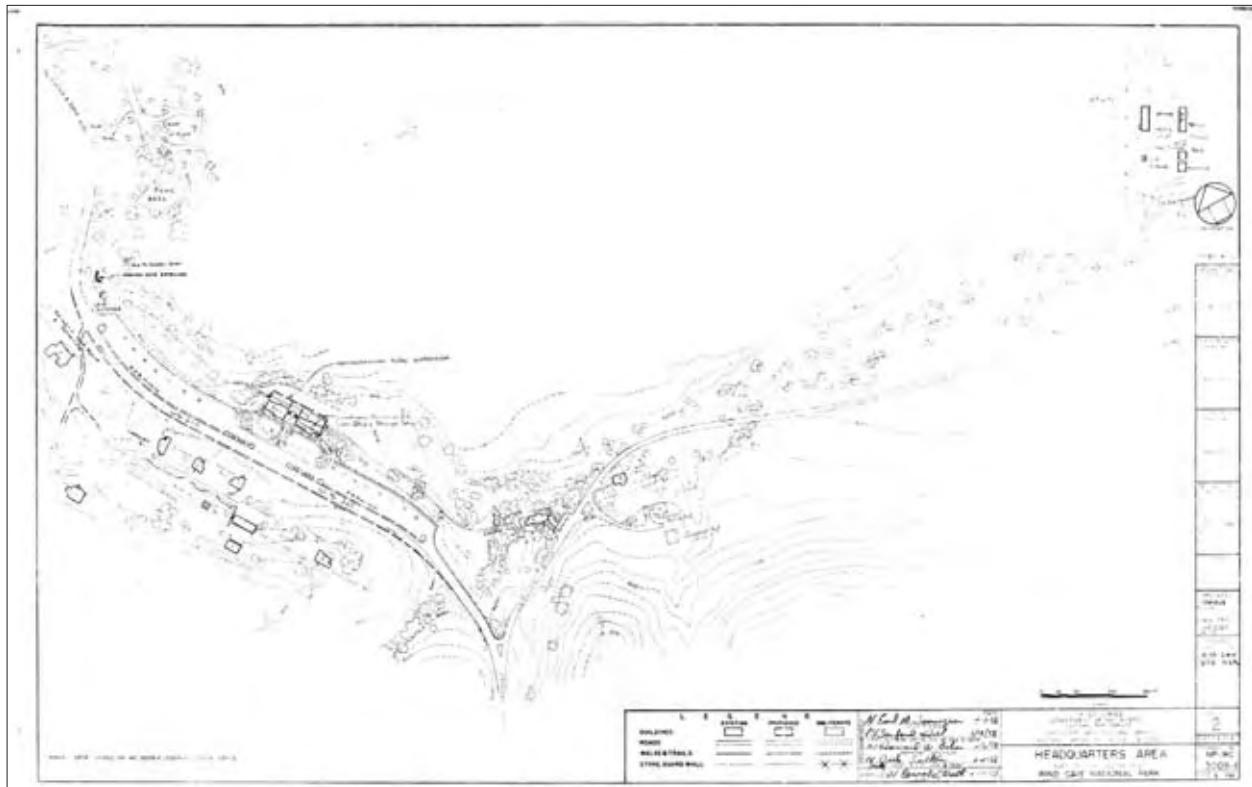


Figure 2-115

"Headquarters Area, A Part of the Master Plan," Wind Cave National Park, March 1, 1958.

Source: Wind Cave National Park Archives



Source: Wind Cave National Park Archives

Figure 2-116  
McDonald gravesite memorial, circa 1959.



Source: Wind Cave National Park Archives

Figure 2-117  
Effects from wild fire, 1964.

Source: Wind Cave National Park Archives



Figure 2-118  
“Topographic Sheet 13,” Wind Cave National Park, September 1961.

Source: Wind Cave National Park Archives

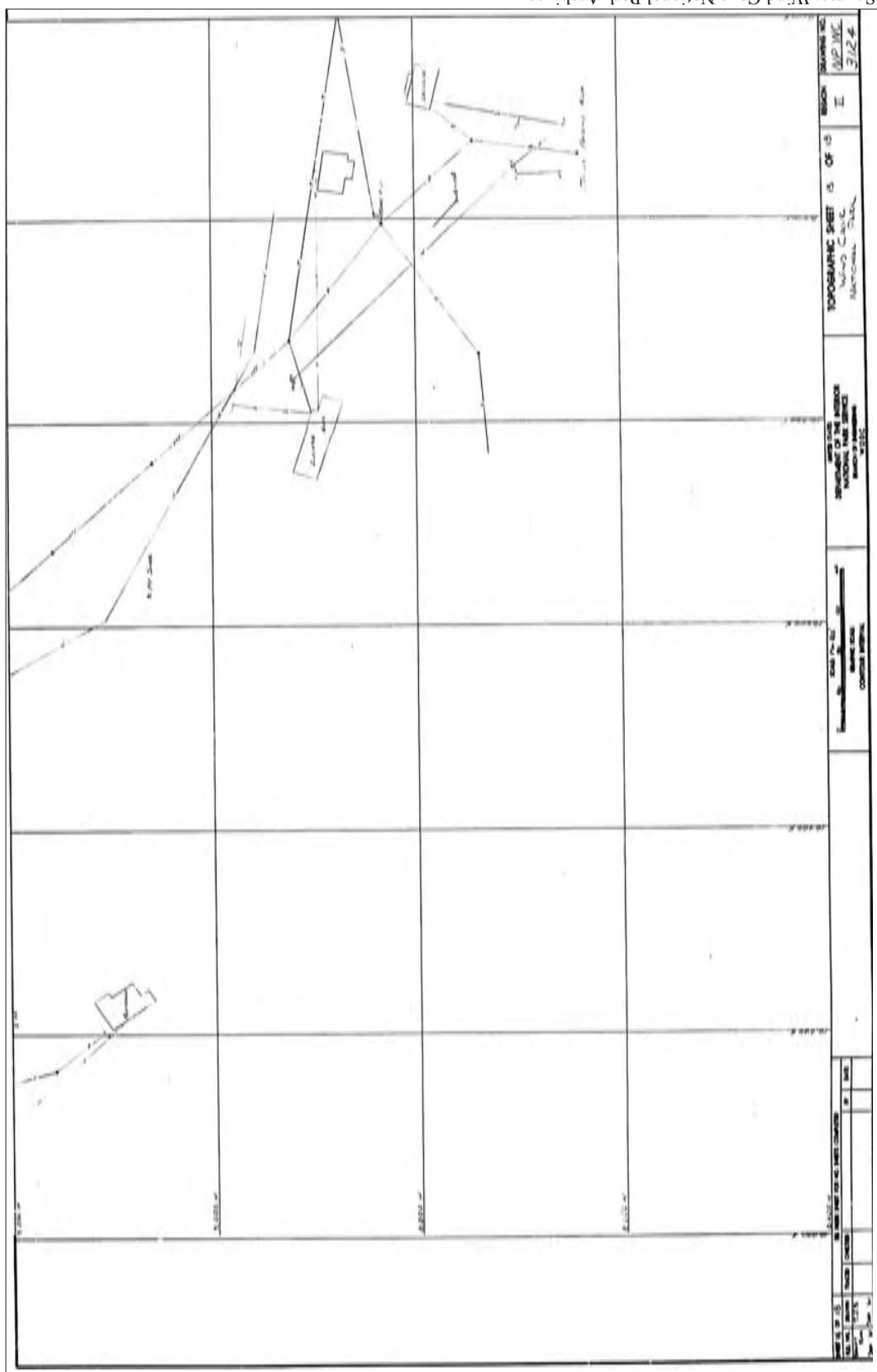


Figure 2-119  
“Topographic Sheet 14,” Wind Cave National Park, September 1961.

Source: Wind Cave National Park Archives

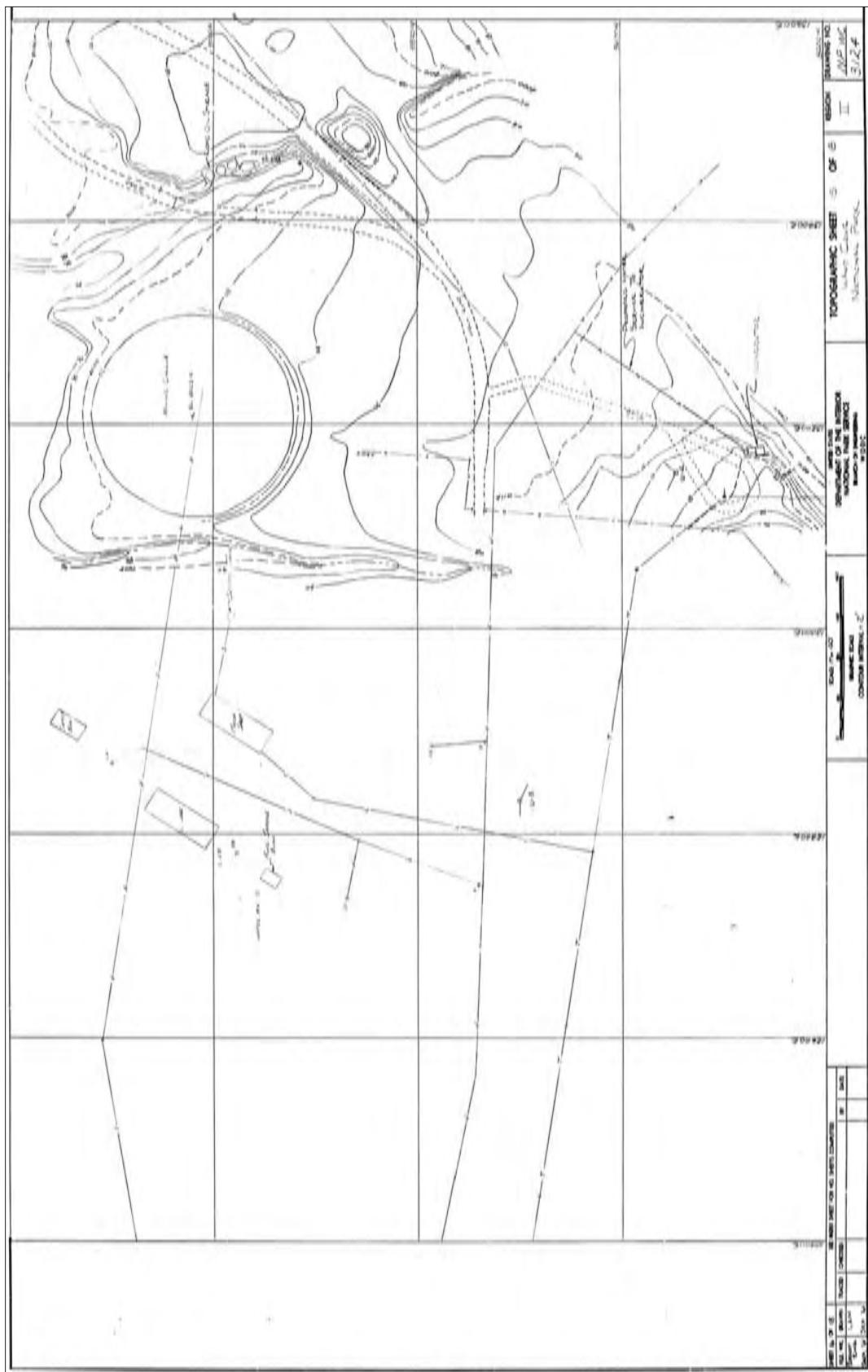


Figure 2-120  
“Topographic Sheet 16,” Wind Cave National Park, September 1961.

Source: Wind Cave National Park Archives



Figure 2-121  
“Topographic Sheet 17,” Wind Cave National Park, September 1961.

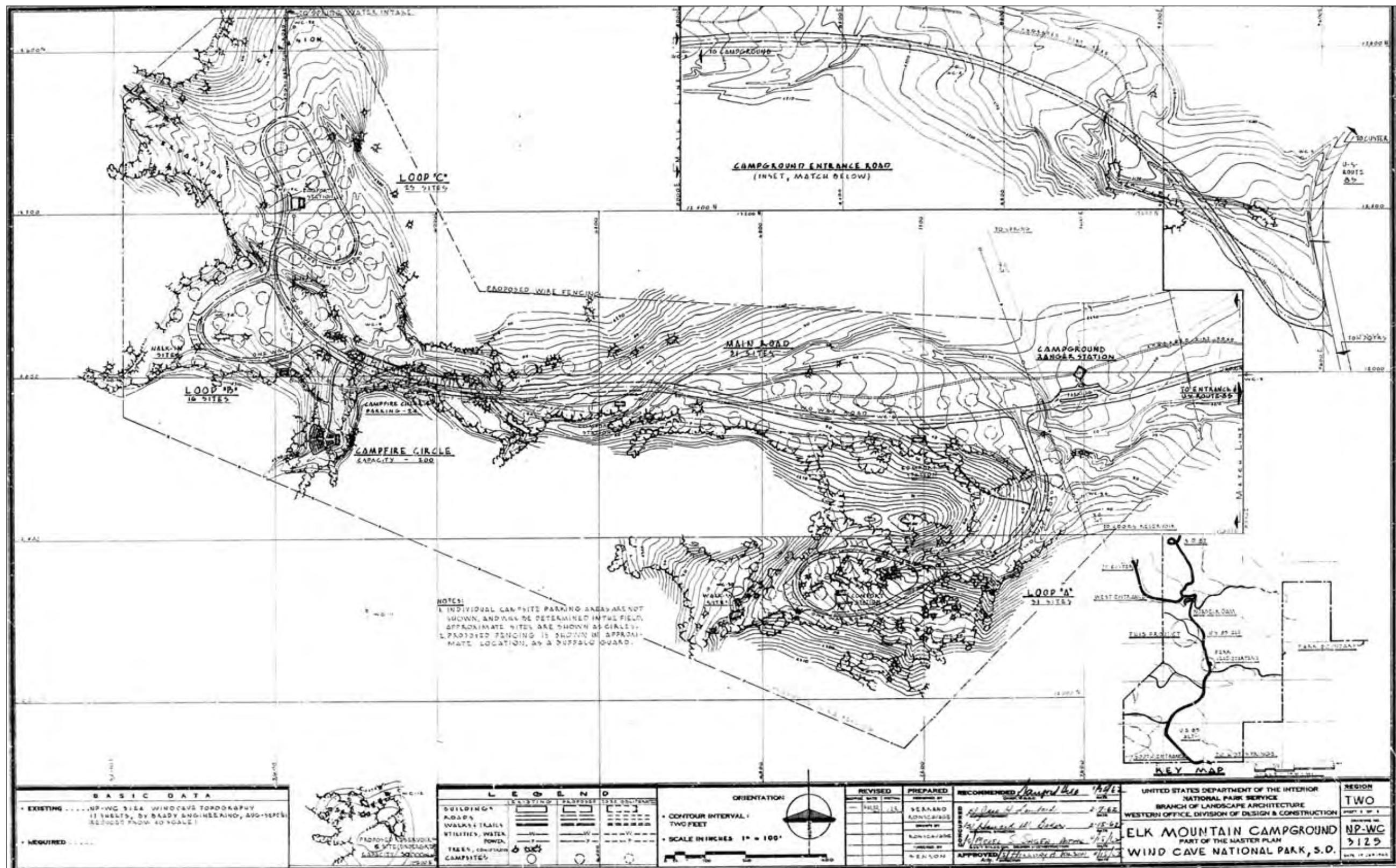
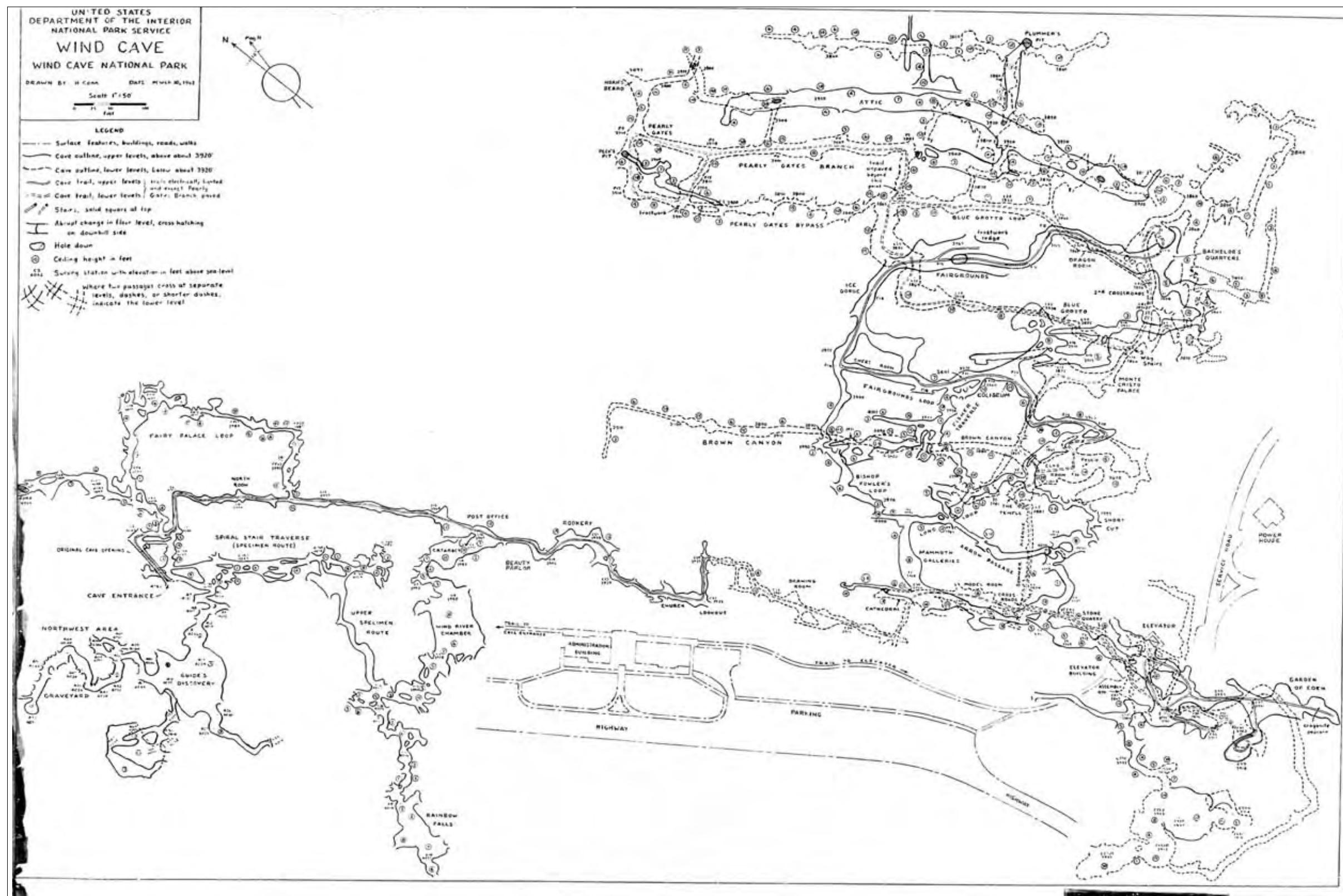


Figure 2-122

"Elk Mountain Campground, Part of the Master Plan," Wind Cave National Park, January 1962.



Source: Wind Cave National Park Archives

Figure 2-123

“Wind Cave, Wind Cave National Park,” Drawn by Herb Conn, March 1962.

Source: Wind Cave National Park Archives

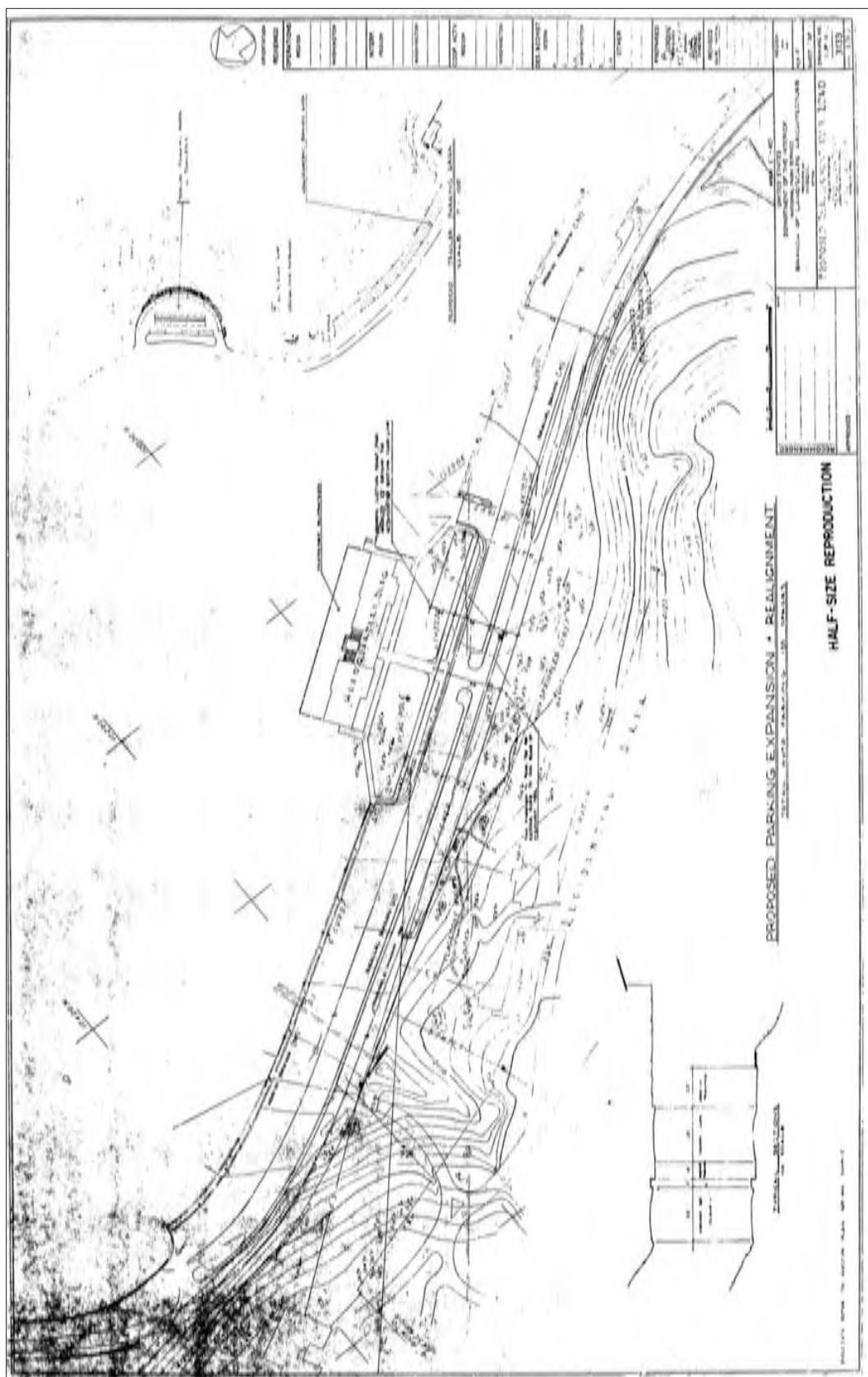
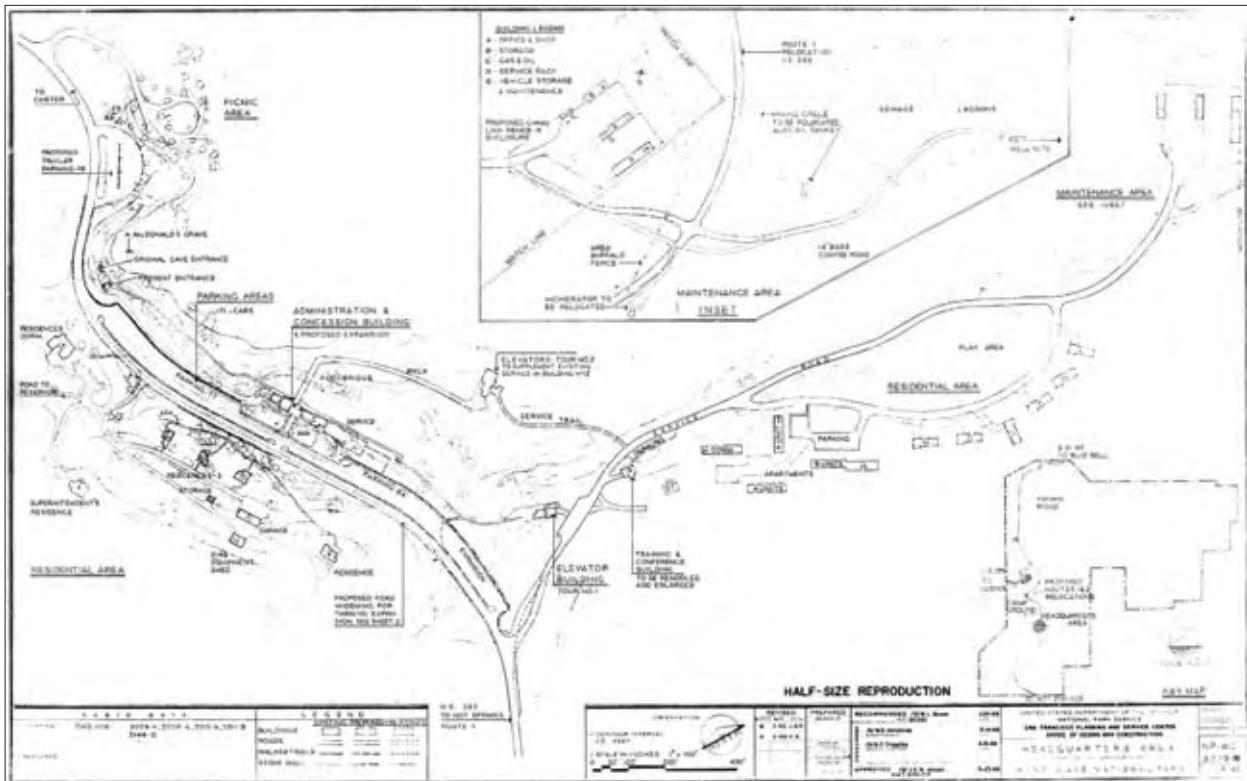


Figure 2-124  
“Proposed Realignment - Main Road, Headquarters,” May 1962.

# WIND CAVE NATIONAL PARK \* CULTURAL LANDSCAPE REPORT



Source: Wind Cave National Park Archives

Figure 2-12.

"Headquarters Area, Part of the Master Plan," Wind Cave National Park, September 1963.

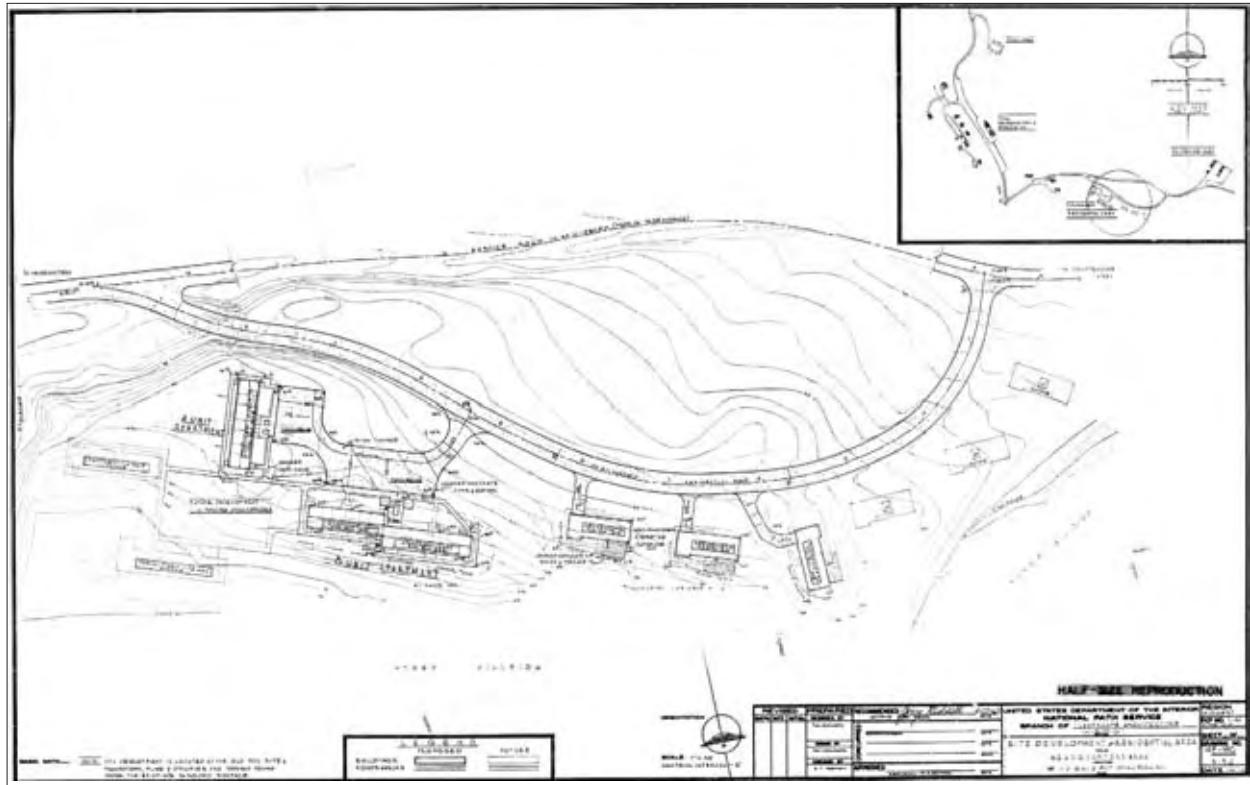
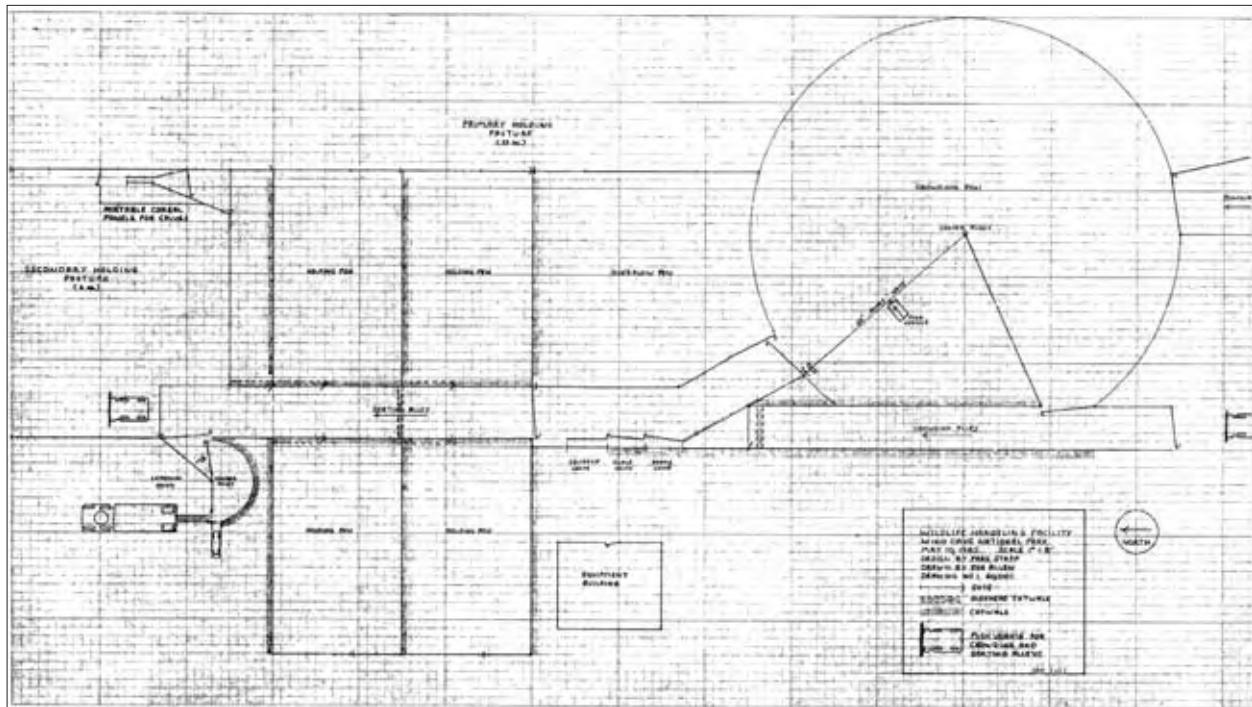


Figure 2-126  
“Site Development Residential Area, Headquarters Area,” May 1963.

Source: Wind Cave National Park Archives



Source: Wind Cave National Park Archives

Figure 2-127  
“Wildlife Handling Facility,” Wind Cave National Park, May 10, 1985.

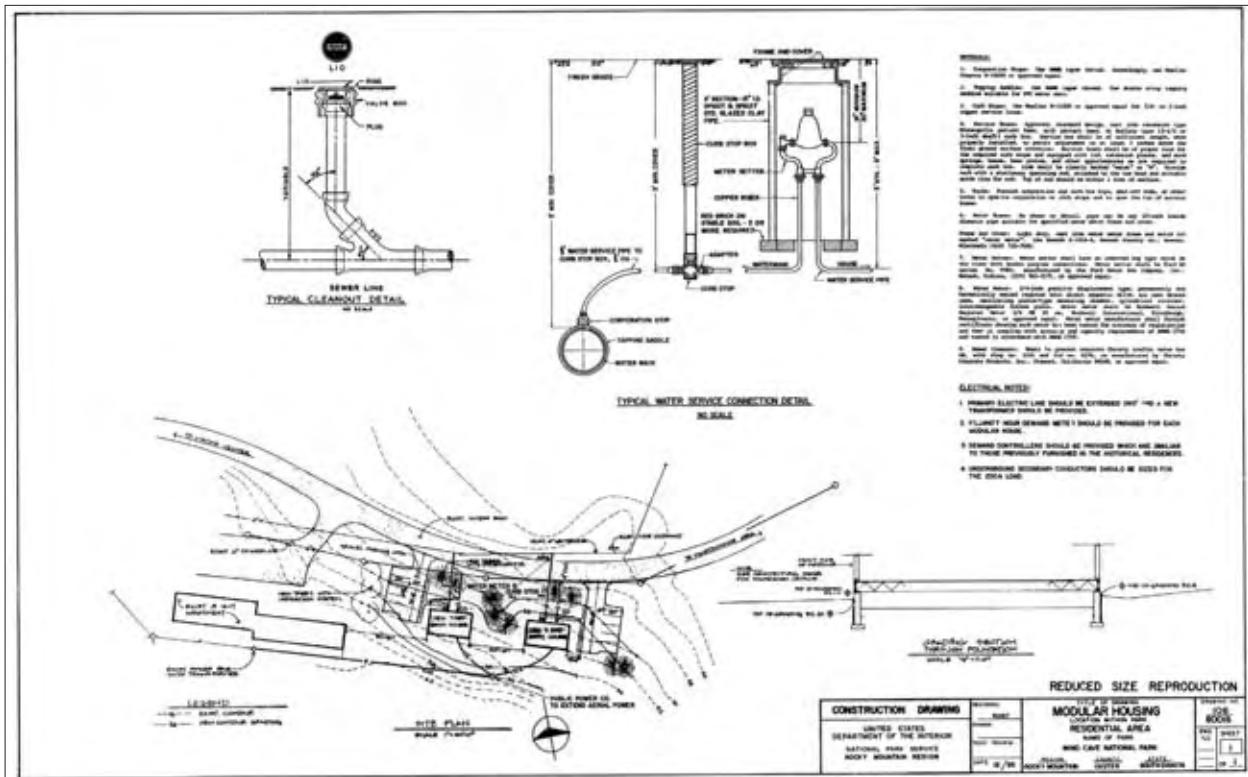
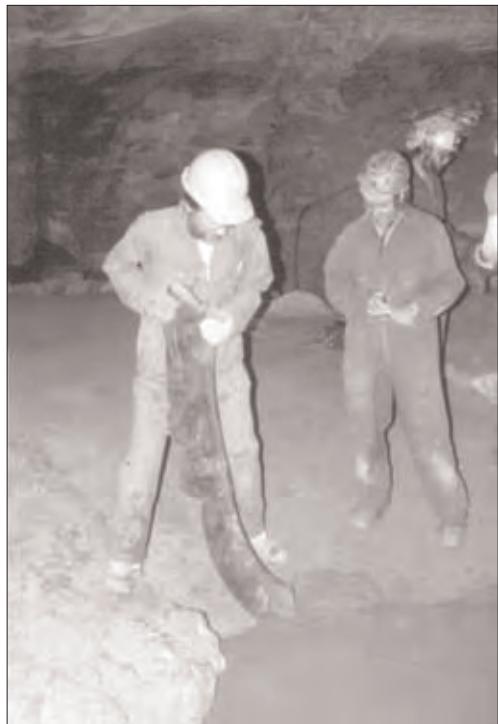


Figure 2-128  
“Modular Housing, Location Within Park, Residential Area,” December 1985.

Source: Wind Cave National Park Archives



Source: Wind Cave National Park Archives

Figure 2-129  
Cave trail construction, 1986.



Source: Wind Cave National Park Archives

Figure 2-130  
Debris removed from cave, circa 1988-1989.



Source: Wind Cave National Park Archives

Figure 2-131  
Installation of revolving door at Walk-in Entrance, 1991.



### Legend

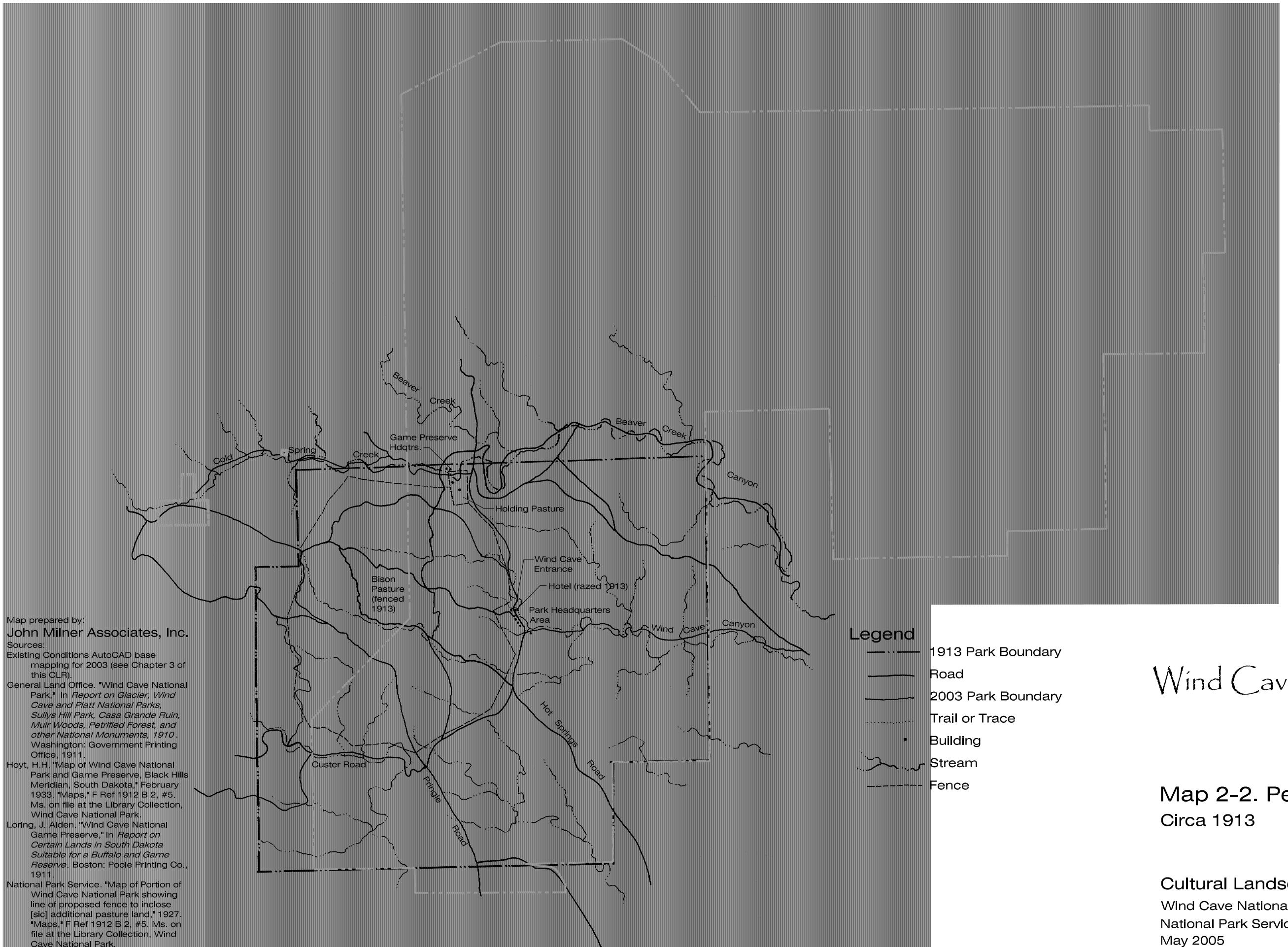
- 2003 Park Boundary
- Wagon road
- Building
- Stream
- - - Fence

## Wind Cave National Park PARK LANDSCAPE

**Map 2-1. Period Plan**  
**Circa 1892**

**Cultural Landscape Report**  
Wind Cave National Park, South Dakota  
National Park Service  
May 2005



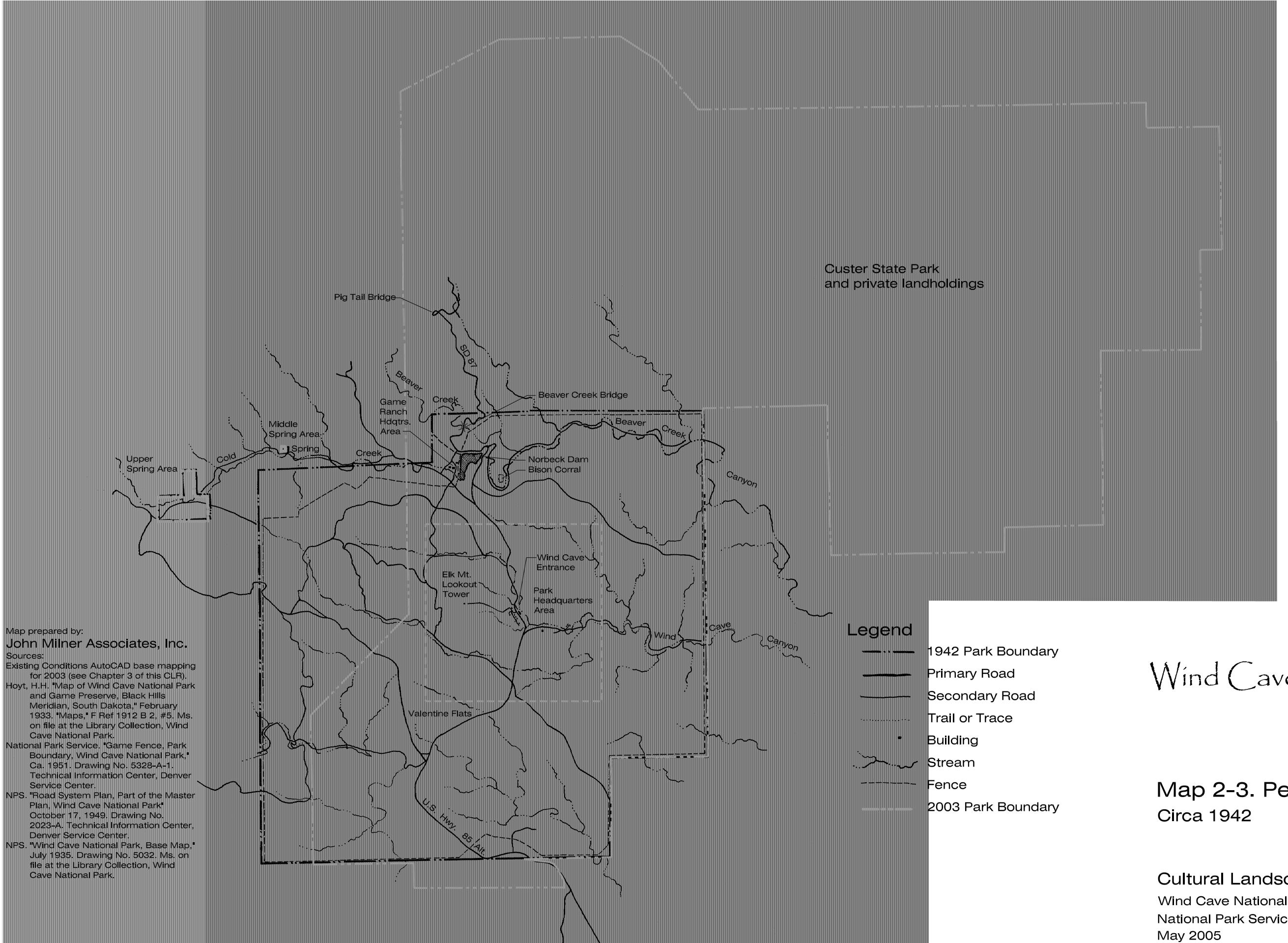


## Wind Cave National Park PARK LANDSCAPE

Map 2-2. Period Plan  
Circa 1913

Cultural Landscape Report  
Wind Cave National Park, South Dakota  
National Park Service  
May 2005



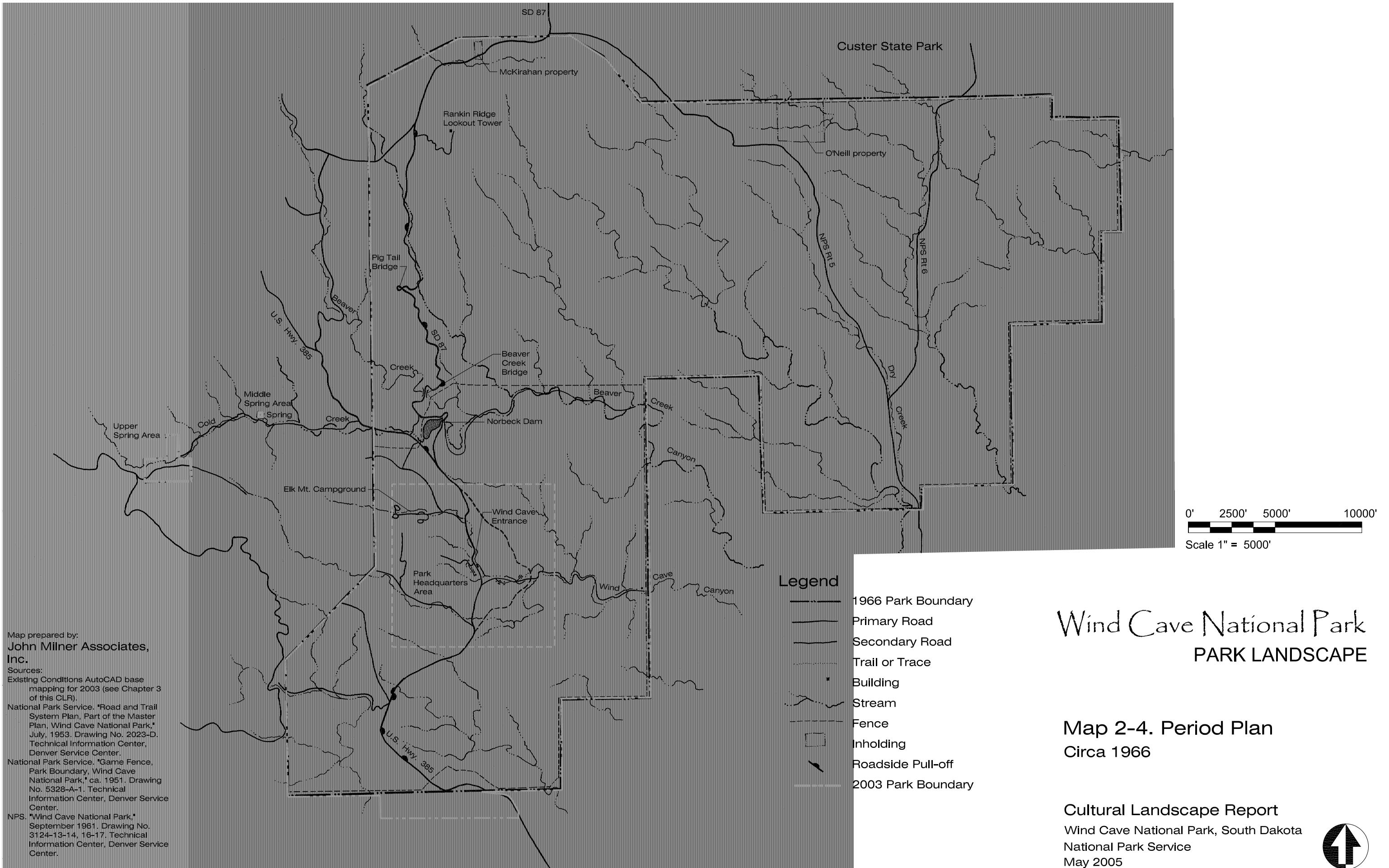


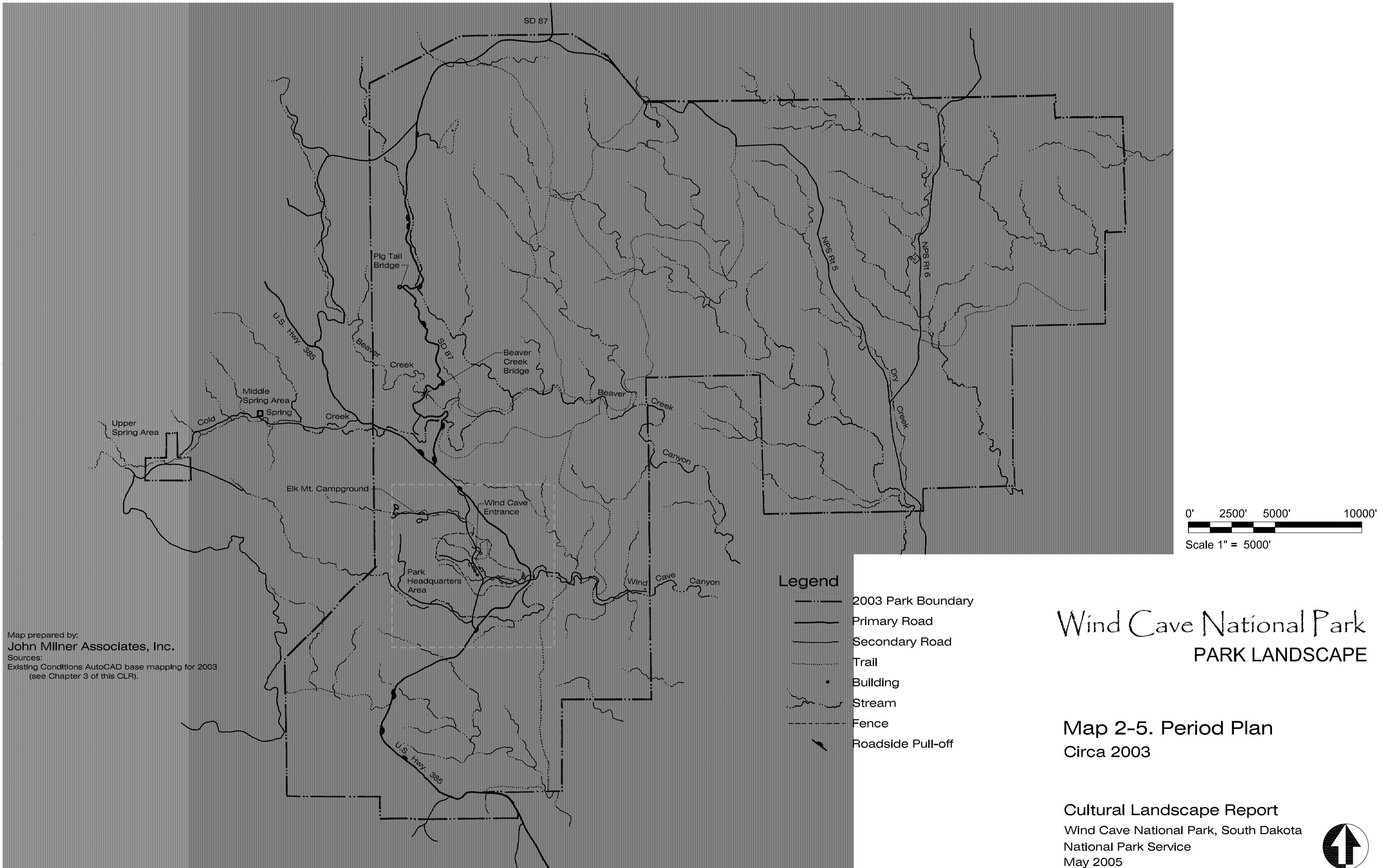
## Wind Cave National Park PARK LANDSCAPE

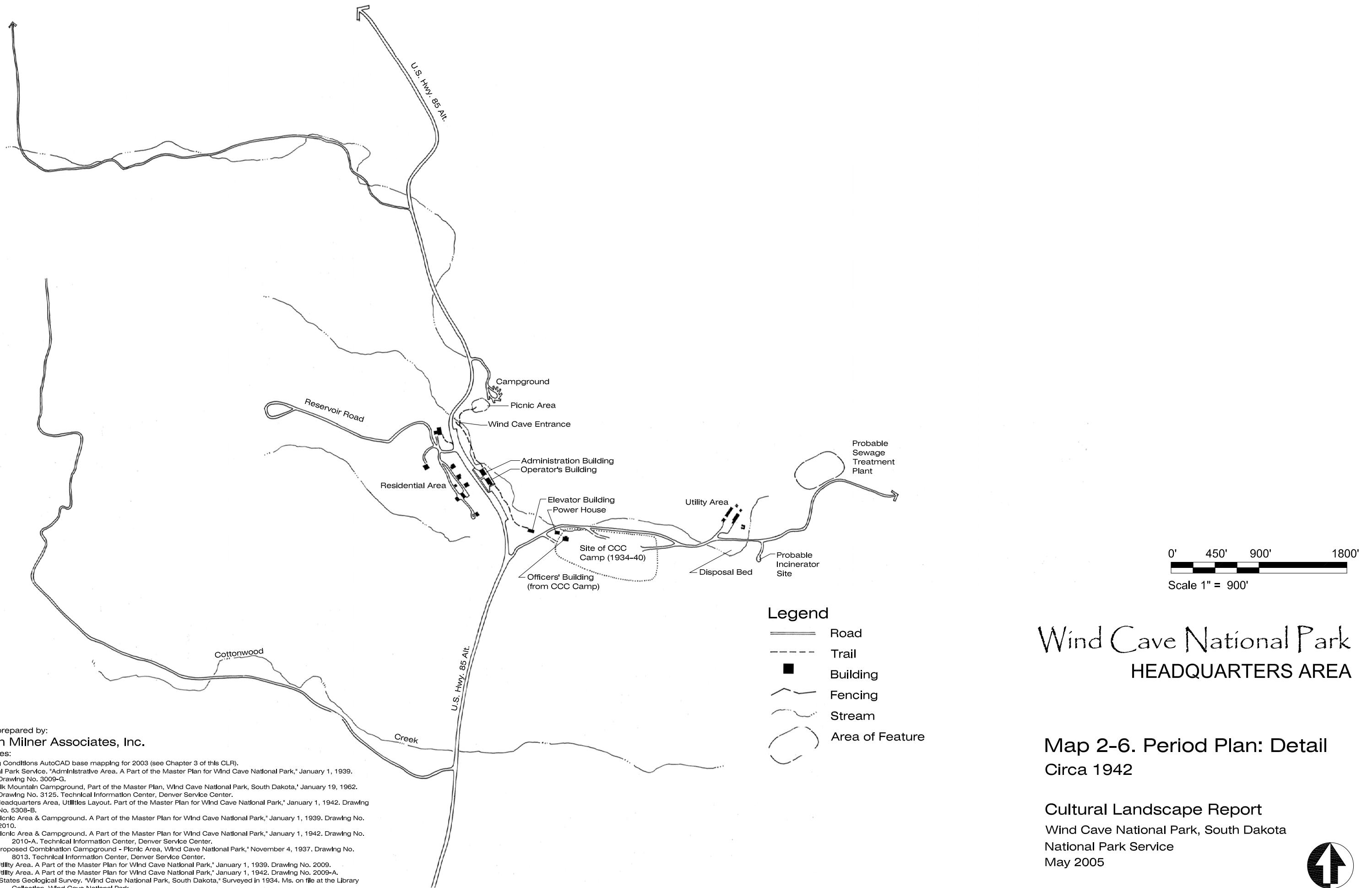
Map 2-3. Period Plan  
Circa 1942

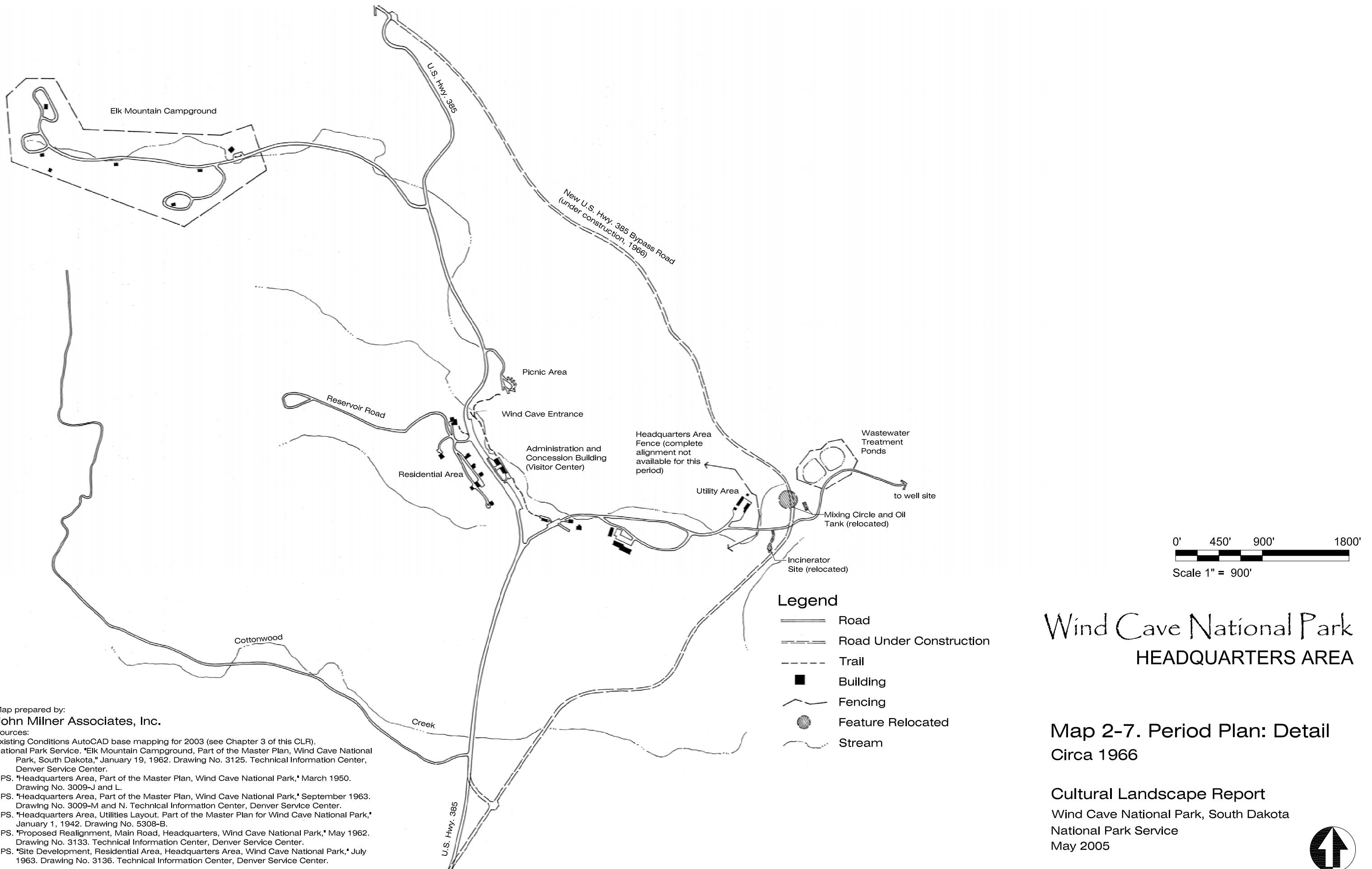
Cultural Landscape Report  
Wind Cave National Park, South Dakota  
National Park Service  
May 2005

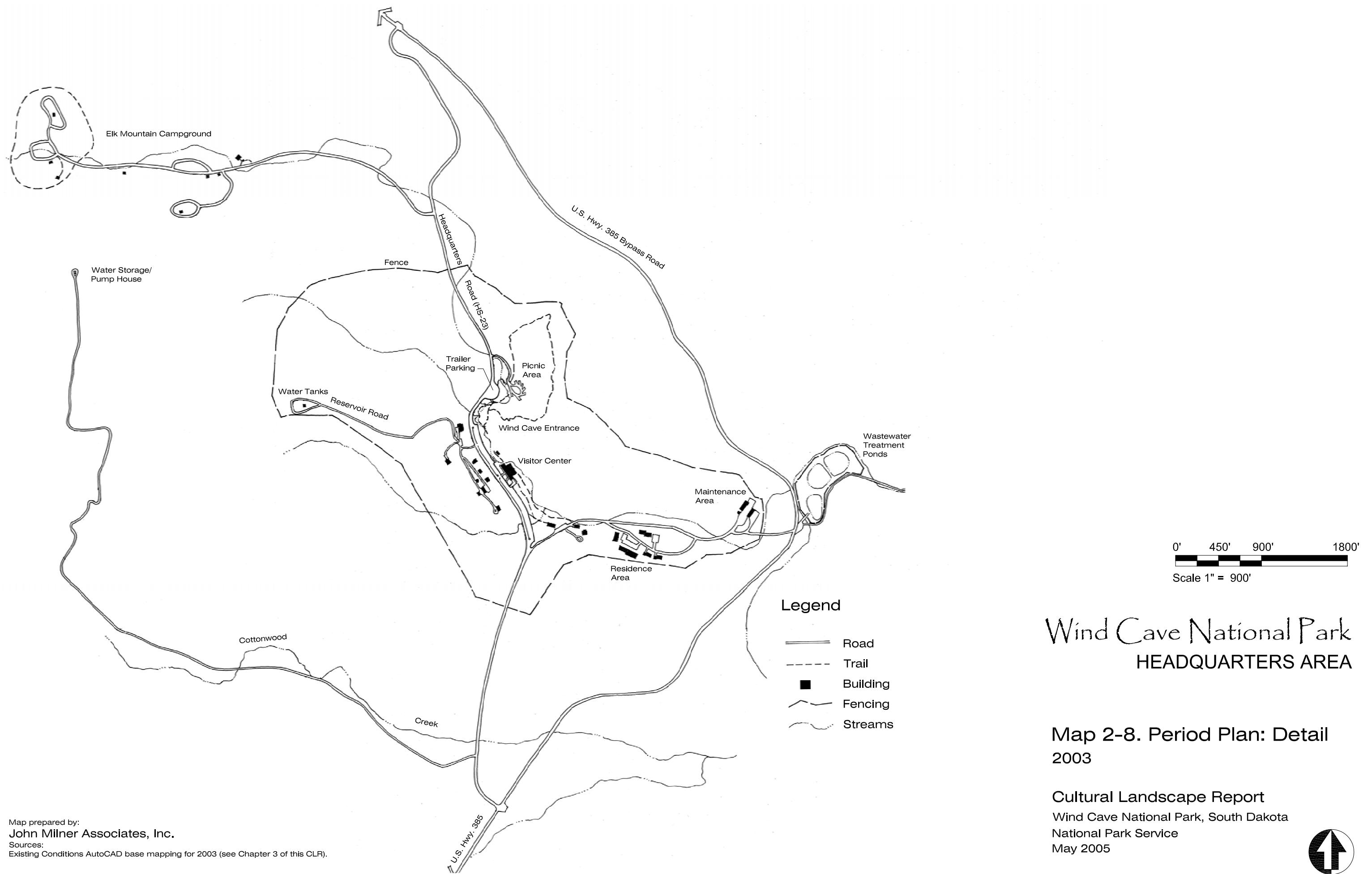














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CHAPTER THREE

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## EXISTING CONDITIONS

## CHAPTER THREE

# EXISTING CONDITIONS

### INTRODUCTION

This chapter provides written, graphic, and photographic documentation of the tangible results of human activity at Wind Cave National Park (NP). Because it is essential to understand the natural landscape in order to understand the cultural landscape, the chapter begins with an overview of the park's environmental context, including climate, geology, and biological responses to the physical environment. This overview is followed by detailed, site-specific information that describes three component landscapes: 1) park landscape; 2) Wind Cave; and 3) developed areas, which include the Headquarters Area and Elk Mountain Campground. Map 3-1 shows what portion of the park is included in the developed areas and the greater park landscape area. Within each of the areas, descriptions of landscape characteristics are organized by the following categories (corresponding inventory abbreviations are noted in parentheses):

Natural Systems and Features (N)

Spatial Organization (SO)

Land Use (L)

Circulation (C)

Topographic Modifications (T)

Vegetation (Ve)

Buildings (B)

Structures (S)

Views and Vistas (V)

Small-scale Features (SS)

Archeological Resources (A)

The abbreviations correspond to the feature numbers used in the existing conditions mapping, in Chapter 4 inventories, and Appendix A: Landscape Feature Inventory. A specific letter prefix has been added to each inventory number to indicate the area in which it falls: Wind Cave (C), the developed areas (H), and the greater park (P). For example, a natural feature in the cave would be assigned an inventory number of C-N-01.

See maps 3-2 through 3-11 at the end of this chapter for the locations of features described. All Figures referenced are photographs, which follow the maps at the end of this chapter. A series of maps, 3-12 through 3-17, follow the photographs and indicate the location and orientation of each photographic viewpoint.

## CONDITION ASSESSMENT

Senior staff members of the park conducted a tour of the facilities including developed areas of the Headquarters Area, the Walk-in Cave Entrance, areas of Wind Cave, and support buildings and structures. Various issues concerning the preservation and interpretation of the cave, grounds and existing buildings were discussed. The project team conducted a two-day physical inspection of all of the buildings in the project area, as well as the cultural landscape of the developed areas. An additional week of fieldwork was undertaken to complete the landscape documentation. Data was recorded via photography, voice recording and hand-written notes.

The issues to be addressed, as listed in the Scope of Work for the Wind Cave NP CLR, include an evaluation of the condition of all structures within the boundaries of the study area. This includes an evaluation of the exterior materials such as roofing, wall construction, foundation, windows and doors, and special features including chimneys. Additional evaluation is of the architectural contribution of the buildings to the park. The general character of the built structures of the park has been determined by two periods of construction, that of the Civilian Conservation Corps (CCC) and that of Mission 66. Comments are included regarding architectural themes within the built environment in terms of character and appropriateness.

As requested by the Scope of Work, only the exterior of the structures were studied for their architectural and structural integrity. The purpose of the study is to bring attention to the deficiencies of the fabric of the structures, provide a basis for recommendations for their proper maintenance and conservation in the future, as discussed in later chapters.

The condition assessment of landscape features focused on constructed and planted elements with a concentration on the developed areas including the Headquarters Area and Elk Mountain Campground; Wind Cave; and the SD 87 corridor within the larger park landscape.

Each landscape element, feature, or system was evaluated in terms of its existing condition and current state of repair, utilizing the terms good, fair, or poor condition:

### Good Condition

- The feature or element is intact, structurally sound, and performing its intended purpose.
- Few or no cosmetic imperfections.
- The feature or element needs no repair and only minor or routine maintenance.

### Fair Condition

- Early signs of wear, failure, or deterioration are evident, although the feature or element is generally structurally sound and performing its intended purpose.
- There is failure of a sub-component of the feature or element.
- Replacement of up to 25 percent of the feature or element is required.
- Replacement of a defective sub-component of the feature or element is required.

### Poor Condition

- The feature or element is no longer performing its intended purpose.
- The feature or element is missing.
- The feature or element shows signs of imminent failure or breakdown.
- Deterioration or damage affects more than 25 percent of the feature or element and cannot be adjusted or repaired.
- The feature or element requires major repair or replacement.

Condition assessments are included within the following existing conditions text sections and in Appendix A: Landscape Feature Inventory.

## **ENVIRONMENTAL CONTEXT AND SETTING**

### CLIMATE

Due to its location on the northern plains, far within the interior of the continental landmass, temperatures at Wind Cave NP show extreme seasonal variability, with recorded winter lows of -30°F and summer highs occasionally reaching in excess of 100°F. Average annual precipitation is 17.81 inches, with winter snow providing less than a quarter of the total. This precipitation is in part enhanced by the air masses cooling and losing capacity to hold moisture as they rise over the Black Hills, and afternoon and evening thunderstorms are frequent during the summer.<sup>1</sup>

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<sup>1</sup> National Park Service, "General Management Plan/Environmental Impact Statement, Wind Cave National Park, South Dakota" (Washington: US Government Printing Office, 1994), 44.

## BEDROCK GEOLOGY<sup>2</sup>

Southwestern South Dakota lies at the junction of two major geological provinces: the Great Plains and the Black Hills Dome (*Figure 3-1 Wind Cave National Park Geology*). During the Laramide Revolution, the geological event that raised the Rocky Mountains, the flat layers of sedimentary rock that lay beneath the northern Great Plains were raised, tilted, and truncated by erosion, leaving a pattern in which the different bedrock strata are exposed in long, parallel zones surrounding the uplift. These layers of sedimentary rock—sandstone, shale, limestone, dolomite, chert, and gypsum—represent a variety of depositional events that have punctuated the last 300 million years. Based upon their dominant characteristics, such as the composition, size, shape, and organization of their constituent particles (lithology), in conjunction with the evolutionary relationships of their associated fossils (biostratigraphy), these rock layers have been grouped into geological units called formations. The oldest formations in Wind Cave NP are in the northwest, with strata tilting down toward the southeast, beneath progressively younger formations. Each of these formations has its own characteristic weathering pattern. Thus topography and soils vary considerably from northwest to southeast across the park.

The basic rock formations present in the park are as follows, from oldest to youngest, roughly from the east side of the park to the west:

Pre-Cambrian Rocks. Mostly schist intruded by pegmatite. This association is highly metamorphosed and devoid of fossils, but due to its relationship with the surrounding rock it is presumed to be Pre-Cambrian in age. These rocks occur in the northwestern corner of the park. Schist is well-exposed along the road south of the Pig Tail Bridge and pegmatites are found along South Dakota Highway 87 (SD 87) north of the Beaver Creek Bridge.

Deadwood Formation. Mostly red and dark brown sandstone. These rocks are found in the northwestern part of the park where they form dark-gray bluffs and reddish-brown cliffs. The Deadwood Formation is only about twenty-five feet thick in the vicinity of Wind Cave and crops out in a narrow sinuous band from where Cold Springs Creek enters the park to where the Centennial Trail crosses the northern boundary. An erosional surface with red soil separates the Deadwood from the overlying Englewood Limestone.

Englewood Limestone. Consists of a pink, sandy, fossiliferous limestone. The Englewood is found adjacent to the Deadwood sandstone in the northwest quarter of the park, and is well-exposed at the base of the cliffs bordering Beaver Creek upstream from its confluence with Cold Spring Creek. Like the Deadwood Formation, this is a relatively thin unit, only thirty feet thick, but it was deposited much later, during Devonian to Mississippian time (400 to 360 mya). The Englewood grades upward into the overlying Pahasapa Formation and the contact between the two is defined as the zone where the limestone changes from pink to gray.

Pahasapa Limestone. (Sometimes known as the Madison Limestone). Consists of limestone and dolomite with minor concentrations of gypsum, chert, and Mississippian-age (360 to 320 mya)

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<sup>2</sup> This section summarized from John Paul Gries, *Roadside Geology of South Dakota*, 2nd ed. (Missoula, MT: Mountain Press Publishing Company, 1998).

fossils including brachiopods, gastropods, crinoids, and corals. The Pahasapa Formation is considerably thicker than the Deadwood and Englewood formations, and directly underlies much of the northwest quarter of the park where it is exposed in steep canyon walls, its outcrop belt extending from Fossil Ridge in the southwest corner of the park to the headwaters of Highland Creek along the north-central boundary. The Pahasapa dips into the subsurface toward the east, where it is the host rock for Wind Cave. A well log (a lithologic record of the strata penetrated) from the park water supply two miles east of the Wind Cave entrance has penetrated 258 feet of the Pahasapa Formation.

Minnelusa Formation. Consists of red and yellow, fine-grained sandstone with many interbedded layers of shale, limestone, dolomite, and gypsum. The Minnelusa is the thickest and most extensive formation in the park, cropping out in a two-mile-wide swath from the extreme southwestern corner of the park through the developed areas to the northern boundary. The fossils are Pennsylvanian to Permian in age (320-290 mya). The Minnelusa is well-exposed along the Wind Cave Canyon trail, where the park's water well penetrated 472 feet of this formation.

Opeche Formation. Includes redbeds of sandstone, mudstone, siltstone, and shale containing scattered beds of white gypsum and irregular lenses of caliche. In the park, this formation is between forty and a hundred feet thick and occurs as a sinuous belt from Gobbler Canyon at the park's southern boundary through Wind Cave Canyon, Negro Canyon, and the canyon of Highland Creek, to the northern boundary at the head of Dry Creek. The formation is believed to be Permian, dating between 248 to 290 million years in age.

Minnekahta Formation. Consists of thinly-bedded, slabby, pink to purplish, remarkably pure limestone. This formation occurs in the central part of the park and is between forty and a hundred and twenty feet thick. Caves rarely form in the Minnekahta limestone because it is so thinly bedded that the ceilings collapse.<sup>3</sup> Contains scattered Middle-Permian-age fossils.

Spearfish Formation. Includes redbeds of shale and siltstone with white gypsum. This formation is up to three hundred and fifty feet thick in the vicinity of the park and underlies most of Red Valley. These rocks are non-fossiliferous, but because of their position in the sequence they are believed to be Late Permian to Early Triassic in age.

Sundance Formation. Comprised of green shale and yellow marine sandstone, this formation only occurs along the lower slopes of the inner flanks of hogback ridges on the east side of the park. The Sundance is probably the most fossiliferous formation in South Dakota, containing Jurassic-age clams, oysters, cephalopods and belemnites.

Unkpapa Formation. Consists of variegated, creamy white sandstone with yellow and purple laminations, the laminations often offset by small syn-deposition faults. No fossils are known from this formation, but it is believed to be of Jurassic age. The Unkpapa occurs closely associated with the Sundance Formation, and is perhaps made up of recycled Sundance sediments. The rock is sometimes used as an interior decorative stone. The formation occurs in the eastern part of the park in association with Boland Ridge.

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<sup>3</sup> Minnekahta Formation, <http://www.nps.gov/wica/Geology%20Driving%20Tour.htm> (accessed July 16, 2003).

Lakota/Fusion Member. Includes variegated clay and sandstone of Cretaceous age associated with hogback ridges in the eastern part of the park.

Fall River/Dakota Formation. Comprised of tan to pink, fine-grained, massively-bedded, Cretaceous sandstone occurring in the farthest eastern part of the park in association with Boland Ridge.

White River Group. Includes pale clays, sand and channel gravel with abundant beds of volcanic ash and concretions.<sup>4</sup> In places the White River Group contains world-class fossil beds of Oligocene-age mammals. This formation occurs at the head of the drainages of Red Valley as small, eroded remnants of what was formerly more extensive deposits laid down across various other formations and now eroded.

Quaternary terrace gravels. These occur at Bison Flat, the flats above Prairie Dog Canyon, along the east flank of Rankin Ridge, along the northern park boundary, and in Red Valley.

Quaternary alluvium. This occurs in Cottonwood Creek, Beaver Creek, Highland Creek, and Blacktail Creek.

These rocks and sediments, their current distribution, and their fossil content reflect the geological history of this area.

## GEOLOGICAL HISTORY<sup>5</sup>

The history of the Black Hills region begins in the Pre-Cambrian Period, which encompasses the earliest and least understood chapters in the Earth's history. During this time, the ancient core of North America was slowly assembled through a long series of mountain building events. Mountains rose up, added material to the continent's margin, and then were repeatedly worn away. In the Black Hills, the intense compression and igneous activity associated with mountain building produced schist with pegmatite intrusions. As more material accumulated along the margin of the fledgling continent, the zone of mountain building migrated outward and the core of the continent wore down flat over eons.

During the Cambrian Period, approximately 520 to 500 million years ago (mya), the seas rose up over the old, eroded core of the continent. This inundation, known as the Sauk transgression, covered the barren surface of Pre-Cambrian schist and pegmatite with a layer of beach sand and coastal sandbar deposits—sediments which eventually became the Deadwood Formation. Later, during the beginning of the Ordovician Period, about 490 mya, the Sauk Sea retreated. Throughout the ensuing Silurian period, this area was again subject to erosion and was eventually reduced to a flat plain.

During the Mississippian Period, about 345 mya, in an event known as the Kaskaskia transgression, the seas once again crept up onto the beveled interior of the continent. At this time

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<sup>4</sup> Concretions are nodules of rock resulting from localized concentrations of cement (e.g. calcium carbonate or iron oxide) within sediment, often encasing a fossil.

<sup>5</sup> This section summarized from Gries, *Roadside Geology*.

North America lay along the tropics and the warm, shallow Kaskaskia Sea was a virtual limestone factory, both through direct precipitation from calcium-saturated seawater and through the activity of calcite-secreting organisms such as crinoids, brachiopods, and bryozoans. Much of the cave-forming limestone in North America was deposited at this time. In the region that would become the Black Hills, the Englewood and Pahasapa limestone formations were laid down, burying the Deadwood sandstone. At the close of the Mississippian, the ocean again retreated, exposing the limestone that had solidified beneath the seafloor. Groundwater moving through fractures in the limestone dissolved the calcite and formed a karst landscape of sinkholes and collapsed caves. This was the beginning of Wind Cave, and many other caves across North America.

During the Early Pennsylvanian Period, 320 mya, the seas once again advanced (the Absaroka transgression) and the karst surface was inundated and the sinkholes filled with oceanic sediments. A brief retreat of the sea left behind a red soil zone, which was later buried by sand and gypsum which precipitated from super-saline water under extremely hot, arid conditions. This series of deposits became the Minnelusa Formation.

At the same time, the plate that carried North America pressed into that which included Africa causing uplift of the eastern side of the continent, and forcing the seas off to the south and west. By the beginning of the Permian Period, about 290 mya, and continuing into the Triassic Period, about 250 mya, the Black Hills region was part of a vast, fluctuating desert and coastal plain. The heavily-oxidized desert deposits, with their characteristic red color, in association with evaporate minerals such as gypsum, became the Opeche, Minnekahta, and Spearfish Formation. The extremely hot and arid conditions were global during the deposition of these rocks, and redbeds and evaporates are found worldwide.

During the remainder of the Mesozoic Era, the sea crept back up in fits and starts, eventually reaching its all-time highstand during the end of the Cretaceous Period, about 65 million years ago. Sediments laid down in the seaway became the Sundance, Unkpapa, Lakota, and Dakota formations. The Dakota Sandstone represents the migrating beach front as the Great Cretaceous Seaway retreated from the interior of North America.

Approximately 60 million years ago, during the Laramide Orogeny, the Black Hills began to elevate. The sedimentary cover was stripped off the core of Pre-Cambrian basement rocks, and the eroded edges of sedimentary formations were exposed along the edge of the uplift. The apron of sand, silt, and clay that spread across the plains eastward became the White River Group, where countless animals were trapped in flooded channels.

## CAVE HISTORY<sup>6</sup>

Wind Cave, one of the oldest known cave systems in North America, formed through an unusually long and complex series of events. After lithification, uplift, and exposure of the Pahasapa limestone, caves began to form near the surface as the limestone and dolomite was dissolved by acidified groundwater operating on fractures in the bedrock such as faults or joint

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<sup>6</sup>This section summarized from Arthur Palmer, *Wind Cave: An Ancient World Beneath the Hills* (Hot Springs, SD: Black Hills Parks and Forests Association, 2001).

planes. Fluctuations in the water table controlled the vertical aspect of cave formation, with dissolution of limestone occurring in the saturated (phreatic) zone, and groundwater circulation controlling the horizontal extent of development.

In the middle units of the Pahasapa limestone, anhydrite was hydrated into gypsum, the resulting expansion of the mineral veins fractured the surrounding rocks, particularly the dolomite beds. Gypsum in the deepest layers produced hydrogen sulfide, which migrated upward where it was oxidized to sulfuric acid, a powerful reagent which dissolved the limestone and formed the earliest cave openings. Then, as fresh water from the surface entered the cave, gypsum dissolved away, in some places being replaced by calcite, which formed the boxwork fins. During this time (late Mississippian, early Pennsylvanian) the existing cave passages and rooms were enlarged. The lack of significant surface openings indicates much of the cave was formed by rising hydrothermal water. This conclusion is further supported by the fact that, except in a few places, the cave does not reach to the top of the Pahasapa Formation, nor does it extend far below the water table.<sup>7</sup>

Eventually the land subsided and the Pahasapa limestone was buried. Then, after 230 million years of burial under almost a mile of sediment, the core of the Black Hills began to uplift. The sedimentary cover was stripped off, exposing the Pahasapa limestone along the margins. After exposure, large amounts of groundwater entered the pre-existing cave systems, greatly enlarging the passages. Wall crusts of calcite were formed at this time.

More recently, the cave became overfilled as the water table dropped, allowing speleothems such as dripstone, frostwork, and popcorn to form. The crumbly dolomite between the veins of calcite decomposed, leaving behind boxwork.<sup>8</sup>

## GEOMORPHOLOGY<sup>9</sup>

The topography and landforms of Wind Cave NP are largely controlled by bedrock geology. There is a regional slope from the northwest down to the southeast, which progresses from older, rugged, uplifted formations down across progressively younger, more easily eroded rocks. In general, drainage systems flow toward the southeast, at right angles to the boundaries between geological formations. Within this context the park may be broken down into the following six geomorphic zones:

Geomorphic Zone One is the forested uplands to the northwest, where most of the land lies between 4,300 to 4,800 feet above mean sea level. This zone is made up of dissected ridges and intervening valleys and includes the highest elevation in the park, 5,013 feet, atop Rankin Ridge. The southern part is dissected by Reaves Gulch, Curley Canyon, and Limestone Canyon. This zone is directly underlain by the Pre-Cambrian schist and pegmatite and the Deadwood Sandstone, and roughly corresponds to the Central Crystalline Area of Darton and Paige.<sup>10</sup>

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<sup>7</sup> [http://www.nps.gov/wica/Origin\\_of\\_Wind\\_Cave.htm](http://www.nps.gov/wica/Origin_of_Wind_Cave.htm) (accessed July 14, 2003).

<sup>8</sup> [http://www.nps.gov/wica/Origin\\_of\\_Wind\\_Cave.htm](http://www.nps.gov/wica/Origin_of_Wind_Cave.htm) (accessed July 14, 2003).

<sup>9</sup> This section summarized from Gries, *Roadside Geology*.

<sup>10</sup> N.H. Darton and S. Paige, *Description of the Central Black Hills, South Dakota, Geological Atlas Folio No. 219*, (Washington: United States Geological Survey, 1925).

Geomorphic Zone Two extends through the middle of the park from the southwest corner to the north-central boundary. Here elevations range from 4,000 feet to 4,300 feet above mean sea level (MSL). This area is underlain by the Englewood Limestone, the Pahasapa Limestone, and the Minnelusa Formation and roughly corresponds to the Limestone Plateau of Darton and Paige. Much of this zone is covered with Quaternary terrace gravels. This zone can be broken down into two sub-areas separated by Beaver Creek Canyon; a southern part which includes the upper reaches of Gobbler Canyon, Bison Flats, and the land directly overlying Wind Cave, and a northern part which contains a dissected surface of upland prairies and woodlands.

Geomorphic Zone Three is a discontinuous zone of deep, well-vegetated canyons occurring where the overlying Minnelusa Formation has been eroded down into the underlying shales and siltstone of the Opeche Formation. These canyons are, from south to north, Gobbler Canyon, an unnamed canyon, Wind Cave Canyon, Negro Canyon, Beaver Creek Canyon (the deepest), another unnamed canyon, the canyon of Highland Creek, and then three small, unnamed canyons. The contact between the Minnelusa and Opeche formations occurs at around 3,900 feet in the southern part of the park, and about 4,100 feet in the northern part. The formation of these canyons is perhaps tied to the collapse of former caves in the underlying Pahasapa limestone.

Geomorphic Zone Four is the Red Valley, an area of open, rolling grassland underlain by the Minnekahta and Spearfish formations and remnant patches of the White River Group. Elevations range from around 4,100 feet down to 3,560 feet in Fuson Canyon, the lowest elevation in the park. The Red Valley gets its characteristic color from soils derived from the iron-stained rocks of the Spearfish Formation, while local concentrations of gypsum create grey, barren patches in the prairie grassland. This region corresponds to the Red Valley and Darton and Paige.

Geomorphic Zone Five is the Boland Ridge area, underlain by the Sundance, Unkpapa, Lakota, and Fall River/Dakota formations. This is an area of thin sandstone ridges with elevations ranging from 3,900 to 4,200 feet above MSL. Due to the tilting of the beds, eastern slopes are gradual, while western slopes are abrupt, and this region roughly corresponds to the Hogback Ridge Area of Darton and Paige.

Geomorphic Zone Six is the underground cave system. The known extent of the cave system, which underlies an approximate 1.1 by 1.2 mile rectangle of the park, has over 100 miles of passages loosely organized in three levels. These levels slope down to the southeast, along with the regional geology. The cave's natural entrance is at an elevation of 4,082 feet above MSL. The lake on the lowest level is 3,592 feet above MSL, which is the local elevation of the water table.

## HYDROLOGY<sup>11</sup>

There is almost no surface water in the park, with the exception of Beaver, Highland, and Cold Spring Creeks. Historical records indicate that a higher concentration of surface water existed in the earlier decades of this century, as does empirical evidence such as the 200-foot gorge where Beaver Creek cuts through Buffalo Gap. Surface drainage into Beaver Creek today, however,

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<sup>11</sup> This section is summarized from Gries, *Roadside Geology* and the Wind Cave GMP/EIS.

consists only of intermittent streams. The park staff has located small wetlands in the drainages of Cold Spring, Beaver Creek, and Highland Creek. There are over ninety small seeps and springs in the park, some of which have been developed to provide a more dependable source of water for wildlife. Several springs occur along the western margin of the park and seem to be related to the confining units within the Minnelusa formations.

Like the strata and surface elevations, the water table slopes to the southeast. The principle aquifer is in the Pahasapa Limestone, which is a significant source of groundwater throughout the region. The saturated zone in the Pahasapa is recharged via stream loss, and the low permeability of the overlying shales in the Minnelusa Formation creates artesian conditions down the hydrologic slope. In the park, the top of the saturated zone is a subdued reflection of the topography, approximately 600 feet below the land surface in the vicinity of the cave. Wind Cave is the only cave in the Black Hills in which explorers have been able to descend to the water table. There, instruments record seasonal variations in the water level.

The cavernous nature of the bedrock impacts the amount of surface flow. For example, Beaver Creek loses an appreciable amount of water to underground passages within the Pahasapa Limestone just north of Wind Cave. According to park staff, some of the water has been found in the park's well. It is typical for streams in the Black Hills to lose flow as they course across the Pahasapa Limestone. Most of the drainages in the park flow from the northwest to the southeast, and their deepest canyons occur where the stream beds cut across the Madison Formation. These canyons are steep-walled and flat floored, and frequently include dry creek beds.

Only three of the streams in the park are perennial—Beaver Creek, Highland Creek, and Cold Springs Creek—but depending on the time of year and the amount of precipitation, Reaves Gulch, Red Valley, Fuson Canyon, and Wind Cave Canyon may also have flowing water. All of these streams lose flow to the subsurface limestone—much of the flow of Beaver Creek is lost underground to Beaver Creek Cave—and several million gallons of water enter the aquifer daily.<sup>12</sup>

## SOILS<sup>13</sup>

The park soils occur in an orderly pattern that is directly related to bedrock geology and resulting landforms. No soils have been identified as being prime or unique agricultural soils by the Soil Conservation Service (SCS).<sup>14</sup> In the Red Valley portion of the park, some soil erosion is evident.

Soil associations can be either residual or transported, and are strongly influenced by underlying bedrock, slope, and moisture conditions. In general, 1) soil formed over sandstone has good texture, but little in the way of mineral nutrients; 2) soil formed over shale is clayey, compacts easily, and may withhold moisture from plant roots; and 3) soil formed over limestone is acid

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<sup>12</sup> National Park Service, Draft “Cave and Karst Resource Management Plan; Wind Cave National Park” (Custer County, SD: Wind Cave National Park, August 2002), 10.

<sup>13</sup> This section summarized from Charles Hunt, *Geology of Soils, Their Evolution, Classification, and Uses* (San Francisco: W.H. Freeman and Company, 1972) and the Wind Cave NP GMP/EIS.

<sup>14</sup> NPS, *GMP/EIS*, 45.

neutral and maintains fertility. Loams are generally weathered from sandstones thinly interbedded with shales. Residual soils on slopes are thin; transported soils on valley bottoms are deeper. Mountainous areas have thin lithosols and exposed rock outcrop, while soils on the rolling hills are deep cobbly loam or stony clay. Within the context of the park's semi-arid climate, there are various microclimates influencing soil formation. For example, north-facing slopes are moister, more vegetated, and accumulate more organic material than equivalent south-facing slopes.

On a broad scale, four of the eight soil associations identified by the U.S. Department of Agriculture (USDA) in the southern Black Hills occur within the park. They all show a close relationship to the geomorphic zones and underlying bedrock

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 micaceous schist and granite; found on mountains.<sup>15</sup> This association occurs over the Pre-Cambrian schist/pegmatite and the Deadwood Sandstone in Geomorphic Zone One.

The Vanocker-Sawdust-Paunsaugunt Association, which occurs over the Englewood, Pahasapa, and Minnelusa formations in Geomorphic Zone Two, consists of deep and shallow, well-drained, gently sloping to very steep, loamy soils formed in material weathered from limestone and calcareous sandstone, on mountains.<sup>16</sup>

The Nevee-Gypnevee-Rekop Association, which occurs over the Opeche and Spearfish Formations in Geomorphic Zone Four, consists of 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.<sup>17</sup>

The Canyon-Rockoa-Rock Outcrop Association, which overlies the Sundance, Unkpapa, Lakota, Fall River/Dakota formations in Geomorphic Zone Five and consists of shallow and deep, well-drained, gently sloping to very steep, loamy soils formed in material weathered from interbedded limestone, sandstone, and shale.<sup>18</sup>

Biological systems are intimately tied to soil associations, which, according to the USDA, "provide some indication of the actual and potential distribution and density of wildlife and their habitat."<sup>19</sup>

## CULTURAL CONTEXT AND SETTING

Wind Cave NP is located in southwestern corner of South Dakota, ten miles north of Hot Springs. The countryside surrounding the park is very rural in character. Rapid City, South

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<sup>15</sup> U.S. Department of Agriculture (USDA), *Soil Survey of Custer and Pennington Counties* (Black Hills Parts, SD: Soil Conservation Service, Washington, 1985), 12.

<sup>16</sup> USDA, *Soil Survey*, 9.

<sup>17</sup> USDA, *Soil Survey*, 8.

<sup>18</sup> USDA, *Soil Survey*, 7.

<sup>19</sup> USDA, *Soil Survey*, 100.

Dakota, located northeast of the park with a population of approximately 90,000, is the nearest metropolitan area. Air travel to the region is supported by Rapid City Regional Airport with multiple daily flights. U.S. 16 departs Rapid City heading south to Custer. U.S. 385 provides access to Wind Cave NP and then continues south to Hot Springs, South Dakota. Other minor county roads provide alternative routes to the park.

The region's numerous attractions draw many visitors to the area. Custer State Park, Black Hills National Forest, Mount Rushmore National Memorial, and Jewel Cave National Monument are immediately adjacent, while Devils Tower National Monument, Badlands National Park, South Dakota State Parks, Wall Drug, and Buffalo Gap National Grasslands are located within two hundred miles of the park. These parks and sites, as well as neighboring towns and cities, provide tourist amenities including lodging options, restaurants, and tourist attractions.

Wind Cave NP averages close to 700,000 visitors a year.<sup>20</sup> Visitors travel to the park for a variety of reasons. Most are attracted to the scenic beauty of mixed grass prairie, ponderosa pine forest, and associated wildlife that include bison, elk, coyotes, and prairie dogs.<sup>21</sup> The natural history of the area also attracts many visitors. As one of the world's longest and most complex caves, the cave is well known for its unusual cave formations and features. At the core of the park, the developed areas contain the Headquarters Area—including the Administration Building (Visitor Center), the Historic Housing Area, Cave entrances, the picnic area, and the Elk Mountain Campground. The majority of visitors who enter the park come to this area.

## **ETHNOGRAPHIC AND ARCHEOLOGICAL RESOURCES**

### **ARCHEOLOGICAL RESOURCES<sup>22</sup>**

Seventy-six archeological sites have been recorded in the park (see Table 3-1 below). Of these recorded sites, nine are historic and sixty-seven are prehistoric. The historic sites are primarily associated with early homesteading activities. The density of prehistoric sites suggests that this area was used extensively by prehistoric peoples. Fifty-two archeological sites have been documented at Wind Cave NP within the undeveloped areas outside the Headquarters Area. They include both prehistoric and historic sites, with features such as rock art, rock shelters, tipi rings, rock cairns, kill sites, quarries, lithic scatters, lithic reduction (manufacture) sites, historic homestead sites, and dump sites or middens.

The Beaver Creek Rock Shelter site has been listed in the National Register of Historic Places. Three additional sites have been determined to be eligible for listing in the National Register but have not yet been nominated. These include site 39CU821, a Middle Archaic site; site 39CU868, a prehistoric settlement site with a lithic component; and site 39CU872, a prehistoric lithic material source or quarry site.

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<sup>20</sup> From <http://www.nps.gov/wica/pphtml/facts.html> (accessed September 28, 2003).

<sup>21</sup> From <http://www.nps.gov/wica/index.htm> (accessed September 28, 2003).

<sup>22</sup> The source for the information summarized in this section is: Jennifer Galindo, "Wind Cave Archeological Inventory Project: Final Report," (U.S. Dept. of the Interior, National Park Service, Midwest Archeological Center, Lincoln, Nebraska, 2004).

Four additional sites were evaluated in 1988 and determined to be ineligible for the National Register. These include sites 39CU869, 39CU870, 39CU871, and 39CU873.

Four archeological sites in the park have been reported, but are not yet documented. These include a tipi ring site in the Sanctuary area, southwest of the Headquarters Area; a chipped-stone ledge beneath Beaver Creek Bridge; north of Cottonwood Creek, a historic dump site that appears to include prehistoric lithic material; and an unrecorded rock shelter in Curley Canyon. Additionally, two sites were recorded in 1993 but the forms lost before a site number could be assigned. These include the Windy Point site, which has a rock cairn and raw chipped stone material; and the Valentine Flats site.

Additional sites for which GIS data is available, but no further information was available for the purposes of this CLR, include the following. Some of these may overlap with sites described above, but available information was not detailed enough to determine whether multiple names or numbers have been assigned to the same site. These sites include: the Bill Swift site, Cattail Springs Quarry site, Ghost Stream site, Gobbler Knob and Gobbler Pass sites, Hawks Tipi Ring sites, Hidden Valley Tipi Rings site, the Only See One site, the Valley View site, Scott Homestead site (WCNP-HC#6), Wind Cave Canyon site, several unnumbered tipi ring sites, unnamed sites numbered WC#1 through WC#5, and unnamed sites numbered WCNP-HC#5, 7, 8, 9, and 10.

Many more sites likely exist that have not yet been reported or recorded. However, more than 90 rock art sites have been recorded throughout the Black Hills, many in Hogback Ridge sandstone. Exposed sandstone on the east-facing sides of canyons in the western part of the park appears likely to have rock art. Stylistically, Pecked Realistic and Pecked Abstract forms are typical of the area, many depicting hunting scenes. It is believed that these date to the PaleoIndian and Archaic periods.

Table 3-1. List of all archeological sites recorded within Wind Cave NP as of September of 2004.<sup>23</sup>

Site #	Site Name	Site Type	Time Period	National Register Status
39CU352	WICA 1	rockshelter with one chipped stone flake		
39CU353	WICA 2	artifact scatter		Recommended Not Eligible by the author
39CU354	WICA 3	artifact scatter		
39CU355	WICA 4	rockshelter with an artifact scatter		Recommended Potentially Eligible by the author
39CU356	WICA 5	tipi rings		
39CU357	WICA 6	artifacts in stream cut bank	Late Prehistoric	Recommended Eligible by the author
39CU358	WICA 7	artifact scatter		
39CU359	WICA 8	tipi rings		Determined Eligible by SHPO
39CU360	WICA 9	two human burials & artifact scatter		Recommended Potentially Eligible by the author
39CU779	Beaver Creek Rockshelter	rockshelter with stratified cultural deposits dating between 3870-6720 B.P.	Archaic	On National Register
39CU781	Ghost Stream	artifact scatter	Early archaic	Recommended Potentially Eligible by the author
39CU820	Hidden Valley Tipi Rings	tipi rings		Recommended Eligible by the author
39CU821	Wind Cave Canyon	occupation/artifact scatter	Archaic	Determined Eligible by SHPO
39CU822		artifact scatter	Archaic	Recommended Potentially Eligible by the author
39CU823		stone alignment	Late Prehistoric	Recommended Eligible by the author
39CU834		historic stone foundation & root cellar	Post AD 1875	Recommended Potentially Eligible by Ann Johnson
39CU868	Gobbler Knob	occupation/artifact scatter		Determined Eligible by SHPO
39CU869	Schroeder Wash	quarry		Determined Not Eligible by SHPO
39CU870	Schroeder Garden	quarry		Determined Not Eligible by SHPO
39CU871	Power Line 4	quarry		Determined Not Eligible by SHPO
39CU872		quarry		Determined Eligible by SHPO

<sup>23</sup> Jennifer Galindo, "Wind Cave Archeological Inventory Project: Final Report" (U.S. Dept. of the Interior, National Park Service, Midwest Archeological Center, Lincoln, Nebraska, 2004).

39CU873		quarry		Determined Not Eligible by SHPO
39CU874	NPS 12-1	artifact scatter		Recommended Potentially Eligible by Ann Johnson
39CU875	Cattail Springs Quarry	quarry		Recommended Eligible by the author
39CU876	Bill Swift Site	quarry		Recommended Potentially Eligible by Ann Johnson
39CU877		tipi rings		Recommended Potentially Eligible by Ann Johnson
39CU899	NPS6-1	tipi rings		Recommended Potentially Eligible by Ann Johnson but severely threatened
39CU900	NPS6-2	prehistoric artifact scatter, homestead, 1970s AIM camp		Recommended Potentially Eligible by Ann Johnson
39CU912	Gobbler Pass	artifact scatter		Destroyed
39CU918	Valley View Site	artifact scatter, tipi ring, 3 cairns		Recommended Potentially Eligible by Ann Johnson
39CU919		artifact scatter		Recommended Not Eligible by the author
39CU920		artifact scatter		Recommended Potentially Eligible by Ann Johnson
39CU921		artifact scatter		Recommended Potentially Eligible by Ann Johnson
39CU1194		quarry		Recommended Not Eligible by Ann Johnson
39CU1195		artifact scatter		Recommended Not Eligible by Ann Johnson
39CU1196		tipi rings	Middle Archaic projectile point found nearby but tipi rings are likely Late Prehistoric	Recommended Eligible by the author
39CU1197		tipi rings	Late Archaic projectile point found nearby but tipi rings date to the Late Prehistoric	Recommended Eligible by the author
39CU1234	WC#1	artifact scatter		Recommended Potentially Eligible by the author
39CU1235	WC#2	quarry		Recommended Not Eligible by the author
39CU1236	WC#3	quarry		Recommended Potentially Eligible by the author
39CU1237	WC#4	artifact scatter		Recommended Potentially Eligible by the author

39CU1238	WC#5	quarry		
39CU1283	WCNP-HC#5	buried hearth in cut bank		Destroyed
39CU1284	WCNP-HC#6 Scott homestead	prehistoric artifact scatter and homestead	AD 1880's	Recommended Potentially Eligible by Fredlund & Sundstrom
39CU1285	WCNP-HC#7	quarry		Recommended Potentially Eligible by Fredlund & Sundstrom
39CU1286	WCNP-HC#8	artifact scatter		Recommended Potentially Eligible by the author
39CU1287	WCNP-HC#9	artifact scatter and historic stone alignment		Recommended Potentially Eligible by Fredlund & Sundstrom
39CU1288	WCNP-HC#10	buried artifact scatter in cut bank		Recommended Potentially Eligible by the author but severely threatened
39CU1761		artifact scatter		Recommended Not Eligible by the author
39CU2566	Three Large Cairns Site	cairn	Protohistoric or historic seed bead found beside feature	Recommended Not Eligible by Bill Hunt
39CU2567	Hawks Tipi Ring Site	tipi rings and artifact scatter	Late Prehistoric	Recommended Eligible by the author
39CU2568	Only See One	tipi ring and artifact scatter		Recommended Potentially Eligible by the author
39CU3040	Prairie Dog Chipped Stone	artifact scatter		Recommended Potentially Eligible by the author
39CU3041	Windy Top Work Station	artifact scatter		Recommended Potentially Eligible by the author
39CU3042	Flat Top Tipi Ring Site	tipi rings and artifact scatter		Recommended Potentially Eligible by the author
39CU3043	Top of the Hill Site	artifact scatter		Recommended Potentially Eligible by the author
39CU3044	The Bachelor Site	tipi ring		Recommended Potentially Eligible by the author
39CU3045	Baby Pine Hill Site	artifact scatter		Recommended Not Eligible by the author
39CU3046	The Real Site	artifact scatter	Late Prehistoric	Recommended Eligible by the author
39CU3047	Small Stone Cairn Site	cairn		Recommended Potentially Eligible by the author
39CU3048	Chert Quarry Outcrop Site	quarry		Recommended Potentially Eligible by the author
39CU3049	Fake Chert Quarry Site	artifact scatter		Recommended Not Eligible by the author
39CU3050	Tobacco Site	historic artifact scatter	AD 1920s	Recommended Potentially Eligible by the author

39CU3051	Small Hill Scatter Site	artifact scatter		Recommended Not Eligible by the author
39CU3052	Amy Site	artifact scatter		Recommended Potentially Eligible by the author
39CU3061		artifact scatter		Recommended Potentially Eligible by the author
39CU3159		historic dump		Recommended Potentially Eligible by the author
39CU3160		tipi rings, artifact scatter, historic stone piles		Recommended Potentially Eligible by the author
39CU3161	South Side Tipi Rings	tipi rings and artifact scatter		Recommended Eligible by the author
39CU3162	Cortez Site	artifact scatter		Recommended Potentially Eligible by the author
39CU3163	Loner Site	tipi ring		Recommended Potentially Eligible by the author
39CU3164	Eroding Hillslope Site	artifact scatter		Recommended Potentially Eligible by the author but threatened
39CU3165	Bedrock Scatter	artifact scatter		Recommended Potentially Eligible by the author

## ETHNOGRAPHIC RESOURCES<sup>24</sup>

Owing to the limits of the CLR scope of work and the cultural sensitivities associated with the identification of specific site locations, only a brief overview of park ethnographic resources is provided. For more information regarding ethnographic values and resources see Patricia C. Albers' *The Home of The Bison: An Ethnographic and Ethnohistorical Study of Traditional Cultural Affiliations to Wind Cave National Park*, September 29, 2003.

The lands forming Wind Cave NP represent a portion of the larger Black Hills, an entire area of ethnographic importance. As such, the whole landscape of the park should be viewed as important for its association with tribal peoples. In particular, the area between Elk Mountain and Buffalo Gap, including a section of the Race Track and Wind Cave, is considered sacred. Though Hot Springs and Buffalo Gap are outside of the park, portions of the Race Track are within the park boundary.

The subject of many different sacred story cycles, Wind Cave is considered a sacred site by the Lakotas. The stories about Wind Cave and its association with spiritual figures is part of a larger set of cosmological traditions about the relationships between caves, bison, regeneration, and the wind. Wind Cave is also important owing to its proximity to Buffalo Gap, the Race Track, and the thermal waters of Hot Springs. Ethnographers have indicated that other caves and the entire

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<sup>24</sup> The source for the summary of ethnographic resources is: Patricia Albers, *The Home of the Bison: An Ethnographic and Ethnohistorical Study of the Traditional Cultural Affiliations to Wind Cave National Park*, Volume Two (U.S. Dept. of the Interior, National Park Service & The Department of American Indian Studies, University of Minnesota, 2003).

area beneath the Black Hills limestone formations also have important associations with the Lakotas and Cheyenne.

The Race Track is described in the Cheyenne sacred narrative called The Great Race, and is associated with the origin of their Sun Dance and possibly their Animal Dance. The Lakotas also regard the Race Track as sacred. According to Cheyenne and Lakota versions of The Great Race story, the Race Track begins at Buffalo Gap and continues through the park in an area the Lakota call the Stomping Ground of the Bison Bull.

Other ethnographic resources of special importance within the park include springs, bluffs, rocky outcroppings, ridges, and burial sites. In addition, it is important to note that the locations of places of many religious observances within the park are unknown and may never be known to park managers.

## **CHARACTERISTICS OF THE PARK LANDSCAPE BEYOND THE DEVELOPED AREAS**

### **INTRODUCTION**

This section documents the features and systems associated with the greater park landscape that serves as the setting for the developed areas (which are described in a subsequent section). Covering about 27,300 acres, or ninety-six percent of the park, this area encompasses portions of three distinctive ecosystems and contains a variety of natural and cultural landscape features (*Map 3-1 Component Landscape Map*).

### **NATURAL SYSTEMS**

Natural systems in this area are legion, including geological features such as caves, springs, streams, creeks, wetlands, gulches, canyons, valleys, ridges, mountains, flats, and passes; and biotic features such as animal trails, bison wallows, prairie dog towns, and many other aspects of the prairie, forest, and riparian communities. The topography is closely related to the underlying bedrock, which in turn, determines the overlying soils. In concert with climate and hydrology, the soils and topography influence the type of vegetative cover, and thereby animal habitat.

The regional topography has a general slope from west to east, with the most prominent features in the park being Rankin Ridge and Elk Mountain in the western part, and Boland Ridge in the east. Lying in between and running north-south is Red Valley.

Rankin Ridge (5,013 feet above mean sea level (MSL)), a linear, north-south feature underlain by Pre-Cambrian rocks, is the highest point in the park. Dropping off from its southern flank is a series of three canyons—Reaves Gulch, Curley Canyon, and Limestone Canyon—each debouching into Beaver Creek Canyon. Beaver Creek is the most significant perennial water course in the park (*Figure 3-2 /2Y-15*). Fed by Cold Spring and runoff from the south of Rankin Ridge, it eventually drains into the Cheyenne River, the trunk drainage system for the southern Black Hills and a major tributary of the Missouri River. Beaver Creek Canyon is the largest

canyon in the park, which effectively divides two-thirds of the park into a northern section and the remainder into a southern section.

In the park's southern section, three high points run from north to south along the western boundary: Elk Mountain (approx. 4,505 ft.), Windy Point (4,453 ft.), and Fossil Ridge (approx. 4,425 ft.). Windy Point drops off eastward to an undulating prairie called Bison Flats, which is drained by the upper reaches of Gobbler Canyon to the southeast and Wind Cave Canyon to the northeast. Gobbler Ridge divides the Gobbler Canyon drainage from the Cold Brook drainage. Gobbler Pass divides the ridge, forming the southern entrance to the park. Elk Mountain, Fossil Ridge, and Windy Point are formed in exposed Pahasapa Limestone. Bison Flats is formed on an undulating plain underlain by the Minnelusa Formation, with the Pahasapa directly beneath it.

Cottonwood Creek is the most significant drainage in the park's southern section. It rises between Windy Point and Elk Mountain, and, along with two unnamed tributaries, crosses directly above the cave system before emptying into Wind Cave Canyon, which empties into Beaver Creek outside of the park boundary. Prairie Dog Canyon and Negro Canyon are northern tributaries to Wind Cave Canyon and there is a small promontory called Lookout Point (approx. 4,400 ft.) that overlooks Beaver Creek Canyon to the north and Prairie Dog Canyon to the south.

Highland Creek Canyon forms the eastern flank of Rankin Ridge, dividing the northern section of the park into the rugged Rankin Ridge upland on the west and Red Valley and the Hogback Ridge on the east. Highland Creek drains into Dry Creek, the main drainage for Red Valley. Red Valley is underlain by red shale and gypsum of the Spearfish formation and the reddish nature of the soil is evident where erosion is most active. The main stream bed is incised about ten feet and some sections of the streambeds have been disturbed by bison. In a few areas there is excessive gullyling (*Figures 3-3 /2A-16 and 3-4 /2C-22*).

Boland Ridge (approx. 4,285 ft.) forms the eastern margin of Red Valley (*Figure 3-5 /2D-08*). This ridge, part of the Cretaceous sandstone hogback that encircles the Black Hills, is drained by an unnamed headwater of Fuson Canyon to the south and Blacktail Creek to the east.

There are numerous springs and seeps within the park, including Limestone Spring near the far western boundary of the park, a spring on Windy Point, and another spring near Elk Mountain. Over time, some springs have shifted position as the water table has fluctuated and valleys eroded; this can be recognized by piles of sand carried from underground and deposited above ground.<sup>25</sup> It is possible that a perched aquifer over the Minnelusa Formation, coupled with downcutting in the canyons, has provided the zone of vegetation along Geomorphic Zone Three.

In addition to Wind Cave, over forty "backcountry" caves can be found within the park, all of them formed in the Pahasapa limestone; they are not physically connected to Wind Cave.<sup>26</sup>

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<sup>25</sup> Arthur N. Palmer, *Wind Cave: An Ancient World Beneath the Hills* (Hot Springs, SD: Black Hills Parks and Forests Association, 2001), 29.

<sup>26</sup> National Park Service, "Cave and Karst Resource Management Plan," 10.

## BIOLOGIC SYSTEMS<sup>27</sup>

Wind Cave NP is situated where the southeast flank of the Black Hills uplift meets the Great Plains and this geological crossroads creates an ecotone, or overlap between contrasting ecological systems. The result is a highly diverse zone with species from both habitats. To the northwest, toward the Black Hills uplift, the vegetation and wildlife have many components of Rocky Mountain forests. To the east, the Great Plains provide sweeping expanses of prairie and habitat for the numerous animals that live in these vast grasslands.

## PLANT COMMUNITIES<sup>28</sup>

Plant communities found within the park are typical of the ponderosa pine/prairie transition zone of the lower elevations of the Black Hills. The classification of this vegetation includes 28 community types comprised of eight forest and woodland types, five shrubland types, ten herbaceous types and five sparse vegetation types. Map 3-4, Existing Conditions Plant Communities, indicates the location of these major physiognomic types; the forest and woodland type has been subdivided into coniferous and hardwood groups. Cultural vegetation is discussed later in the Vegetation sections of this chapter.

The coniferous forest and woodland type, made up of ponderosa pine forests and woodlands, is most extensive at higher elevations in the western part of the park (*Figure 3-7 /2J-03*). Conifers are the dominant trees in the park and ponderosa pine (*Pinus ponderosa*) is by far the most abundant conifer. Ponderosa pine/chokecherry forest occurs on northerly aspects and on lower slopes near drainage bottoms. The other community types that make up this physiognomic type include ponderosa pine/sunsgedge, ponderosa pine/western wheatgrass and ponderosa pine/little bluestem woodlands; all occur on a variety of slopes and aspects. In general, few understory plants grow in these forests.

Hardwood forests and woodlands are concentrated in floodplains, drainage bottoms and toeslopes (*Figure 3-8 /2W-22*). They include the green ash (*Fraxinus pennsylvanica*), box elder (*Acer negundo*), and bur oak (*Quercus macrocarpa*). The Black Hills is the western limit of the American elm (*Ulmus americana*) and the paper birch (*Betula papyrifera*). Shrubs typically found in these riparian areas include golden currant (*Ribes odoratum*), Rocky Mountain sumac or skunkbush (*Rhus aromatica*), Western snowberry (*Symphoricarpos occidentalis*), common chokecherry (*Prunus virginiana*), and American plum (*Prunus americana*). The most common vegetation type is the boxelder/chokecherry type, occurring in drainages scattered throughout the park. Plains cottonwood/western snowberry woodland and green ash—American elm/western snowberry forest are two floodplain types that occur in limited areas within the park. The plains cottonwood (*Populus sargentii*) occurs in draws in Red Valley. Small patches of aspen and paper birch forests occur in the northwest part of the park.

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<sup>27</sup> This section summarized from *Wind Cave National Park Handbook #104*.

<sup>28</sup> This section summarized from *USGS-NPS Vegetation Mapping Program Wind Cave National Park, South Dakota*, from <http://biology.usgs.gov/npsveg/wica/report.pdf> (accessed June 3, 2004).

Shrublands consist of extensive mountain mahogany/side-oats grama shrublands in areas underlain by Minnekahta limestone, mainly in the central part of the park. Western snowberry shrubland is a common type in drainage bottoms and draws and is found in the eastern part of the park. The chokecherry shrubland is also frequently found in draws or around rock outcrops.

Seven vegetation types make up the upland herbaceous classification. Big bluestem–little bluestem occurs as large stands on steep rocky slopes in the northeast part of the park and on rocky slopes. The western wheatgrass—green needlegrass and Kentucky bluegrass types, common throughout the park, occur on flat to gently sloping areas (*Figure 3-6 /2M-05*). Needle-and-thread—blue gram vegetation occupy summits of broad benches in the northeast part of the park. Two herbaceous types were created by the USGS-NPS Vegetation Mapping Program for Wind Cave NP. The purple three-awn-fetid marigold type describes the vegetation occurring in prairie dog towns. The introduced weedy graminoid type includes graminoids growing on disturbed sites.

Five different vegetation types make up the sparse vegetation type. The black hills rock outcrop type is found in the northwest part of the park. The ponderosa pine limestone cliff type occurs at small limestone outcrops along some of the larger streams in the central part of the park. Redlands sparse vegetation occurs in small areas associated with exposures of the red Spearfish Formation in the Red Valley.

#### FIRE MANAGEMENT

Periodic burns have typically been a part of the Wind Cave NP ecosystem. Fire improves habitat, allows many species to complete their life cycles, and keeps fuel levels low. Today, fire is also essential in controlling exotic plant invaders. Since 1973, the park has used prescribed burns to help improve and maintain ecosystem health. The 1999 Fire Management Plan outlines a prescribed annual burn plan through 2008, with acreage amounts varying from a few hundred to more than 4,000 acres (*Figure 3-9 /2D-24*).<sup>29</sup>

#### INVASIVE NON-NATIVE PLANTS<sup>30</sup>

There are several invasive plants found within the park and a number of these are considered to be threats to local communities. Common invasive plants encountered in the park are goat's beard or Western salsify (*Tragopogon dubius*), common mullein (*Verbascum thapsis*), Canada thistle (*Cirsium arvense*), leafy spurge (*Euphorbia esula*), dandelion (*Taraxacum officinale*), smooth brome (*Bromus inermis*), Japanese brome (*Bromus japonicus*), cheatgrass (*Bromus tectorum*), Kentucky bluegrass (*Poa pratensis*), Russian thistle (*Salsola pestifera*), crested wheatgrass (*Agropyron desertorum*), yellow sweet clover (*Melilotus officinalis*), and white clover (*Melilotus alba*).

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<sup>29</sup> NPS, "Wind Cave National Park Fire Management Plan" (Hot Springs SD: Wind Cave National Park, 1999).

<sup>30</sup> NPS, GMP/EIS, 47.

## WILDLIFE<sup>31</sup>

The diverse plant communities in the park support an equally diverse assemblage of wildlife. Thirty-three mammal species and one-hundred-twenty-eight resident bird species have been recorded. The most conspicuous animals are bison (*Bison bison*), elk (*Cervus elaphus*), pronghorn antelope (*Antilocapra americana*), mule deer (*Odocoileus hemionus*), white-tail deer (*Odocoileus virginianus*), Canada porcupine (*Erethizon dorsatum*), coyote (*Canis latrans*), bobcat (*Felis rufus*), badger (*Taxidea taxus*), and prairie dog (*Cynomys ludovicianus*). Prairie dogs create an important ecosystem habitat that benefits many other animal species. Their burrows provide shelter for rabbits, the prairie rattle snake, and the endangered black footed ferret, which has been extirpated from the park. The park's bison and elk population management goals have been to maintain 350 to 400 animals of each species, although there are currently around 400 bison and over 800 elk in the park at certain times of the year.

Forest wildlife includes the red squirrel (*Tamiasciurus hudsonicus*), porcupine (*Erethizon dorsatum*), and birds such as the gray jay (*Perisoreus canadensis*), red crossbill (*Loxia curvirostra*), white breasted nuthatch (*Sitta carolinensis*), red headed wood pecker (*Melanerpes erythrocephalus*), and great horned owl (*Bubo virginianus*). Riparian areas generally have more birds than the pine forests, and might include the yellowthroat (*Geothlypis trichas*) and yellow warbler (*Dendroica petechia*), which both eat caterpillars, along with red-winged blackbird (*Agelaius phoeniceus*), rock wrens (*Salpinctes obsoletus*), rock doves (*Columba livia*), mountain bluebirds (*Sialia currucoides*), and cliff swallows (*Hirundo pyrrhonota*). Riparian areas also support weasels (*Mustela spp.*), meadow voles (*Microtus pennsylvanicus*), chipmunks (*Tamias minimus*), cottontails (*Sylvilagus spp.*), and frogs (*Rana pipiens* and *Psuedacris triseriata*).

## RARE, THREATENED, OR ENDANGERED SPECIES<sup>32</sup>

No plant species have been identified to date within the park that are considered endangered by federal agencies or the State of South Dakota agencies. Two plant species that have not been identified in the park but could be present are listed by the Fish and Wildlife Service as possibly threatened or endangered: Barr's milkvetch (*Astragalus barrii*) and Dakota buckwheat (*Eriogonum visherii*).

Three animal species listed by the federal government as threatened or endangered may live in the park. Vagrant bald eagles (*Haliaeetus leucocephalus*) are occasionally found in the park during the late fall and early spring months, and peregrine falcons (*Falco peregrinus*) occasionally visit during spring and fall migrations. The American burying beetle (*Nicrophorus americanus*), which inhabits prairie soils in the vicinity, may also live in the park.

Three other animal species may live in the park that are listed by the USGS Northern Prairie Wildlife Research Center as endangered, threatened, and rare. These are the Black Hills fringed-

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<sup>31</sup> NPS, GMP/EIS, 47-50.

<sup>32</sup> This section summarized from the NPS, *GMP/EIS*.

tailed bat (*Myotis thysanodes pahasapensis*), swift fox (*Vulpes velox*), and Baird's sparrow (*Ammodramus bairdii*).<sup>33</sup>

## LAND USE

Within the greater park area, the most significant land uses are associated with the park's natural resources and visitor access. These include the following:

- Interpretive: There are a number of natural resource interpretive wayside exhibits along U.S. 385 and SD 87.
- Recreation: Recreation activities include wildlife viewing, hiking, and back country camping.
- Utility: Utilities located in the greater park include overhead electrical lines and those associated with the park's water supply.
- Transportation: U.S. 385 and SD 87 pass through the park. U.S. 385 serves as a major connection corridor between Custer and Hot Springs. Two gravel park roads are used by local traffic and park visitors.
- Research: Fenced research areas are being used to determine the effects of grazing on vegetation.

## SPATIAL ORGANIZATION

Patterns of spatial organization in the greater park are largely determined by topography and vegetative cover. Circulation corridors also influence spatial patterns. Most visitors experience the varying topography and open prairie as they travel U.S. 385 or SD 87. U.S. 385 passes through the park from its north entrance through a section of forest then quickly into hilly terrain of pine/grass savannah and open prairie. As the highway travels south there are fewer trees and the terrain becomes rolling. The spatial character of the road corridor—the dips, rises, and broad curves of the road—allow for a sequence of distant views and the enclosure of valleys. The road corridor, as it navigates around and over the terrain, allows drivers to feel the topographic character of the landscape (*Figures 3-10 /2O-04, 3-11 /2M-14, and 3-12 /2P-03*).

SD 87 allows a similar experience as it crosses a portion of the northern section of the park. This road corridor navigates the terrain in a similar way to U.S. 385. However, much of this section of the park is covered by forest and pine/grass savannah. The terrain is more rugged with many visible rock outcrops and the road corridor crossing one or more valleys perpendicularly, providing a different spatial experience for travelers. Dense areas of forest enclose and surround the road corridor in places; elsewhere, the corridor is set in more open pine-grass savannah with occasional patches of prairie (*Figure 3-13 /2Y-01*). Views in the heavily forested areas are short

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<sup>33</sup> United States Geological Service, Northern Prairie Wildlife Research Center, "Fragile Legacy: Endangered, Threatened, and Rare Species of South Dakota." <http://www.npwrc.usgs.gov/index.htm> (Accessed March 21, 2005).

with the crossings at the old Norbeck Dam and Beaver Creek allowing quick glimpses of more distant views (*Figures 3-14 /2Q-16, 3-15 /2Q-05, and 3-16 /2P-20*). Both U.S. 385 and SD 87 include interpretive pull-offs that are often associated with views (*Figures 3-17 /2K-14, 3-18 /2Q-06, and 3-19 /2I-04*).

On the east side of the park, two park roads NPS 5 and NPS 6 pass through the open, mixed-grass prairie of Red Valley. In this area views are largely unrestricted across a broad, mile-wide, gently sloping drainage basin. Only the highest peaks of the surrounding hills are forested. The flatter terrain allows these roads to have more gentle curves and almost unnoticeable rises and falls as they traverse the prairie (*Figure 3-22 /2E-13*).

Several trails in the park allow hikers to experience a variety of spatial patterns from flat-floored, steep-walled canyons, to broad open prairies, to dense pine forest (*Figures 3-23 /2J-14, 3-24 /2I-10, and 3-25 /2Y-07*). Ridges allow panoramic views across the park (*Figure 3-29 /2J-02*).

Smaller spatial districts include:

- Rankin Ridge Fire Tower site, with a short drive from SD 87 and a parking area. A loop trail brings visitors around a rocky face of the ridge then along the top of the ridge. At the top sits the tower which affords views over most of the park and surrounding landscape (*Figures 3-28 /2I-13 and 3-29 /2J-02*).
- The wildlife handling facility is a large fenced area; in its center is a dense collection of corrals and chutes with a small cabin set to one side. The northern portion of NPS 5 passes into the fenced area via a cattle guard and a short drive connects NPS 5 to the area. A small hill screens the view of the facilities from NPS 5 (*Figures 3-30 /2F-23 and 3-31 /2G-04*).
- Two small fenced research areas along NPS 6 were also noted during field investigations (*Figure 3-32 /2C-13*).

## CIRCULATION

The greater park area includes two paved highways, gravel roads, several short drives, and several trails. The two paved highways have associated pull-offs, interpretive areas, and trailhead parking areas.

U.S. 385, the primary route access to the park, travels in a north-south direction from Custer to Hot Springs, crossing a large section of the park's southwest corner. The highway enters the park at Cold Spring and zigzags to the southeast two and a half miles to a point between the Maintenance Area and the wastewater lagoons, then southwest for two and a half miles before turning back to the southeast and exiting the park two miles later. A small portion of this road, approximately a mile in either direction from the wastewater area, consists of a bypass that edges the east side of the Headquarters Area. This asphalt paved road has two twelve-foot-wide lanes and a variety of shoulder types including turf, narrow asphalt, tar and chip, and recently added wide asphalt shoulders with asphalt curbs (*Figures 3-33 /2O-12 and 3-10 through 3-12*).

SD 87 enters the park at its northernmost point from Custer State Park and travels seven miles south where it ends at U.S. 385 three-quarters of a mile from U.S. 385's northern entrance to the park. The northern quarter of this road, which crosses a nearly level area, has gentle curves and long, relatively straight sections, while the southern section curves its way over and around various hills and valleys. SD 87 is a two lane asphalt road with turf shoulders and an occasional narrow gravel shoulder. Beaver Creek Bridge and Pig Tail Bridge are associated with SD 87 (*Figures 3-34 /2H-01 and 3-14 through 3-16*).

Both U.S. 385 and SD 87 have multiple paved interpretive pull-offs ranging in type from wide areas along the road to short loops with parking. Most of those along U.S. 385 have a larger loop and parking separated from the highway with a turf median, while those along SD 87 are smaller with asphalt paving continuous with the highway (*Figures 3-12, and 3-17 through 3-19*).

Two, approximately fourteen-foot-wide, crushed stone, graded roads—NPS 5 and NPS 6—allow access through the western side of the park. These roads correspond with County Routes 5 and 6 outside the park. NPS 5 crosses the park from the southern end of the eastern leg of the park heading in a north/northwest direction along Dry Creek, until its nears the northern border of the park, then turns west/northwest and follows roughly along the boundary of the park until it ends at SD 87. Both the southern and northern legs of this road cross relatively flat terrain while the middle section climbs over 500 feet from Red Valley to the highland area of the park. Unlike SD 87, the NPS5 corridor has gentle curves and long, relatively straight sections. A short section of the road in the north follows a section line making a 90 degree turn at a corner. The portion of NPS5 within the park is just over 7.5 miles long. A small wooden bridge allows the road to cross a creek just before the intersection with the wildlife handling facility access drive (*Figures 3-36 /2A-02, 3-37 /2E-01, and 3-22*).

NPS 6 spurs off of NPS 5 just over a mile north of the southern park boundary and heads northeast for about a half mile before turning north then continuing to the northern park boundary and into Custer State Park. NPS 6 is approximately 3.7 miles long. The character of this road is much like that of NPS 5, following a section line for more than a mile along its middle portion and then climbing out of Red Valley and leaving the park (*Figures 3-38 /2A-19, 3-39 /2B-15, and 3-40 /2C-07*).

Both of these roads include various pull-offs for parking at trailheads and scenic overlooks (*Figures 3-4 /2C-12 and 3-35/2E-14*).

There are a number of other small roads in this portion of the park: a short crushed-stone access drive connects to the wildlife facility off NPS 5; a short asphalt access drive connects to the Rankin Ridge Trailhead and parking off SD 87; a short crushed-stone access drive connects to the Centennial Trailhead and parking near Beaver Creek off SD 87; a short crushed stone access drives leaves SD 87 and connects to the Norbeck Wildlife Preserve (scheduled to be removed when SD 87 is repaved in 2006-07); and a short crushed stone road connects County Route 391 (the “Pringle Cutoff”) through the park to SD 87. Three more unnamed road sections are located in this portion of the park: a crushed stone spur off the Pringle Cutoff that travels for several hundred yards north before exiting the park; a crushed-stone drive to a private residence outside the park leaves U.S. 385 just inside the southern boundary of the park; and several hundred yards

down U.S. 385, another crushed stone county road connector heads south and out of the park (*Figures 3-42 /2F-22, 3-43 /2I-6, 3-2 1/2Q-22, and 3-2 0/2E-13*).

An additional road corridor is included in this portion of the park, providing access between park infrastructure and the Headquarters Area. This narrow road intersects with the southern part of the Headquarters Road not far from its intersection with U.S. 385. The first half of the road runs through prairie and ends at the park's Mixing Circle/storage yard. This area contains a variety of equipment, storage units, and road repair materials and is surfaced with a variety of materials. The road continues west for a short while, and then turns back to the north, running through pine/grass savannah/forest along the way. The road continues to climb Elk Mountain and ends within several hundred yards of the campground amphitheater. At its end, it circles an aboveground water tank (*Figure 3-112 /2R-12*).

There are nine trails within this portion of the park. Most trails are surfaced in hard-packed earth, and in some cases are barely discernible (*Figure 3-44 /2F-03*). Rankin Ridge Trail is a one mile loop with fourteen interpretive stops. The trail passes through ponderosa pine forest and climbs to the highest point in the park, with vistas to open meadows below and the plains to the east. The trail ends on a gravel service road, which returns hikers to the parking lot (*Figures 3-45 /2I-09 and 3-24 /2I-10*).

- The Cold Brook Canyon Trail follows a portion of a historic wagon trail that crossed the region from east to west. The trailhead is along U.S. 385. This mildly strenuous walk ascends 1.4 miles up Cold Brook Canyon to Fossil Ridge.
- The Wind Cave Canyon Trail is less than two miles long and descends into Wind Cave Canyon along a crushed stone/earthen access road. The trailhead is located along U.S. 385 at the wastewater lagoons (*Figure 3-26 /2N-05*).
- The East Bison Flats Trail is a three-mile walk with a trailhead located at the southern entrance of the park along U.S. 385.
- The Lookout Point Trail begins near the old Norbeck Dam site and is comprised of a two mile loop to Lookout Point and down into Beaver Creek Canyon.
- The Sanctuary Trail extends over three and a half miles from the trailhead on SD 87. It skirts the north side of Rankin Ridge, then turns south and joins the Highland Creek Trail.
- The Centennial Trail runs six miles through the park and is only a portion of a much larger trail system. It enters the park at a gate along the northern boundary (near the wildlife facility), then proceeds southward to Beaver Creek Canyon and a trailhead at Beaver Creek.
- The Highland Creek Trail runs over eight and a half miles beginning at a trailhead at the 90 degree bend in NPS 5 in the northern portion of the park. It skirts the top of Highland Creek Canyon, climbs down into and then out of Beaver Creek Canyon, then proceeds south across the flats, eventually dropping down into Wind Cave Canyon.

- The Boland Ridge Trail is almost three miles long. It begins at a trailhead in Red Valley along NPS 6 and climbs up Boland Ridge.

## TOPOGRAPHIC MODIFICATIONS

Topographic modifications within the greater park are limited to roadbed construction, former quarry sites, and possibly some of the former homesteads. Significant blasting has occurred in the northwestern quarter of the park and in the southernmost portion of the park to accommodate U.S. 385. Entrances to some caves in the Highland Creek area were modified by miners in the early twentieth century.<sup>34</sup>

## VEGETATION

There is little vegetation outside the park's developed areas that was planted in association with park development or similar types of land use. Cultural vegetation noted during fieldwork included remnant ornamental species planted in hedgerows and trees at the former Game Preserve Headquarters (*Figure 3-46 /2X-19*).

## BUILDINGS AND STRUCTURES

### P-B-01 WILDLIFE HANDLING FACILITY CABIN

The cabin is a one-story, rectangular building constructed of square-cut milled logs and covered by a gable-end roof with asphalt shingles. An overhang of the roof, approximately 24-inches wide, extends around the entire perimeter of the structure. The structure includes a concrete foundation. A single steel door serves as the entrance. Simple wood frame windows, one over one, are set into the walls on all four sides. A metal stovepipe extends above the roof and serves as a vent for the wood-burning stove (*Figure 3-47 /2F-25*).

### P-B-02 STORAGE BUILDING AT RANKIN RIDGE FIRE TOWER

The low, rectangular storage building sits at the base of the fire tower, within the metal fire tower structure extending from four concrete foundation piers. Constructed of masonry block and painted white, the structure supports a slight gable end roof. A single wooden door is set off-center on the narrow end of the building and a ventilation window is situated high on the adjoining side. On the roof sits a small solar panel (*Figure 3-48 /2I-20*).

### P-S-01 RANKIN RIDGE FIRE TOWER

The fire tower structure sits atop Rankin Ridge, extending above the treetops on a steel armature. Four concrete piers form the base of the structure and steel armature resting on the piers forms a square within which the stairway rises through a series of five landings. At the base of the tower, a concrete landing with three steps provides a foundation for the steel stairway that accesses the

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<sup>34</sup> NPS, GMP/EIS, 27.

top of the tower. A simple, low concrete block restroom/storage building also sits within the metal framework at the base of the tower. Steel railings run along either side of the stairway and, beginning at the second landing, the railings are clad in a chain-link mesh. At the uppermost landing of the stair, a platform of gridded steel panels extends in an overhang around the perimeter of the supporting armature, forming a base for the enclosure at the top of the tower. The enclosure appears to be a metal building, punctuated with windows all around and covered with a corrugated metal roof, with an extensive overhang of about three feet (*Figure 3-49 /2J-01*).

#### P-S-02 BEAVER CREEK BRIDGE (HS-99)

The 1994 National Register Nomination Form prepared by Western History Research provides an excellent description of this bridge: “The open spandrel deck arch bridge has one main span with steel stringer approach span at each end. The 120-foot main span sits on concrete piers. In addition to the main span there are two steel stringer approach spans, with outer concrete girders, at each end. The approach spans sit on the main span’s pier, a concrete pier, and a solid abutment with curved wing walls. The single arch span of this bridge is a two-ribbed open spandrel arch. The ribs are connected with concrete bridging. The arches spring from the bottom of the massive concrete piers. Ten concrete columns rest on each rib and support the concrete floor beams. Between the floor beams are longitudinal concrete stringers. The beams and stringers turn down at the columns to form decorative, ribbed column capitals. The approach spans are similar in configuration but the distance between the piers and abutment is greater than between the columns and main span. The approach spans have steel I-beam stringers which are supported by the concrete floor beams. The approach spans of both ends of the bridge curve; the south span curves to the right and the north span curves to the left. The railing is a concrete balustrade with a panel between each vertical support” (*Figure 3-50 /2P-21*).

#### P-S-03 PIG TAIL BRIDGE (HS-98)

The bridge is a three-span steel I-beam design that extends seventy-seven feet in length. It has an asphalt covered laminated wooden deck which rests on the steel I-beams. The I-beams sit on concrete and stone abutments and piers. One abutment is located on each end of the bridge and two piers are spaced forty feet apart on each side of the roadbed, which passes underneath the bridge. The abutments have short wing walls and concrete bases which are poured on outcrops of native rock. The battered piers are constructed of native sandstone in a coursed ashlar pattern; both piers have a concrete cap. The date “1940” is cast in the center inside of the northern and southern piers. Log uprights are regularly spaced along the outside edge of the deck and two logs, one above the other, are bolted to the uprights forming a guardrail. The log guardrail extends beyond each end of the bridge (*Figure 3-51 /2Q-13*).

#### P-S-04 STOCK PENS, CATTLE CHUTES, ETC AT THE WILDLIFE FACILITY

There are metal and wood board collecting pens, separating pens, runways, squeeze chutes, wing fences, and a circular corral at the wildlife handling facility (*Figures 3-30 /2F-23 and 3-31 /2G-04*).

#### P-S-05 SHOOTING RANGE BOOTH

This small wooden structure is rectangular with an asymmetrical gable end roof. An overhang of the roof runs around the building, extending out farther on the side of the building opposite the door, thus creating the asymmetrical form. Wooden shingles appear to cover the roof and are in a deteriorating condition. A wooden door with a single pane window is situated in the center of one long side and single-pane (could be just screens) windows extend completely around the remaining walls of the structure. Plywood paneling sheaths the building from the foundation to the bottom of the windows that sit at about thirty-six inches above the ground. The structure is in poor shape overall (*Figure 3-52 /2N-03*).

#### P-S-06 PUMP HOUSE AT WATER SUPPLY

The pump house is a relatively new building constructed of concrete masonry units that are covered with board-and-batten siding. The building has a gable end and standing-seam roof of corrugated metal. The roof overhang extends outward about twenty-four inches and runs around the entire perimeter of the building. A single steel door on the narrow end of the structure provides access (*Figure 3-53 /2N-11*).

#### P-S-07 STONE/TIMBER SHELTER

There is a stone and timber shelter built into the side of a bank with an earthen/grass roof along the Wind Cave Canyon Trail (*Figure 3-54 /2N-15*).

#### P-S-08 USGS WATER GAUGING STATION

The station is located on the south side of Beaver Creek approximately two hundred feet downstream from the mouth of Cold Spring Creek. All that is visible aboveground is a small wood structure and a concrete cap (*Figure 3-55 /2Y-17*).

#### P-S-09 TIMBER BRIDGE

A small rough-sawn timber bridge is found along NPS 5. The bridge is very short, about six to eight feet in length, and is constructed of board decking and wearing surface planks over stringers.

## VIEWS AND VISTAS

Wind Cave's scenic views and vistas are one of its more noteworthy landscape characteristics. Upon entering the park from south along U.S. 385, the visitor is treated to a sweeping vista around a broad curve at Gobbler Pass (*Figure 3-56 /2J-24*). U.S. 385 traverses the southwestern part of the park, an area of open, rolling prairie with scattered pines that are either solitary or in small clusters. Pullouts along this route are designed to provide views of prairie dog towns, bison wallows, and a mineral lick. Unfortunately, the park's sewage lagoons are also alongside this road. Route 385's western entrance passes tall rugged cliffs cut by Cold Spring Creek.

NPS 5 and NPS 6 through Red Valley provide views on both sides of open grassland extending back to the tree-covered ridgelines that define the valley. A short hike to the knoll at the intersection of NPS 5 and NPS 6 provides long, panoramic views. The turnout along NPS 5 looking back across Red Valley is designed to take advantage of the long view south, revealing the tree-covered ridgelines receding into the distance and the grassland spotted with red dirt bison wallows, grey limestone outcrops, and patches of white gypsum soil (*Figure 3-57 /2E-05*). As NPS 5 passes through the north-central part of the park, a flat open plateau, views are broad, long, and unconfined, extending north toward distant mountain peaks.

SD 87, which runs through the northwestern part of the park, is much more confined than the other roads, winding through rugged, forested country. The northern entrance pull-off provides an open vista to the mountains to the north, but the other pull-offs on this route do not have long views; rather, they highlight geology and plant and animal communities. The pull-off at the base of Rankin Ridge provides views of open meadows, lying against pine-covered ridges frequently inhabited by bison. Rankin Ridge Lookout Tower, a short distance off of SD 87, sits atop the highest point in the park, and offers breathtaking 360-degree views of the region. Harney Peak and the granite interior of the Black Hills Uplift are visible to the north, while miles of distant prairie can be seen to the east (*Figure 3-29 /2J-02*).

Trails within the park may provide a more intimate view of the landscape. Wind Cave Canyon Trail winds though sun-dappled pine parkland and colorful cliffs. Beaver Creek Canyon Trail follows the stream into an impressive limestone canyon.

Other views and vistas can be seen in the images from Spatial Organization and Circulation sections.

## SMALL-SCALE FEATURES

There is a variety of small-scale features in the greater park area. Most are associated with twentieth century roads and trails, including the entrance complexes at the south entrance on NPS 5, the north entrance on SD 87, and at the north and south entrances on U.S. 385. There is also a gate for hikers on the Centennial Trail and other minor gates around the park. Other circulation related small-scale features include wheel stops, curbing, culverts, and metal and timber guardrails. Most signs in this area of the park are associated with circulation as well: metal traffic signs, entrance signs of wood on stone, a metal historic marker, information signs, and various trailhead and trail markers. The Rankin Ridge Trail has timber and stone steps,

timber benches, and numbered markers for those using a trail guide (*Figures 3-58 /2I-15 and 3-59 /2I-14*). Many small scale features can be seen in the images from Spatial Organization and Circulation sections (*Figures 3-13, 3-33, 3-34, 3-36, and 3-44*).

There are eight interpretive exhibits along U.S. 385 and SD 87. Most are timber panels held by timber posts joined with metal brackets. A few are set on a stone base. Topics covered include prairie dog ecosystems, bison mineral licks, prairie restoration, and details about the eastern and western ecosystems that meet in the park (*Figures 3-60 /2P-08 and 3-61 /2Q-17*).

There are twenty-one reinforced concrete water tanks and springhead developments scattered throughout the park for use by wildlife.<sup>35</sup>

The park's water supply comes from a single well, located in Wind Cave Canyon at the park boundary about two miles east of the wastewater lagoons. Facilities include a pump, pump house, and power transmission lines. Access is provided via a trail/gravel road that passes along the stream corridor.

A portion of the park boundary is fenced with approximately thirty-seven miles of seven-foot-high woven-wire perimeter fence and five miles of five-foot-high fence along the southwest boundary to permit elk migration (*Figures 3-62 /2A-03 and 3-63 /2K-06*). There are also one and one half miles of seven-foot-high fence enclosing the wildlife facility and the 100-acre parcel west of the main park is surrounded by a four-foot-high wire mesh fence. There are also fenced research areas (*Figures 3-30 and 3-32*).

Floodgates, constructed of wood, metal, and concrete, have been set in streambeds such as Highland Creek and Wind Cave Canyon (*Figure 3-64 /2F-19*). Overhead power transmission lines extend from the southern boundary of the park to the developed areas, and on to the noncontiguous 100-acre parcel located west of the park. A single fire hydrant is located at the site of the old Game Preserve Headquarters (*Figure 3-65 /2X-18*).

## **CHARACTERISTICS OF WIND CAVE**

### **INTRODUCTION**

Wind Cave is one of the primary resources within Wind Cave NP. It is one of the most complex cavern systems in the world and its extent is not fully known. Although cave rankings shift constantly, Wind Cave, with over a hundred miles of explored passages, is currently ranked third longest in the U.S. and fifth longest in the world. The genesis of the cave is not completely understood and likely resulted from multiple and complex process. One concept points to the possibility that the cave may have been formed in an unusual fashion—by the upwelling of warm acidic groundwater, rather than surface water percolating downward.<sup>36</sup> It is the “world’s best known example of a three dimensional rectilinear maze cave.”<sup>37</sup> Aside from Wind Cave, there

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<sup>35</sup> NPS, GMP/EIS, 18.

<sup>36</sup> NPS, GMP/EIS, 2.

<sup>37</sup> NPS “Cave and Karst Resource Management Plan,” 5.

are more than forty other caves within the park and many more in the region.<sup>38</sup> Many of these caves are formed in Pahasapa Limestone, although caves are also found in other formations.

## NATURAL SYSTEMS

Natural systems within Wind Cave are dominated by the character of the Pahasapa Limestone. In this region, the Pahasapa Formation can be subdivided into three distinct layers, or members, each approximately one-hundred feet thick and representing different depositional and diagenetic conditions.<sup>39</sup> The upper member consists of relatively unbedded, light gray limestone which is riddled with remnants of collapsed sinkholes, solution pockets and in-filled caves. There are abundant fossil shells near the base of this unit. The contact with the underlying middle member is located part way down the first flight of stairs inside the Walk-in Entrance.<sup>40</sup> The Pahasapa Formation's middle member consists of thinly-bedded limestone and dolomite. Fossils are common near the top, with laterally extensive chert beds just beneath the fossils. The lower member is a thickly-bedded dolomite that is highly fractured with joints and faults. Each of the three members has its own distinctive type of cave geometry, as exemplified in the types of rooms and passages, and assemblage of speleothems, a general term for mineralization deposits commonly called cave formations.

The primary natural systems in Wind Cave include a network maze with primary passages formed on a northwest-southeast trend with interconnecting, perpendicular crawls and three major levels connected by fissures and domes. There are two natural entrances to the cave; one was modified to allow human passage. Other natural resources include speleogens, speleothems, weathering deposits and residues, lakes, streamlets, fossils, and cave biota.

## PASSAGES AND ROOMS

A cave passage is any negotiable part of a cave system that is significantly longer than it is wide or high; the usage is usually restricted to horizontal spaces rather than vertical spaces. Cave passages vary in size and shape, with their shape being closely related to their manner of origin. Rooms are cavities within a cave system that are wider than a passage. Passages often follow existing fractures, fissures, and/or bedding planes and rooms commonly occur at the intersection of those features. The "floor" or "walls" of many of the passages along the tour routes have been excavated or altered to ease access or allow further access (*Figure 3-66 /CC-21*).

Unlike most caves, which have long, horizontally branching passages formed by underground streams containing carbonic acid, Wind Cave's passages are arranged in a three-dimensional maze pattern, which is a characteristic of caves that were formed by water mixing from several sources. These passages may connect larger open spaces (rooms), but many are dead ends and some are blocked along faults by rubble breakdown. There are over 100 miles of mapped passages in the cave and more than 250 named rooms. The Snake Pit Entrance, at 4,250 feet

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<sup>38</sup> NPS, "Cave and Karst Resource Management Plan," 10.

<sup>39</sup> Palmer, *Wind Cave: An Ancient World Beneath the Hills*, 27-28.

<sup>40</sup> Palmer, *Wind Cave: An Ancient World Beneath the Hills*, 28.

above MSL, is the highest point in the cave. Windy City Lake, at 3,601 feet above MSL, is the lowest.<sup>41</sup>

Cave passages in the upper member of the Pahasapa Formation are smooth and rounded. Passages in the middle member are transitional: near the top of this member they are low and wide and lie between resistant chert beds, in the middle they are complex and irregular with ledges and niches, and near the bottom they become higher and narrower. Passages in the lowest member of the formation are quite tall and narrow, following near-vertical fractures and extending for long distances in straight lines. The room geometry also correlates with the three members of the Pahasapa Formation. The upper Pahasapa is host to vaulted rooms with rounded hollows, while rooms in the middle level are short and wide or complex, and rooms in the lowest level are tall, long, and narrow.

#### NATURAL CAVE OPENINGS/BLOWHOLEs

There are a number of openings/blowholes located in the park and above the cave. The natural opening originally associated with the cave's discovery is located north of the Administration Building (Visitor Center) and adjacent to the Walk-in Entrance. This opening was altered from its original form, and later reconstructed. This opening breaches the surface at an altitude of 4,082 feet above MSL, and, like the majority of the openings, is only a small hole measuring less than two feet in diameter. Such a constricted portal, coupled with the considerable volume of the underground network of cavities, makes the cave a natural barometer, exhaling or inhaling depending on variations in atmospheric pressure. From a geologic point of view this is known as a breathing cave and measured wind speeds have reached 70 mph through the Walk-In Entrance and 35 mph through the Natural Entrance.<sup>42</sup> This high airflow indicates that a greater portion of the cave remains to be discovered (*Figure 3-67 /2R-18*).<sup>43</sup>

#### SUBTERRANEAN LAKES

Several subterranean lakes occur at the cave's lowest level. These lakes are apparently static, with no water visibly flowing in or out, and no sedimentary deposits that would indicate water flowing down from the surface. Small streamlets of flowing water, however, have been found up-dip from the lakes. Windy City Lake, whose surface sits at 3,601 feet above sea level, is the lowest point in Wind Cave, and the largest known body of water in any Black Hills cave.<sup>44</sup>

#### SPELEOTHEMS<sup>45</sup>

Speleothems, or cave formations, are mineral deposits formed by precipitation from mineral-saturated fluids, usually as the result of excess carbon dioxide diffusing from the fluids into the air. Wind Cave is classified as a dry cave, meaning that there is little free-flowing water. However, there is moisture— infiltration water drips throughout the cave, particularly below, or

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<sup>41</sup> NPS, *Handbook 104*, 27.

<sup>42</sup> Palmer, *Wind Cave: An Ancient World Beneath the Hills*, 21.

<sup>43</sup> The Draft Cave and Karst Resource Management Plan mentions that Dr. Andreas Pflitsch has installed ultrasonic anemometers to study airflow into the cave, and that Noah Daniels "used more accurate instrumentation to calculate the total volume of Wind Cave," 24.

<sup>44</sup> Palmer, *Wind Cave: An Ancient World Beneath the Hills*, 29.

<sup>45</sup> This section summarized from Palmer, *Wind Cave: An Ancient World Beneath the Hills*.

down-dip, from the surface drainages. Many of the speleothems were formed by this water. Certain types of speleothems at the lakes were formed as water evaporated from the lakes, rose, condensed on cave walls, and flowed back into the lake while carrying minerals with it. These minerals are deposited as speleothems; their shape and orientation are controlled primarily by ambient moisture, amount of minerals in the solution, and localized rates of evaporation. The following list of speleothems found in Wind Cave is organized from the wettest environment to the driest, roughly corresponding from lowest elevations to highest.

Calcite crystal linings were originally formed beneath pools of supersaturated, standing water that later drained away. Good examples occur in the Calcite Jungle, south of the Club Room.

Calcite rafts are paper-thin sheets of calcite that crystallized on the surface of standing pools of water, especially where limestone dust has settled. Good examples occur at Calcite Lake.

Dripstone and Flowstone are calcite deposits formed by drops, thin films, or trickles of water. These formations commonly include stalactites, stalagmites, columns, draperies, and flowstone. These types of speleothems frequently occur beneath surface drainage and are usually only found in the upper levels of Wind Cave. Flowstone and soda straws occur at Sampson's Palace on the Natural Entrance Tour Route; flowstone also occurs on the Corkscrew Stairs on the Garden of Eden Tour Route.

Helictite Bushes are bushy growths that twist and branch, formed by water drawn by capillary action through tiny tubes. Most helictites in Wind Cave are found in the lower level to the northwest and southeast of the Club Room.

Popcorn is a local term for globulites, little pearly clumps of calcite formed either by small amounts of water uniformly seeping out of the cave walls, or by a thin film of water resulting from the splashing of drips. Popcorn is common throughout the cave, particularly in the Middle Level. It frequently grows along the edges of boxwork (*Figure 3-68 /CB-03*).

Frostwork is comprised of needles of aragonite (another mineral formed in calcium carbonate but as small needles) that grow from popcorn, boxwork, or bedrock. Frostwork is most abundant on porous dolomite, especially in places where evaporation is most intense, such as areas deep in the cave or constricted passages where air movement is greater than normal. Good examples occur in the Garden of Eden.

Moonmilk is formed from microscopic crystals of hydromagnesite which form in dry, breezy areas. Moonmilk is pasty when wet, powdery when dry.

Recrystallized gypsum forms as starbursts of radiating crystals of gypsum, also known as cave flowers, or clusters of gypsum needles. This speleothem occurs in the driest parts of the cave, precipitating from sulfate-rich waters that acquired ions from existing gypsum in the surrounding rocks. Some secondary gypsum is also formed by the weathering of pyrite within the Pahasapa Limestone.

Boxwork is comprised of long, sub-parallel, intersecting sets of calcite blades projecting from the cave walls. These are calcite veins that have replaced gypsum that formerly crystallized in

fractures in the surrounding rock and was subsequently attacked by hydrogen sulfide and sulfuric acid, weathering the bedrock to powder, leaving the calcite fins remaining, and creating a random series of small compartments. Boxwork is common in the dolomite beds of the middle Pahasapa Formation, but entirely absent in the limestone above. The Wind Cave boxwork is reputed to be the best developed in the world, and the Elks Room and the Post Office provide excellent examples (*Figure 3-69 /CC-17*).

#### WEATHERING DEPOSITS<sup>46</sup>

The cave contains numerous features related to the residue of weathering, from powdery wall coatings to sandy cave sediment, and large collapse features known as breakdown. In addition, the upper part of the Pahasapa Formation contains paleokarst, an ancient, buried surface of filled-in sinkholes and caves. Much of the cave follows these paleo-filled passages, often partially removing the debris.

Wall coatings are colorful powders that cover some of the cave walls. Their yellow, pink, and brown hues come from weathered iron oxides. These coatings formed when hydrogen sulfide and sulfuric acid reacted with dissolved iron in water, producing pyrite within a porous mass of limestone and dolomite. Once it was exposed to air, the limestone and dolomite crumbled into powder and the pyrite altered into iron oxides. Near the Beauty Parlor are good examples of colorful wall coatings from the weathering of iron-rich dolomite.<sup>47</sup>

Cave sediment includes sand, silt, and clay that has been redistributed downward as the water level fluctuated up and down during the most recent stage of cave development. Some of the fine sediment dissolves away, while some re-precipitates as cemented crusts.

Breakdown refers to piles of rubble from the collapse of cave roofs, including large boulders, slabs, and associated loose material. Cave roofs can become unstable after being drained of water and deprived of accompanying hydrostatic support. Club Room and Half Mile Hall contain some very large fallen blocks of ceiling rock. Much of the rubble adjacent to the tour routes in Wind Cave was generated by workers enlarging the tunnels.

Paleokarst consists of ancient, truncated cave systems, often filled with geological debris. The upper contact of the Pahasapa with the overlying Minnelusa Formation is an ancient karst surface, a former area of sinkholes and caves, many of them subsequently filled with boulders, sand, silt, and clay. The Club Room, located along a fault, contains reddish Pennsylvanian-age cave fill, and the Bachelor's Quarters has good examples of early cave openings now filled with red, limy sediment.

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<sup>46</sup> This section summarized from Palmer, *Wind Cave: An Ancient World Beneath the Hills*.

<sup>47</sup> Palmer, *Wind Cave: An Ancient World Beneath the Hills*, 28.

## CAVE BIOTA

According to the GMP/EIS very little is known about the biota of Wind Cave. Work in 1959 by the National Speleological Society on a small section of the cave found three species of cave-adapted invertebrates, including a species of springtail (*Collembola*) that, at that time, was “either the first collection of the genus outside of Mexico or an entirely new genus.”<sup>48</sup> Wood rats and mice utilize the cave. Very few bats inhabit the cave, although bat scratches show that they have utilized the cave heavily in the past. A green alga grows on the surface of rocks in areas illuminated by the cave’s lighting system. The draft “Cave and Karst Resource Management Plan” mentions the possible presence of chemoautotrophic bacteria, making Wind Cave “a candidate for supporting one of the world’s few ecosystems which is independent of photosynthesis.”

According to the “Cave and Karst Resource Management Plan,” Dr. John Moore is conducting a study of how cave tours impact the biota, and the Biotechnology Institute of Western Kentucky University has begun a project investigating microbial diversity in the cave using DNA fingerprinting.

## FOSSILS

Beds of Mississippian-age invertebrate marine fossils are found near the base of the upper Pahasapa member and the top of the middle Pahasapa member. Commonly encountered fossils include clam-like brachiopods, gastropods, and colonial tabulate corals such as *Aulopora*. Fossils are readily visible in the cave ceilings in the passages between the Elks Room and the Fairgrounds.<sup>49</sup>

## CULTURAL IMPACTS

Physical modification of the passages along the tour routes is evident in blasted and chiseled out trails, concrete paving, and rubble dumped into side passages, along with discarded asphalt, wood, and concrete. In the years since the cave was opened, countless speleothems have been removed by promoters and visitors.

Cave environmental conditions are highly sensitive, and tour groups cause variations in air temperatures, moisture, and chemistry, and leave behind waste material such as lint, hair, and shoe rubber. Electrical systems add heat to localized environments and encourage growth of algae.

Surface activities also impact the cave. The parking lot, houses, and sewer system are built directly over the cave, and some cave passages are only a few feet below the surface. High nitrate levels have been found in cave water beneath the Historic Housing Area, and chloroform, toluene, acetone, benzene, styrene, methyl isobutyl ketone, ortho-xylene, para-xylene and caffeine have been detected in the cave. The “Cave and Karst Resource Management Plan” states:

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<sup>48</sup> NPS, GMP/EIS, 48.

<sup>49</sup> Palmer, *Wind Cave: An Ancient World Beneath the Hills*, 28

Portions of Wind Cave are located down-dip from a fault that passes through the Mixing Circle, a park storage area. Some materials discarded at the Mixing Circle have been dumped directly into an intermittent stream that follows this fault. A slash burn pile is located near this same drainage. Historically, treated fence posts were burned at this site and metals, arsenic, and Penta were found in cave drip waters down-dip from this site.<sup>50</sup>

## LAND USE

Use of the cave includes:

- **Recreation:** The cave's use as a tourist attraction lures approximately 80,000 to 100,000 visitors each year. A variety of tours, including a candlelight tour and a caving tour, provides visitors with their choice of experiences.
- **Interpretive:** The tours interpret many aspects of the cave environment, including geological processes that formed the cave, the resulting “underground wonderland,” and the early historic development associated with the cave.
- **Utility:** The utilities located in the cave consist of electrical lines and lighting fixtures, as well as telephone lines and boxes.
- **Scientific documentation and research:** Various documented and scientific investigation activities occur in the cave and include cave surveying, environmental monitoring, and other research.

## SPATIAL ORGANIZATION

The spatial organization of the cave system is shaped by the forms of the natural passages and rooms. These passages and rooms can be characterized as a mazelike, three-dimensional framework exhibiting considerable horizontal variation that reflects the layering in the Pahasapa Limestone. Passages branch off both horizontally and vertically (*Figures 3-70 /CA-03, 3-71 /CA-07*).

Rooms and passages in the uppermost member of the Pahasapa Formation are vaulted with smooth, rounded walls and ceilings that are indented with round hollows. The Garden of Eden is a typical room in this part of the Pahasapa. It has a vaulted ceiling supported by quartz-lined pillars and popcorn adorning the walls (*Figure 3-72 /CB-21*).

The middle member of the Pahasapa contains varied passages and rooms: near the top they are low and wide, in the middle they are complex and irregular with ledges and niches, and at the bottom they are high and narrow. The Fairgrounds represents a typical room in the upper part of the middle member. The room is wide, but without pillars, its broad, flat ceiling is formed by a rigid layer of resistant chert. The Assembly Room represents a typical room in the middle part of

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<sup>50</sup> NPS, “Cave and Karst Resource Management Plan,” 26.

the middle member, with projecting ledges and extensive boxwork on the ceilings and walls. The middle level is where most of the public trails are located (*Figure 3-73 /CC-13*).

Passages and rooms in the lowest level are high, narrow fissures that follow fractures such as joints and faults, and extend for long distances in straight lines. Blue Grotto, on the Fairgrounds Tour, dips into the lower middle level. Most of the lower middle level is not open to the public.

## CIRCULATION

The cave's circulation network, like its spatial organization, is controlled by natural passages and rooms. Most of the public trails are located in the middle member of the Pahasapa Formation and cover less than one percent of the cave's area. At the present time, the park offers three different year-round guided tours on paved trails totaling 0.76 miles, and two tours on unpaved trails totaling 0.61 miles. Limited areas of the cave are wheelchair accessible via the elevator.

Following are descriptions of the various cave tours offered in Fiscal Year 2004. The numbers in parenthesis after each tour name reflect the percentage of visitors surveyed who took the various cave tours.<sup>51</sup>

The Natural Entrance Tour (55% of visitors) covers 1/2 mile and lasts approximately 1-1/4 hours. The tour begins near the Natural Entrance, where visitors enter through a revolving door airlock and the historic CCC-era door. After descending three flights of steps, the tour proceeds south-south-eastwardly to the Lower Elevator Landing, covering a linear distance of about 1,400 feet. Along the way, the trail passes through the North Room (a.k.a. Bridal Chamber, 3,983 ft. above MSL), Crystal Palace, Post Office (3,960 ft. above MSL), Roe's Misery, Beauty Parlor, Devils Lookout (3,931 ft. above MSL), Methodist Church, Model Room (a.k.a. Oddfellows Hall), Crossroads (3,885 ft. above MSL), then through the Giants Stone Quarry to the elevators shaft. The tour showcases the abundant boxwork in the middle member of the Pahasapa Limestone. There are 300 stairs, mostly traversing down.

The Fairgrounds Tour (24% of visitors) covers 1/2 mile in approximately 1-1/2 hours and is the most strenuous of the paved-trail tours, with over 450 stairs. The tour enters the cave via the Lower Elevator Landing and consists of a long loop before exiting back again via the elevator. Along the way the trail passes through the Temple, Elks Room (3,911 ft. above MSL), Chert Room, Fairgrounds (3,967 ft. above MSL, the largest room open to the public), and the Bachelor's Quarters. This tour features large rooms with popcorn and frostwork in the upper member of the Pahasapa and boxwork in the middle member.

The Garden of Eden Tour (17% of visitors) is the least strenuous of the routes, covering less than 1/4 mile and lasting about one hour, with about 150 stairs. This tour begins at the middle elevator landing and loops through a series of upper level rooms, including the Garden of Eden and the Eastern Star Room, ending up back at the middle elevator landing. This tour, which features popcorn, frostwork, and flowstone, is recommended for people with limited time or abilities.

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<sup>51</sup> NPS, "Draft Long-Range Interpretation Plan," 18.

All three of these tours use hard-surfaced trails approximately four feet wide. Trails on these tours are cut into the stone and/or filled with concrete to smooth them out (*Figures 3-74/CA-15 and 3-73/CC-13*). Some are lined with stones and some have been blasted to increase accessibility (*Figures 3-75 /CB-19 and 3-66*). Due to the three-dimensional nature of the cave, there are numerous sets of stairs and ladders (*Figure 3-76 /CB-13*). Steps with punched-metal treads painted yellow and set in concrete are commonly employed (*Figures 3-70 /CA-03 and 3-71 /CA-07*).

In addition to the three regular tours, the park also offers two other tours that are somewhat more strenuous and follow unsurfaced trails.

The Candlelight Tour (2% of visitors) requires some bending and stooping along a partially developed trail with no electrical lighting. This tour takes two hours to cover one mile. It starts at the lower elevator and proceeds to the Three Way Stairs, continuing north through the Blue Grotto (3,835 ft above MSL) to the Chamber de Norcutt and the Catacombs, where stairs lead to the Pearly Gates. From there the route returns to the Catacombs then to the Council Chamber and the Badlands. Along the way there are wooden ladders and fitted-stone walkways (*Figures 3-77 /CC-23 and 3-78 /CC-24*).

The Wild Cave Tour (1% of visitors) involves extensive crawling and some climbing through passages without trails or electrical lighting. Footing is often tricky. The Wild Cave Tour starts at the Lower Elevator Landing, passes through the BePaDoBeDe Room, the Muddle Room, and Rome.

The Special Tours (1% of visitors) are offered for visitors with limited mobility. These tours start at the Lower Elevator Landing and visit the Assembly Room.

## VIEWS AND VISTAS

The views within the cave are made possible by artificial illumination. Lighting helps visitors find their way and highlights cave features. NPS tour guides also use flashlights and candles to light aspects of the cave as they lead tours. Views are generally associated with large open spaces or rooms illuminated with artificial lighting.

## STRUCTURES

There are only a few structures within the cave. A double-shaft elevator system descends to two stops within the cave. The elevators are enclosed in a concrete shaft and at each stop the entrances are enclosed by a concrete masonry unit antechamber that acts as an airlock (*Figures 3-79 /CB-16 and 3-80 /CB-17*). The antechambers have a concrete floor.

Other structures include concrete reinforcing pillars and a concrete and chain link stabilizing structure bolted to the bedrock (*Figures 3-81 /CA-05 and 3-82 /CB-01*).

## SMALL-SCALE FEATURES

Small-scale features within the cave include components of the lighting system, hand rails, emergency telephones, graffiti, survey markers, construction debris, early explorer artifacts, trash receptacles, benches, and a timber ladder. Lighting units and wires are ubiquitous along the tour routes (*Figures 3-83 /CC-08*). Transformer boxes are usually located in a side passage or area hidden with a metal gate themed to appear as stone (*Figure 3-84 /CA-16*). These metal gates and some sections of wiring have been covered with concrete or piles of stone to blend into the cave (*Figure 3-85 /CB-06*). Emergency telephones are also located along tour routes (*Figure 3-86 /CC-04*). Stair railings are also found along the cave steps and in steep areas (*Figures 3-70 and 3-74*). A set of aluminum steps serves as an emergency escape route for visitors in the Garden of Eden area (*Figure 3-76*).

Historic and non-historic graffiti has been smoked and written on the walls or ceilings of the cave and paint or metal survey markers are also present (*Figures 3-87 /CB-12, 3-88 /CC-02, and 3-89 /CC-03*). The developed portion of the cave features debris from the cave's several development eras, including asphalt, concrete, stone blasted to enlarge passages, wood boards, electrical equipment, and other materials workers did not want to carry out of the cave. These piled materials are along walks, used to cover electrical wire, thrown in voids, piled in rooms and passages, and sometimes enclosed with concrete to appear like a natural part of the cave (*Figures 3-90 /CB-04 and 3-85*). The NPS is currently attempting to evaluate and remove some of the material, particularly asphalt, wood, and concrete. They are also removing blasted stone to re-open passages. Dust and earth removed from surfaces along the trail often reveal extensive formations that had been obscured (*Figure 3-91 /CB-07*). Early cave explorer artifacts—including string, candles, wax drippings, newspapers bottles, and matchsticks—can also be found.

Other small-scale features include chain link fencing, trash receptacles, a wood board ladder along the Candlelight Tour, and three long wood board and steel benches set in concrete in the Fairgrounds (*Figures 3-81 and 3-92/CC-14*).

## POTENTIAL ARCHEOLOGICAL RESOURCES

Cultural materials found on the surfaces and buried beneath debris should be viewed as potential archeological resources. The cultural material that have been encountered and removed have been placed into the park's museum collection, discarded, or left in place in the cave. Cultural materials include wood fragments; metal fragments; imported construction materials including concrete and asphalt; remnants of electrical systems; and various items deposited, lost, or buried by workers, staff, and visitors over time since the initial period of exploration.

The remaining buried or partially buried items, artifacts, and other cultural materials that have been left within the cave should be viewed as having the potential for information value regarding the human occupation and interventions within the cave.