HISTORIC STRUCTURES REPORT

Rattlesnake Springs Ranger Residence and Pump House

National Park Service | *June 2022*

Architecture
Planning
Conservation



Architectural
Resources Group

Signature Page

PREPARED BY:
Architectural Resources Group, Inc.

RECOMMENDED BY:

Erin Gearty
Cultural Resources Program Manager

7/14/2022
Date

CONCURRED BY:

Herb Dawson
Regional Historical Architect

7/15/2022
Date

APPROVED BY:

CARMEN CHAPIN
Digitally signed by CARMEN CHAPIN
Date: 2022.07.15 08:36:27 -06'00'

Carmen Chapin
Superintendent

Date

CLIENT:

National Park Service
Carlsbad Caverns National Park
3225 National Parks Highway
Carlsbad, NM 88220

Carmen Chapin
Superintendent

Claire M. Roberson
Contracting Officer

Herb Dawson
Contracting Officer's Representative/
Project Manager

Erin Gearty
Cultural Resources Program Manager

PRIME ARCHITECT:

Architectural Resources Group, Inc.
Pier 9, The Embarcadero, Suite 107
San Francisco, CA 94111

Kitty Vieth, AIA, LEED AP
Principal-in-Charge

Alicia Virani
Project Manager

Sarah Hahn
Senior Architectural Historian

Stacy Farr
Architectural Historian

Mayank Patel
Architectural Conservator

Mei Yang
Technical Drafter

ARG #190636.16

LANDSCAPE ARCHITECT:

FiLL Landscape Architecture
1342 W. Oak Street
Fort Collins, CO 80521

Phil Hendricks, Jr.
Principal

CIVIL ENGINEER:

Provost & Pritchard
Consulting Group
286 W. Cromwell Avenue
Fresno, CA 93711

Rod McNeely, PE
Principal

STRUCTURAL ENGINEER:

SOHA Engineers
48 Colin P. Kelly Street
San Francisco, CA 94107

Larry Chambers, PE
Senior Project Manager

MECHANICAL, PLUMBING,
FIRE PROTECTION ENGINEER:

Interface Engineering
1999 Harrison Street, Suite 550
Oakland, CA 94612

Rick Russell, PE
Principal

Dominic Pedotto, PE
Project Engineer

ELECTRICAL ENGINEER:

O'Mahony & Myer, Inc.
4340 Redwood Highway, Suite 345
San Rafael, CA 94903

Pieter Colenbrander, PE
Principal

Architectural
Resources Group

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Section One

Study Summary

INTRODUCTION

Architectural Resources Group (ARG) has prepared this Historic Structure Report (HSR) for the Rattlesnake Springs Ranger Residence and Pump House at the request of the National Park Service (NPS). The HSR documents the evolution of both buildings and their existing conditions, provides a summary of significance and integrity, outlines historic preservation objectives, and provides recommendations for an overall treatment approach. This document serves to inform future planning efforts for the buildings as NPS evaluates options for rehabilitation and continued use.

The Rattlesnake Springs Ranger Residence was constructed in 1940 by the Civilian Conservation Corps, and an addition was completed in 1942. The Pump House was constructed in 1935 as part of a Public Works Administration project and expanded in 1940 by the Civilian Conservation Corps. Both buildings were designed by NPS architects. The buildings are contributors to a National Register of Historic Places (NRHP) historic district (listed as Rattlesnake Springs Historic District in 1988). The historic district is listed under Criterion A and C in the areas of exploration/ settlement, landscape architecture, architecture, historic archeology, agriculture, and the PWA program. The period of significance was broadly assigned as 1800-1899 and 1900-1943.

The statement of significance developed in the 1988 National Register nomination form reads:

> "The Rattlesnake Springs Historic District is significant under both Criterion A and C as a landscaped Chihuahuan Desert oasis reflecting architecture of the National Park Service and the Civilian Conservation Corps executed under Public Works Administration programs of the Depression Era, and incorporating landscaped and horticultural features of the homesteader of the land at the spring. The oasis has been reshaped and terraced, watered, planted, and tended by man for more than a hundred years. Since the occupation of homesteader Henry Harrison in 1880, Rattlesnake Springs has been transformed from a treeless, marshy drainage filled with rushes, into a wooded park setting containing structural features built between 1934 and 1940 that are significant in design and craftsmanship as fine examples of the adaptation of historic southwestern building styles and materials to the "rustic" mode popular for park architecture of the period.
>
> The homestead house site is significant under Criteria D as a site likely to yield important historical information."[1]

CONTENTS OF THE HISTORIC STRUCTURE REPORT

The contents of this HSR comply with NPS Director's *Order 28: Cultural Resource Management Guideline,* Chapter 8 and *Preservation Brief 43: The Preparation and Use of Historic Structure Reports.* This HSR conveys information about the design and construction of the Ranger Residence and Pump House in two main sections: 1) Developmental History and 2) Treatment and Use. The Developmental History section comprises a chronology of development and use; a historical background and context; a physical description and a list of character-defining features and

1 Swanson, National Register Nomination, Rattlesnake Springs Historic District, Section 8, Page 1.

materials; and a discussion of significance. This section also provides a comprehensive analysis of the building's interior and exterior conditions, and examines the building's structural, mechanical, electrical, fire protection, and plumbing systems.

The Treatment and Use section provides a comprehensive set of recommendations for the building. The proposed treatment was developed in accordance with *The Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for Preserving, Rehabilitating, Restoring, and Reconstructing Historic Properties (The Standards).*

PROJECT GOALS

According to National Park Service Preservation Brief 43, an HSR provides documentary, graphic, and physical information about a property's history and existing conditions. Broadly recognized as an effective part of preservation planning, an HSR also provides a thoughtfully considered argument for selecting the most appropriate approach to treatment prior to the commencement of work and outlines a scope of recommended work. The report serves as an important guide for all changes made to a historic property during preservation, rehabilitation, restoration, or reconstruction.

METHODOLOGY

The Rattlesnake Springs Ranger Residence and Pump House HSR has been developed using information gathered from meetings, interviews with interested parties, archival research, and field investigation. The methodology employed for this report meets the standards and requirements set forth in the following documents:

- NPS Director's Order 28: Cultural Resource Management Guideline, Chapters 7 and 8
- Preservation Brief 43: The Preparation and Use of Historic Structure Reports
- The Secretary of the Interior's Standards for the Treatment of Historic Properties
- National Register Bulletin 15: How to Apply National Register Criteria for Evaluation
- National Register Bulletin 39: Researching a Historic Property

Meetings

ARG attended an initial project meeting at the Rattlesnake Springs site with representatives from NPS on November 9, 2021. The project scope, objectives, coordination, schedule, information gathering, compliance process, and procedures were discussed at this meeting. Since that time, additional correspondence has been completed via conference call and e-mail on an as-needed basis with key NPS staff, ARG personnel, and ARG subconsultants in order to confirm direction on report development.

Background Research and Data Collection

ARG visited the Carlsbad Caverns National Park Maintenance Facility and the Carlsbad Caverns National Park Headquarters in Carlsbad, New Mexico in November 2021 to collect existing primary and secondary source documents related to the Rattlesnake Springs Ranger Residence and Pump House and their development over time. ARG also conducted research on the building using the NPS Technology Information Center's (TIC) online database (ETIC), the NPS Planning, Environment, and Public Comment (PEPC) website, and other resources. The archival materials collected include architectural drawings, historical photographs, superintendent's reports, maintenance and repair reports, and related correspondence.

Field Investigation and Condition Assessments

The project team, including ARG staff and subconsultants, conducted field investigations at Rattlesnake Springs in November 2021 to document existing conditions. ARG staff and subconsultants examined and photographed the existing setting, exterior, and interior conditions at that time.

Study Summary

RESEARCH FINDINGS

The Rattlesnake Springs site has been thoroughly documented over time, particularly through the National Register nomination for the Rattlesnake Springs Historic District, completed by Betsy Swanson in 1986 (certified in 1988), and the Cultural Landscapes Inventory for Rattlesnake Springs, completed by the National Park Service in 2004.

ARG has incorporated pertinent information from these documents into this HSR, updated information where relevant, and completed additional building-specific research to confirm and expand the historical record for the Ranger Residence and Pump House.

MAJOR ISSUES IDENTIFIED

The Ranger Residence and Pump House are generally in fair to good condition. Specific areas of deterioration and disrepair are further described in the Condition Assessment section of this report.

A major issue was identified at the roof structure of the Pump House. The roof beam at the north entry of the Pump House shows signs of extensive deterioration. The timber has extensive cracks, pockets, and shows signs of rot and is compromising the load carrying ability of the structural beam. In addition, some of the viga ends show signs of deterioration and rot.

RECOMMENDATIONS FOR TREATMENT AND USE

Rehabilitation is recommended as the overall treatment approach for the Ranger Residence and Pump House. All future work shall be carried out in accordance with *The Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for Preserving, Rehabilitating, Restoring, and Reconstructing Historic Buildings (The Standards).*

The scope of work recommended for rehabilitation of the Ranger Residence and Pump House includes repair of deteriorated features and renewal of the interior and exterior finishes. Each of the building systems also require improvements, including civil, landscape, structural, mechanical, plumbing, and electrical upgrades.

Section Two

Administrative Information

BUILDING INFORMATION

Original Name:	Employee's Residence (Building 22), Light Plant addition to residence (Building 37), Pump House (Building 20)
NPS Preferred Structure Name:	Rattlesnake Springs Residence and Pump House
Current Name:	Rattlesnake Springs Ranger Residence and Pump House
NPS Structure Number:	Residence (Building 22), Light Plant addition to residence (Building 37), Pump House (Building 20)
Cultural Resource Inventory System – Historic Structures (CRIS-HS)/Legacy LCS Number:	Rattlesnake Springs Residence (061750), Pump House (061751)
Location:	Carlsbad Caverns National Park, Eddy County, New Mexico
Construction Date:	1935/1940/1942
Architect:	National Park Service: Ken Saunders/Del Jones/ Trent Thomas
Landscape Architects:	National Park Service
Contractor:	Civilian Conservation Corps
Historic Use:	Residence, Pump House
Current Use:	Residence, Storage
Designations:	Contributors to Rattlesnake Springs Historic District (certified 1988)

PREVIOUS DOCUMENTATION AND STUDIES

For the preparation of this HSR, ARG reviewed several sources (listed in the Bibliography) including the following key documents:

- Betsy Swanson, "Rattlesnake Springs Historic District, National Register nomination form, 1986 (certified in 1988).
- National Park Service, "Cultural Landscapes Inventory for Rattlesnakes Springs," 2004.
- Hal K. Rothman, *Promise Beheld and the Limits of Place: A Historic Resource Study of Carlsbad Caverns and Guadalupe Mountains National Parks and the Surrounding Areas,* 1998.

Additional information (historical photographs, maintenance records, and architectural drawings) was obtained electronically from NPS staff and onsite at the Carlsbad Caverns National Park Maintenance Facility and the Carlsbad Caverns National Park Headquarters archives in Carlsbad, New Mexico.

Section Three

Historical Background and Context

INTRODUCTION

The historical overview below is adapted from the National Register nomination for the Rattlesnake Springs Historic District, completed by Betsy Swanson in 1986 (certified in 1988); *Promise Beheld and the Limits of Place: A Historic Resource Study of Carlsbad Caverns and Guadalupe Mountains National Parks and the Surrounding Areas,* completed by Hal K. Rothman in 1998; and the Cultural Landscapes Inventory for Rattlesnake Springs, completed by the National Park Service in 2004. ARG has revised, condensed, and updated narrative components of these reports for the purposes of this study. Additional information is included from documents provided by the National Park Service, such as drawings and maintenance records, and from site work and archival research conducted by ARG in November 2021 at Carlsbad Caverns National Park and Carlsbad Caverns National Park Headquarters in Carlsbad, New Mexico.

RATTLESNAKE SPRINGS HISTORICAL OVERVIEW

Rattlesnake Springs is one of a series of natural springs around the base of the Guadalupe Mountains which span the border between New Mexico and Texas. Archeological investigations indicate that the area experienced human visitation as early as the Archaic period (1000BCE).[1] By at least the fourteenth century, indigenous groups were hunting, gathering, and farming along streams in the western tributary drainages of the Pecos River, where Rattlesnake Springs is located. The area served as a major north-south trade route, where Plains Tribes, including the Mescalero Apache who were nomadic hunters

1 National Park Service, "Cultural Landscapes Inventory, Rattlesnake Springs, Carlsbad Caverns National Park," 2004, 28.



Overview of Rattlesnake Springs area and view of Guadalupe Mountains, 1973 (National Park Service, CAVE Administrative Records Archive, Negative No. CACA 4651)

engaged in trade with Pueblo peoples, including Pecos, Rio Grande, and Salinas tribes. Large and relatively permanent camps tended to be located at freely flowing springs or streams, and Native American groups are likely to have camped in the area around Rattlesnake Springs during this era.[2]

Spanish exploration began in the Pecos River valley area in the sixteenth century, although the lack of any substantial valuable natural resources and distance from established settlements along the Rio Grande limited permanent settlement.[3] Explorers used the area as a travel corridor and for limited camping and trading sites. During this period, the Spanish military led slave raids against the Apache, which were met by retaliatory raids. Violent clashes continued until 1810 when a treaty assigned the Apache to territory between El Paso and the Sacramento Mountains.[4]

2 NPS, "Cultural Landscapes Inventory, Rattlesnake Springs," 28.
3 NPS, "Cultural Landscapes Inventory, Rattlesnake Springs," 28.
4 NPS, "Cultural Landscapes Inventory, Rattlesnake Springs," 28.

Mexico gained independence from Spain in 1821 and the area presently known as New Mexico became a province of Mexico. Twenty-five years after Mexican independence, the U.S. declared war on Mexico and claimed New Mexico as a U.S. territory. With the 1848 Treaty of Guadalupe Hidalgo, Mexico gave up all claims to the territory and ceded New Mexico and the rest of what is now the southwestern region of the United States. U.S. military forces remained active in the area for several decades, engaged in an effort to capture members of the Mescalero Apache tribe who had not yet been relegated to reservation land. Troops used Rattlesnake Springs as a camp and staging area for these campaigns into the Guadalupe Mountains.[5]

By 1849, Spanish and Mexican travelers had created a wagon road that followed the Black River from the Pecos River to the Guadalupe Pass and westward to El Paso del Norte on the Rio Grande. An 1849 map drawn by Robert Creuzbaur shows the established wagon road, as well as a spring corresponding with the approximate location of Rattlesnake Springs, labeled Ojo del Camino (Spring of the Road).[6]

In 1878, while on a scouting mission, Captain Thomas C. Lebo, 10th Cavalry, Commanding Company K, described Rattlesnake Springs as such:

> "Grazing here is very good; wood is scarce. The spring flows a very large stream of water which runs about one mile nearly due E. and empties into Black River, which at this point is a very large stream (an abundance of small fish)."[7]

The era of massive cattle drives in the west also began in the decades after the Civil War, and Rattlesnake Springs was located on the route of both the primary cattle drives, the Goodnight-Loving Trail, and the Slaughter Cattle Trail. The springs were likely used as a watering stop during these drives.[8]

An 1881 military map drawn by Captain W. R. Livermore and Topographical Assistant F. E. Butterfield continues to show the wagon road depicted in the 1849 map, but was the first map to identify Rattlesnake Springs by its present name.[9] This map shows the eastward route of the wagon road joining another road that followed the Pecos River to points north and east; the westward route was depicted joining the route known both as the Emigrant Trail to California and the Butterfield Trail (a stagecoach road) at Pine Springs and proceeding on through Guadalupe Pass towards El Paso. Emigrants traveling west along these established early roads undoubtably camped at Rattlesnake Springs.

HENRY HARRISON AND FIRST SETTLEMENT OF RATTLESNAKE SPRINGS

After passage of the Homestead Act of 1862, cattlemen and farmers began to establish homesteads in southeast New Mexico. In 1880, William Henry Harrison, with his wife Mary Jane Whitehead and two sons Harry and Frank, settled at Rattlesnake Springs. Harrison was born in 1848 in Tippecanoe, Indiana to a family that claimed relations to U. S. President William Henry Harrison.[10] He hunted buffalo in Texas as a young man, and eventually moved westward into present day New Mexico.

Harrison grazed cattle and horses, planted corn for cattle feed and grass for winter hay, and sold feed and cattle to the Army regiments that frequented the springs area during anti-Indian military campaigns. Along with Charles

5 NPS, "Cultural Landscapes Inventory, Rattlesnake Springs," 29.
6 Betsy Swanson, "National Register of Historic Places Inventory-Nomination Form- Rattlesnake Springs Historic District," completed for the National Park Service, 1988 (certified), Section 8 Page 1.
7 Swanson, National Register Nomination, Rattlesnake Springs Historic District, Section 8 Page 1.
8 Swanson, National Register Nomination, Rattlesnake Springs Historic District, Section 8 Page 2.
9 Swanson, National Register Nomination, Rattlesnake Springs Historic District, Section 8 Page 1.
10 Swanson, National Register Nomination, Rattlesnake Springs Historic District, Section 8 Page 2.

Slaughter, who operated a nearby ranch, Harrison is credited as one of the first persons to establish a cattle ranch in the region.[11] Harrison received ownership of the area through two homestead patents: one for 160 acres in 1889, and the other, also for 160 acres, in 1912.[12]

In 1881, Harrison began to construct the irrigation system that still exists at Rattlesnake Springs. He fenced the property, increased the flow of the springs, enlarged the pond, and dug six-and-a-half- foot wide shallow irrigation ditches.[13] The system consisted of north and south loops, each feeding from the springs pond, with a lateral offshoot that watered a small orchard to the south. The irrigation system at Rattlesnake Springs is broadly regarded as the oldest irrigation system in continuous use in the region. Harrison registered the system with the State of New Mexico in 1921 as the "Harrison Ditch System," which remains its legal name.[14]

Harrison used his irrigation system to reshape the landscape of Rattlesnake Springs, away from its historic character as a treeless marshland bordered with grass and into the treed, verdant character it retains in the present day. He used the land for farming and ranching, grew hay and corn for stock, established an orchard, and cultivated a vegetable garden. He also constructed fences and buildings including a five-room adobe house and a garage, located about 200 feet northeast of the springs pond.[15] Buildings from this era are no longer extant at the site.

In 1892, Harrison married Ida May Ward, and together they had four children, Ernest, Zula, Carrie, and Hazel. Harrison died in 1931, leaving a heavily mortgaged property to his second wife and children.[16]

11 Swanson, National Register Nomination, Rattlesnake Springs Historic District, Section 8 Page 2.
12 NPS, "Cultural Landscapes Inventory, Rattlesnake Springs," 23.
13 NPS, "Cultural Landscapes Inventory, Rattlesnake Springs," 29.
14 Swanson, National Register Nomination, Rattlesnake Springs Historic District, Section 8 Page 2.
15 NPS, "Cultural Landscapes Inventory, Rattlesnake Springs," 29.
16 William Henry Harrison in the New Mexico, U.S., Deaths, 1889-1945, accessed December 29, 2021 at www.ancestry.com.



Rattlesnake Springs ca. 1934, prior to development by the National Park Service (National Park Service, Negative No. CACA 6459)

CARLSBAD CAVERNS NATIONAL PARK AND FEDERAL OWNERSHIP

President Calvin Coolidge established Carlsbad Cave National Monument through presidential proclamation on October 25, 1923, and the federal government designated the area as Carlsbad Caverns National Park in 1930.[17] In January 1935, the federal government purchased a portion of Harrison's property and water rights with the intention that the springs would serve as a water source for Carlsbad Caverns National Park, six miles to the northeast.[18] The work was administered by the Public Works Administration and at the outset provided employment for sixty-four men.[19]

In 1934, the area around the spring was partially wooded with a fruit orchard, and cottonwood and willow trees along the irrigation ditches and spring drainage. The

17 Architectural Resources Group (ARG), "Historic Structure Report, Superintendent's Building, Carlsbad Caverns National Park," completed for the National Park Service, 2020, 9.
18 "Park to Get Fresh Water," *Carlsbad Current-Argus*, January 4, 1935, 1.
19 NPS, "Cultural Landscapes Inventory, Rattlesnake Springs," 31; "Water Line Work Starts," *Carlsbad Current-Argus*, January 20, 1935, 1.

terraced landform presently located alongside the spring draw may have also been associated with Harrison's agricultural work.

The first National Park Service development at Rattlesnake Springs was demolition and clearance of the homestead structures, and construction of a concrete spring house to hold the turbine sump pump and send water to a new pump house via a subsurface pipe.[20] The new pump house was designed by an unidentified architect of the National Park Service's Western Region Office in San Francisco with the initials G. F. G.[21] The building is designed in the Pueblo Revival style, had a rectangular one-room footprint, and was constructed of limestone masonry blocks with concrete floors and roof. The interior and exterior walls were covered with stucco, and interior walls were further finished with plaster and painted with oil-based paint.[22] A diversion dam at the northwest corner of the property, believed to have originally been constructed by Harrison, was also rebuilt and repaired. This phase of work was completed in 1935.[23]

In addition to providing water for Carlsbad Caverns, terms of the National Park Service's acquisition of Rattlesnake Springs required that a certain amount of water continue to be used to irrigate approximately twenty acres of existing land extending east from the springs towards to Black River.[24] In 1938, the Civilian Conservation Corps (CCC) established a camp at Rattlesnake Springs and commenced landscape work at this irrigated land.

The CCC was established by Congress on March 31, 1933 to provide jobs for young, unemployed men during the Great Depression. The young men, often referred to as enrollees,

20 NPS, "Cultural Landscapes Inventory, Rattlesnake Springs," 31.
21 National Park Service, "List of Classified Structures, Carlsbad Caverns National Park," 1994. In the collection of CAVE Headquarters Archives.
22 National Park Service, building plans in the collection of CAVE Headquarters Archives; Swanson, National Register Nomination, Rattlesnake Springs Historic District, Section 7, page 6-7.
23 NPS, "Cultural Landscapes Inventory, Rattlesnake Springs," 31.
24 NPS, "Cultural Landscapes Inventory, Rattlesnake Springs," 2.



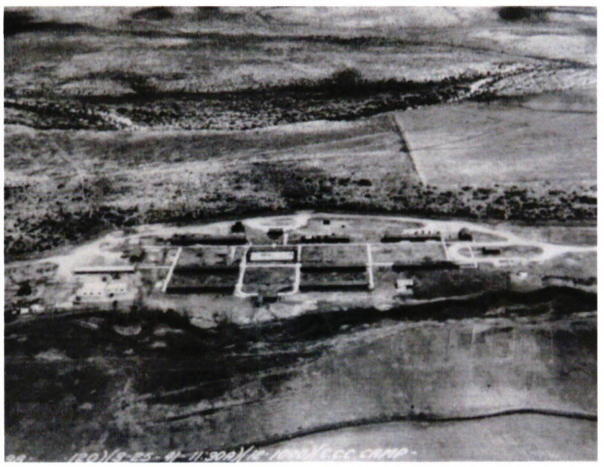
Water system development at Rattlesnake Springs, May 1935, with foundation of Pump House under construction in foreground (National Park Service, Negative No. 7437)

were enlisted to complete work programs intended to improve public lands including state and national parks. The CCC camp at Rattlesnake Springs consisted of a central parade ground surrounded by buildings, including four barracks that housed sixty-two men, a school, recreation hall, kitchen and mess hall; and storage facilities.[25]

Operated by the U.S. Army, the CCC camp at Rattlesnake Springs was designated Camp NP-1-N (Company #831).[26] Construction work was supervised by technicians from the NPS Regional Office in Santa Fe, including Project Superintendent Arthur V. Reed, Architectural Foreman Charles McPhee, Engineer Joseph Gunn, Landscape Architect Zenon Baclawski, and Construction Foreman Eugene Scanlon. Sixty-two men were enrolled at the camp. Working together, this team executed projects both at Rattlesnake Springs, as well as projects at the headquarters area of Carlsbad Caverns.[27]

At Rattlesnake Springs, superintendents' reports show that corps workers lined the pond with limestone masonry

25 CCC Legacy website, "CCC Camps in New Mexico," https://ccclegacy.org/CCC_Camps_New_Mexico.html (accessed may 18, 2022).
26 Swanson, National Register Nomination, Rattlesnake Springs Historic District, Section 8, page 5.
27 Swanson, National Register Nomination, Rattlesnake Springs Historic District, Section 8, page 5-6.



Aerial view of CCC camp at Rattlesnake Springs, 1941
(National Park Service, CAVE Administrative Records Archive)

walls and made its shape more rectangular.[28] They expanded the irrigation system by adding a new diversion ditch and new iron headgates. A gravel service road with culverts was introduced, and the irrigated plots were graded and planted with grasses. Enrollees preserved, trimmed, pruned, and planted trees, including five rows of Rio Grande cottonwoods approximately eighty-five feet apart. Substantial road surface was added to the site, including parking areas and loops at the east and the north ends of the camp. Most of the landscaping completed at Rattlesnake Springs followed plans drawn by NPS Regional Landscape Architect Harvey Cornell.[29]

In 1940, CCC workers constructed the one-story residential building at Rattlesnake Springs, originally designated simply as employee's housing and intended to house the pump operator. The ranger division of Carlsbad Caverns National Park took over water pumping operations in 1948, after which the building became known as the Ranger Residence.[30] The building was designed by NPS regional architects Ken Saunders and Del Jones in the New Mexico

28 NPS, "Cultural Landscapes Inventory, Rattlesnake Springs," 31.
29 NPS, "Cultural Landscapes Inventory, Rattlesnake Springs," 31.
30 NPS, "Cultural Landscapes Inventory, Rattlesnake Springs," 24.



Ranger Residence, primary (south) and east façades ca. 1949
(National Park Service, CAVE Administrative Records Archive)

Territorial Revival style.[31] The building was constructed of adobe brick made by CCC workers, and finished with stucco cladding. An addition to the residence was constructed in 1942 to serve as a light plant; by 1950 the light plant equipment had been removed and the addition was in use as storage.

CCC workers also constructed an addition to the Pump House in 1940, giving the building the L-plan footprint it retains today. The addition was designed by NPS regional architect Trent Thomas of the NPS Southwest Regional Office. Construction was adobe brick and walls were finished with a cement stucco shelter coat.[32] The original Pump House was further altered by the removal of vigas at the roofline, which were sawed off to be flush with wall surface. The doors of the original Pump House were reused for the entry to the new addition.

The CCC camp was disbanded on May 22, 1942, and in March 1943, 117 soldiers from nearby Carlsbad Air Base arrived at Rattlesnake Springs to begin dismantling most of the buildings associated with the CCC camp and restoring the site.[33] The former camp was developed as a military recreation site and a swimming pool and tennis court were

31 Swanson, National Register Nomination, Rattlesnake Springs Historic District, Section 8, page 5.
32 NPS, "Cultural Landscapes Inventory, Rattlesnake Springs," 41.
33 Swanson, National Register Nomination, Rattlesnake Springs Historic District, Section 8, page 6.



Pump House following 1940 addition, primary (north) and east façades, ca. 1968 (National Park Service, CAVE Administrative Records Archive)

constructed.[34] The U. S. Army rerouted the original access road at the site around the pool to the north perimeter of the property, its current location. They also constructed parking areas and walkways, and fences to protect the residence, Pump House, and immediate surroundings.

In August 1944 most of the CCC camp buildings were removed and the materials relocated to an Army camp near Santa Fe.[35] The Army left Rattlesnake Springs in 1947, wherein the swimming pool was filled in as a safety precaution.[36] The last CCC camp building at the site was demolished in the 1950s and only a few rock formations and the rows of cottonwood trees remain at the camp location from this era of development.[37]

In 1954, the New Mexico Department of Game and Fish installed a levee for the construction of a duck pond on the east end of the property, at the site of the infilled swimming pool.[38] In the early 1960s, NPS removed most of the original orchard trees at the site as planted by

34 NPS, "Cultural Landscapes Inventory, Rattlesnake Springs," 32.
35 Swanson, National Register Nomination, Rattlesnake Springs Historic District, Section 8, page 6.
36 NPS, "Cultural Landscapes Inventory, Rattlesnake Springs," 24.
37 Swanson, National Register Nomination, Rattlesnake Springs Historic District, Section 8, page 6.
38 NPS, "Cultural Landscapes Inventory, Rattlesnake Springs," 32.



Press day picnic at the Ranger Residence, 1974 (National Park Service, CAVE Administrative Records Archive, Negative No. CACA 4798)

Henry Harrison, and planted new fruit trees along the road, abandoning much of the historic orchard location.[39] In 1964, the original mud-lined irrigation ditches laid by Henry Harrison were paved and reformed. Additional sitework completed by NPS during this era included construction of a fence around the entire unit boundary; construction of a concrete spill box for overflow at one planting terrace; extensive grading work on the irrigated plots, including construction of some levies; and planting of some irrigated plots with native grasses and alfalfa.[40]

A memorandum of understanding entered into in 1984 by the Nature Conservancy and the NPS agreed to prevent uses that might threaten wetland habitat, native flora and fauna. The use of the area for livestock grazing was terminated, and cultivation of hay and grasses was reduced. Horse grazing was also moved off the property in 1997.[41]

In 1988, the Rattlesnake Springs Historic District was listed in the National Register of Historic Places. District contributors include a broad range of buildings, structures, and objects representing about sixty years of development

39 NPS, "Cultural Landscapes Inventory, Rattlesnake Springs," 25.
40 NPS, "Cultural Landscapes Inventory, Rattlesnake Springs," 32.
41 NPS, "Cultural Landscapes Inventory, Rattlesnake Springs," 32.

at the site, and include the spring pond and spring house; the Pump House; the Ranger Residence; the creek; the irrigation ditches; original orchard site; pastures; the remains of the CCC camp; and Henry Harrison's homestead site. The primary use of the area is currently ranger housing and pump and irrigation system maintenance. The site is also used as a picnic ground, and a small comfort station was constructed ca. 1977 to support this use.

PUEBLO REVIVAL STYLE

The Pump House is designed in the Pueblo Revival style.

Similar to the concurrent Mission Revival style, the Pueblo Revival style draws on local historical precedents, including Native American pueblo architecture and Spanish Colonial architecture, reflecting the presence of Spanish-built churches at indigenous pueblos.[42] The style emerged in California in the 1890s but became most popular in the Southwest, specifically in Arizona and New Mexico.

Pueblo Revival style buildings are characterized by rectangular massing with flat roofs and flat or stepped parapets. Construction can be adobe, concrete block, or frame, but in most cases building corners are rounded or otherwise blunted and exterior walls are finished with irregular stucco texture. The hand-built appearance of Native American prototypes is often furthered by the use of rough-hewn vigas (roof beams), window lintels, and porch supports. Fenestration is generally recessed within the thickness of the adobe and stucco walls; windows can be double-hung or casement, in wood or metal. Stucco walls are generally colored or painted in earth tones.[43]

While the Pueblo Revival style was most commonly applied to residential and commercial architecture, in the late nineteenth and early twentieth centuries, historic revival styles were used by the National Park Service as an expression of the "rustic" ideal of design and craftsmanship, with the intended effect of "sympathy with natural surroundings and with the past."[44] Pueblo Revival style architecture was often used for structures in Southwest region parks.

NEW MEXICO TERRITORIAL REVIVAL STYLE

The Ranger Residence is designed in the New Mexico Territorial Revival style.

New Mexico was annexed to the United States as a territory in 1848 and became a state in 1912; the intervening sixty-four-year Territorial Period gave rise to unique cultural expressions marked by hybridity. Around the end of the Civil War, New Mexico Territorial style architecture emerged when arrivals from the east began to incorporate milled posts, moulded trim, pedimented lintels, and brick dentil cornices into existing regional Pueblo style architecture.

The overall effort to make buildings look more European resulted in hybrid Pueblo and Greek Revival style buildings with white columns and classical proportions. The style faded from popularity after the 1880s when the arrival of the railroad made Victorian architecture more popular. However, the style persisted in rural communities in the last decades of the nineteenth century and the early decades of the twentieth century, often in folk variations created by skilled builders and craftsmen.[45] For this reason, the style is sometimes considered to have remained in evolving but consistent use into the twentieth century period, and generally referred to as New Mexico Territorial Revival style.

Similar to all revival styles, New Mexico Territorial Revival style draws on historical precedents, in this case, as

42 Virginia Savage McAlester, *Field Guide to American Houses* (New York: Knopf, 2020) 543.
43 McAlester, *Field Guide to American Houses,* 543-546.
44 Albert H. Good, "Park and Recreation Structures, Part I, Administration and Basic Services Facilities," National Park Service, U. S. Government Printing Office, Washington D. C., 1938, 5.
45 Bainbridge Bunting and John P. Conron, "The Architecture of Northern New Mexico," NMA, September-October 1966, 21.

previously introduced, nearly directly from New Mexico Territorial style. The style was intended to celebrate the state's Territorial history and became popular for general residential architecture in New Mexico and specifically in Santa Fe, where it was extensively employed for state government buildings.

New Mexico Territorial Revival style buildings are characterized by rectangular massing with flat roofs and flat parapets. Construction can be adobe, concrete block, or frame. Massing is generally symmetrical and, in contrast to Pueblo Revival style, corners are crisp. The primary façade often includes a portal, or porch, with whitewashed milled lumber columns or Doric supports. Fenestration is generally symmetrical, and windows are double-hung multi-lite sash or casement, in wood or metal, often with pedimented lintels. Facades often terminate with a denticulated brick cornice making a low flat parapet.[46]

While the New Mexico Territorial Revival style was most commonly applied to residential, commercial, and municipal architecture, in the late nineteenth and early twentieth centuries, historic revival styles were used by the National Park Service in keeping with the "rustic" ideal of design and craftsmanship.[47] New Mexico Territorial Revival style architecture was used at parks within New Mexico, and was particularly employed by architects working out of the NPS Regional Office in Santa Fe.

46 James C Massey and Shirley Maxwell, "Spanish Revival Architecture in America," Old House Journal, June 2021, accessed December 28, 2021 at https://www.oldhouseonline.com/house-tours/spanish-architecture-in-america/.
47 Albert H. Good, "Park and Recreation Structures, Part I, Administration and Basic Services Facilities," National Park Service, U. S. Government Printing Office, Washington D. C., 1938, 5.

Section Four

Chronology of Development and Use

CHRONOLOGY OF HISTORIC EVENTS

Prehistoric period	The area around Rattlesnake Springs experienced human visitation as early as the Archaic period (1000BCE).
c. 1300-1400	Indigenous groups hunted, gathered, and farmed along streams in the western tributary drainages of the Pecos River, where Rattlesnake Springs is located. The area served as a major north-south trade route, and indigenous groups are likely to have camped in the area around Rattlesnake Springs during this era.
c. 1500-1800	Spanish exploration began in the Pecos River valley area at the beginning of this period; explorers used the area as a travel corridor and for limited camping and trading sites. Towards the end of this period, Spanish military led slave raids against the Apache, which were met by retaliation. Violent clashes continued until 1810 when a treaty assigned the Apache to territory between El Paso and the Sacramento Mountains.
1821	Mexico gained independence from Spain, and the area became a province of Mexico.
1846-1848	In 1846 the U.S. declared war on Mexico and claimed New Mexico as a U.S. territory. With the 1848 Treaty of Guadalupe Hidalgo, Mexico gave up all claims to the territory and ceded New Mexico and the rest of what is now the southwestern region of the United States.
1848-c.1890	U. S. Military forces remained active in the area in an effort to capture members of the Mescalero Apache tribe who had not yet been relegated to reservation land, and used Rattlesnake Springs as a camp and staging area.
1849	A map drawn by Robert Creuzbaur shows a wagon road established by Spanish and Mexican travelers that followed the Black River from the Pecos River to the Guadalupe Pass and westward to El Paso del Norte on the Rio Grande; a spring was depicted on the map corresponding with the approximate location of Rattlesnake Springs, labeled Ojo del Camino (Spring of the Road).

Chronology of Development and Use

1870-1880	The decades following the Civil War saw massive cattle drives in the west. Rattlesnake Springs was located on the route of both the primary cattle drives, the Goodnight-Loving Trail and the Slaughter Cattle Trail. The springs were likely used as a watering stop during these drives. During this era, the westward route of the wagon road depicted in 1849 map joined the route known both as the Emigrant Trail to California and the Butterfield Trail; emigrants traveling west along these established early roads likely camped at Rattlesnake Springs.
1878	Rattlesnake Springs explored by United States military officers and regiments; area is described as good for grazing with a large spring and good grass but scarce wood.
1880	Henry Harrison begins to homestead at Rattlesnake Springs.
1881	Harrison begins construction of gravity-fed ditch irrigation system. A military map drawn by Captain W. R. Livermore and Topographical Assistant F. E. Butterfield was the first to identify Rattlesnake Springs by its present name, and locate it along the Black River. United States military officers and regiments passing through Rattlesnake Springs purchase corn and hay from Harrison.
1882	Survey of the property records a circular swamp with a width of 392 feet; grass is described as good, while soil is described as third rate, and the site is recorded as having no timber.
1889	Harrison receives patent of 160 acres encompassing springs and related drainage area, under Homestead Act of 1864.
1912	Harrison receives second and final patent of an additional 160 acres at the Rattlesnake Springs
1921	Harrison's gravity-fed ditch irrigation system surveyed and registered with the State of New Mexico.
1923	President Calvin Coolidge establishes Carlsbad Cave National Monument through presidential proclamation on October 25.
1930	Congress designates Carlsbad Cave National Monument as Carlsbad Caverns National Park on May 14.
1931	Harrison dies and ownership of land passes to second wife (Ida May Ward) and children.

Chronology of Development and Use

1934	NPS purchases 79.87 acres of the Harrison homestead and rights to 1/2-acre foot of water at Rattlesnake Springs from Ida Harrison Pennell (Harrison's widow) for $7,350, to provide water to Carlsbad Caverns National Park.
1935	Public Works Administration employs crew of local men to construct a spring house in the spring pond; 6.2-mile pipeline from Rattlesnake Springs to Carlsbad Caverns National Park headquarters; fence around the spring pond; and Pump House. CCC workers rebuild and repair diversion dam at the northwest corner of the Rattlesnake Springs property, believed to have originally been constructed by Harrison.
1938	CCC camp established at Rattlesnake Springs with sixty-two enrollees.
1940	CCC workers construct Ranger Residence following architectural plans drafted by NPS architects; CCC workers also construct addition to the Pump House.
1941	CCC workers line the springs pond with limestone blocks; construct new diversion ditch adjacent to the access road; and install new iron head gates at the pond which remain in place.
1942	CCC operations at Rattlesnake Springs discontinued. Addition of light plant constructed at Ranger Residence, work done by force account (public agency uses its own personnel and equipment or hired labor).
1943	U. S. Army develops Rattlesnake Springs as a rest camp. Soldiers from Carlsbad Army Air Field move to site, demolish most CCC camp buildings and structures, clean up and restore camp site, construct swimming pool, tennis court, and associated parking lot and walkways, and realign road to the north perimeter of the property, its current location.
1944	Building materials from CCC camp removed and hauled to an Army camp near Santa Fe.
1947	Swimming pool is filled in and Army leaves Rattlesnake Springs. Two-way communication established between Rattlesnake Springs and Carlsbad Caverns.
1948	Water pumping operations taken over by ranger division; rangers begin residing at the Ranger Residence. CCC camp flagpole moved from former camp area to its current location directly southwest of the Ranger Residence.
1949	Original diesel-powered pump at Pump House replaced with electric pump.

Chronology of Development and Use

1950	Last CCC camp building, the garage, demolished, leaving foundation.
1954	Special use permit issued for construction of a duck pond at the east end of the Rattlesnake Springs area on the site of the buried swimming pool; New Mexico Department of Game and Fish installed levee for construction of the pond; series of small concrete dikes constructed to contain pond water.
1960	NPS water rights at Rattlesnake Springs granted seniority by U. S. District Court over adjacent Washington Ranch.
1962	Original fruit trees at orchard planted by Harrison removed and replaced.
1963	Public Law 88-249 brought Rattlesnake Springs unit under control of Carlsbad Caverns National Park. NPS drills well 100 meters from spring pond to supply water to Carlsbad Caverns National Park; this well still supplies water to the park.
1964	NPS reexcavated Harrison's original gravity fed irrigation ditches to a depth of eighteen inches and lined them with concrete; new metal head gates installed at divergence points of lateral ditches.
1968	Water pipeline constructed crossing Rattlesnake Springs unit and connecting a new well just south of the boundary with Washington Ranch.
c. 1977	Comfort station constructed. Construction completed by day labor for a total cost of $12,600.
1980	Duck pond removed in the early 1980s; some dikes remain in place.
1983	Nature Conservancy purchases nine acres of land on the south boundary of Rattlesnake Springs.
1984	Memorandum of Understanding established with the Nature Conservancy; horse use at Rattlesnake Springs relegated to "Back 40" area.
1985	Nature Conservancy purchases four and a half acres of land from the adjacent Washington Ranch.
1988	Rattlesnake Springs Historic District listed on the National Register of Historic Places. District includes spring pond and house; Pump House; Ranger Residence; creek; irrigation ditches; orchard site; pastures; CCC camp remains; and homestead site remains.

1991	Under newly established Rattlesnake Springs Landscape Management Plan, thirty cottonwood trees trimmed and six transplanted around the CCC camp site. ADA accessible picnic site and fencing constructed at CCC camp site. Repairs and improvements made at site, including installation of cattle guard at road between Pump House and new horse corrals; and replacement of one flume and associated gate.
1995	Carlsbad Caverns National Park receives World Heritage Site status.
1998	Horses phased out at Rattlesnake Springs.
2000	New water line from Rattlesnake Springs to the new Treatment Building/Pump House, to the new 250,000 gallon tank and then to the 500,000 gallon tank.
2021	NPS establishes a second well, adjacent to the first (1963) well in 2021. This second well is the park' current water source (PMIS project 310827, completed 1/10/2021).

CHRONOLOGY OF PHYSICAL CONSTRUCTION

1935	Pump House constructed. Designed by NPS architects and built as part of a Public Works Administration project. Original form was a one-room, rectangular plan building of stone masonry construction with concrete floors and a roof supported by vigas. Exterior wall surfaces were covered in a cement stucco shelter coat and interior walls received a plaster coat with an oil based paint finish. Construction was completed by CCC work crews and by force account (public agency uses its own personnel and equipment or hired labor).
1940	Ranger residence constructed by CCC, with original designation as employee's residence. Residence was designed in 1939 by Ken Saunders and Del Jones of the NPS Regional Office, Branch of Plans and Design in Santa Fe. Original form was rectangular footprint with projecting one-car garage. Interior arrangement included living room, dining room, kitchen, interior service porch, covered porch, bathroom, hallway, and two bedrooms. Pump House addition constructed by CCC. Design by Trent Thomas. Adobe construction. Doors of original Pump House removed and reused on new addition. Roofline vigas of original Pump House sawn off to be flush with wall surface. New cement stucco shelter coat applied to original Pump House.

Chronology of Development and Use

1942	At Ranger Residence, light plant addition constructed. Design by Southwest Regional Office architect Lyle E. Bennett. Addition has a square footprint, cement block construction and cement stucco shelter coat. Work done by force account (public agency uses its own personnel and equipment or hired labor). Plans on file for the addition differ somewhat from the as-constructed conditions.
1949	Original diesel engine at Pump House removed and replaced with electric pump.
c. 1950	By 1950, light plant equipment removed from addition to Ranger Residence, and the area is in use as storage.
1967	Pump House painted; two drains installed in "little Pump House."
1968	Pump repaired; fire hydrant removed.
1976	At Pump House, stuccoing completed and interior painted. Viga ends over front entry possibly removed at this time and plastered over.
1989	At Pump House, panel and electrical boxes mounted to exterior wall, west façade.
1991	At Ranger Residence, heating system changes from fuel oil to LP gas (propane). At Pump House, roof patched over perimeter flashing following interior leak at south wall.
1992	At Pump House, new chlorine injector installed.
1993	At Ranger Residence and Pump House, built-up roof removed and replaced with modified bitumen system; canales repaired and brick cornice repointed. A small number of damaged bricks were replaced in kind.
1996	At Ranger Residence, rotten posts at portal (porch) removed and replaced in kind.
2003	Electrical powerlines relocated underground. At Pump House, panel and electrical boxes mounted to exterior wall removed.
2004	At Pump House, patch, repair, and paint lintel beam; stabilization, priming, and repainting of exterior canales; and stabilization, priming, and repainting of cross member beam at the porch.
2007	New sewer line installed in vicinity of Ranger Residence.

Chronology of Development and Use

2010	At Ranger Residence, termite damage assessment and treatment; septic system maintenance, and installation of backflow prevention for water distribution system to the building. Note: Termite monitoring/treatment at Rattlesnake Springs is ongoing.
	At Pump House, interior painting.
2015	At Ranger Residence, termite mitigation and damage repair; exterior painting and ten square feet of stucco crack repair; replace all original multi-light double hung wood frame windows with vinyl double-pane simulated divided light windows to match original configuration; repair pipe sections at septic system.
	At Pump House, replace electrical equipment.
2016	At Ranger Residence and Pump House, built-up roof replaced with single membrane roof.
2019	At Ranger Residence, interior linoleum floor finish replaced.
2020	Septic system replaced and leach field moved.

Information above compiled from these sources: Carlsbad Caverns National Park Facilities/Maintenance Records and Headquarters Archives, Series 03, File Units 01-20; Carlsbad Caverns National Park Superintendent Reports, 1926 - 1977; National Register nomination for the Rattlesnake Springs Historic District, completed for the National Park Service by architectural historian Betsy Swanson in 1986 and certified in 1988; FMSS database; PMIS #310827; and a Cultural Landscapes Inventory for Rattlesnake Springs, completed by the National Park Service as part of the National Park Service Park Cultural Landscapes Program in 2004.

Section Five

Physical Description



Aerial imagery of the Ranger Residence and Pump House (Bing Maps aerial, 2022; amended by ARG)

SITE

Rattlesnake Springs is an isolated unit of Carlsbad Caverns National Park, located six miles southwest of the park's main headquarters. Organized around a natural spring which is fed by ground water from the Guadalupe Mountains, the site was transformed from treeless marshy drainage to a verdant landscaped setting by homesteader Henry Harrison, who in 1881 constructed the irrigation system which is still in use at the site.

The NPS purchased the Rattlesnake Springs tract in 1934 and used the spring as a water source for Carlsbad Caverns Park. They also used the irrigation system to continue the historic cultivation pattern of the land around the springs, including a fruit orchard, pasture land, harvesting of hay and alfalfa, and domestic use.

The Pump House was constructed in 1935 and expanded in 1940, and is located directly north of the spring pond. The Ranger Residence was constructed in 1940 and is located northeast of the Pump House. The historic irrigation lines are located north and east of the spring pond, and extend east toward the Black River in two branches; the line constructed by Harrison in 1881 is located north of Rattlesnake Springs Road, the primary access road throughout the site, while a second line, constructed by CCC workers in 1941, is located directly south of Rattlesnake Springs Road.

Physical Description



Ranger Residence, primary (south) façade, view northwest (ARG 2021)

In 1939, NPS Regional Landscape Architect Harvey Cornell drafted a landscape plan for the area around the Ranger Residence; while some plantings deviated from the plan as drafted, the general arrangement of trees (ornamentals, Cottonwoods) grouped close to the house, irrigation ditches, and road was followed and have largely been maintained. The Bermuda grass lawns that form the ground cover around the Ranger Residence, Pump House and pond were planted by CCC workers in 1940.

In the broader site, CCC workers also removed remaining homestead structures; constructed roads and paths; improved irrigation ditches; contained the spring pond with rock walls; terraced some areas of land; planted additional trees; and constructed their work camp, the buildings and structures of which have all been removed.

Overall, the terrain around the Pump House and Ranger Residence and the integrity of the buildings' setting remains much as it did during the historic period.

RANGER RESIDENCE

Exterior

The Ranger Residence is a one-story New Mexico Territorial Revival-style residential building constructed of adobe with a stucco shelter coat (finish), and capped with a flat roof. The building sits at grade and has a generally rectangular footprint measuring 65' X 37'. The building was designed by NPS architects Ken Saunders and Del Jones and constructed in 1940 by CCC workers. The building is located on the north side of Rattlesnake Springs Road, northeast of the pond and Pump House.

The primary (south) façade is asymmetrically arranged. The primary wood paneled entry door is located slightly east of center and fitted with a contemporary metal screen door. The entrance is flanked by three eight-over-eight, double-hung, two-pane vinyl simulated divided light windows (two at the west and one at the east), all fitted with screens.

Physical Description



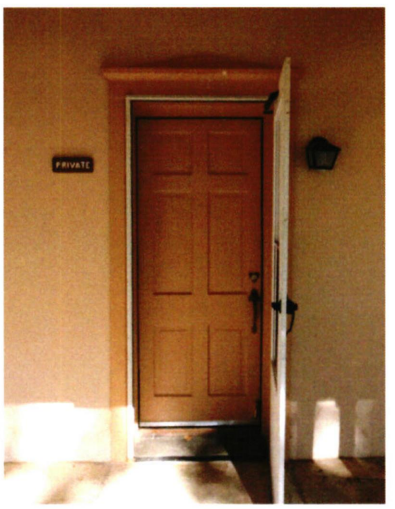
Portal at primary (south) façade, view east (ARG, 2021)



Portal detail showing paired and tripled box columns with capitals and brick denticulated cornice, view northwest (ARG, 2021)



Windows with pedimented moulded lintels, view northwest (ARG, 2021)



Primary entry door, view north (ARG, 2021)

The entry door and windows are set within pedimented wood surrounds and the entry door retains it's original bronze hardware (lock replaced). This portion of the façade is spanned by a flat-roof *portal* (porch) with paired and tripled box columns with chamfered edges and Doric capitals. The columns support a wooden entablature and denticulated red brick cornice. The roof soffit has exposed rafters and wood tongue and groove sheathing. Additional features of the *portal* include tin-lined wood canales at the roofline and flagstone paving.

Physical Description



Ranger Residence, primary (south) façade, view northeast (ARG 2021)

The west side of the primary façade projects out from the main volume of the façade and includes a centered eight-over-eight double-hung, vinyl simulated divided light window with a pedimented surround. This portion of the primary façade terminates with a continuation of the denticulated red brick cornice, forming a low parapet that continues around all facades of the building.

The east façade includes two recessed eight-over-eight double-hung vinyl simulated divided light windows fitted with screens. The façade terminates with the characteristic low parapet and denticulated red brick cornice.

The rear (north) façade includes four eight-over-eight double-hung vinyl simulated divided light windows and two smaller, horizontally oriented eight-over-eight double-hung windows (also vinyl), all recessed with wood surrounds and screens. HVAC equipment is located near the center of the façade on a small concrete pad and electrical equipment attaches to the façade further west of center. This portion of the rear (north) façade terminates with three tin-lined wood canales and a low parapet with the characteristic denticulated red brick cornice.



East façade, view west (ARG, 2021)

A small volume projects from the northwest corner of the building. Constructed with a rectangular footprint, a flat roof, and stucco-clad walls to match the remainder of the house, this part of the building was designed by NPS architect Lyle E. Bennett and constructed in 1942 to serve as a light plant for Rattlesnake Springs. The east-facing façade of this addition features a band of two, three-pane wood windows along the transom level. A replacement laminated wood door on the west-facing façade is flanked



Rear (north) façade, view southwest (ARG, 2021)

to the south by a small wood utility door at the ground level which historically provided access to the oil tank compartment, and to the north by a four-over-four double-hung wood window fitted with a screen. This area of the west façade terminates with a low parapet and a minimal interpretation of the characteristic denticulated red brick cornice.

The west façade is asymmetrically arranged. The south portion of the façade includes a projecting ell housing a single-car garage. The garage has a metal replacement roll-up garage door with wood surrounds, and a tin-lined wood canale at the southwest corner of the building. The central portion of the façade includes paired six-over-six double-hung vinyl simulated divided light windows with screens and a half-glazed wood door with an aluminum screen door, and one additional recessed wood door with a small diamond pane window and contemporary metal screen door. Both entrances open onto a flagstone patio that is enclosed by stucco-clad half-walls with square drain openings along their lower perimeter. The patio is divided internally by a stucco half-wall with a shaped wood gate



West façade, view east (ARG 2021)



West patio, view south (ARG 2021)



West patio, view northeast (ARG 2021)

with iron hardware. Both the south and central portions of the west façade terminate with the characteristic low parapet and denticulated red brick cornice.

Interior

Interior arrangement includes a living room at the center of the building; a hallway, bathroom, and two bedrooms in the east portion of the building; a kitchen and dining room north of the living room; a garage at the southwest corner; an enclosed porch west of the living room; and an enclosed service porch and utility/storage room at the northwest corner of the building. Interior walls are plaster over metal lath and wood studs. The ceilings are distinguished by peeled vigas and coved plaster finishes. Floors are concrete over a concrete foundation with carpet or tile flooring materials. The enclosed porch has a flagstone floor.

The kitchen appears to have undergone the most change of all spaces within the residence. Its floor, along with that of the adjoining storage porch and dining room, is clad in modern floor tile. The double stainless steel sink is not original, and the kitchen cabinetry and hardware as well as the laminated countertop and backsplash appear to have been installed c.1960 or later.

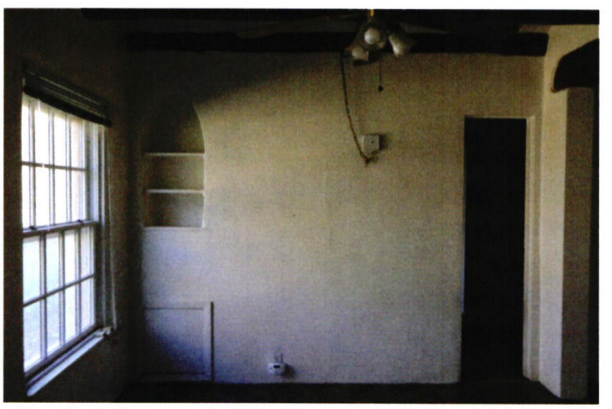
Aside from the kitchen, interior finishes appear largely original. Interior doors are wood panel or multi-lite



Living room, view east (ARG, 2021)



View from living room to enclosed porch, view west (ARG, 2021)



View of dining room from kitchen, view west; note arched wall niche (ARG, 2021)

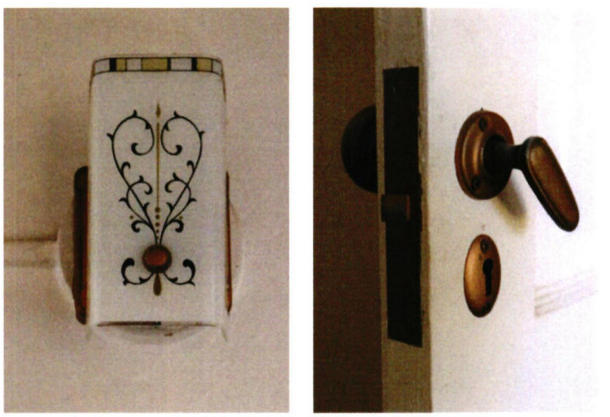


Hall, view northeast, showing north and south bedroom access and built in cabinets/drawers (ARG, 2021)



Kitchen, view northwest (ARG, 2021)

wood and most retain their original hardware. Original built-in cabinetry remains in the hallway. The enclosed service porch includes wood pantry closets that may be remnants of the original kitchen cabinetry. Notable original decorative features and finishes include two decorative wood grilles in the living room, an arched recessed display niche in the dining room, and white glass wall sconces throughout the building. At the south end of the hallway is an HVAC enclosure closet that is not original.



Light fixtures and door hardware, throughout (ARG, 2021)



Pump House, north (front) façade, view south (ARG, 2021)

PUMP HOUSE

Exterior

The Pump House is a one-story Pueblo Revival-style building of stone masonry (original building) and adobe (addition) construction with a stucco shelter coat. The building is L-shaped in plan, measures 37' x 25', and is capped by a flat roof with parapet. It is located directly north of the pond and southwest of the Ranger Residence. Designed by an architect of the Western Division Branch of Plans and Design in San Francisco with the initials "G. F. G.," the original stone masonry Pump House was constructed in 1935 as a Public Works Administration project. A stucco addition designed by NPS architect Trent Thomas was constructed by CCC workers in 1940. In 1940 the entire building received a stucco shelter coat; all exterior walls feature a slightly battered profile.

The primary (north) façade is asymmetrically arranged. Paired four-lite tongue and groove wood doors with wrought-iron straps and nail heads are located at the east side of the north façade within a shallow recessed porch. These doors were a part of the original building when it was constructed in 1935, and were relocated to this portion of the façade during construction of the addition in 1940. The porch is surmounted by a heavy adzed beam which supports vigas and a tongue and groove plank ceiling laid in a herringbone pattern. The west portion of the primary façade, which is the original 1935 portion of the building, has a slightly higher roofline, and includes two narrow recessed eight-lite metal casement windows. The primary façade terminates with a flat parapet and slim metal coping, which continues around all façades.

The west façade includes one narrow recessed eight-lite metal casement window and has three utility boxes attached to the north portion. The west façade terminates with the characteristic parapet and coping.

The rear (south) façade is asymmetrically arranged. Two narrow recessed eight-lite metal casement windows are located at the west portion. The east portion projects out and has a lower roofline, and includes paired recessed eight-lite metal casement windows. The rear façade terminates with the characteristic parapet and coping.

Physical Description

The east façade includes one set of paired recessed eight-lite metal casement windows, located slightly south of center, and a tin-lined, pole-shaped wood canale at the roofline. The east façade terminates with the characteristic parapet and coping.



Doors at primary (north) façade entry porch, view south (ARG 2021)



Porch roof ceiling with vigas and tongue & groove ceiling (ARG 2021)



West façade, view slightly southeast (ARG, 2021)



South façade, view northeast (ARG, 2021)



East façade, view west (ARG, 2021)

Interior

The interior walls of the Pump House are plastered and the floor is concrete. A raised concrete plinth runs diagonally through the east portion of the building, upon which was formerly mounted a horizontal submersible booster pump and motor. A doorway between the east and west wings of the building consists of a six-lite transom and one step up into the raised level of the west wing.

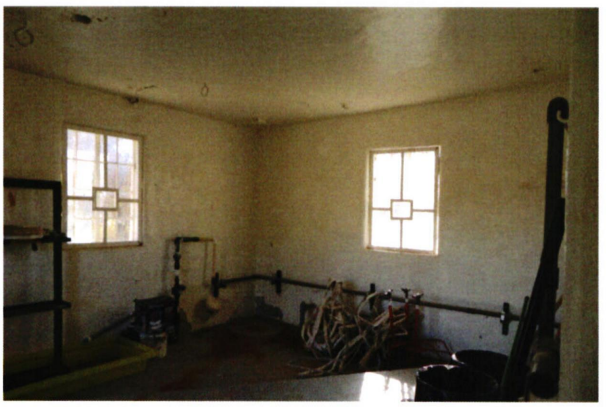
Pumps and related mechanisms are located in the west wing, along with additional wall-mounted mechanical equipment. Pumps were originally operated by diesel fuel; an electric pump was installed in 1949. Most windows are fitted with interior screens; paired windows in the east portion of the building have screens that are modified with central openings in order to access the windows' operating hardware.



View into west wing of Pump House showing floor level change and six-lite transom above door opening, view west (ARG, 2021)



West wing of the Pump House interior, view west (ARG, 2021)



East wing of the Pump House interior, view southeast (ARG, 2021)



East wing of the Pump House interior, view northwest (ARG, 2021)

Section Six

Evaluation of Significance

PREVIOUS EVALUATIONS

The historical significance of Rattlesnake Springs was recognized in 1988 when the Rattlesnake Springs Historic District was listed in the National Register of Historic Places. The Rattlesnake Springs Historic District includes the Pump House and Ranger Residence along with the spring pond and house, the creek, irrigation ditches, orchard site, pastures, the CCC camp remains, and the homestead site remains.[1] Rattlesnake Springs was found to be significant in the areas of historic archeology, architecture, exploration and settlement, landscape architecture, and association with the PWA public work program. The period of significance was broadly assigned as 1800-1899 and 1900-1943.

The statement of significance developed in the 1988 National Register nomination form reads:

> "The Rattlesnake Springs Historic District is significant under both Criterion A and C as a landscaped Chihuahuan Desert oasis reflecting architecture of the National Park Service and the Civilian Conservation Corps executed under Public Works Administration programs of the Depression Era, and incorporating landscaped and horticultural features of the homesteader of the land at the spring. The oasis has been reshaped and terraced, watered, planted, and tended by man for more than a hundred years. Since the occupation of homesteader Henry Harrison in 1880, Rattlesnake Springs has been transformed from a treeless, marshy drainage filled with rushes, into a wooded park setting containing structural features built between 1934 and 1940 that are significant in design and craftsmanship as fine examples of the adaptation of historic southwestern building styles and materials to the "rustic" mode popular for park architecture of the period. Those architectural and landscaped features reflecting the period of development but not yet 50 years old are significant under both criterion as achieving significance within the past 50 years because of exceptional importance both as illustrative of National Park Service stylistic architectural development prior to World War II, and as examples of public work projects of the Depression.
>
> The homestead house site is significant under Criteria D as a site likely to yield important historical information."[2]

Rattlesnake Springs Historic District remains historically significant for the reasons developed in the 1988 National Register nomination form. All architectural and landscaped features reflecting the period of development are now more than 50 years old, and as such are no longer required to convey exceptional importance as detailed in the nomination form.

The two buildings discussed in this Historic Structure Report, the Pump House and the Ranger Residence, are contributors to the Rattlesnake Springs Historic District. As detailed in this report, both buildings were designed by architects employed by the National Park Service and constructed by laborers employed by the Public Works Administration and, later, the Civilian Conservation Corps. Reflecting the construction dates and continued use of both of these buildings, this report assigns refined periods of significance to these buildings. The period of significance for the Pump House is 1935 through 1940, spanning from

1 Swanson, National Register Nomination, Rattlesnake Springs Historic District, Section 7, Page 4-16.

2 Swanson, National Register Nomination, Rattlesnake Springs Historic District, Section 8, Page 1.

the year the original portion was built through construction of a major addition in 1940. The period of significance for the Ranger Residence is 1940 through 1942, spanning from the year it was built through construction of the light plant addition in 1942.

INTEGRITY

Integrity refers to the ability of a property to convey its historical significance in relation to its period of significance, generally achieved by the retention of some or all seven aspects of integrity including location, design, setting, materials, workmanship, feeling, and association.

Both the Pump House and the Ranger Residence have not been moved and as such retain integrity of location. Neither building has undergone any major alterations outside of the period of significance, and as such both buildings retain integrity of design. While some changes have been made to the broader setting of the Rattlesnake Springs Historic District such as installation of visitor service facilities in the picnic area, the area immediately surrounding the Pump House and the Ranger Residence remains largely unchanged from the period of significance and as such both buildings retain integrity of setting. Both buildings have slightly diminished integrity of materials and workmanship, because some original features including vigas at the Pump House and original secondary entrance doors and garage doors at the Ranger Residence have been removed and either not replaced or replaced not-in-kind. However, at both buildings, the majority of original materials and features have either been retained or replaced in kind. Due to the retention of a substantive quantity of historic design, materials, and workmanship at both buildings in combination with retention of historic location and setting, both buildings convey their historic character and therefore retain integrity of feeling. And, finally, both buildings continue in the same use as their historic association, and therefore retain integrity of association.

CHARACTER-DEFINING FEATURES

A character-defining feature is an aspect of design, construction, or detail that is representative of a historic resource's function, type, or architectural style. Character-defining elements include the overall shape of the historic resource, its materials, craftsmanship, decorative details, interior spaces, and features, as well as the various aspects of the resource's site and environment.

Character-defining features of the Pump House include:

- One-story height and L-plan footprint;
- Flat roof with low flat parapet at all facades;
- Stone masonry and adobe construction with slightly battered wall profile;
- Stucco shelter coat;
- Location, dimensions, and detailing of the recessed entry porch, including paired four-lite tongue and groove wood doors with wrought-iron straps and nail heads; heavy adzed beam supporting vigas; and tongue and groove plank ceiling laid in a herringbone pattern;
- Location, dimensions, materials, and operability of windows at all facades, including narrow shape and vertical orientation, recessed profile, casement form, and steel material;
- Interior arrangement characterized by two rooms separated by an opening with one step and a six-lite transom; and
- Interior finishes including concrete floor and plastered walls.

Character-defining features of the Ranger Residence include:

- One-story height and generally rectangular footprint;
- Flat roof with low parapet and denticulated red brick cornice at all facades;
- Adobe construction;

- Stucco shelter coat;
- Location, dimensions, and detailing of the portal or entry porch, including flat roof supported by paired and tripled box columns with chamfered edges and Doric capitals; exposed rafters and tongue and groove wood cladding of porch roof soffit; wooden entablature and denticulated red brick cornice; tin-lined wood canales at the roofline; and flagstone paving;
- Wood paneled primary entry door with original hardware;
- Location and dimensions of window openings at all facades, including vertical and horizontal orientation, pedimented surrounds, recessed profile, multi-light configuration, and double-hung operation (vinyl double-pane simulated divided light windows not original, but replaced to approximate original)
- Interior arrangement characterized by living room, dining room kitchen, hallway, two bedrooms, garage, enclosed porch, service porch, and storage room;
- Interior finishes including concrete, bathroom tile, flagstone floors at covered porch, plaster walls, and ceiling with peeled vigas and coved plaster;
- Interior features including wood panel and multi-lite doors with original brass hardware; built-in hallway cabinets with original hardware; arched display niche with shelving in dining room; wall-mounted rectangular glass light fixtures (throughout); and decorative wood grilles in living room (near front entry door).

Features installed at the Ranger Residence outside the period of significance that are not considered character-defining features include the roll-up garage door at the west façade; the laminated wood door at the west façade; kitchen cabinetry and hardware, sink, countertop/backsplash, and hardware; and the HVAC enclosure closet at the south end of the hall.

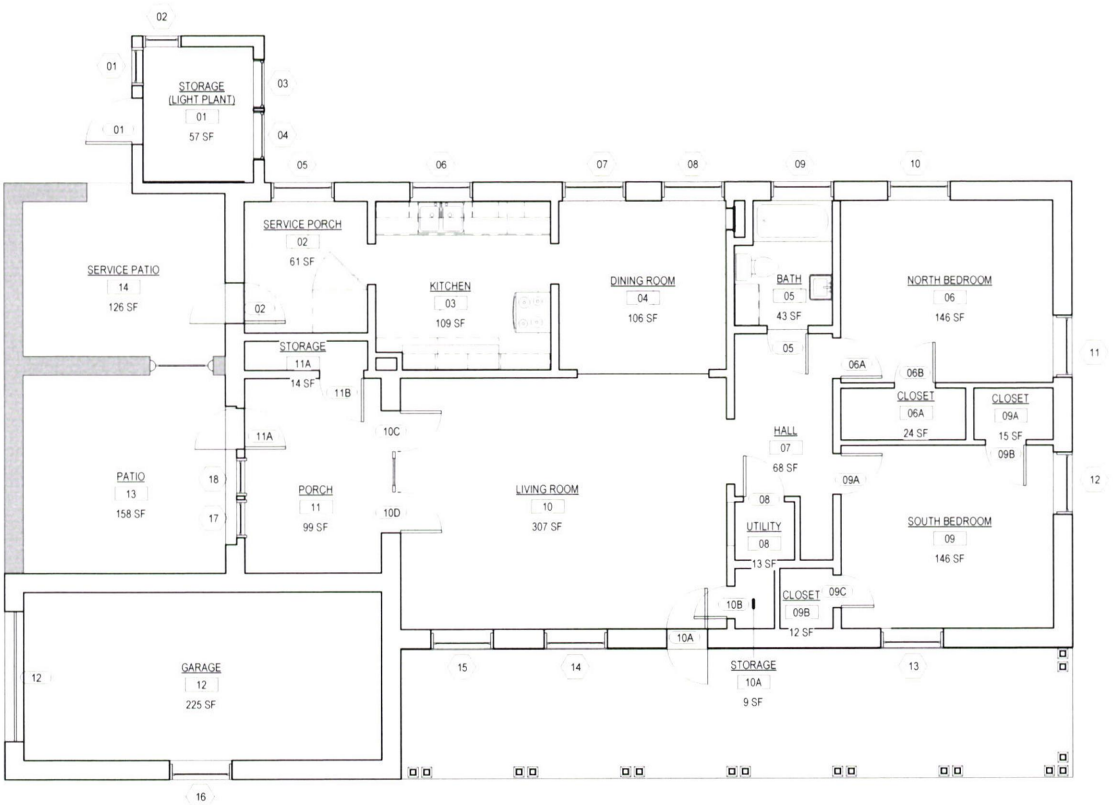
Section Seven

Condition Assessment

Existing exterior and interior material conditions at the CAVE Rattlesnake Springs Ranger Residence and Pump House were surveyed in November 2021. The scope of the existing conditions assessment was limited to visual inspection and did not include any materials testing or destructive investigation.

Throughout this assessment, materials and features have been given overall condition ratings of good, fair, or poor. Good condition indicates that the material does not show signs of active deterioration and is not currently in need of repair beyond routine maintenance to finishes. Materials identified as being in fair condition exhibit active deterioration, but in limited quantities or locations. Poor condition means that deterioration is advanced, and the material or feature will require extensive repair or possibly replacement in kind. The exterior and interior materials at the Ranger Residence are in fair to mostly good condition: deterioration is typically minor in nature or very limited in quantity. The exterior and interior materials of the Pump House are in fair to poor condition: deterioration at select locations is advanced and will require extensive repair or replacement.

This assessment refers to rooms and room numbers as indicated on the existing conditions drawings found in Appendix E of this document. The main floor plans are included in this section for reference.



Ranger Residence floor plan with room names and numbers labeled, for reference within this chapter.



Image 01: Looking north toward the Ranger Residence from Rattlesnake Springs Road. Note the low earth terrace.



Image 02: Deterioration at the base of the window in the north wall of the North Bedroom (Window 10).



Image 03: Deterioration at the base of the window in the east wall of the South Bedroom (Window 12).

Ranger Residence

SITE AND EXTERIOR FEATURES

Grading and Site

Built atop an artificially raised, low earth terrace (Image 01), the Ranger Residence is situated approximately 70 feet north of Rattlesnake Springs Road and 215 feet northeast of the Pump House. The elevated position of the residence and slope of the site directs water away from the building along the south and west, but several low areas and holes adjacent to the north and east walls capture water during heavy periods of rain. This accumulation of moisture and rising damp has resulted in damage to the exterior stucco finish in several locations at the base of the north and east exterior walls (Images 02 and 03). Bermuda grass adjacent to the building has further contributed to the deterioration of the finishes at the base of the walls. When allowed to grow against a building, vegetation contributes to the accelerated deterioration of finishes through the accumulation of excess moisture.

A chain link fence encloses the backyard, beginning at the north wall of the Service Patio and terminating at the northeast corner of the building. A chain link gate is present at the northwest corner of the Service Patio, parallel to the storage room (Storage 01). The northernmost section of the fence is parallel to the



Image 04: Chain link fence surrounding the back yard of the residence. Note the tree intersecting the fence.



Image 05: Looking east toward the uneven and overgrown dry-laid stone paver walkway leading to Service Patio 14.

irrigation ditch to the north of the residence. The fence is in good condition at the west and in fair condition along the north and east sides. A tree has grown through the fence at the north side of the yard (Image 04) and a small portion of the chain link fabric has detached from the top rail of the southeastern section of fence.

Porches and Paving

From the driveway at the west of the building, the topography of the site is relatively level to the entrances of the two patios (Patio 13 and Service Patio 14), but a continuous paved walkway is not present. There is a narrow dry-laid stone paver walkway leading from the driveway to the gate of the chain link fence (Image 05). The walkway is in poor condition and the sand filled joints are filled with grass. Several of the pavers are uneven creating a tripping hazard for occupants and visitors.

A concrete walkway connects the stone paver path to the stone paved patio areas at the west side of the residence (Image 06). Minor spalling was observed at the concrete adjacent to Storage 01 (Image 07). The grouted-in-place stone paving of the west patios is in good condition. There are a few minor areas where the grouted joints are loose and should be repointed or grouted. The patios are enclosed by partial-height walls; water sheds from the patios through drainage openings at the base of the west walls. Minor duff and a significant amount of dirt accumulation was observed at both patios (Image 08).



Image 06: Looking south toward the concrete walkway that connects the backyard to Service Patio 14.



Image 07: Spalling of the concrete walkway at the entrance of Storage 01.



Image 08: Looking west at the grouted-in-place stone paving at Service Patio 14. Note the accumulated dirt and tree duff.



Image 09: Redbud tree intersecting stone paver path.



Image 10: Stone path from the driveway to the portal.



Image 11: Uneven and overgrown dry-laid stone patio adjacent to the portal.



Image 12: Grouted-in-place stone paving at the portal.



Image 13: Deteriorated and uneven dry-laid stone steps leading from the south patio.

There is a discontinuous walkway from the driveway to the entrance at the portal that is intersected by a Redbud tree (Image 09). The dry-laid stone walkway is in poor condition, the sand filled joints are filled with grass, and many of the pavers are uneven or missing (Image 10).

A dry-laid stone paver patio is located adjacent to the portal and connects to the walkway from the driveway. The patio is in poor condition, the sand filled joints are filled in with grass, and many of the pavers are uneven (Image 11).

The portal has grouted-in-place stone paving that is in good condition (Image 12). There are a few minor areas where the grouted joints are loose and crumbling and should be repointed or grouted.

Two dry-laid stone paths lead from the south patio to the south and west lawns where they adjoin dry-laid stone steps. The walkways are in poor condition, the sand filled joints are filled in with grass, and many of the pavers are uneven or missing. The stone steps are in very poor condition, with stones missing and uneven (Image 13).

FOUNDATIONS AND FLOOR FRAMING

Concrete

The Ranger Residence has concrete footings below walls and concrete slab-on-grade foundations below floors, which is exposed as the current floor finish at the garage.



Image 14: Crack in the concrete slab of the garage.

Original drawings indicate the slab is 4-inches thick over a 4-inch thick gravel and sand base. Where exposed, the concrete slab appears in good condition though a crack was observed along the length of the garage floor slab (Image 14). See Appendix I for additional detail included in the Structural Letter Report.

EXTERIOR WALLS

Adobe

The exterior walls of the residence are constructed of 14-inch thick adobe with a stucco exterior finish and plaster interior finish. The roof parapet is articulated with a denticulated red brick cornice. Beneath the brick cornice at the portal is a wooden entablature. The adobe is painted a light tan color, and the brick is a deeply saturated red with grey mortar.

Overall the exterior walls are in good condition. There is minor cracking and erosion of the mortar at the cornice of the south and west façades. This condition was observed above the west canale of the south elevation where the roof of the portal and the garage join (Image 15) and at the north and south corners of the parapet of the garage (Image 16). There is significant biological growth at the mortar of the parapet of the north and east façades (Image 17). Evidence of a previous patch is visible at the central portion of the wood entablature of the portal, and an open



Image 15: Mortar cracking and erosion at the junction between the portal roof and the garage.



Image 16: Mortar cracking and erosion at the south corner of the parapet of the garage.



Image 17: Biological growth at the mortar of the parapet of the east façade.



Image 18: Open joint between the entablature and brick cornice of the south façade.



Image 19: Biological growth, staining, and paint loss at grade, north façade. Note the insulated pipes serving the kitchen sink.



Image 20: Patching at the sill of the Bathroom window (Window 09).



Image 21: Cracking of the stucco finish at the north corner of the garage door.



Image 22: Cracking of the stucco finish at the patio wall.

joint was observed between the entablature and cornice (Image 18).

Biological growth is present at the base of the north and east walls due to an accumulation of moisture at grade. Moisture has further contributed to significant paint loss and staining at the base of the walls (Image 19).

A previous patch of the stucco finish is visible beneath the sill of the bathroom window (Window 09). The patch is visible due to the poor quality of the repair (Image 20). Minor cracks and crazing in the stucco finish are present along the entire façade. There are larger cracks in the finish at the north corner of the garage door (Image 21) and at the intersection of the half-height walls enclosing the west patios, when viewed from the west side (Image 22).



Image 23: Water stain on the stucco beneath the hose bib at the south façade.

The stucco finish is lightly stained from water damage beneath the hose bib at the south façade (Image 23) and beneath the east canale of the north façade.

ROOF STRUCTURE AND ROOFING

Roof Structure

The main roof framing assembly of the Ranger Residence consists of wood sheathing over wood joists supported by 10 inch diameter peeled vigas. The garage roof framing is similar to the main roof framing except the joists are oriented perpendicular to the vigas (Image 24). The roof structure of the portal consists of wood sheathing supported by wood joists (Image 25). The wood joists are supported by an adobe wall at the north and wood beams at the south and the wood beams are supported by paired chamfered box columns. The roof framing appears in good condition, where visible.

All exterior wood structural elements have been painted a warm tan color. At the interior of the garage, the structural elements have been painted to match the interior walls of the garage. At the portal, the painted finish is typically missing or weathered at the bottom 2 inches of each column. Moisture damage and rot was observed at the base of the columns (Image 26).

While not observed during the time of the site visit, NPS staff reported that birds, likely swallows, have been observed nesting on the adobe walls under the Portal.



Image 24: Painted wood roof framing at the interior of the garage. Note the original 2x8 painted wood sheathing.



Image 25: Painted wood roof framing of the portal.



Image 26: Moisture damage and rot typical at the base of the portal columns.



Image 27: Overall view of the sheet membrane roof.



Image 28: Tree duff at the south west corner of the roof.



Image 29: Canale in need of cleaning at south façade.



Images 30 and 31: Brick chimneys.

Roofing

The roofing of the residence is a tan color thermoplastic polyolefin (TPO) membrane that was installed in 2015 (Image 27). The roofing appears in good condition. No leaks were observed at the interior of the residence. A small amount of tree duff was observed at the corners of the roof, and some minor dirt accumulation was present on the roofing membrane (Image 28).

There are seven wooden canales lined with sheet metal that project from the portal and from the back and sides of the residence. Though the canales appear to be pre-manufactured replacements, they match the original canales in material and style. The canales are in good condition. While some were free of dirt and tree duff, a few require cleaning (Image 29). Routine removal of dirt and debris will assist in preventing accelerated deterioration of the canales.

Chimneys

The flat roof of the residence was designed with three brick chimneys, all of which are extant. The brick and mortar is in good condition, and the chimneys appear to be structurally sound with no deterioration noted (Images 30 and 31).

While not observed during the time of the site visit, NPS staff reports that bats have been observed roosting in the chimneys.

EXTERIOR DOORS

Wood Doors

There are three single entry doors to the original residence; two at the west porches (Service Porch 02 and Porch 11) and one at the south portal. The entry doors at the west façade are not original. The entry door of the Service Porch (Door 02) is a painted flush wood door with a single diamond-shaped vision lite, likely installed in the 1950s-1960s, and stainless steel keyed entrance knob (Image 32). A white aluminum screen door with retractable screens has been installed at this entrance (Image 33). Both the flush wood door and screen door are in good condition. The entry door of the porch (Door 11A) is a painted half-glazed paneled door with a stainless steel keyed entrance knob. The original 1939 drawing of the residence shows a single screen door at this entrance. An aluminum screen door, not original, is presently installed at this entrance, and it has been retrofitted with a diamond pattern security grille on the lower half (Image 34). While the screen door is in good condition, the finish of the paneled wood door is in fair condition with alligatoring and flaking of the paint present on the lower half of the door (Image 35).

There is a single painted wood paneled entry door at the south portal (Door 10A). The door is original to the construction of the residence and most of the original door hardware is intact (Images 36 and 37). The original hardware is a brass lever handle with matching mortise cylinder escutcheon. A stainless steel deadbolt has been installed over the original brass escutcheon of the original deadbolt. Minor overpaint was observed at the escutcheon and some small gouges in the paint finish are present above the left corner of the escutcheon plate. A contemporary white aluminum screen door with retractable screens has been installed at this entrance. Both the flush wood door and screen door are in good condition.

In 1942, a new addition, the Light Plant, was added to the northwest corner of the residence. This addition,



Images 32 and 33: Door 02 and aluminum screen door.



Images 34 and 35: Screen door at Door 11A and alligatoring and flaking of paint at lower half of Door 11A.



Images 36 and 37: Door 10A and detail view of extant hardware.



Image 38: Rotting of wood substrate and loss of paint finish at the base of Door 01.

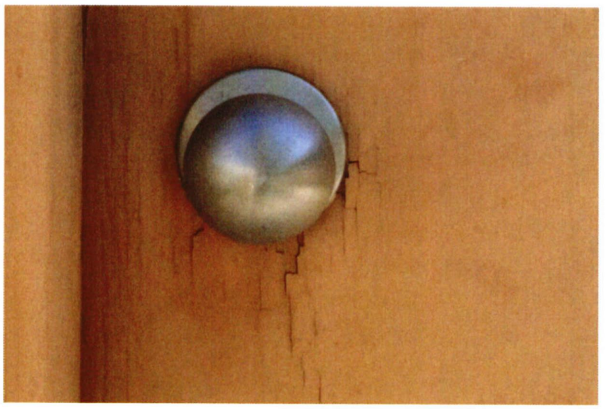


Image 39: Flaking paint and deteriorating wood substrate around the door knob of Door 01.

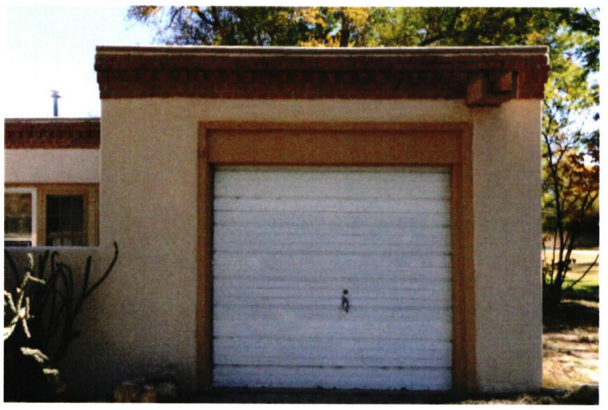


Image 40: Replacement roll-up garage door.



Image 41: Unsecured trim of the wood screen at the south Garage window (Window 16).

Storage 01, currently houses a water heater that serves the residence. The entry door, Door 01, does not appear to be original to the addition. The door is a single painted flush wood door with a stainless steel entrance knob. A painted metal padlock hasp is installed at the exterior side as a method of securing the entry. The painted finish of the hasp is worn from routine use. The door is not appropriate for exterior use, and the door substrate and finish are in poor condition. The wood, particularly at the base of the door, is rotted and soft from water damage (Image 38). The paint at this location has deteriorated and is flaked or missing. The painted finish and wood substrate beneath the door knob at the exterior side is similarly flaking and deteriorated (Image 39).

A replacement roll-up metal garage door (Door 12) with a newer painted infill panel is installed at the west façade (Image 40). The 1939 drawings show paired wood doors at this location and historic photographs confirm the absence of the infill panel above the paired doors. The painted garage door is in good condition with no observable signs of deterioration.

EXTERIOR WINDOWS

Vinyl Windows

The primary (south) façade includes three eight-over-eight double-hung vinyl windows, two at the west and one at the east, all fitted with painted wood screens. The



Image 42: Material loss at the sill of the south Living Room window (Window 14).



Image 43: Material loss and mismatched paint finish at the trim of the Storage 01 window (Window 02).

windows are set within wooden surrounds. The original drawings depict six-over-six double-hung wood windows at each façade. The existing windows are contemporary and appear to be recently installed. They are in good condition with no observable signs of deterioration. The bottom trim of the wood screen at the west window (Window 16) is unsecured (Image 41) and there is some material loss at the painted wood sill of a single living room window (Window 14) (Image 42).

The remaining façades of the original construction feature identical eight-over-eight double-hung wood windows fitted with wood screens. The windows and screens are in good condition.

Wood Windows

The 1942 addition, Storage 01, features two four-over-four double-hung wood windows fitted with wood screens, one each at the north and west façades. The windows are generally in good condition though the wood surround and screen of the north window is in fair condition. There is material loss at the left corner of the bottom trim and the painted finish of the left trim does not match the rest of the surround (Image 43). The upper portion of the wood screen is broken and a portion of the wood is unsecured (Image 44). The east façade of the addition features a paired triple-pane painted wood window. The window is in good condition, but a significant amount of dirt and cobwebs were observed at the interior side (Image 45).



Image 44: Broken screen and unsecured frame at the top of the Storage 01 window (Window 02).



Image 45: Significant dirt and cobwebs accumulation at the east elevation window, Window 04, of Storage 01.




Images 46 and 47: Exterior light fixture at Door 10A and exterior light fixtures at Door 11A.




Images 48 and 49: Original door type and brass hardware.



Image 50: Brass leverset at the north Bedroom door (Door 06A).



Image 51: Blackened door knob at the interior side of the Bathroom door (Door 05).

EXTERIOR LIGHT FIXTURES

There are two exterior light fixtures at the Ranger Residence. A single metal wall sconce, painted black, is located at the south entrance of the residence, east of Door 10A (Image 46). The sconce is operable and in good condition with minor dirt accumulation and debris noted on its surfaces. The fixture is not original to the construction of the residence.

A second light fixture is located on the west elevation, north of Door 11A (Image 47). This fixture is utilitarian with an exposed bulb in a lamp holder. Above this fixture is a surface-mounted motion sensor security light. While neither fixture is original, both are in good, operable condition.

INTERIOR FEATURES AND FINISHES

Interior Doors

The original interior doors and hardware remain largely intact and in good condition. The single door connecting the kitchen and dining room, illustrated in the original construction drawings, is no longer present, but the cased opening remains. The original interior doors are single, painted, six-panel, solid wood doors with original brass hardware intact (Images 48 and 49). The door hardware is typically a cylindrical knob lockset or passageset, except at the hall side of the north bedroom where a brass leverset

is installed (Image 50). Hinges and door- and hinge-mounted door stops are original and intact. The interior side of the bathroom door hardware is blackened and in need of cleaning (Image 51).

Two original, single, painted, multi-lite solid wood doors with original brass cylindrical locksets (Doors 10C and 10D) connect the living room to the covered porch (Image 52). A single, fixed, six-lite, painted wood panel separates the two multi-lite doors. The doors, panel, and door hardware are in good condition.

A single, flush, non-original interior door is installed at the utility closet (Utility 08). The door is painted hollow-core with bottom louver and a contemporary antiqued brass knob passageset and unmatched bright brass hinges (Photos 53 and 54). Unlike the original interior doors, the door of the utility closet is cased with surface-applied medium density fiberboard (MDF) trim. With the exception of two openings, the original doors lack trim. The opening between the dining room and kitchen and the bathroom door are cased in painted wood trim, and the trim appears to be original to the building construction.

Flooring

The floor coverings range from sheet vinyl at the service porch, kitchen, and dining room, vinyl composite tile in the bathroom, flagstone at the west porch (Porch 11), and broadloom carpeting throughout the living room, hall, and bedrooms. The unfinished concrete structural slab is visible in the garage. While the original flagstone at the west porch and the newer sheet vinyl are in good condition, the carpet and vinyl composition tile are in fair condition.

The carpet throughout is buckled in multiple locations and should be re-strpainted or replaced (Image 55). There are multiple locations where unmatched replacement vinyl tile is installed in the bathroom and the tile looks worn and in need of replacement (Image 56).

Interior Wall Finishes

Original walls are wood framed with a smooth plaster finish. The plaster finish is in good condition. There is an



Image 52: Original multi-lite wood doors opening into the Living Room from Porch 11 (Doors 10C and 10D).





Images 53 and 54: Door 08 at Utility 08.



Image 55: Buckled and worn carpet in Living Room.

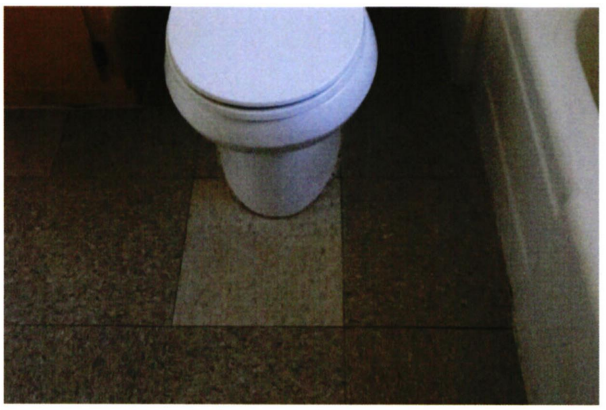


Image 56: Mismatched and worn vinyl composition tile in the Bathroom.



Image 57: Bulge in the plaster of the east wall of the Dining Room.

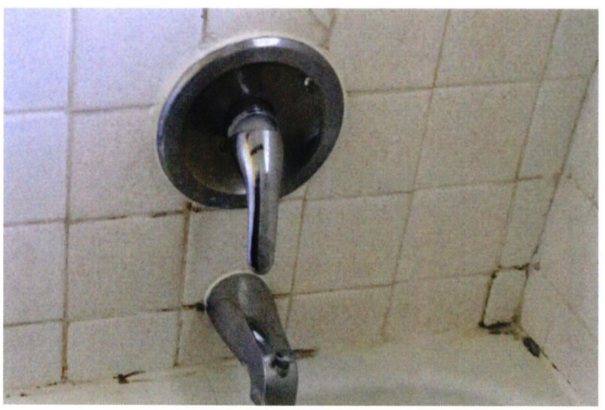


Image 58: Staining of the grout surrounding the bathroom tub.



Image 59: Dirt and stain accumulation at the interior of the Storage Addition.



Image 60: Dirt and stain accumulation at the west window of the Storage Addition (Window 01).

isolated area at the east wall of the dining room where a bulge is present, likely the result of a crack where the plaster has detached from the lath (Image 57).

Gypsum board (drywall) has been used to enclose Utility 08 and is in good condition. The gypsum board is painted at the hall-side and unpainted at the interior of the closet.

The glazed ceramic tile in the bathroom is in fair to poor condition. There is dark staining at the grout around the toilet and bathtub and several areas of loose and mismatched tiles (Image 58).

The painted concrete walls of Storage 01 are in fair condition with some dirt and staining present throughout (Images 59 and 60).

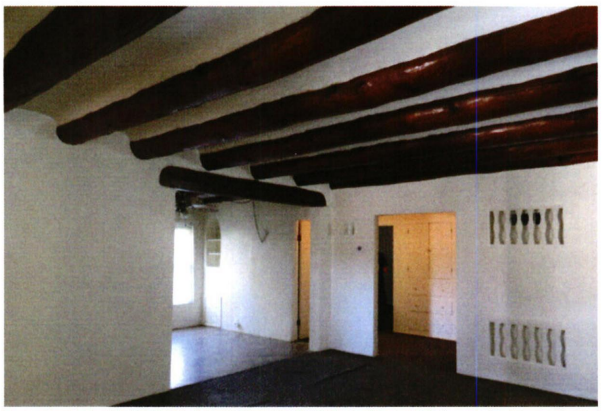


Image 61: Viga ceilings at the interior of the Ranger Residence. Note the coved plaster between the vigas.



Image 62: Painted tongue and groove plank ceiling at the Portal.

Ceiling Finishes

Ceilings throughout the interior residential spaces are supported by large stained vigas and finished with smooth coved plaster (Image 61). The vigas of the garage are painted and supporting the painted structural wood members of the roof. The ceilings of the interior residential spaces are in good condition.

The ceiling of the portal is painted wood tongue and groove planks supported by smaller painted wood cross-beams (Image 62). The wood substrate and painted finishes are in good condition. The ceiling of the storage addition (Storage 01) is painted concrete and is similarly in good condition.

While not observed during the time of the site visit, from discussions with NPS staff, bats have been observed roosting at the east end of the portal ceiling.



Image 63: Flush mounted light fixture at the center viga in the kitchen.

Light Fixtures

The original glass wall sconces remain throughout the residence and are in good condition. Surface-mounted fluorescent task lighting is installed beneath the upper kitchen cabinets at the sink and above the south countertop. A flush mount ceiling fixture is installed at the center viga of the kitchen (Image 63); it is unclear if this fixture is original to the building's construction but it is in good condition. Ceiling fans are installed at the enclosed porch (Porch 11) and dining room and although contemporary, they are in good condition (Image 64).

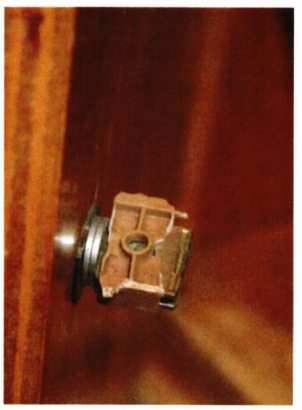


Image 64: Ceiling fan in Porch 11.



Image 65: Detail view of kitchen cabinet hardware.





Images 66 and 67: Material loss and taped cabinet at the northwest base cabinet; broken cabinet latch.



Image 68: Base cabinet in the bathroom.

Casework

The stained wood casework and hammered metal cabinet hardware installed in the kitchen are not original to the building's construction (Image 65). Minor finish wear was noted at the interior of the cabinets and some material loss was noted at the northwest drawer. The northwest base cabinet door no longer latches and was taped to the cabinet frame during the time of the field investigation (Images 66 and 67). The kitchen casework and hardware are in good condition.

The upper casework in the bathroom matches the casework in the kitchen in material, finish, and hardware type. The stained wood base cabinet in the bathroom does not match the original casework in style, finish, or hardware selection (Image 68). The finish is significantly less saturated in color and lighter than the original upper cabinetry. The casework throughout the bathroom is in good condition.

BUILDING SYSTEMS

A civil, landscape, structural, mechanical, electrical, and plumbing systems assessment also occurred during the site visit in November 2021. A team of engineers inspected the existing building systems at the Ranger Residence and Pump House to describe existing systems, evaluate current conditions, and make recommendations for repair and upgrade. Their findings are summarized here for reference. For a complete description of these findings refer to the engineering reports in the appendices.

Civil

The structure appears to be constructed on an earthen building pad that is roughly level with the existing ground grade north of the building and approximately two to three feet above existing ground elevations south and east of the residence. Due to the elevated building pad on the south and east sides of the building, there is generally good drainage away from the building in these locations. The existing ground profile on the west and north sides is much flatter and drainage away from the building pad is marginal at best.

There are seven roof drain canales associated with the structure. In most areas, there is evidence of soil erosion next to the building due to rainwater discharge through these roof drains. Four of the seven roof drain canales discharge to the north side of the building where ground grades are flatter and do not drain away from the building very well. A newer pad mount condensing unit has been installed on the north side, in front of a window and very close to the discharge point of one of the existing canales.

- Water: The building is provided with water service from the pressurized water supply main that originates at the Rattlesnake Springs well site and transmits water to the Carlsbad Caverns cave headquarters area. NPS staff noted that water supply to the building is in good working condition.
- Sewer: The building has a dedicated septic tank and disposal system. NPS staff noted this system was most recently reconstructed in 2018 and is in good operational condition.
- Telecommunication: There is an aerial communication service from the joint power/telecommunication pole line located west of the building. There are also satellite dish receivers on the roof.
- Power: Electric power is fed to the building from an underground service that originates from a meter on a drop pole approximately 100 feet to the west of the western patio. NPS staff noted no problems with this service.

Landscape

There is an existing aggregate base course driveway connecting the Rattlesnake Springs Road and the residence garage along the west building wall. The driveway has ample size to accommodate several vehicles. The aggregate base course paving appears to be in good condition.

There are 7 roof drainage canales, located along the south, east and north wall of the residence. The canales extend out from the parapet wall approximately 2 feet, roof drainage spills out the canales onto the site area below.

At each of the canales locations, small amounts of erosion are visible. At the southwest corner canale there is a stone rubble splash pad and at the south wall canales there is a plastic rain gutter splash pad.

Several low areas adjacent to the residence walls and holes in the finished grade are visible along the north and east walls. These areas hold water and do not drain, in several areas there is damage to the exterior stucco.

There are three conditions where the site finished grade and landscape and the building walls interface:

- Adjacent to the paved porch and patio areas.
- Stone-edged planting beds exist along portions of the south and west residence walls. These planting areas have not been maintained and are filled with Bermuda grass and weeds.
- The site landscape is generally flood-irrigated bermudagrass, that is mowed periodically. Along the east and north building walls grass is growing up against the exterior house walls, requiring hand trimming in areas that a mower cannot reach. Also as stated earlier several of these areas are not sloped properly for surface drainage to drain away from the residence walls. A properly designed maintenance strip could facilitate proper drainage and mitigate building wall damage from mowing equipment. A maintenance strip along the bottom of the chainlink fence would diminish the need for hand trimming along the fence line. Refer to Section 10 - Work Recommendations and Alternatives.

There are exposed utility lines along the north wall from Storage 01 to the kitchen area. These appear to be potable water lines.

The landscape surrounding the residence is periodically mowed and maintained, flood irrigated from several flood irrigation gates along the adjacent irrigation ditch, the majority of ground cover is bermudagrass, and many of the trees are remnants of the area's historic orchards.

Site furnishings are limited to a bear-proof combination trash and recycling container.

There is no visible site lighting. Lighting could enhance security and safe access if desired. If lighting is added, it should be Dark Sky compliant.

Structural

According to the referenced drawings, the ground floor of the building consists of a 4-inch-thick concrete slab-on-grade with 6"x6", #10-welded wire mesh over a 4-inch-thick gravel and sand base. Walls are supported by concrete strip footings between 12" and 16" thick. No reinforcing steel is indicated at these strip footings.

From the original drawings, the exterior walls are 14-inch-thick adobe with a stucco exterior finish and plaster interior finish. Interior walls are shown to be constructed of 2x4 wood studs at 16" on center with plaster finish.

From field observations along with information provided in the drawings, the main roof framing consists of 1x8 straight wood sheathing supported by tapered 2x6 wood joists which are supported directly above timber vigas approximately 10" in diameter and spaced at approximately 30" on center. The tapered joists are oriented parallel to the vigas. The ceiling of the main roof consists of exposed viga framing with a coffered plaster ceiling between vigas.

The garage roof framing is similar to the main roof construction except that the tapered 2x6 joists are oriented perpendicular to the vigas.

The roof above the south entry portal consists of 2x8 wood sheathing supported by 2x4 wood joists spanning approximately 6'-8". The 2x4 joists are supported by an adobe wall at the north end of the portal and 4x8 wood beams at the south end. The wood beams are then supported by 4x4 wood posts spaced at about 6'-9" on center.

Wind forces are likely to control lateral force demands for this structure as seismic design forces are very low. Although clearly not specifically detailed for lateral resistance, this building is likely to perform as a shear wall building. The wood roof sheathing will act as a horizontal diaphragm to transfer forces to the adobe and plaster sheathed walls, which will in turn transfer forces to the foundations.

The structure is generally in good condition. There are signs of some cracking at portions of the band of brick work that runs along the top of the exterior adobe walls. This does not appear to pose a significant structural concern at this time, but should be addressed in the near future through possible re-pointing of the grout joint.

There is a significant crack measured at about 1/8" wide at the garage floor slab that runs the length of the garage. The crack is not of structural concern but should be patched with epoxy injection.

No significant structural deficiencies were noted during the site visit. Note that no structural calculations have been performed for gravity loading of the roof framing and no seismic or wind lateral analysis have been performed.

Mechanical

The building is heated and cooled by an electric direct exchange (DX) split system heat pump unit located within a central closet (Utility 08). It is ducted to sidewall diffusers for supply and has a louvered door for return. The system is controlled by a single wall-mounted programmable thermostat.

The existing system serving the Ranger Residence is within the ASHRAE life expectancy and was functional at the time of the survey. The existing ductwork has a lifespan of up to 30+ years, and the observed ductwork and diffusers appears to be generally in good condition.

Plumbing

The existing plumbing fixtures are served by a sanitary sewer line that enters the building underground and was not visible for inspection during the site visit. The existing sanitary sewer piping material was unverifiable at the time of the site visit. It appears that all vent piping is cast iron and travels up the side of the building and terminates above the roof. The roof is served by canales that daylight

out the side of the roof. The canales drain onto the landscape below. The domestic water system enters in the adjacent Pump House and is routed underground to the Ranger Residence. Service to both buildings is metered at the Pump House.

There is an electric water heater located in Storage 01 at the rear of the Ranger Residence. The unit is partially insulated with an insulation wrap held onto the unit with tape. Nameplate data is partially visible, but a portion has been damaged by the tape. The unit is a Whirlpool type model number E2F40HD045V with a 40 gallon capacity. From observation, the unit and connecting piping appear to be in fair condition and does not appear to need an upgrade. The insulation around the unit is in need of repair. This was the only water heater observed and is therefore assumed to serve all hot water requirements for the building.

The propane system is no longer in use and has been abandoned in place. There was a propane gas system used for this building with a meter located at the exterior on the east side of the building. Building documentation identifies that propane gas was originally provided for the kitchen stove and water heater use. Propane was stored underground. The estimated 500-gallon propane tank was observed at the building's exterior which appeared to be in fair to poor condition. The tank and associated infrastructure should be removed.

The restroom was found to be in working order. The sink features a single-handle Delta faucet with short spout. The toilet is a floor mounted Kohler with a 1.6 gallon flush capacity. The shower/tub includes a single-handle control valve with shower head and tub spout.

The kitchen is equipped with a two-basin residential utility sink that was found to be in working order.

A laundry connection is provided with domestic cold and hot hose bibbs with shutoff valves and a sanitary sewer connection with a P-trap. Fixtures and connections appear to be in acceptable condition.

A Diverstech CP-22 condensate pump is provided with the AC unit to handle condensate. The unit appears to be in working order.

A hose bibb is provided outside of the Ranger Residence on the south wall. The fixture was found to be in working order.

Electrical

The Ranger Residence and Pump House are both fed from a dedicated pole-mounted Excel Energy utility transformer bank located on a pole just west of the Pump House. The 3-phase transformer bank is connected for a 240V, Delta, 3-Phase, 4-Wire electric service output.

The Ranger Residence is fed with 1-Phase, 120/240V overhead residential-style service wires from the pole-mounted transformer bank to a riser pole with a 150A, 120/240V electric service meter and main breaker panel. The Xcel Energy utility meter is an older-style analog meter with no "smart" tracking capabilities. The pole-mounted meter/main panel then feeds underground to the residence, to a 225A rated branch panel located at the rear exterior. Although the house panel is rated at 225A, the capacity of the residential service is limited to 150A by the main breaker in the Excel meter panel at the pole to the west.

The Ranger Residence panel is located at the north exterior of the house, in a Nema 3R weather-proof enclosure. The panel is a typical 1-phase style, with 40 breaker spaces. Only 17 spaces are occupied by breakers, leaving some additional breaker space capacity.

The load on the panel is reportedly functional (no tripping breakers), but without actual load readings, it is not possible to say how much extra load capacity may exist on the panel during normal operation. The Excel Energy meter out at the pole is not a "Smart Meter" and can, therefore, not provide any historical demand data.

The overall integrity of the building wiring systems could not be identified during this visual inspection, but can be assumed to be in rather old condition, based on the age

of the building. Wiring systems are hidden in the walls and ceiling and were not visible. It is recommended that the branch wiring be megger tested and ground tested to verify the insulation integrity and system grounding continuity.

Most power receptacle and light fixture locations are original and are still fed with concealed wiring inside the walls.

Some surface-mounted low-profile Wiremold raceway has been installed from surface-mounted bedroom light switches, to the bedroom lights. Extensions are probably from the original locations to more usable locations that exist now.

The garage includes all surface-mounted conduit, wiring, and receptacles/lights, since the walls are solid.

Receptacles in the residence are, for the most part, all flush mounted and are standard 3-prong, grounded type receptacles. Locations appear to be original, but the receptacles have been replaced over time. It could not be verified if ground wires actually exist to the ground prong on these receptacles, during this visual only inspection.

Ground fault interrupting type receptacles do exist at the bathrooms and kitchen, near sinks, as required by code. Each was tested, and they are operational. It should be noted that if there are any ungrounded receptacles in the residence, these can be replaced with GFCI style receptacles, which will provide better protection for occupants where ground wires may be lacking.

The lighting systems in the residence generally consist of a mix of original fixture locations and some surface-mounted new fixture locations. Numerous fixtures are still incandescent, but other fixtures have newer screw-in type, after-market, LED lamps. There are also several linear fluorescent lamps in the Garage. Significant energy savings could be achieved by replacing the exterior and interior incandescent fixtures with modern LED fixtures or at least new LED lamps throughout.

Lighting controls are limited to standard conventional manual wall switches. There are no automatic occupancy sensor controls for bathroom or garage lighting and no timeclocks for exterior lighting. Additional energy savings would be available by providing automatic controls for these spaces.

Based on the residential occupancy, there are no exit signs and no emergency lighting in the residence. None are required.

Fire Alarm

Based on the residential occupancy, the building has no fire alarm system, but none is required by code.

There are residential-style battery operated ceiling mounted smoke detectors with local sounder alarms in most rooms, as required by code. These should be checked for proper batteries and operation.

Data and Security Systems

The residence is fed by a single exterior overhead telephone cable, from the joint overhead power and telephone lines at the west side of the site. There appear to be only 2 activated telephone lines in the residence, terminated in the Dining Room area windowsill.

The overhead telephone service line lands on the building at the west exterior, in a telephone utility service connection box near the roof edge. Three individual telephone cables are routed along the west and north exterior of the structure.

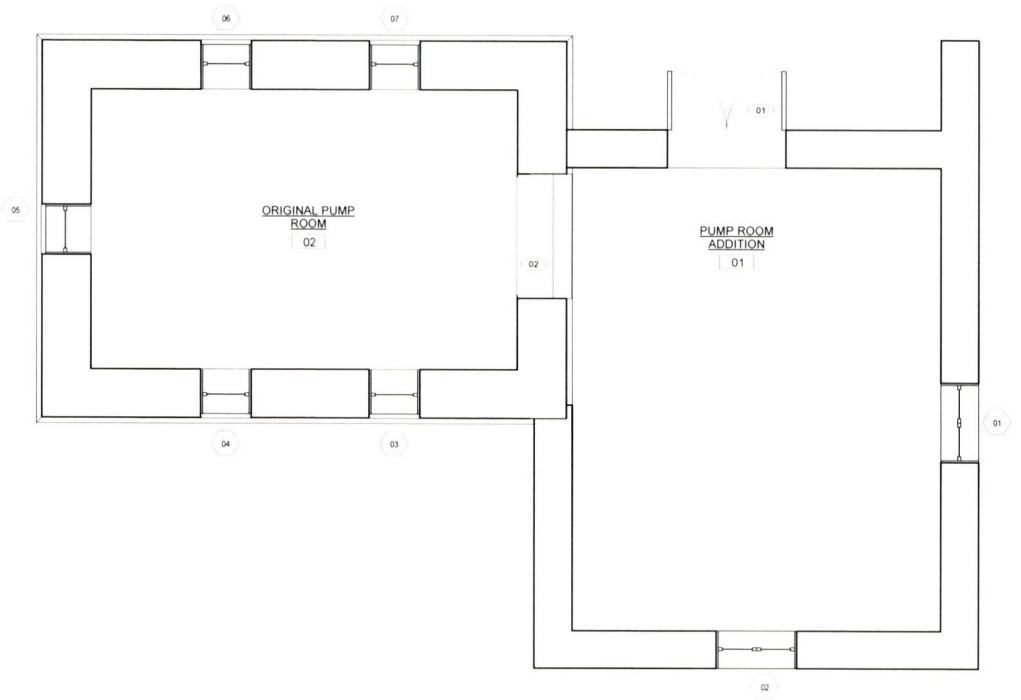
Two of the cables go along the north exterior wall and enter the residence at a window next to the exterior power panel. These are terminated in 2 telephone jack boxes mounted on the interior side of the windowsill of the Dining Room area. These jacks should be relocated to a more suitable location.

The third cable goes along the west exterior, towards the garage, and is hanging loose at the exterior, with no connection.

It is not known if the existing lines can provide any internet connectivity. If they do, it may be very slow DSL service, based on the remote nature of the site.

There is no cable TV system in the residence, but there are 2 satellite dishes located on the roof. The satellite dishes are no longer in service and should be replaced, if TV service is required.

There is no security system at the residence.



Pump House floor plan with room names and numbers labeled, for reference within this chapter.

Pump House

SITE AND EXTERIOR FEATURES

Grading and Site

Although the site around the Pump House is relatively level, several low areas and holes around the building perimeter capture water during periods of rain. Grass and weeds are growing adjacent to the exterior walls, and if not removed, will contribute to the deterioration of the exterior wall finish. When allowed to grow against a building, vegetation contributes to the accelerated deterioration of finishes through the accumulation of excess moisture.

The area between the road and the Pump House and the area to the west appear to drain toward the building. Positive drainage away from the structure should be established to prevent degradation of the structure and exterior building finishes.

FOUNDATIONS AND FLOOR FRAMING

Concrete

The original Pump House drawings indicate that the foundations for the original building construction consist of a concrete slab-on-grade with perimeter concrete footings that support the exterior walls. The 1940 addition drawings indicate a 4-inch thick reinforced concrete slab-on-grade and the perimeter stone walls extend below grade with no separate concrete footings shown. The concrete is in good condition structurally. See Appendix I for additional detail included in the Structural Letter Report.

A light grey painted finish coats the concrete in the original Pump House building and the addition. The painted finish



Image 69: Deterioration of paint finish and rust staining at the concrete slab in Pump Room 01.

is deteriorated and flaking throughout, particularly in the original portion (Pump Room 02). Rust stains are present throughout with the most significant staining present at the southeast corner of the addition (Image 69). The original concrete platforms for the Pump House equipment remain and in the original Pump House, unused equipment remains.

EXTERIOR WALLS

Stuccoed Masonry

The exterior walls are constructed of stone with a coating of a painted, textured, stucco finish. The walls are slightly battered; the walls of the original Pump House are battered more dramatically than the walls of the 1940 addition. The exterior walls are in good condition. There is minor paint loss particularly at the north porch and minor cracks in the finish of the exterior walls of the north and east façades (Images 70 and 71). Several swallow nests were observed at the intersection of the north porch wall and the porch ceiling above the paired entry doors (Image 72). Swallow nests were also observed at the exterior walls around the windows (Image 73)

ROOF STRUCTURE AND ROOFING

Roof Structure

The original drawings graphically indicate that the roof of the original Pump House is a concrete slab. It was





Images 70 and 71: Paint loss at the north façade; Minor cracking of stucco finish at north façade.



Image 72: Swallow nests at the intersection of the north porch wall and the porch ceiling.



Image 73: Swallow nest typical on the exterior walls around the windows.



Image 74: Original viga ends not extant at the north elevation.



Image 75: Rectangular penetration in roof slab showing bubbling and flaking finish material.



Images 76 and 77: Penetrations in roof slab of addition; Penetration in roof slab of original Pump House.



Image 78: Severe deterioration of wooden beam over north entrance.

not possible to verify this in the field. The drawings also indicate roof vigas projecting beyond the exterior face of the walls at the north and south façades. A note is provided on the 1940 addition drawings stating "existing viga ends to be sawed off at face of wall." Field observation confirmed that the vigas have been removed and covered with stucco (Image 74).

The 1940 addition drawings show the roof is a 5-inch-thick reinforced concrete slab. The roof at the entry consists of the same concrete slab with lagging at the soffit, supported by vigas that are in turn supported by a large beam. The drawings indicate that the vigas originally projected beyond the face of the exterior wall at the north elevation, but field observations confirmed that these were sawn off and patched over similar to the vigas of the original Pump House construction.

There is a large rectangular penetration in the concrete roof slab of the original Pump House (Image 75). It appears that plywood was placed over the opening and the roofing material applied over the plywood. There is no corresponding opening visible in the roof membrane above. There are two circular penetrations in the concrete of the addition and two similar penetrations in the original Pump House roof slab (Images 76 and 77).

The exterior wood structural elements have been painted a warm tan color similar to that of the exposed structural elements of the Ranger Residence. The painted finish is



Image 79: Deterioration at the ends of the vigas at the entry of the Pump House.

deteriorated in some select locations along the vigas and lagging. While the roof structure overall appears in fairly good condition, the roof beam at the north entry shows signs of extensive deterioration. The timber has extensive cracks, pockets, and shows signs of rot and is therefore compromising the load carrying ability of the structural beam (Image 78). In addition, the end of some of the vigas show signs of deterioration and rot (Image 79).

Roofing

The roofing is recently installed Thermoplastic Polyolefin (TPO) membrane that is tan in color and overturned atop the parapet (Image 80). The membrane appears in good condition.

There are two roof drains at the Pump House. The original building has a roof area drain that collects rainwater and daylights through north face of the building. There is one wooden canale that projects from the east façade of the addition, which the 1939 drawing indicates is cut from an 8-inch log lined with sheet metal (Image 81). The canale is in fair condition with most of its painted finish worn off. The wood appears to be in fair condition but is in need of repainting to protect its material integrity.

EXTERIOR DOORS

Wood Doors

The paired entry doors at the recessed porch are original to the 1935 construction and functioned as the entry doors



Image 80: TPO membrane roofing.



Image 81: Wood canale lined with sheet metal.



Image 82: Original transom with panes removed for utility pipe.




Images 83 and 84: Original tongue and groove wood doors; Original doors, interior.



Image 85: Glazing putty is deteriorated throughout.



Image 86: Damaged and poorly fitted interior screen at south wall of original Pump House.

at the east of the original Pump House. When the new addition was built, the original doors were relocated to the north porch entrance. A multi-lite, painted wood transom is still present above the original entry location (Image 82). The existing entry consists of paired four-lite tongue-and-groove wood doors with wrought-iron straps and nail heads (Images 83 and 84). The doors are in good condition with only minor dirt accumulation observed at the surface.

The original transom at the interior is in fair condition. Two of the lites have been removed to allow for a utility pipe, since abandoned, to protrude through the opening. The glass has been painted over to match the warm white interior color of the walls.

EXTERIOR WINDOWS

Steel Windows

The windows of the original Pump House construction and the later addition feature painted steel multi-lite windows. The original windows are narrow, fixed, and vertically oriented. The windows of the Pump House addition are paired casement windows. Windows throughout are in fair condition. Glazing putty is deteriorated and in some locations missing (Image 85). Glazing putty should be tested for asbestos, and if present, abatement is recommended. The southeast window of the original Pump House (Window 03) is missing the bottom muntin. Duff and swallow nests were observed at the same window. Swallow nests are present along the windows of the north elevation.

Painted wood screens are poorly fitted to the interior side of the casement windows and the south windows of the original Pump House (Image 86). The screens of the casement windows prevent their operability.

INTERIOR FEATURES AND FINISHES

Interior Wall Finishes

The interior walls are painted plaster and in fair condition. Rust stains, dirt accumulation, and peeling paint are typical throughout (Image 87). The painted finish is more worn in the original Pump House where larger sections of missing

paint were observed, likely a result of moisture migrating through the exterior walls due to improper site grading. Cracking observed along the north interior wall of the Pump House is non-structural and limited to the painted finish.

Ceiling Finishes

Similar to the interior walls, the ceiling finishes at the interior of the Pump House are painted plaster. The ceiling finish is in fair to poor condition with peeling paint observed throughout (Image 88). The most significant damage to the ceiling finish is around the large rectangular opening in the roof slab of the original Pump House. At this location, the paint is bubbled and peeling due to moisture infiltration (Image 89).

BUILDING SYSTEMS

Civil

The Pump House structure and subsequent addition were constructed on native ground, just north of the adjacent pond. Therefore, existing ground grade, which is relatively flat, is flush with the base of the exterior stucco coating of the building walls. In the absence of an elevated earthen building pad, there is not a well-defined drainage slope away from the building. The original Pump House structure incorporated a finish slab elevation approximately 6" above grade, so there was a step up into the building. While the site did not have good drainage away from the building, this elevated slab kept site drainage out of the building. The addition to the Pump House was constructed with a step-down slab that is roughly level with adjacent site grades. This may have been designed with slab closer to finish grade to facilitate transport of equipment in and out of the building.

Low areas were observed along the west façade of the building and at the flush doorway pad at the north façade. NPS staff noted that the flush doorway is subject to drainage intrusion from site drainage that concentrates at this low point.

There are two roof drains associated with the structure. The original building has a roof area drain that collects



Image 87: Deterioration of interior wall finishes throughout.



Image 88: Deterioration of interior ceiling finishes throughout.



Image 89: Deterioration of interior ceiling finishes throughout.

rainwater and drains through a drop pipe through the building which daylights through north face of the building with a small pipe, approximately 12" above grade. The building addition has a single roof drain canale through the east parapet which has an open discharge to the ground below. There is evidence of soil erosion next to the building due to discharge of rainwater through these roof drains. It is recommended that the canale be extended to approximately twice its current length in order to divert roof runoff away from the foundation.

An all-weather aggregate base access road serves the residence and Pump House site. This road appears to be well maintained to meet the needs of the users. This road has a dead-end turnaround just north of the Pump House. While this road is open to the public to the point of the turn-around, it appears that the road is generally used by Park Maintenance personnel for access to the Pump House plus access to secure areas beyond the turn-around area such as the nearby water well site. This road is elevated above the adjacent ground grade and prevents any drainage away from the Pump House in a northerly direction.

NPS staff mentioned that walking access to the building can be difficult after rainfall events when the ground is saturated and when seasonal weeds and grasses overtake the area. Improvements for pedestrian and vehicle access would be appreciated.

The building has remnants of previous water supply infrastructure related to pump intake and discharge piping. None of this infrastructure is necessary and should be removed to provide additional area for storage.

The building does not have any plumbing fixtures and does not require a sewer service.

The electric meter is located on the west wall of the structure. The electric service is fed to the building from an underground service that originates from a pole-mounted transformer on an existing joint pole located approximately 60' to the northwest. NPS staff noted no problems with this service.

Landscape

Rattlesnake Springs Road terminates in a turnaround adjacent to the Pump House. Pipe guardrails define the road edges. There are no developed parking areas, although a section of the road is wide enough to parallel park without blocking thru traffic.

The only site paving is within the covered building entry. The paving appears to be in good condition with minor cracking. There is no formal pedestrian access to the Pump House entry door or to the existing interpretive panel.

Low areas are visible all around the building perimeter. These areas should be filled and graded for positive drainage away from the building. The site area between the road and the pump house appears to drain to the building, a swale should be developed between the road and building directing drainage away from the building to the adjacent irrigation ditch. The site area west of the pump house appears to drain to the building, a swale should be developed directing drainage away from the building to the adjacent Pond.

The site landscape is non-irrigated bermudagrass and weeds, that is mowed periodically. The grass is growing up against all the exterior pump house walls, requiring hand trimming in areas that a mower cannot reach. Also as stated earlier several of these areas are not sloped properly for surface drainage to drain away from the residence walls. A properly designed maintenance strip can facilitate proper drainage.

There are building service utilities located outside the building walls including a hatch covered valve box.

There is one log bench at the pond edge. Turf mowing allows for limited access to the bench.

Site signage is limited to a single interpretive panel adjacent to the road.

There is no visible site lighting. Lighting could enhance security and safe access if desired. If lighting is added it should be Dark Sky compliant.

The historic pond was not assessed in detail.

Structural

The Pump House is generally in good condition structurally. The only significant structural issue observed is at the timber beam adjacent to the north entry.

The existing roof beam at the roof overhang of the north entry shows signs of extensive deterioration. The existing 10x10 timber has extensive cracks, pockets and shows signs of rot. In addition, the end of the some of the vigas show signs of deterioration and rot.

Wind forces are likely to control lateral force demands for this structure as seismic design forces are very low. Although clearly not specifically detailed for lateral resistance, this building is likely to perform as a shear wall building.

Mechanical

The Pump House building is furnished with an electric direct exchange (DX) split system heat pump unit. The unit is not connected and the unit pipe connections are cut and taped off. It appears to be abandoned in place.

Plumbing

The domestic water system enters the Pump House on the west side and is routed around on the wall and underground to the Ranger Residence.

The water supply pump system is no longer in use and has been selectively demolished and/or abandoned in place. The existing water supply pump is located in the west portion of the Pump House. It originally served as the water supply for the Carlsbad Caverns park headquarters area. A turbine sump pump installed within a partially submerged concrete structure in the pond is piped to the Pump House pump by a buried six-inch pipe. The Pump House pump was installed in 1949 and has a Fairbanks Morse motor rated at 40 HP. A four-inch pipe supplied water to the park headquarters area. The pump is no longer used since a well was installed in 2021.

The domestic water supply is equipped with a Precision Meters flow meter.

Electrical

The Pump House is fed with a 3-Phase, 120/240V, 4-Wire underground service conduit and wires from the pole-mounted transformer bank to the west exterior of the Pump House. The Pump House includes an exterior Xcel meter, with 2 main breakers; one rated at 200A and one rated at 125A. There is no back-up power at the site and no provision for plugging in a temporary source. The Xcel Energy utility meter appears to be a modern style "smart" meter that should be able to provide load tracking capabilities for peak demand and energy usage.

The Pump House electric panels are located at the west exterior of the Pump House, in Nema 3R weather-proof enclosures, as well as just inside the west wall of the Pump House. The panels are rated at 120/240V, 3-Phase to serve the pump loads and miscellaneous 120V loads.

The main 200A panel is a typical 3-phase style, with 30 breaker spaces. Only 12 spaces are occupied by breakers, leaving some additional breaker space capacity.

The 150A service breaker feeds a large disconnect on the opposite side of the wall (inside).

The interior loads at this building appear to have been mostly disconnected and removed. The interior disconnects are open with loose and cut wires hanging loose.

The branch loads in the main 200A panel are not labeled, but include a 50A/2P breaker, an 80A/2P breaker, (4) 20A/1P breakers, and what appears to be a GFCI module.

As noted above, most interior wiring systems have been disconnected and are no longer functional. All interior power wiring is in surface-mounted conduit and boxes, run on the wall and ceilings.

There are several interior surface-mounted light switches and receptacles, but the only lighting appears to have been the ceiling screw-in incandescent lamp sockets, which no longer have lamps in them.

The Pump House can be considered to be completely void of any usable electrical or lighting and will need a full interior electrical upgrade to be used for any purpose other than non-lit Storage. The power service panel at the exterior should be suitable to be re-used and re-purposed for whatever new use this structure may get.

Fire Alarm

The Pump House has no fire alarm system or smoke detectors and will need to be outfitted with specific devices, based on the intended future use.

In order to meet NPS standards, smoke detection should be provided, at a minimum.

Data and Security Systems

The Pump House can be considered to be completely void of any usable telephone, cable TV, or security systems.

Previous telephone service was provided overhead near the electric service meter and entered the building through a loose telephone cable, through the window next to the exterior electric panels. The original overhead service connection has been cut off and no longer exists.

Section Eight

Historic Preservation Objectives

The CAVE Rattlesnake Springs Ranger Residence and Pump House are located within the National Register of Historic Places Rattlesnake Springs Historic District. As such, it is important that all future work at the site be carried out in accordance with *The Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for Preserving, Rehabilitating, Restoring, and Reconstructing Historic Properties (The Standards).* The recommendations and guidelines set out in this HSR are based on *The Standards.* In addition, recommendations make use of NPS Sustainability Standards.

The Standards provide general information for stewards of historic resources to determine appropriate treatments. They are intentionally broad in scope to apply to a wide range of circumstances and are designed to enhance the understanding of basic preservation principles. *The Standards* are neither technical nor prescriptive but are intended to promote responsible preservation practices that ensure continued protection of historic resources. There are four basic treatments outlined in *The Standards*: preservation, rehabilitation, restoration, and reconstruction. Each level of treatment has its own set of standards that guide the approach to work. Generally, in planning for anticipated work on a historic structure, one of the four treatment levels is selected as the overall treatment approach.

In order to keep the Rattlesnake Springs Ranger Residence and Pump House in use by the park, the treatment selected for these buildings is rehabilitation. The Secretary of the Interior's *Standards for Rehabilitation* are included for reference in Appendix F. According to the Secretary of the Interior,

> **Rehabilitation** is defined as the act or process of making possible a compatible use for a property through repair, alterations, and additions while preserving those portions or features which convey its historical, cultural, or architectural values.[1]

"In Rehabilitation, historic building materials and character-defining features are protected and maintained as they are in the treatment Preservation; however, an assumption is made prior to work that existing historic fabric has become damaged or deteriorated over time and, as a result, more repair and replacement will be required."[2] Rehabilitation assumes that at least some repair or alteration of the historic resource will be needed in order to provide for an efficient contemporary use; however, these repairs and alterations must not damage or destroy materials, features, or finishes that are important in defining the resource's historic character. For example, certain treatments – if improperly applied – may cause or accelerate physical deterioration of the historic resource. This can include using improper repointing or exterior masonry cleaning techniques or introducing insulation that damages historic fabric. In almost all of these situations, use of these materials and treatments will result in a project that does not meet *The Standards*.

The project should follow the approach hierarchy documented in the "Guidelines for Rehabilitating Historic Buildings" included in *The Standards*: Identify, Retain, and Preserve Historic Materials and Features; Protect and Maintain Historic Materials and Features; Repair Historic

[1] *Standards for Rehabilitation and Guidelines for the Treatment of Historic Properties.* Retrieved June 19, 2016, from https://www.nps.gov/tps/standards/four-treatments/treatment-rehabilitation.htm.
[2] *Four Approaches to the Treatment of Historic Properties.* Retrieved July 7, 2016, from https://www.nps.gov/tps/standards/four-treatments.htm.

Historic Preservation Objectives

Materials and Features; Replace Deteriorated Historic Materials and Features; Design for Replacement of Missing Historic Features; Alterations/Additions for the New Use. All work performed should follow the "Guidelines for Rehabilitating Historic Buildings."

In keeping with *The Standards*, interventions, structural improvements, and ongoing maintenance should be undertaken as necessary while minimizing the loss of historic fabric and retaining the existing form and appearance of the historic features. If possible, interventions should be designed to be reversible. Features should be thoroughly documented photographically before any work is undertaken in order to chronicle changes and to aid in reversing any alterations that become inappropriate in the future.

The ultimate use of the CAVE Rattlesnake Springs Ranger Residence is assumed to be the continuation of its current and historic use as a residence for park staff. The ultimate use of the Pump House is assumed to be the continuation of its current use as a storage facility for the park. Even if the programmatic uses of the Ranger Residence and Pump House were to change, there are material deficiencies that should be addressed. In addition, alterations to the Ranger Residence are needed to provide a universally safe and accessible environment for residents. If the programmatic use of the Pump House changes in the future, alterations may be needed to provide a universally safe and accessible environment for park staff and visitors. The following sections detail requirements and recommendations for the treatment of the Ranger Residence and the Pump House in their current uses. A limited analysis of potential requirements to provide guidance for a change in use of the Ranger Residence to a park administration building, and for the Pump House to function as an interpretive facility for visitors to the site is also included.

Section Nine

Requirements for Work

APPLICABLE CODES, LAWS, AND REGULATIONS

Compliance with prevailing building codes is not required for existing buildings, unless they undergo an addition, alteration, repair, or change in use or if a code deficiency presents a distinct hazard to life safety. This report assumes that rehabilitation may be undertaken in the future and provides guidance for this. According to NPS Director's Order 28, historic structures are "generally expected to meet modern safety, access, and energy efficiency standards," but it is also understood that the character of the historic resource may limit the interventions that are acceptable. The following preliminary analysis by Architectural Resources Group outlines the larger code, fire protection, life safety, and accessibility issues that currently exist at the CAVE Rattlesnake Springs Ranger Residence and Pump House.

The governing building codes for any proposed work include:

- 2021 International Existing Building Code (IEBC)
- 2015 Architectural Barriers Act (ABA) Standards
- NPS-28: Cultural Resource Management Guideline
- The Secretary of the Interior's Standards (NHPA)

Additional applicable codes, laws, and directives include:

- 2021 International Building Code (IBC): As referenced and/or required by the IEBC.
- 2021 International Mechanical Code (IMC)
- 2021 National Electrical Code (NEC) (NFPA 70)
- 2021 International Plumbing Code (IPC)
- 2021 International Energy Conservation Code (IECC)
- NFPA 101 Life Safety Code
- Director's Order #42 (Accessibility for Visitors)
- Director's Order #16A (Accessibility for Employees)
- Memorandum to Regional Directors and Park Superintendents: Disability Access in the National Park Service, 2006
- NPS Preservation Briefs

The prevailing code, the IEBC, prescribes solutions to conditions based on existing construction. When conformance with the IBC would adversely affect the historic character of a qualified historic building, the IEBC may be invoked as a means to preserve historic fabric and explore solutions that meet the intent, but not necessarily the letter, of the IBC. As contributing buildings to the National Register of Historic Places Rattlesnake Springs Historic District, the Ranger Residence and Pump House are considered historic buildings under the IEBC and the provisions of IEBC Chapter 11 and IBC Chapter 34 may be used.

In addition to the IEBC and IBC, fire and life safety issues in the national parks are governed by the code of The National Fire Protection Association (NFPA). The primary NFPA code applicable to this building is NFPA 101, the Life Safety Code. Other NFPA codes to be considered include NFPA 70, the National Electric Code; NFPA 72, the National Fire Alarm Code; and NFPA 914, Code for Fire Protection in Historic Structures. NFPA 914 provides for performance-based approaches and operational solutions that meet the intent of NFPA 101 with the least impact on a building's historic character.

Although not a building code, the Architectural Barriers Act (ABA) is a federal civil rights law enacted in 1968 that

governs disabled access to facilities designed, built, altered or leased with certain federal funds. In 2015, new design standards were released for new or altered facilities covered by the ABA. The 2015 ABA Accessibility Standards have been used in this analysis.

The following code-related recommendations assume that the buildings will continue to house their current uses, but make recommendations for possible future alternative uses. Based on discussions with park staff at the time of the site visit, a possible alternative use for the Ranger Residence is as an administrative space for park staff. As Rattlesnake Springs does receive some park visitation, a potential future use for the Pump House is as an interpretive space with information pertaining to the history of the site and its natural resources. This space is envisioned as open to the public during business hours, but not necessarily as a space that requires permanent staff on site when open.

CODE REQUIREMENTS

Type of Construction

The Ranger Residence is constructed with a mix of combustible and non-combustible materials. The exterior walls and foundation of the building are constructed of non-combustible adobe or concrete, and the floors are concrete or flagstone. The interior walls and roof are constructed of combustible wood framing and timber. As such, the Ranger Residence is considered Type III-B construction. Type III is described in IBC Section 602.3 as "that type of construction in which the exterior walls are of noncombustible materials and the interior building elements are of any material permitted by this code." Type III-A requires 1-hour rated interior bearing walls, floor construction, and roof construction, while III-B requires no fire-resistance rating of these elements. A 1-hour fire-rated wall is an assembly consisting of building materials that can contain a fire for one hour.

The Pump House is constructed of non-combustible materials. The exterior walls and foundation of the building are constructed of non-combustible concrete and masonry, and the roof and floors are concrete. As such, the Pump House is considered Type II-A construction. Type II is described in IBC Section 602.3 as that type of construction in which the building elements are of noncombustible materials. Type II-A requires 1-hour rated interior bearing walls, floor construction, and roof construction, while II-B requires no fire-resistance rating of these elements. A 1-hour fire-rated wall is an assembly consisting of building materials that can contain a fire for one hour.

Occupancy Group

Chapter 3 of the IBC defines the different types of uses for each occupancy group. As a residence, the Ranger Residence falls into the Residential, or R occupancy group. The IBC further characterizes occupancies by the number of occupants and whether or not occupancy is transient or permanent in nature. As the residence is used in a more permanent manner and serves as a single occupancy, the dwelling is categorized further into the R-2 occupancy use.

If the residence were to undergo a change in use and serve as administrative space for park staff, the building classification would change to a Business, or B occupancy. As per IBC section 304.1, "Business occupancies include the use of a building for office, professional or service-type transaction, including storage of records and accounts."

In its current use, the Pump House is classified as a Storage, or S occupancy type. Per IBC section 311.1, "Storage Group S occupancy includes, among others, the use of a building or structure, or a portion thereof, for storage that is not classified as a hazardous occupancy." The IBC further characterizes storage occupancies based upon the hazard level of the objects being stored. Storage Group S-1 occupancies house items considered to be moderately hazardous whereas Storage Group S-2 occupancies house items considered to be low-hazard. Since future storage needs may change, this assessment will assume the more restrictive occupancy, or Storage Group S-1 use.

If the Pump House were to undergo a change in use and serve as an interpretive space for park visitors, the building

classification would become a Business, or B, occupancy. Interpretive spaces are typically considered an assembly occupancy (Group A-3 in this case). According to IBC 303.1.1, small buildings used for assembly purposes with an occupant load of less than 50 are considered a Group B occupancy. As described later in this section, the most conservative occupant load for the proposed use would be 16 persons. The following code analysis describes requirements for a Group B occupancy of the Pump House.

Allowable Area and Height

As described above, the Ranger Residence is classified as an R-2 occupancy group. For R-2 occupancy groups of Type III-B construction, the height limit when unsprinklered is four stories, with a maximum height of 55 feet, and a maximum area of 16,000 square feet. The building is currently one story with a maximum height of 9 feet and 6 inches and is approximately 1,815 square feet in area. As such, it is currently in compliance with allowable area and height limitations set forth in the IBC. If the residence were to undergo a change in use in the future to a Business, or B, occupancy group of Type III-B construction, and retain its current height and area, the height and area limitation requirements would continue to be met whether the building was sprinklered or unsprinklered.

As categorized within the S-1 occupancy classification and of Type II-A construction, the height limitation for the Pump House when unsprinklered is four stories, with a maximum height of 65 feet, and a maximum area of 26,000 square feet. The building is currently one story with a maximum height of 13 feet and is approximately 460 square feet in area. As such, it is currently in compliance with these requirements. If the building were to undergo a change in use in the future to a B occupancy group of Type II-A construction, and retain its current height and area, the height and area limitations would continue to be met whether the building was sprinklered or unsprinklered.

Occupant Load and Egress Paths

Chapter 10 of the IBC establishes the number of allowable occupants in a building, the occupant load, based on the different building functions and the area of each within the building. The number of required exits and the required width for each exit path is then determined from the occupant loads being served.

The Ranger Residence has one current functional use, residential, with an occupant load of 200 gross square feet per occupant. Applying this occupant load to the occupiable area of the building, the total allowed load for the residence is 8 occupants. If in the future the residence serves as administrative offices, the occupant load would be revised to 150 gross square feet per occupant. Applying this occupant load to the current occupiable area of the building, the total occupant load would be adjusted to approximately 10 occupants. The final occupant load may vary depending on the square footage of accessory uses within the building at the time of reprogramming.

Similarly, the Pump House has a single functional use, storage, with an occupancy load of 300 gross square feet per occupant. Applying this occupant load to the occupiable area of the building, the total allowed load for the building is 2 occupants. If in the future the Pump House serves as an interpretive space, the occupant load would be adjusted to 30 net square feet per occupant. Applying this occupant load to the current occupiable area of the building, the total occupant load would be adjusted to approximately 16 occupants.

The building code also stipulates minimum required widths and quantities of exiting doorways. Per IEBC section 1203.3, regarding historic buildings, existing door openings, corridor, and stairway widths may remain "provided that, in the opinion of the code official, there is sufficient width and height for a person to pass through the opening or traverse the means of egress." The combined occupant load of 8 occupants at the Ranger Residence requires a minimum of one exit doorway. The Ranger Residence has a combined total exit width of 94 inches served by 3 exit doorways. The occupant load of the Pump House requires a minimum of one exit doorway. The Pump House has a combined total exit width of 56 inches served by a single

paired exit doorway. Even with a change in occupancy as proposed, each building will exceed the requirement for total exit doorway width and quantity.

Per the IEBC and IBC, a minimum level of illumination and exit signage is required for all exit paths serving an exit discharge of more than 49 occupants. The illumination must be provided by lights connected to an emergency power system that will operate when the building power fails. As the exit discharges at the Ranger Residence and Pump House do not serve more than 49 occupants each, the buildings are not required to have exit illumination. Even with a change in use as previously described, the buildings would not serve more than 49 occupants.

Exit doors also have technical requirements for thresholds to reduce tripping hazards and maximum opening force limits to operate the latching hardware and overcome any door-closer device. The exit doors at the Ranger Residence do not meet these requirements. These doors have door knobs, which require twisting of the wrist to operate for exiting.

If the building undergoes a change in use, and as the door hardware is original, it is recommended that at least one door is retrofitted with a door opener to comply with current code requirements and to provide a safe means of egress from the building. Thresholds at the exit doors do not meet current code requirements and will require modification to provide universal access.

The existing exit doors of the Pump House meet the technical requirements for thresholds and door hardware operability.

Toilet Fixtures

Per IEBC section 809.1, the current plumbing count may remain so long as the building's occupancy loads do not increase by more than 20 percent. Chapter 29 of the IBC provides requirements for the minimum number of plumbing fixtures based on the occupancy groups and the number of occupants (Table 2902.1). Based on this table, as an administrative space, the Ranger Residence would require one water closet, one lavatory, and one drinking fountain. The requirement for a drinking fountain can be met when occupants are supplied with access to a water cooler. The Ranger Residence meets the plumbing fixture count required by the current code in its current and potential future occupancy use.

Human Safety (Egress)

The means of egress from the Ranger Residence and Pump House are currently compliant with the IBC. Compliant elements include corridor widths, doors, number of exits, and length of travel to the exits. If the buildings were to undergo a change in use as described previously in this section, the means of egress would still be in compliance with the IBC.

Fire Protection

Fire protection systems including fire alarms and sprinklers are not required by code if the buildings do not undergo a change in use. Smoke detectors are required to remain in the Ranger Residence and should be routinely inspected for operability. Provided the small building area and the low occupancy count of the proposed future occupancy uses, a fire sprinkler and alarm system would not be required in either building. If the buildings undergo a change in use in the future, per IBC section 906.1, portable fire extinguishers are required throughout each building.

Energy Conservation

NPS is committed to leadership in sustainability practices. New buildings and major renovations are required to meet federal sustainability requirements, but upgrades are only required if a major renovation is planned and executed.

Hazardous Materials Abatement

Lead is typically an issue in buildings painted prior to 1978. Due to the age of the buildings, lead paint is likely to be found throughout the interior and exterior finishes. Although lead paint is likely present, it does not need to be removed if the paint coatings remain intact (i.e., they are not crumbling or peeling from the wall surface). Asbestos is also potentially present, typically in insulation, roofing

cement, previous floor coverings, or window glazing putty. Abatement of asbestos is not required unless the materials are friable and will be disturbed during demolition work.

Universal Accessibility

In addition to the governing codes, NPS Management Policies require all historic structures to provide the "highest feasible level of physical access to historic properties that is reasonable, consistent with the preservation of each property's significant historical features."[1]

A complete accessibility survey was not performed as part of this study. The survey included an assessment of the level of accessibility at the interior of the buildings, but did not include a site survey nor an assessment to measure the pounds of force required to open each of the existing doors. In their current use, neither structure is required to comply with the Architectural Barrier Act (ABA). If in the future the occupancy uses are altered, both structures will be required to comply with ABA standards.

In order to comply with ABA standards, accessible parking and an accessible path of travel from the parking spaces to each of the buildings would be required. Some of the existing door widths, hardware, and thresholds would need to be assessed and modified to allow for universal access within the Ranger Residence. The south portal entry and service entry could remain, but would need to be retrofitted with automatic door openers to provide universal access. The existing kitchen space, which could function as a kitchen for staff, would require accessible height countertops, an accessible sink base, and an accessible refrigerator. Compliance with ABA standards with regards to the accessible counter heights may cause an adverse effect and would need to be studied further. The restroom would require redesign to provide additional floor space for maneuverability, although this would be achievable within the current footprint of the bathroom with the removal of the bathtub. The existing wall layout and configuration throughout the Ranger Residence can remain intact even if it were to undergo a change in use.

Accessibility within the Pump House is presently a challenge due to the change in elevation between the original structure and later addition. If the structure undergoes a change in use in the future, an accessible ramp may need to be added if universal access is required throughout the building.

[1] NPS Management Guidelines 2006, 5.3.2.

Section Ten

Work Recommendations and Alternatives

ARCHITECTURAL RECOMMENDATIONS

The following architectural recommendations are based on conditions observed during a visual survey of the CAVE Rattlesnake Springs Ranger Residence and Pump House and discussions with park staff in November 2021. As much of the original construction remains intact, the majority of the two buildings are of primary significance. The character-defining features within areas of primary significance should be retained to the greatest extent possible. Some character-defining features also remain in spaces of secondary significance. Although sensitive alteration of these spaces may be acceptable, the character-defining features should remain intact. Non-contributing areas are not original, and alteration or removal of these spaces may be considered.

Code-related Recommendations

The following code-related recommendations assume that the building will continue to house its current uses, but includes further assessment for potential future uses as described previously in Section 9. Some recommendations may need to be refined if one or more of the uses changes.

Human Safety (Egress)

The means of egress from the Ranger Residence and Pump House are generally compliant as previously noted. If the programmatic use of the Pump House were to change in the future, it is recommended that an accessible ramp be provided between the lower and upper levels of the building.

Fire Protection

The Ranger Residence and Pump House do not have a fire sprinkler system. Sprinklers may be installed throughout the buildings to protect the buildings and their occupants, but this is not a requirement due to the limited number of occupants served and the occupancy classifications of these structures.

If sprinklers are added, the system should be carefully designed to avoid impacting the character-defining features and spaces of the building. Design documents should include locations of piping runs as well as sprinkler heads. If the buildings undergo a change in use and will be utilized by the public, consideration should be given to the installation of a dual interlock preaction dry pipe system with integrated smoke detection.

Energy Conservation

A general approach to energy conservation at the Ranger Residence and Pump House should include balancing performance with preservation of historic materials. As long as the historic exterior walls, windows, and doors remain in good condition, they should be maintained in situ. The addition or improvement of weather-stripping at exterior doors and any operable windows will improve thermal performance as will the routine maintenance of caulking. Additional improvements at windows should include the replacement of all caulking at the Pump House windows to ensure the windows are weather tight. It is further recommended that plumbing fixtures in the Ranger Residence are replaced with low-flow devices. All historic light fixtures should be retained and a complete energy audit should be performed. Existing historic light fixtures should be fitted with LED bulbs and non-historic fixtures should be replaced with compatible LED fixtures. An occupancy sensor should be provided in the bathroom. These recommendations to improve the energy efficiency of the buildings should be performed especially if the building uses are altered in the future.

Hazardous Materials Abatement

Although lead paint is likely present in the building, it does not need to be removed if the paint coatings remain intact (i.e., they are not crumbling or peeling from the wall

surface). A survey to determine if asbestos and lead paint is present in both buildings is recommended. Testing of the existing floor coverings should occur through all layers of sheet flooring, including mastic, prior to replacement or removal. Inspection of the original glazing putty should also be undertaken at the steel windows of the Pump House to determine if asbestos is present. Removal of glazing is an in-situ process that is time consuming and requires specialized workers, especially when attempting to salvage original glass panes. Hazardous material abatement should be performed even if the building undergoes a change in use.

Universal Accessibility

The need for universal access is not required if neither building undergoes a change in use. If the programmatic uses are altered in the future, both buildings will need improvements to provide universal accessibility to occupants and visitors. Greater universal access can be achieved at the Ranger Residence by the installation of door openers at the exterior doors of the residence, reduction in the height of existing exterior door thresholds, installation of paved walk paths from accessible parking to the entry doors, and by providing an accessible restroom and kitchen at the interior.

At the Pump House, universal access can be achieved through the installation of a ramp at the interior, and by providing paved walk paths from accessible parking spaces at the exterior.

MATERIAL CONSERVATION RECOMMENDATIONS

General Approach

The following materials conservation recommendations are based on conditions observed during a visual survey of the Ranger Residence and Pump House conducted in November of 2021. Recommendations are included for repair and maintenance, generally referred to as treatments. Treatments carried out on historic buildings typically respond to goals related to the preservation of materials and elements original to a building's construction. Original or historic building materials, also known as historic fabric, contribute to the significance of a building because they inform the degree of architectural integrity a building retains. Historic fabric is tied to historic integrity criteria of "feeling" and "workmanship," and often represents traditional materials or building techniques which are no longer part of common construction practice. Retaining historic fabric increases the authenticity of character-defining elements and serves broader preservation goals of advancing knowledge about the history of building design and technology. Treatments need to be both visually appropriate to retain character-defining features, and physically compatible to minimize loss of and damage to historic building materials.

It is critical that all future work to the Ranger Residence and Pump House shall be carried out in accordance with *The Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for Preserving, Rehabilitating, Restoring, and Reconstructing Historic Buildings (The Standards and The Guidelines). The Standards* provide a framework for determining appropriate treatments for historic properties and are discussed elsewhere in this document. *The Guidelines* establish a hierarchy of treatments for materials and features that have been identified as character-defining and therefore, should be retained and preserved:

- **Protection** generally involves the least degree of intervention possible and includes the maintenance of historic material through preventive treatments such as cleaning, rust removal, caulking, and painting. Protection work should be undertaken at the original wood panel and multi-lite doors of the Ranger Residence.
- **Repairing** is recommended when the physical condition of character-defining features and materials warrant additional work and should involve the least degree of intervention possible. Limited replacement in-kind or the use of substitute materials is also allowed. Repair work should be undertaken at the original steel casement windows of the Pump House.

- **Replacement** of a feature is permitted when it is missing or beyond repair, but only if sufficient evidence or documentation exists to reproduce the feature, and if it is desirable to re-establish the feature.[1] The timber roof beam at the main entry of the Pump House requires replacement.

Recommended exterior and interior treatments will focus on the preservation of existing historic fabric. Replacement will only be considered for severely deteriorated or compromised materials, and replacement materials should be selected and finished to match the historic materials (i.e., in-kind replacement).

Treating and Maintaining Historic Buildings

Architectural treatments recommended in this section encompass both repairs and conservation measures. Repairs refer to procedures associated with routine activities such as cleaning and painting, but also address standard maintenance measures that nonetheless require specialized skills and materials to address the needs of historic buildings. Conservation treatments refer to methods that save or preserve existing historic materials rather than replacing them. Before they are implemented on historic features, new or unproven treatment materials and methods should be tested for physical, chemical, and visual compatibility with historic materials.

Proper and timely maintenance is crucial to the long-term preservation of historic buildings. The purpose of maintenance is to prolong the life of building materials and to protect the investments made in their construction and repair. Regular and well-timed preventive measures greatly reduce the cost of maintaining materials and systems by detecting deficiencies and deterioration before they become severe. A written Maintenance Plan can be useful to support planning and implementation of architectural treatments, including preventive maintenance. A Maintenance Plan should provide scoping and conceptual costs for repair projects, identify appropriate materials and methods for treating historic fabric, and establish inspection schedules for the continued upkeep and preventive care of building materials and systems.

Maintenance and repairs to the Ranger Residence and Pump House should focus on retaining and preserving intact character-defining features. Preventive maintenance including the periodic renewal of protective coatings, glazing putty, and sealants is critical to the long-term durability of historic fabric besides cleaning to remove dirt, debris, stains and biological growth. If possible, deteriorated features should not be replaced; rather, they should be rehabilitated using small-scale patching, Dutchman repairs, or replacement of individual components.

Following are recommendations for treatment and maintenance of exterior and interior features of the Ranger Residence and Pump House. Recommendations for cleaning require an FMSS cleaning schedule to remove dirt, staining, and debris. Refer to Appendix L for the FMSS schedule.

Site and Exterior Features

Grading and Site General Recommendations

- Pedestrian access should be improved at the Ranger Residence and developed at the Pump House. The routes do not have to be in compliance with accessibility requirements unless the structures undergo a change in use.
- Low areas should be filled and graded for positive drainage away from the buildings. A maintenance strip around both building perimeters could help correct current drainage issues.
- Cover exposed utilities at perimeter of both buildings. This may be achieved by installing a maintenance strip around the building perimeters. See landscape report in Appendix H, for sketch detail of maintenance strip.
- Install stone splash pads below each canale to reduce erosion and improve drainage. The canales should be extended to divert water away from the structures.

[1] *Standards for Rehabilitation and Guidelines for Rehabilitating Historic Buildings,* retrieved August 17, 2011 from http://www.nps.gov/hps/tps/standguide/rehab/rehab_approach.htm.

- Clear away tree duff and plant growth adjacent to the structures periodically. Clear snow as soon as possible. Accumulation of duff, plant growth, and snow retains moisture and duff piles are a fire hazard in dry conditions.

Grading and Site at Ranger Residence

- There are exposed soil areas around the residence, these areas should be plugged with grasses matching the surrounding areas. Temporary surface irrigation should be utilized to establish the grasses.
- Weeds and grasses should be removed from shrub beds, and beds cleaned out. Mulch shrub bed areas with gravel mulch over a weed barrier geotextile.
- A concrete apron should be installed along the sill of the garage door at the residence. The apron should slope away slightly from the garage, diverting drainage away from the door opening. The site area should be regraded for positive drainage away from the door.
- Reattach chain link fabric to top rail of the southeastern section of chain link fence enclosing the backyard. Consider shifting north section of fencing further north to prevent further damage due to existing tree growth.

Porches and Flagstone Paving of the Ranger Residence

- Reconstruct a three to four foot-wide dry laid stone walkway connecting the residential driveway to the front door/porch areas. The routes do not have to be in compliance with accessibility regulations unless the buildings undergo a change in use.
- Reconstruct the dry laid stone front patio in its current location at the residence. The area does not have to be in compliance with accessibility regulations, unless a change in use occurs.
- Reconstruct the dry laid stone walkways and steps in their current locations at the east and south lawns of the residence.
- Repoint the grout joints that are loose or crumbling at the portal and west patios.
- Consider a cleaning campaign at flagstone to reduce heavy staining. Clear tree duff and plant growth adjacent the structure away periodically. Clear snow as soon as possible. Accumulation of duff, plant growth, and snow retains moisture at masonry and wood surfaces, and duff piles are a fire hazard in dry conditions.
- Wash stone at low pressure with warm water to remove dirt, debris, and stains. If any tenacious stains remain, use a bio cleaner at select locations only (such as D/2 biological solution). Note that chemicals should not be allowed to seep into the ground surface.
- Routinely sweep away dirt and debris to prevent staining.
- Routinely remove excess moisture or condensation accumulation to prevent weathering and mineral buildup.

Foundations & Floor Framing

Floor Slab of the Ranger Residence

- Patch the crack in the garage floor slab of the residence with an epoxy injection.

Floor Slab of the Pump House

- Remove rust stains from the concrete floor of the Pump House using a concrete cleaner formulated to remove such stains. All ferrous metal elements, including the pipes and free-standing racks, should be painted to prevent the formation of new stains in the future as existing stains are concentrated in these areas. Metal racks should also be raised off the floor using lumber, rubber bumpers, or other means if the room gets flooded during rain.

Exterior Walls

Stucco General Recommendations

- Clean the painted finish to remove general soiling and biological growth periodically.
- Sound all stucco surfaces to determine the extent of cracking and if loss of bond has occurred. If stucco is debonded, remove loose stucco and patch surface with repair mortar matching adjacent surface in texture.

Where stucco is firmly bonded to substrate, proceed with crack repair. Rout out crack and patch with repair mortar matching adjacent surface in texture. Patching mortar to be compatible with existing stucco in physical properties and visual characteristics. Color match patching mortar for integrally-colored stucco.

- Renew finishes at stucco walls periodically. Match the existing paint color.
- Use exclusion measures to prevent seasonal bird nesting on the walls of both structures. Removal of bird nests should be completed in consultation with the Park Natural Resources Team and outside of the nesting season.

Brick at the Ranger Residence

- Repoint brick grout joints where mortar is missing or deteriorated. Match existing mortar color and type.
- Clean the mortar to remove general soiling and biological growth periodically.

Concrete Walls of the Ranger Residence

- Clean concrete to remove general soiling and biological growth periodically using a bio cleaner (such as D/2 biological solution). Caution is required to ensure cleaning agents are not allowed to exit the building and seep into the ground surface.
- Renew painted finishes at concrete walls of the storage addition of the residence. Match the existing paint color.

Roof Structure & Roofing

General Recommendations

- Clean the roofs to remove dirt, tree duff and biological growth periodically. Flat roof areas require more frequent cleaning.
- Clean the canales to remove dirt and debris. Diligent maintenance is necessary to ensure good drainage in heavily vegetated areas.

Roof of the Pump House

- Replace the timber beam and deteriorated vigas of the Pump House entry with like timber.
- Refresh paint at the log canale of the Pump House.

Roof of the Ranger Residence

- Perform an assessment to determine the extent of rot at the base of the Portal columns. Depending on the extent of deterioration, repairs may be undertaken through the use of a wood Dutchman or with epoxy-based fillers.
- Extend roof canales lengths to prevent water from ponding adjacent to the building perimeter.

Chimneys of the Ranger Residence

- Use exclusion measures to prevent bats from entering the chimneys of the Ranger Residence. Investigate chimney flashing and spark arrestors for gaps.

Exterior Windows

Windows of the Ranger Residence

- Routinely clean windows of dirt, debris, and cobwebs.
- Losses at the wood sill of Window 14 may be filled with epoxy repair compound, shaped to match adjacent wood.
- Repair damaged wood screens.
- Paint trim at Window 02 to match window trim at all other windows of the residence.

Steel Windows of the Pump House

- Repair and preserve all original windows. Clean, lubricate, and ensure windows operate smoothly and properly.
- Rehabilitate wood window screens at interior.
- Remove light rust, flaking, excessive paint, and excessive glazing compound. Prime exposed metal with rust-inhibiting primer.
- Repaint steel sections with two coats of finish paint compatible with primer.
- Patch small holes or uneven areas resulting from any rusting of steel windows.
- Replace the bottom muntin at Window 03 in-kind.
- Replace cracked or missing glazing compound.
- Provide high quality elastomeric caulk around all steel windows in need of re-caulking.

- Provide weatherstripping at all windows.
- Clean window sills to remove general soiling, biological growth, and scaling.

Exterior Doors

Wood Doors General Recommendations

- Renew finishes at exterior wood doors and repair damaged wood components.
- Repair and preserve all original doors. Clean, lubricate, and ensure all doors operate smoothly and properly.

Interior Features and Finishes

Ceiling General Recommendations

- Clean ceilings to remove dirt, debris, and cobwebs periodically.
- Conduct a lead paint analysis before commencement of any repair work at painted ceilings.

Ceiling of the Ranger Residence

- Use exclusion measures to prevent bats from roosting at the east end of the portal ceiling. Removal of bats should be completed in consultation with the Park Natural Resources Team.

Ceiling of the Pump House

- Investigate cause of moisture intrusion and damage at the ceiling of the Pump House. Repair existing leaks and ensure proper roof drainage.
- Sound ceiling plaster at areas of damaged paint finish to check if the plaster has debonded from the substrate. Loose or detached plaster will need to be removed and the area replastered before painting.
- Renew painted finish throughout the Pump House.

Walls of the Ranger Residence

- Clean or replace stained tile grout throughout bathroom.
- Replace wall tile throughout bathroom with ceramic tile.

Walls of the Pump House

- Investigate cause of moisture intrusion and damage at the interior walls of the Pump House. Repair existing leaks and ensure proper drainage around building perimeter at roof and ground level.
- Remove rust stains from the walls of the Pump House using a concrete cleaner formulated to remove such stains. After cleaning, coat walls with a penetrating corrosion inhibitor (such as Sika FerroGard-903). Caution is required to ensure cleaning agents are not allowed to exit the building and seep into the ground surface.
- All ferrous metal elements in the Pump House, including pipes and free-standing racks, should be painted to prevent the formation of new stains in the future as existing stains are concentrated in these areas.

Flooring in the Ranger Residence

- Renew or re-stretch carpeting throughout the Ranger Residence. When changes to the carpeting are considered, compatible flooring options include flagstone, linoleum, or vinyl tile.
- Test existing vinyl tile throughout for asbestos.
- Replace existing bathroom tile. Compatible flooring includes ceramic, linoleum, or vinyl tile.

Doors General Recommendations

- Repair and preserve all original doors and door frames.
- Clean, lubricate, and ensure doors operate smoothly and properly.

Casework in the Ranger Residence

- Clean to remove dirt, debris, and stains.
- Renew the casework finish. Match existing finish type and color.

Hardware in the Ranger Residence

- Clean to remove dirt, debris, and stains from all door, window, and plumbing hardware.
- Clean brass door hardware to remove tarnish using an appropriate cleaner and refinish with lacquer to match historic finish.
- Lubricate hardware periodically. Ensure smooth operability of all doors, cabinetry, and drawers.
- Renew all hardware finish with clear lacquer.

Appendix A

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- Drawings
- Photographs

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- Manuscripts and documents
- Drawings
- Photographs

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Appendix B

Historic Photographs



Overview of Rattlesnake Springs area and view of Guadalupe Mountains, 1973
(National Park Service, CAVE Administrative Records Archive, Negative No. CACA 4651)

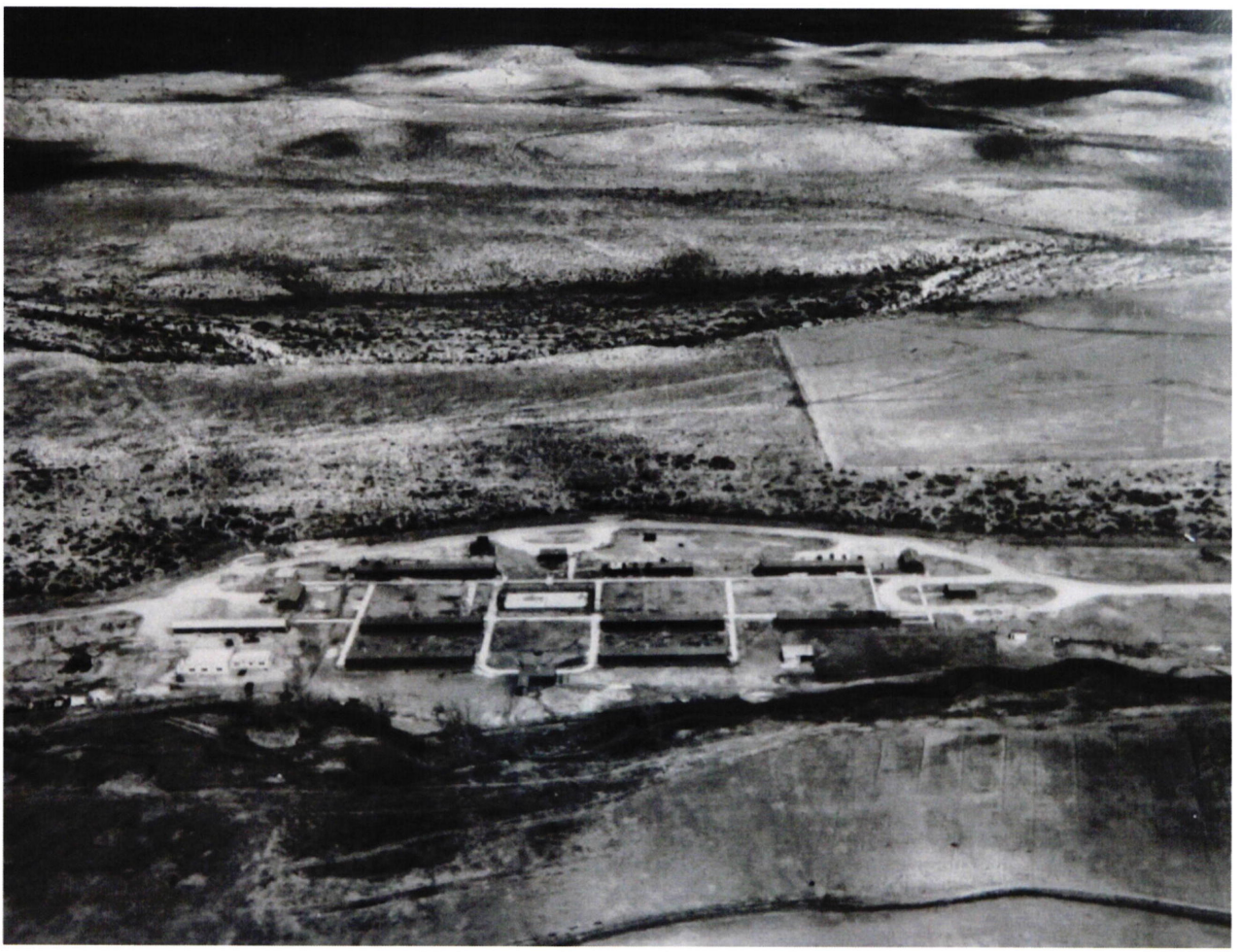
Historic Photographs



Rattlesnake Springs ca. 1934, prior to development by the National Park Service
(National Park Service, Negative No. CACA 6459)

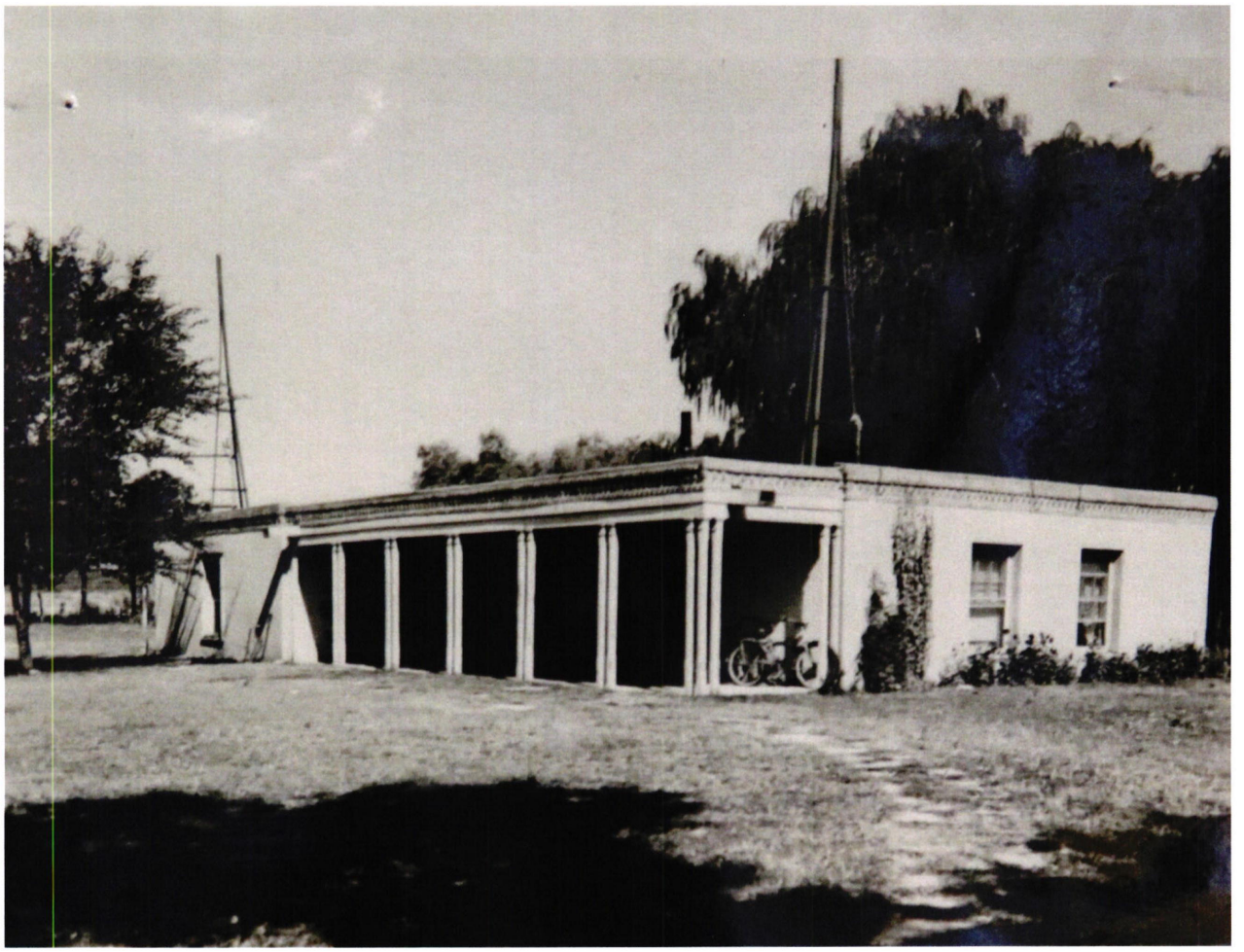


Water system development at Rattlesnake Springs, May 1935, with foundation of pump house under construction in foreground (National Park Service, Negative No. 7437)



Aerial view of CCC camp at Rattlesnake Springs, 1941
(National Park Service, CAVE Administrative Records Archive)

Historic Photographs



Ranger's Residence, primary (south) and east façades ca. 1949. Note evidence of electrical poles and radio mast.
(National Park Service, CAVE Administrative Records Archive)



Ranger's residence, west and north façades ca. 1949. Note the partial view of one of the original pair of garage doors to the far right of the frame and the four-over-four windows at the corner of the Light Plant addition. (National Park Service, CAVE Administrative Records Archive)



Pump house following 1940 addition, primary (north) and west façades, 1953. Note the partially buried fuel oil (diesel) tank in the foreground and newer electrical switch gear on side of building for powering pump.
(National Park Service, CAVE Administrative Records Archive)



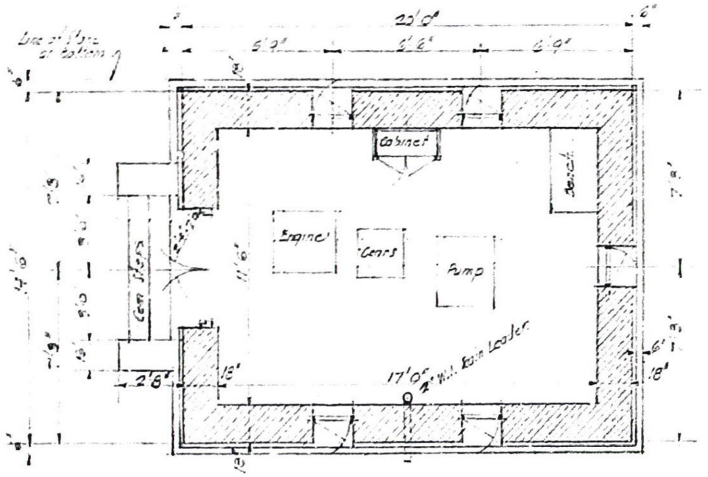
Pump House following 1940 addition, primary (north) and east façades, ca. 1968
(National Park Service, CAVE Administrative Records Archive)

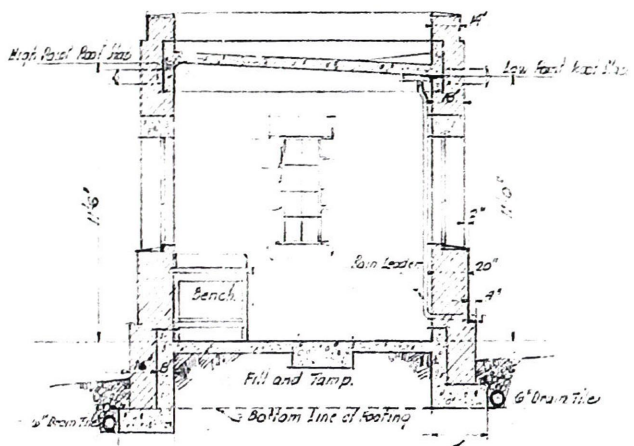


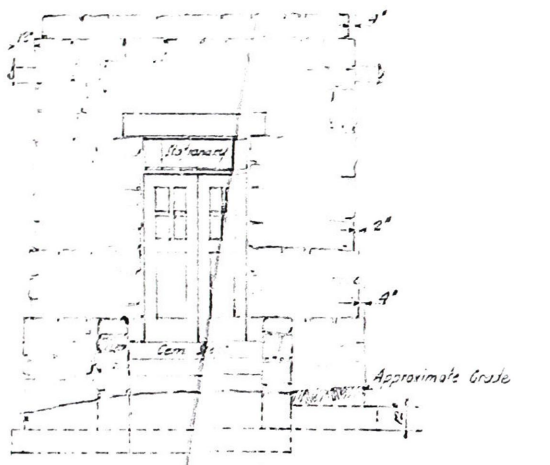
Press day picnic at the Ranger's Residence, 1974
(National Park Service, CAVE Administrative Records Archive, Negative No. CACA 4798)

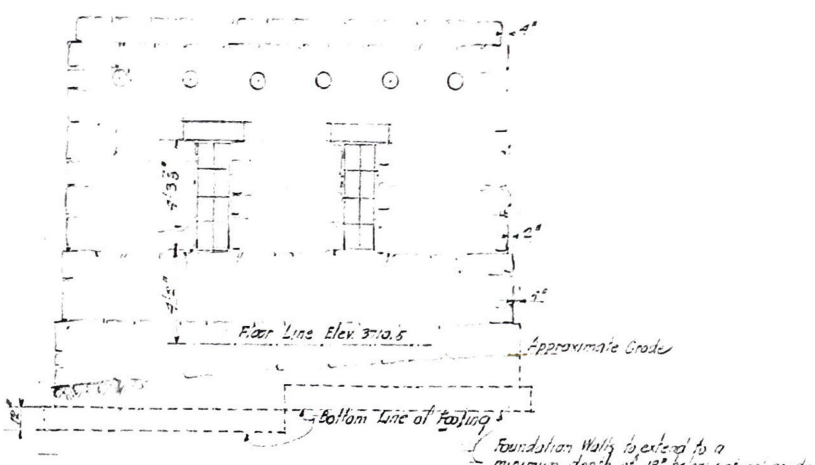
Appendix C

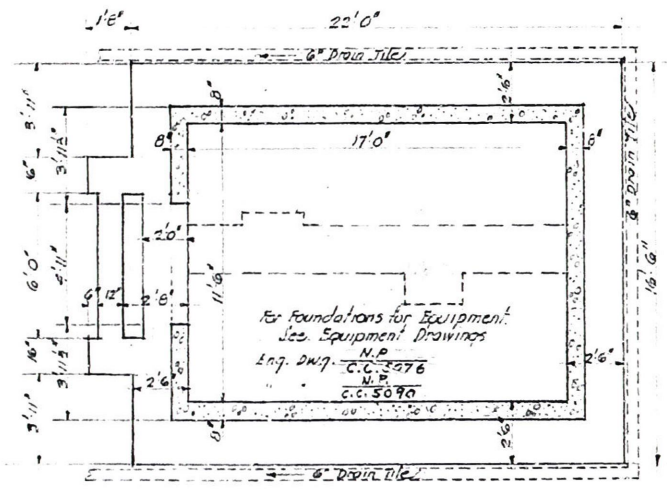
Selected Historic Drawings

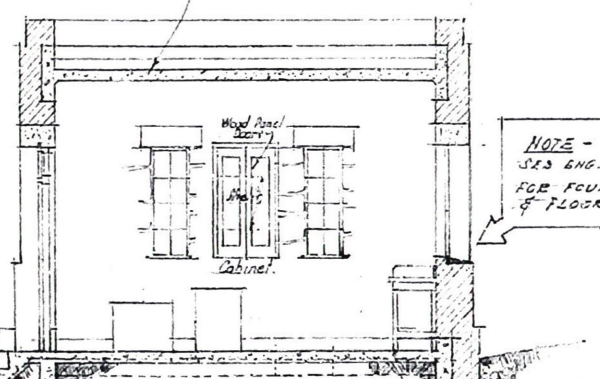




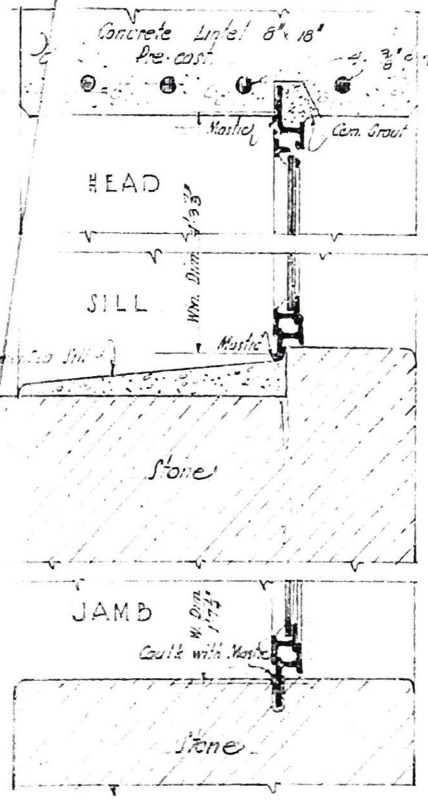


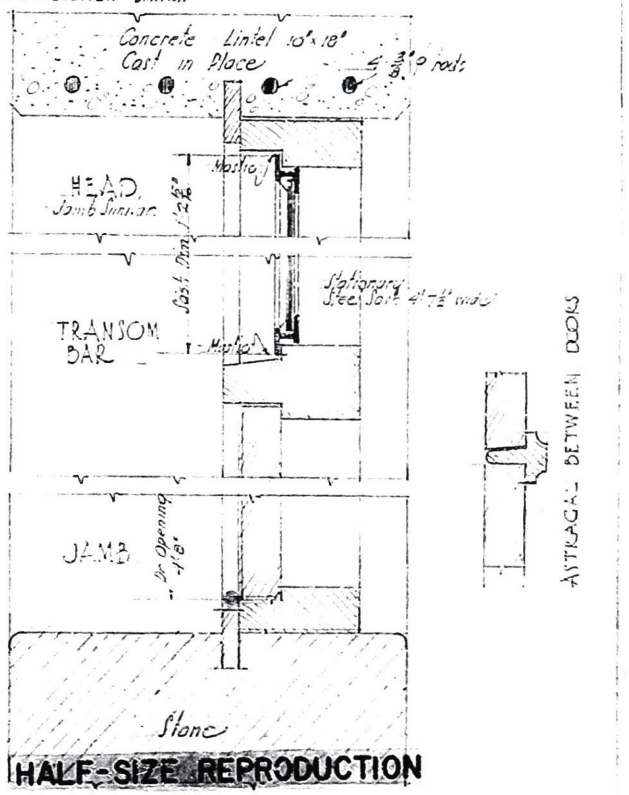






NOTE -
SEE ENG. DWG. NP CC 5076 FOR FOUNDATIONS & FLOOR





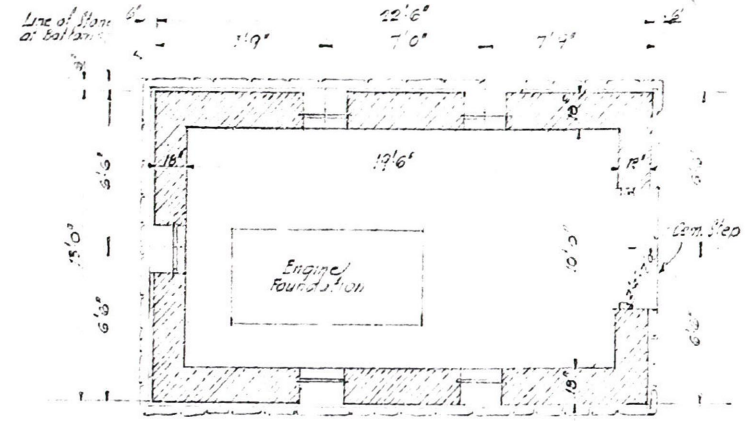
Public Works Project No. 3 — Physical Improvements — E.P. to 26.14

Recommended	Chief Architect	Date 11-13-33	U.S. DEPARTMENT OF THE INTERIOR
Cleared for Sub.	Asst. Chief Engineer	Date 3-8-34	OFFICE OF NATIONAL PARKS, BUILDINGS & RESERVATIONS
Concurred	Chief Engineer	Date 3-31-34	CARLSBAD CAVERNS NATIONAL PARK
Concurred	Supervising Engineer	Date 3-16-34	PUMPING STATION
Approved	Director	Date 3/23/34	RATTLESNAKE SPRINGS WATER SUPPLY

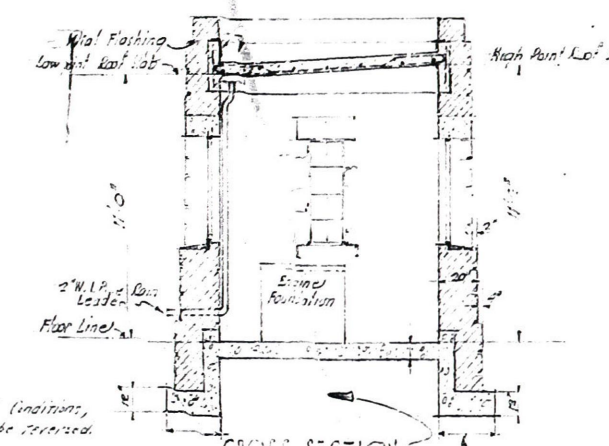
DRAWN BY BRANCH OF PLANS AND DESIGN

NP-CC-3016 SHT. 1 OF 2

CARLSBAD CAVERNS NATIONAL PARK PUMPING STATION, RATTLESNAKE SPRINGS WATER SUPPLY, 1933.

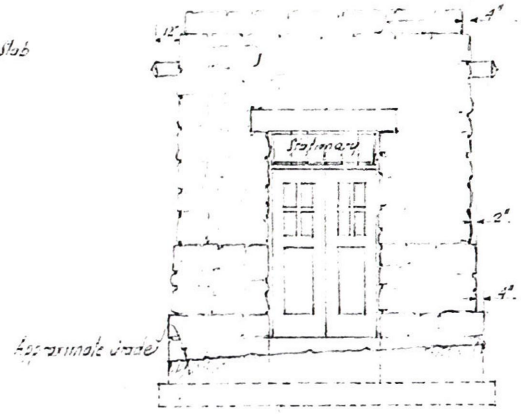


FLOOR PLAN.
Scale ½ in. = 1ft.

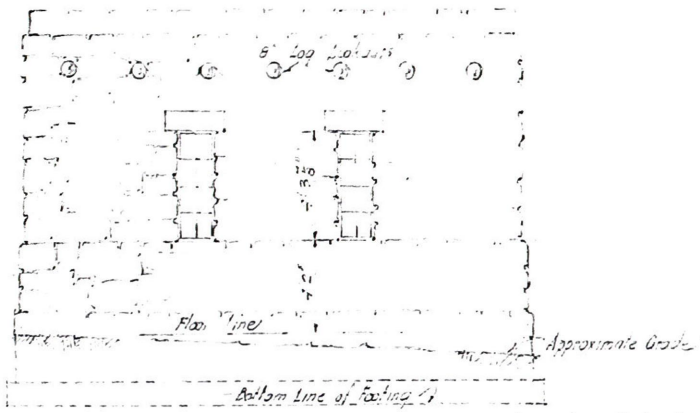


Notes: If desirable, due to field conditions, pile door and window can be reversed.

CROSS SECTION
Scale ½ in. = 1ft.

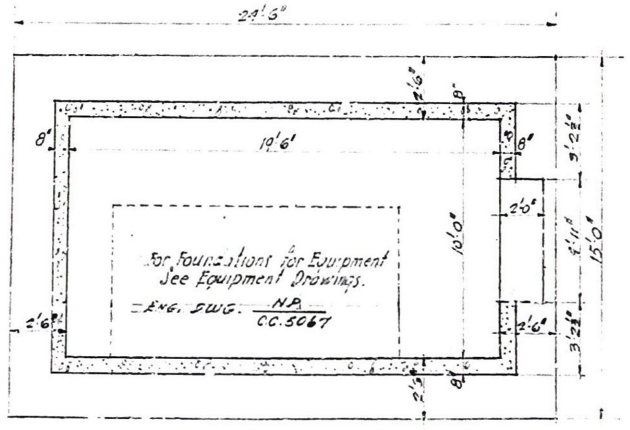


NORTH ELEVATION
Scale ½ in. = 1ft.



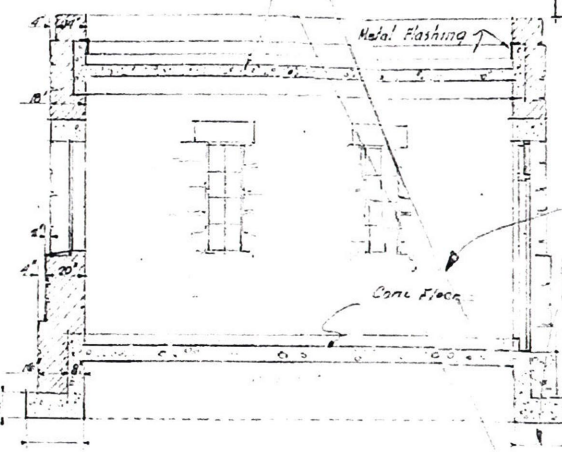
EAST ELEVATION
West Elevation Similar

Foundation walls to extend into rock, depth of "E" below natural grade



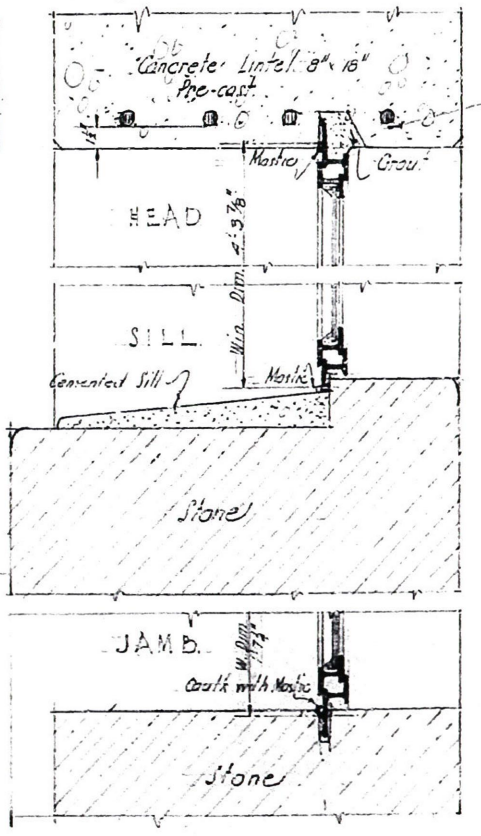
FOUNDATION PLAN
Scale ¼ in. = 1ft.

4 inch Concrete Slab reinforced with ⅜"ø rods 6' Cen. Bend up alternate rods at ½ point. Temperature steel to be ⅜"ø rods 12" cc.



LONGITUDINAL SECTION

Note
See Engineering Drawing N.P. C.C.5067 for Foundation, Walls & Floor

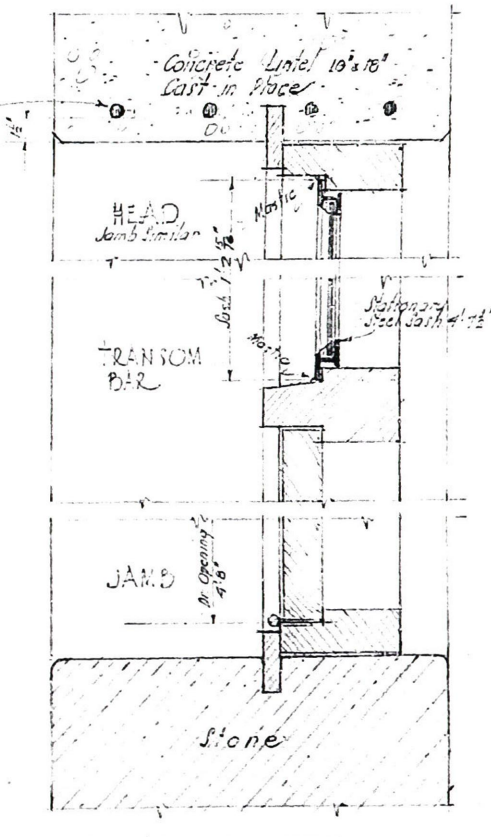


4 - ⅜"ø Rods

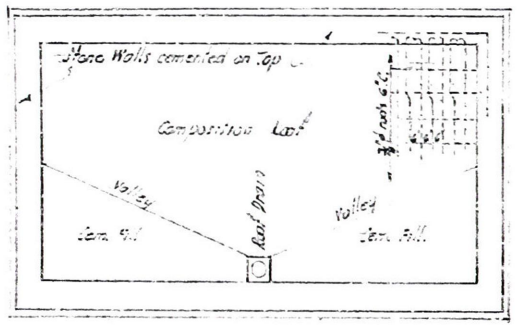
All flash & fit steel parts to swing out. To be built into Wall

Scale 3 in. = 1ft.

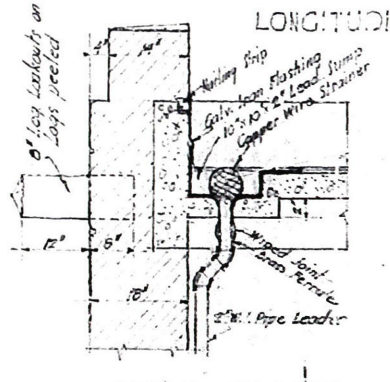
DETAIL OF WINDOW



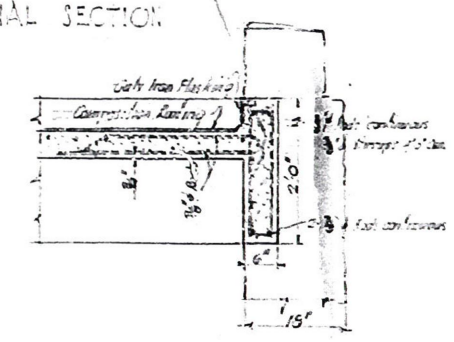
DETAIL OF DOOR



ROOF PLAN



DETAIL OF ROOF DRAIN
Scale ½ inch = 1ft.

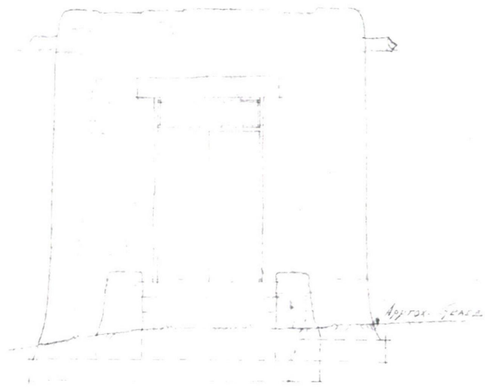


DETAIL AT HIGH POINT OF ROOF

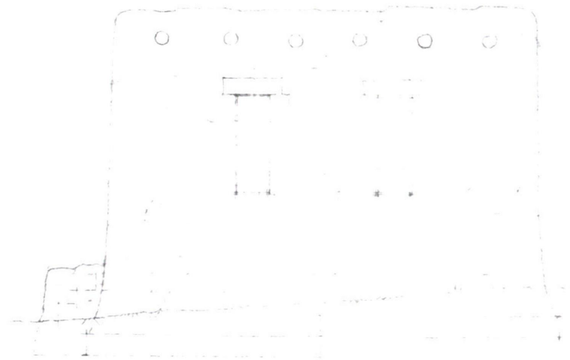
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Recommended	A.E. Demaray Chief Engineer	Date 11-13-33	U.S. DEPARTMENT OF THE INTERIOR OFFICE OF NATIONAL PARKS, BUILDINGS & RESERVATIONS
Cleared for Ind.	T.D. Ritchie Chief Engineer	Date 12-21-33	CARLSBAD CAVERNS NATIONAL PARK
Concurred	P.C. Stimmel Chief Engineer	Date 3-21-34	BOOSTER PUMP STATION
Concurred	Thomas Boles Superintendent	Date 3-16-34	RATTLESNAKE SPRINGS WATER SUPPLY
Approved	A. E. Demaray Acting Director	Date 3/23/34	DRAWN BY BRANCH OF PLANS AND DESIGN

Date Nov 15 1933
Sheet No. 1 of 2 Sheets
Drawing No. C.C.5076

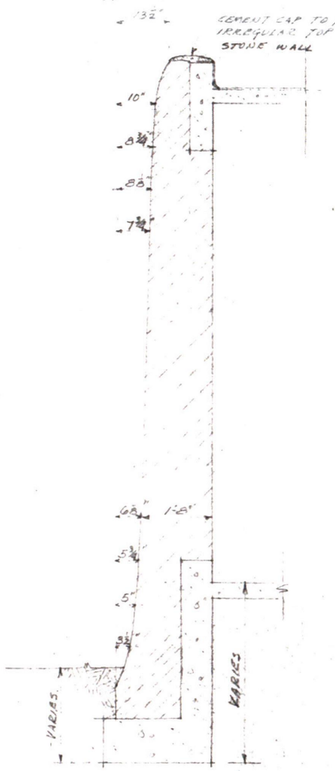
CARLSBAD CAVERNS NATIONAL PARK PUMPING STATION, RATTLESNAKE SPRINGS WATER SUPPLY, 1933.



EAST ELEVATION
Scale ¼in = 1ft



NORTH ELEVATION



TYPICAL WALL SECTION
Scale ½in = 1ft.

NOTE: FOR ... SEE DRAWING CC-3017

REVISED ELEVATIONS AND WALL SECTION

PWA Proj. No. 3 Rep. Improvements P.P. No 25-14

U.S DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE

CARLSBAD CAVERNS NATIONAL PARK
PUMPING STATION
RATTLESNAKE SPRINGS WATER SUPPLY

DRAWN BY BRANCH OF PLANS AND DESIGN

Date June 5, 35

one sheet only

Drawing No. CC-3017A

D-19

REVISED ELEVATIONS AND WALL SECTION, CARLSBAD CAVERNS NATIONAL PARK PUMPING STATION, RATTLESNAKE SPRINGS WATER SUPPLY, 1935.

ALTERATIONS AND ADDITION TO PUMP HOUSE FOR EQUIPMENT PURCHASED BY PWA, RATTLESNAKE SPRINGS AREA, CARLSBAD CAVERNS NATIONAL PARK, 1939.

TRIM LINE

CLEARED

RECREATIONAL PLANNING AND STATE COORDINATION

H. Wirth
ACTING REGIONAL DIRECTOR

6/8/39

REVIEWED

RESEARCH AND EDUCATION

PLANNING

SANITATION

HISTORY

DESIGNED BY
ARCHITECT
Del. Jones

DRAWN BY
Albert Good 5/6/39

CHECKED BY
Wm. Stanley 5/7/39

APPROVED
Chief of Planning 5-17-39

BASIC DATA

FRONT ELEVATION
SCALE 1/4"-1'-0"

NOTE.
- EXTERIOR STUCCO FINISH ON ALL OUTSIDE WALLS.
- COLOR TO BE SELECTED BY BRANCH OF PLANS AND DESIGN.
- INTERIOR STUCCO ON INTERIOR WALLS-COLOR TO BE APPROVED

ELEVATION
SCALE 1/4"-1'-0"

ELEVATION
SCALE 1/4"-1'-0"

ROOF PLAN
SCALE 1/8"-1'-0"

FLOOR PLAN
SCALE 1/4"-1'-0"

Note:
All dimensions are shown from adobe line

NOTE: All wood framing shall be kept a minimum of 2" from outside of chimney & interfaces filled with incombustible material. Gas piping to range & refrigerator & gas tanks shall be installed in accordance with N.P.S. Safety Committee Standard No. 2.

See memo 6-30-39 to Supt.

HALF-SIZE REPRODUCTION

SCALE AS SHOWN

RECOMMENDED: Chief of Planning — DATE 6/19/39	UNITED STATES DEPARTMENT OF THE INTERIOR NATIONAL PARK SERVICE	REGION III
CONCURRED: Thomas Allen — DATE 5/24/39	EMPLOYEE'S RESIDENCE	SHEET 1 OF 3
APPROVED: [illegible] Acting — DATE 5-23-39	RATTLESNAKE SPRINGS / CARLSBAD CAVERNS NATIONAL PARK	DRAWING NO. NP CC-2039

TRIM LINE

EMPLOYEE'S RESIDENCE, RATTLESNAKE SPRINGS, CARLSBAD CAVERNS NATIONAL PARK, 1939.

TRIM LINE

TRIM LINE

CLEARED
REGIONAL DIRECTOR
RECREATIONAL PLANNING AND STATE COOPERATION

REVIEWED
RESEARCH AND EDUCATION
SANITATION
PLANS AND PUBLICS
DRAFTING
HISTORY
ENGINEERING

DESIGNED BY
DATE MAY 5, 1939

SECTION A-A
SCALE 1"=1'-0"

SECTION B-B
SCALE 1"=1'-0"

SECTION C-C
SCALE 1"=1'-0"

SECTION G-G

SECTION D-E-F

SECTION H-H
SCALE 1"=1'-0"

SOUTH WALL

PLAN
SCALE 1/2"=1'-0"

NORTH WALL

NOTE:
The numbers on this layout are based on fixtures from THE CRANE CO. or their equal.

NOTE
FOR PLUMBING LAYOUT, MATERIAL LIST & FIXTURE LIST O.K. MAY 16, 1939.

FOUNDATION PLAN
SCALE 1/4"=1'-0"

PLAN

SECTION
SCALE 1/2"=1'-0"
GREASE TRAP

CANALE DETAIL
SCALE 3/8"=1'-0"

PLOT PLAN
SCALE 1"=50'-0"

BASIC DATA

RECOMMENDED _____ DATE _____
CONCURRED _____ DATE _____
APPROVED _____ DATE _____

UNITED STATES
DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE
BRANCH OF PLANS & DESIGN
REGIONAL OFFICE

REGION III
SHEET 2 OF 2
DRAWING NO. NP CC-2039

EMPLOYEE'S RESIDENCE
NAME OF JOB
RATTLESNAKE SPRINGS
LOCATION
CARLSBAD CAVERNS NATIONAL PARK
NAME OF PARK OR MONUMENT

EMPLOYEE'S RESIDENCE, RATTLESNAKE SPRINGS, CARLSBAD CAVERNS NATIONAL PARK, 1939.

TRIM LINE

CLEARED — REGIONAL DIRECTOR — PLANNING AND STATE COORDINATION

REVIEWED — REGIONAL DIRECTOR — RESEARCH AND EDUCATION — SANITATION — FORESTRY — HISTORY — ENGINEERING

DESIGNED BY — TRACED BY — TRACING CHECKED BY — QUANTITIES CHECKED BY — APPROVED — DATE

BASIC DATA

Note: Section these cabinets similar to "Section D-D"

ELEVATION "A"
KITCHEN CABINET DETAILS
SCALE ¼"=1'-0"
SEE REVISED DETAIL

SECTION "A-A"
KITCHEN CABINET DETAILS
SCALE ¼"=1'-0"

ELEVATION "B"
KITCHEN CABINET DETAILS
SCALE ¼"=1'-0"

SECTION "B-B"
KITCHEN CABINET DETAILS
SCALE ¼"=1'-0"

ELEVATION
SERVICE PORCH CABINET D'TLS.
SCALE ¾"=1'-0"

SECTION "C-C"
SERVICE PORCH CABINET
SCALE ¾"=1'-0"

ELEVATION
LINEN CAB. DETAILS
SCALE ¾"=1'-0"

SECTION "D-D"
LINEN CAB. DETAILS
SCALE ¾"=1'-0"

PLAN "P-P"
SERVICE PORCH CABINET DETAIL
SCALE ¾"=1'-0"

PLAN "S-S"
LINEN CABINET DETAILS
SCALE ¾"=1'-0"

PLAN "R-R"

KITCHEN PLAN
SCALE ¼"=1'-0"
KEY TO ELEVATIONS

ENTRANCE DOOR HEADER DETL.
SCALE 3"=1'-0"

ENTRANCE DOOR ELEVATION
SCALE ¾"=1'-0"

SECTION "E-E"
SCALE ¾"=1'-0"

ENTRANCE DOOR JAMB DETAIL
SHOWING NAILER BLOCKS
SCALE 3"=1'-0"

DETAIL OF MOLDING - SIMILAR TO SANDUSCO MOLD # 7308
FULL SIZE

NOTE: THESE PIECES ON WINDOWS UNDER PORTAL ONLY.

HEADER DETAIL

JAMB DETAIL

SILL DETAIL

TYPICAL WINDOW DETAIL
FRONT ELEVATION
SCALE 3"=1'-0"

HEADER DET'L.
JAMB SIMILAR.

SILL DETAIL

TYPICAL WINDOW DETAIL
ALL OTHER ELEVATIONS
SCALE 3"=1'-0"

HDR. DETAIL

JAMB DETAIL

INTERIOR DOORS DETAIL
SCALE 3"=1'-0"

SCALE AS INDICATED

RECOMMENDED _____ DATE _____
CONCURRED _____ DATE _____
APPROVED _____ DATE _____

UNITED STATES
DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE
BRANCH OF PLANS & DESIGN
PREPARED BY
DRAFTSMAN'S OFFICE

REGION III
SHEET 3 OF 11
DRAWING NO. N.P. CC-2039

NAME OF JOB
EMPLOYEE'S RESIDENCE
LOCATION
RATTLESNAKE SPRINGS
NAME OF PARK OR MONUMENT
CARLSBAD CAVERNS NATIONAL PARK

TRIM LINE

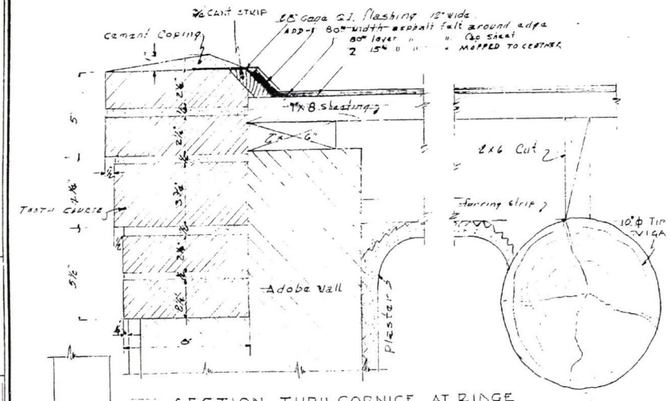
EMPLOYEE'S RESIDENCE, RATTLESNAKE SPRINGS, CARLSBAD CAVERNS NATIONAL PARK, 1939.

TRIM LINE

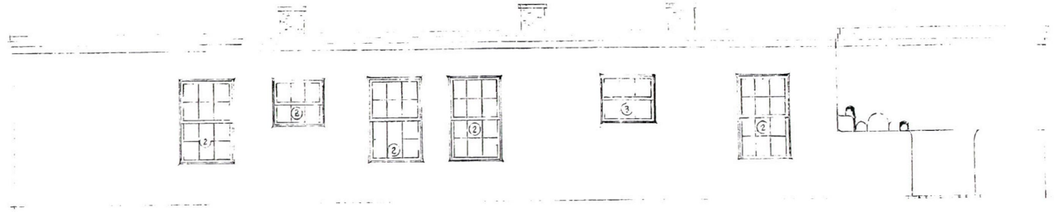
CLEARED — REGIONAL DIRECTOR — RECREATIONAL PLANNING AND STATE COOPERATION

REVIEWED — RESEARCH AND EDUCATION — SANITATION — FORESTRY — HISTORY — ENGINEERING

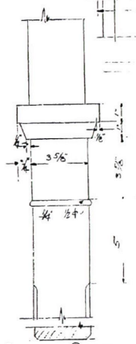
DESIGNED BY — DATE



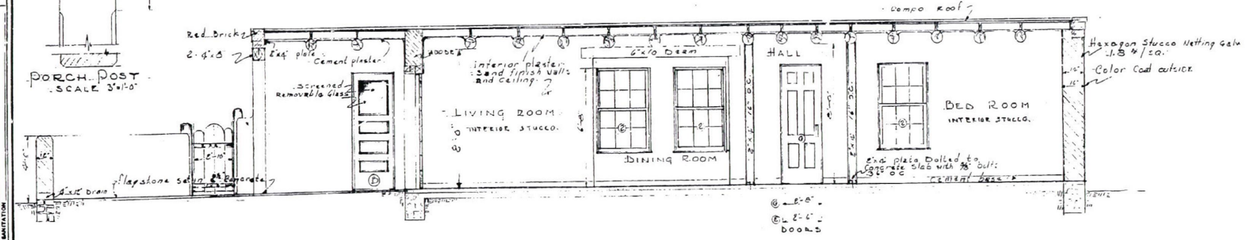
SECTION THRU CORNICE AT RIDGE
SCALE 3"=1'-0"

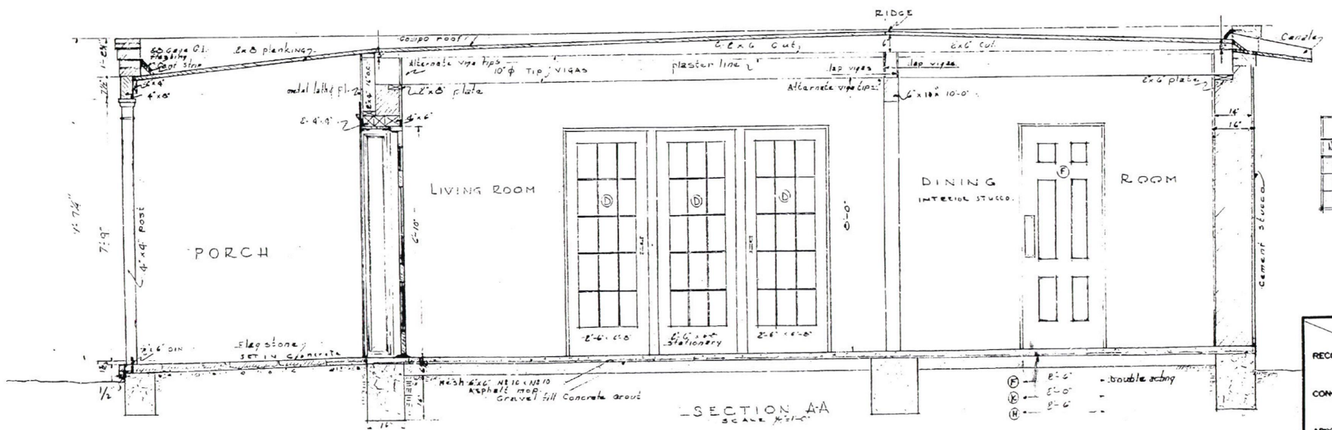


REAR ELEVATION
SCALE ¼"=1'-0"



PORCH POST
SCALE 3"=1'-0"





SECTION A-A
SCALE ¼"=1'-0"

WINDOW SCHEDULE

No.	Type	No. Lts.	Lt. Size	Sash Opening	Max. Opening
1	D.H.	12	12"x16"	3'-4½"x5'-5"x1½"	3'-9"x5'-1½"
2	D.H.	12	Do.	3'-4½"x5'-2"x1½"	3'-9"x5'-1½"
3	D.H.	6	Do.	3'-4½"x2'-9"x1½"	3'-9"x3'-1"

BASIC DATA

SCALE

RECOMMENDED — DATE
CONCURRED — DATE
APPROVED — DATE

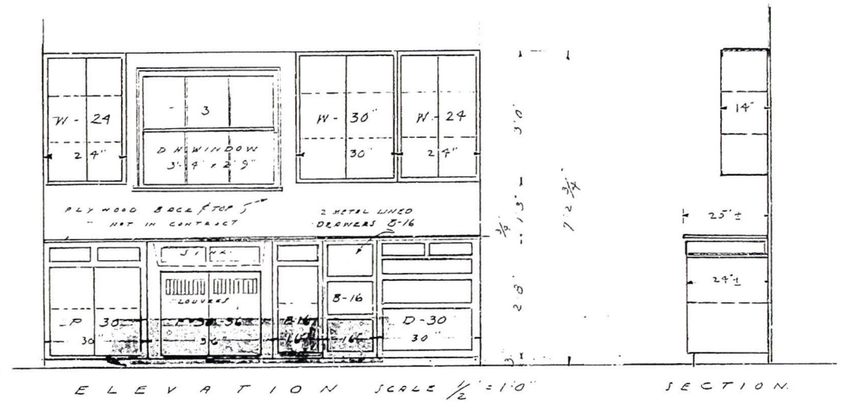
UNITED STATES
DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE
BRANCH OF PLANS & DESIGN
REGION III OFFICE

REGION III
SHEET 4 OF 9
DRAWING NO. N P CC-2039

EMPLOYEE'S RESIDENCE
NAME OF JOB
RATTLESNAKE SPRINGS
LOCATION
CARLSBAD CAVERNS NATIONAL PARK
NAME OF PARK OR MONUMENT

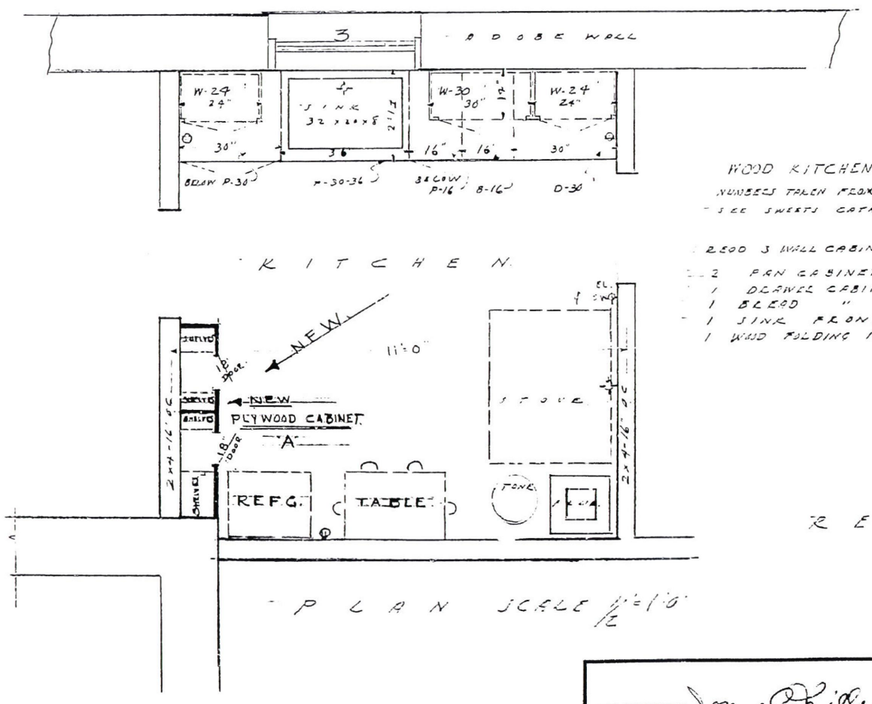
TRIM LINE

EMPLOYEE'S RESIDENCE, RATTLESNAKE SPRINGS, CARLSBAD CAVERNS NATIONAL PARK, 1939.



ELEVATION SCALE 1/2" = 1'0"

SECTION.



PLAN SCALE 1/2" = 1'0"

WOOD KITCHEN CABINETS.
NUMBERS TAKEN FROM CURTIS CO.
- SEE SWEETS CATALOGUE.

2 600 3 WALL CABINETS ABOVE SINK.
2 PAN CABINETS BELOW SINK.
1 DRAWER CABINET " "
1 BLEAU " WITH 2 METAL LINED DRAWERS.
1 SINK FRONT
1 WOOD FOLDING IRONING BOARD

REVISED KITCHEN
SHOWING WOOD STOCK CABINETS

BASIC DATA

SCALE

RECOMMENDED [signature] DATE 9-19-39
REGIONAL LANDSCAPE ARCHITECT
CONCURRED Thomas Boles DATE 9.23.39
CHIEF OF DIVISION
APPROVED Hillory A. Tolson DATE 9/26/39
REGIONAL DIRECTOR

UNITED STATES
DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE
BRANCH OF PLANS & DESIGN
PREPARED BY
HIGH CASTLE, CURTIS
OFFICE

EMPLOYEES RESIDENCE
NAME OF JOB
RATTLESNAKE SPRINGS
LOCATION
CARLSBAD CAVERNS NATIONAL PARK.
NAME OF PARK OR MONUMENT

REGION III
SHEET 5 OF 16
DRAWING NO. NP CC 2039

DESIGNED BY K. SPENCER
DATE 9/20/39

CLEARED
REGIONAL DIRECTOR
PLANNING AND STATE COOPERATION
RECREATIONAL
REVIEWED
RESEARCH AND EDUCATION
SANITATION
FORESTRY
HISTORY
PLANS AND DESIGN
ENGINEERING

TRIM LINE

TRIM LINE

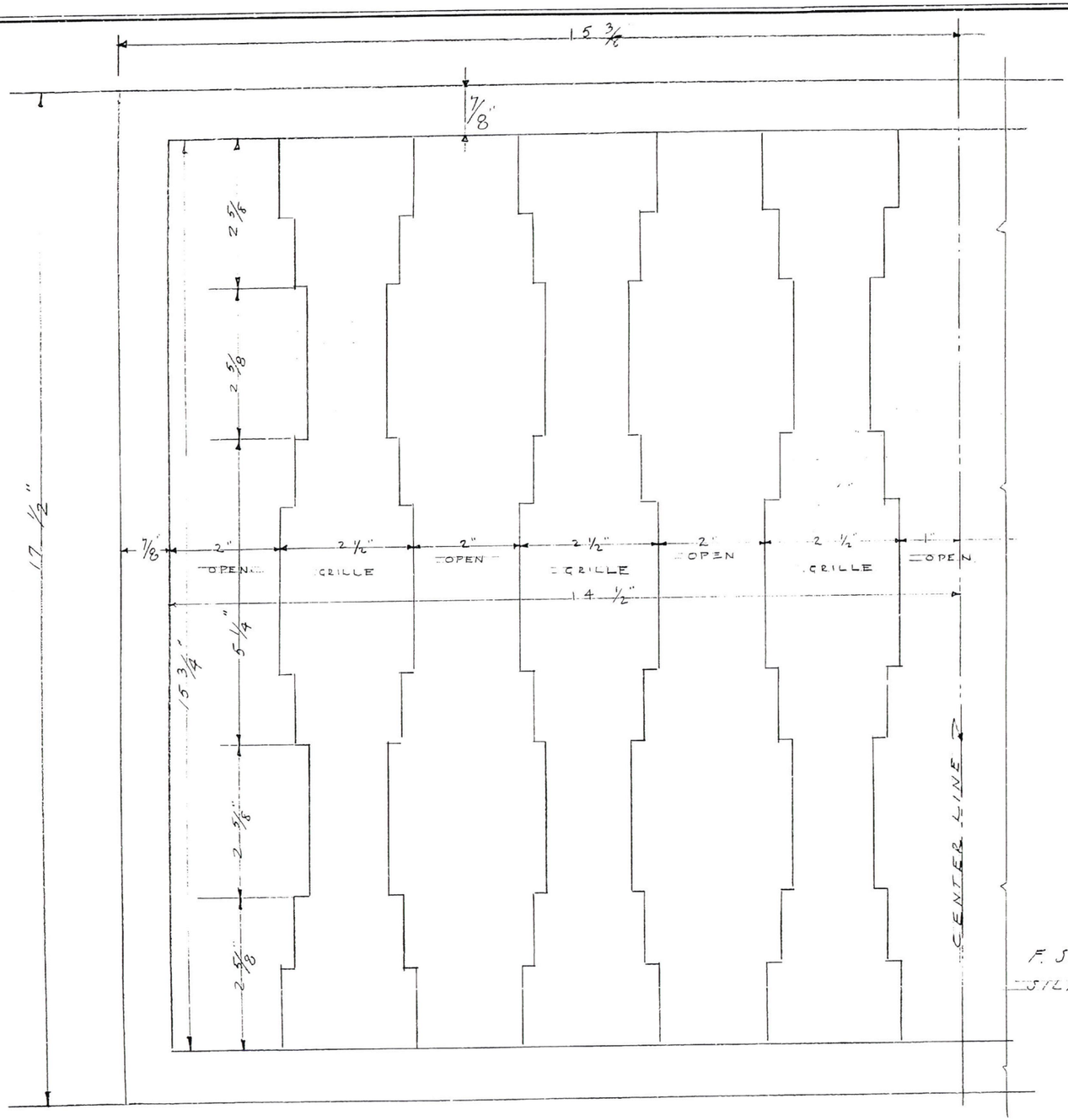
REVISED KITCHEN, EMPLOYEE'S RESIDENCE, RATTLESNAKE SPRINGS, CARLSBAD CAVERNS NATIONAL PARK, 1939.

CLEARED
RECREATIONAL PLANNING AND DEVELOPMENT
REGIONAL DIRECTOR

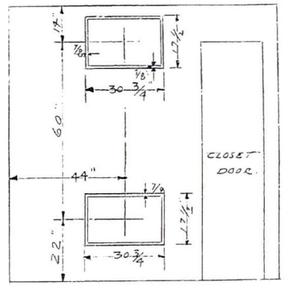
REVIEWED
RESEARCH AND EDUCATION
INTERPRETATION
FORESTRY
HISTORY

DESIGNED BY
PLANS AND DESIGN
DATE
MAY 2, 1939
ENGINEER IN

BASIC DATA

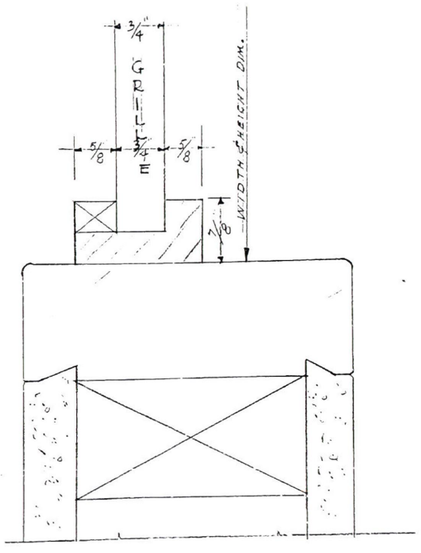


FULL SIZE ELEVATION



ELEVATION Scale 1/2"=1'0"

F.S. SECTION
SILL & HEAD



SCALE

RECOMMENDED ____ DATE ____
CONCURRED ____ DATE ____
APPROVED ____ DATE ____

UNITED STATES
DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE
DIVISION OF PLANS & DESIGN
PREPARED BY
WASHINGTON OFFICE

CRILLE DETAILS EMPLOYEE'S RESIDENCE
NAME OF FOR
RATTLESNAKE SPRINGS
LOCATION
CARLSBAD N. M.
NAME OF PARK OR MONUMENT

REGION III
SHEET 6 OF 7
DRAWING NO. N P
SC. 2039

EMPLOYEE'S RESIDENCE, RATTLESNAKE SPRINGS, CARLSBAD CAVERNS NATIONAL PARK, 1939.

TRIM LINE

CLEARED

REGIONAL DIRECTOR

REVIEWED

RECREATIONAL PLANNING AND STATE COORDINATION

RESEARCH AND EDUCATION

SANITATION

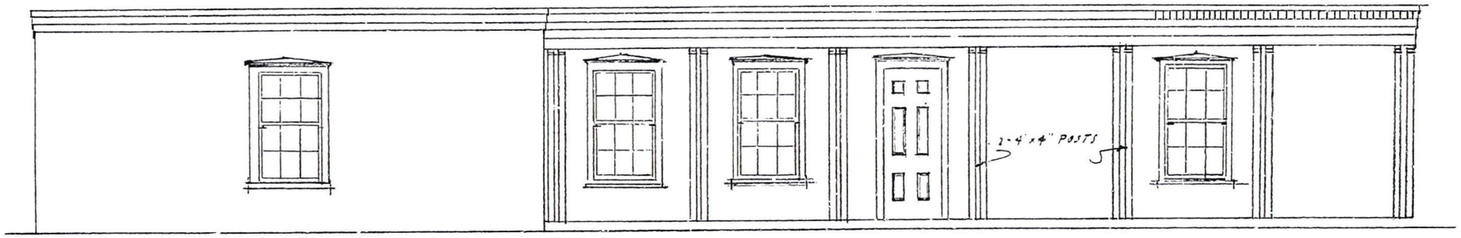
FORESTRY

HISTORY

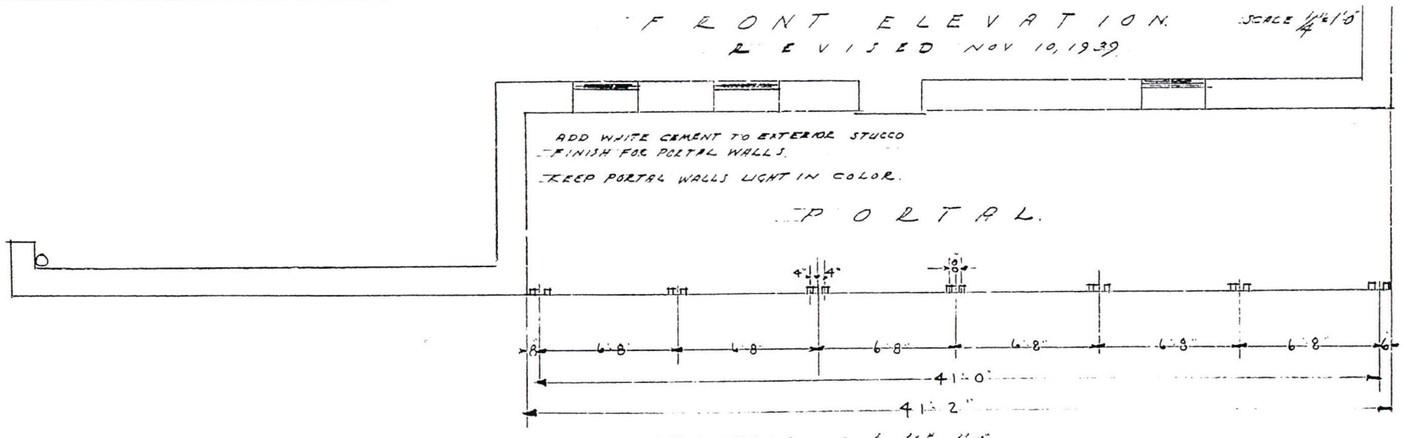
PLANS AND DESIGN

ENGINEERING

Nov 10, 1939



FRONT ELEVATION. SCALE 1/4"=1'0"
REVISED NOV 10, 1939



ADD WHITE CEMENT TO EXTERIOR STUCCO FINISH FOR PORTAL WALLS.
KEEP PORTAL WALLS LIGHT IN COLOR.

PORTAL.

PLAN. Scale 1/4"=1'0"

BASIC DATA

SCALE

RECOMMENDED _____ DATE 11-9-39
REGIONAL LANDSCAPE ARCHITECT

CONCURRED _____ DATE 11.15.39
SUPERINTENDENT

APPROVED _____ DATE 11.21.39
ACT. REGIONAL DIRECTOR

UNITED STATES
DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE
BRANCH OF PLANS & DESIGN
PREPARED BY

EMPLOYEE'S RESIDENCE
NAME OF JOB
RATTLESNAKE SPRINGS
LOCATION
CARLSBAD CAVERNS NATIONAL PARK
NAME OF PARK OR MONUMENT

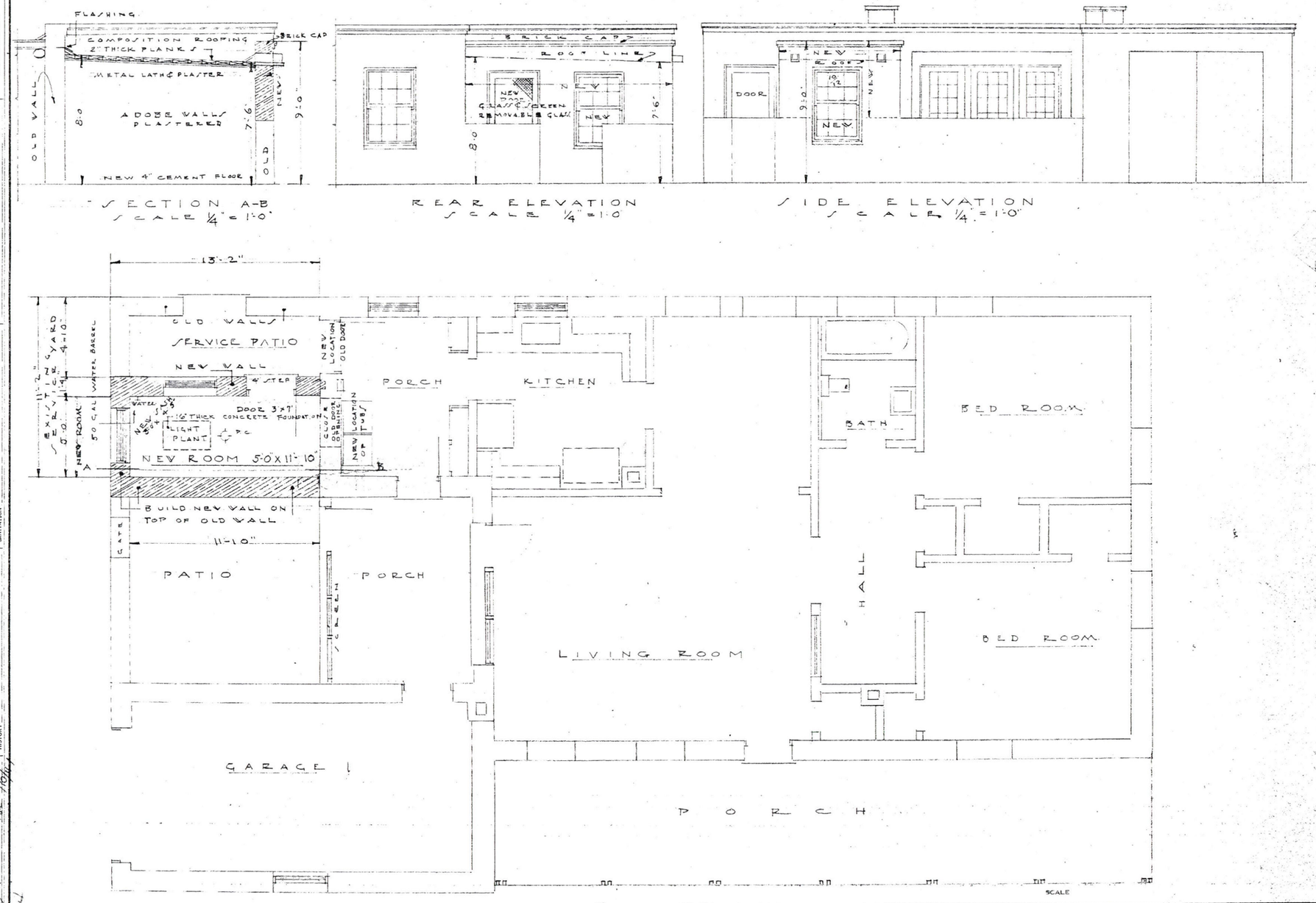
REGION III

SHEET 7 OF 7

DRAWING NO.
N.P.
CC. 2039

EMPLOYEE'S RESIDENCE, RATTLESNAKE SPRINGS, CARLSBAD CAVERNS NATIONAL PARK, 1939.

TRIM LINE



CLEARED
REGIONAL DIRECTOR
RECREATIONAL
PLANNING AND STATE COOPERATION
REVIEWED
RESEARCH AND EDUCATION
SANITATION
FORESTRY
HISTORY
PLANS AND DESIGN
ENGINEERING
DESIGNED BY K. SAUNDERS
DATE NOV 21, 41

RECOMMENDED V. Cornell REGIONAL CHIEF OF PLANNING DATE 11-24-41
CONCURRED Thomas Boles SUPERINTENDENT DATE 12.U.U1
APPROVED REGIONAL DIRECTOR DATE 12/12/41

EXPIRED: Adlib Exponent Connector on INPDCOSDOSVC

UNITED STATES
DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE
BRANCH OF [illegible] & DESIGN
PREPARED BY
REGIONAL OFFICE
OFFICE

ADDITION TO EMPLOYEES RES
NAME OF JOB
RATTLESNAKE SPRINGS
LOCATION
CARLSBAD CAVERNS NAT. PARK
NAME OF PARK OR MONUMENT

REGION THREE
SHEET 1 OF 1
DRAWING NO. NP-CC 2089-C

TRIM LINE

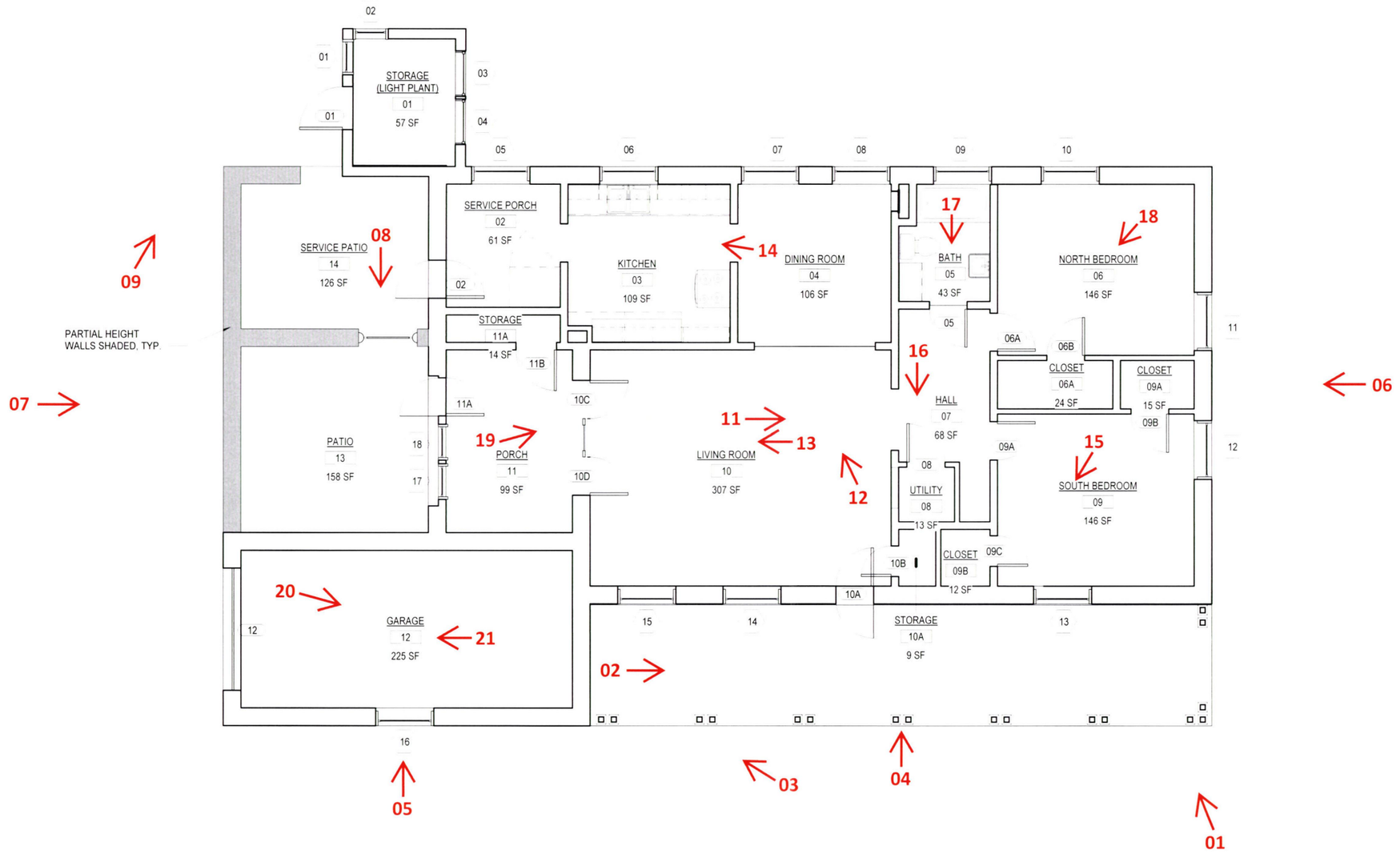
ADDITION TO EMPLOYEE'S RESIDENCE, RATTLESNAKE SPRINGS, CARLSBAD CAVERNS NATIONAL PARK, 1941.

Appendix D

Existing Condition Photographs

Existing Condition Photographs

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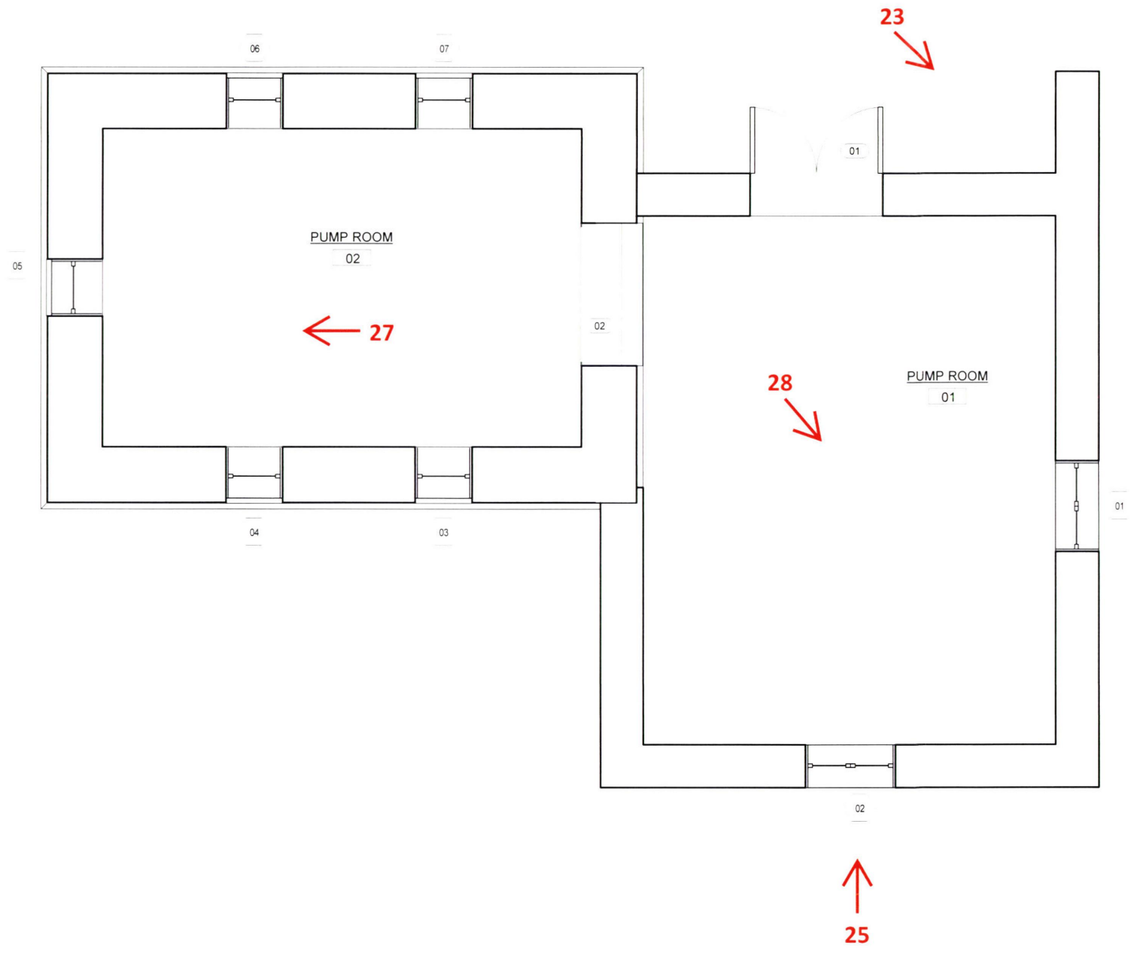


1 FIRST FLOOR PLAN
-- SCALE: J

SCALE J 4 0 4 8
SCALE OF FEET

EXISTING CONDITIONS DRAWING

DESIGNED: -	SUB SHEET NO.	TITLE OF SHEET: RANGER RESIDENCE PHOTO MAP RATTLESNAKE SPRINGS RANGER RESIDENCE CARLSBAD CAVERNS NATIONAL PARK	DRAWING NO.: - -
DRAWN: ZY			PMIS/PKG. NO.: 318326
TECH REVIEW: AV			SHEET: 1 OF 1
DATE: 5/19/2022			



1 FIRST FLOOR PLAN
-- SCALE: H

SCALE H 2 0 2 4 6
SCALE OF FEET

EXISTING CONDITIONS DRAWING

DESIGNED: -	SUB SHEET NO.	TITLE OF SHEET: PUMP HOUSE PHOTO MAP RATTLESNAKE SPRINGS PUMP HOUSE CARLSBAD CAVERNS NATIONAL PARK	DRAWING NO. - -
DRAWN: ZY			PMIS/PKG. NO. 318326
TECH REVIEW: AV			SHEET 1 OF 1
DATE: 5/19/2022			

Existing Condition Photographs

RANGER RESIDENCE



Image 01 - Ranger's residence, primary (south) façade, view northwest (ARG, 2021)



Image 02 - Portal at primary (south) façade, view east (ARG, 2021)

Existing Condition Photographs



Image 03 - Detail of portal at primary (south) façade, view northwest (ARG, 2021)

Existing Condition Photographs



Image 04 - Detail of posts and brick cornice at primary (south) façade, view east (ARG, 2021)

Existing Condition Photographs



Image 05 - West portion of primary (south) façade, view north (ARG, 2021)

Existing Condition Photographs



Image 06 - East façade, view west (ARG, 2021)

Existing Condition Photographs



Image 07 - West façade, view east (ARG, 2021)

Existing Condition Photographs



Image 08 - View looking south toward the north wall of the Garage with Service Patio 14 in the foreground and Patio 13 beyond. (ARG, 2021)



Image 09 - North portion of west façade showing 1942 addition, view northeast (ARG, 2021)

Existing Condition Photographs



Image 10 - Rear (north) façade, view southwest (ARG, 2021)



Image 11 - Living room, view east (ARG, 2021)



Image 12 - View from living room to dining nook, view north (ARG, 2021)



Image 13 - View from living room to dining nook, view north (ARG, 2021)



Image 14 - Kitchen, view northwest (ARG, 2021)

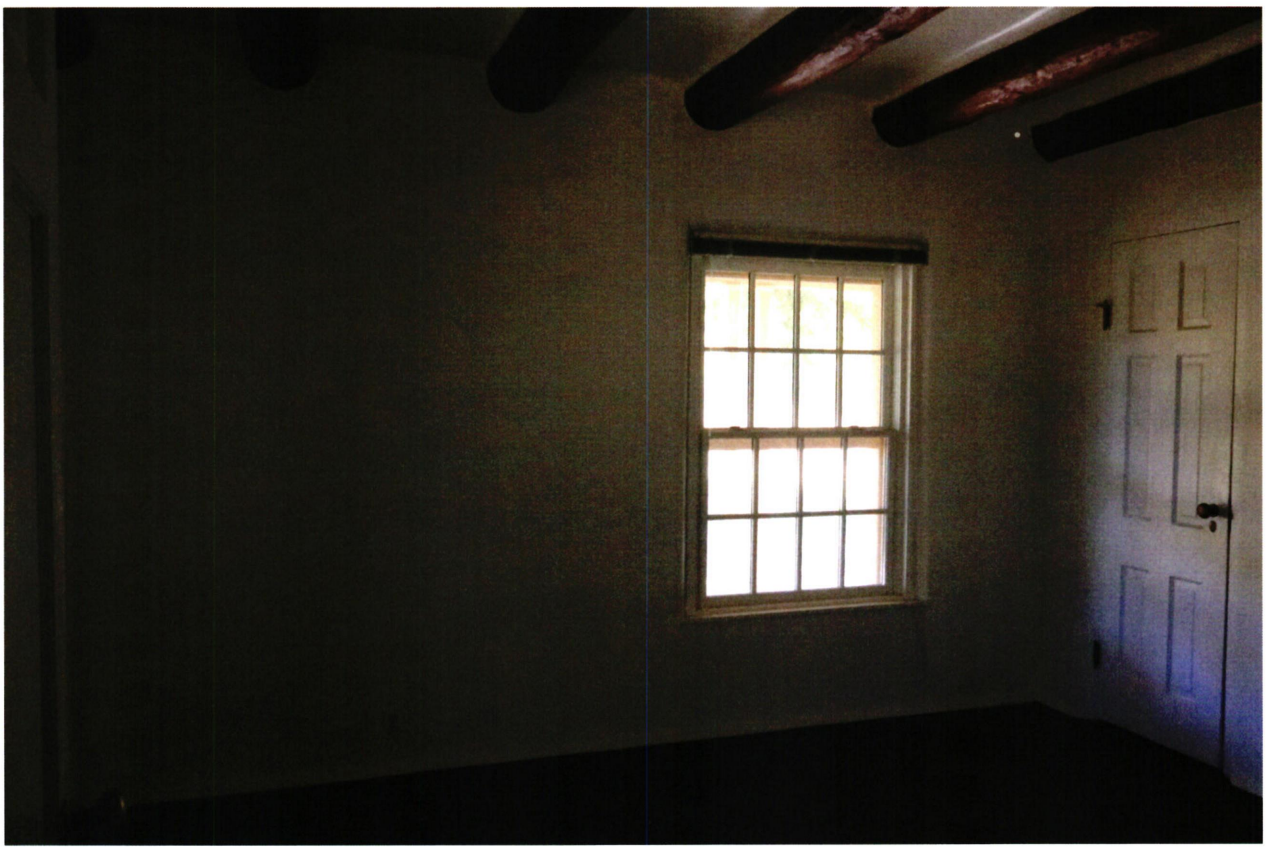


Image 15 - South bedroom, view southwest (ARG, 2021)



Image 16 - Hallway with HVAC closet, view south (ARG, 2021)



Image 17 - Looking south toward Door 05 in the bathroom (ARG, 2021)



Image 18 - Looking southwest toward Doors 06A and 06B within the north bedroom (ARG, 2021)



Image 19 - Looking northeast toward Doors 10C and 10D of the Porch 11 (ARG, 2021)



Image 20 - Looking southeast toward Window 16 of the Garage (ARG, 2021)



Image 21 - west toward the garage door from within the garage (ARG, 2021)

PUMP HOUSE



Image 22 - Primary (north) façade, view south (ARG 2021)



Image 23 - Detail of ceiling at porch at primary (north) façade, view southeast (ARG 2021)



Image 24 - West façade and partial view of rear (south) facade, view northeast. Note the hatch-covered vault in the foreground (ARG, 2021)



Image 25 - East portion of rear (south) façade, view north (ARG, 2021)



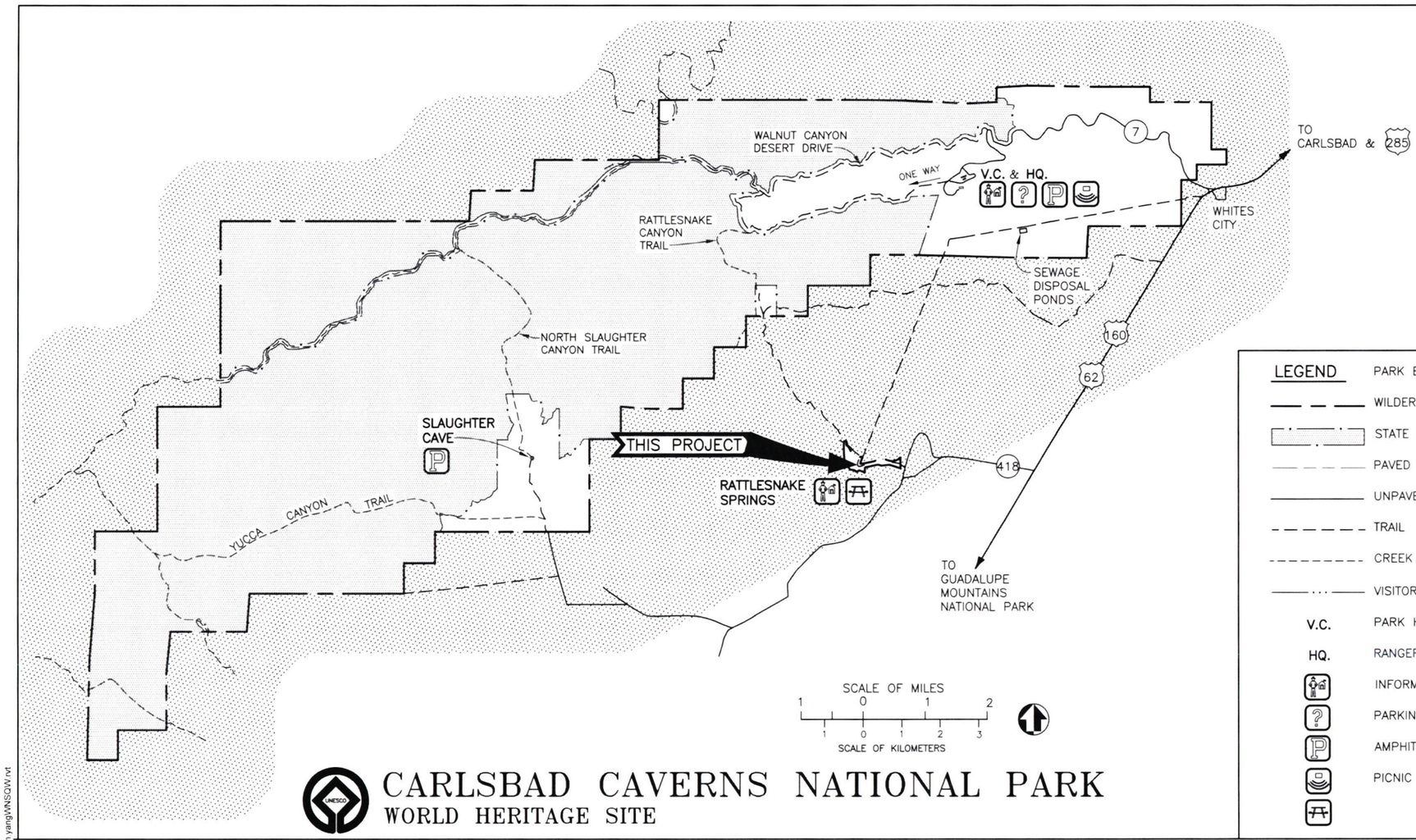
Image 26 - East façade, view west (ARG, 2021)

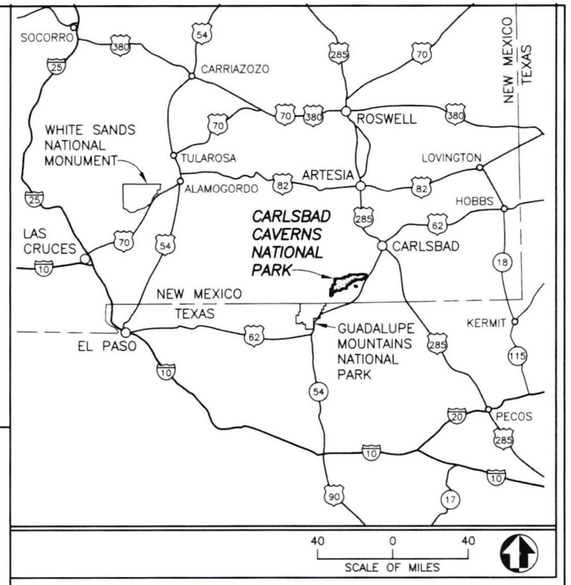


Image 27 - West portion of the pump house interior, view west (ARG, 2021)



Image 28 - East portion of the pump house interior, view southeast (ARG, 2021)





LEGEND	
	PARK BOUNDARY
	WILDERNESS AREA
	STATE LINE
	PAVED ROAD
	UNPAVED ROAD
	TRAIL
	CREEK OR RIVER
	VISITOR CENTER
V.C.	PARK HEADQUARTERS
HQ.	RANGER STATION
	INFORMATION CENTER
	PARKING
	AMPHITHEATER
	PICNIC AREA

CARLSBAD CAVERNS NATIONAL PARK
WORLD HERITAGE SITE

CAVE - PMIS 318326

2/2/2022 12:14:05 PM KE REVIT 2017 C:\Users\M.Yang\Documents\CAVE Rattlesnake Springs Central 2021_myangWNSQW.rvt

A/E FIRMS

CIVIL ENGINEER
PROVOST & PRITCHARD CONSULTING GROUP
286 W. CROMWELL AVENUE
FRESNO, CA 93711

ARCHITECT
ARCHITECTURAL RESOURCES GROUP
PIER 9, THE EMBARCADERO, SUITE 107
SAN FRANCISCO, CA 94111

M/P/FP ENGINEER
INTERFACE
1999 HARRISON ST. SUITE 550
OAKLAND, CA 94612

LANDSCAPE ARCHITECT:
FILL LANDSCAPE ARCHITECTURE
1342 W. OAK ST.
FORT COLLINS, CO 80521

STRUCTURAL ENGINEER
INTERFACE
1999 HARRISON ST. SUITE 550
OAKLAND, CA 94612

ELECTRICAL ENGINEER
O'MAHONY & MYER
4340 REDWOOD HIGHWAY, SUITE 345
SAN RAFAEL, CA 94903

Mark	Sheet	REVISION	Date	Initial

QUALITY DESIGN CERTIFICATION

☐ Prepared in Accordance with Design Development (Title I) ____ Drawing No.
OR
☐ Variance from Design Development (Title I) Approved by Superintendent on ____ Date
OR
☐ Construction Drawings Not Preceded by Design Development (Title I)

Project Manager ____ Date

EXISTING CONDITIONS

UNITED STATES
DEPARTMENT OF THE INTERIOR

NATIONAL PARK SERVICE
DENVER SERVICE CENTER

TITLE OF DRAWING
RANGER RESIDENCE

LOCATION WITHIN PARK
RATTLESNAKE SPRINGS

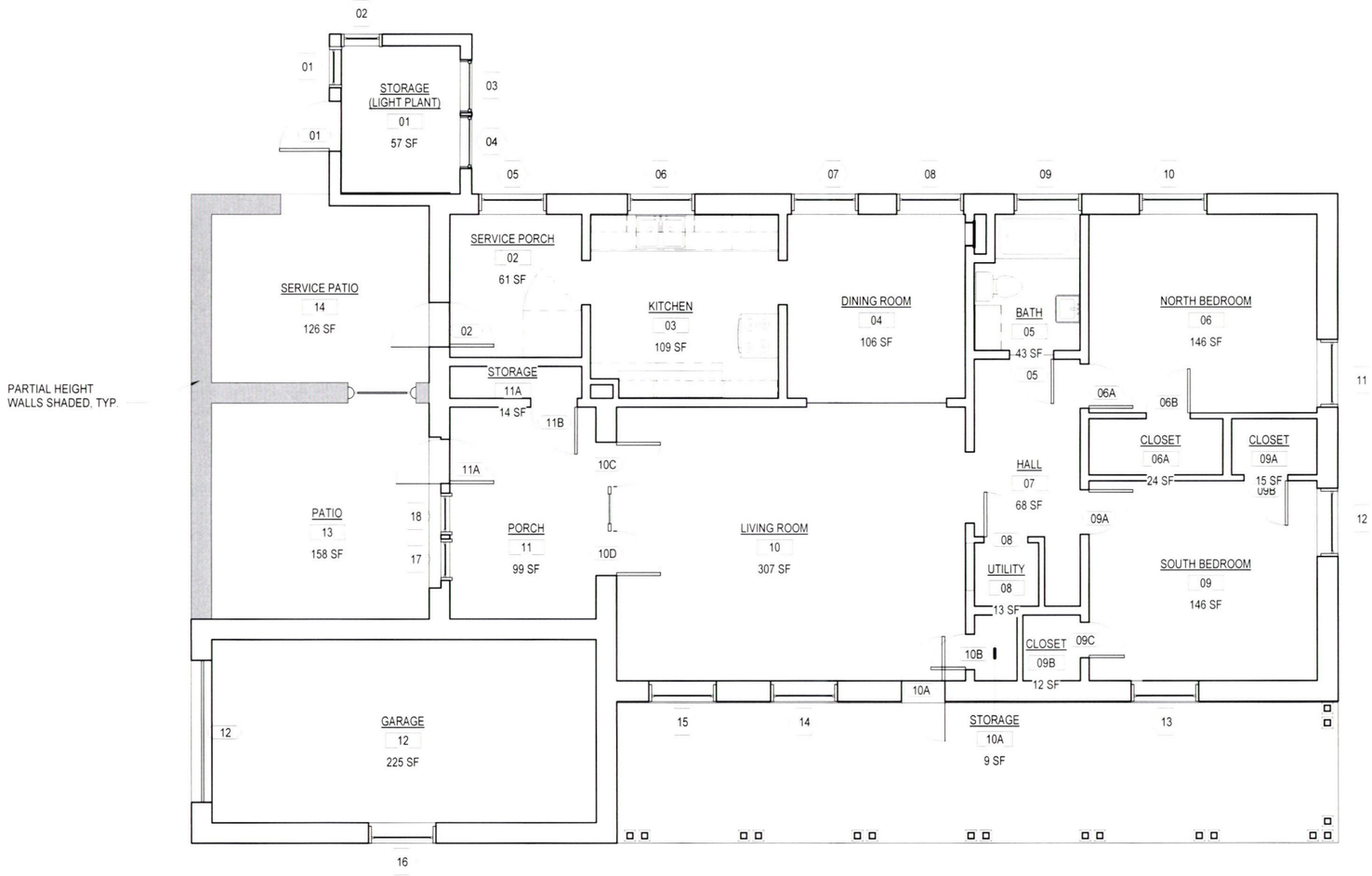
NAME OF PARK
CARLSBAD CAVERNS NATIONAL PARK

REGION	COUNTY	STATE
SOAR	EDDY	NEW MEXICO

DRAWING NO.
-
-

PMIS/PKG. NO.
318326

SHEET
1 OF 5



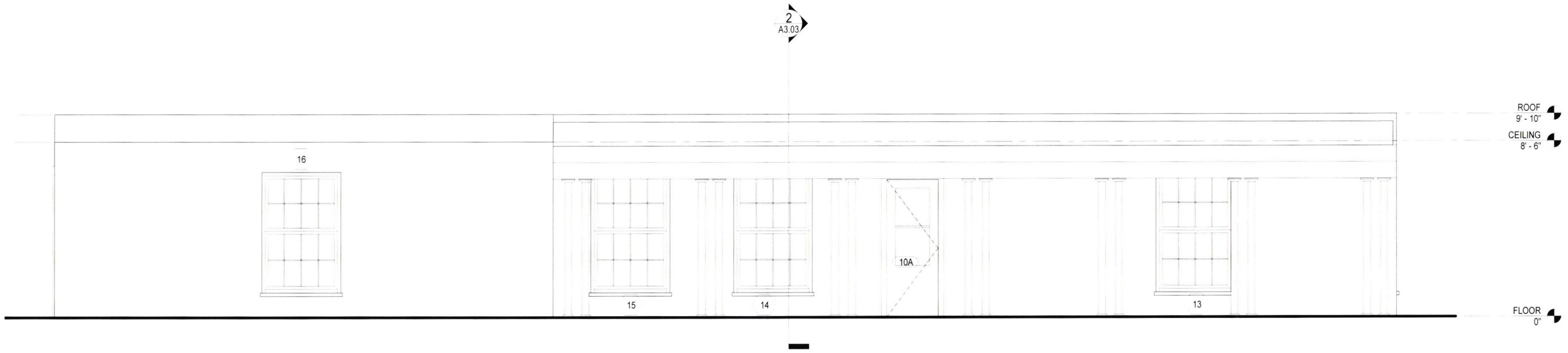
1 A2.01 FIRST FLOOR PLAN
SCALE: J

SCALE J 4 0 4 8
SCALE OF FEET

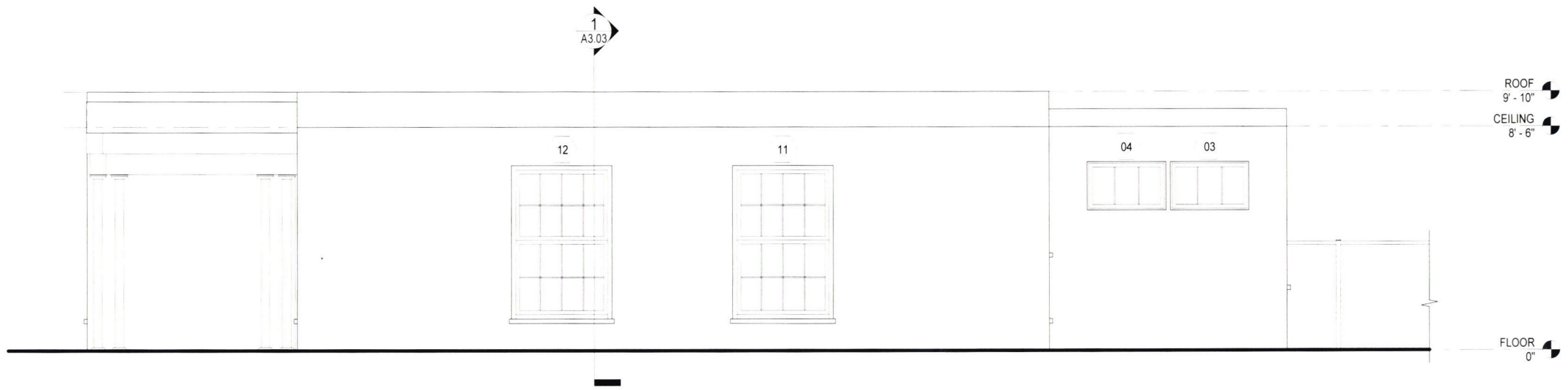
EXISTING CONDITIONS

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-			-
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TECH REVIEW: AV		RATTLESNAKE SPRINGS RANGER RESIDENCE CARLSBAD CAVERNS NATIONAL PARK	SHEET 2 OF 5
DATE: 02/08/2022			

5/18/2022 11:45:47 AM ZY REVIT 2017 A2.01 C:\Users\M Yang\Documents\CAVE Rattlesnake Springs Central 2021_m yangWMSQW.rvt



1 SOUTH ELEVATION
A3.01 SCALE: H



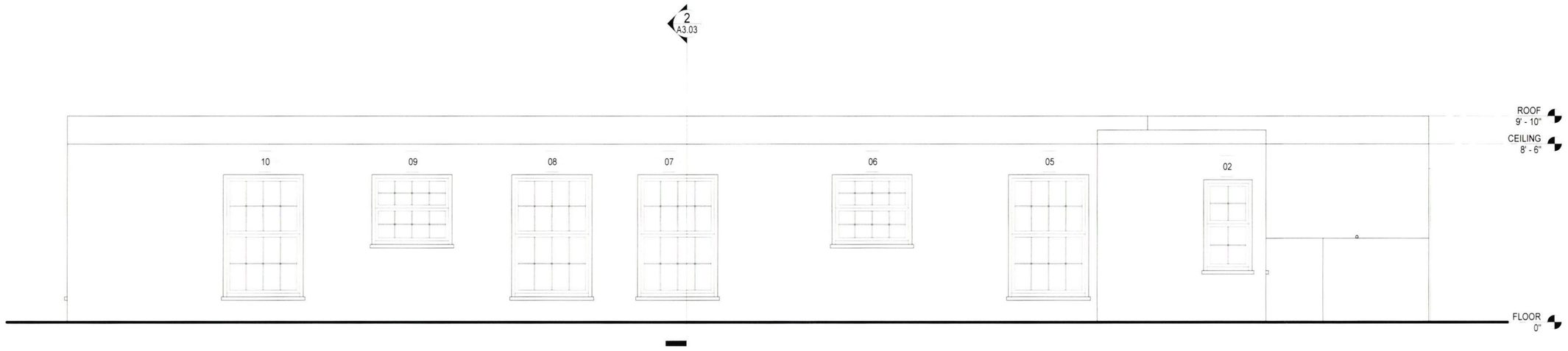
2 EAST ELEVATION
A3.01 SCALE: H

SCALE (H) 2 0 2 4 6
SCALE OF FEET

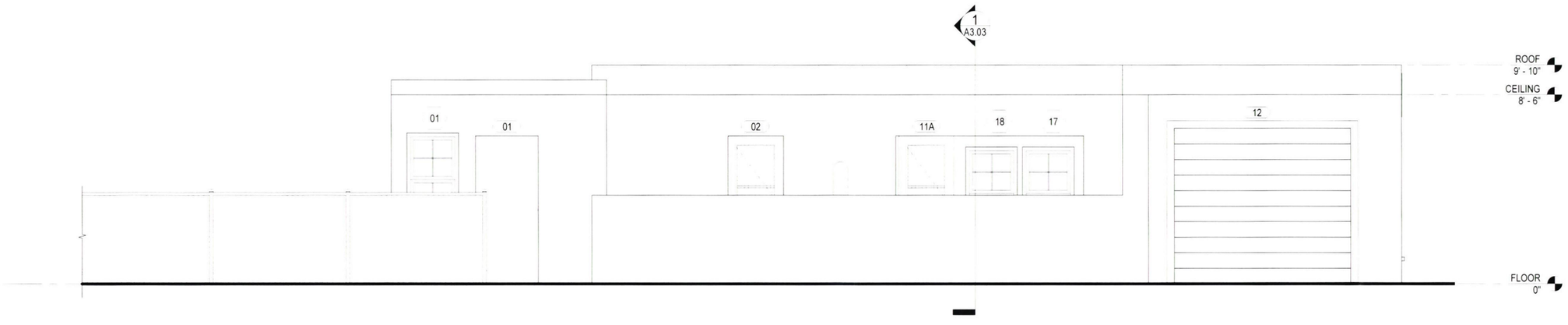
EXISTING CONDITIONS

DESIGNED:	SUB SHEET NO.	TITLE OF SHEET	DRAWING NO.
-	A3.01	BUILDING ELEVATIONS	-
DRAWN: ZY		RATTLESNAKE SPRINGS RANGER RESIDENCE CARLSBAD CAVERNS NATIONAL PARK	-
TECH REVIEW: AV			PMIS/PKG. NO. 318326
DATE: 01/28/22			SHEET 3 OF 5

2/2/2022 12:14:05 PM ZY REVIT 2017 A3.01 C:\Users\M.Yang\Documents\CAVE Rattlesnake Springs Central 2021_m.yangWNSQW.rvt



1 A3.02 NORTH ELEVATION
SCALE: H



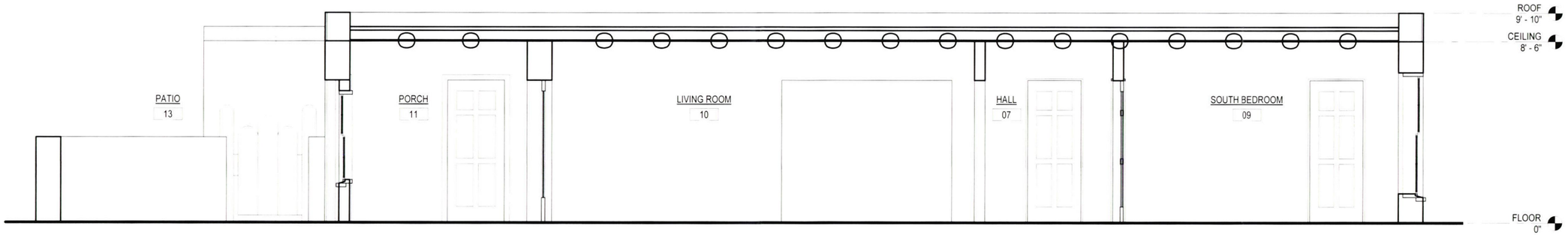
2 A3.02 WEST ELEVATION
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SCALE OF FEET

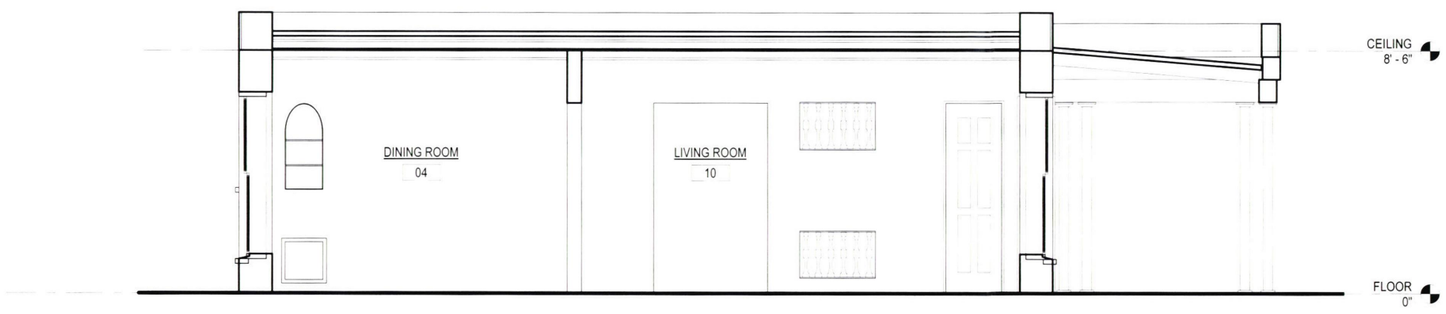
EXISTING CONDITIONS

DESIGNED: Designer DRAWN: Author TECH REVIEW: Checker DATE: 01/28/22	SUB SHEET NO. A3.02	TITLE OF SHEET: BUILDING ELEVATIONS RATTLESNAKE SPRINGS RANGER RESIDENCE CARLSBAD CAVERNS NATIONAL PARK	DRAWING NO. - - PMIS/PKG. NO. 318326 SHEET 4 OF 5

2/2/2022 12:14:05 PM Author REVIT 2017 A3.02 C:\Users\M Yang\Documents\CAVE Rattlesnake Springs Central 2021_m yangWNSQW.rvt



1 LONGITUDINAL BUILDING SECTION
A3.03 SCALE: H



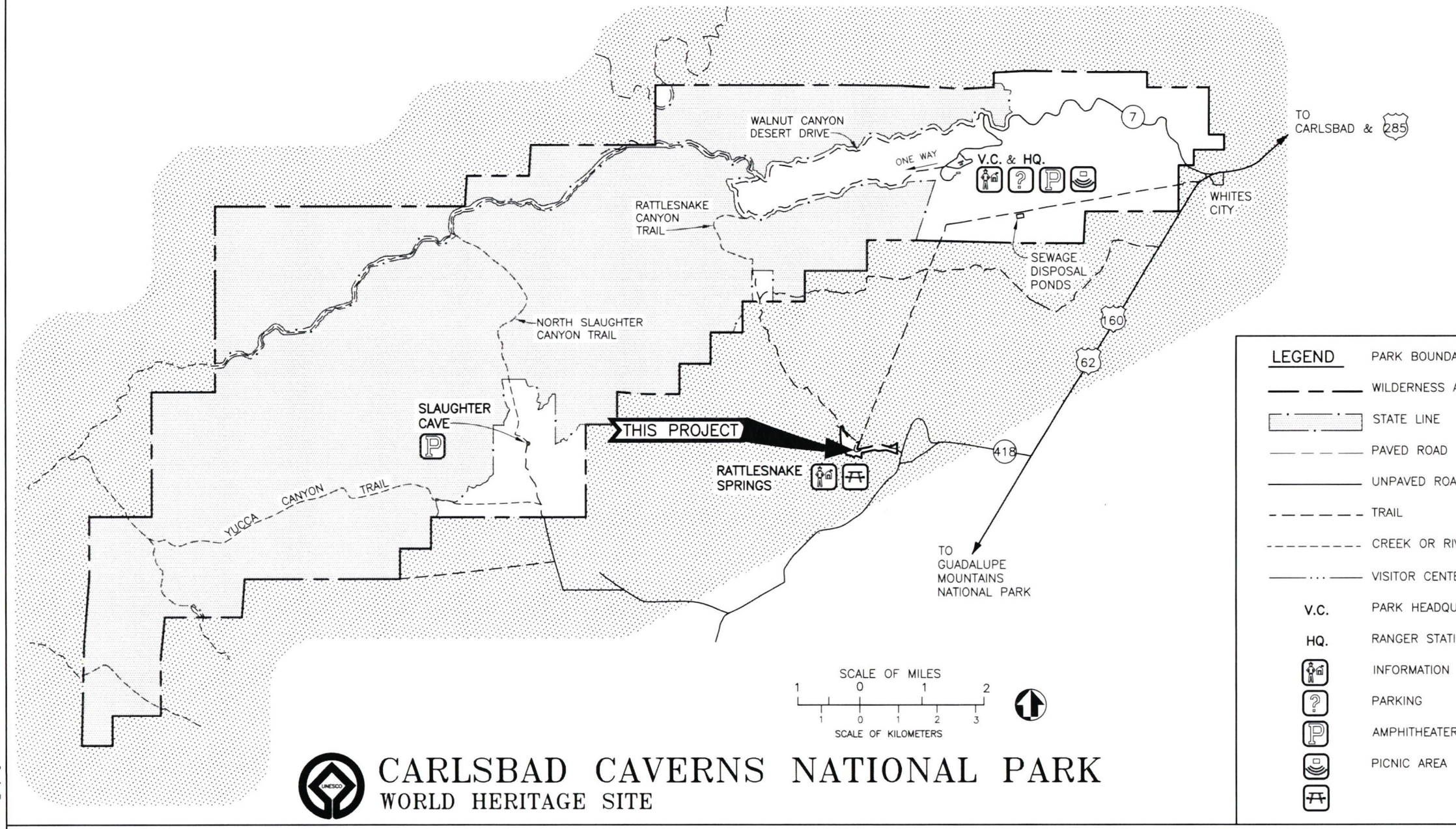
2 TRANSVERSE BUILDING SECTION
A3.03 SCALE: H

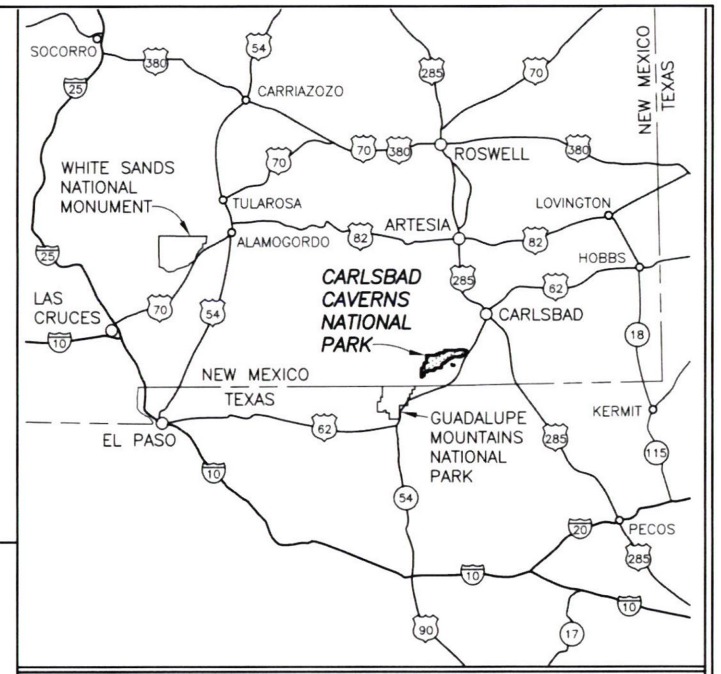
SCALE (H) 2 0 2 4 6
SCALE OF FEET

EXISTING CONDITIONS

DESIGNED: -	SUB SHEET NO.	TITLE OF SHEET	DRAWING NO. -
~~DRAWN~~: zy	A3.03	BUILDING SECTIONS	-
TECH REVIEW: AV		RATTLESNAKE SPRINGS RANGER RESIDENCE CARLSBAD CAVERNS NATIONAL PARK	PMIS/PKG. NO. 318326
DATE: 01/28/22			SHEET 5 OF 5

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CARLSBAD CAVERNS NATIONAL PARK
WORLD HERITAGE SITE

LEGEND

- PARK BOUNDARY
- WILDERNESS AREA
- STATE LINE
- PAVED ROAD
- UNPAVED ROAD
- TRAIL
- CREEK OR RIVER
- VISITOR CENTER
- V.C. — PARK HEADQUARTERS
- HQ. — RANGER STATION
- INFORMATION CENTER
- PARKING
- AMPHITHEATER
- PICNIC AREA

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A/E FIRMS

CIVIL ENGINEER:
PROVOST & PRITCHARD CONSULTING GROUP
286 W. CROMWELL AVENUE
FRESNO, CA 93711

LANDSCAPE ARCHITECT:
FILL LANDSCAPE ARCHITECTURE
1342 W. OAK ST.
FORT COLLINS, CO 80521

ARCHITECT:
ARCHITECTURAL RESOURCES GROUP
PIER 9, THE EMBARCADERO, SUITE 107
SAN FRANCISCO, CA 94111

STRUCTURAL ENGINEER
INTERFACE
1999 HARRISON ST. SUITE 550
OAKLAND, CA 94612

M/P/FP ENGINEER
INTERFACE
1999 HARRISON ST. SUITE 550
OAKLAND, CA 94612

ELECTRICAL ENGINEER
O'MAHONY & MYER
4340 REDWOOD HIGHWAY, SUITE 345
SAN RAFAEL, CA 94903

Mark	Sheet	REVISION	Date	Initial

QUALITY DESIGN CERTIFICATION

- ☐ Prepared in Accordance with Design Development (Title I) _____ Drawing No.
  OR
- ☐ Variance from Design Development (Title I) Approved by Superintendent on _____ Date
  OR
- ☐ Construction Drawings Not Preceded by Design Development (Title I)

_____ Project Manager _____ Date

EXISTING CONDITIONS

UNITED STATES
DEPARTMENT OF THE INTERIOR

NATIONAL PARK SERVICE
DENVER SERVICE CENTER

TITLE OF DRAWING
PUMP HOUSE

LOCATION WITHIN PARK
RATTLESNAKE SPRINGS

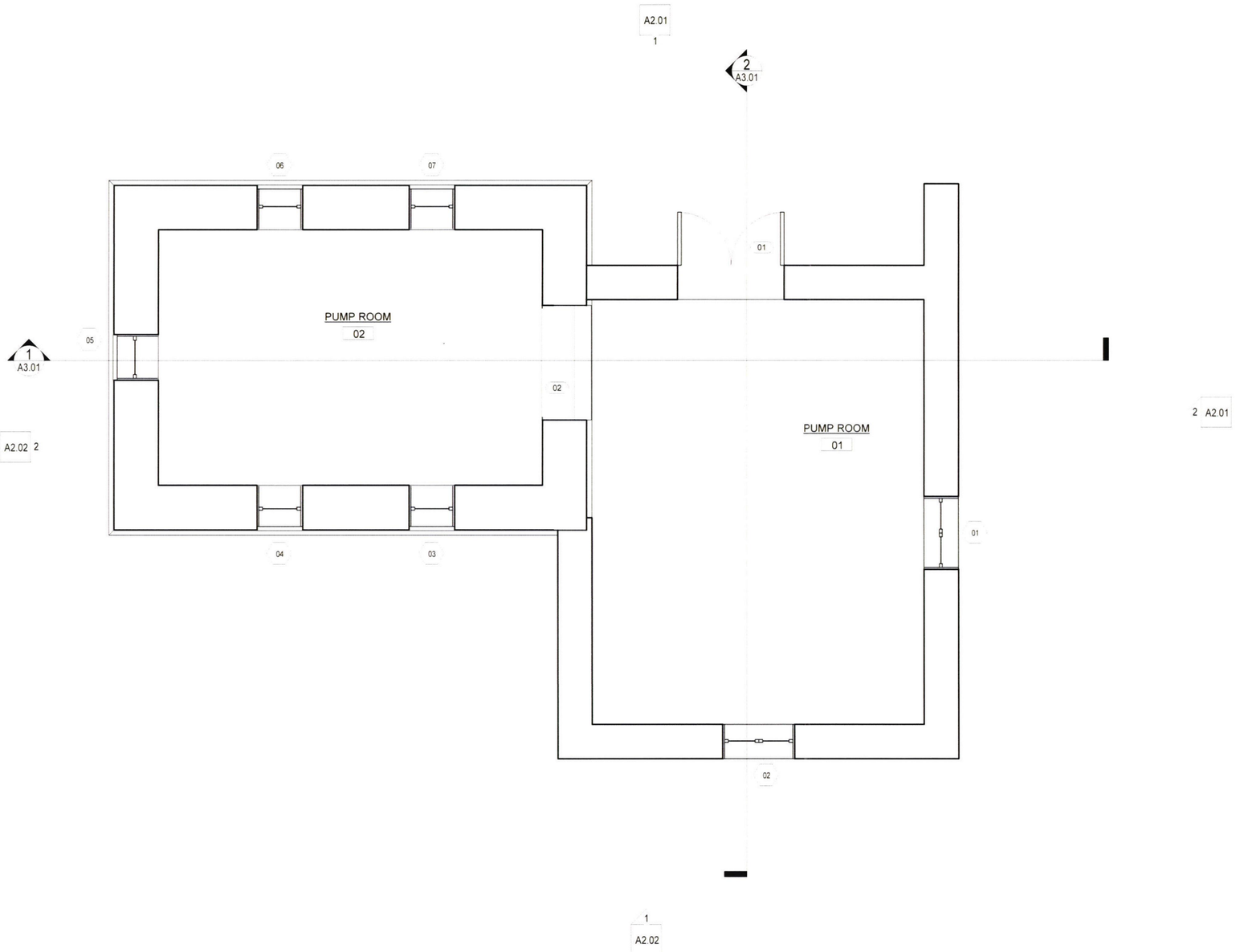
NAME OF PARK
CARLSBAD CAVERNS NATIONAL PARK

REGION SOAR | COUNTY EDDY | STATE NEW MEXICO

DRAWING NO. - -

PMIS/PKG NO. 318326

SHEET 1 OF 6



1 FIRST FLOOR PLAN
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SCALE OF FEET

EXISTING CONDITIONS

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DATE: 02/08/2022			SHEET 2 OF 6

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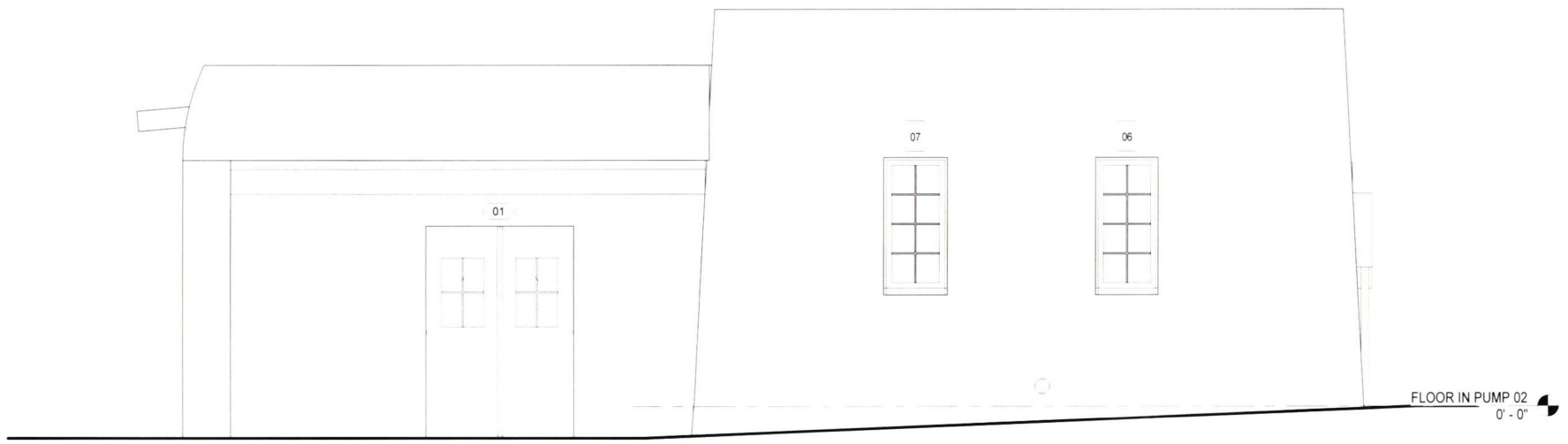
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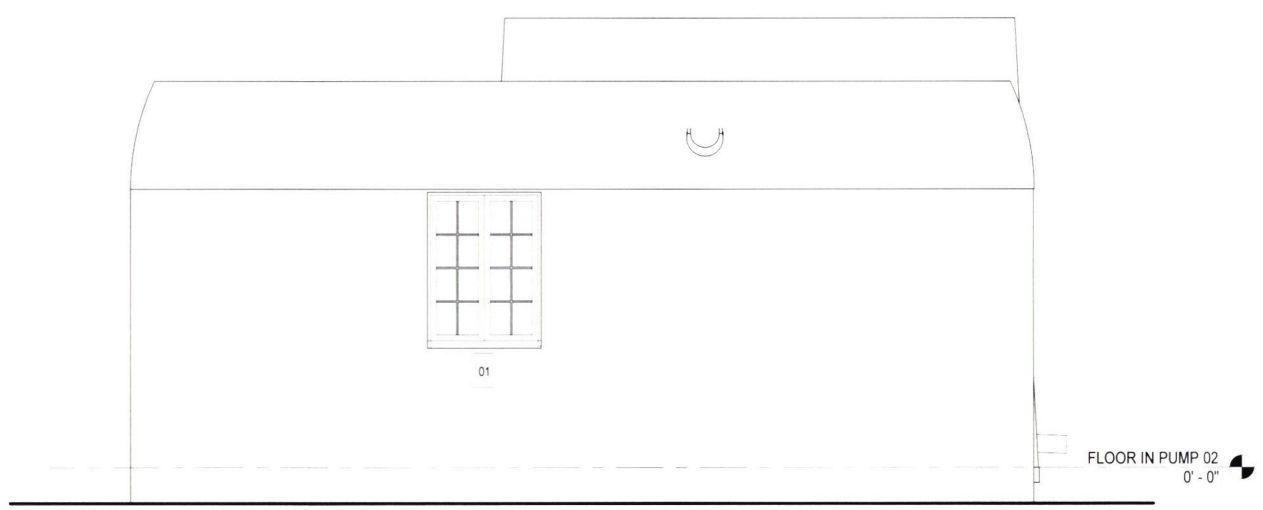
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CHKD ZY			-
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DATE 02/08/2022			SHEET 3 OF 6

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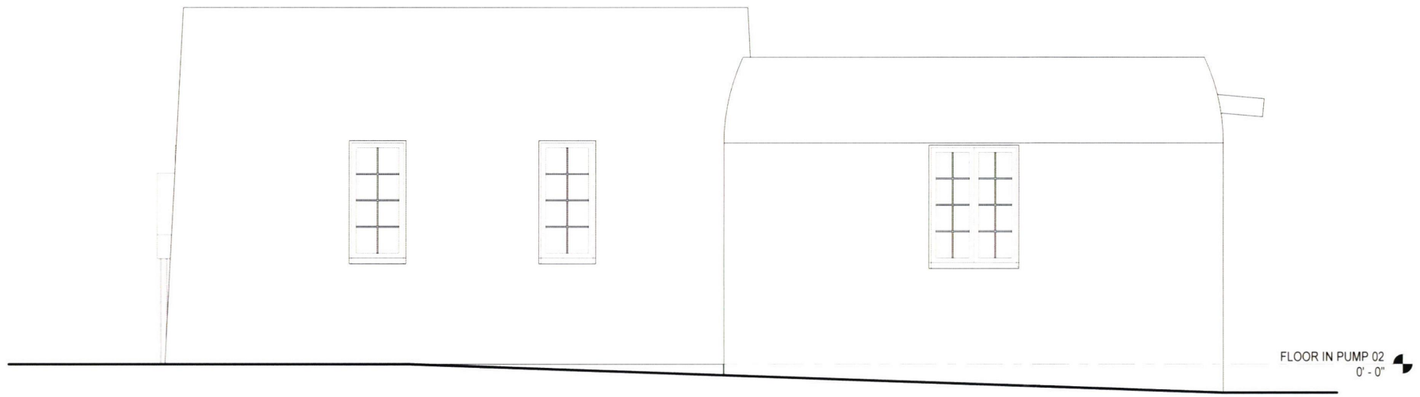
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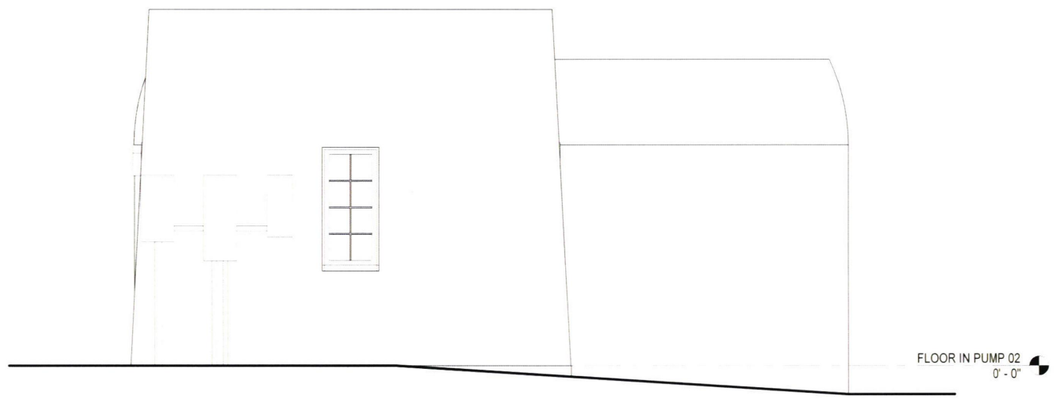
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1 SOUTH ELEVATION
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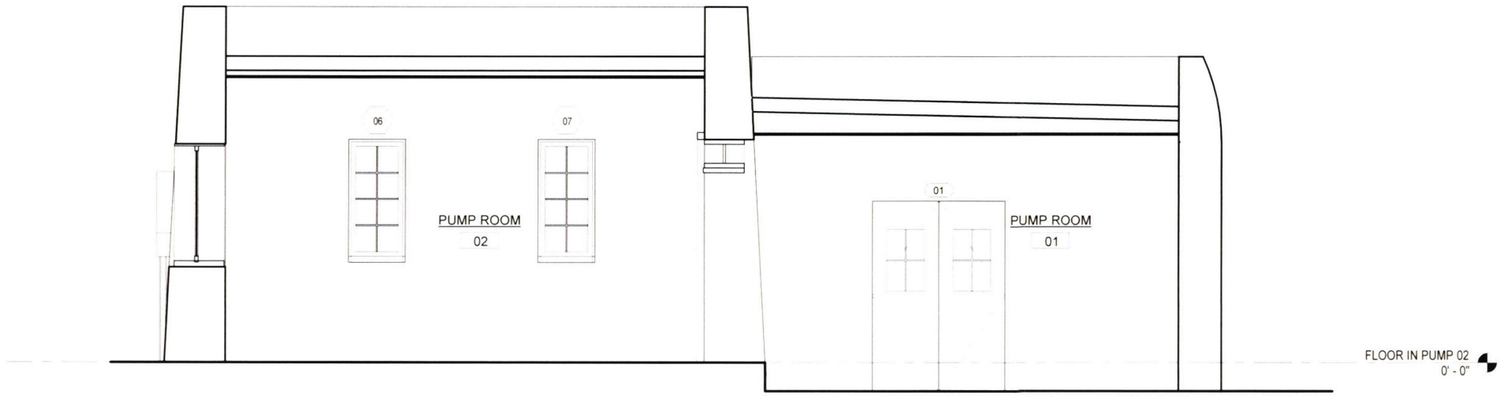
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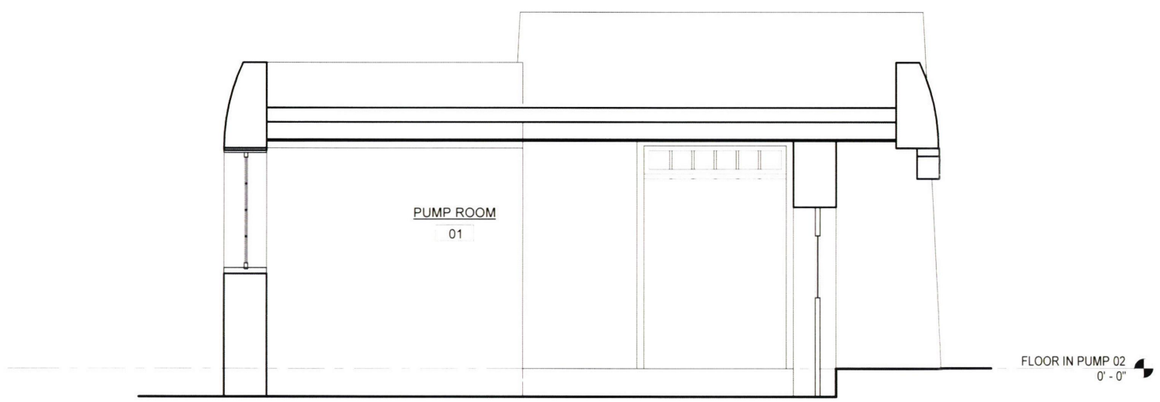
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1 LONGITUDINAL BUILDING SECTION
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2 TRANSVERSE BUILDING SECTION
A3.01 SCALE: H

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EXISTING CONDITIONS

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DRAWN: ZY			-
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DATE: 02/08/2022			SHEET 6 OF 6

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Appendix F

The Secretary of the Interior's Standards for Rehabilitation

The *Standards* are to be applied to specific rehabilitation projects in a reasonable manner, taking into consideration economic and technical feasibility. The Standards apply to historic buildings of all periods, styles, types, materials, and sizes. They apply to both the exterior and the interior of historic buildings. The *Standards* also encompass related landscape features and the building's site and environment as well as attached, adjacent, or related new construction.

1. The historic character of a property shall be retained and preserved. The removal of historic materials or alteration of features and spaces that characterize a property shall be avoided.
2. Each property shall be recognized as a physical record of its time, place, and use. Changes that create a false sense of historical development, such as adding conjectural features or architectural elements from other buildings, shall not be undertaken.
3. Most properties change over time; those changes that have acquired historic significance in their own right shall be retained and preserved.
4. Distinctive features, finishes, and construction techniques or examples of craftsmanship that characterize a historic property shall be preserved.
5. Deteriorated historic features shall be repaired rather than replaced. Where the severity of deterioration requires replacement of a distinctive feature, the new feature shall match the old in design, color, texture, and other visual qualities and, where possible, materials. Replacement of missing features shall be substantiated by documentary, physical, or pictorial evidence.
6. Chemical or physical treatments, such as sandblasting, that cause damage to historic materials shall not be used. The surface cleaning of structures, if appropriate, shall be undertaken using the gentlest means possible.
7. Significant archeological resources affected by a project shall be protected and preserved. If such resources must be disturbed, mitigation measures shall be undertaken.
8. New additions, exterior alterations, or related new construction shall not destroy historic materials that characterize the property. The new work shall be differentiated from the old and shall be compatible with the massing, size, scale, and architectural features to protect the historic integrity of the property and its environment.
9. New additions and adjacent or related new construction shall be undertaken in such a manner that if removed in the future, the essential form and integrity of the historic property and its environment would be unimpaired.[1]

[1] *Secretary's Standards for Rehabilitation*, retrieved July 7, 2016 from https://www.nps.gov/tps/standards/rehabilitation.htm.

National Park Service

Condition Assessment

Rattlesnake Springs Residence and Pump House

Contract No.:140P1220D003
Task Order No.:140P1321F0176
PMIS No.:318326

Carlsbad Caverns National Park
May 19, 2022

Prepared for:
Architectural Resources Group, Inc.
9 Pier, The Embarcadero Suite 107
San Francisco, CA 94111

Prepared by:
Provost & Pritchard Consulting Group
455 W. Fir Avenue
Clovis, California 93611

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Report Prepared for:

Architectural Resources Group, Inc.

9 Pier, The Embarcadero Suite 107
San Francisco, CA 94111

Contact:

Kitty Vieth

(415) 421-1680

Report Prepared by:

Provost & Pritchard Consulting Group

455 W. Fir Avenue
Clovis, California 93611

Rod McNeely, P.E., Principal Engineer
Soo Ho Park, P.E. Senior Engineer QA/QC

Contact:

Rod McNeely, P.E.
(559) 449-2700

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Executive Summary

On November 9, 2021, Rod McNeely of Provost & Pritchard participated in ARG's consultant team condition assessment field review trip to Rattlesnake Springs Historic District at Carlsbad Caverns National Park. The Rattlesnake Springs Residence and Pump House were reviewed with representatives of Architectural Resources Group, Inc., other team members, and Carlsbad Caverns National Park (CAVE) staff. The purpose of the scoping trip was to assess the existing condition of the Residence and Pump House in support of a Historic Structures Report for the National Park Service.

In support of this overall effort, this report provides a summary of our observations from the field trip that address the following site civil related improvements:

- General site observations and conditions of civil infrastructure and site drainage surrounding the Residence and Pump House
- Provide recommendations for site grading to improve drainage and maintenance conditions.

1 Background

1.1 Introduction

This report addresses the existing site conditions and treatment recommendations surrounding the Rattlesnake Springs Residence and Pump House in support of a Historic Structures Report.

The spring fed irrigation headwork pond and extensive network of graded irrigation canals were constructed by the original homesteader, Henry Harrison. Mr. Harrison passed away in 1931. NPS purchased approximately 80 acres of the Harrison homestead from Mr. Harrison's widow in 1934 for the purpose of using the spring fed pond as the potable water supply for Carlsbad Caverns National Park. The property included the spring fed pond and access to water rights. The original pump house was designed by NPS architects in 1933 for a location on the east side of the pond and subsequently redesigned by NPS in 1934 for the constructed position on the north side of the pond. NPS commenced construction of the Pump House and water system infrastructure improvements. The Residence was constructed in 1940.

NPS subsequently constructed a nearby well which extracts groundwater from the same aquifer which feeds the local spring and on-site irrigation headwater pond. The new groundwater supply replaced the need for the surface water supply and Pump House infrastructure. Most of the former pumps and infrastructure in the Pump House have been removed. The structure now functions as a storage building and Park staff noted that this is the continued plan. The Residence has been used to house Park staff; mainly permanent staff related to law enforcement. Park staff confirm there is no plan to change this use.

1.2 Attendees

The condition assessment field trip took place on November 9, 2021, with the following attendees:

Erin Gearty – NPS (Region/Contracting Officer Representative)
Kitty Vieth – Architectural Resources Group
Alicia Virani – Architectural Resources Group
Dominic Pedotto – Interface Engineering (Mechanical)
Larry Chambers – SOHA Engineering (Structural)
Pieter Colenbrander – O'Mahony & Myer (Electrical)
Rod McNeely – Provost & Pritchard Consulting Group (Civil)
Phil Hendricks – FiLL (Landscape Architect)

2 Pump House

2.1 Existing Conditions/Observations

Site Drainage: The pump house structure and subsequent addition were constructed on native ground, just north of the adjacent pond. Therefore, existing ground grade, which is relatively flat, is flush with the base of the exterior stucco coating of the building walls. In the absence of an elevated earthen building pad, there is not a well-defined drainage slope away from the building. The original pump house structure incorporated a finish slab elevation approximately 6" above grade, so there was a step up into the building. While the site did not have good drainage away from the building, this elevated slab kept site drainage out of the building. The addition to the pump house was constructed with a step-down slab that is roughly level with adjacent site grades. This may have been designed with slab closer to finish grade to facilitate transport of equipment in and out of the building.

Low areas were observed along the west façade of the building and at the flush doorway pad at the north façade. NPS staff noted that the flush doorway is subject to drainage intrusion from site drainage that concentrates at this low point.



Photo 1 - Pump House addition finish floor flush with ground elevation

Site planting: Native non-irrigated Bermuda grass and seasonal weeds form the vegetated material surrounding all four sides of the Pump House. NPS staff report that these grass and weeds are mowed and trimmed a few times a year, depending on maintenance staff availability and intensity of vegetation.

Roof Drains: There are two roof drains associated with the structure. The original building has a roof area drain that collect rainwater and drains through a drop pipe through the building which daylights through north face of the building with a small pipe, approximately 12" above grade, see **Photo 2**. The building addition has a single roof drain canale through the east parapet which has an open discharge to the ground below, see **Photo 3**. There is evidence of soil erosion next to the building due to discharge of rainwater through these roof drains. It is recommended that these two canales be extended to approximately twice their current length in order to divert roof runoff away from foundation.

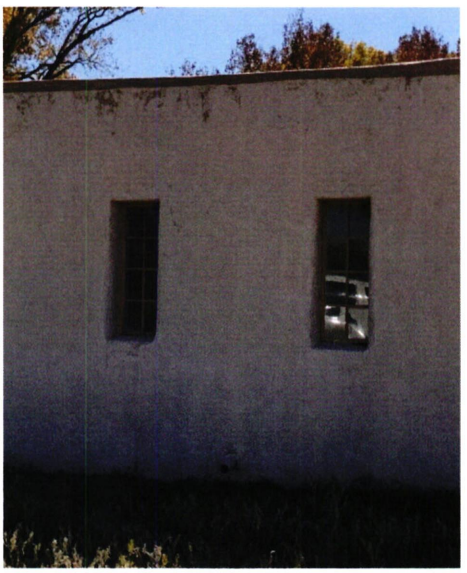


Photo 2 - North facade roof drain outlet



Photo 3 - East facade roof drain canale

Site and Building Access: An all-weather aggregate base access road serves the Residence and Pump House site. This road appears to be well maintained to meet the needs of the users. This road has a dead-end turnaround just north of the Pump House. While this road is open to the public to the point of the turn-around, it appears that the road is generally used by Park Maintenance personnel for access to the Pump House plus access to secure areas beyond the turn-around area such as the nearby water well site. This road is elevated above the adjacent ground grade and prevents any drainage away from the Pump House in a northerly direction.

NPS staff mentioned that walking access to the building can be difficult after rainfall events when the ground is saturated and when season weeds and grasses overtake the area. Improvements for pedestrian and vehicle access would be appreciated.

Site Utilities:

Water: The building has remnants of previous water supply infrastructure related to pump intake and discharge piping. None of this infrastructure is necessary and should be removed to provide additional area for storage.

Sewer: The building does not have any plumbing fixtures and does not require a sewer service.

Power: The electric meter is located on the west wall of the structure. The electric service is fed to the building from an underground service that originates from a pole mounted transformer on an existing joint pole located approximately 60' to the northwest. NPS staff noted no problems with this service.

2.2 Recommendations

Drainage improvements:
In order to mitigate the lack of positive drainage away from the building, the site should be re-graded with drainage swales offset and surrounding the building to provide positive drainage away from the building together with a longitudinal slope for the drainage swales to further convey drainage away from the building. Exploratory excavation and soil testing should be conducted on the north side of the Pump House where the original buried fuel oil tank was located. If contamination is encountered, mitigations should be implemented as a function of future site re-grading. A topographic survey should be completed, and fine grading plan prepared to accurately design positive drainage flow away from the building. **Photo 4** illustrates the concept of incorporating drainage swales to provide positive drainage away from the building.



Photo 4 - Concept for drainage swale at north facade of Pump House

Site and Building Access: To improve access NPS should consider adding a compacted aggregate base drive approach to provide a stable, all-weather surface for vehicular and pedestrian access to the building from the access road. Such path would need to be designed in concert with new drainage swale to ensure the goal of providing positive drainage away from the building is achieved.



Photo 5 - Concept for Access pathway to Pump House

Roof drainage and control of site vegetation: Permanent splash pads should be constructed below the canale and north face of building roof drain discharge point to provide a durable and erosion-resistant surface for concentrated drainage discharge. Additionally, future rehabilitation efforts should consider construction of a perimeter 12" minimum width maintenance strip to form a barrier between native vegetative growth and face of building. This will reduce root zone moisture in soil adjacent to building and provide a hard surface to form a boundary for maintenance.

The splash pads and maintenance strips can be easily constructed of a permeable gravel base overlaid with permanent, yet removable pre-cast pavers, locally sourced cut or natural stone pavers or exposed gravel. The Landscape Architecture Condition Assessment report provides a graphic detail of a proposed maintenance strip. See **Photo 6** which illustrates a similar maintenance strip installed at the perimeter of the Rattlesnake Springs Well Site Building. While materiality of cast in place concrete is different from proposed materials, this hardscape feature functions well to prevent grasses and weeds from growing up next to the building.



Photo 6 - Sample perimeter concrete maintenance strip and splash pad at Rattlesnake Springs well site building

3 Residence

3.1 Existing Conditions/Observations

Site Drainage: The Residence is a slab on grade structure that was constructed in 1940. The structure appears to be constructed on an earthen building pad that is roughly level with the existing ground grade north of the building and approximately two to three feet above existing ground elevations south and east of the residence. Due to the elevated building pad on the south and east sides of the building, there is generally good drainage away from the building in these locations. The existing ground profile on the west and north sides is much flatter and drainage away from the building pad is marginal at best.

Roof Drains: There are seven roof drain canales associated with the structure. In most areas, there is evidence of soil erosion next to the building due to rainwater discharge through these roof drains. Four of the seven roof drain canales discharge to the north side of the building where ground grades are flatter and do not drain away from the building very well. A newer pad mount condensing unit has been installed on the north side, in front of a window and very close to the discharge point of one of the existing canales.



Photo 7 - Residence rear roof drainage canales

Site Utilities:

Water: The building is provided with water service from the pressurized water supply main that originates at the Rattlesnake Springs wellsite and transmits water to the Carlsbad Caverns cave headquarters area. NPS staff noted that water supply to building is in good working condition.

Sewer: The building has a dedicated septic tank and disposal system. NPS staff noted this system was most recently reconstructed in 2018 and is in good operational condition.

Telecommunication: There is an aerial communication service from the joint power/telecommunication pole line located west of the building. There are also satellite dish receivers on the roof.

Power: Electric power is fed to the building from an underground service that originates from a meter on a drop pole approximately 100 feet to the west of the western patio. NPS staff noted no problems with this service.

3.2 Recommendations

Drainage improvements: Site grading and drainage improvements should be implemented around the perimeter of the building to improve drainage away from the building. A topographic survey should be completed, and fine grading plan prepared to accurately design positive drainage flow away from the building in all directions.

- Minor fine grading along the south façade planter to lower adjacent grade at building and continue positive drainage away from building.
- Minor fine grading along the east side of building would be beneficial to remove localized low points and provide consistent positive drainage away from the building.
- The pad-mounted condensing unit should be relocated to another location on the north side of the building, preferably away from a window and canale discharge point.
- The north and west sides of the building should be re-graded to mitigate the lack of positive drainage away from the building. A new drainage swale, parallel with building, offset 10 to 15 feet, would provide means to achieve positive drainage away from the building together with a longitudinal slope

to convey the drainage to the east side of the north backyard area and to the south for the westerly side yard area.

Roof drainage and control of site vegetation: Permanent splash pads should be constructed below each roof drain canale to provide a durable and non-erodible surface for concentrated drainage discharge from the roof. Canale lengths should be extended to prevent water from ponding adjacent to the building perimeter. Additionally, future rehabilitation efforts should consider construction of a perimeter 12" minimum width maintenance strip to form a barrier between native vegetative growth and face of building. This will reduce root zone moisture in soil adjacent to building and provide a hard surface to form a boundary for maintenance.

The splash pads and maintenance strips can be easily constructed of a permeable gravel base overlaid with permanent, yet removable pre-cast pavers, locally sourced cut or natural stone pavers or exposed gravel. The Landscape Architecture Condition Assessment report provides a graphic detail of a proposed maintenance strip. See **Photo 6** which illustrates a similar maintenance strip installed at the perimeter of the Rattlesnake Springs Well Site Building. While materiality of cast in place concrete is different from proposed materials, this hardscape feature functions well to prevent grasses and weeds from growing up next to the building.

Memorandum

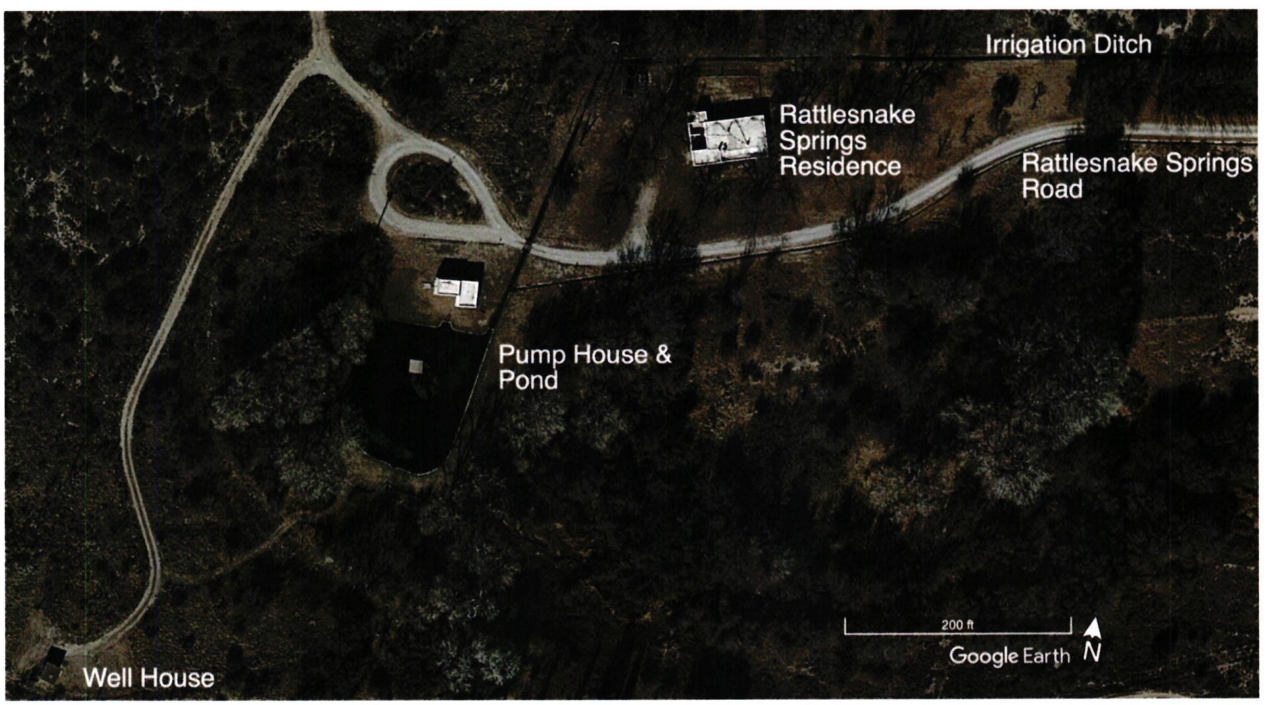
FiLL p.l.l.c. Landscape Architecture
1342 W. Oak Street
Fort Collins, CO
www.FiLL-LA.com

Subject: CAVE Rattlesnake Springs Residence and Pump House Historic Structure Report. Site Condition Assessment and Recommendations (100% Draft)
To: Alicia Virani (ARG), Kitty Vieth, AIA, LEED AP (ARG)
From: Phil Hendricks Jr. ASLA
Date: June 29, 2022

The following is a summary of Landscape Architectural site observations, assessment, and recommendations for improvements to the site areas adjacent to the Rattlesnake Springs Residence and Pump House at Rattlesnake Springs, Carlsbad Caverns National Park, New Mexico. An on-site assessment was completed on November 9, 10 and 11, 2021. Attendees included NPS staff and ARG project team members

Project Context

Site. Carlsbad Caverns National Park (CAVE) is in southeastern New Mexico near the City of Carlsbad. Rattlesnake Springs is an isolated unit of Carlsbad Caverns National Park, it features a riparian ecosystem, a natural spring and large groves of cottonwood trees planted by the Civilian Conservation Corps. Rattlesnake Springs is a day use area only, open to the public during daylight hours. Site access is from Highway 62/180, the area is located approximately two miles west of the highway, off county road 418 (Washington Ranch Road), to Rattlesnake Ranch Road. The Rattlesnake Springs Residence and the Pump House are located at the west termination of the site access Road.



Climate. From the NPS website (https://www.nps.gov/cave/learn/nature/weather.htm): "Carlsbad Caverns National Park preserves and protects a portion of the northern Chihuahuan Desert, the largest and the wettest of the North American deserts. The park averages 14.9 inches (37.8 cm) of annual precipitation with a monsoon season that usually occurs from July through September when massive thunderstorms drop much of the rain for the year. The park has a semiarid climate with generally mild winters and warm to hot summers. The average annual high temperature is 79°F (26°C) and the average annual low temperature is 47°F (8°C) with a mean annual temperature of 63°F (17°C)." Average snowfall is approximately 3 inches.

Site Access

Vehicle Access. Public access is via Rattlesnake Springs Road that terminates at a turnaround and service access gate adjacent to the Pump House. A gated Service Road leads to the new well and pump house at the southwest corner of the site. Rattlesnake Springs Road is well maintained road base. A road base driveway provides access and parking for the Rattlesnake Springs Residence. The Pump House is adjacent to the turnaround at the west end of Rattlesnake Springs Road, there is space for parallel parking near the Pump House.

Treatment Recommendations: As discussed with NPS, no road or driveway treatments are required.



Figure 1 Rattlesnake Springs Road



Figure 2 Rattlesnake Springs Road

Pedestrian Access. There are no dedicated pedestrian access routes through the site or to the Rattlesnake Springs Residence or to the Pump House.

Treatment Recommendations: As discussed with NPS, pedestrian access will be improved at the Rattlesnake Springs Residence and developed at the Pump House. The routes do not have to be in compliance with accessibility requirements.

Public Visitation. Rattlesnake Springs is open for public access, the public can and do visit the area. Most visitors utilize the day use picnic area. Visitation numbers to the Rattlesnake area is not known. From discussions with the NPS the number is very low, with that assumption there is no need to provide improvements for public visitation.

Landscape. From the NPS website: https://www.nps.gov/cave/learn/nature/treesandshrubs.html:

"Carlsbad Caverns National Park is situated in the northern portion of the Chihuahuan Desert region. It is in an overlap area that is influenced by ecosystem components of the Sierra Madre, Rocky Mountains, and Great Plains. The park's lower elevations tend to share the traits of the Chihuahuan Desert and Great Plains, while the higher elevations tend to have similarities with the Rocky Mountains and the Sierra Madre of Mexico."

The Parks website lists several sources of specific Park plant and landscape information, including vegetation mapping, plant checklists, surveys, and management plans.

Rattlesnake Springs is an isolated unit of the Park, encompassing a natural spring, stream and wetland system that creates an oasis in the Parks Chihuahuan Desert ecosystem and is the primary domestic water supply for the Park. In the late 1800's the area was homesteaded, and an irrigation ditch system was developed for landscape irrigation. Due to the availability of natural and irrigated waters sources Rattlesnake Springs has a variety of vegetation types, unlike the other areas of the Park. The areas landscape includes Arroyo Riparian Woodlands, Desert Riparian Woodlands, Pecan Orchard and Cottonwood - Willow Forested Wetlands.

The landscape surrounding the Residence and the Pump House is a maintained, flood and non-irrigated landscape, the majority of groundcover is bermudagrass and many of the trees are remnants of the area's historic orchards.

A recent assessment (Tree Assessment and Management Recommendations, Rattlesnake Springs, Carlsbad Caverns National Park, Carlsbad, NM) of the trees in the area has been completed by the NPS. The report maps and reports on the health of the area's trees. Generally, the trees are in good health and condition and regularly maintained by the NPS.

Treatment Recommendation: There are exposed soil areas around the residence, these areas should be plugged with grasses matching the surrounding areas. Temporary surface irrigation should be utilized, in areas that are not covered by flood irrigation, to establish the grasses.

Rattlesnake Springs Residence



Figure 3 Garage Entry

Vehicle Access and Parking. There is an existing aggregate base course driveway connecting the Rattlesnake Springs Road and the residence garage along the west building wall. The driveway is ample size to accommodate several vehicles. The aggregate base course paving appears to be in good condition.

Treatment Recommendations: From discussion with the NPS there is no need to improve the driveway paving. A concrete apron should be installed along the sill of the garage door. The apron should slope away slightly from the garage, diverting drainage away from the door opening. The site area should be regraded for positive drainage away from the door.

Pedestrian Access – Residence Front Door Walkway. There is a partial narrow dry laid stone (limestone) paver walkway leading from the driveway to the front door. The walkway is in poor condition, the flagstone pavers are not continuous, the sand filled joints are in poor condition filled in with grass and many of the pavers are uneven and missing, creating a potential trip hazard.



Figure 4 Walkway from Driveway

Treatment Recommendations: Reconstruct a three- to four-foot-wide dry laid stone walkway connecting the driveway to the front door/porch area. The new walkway should be realigned to avoid the existing roof canale and preserve the existing Redbud tree adjacent to the front door/porch. The routes do not have to be in compliance with accessibility regulations.



Figure 5 Front Patio

Pedestrian Access – Front Patio. The existing dry laid stone paver patio is adjacent to the front covered porch and connected to the walkway from the driveway. The patio is in poor condition, the sand filled joints are in poor condition filled in with grass and many of the pavers are uneven, creating a potential trip hazard.

Treatment Recommendations: Reconstruct the dry laid stone patio in its current location. Per conversations with the NPS, the area does not have to be in compliance with accessibility regulations.

Pedestrian Access – Front Covered Porch. The existing grouted in place stone paving of the covered porch appears to be in good condition. A few minor areas of the grouted joints are loose and crumbling and should be repointed or grouted.

Treatment Recommendations: Repoint the grout joints that are loose or crumbling.



Figure 6 Front Covered Porch



Pedestrian Access – Residence Side Door Walkway. There is a partial narrow dry laid stone paver walkway leading from the driveway to the side door patio. The walkway is in poor condition, the sand filled joints in poor condition filled in with grass, several of the pavers are uneven and the walkway is not continuous, creating a potential trip hazard.

Treatment Recommendations: Reconstruct a three- to four-foot-wide dry laid stone walkway connecting the driveway to the side door patio area. The routes do not have to be in compliance with accessibility regulations.



Figure 8 Side Door Walkway



Pedestrian Access – West Side Patio Areas. This patio area is accessed from the driveway walkway and connects the two side residence doors. A concrete walk connects the walkway and the patio areas through a gate in the existing chain-link fence. The two grouted in place stone paved patio areas are enclosed by screen walls. The grouted in place stone paving appears to be in good condition. A few minor areas of the grouted joints are loose and should be repointed or grouted. The enclosed patio areas drain through drainage openings in the screen walls.

Treatment Recommendations: Repoint or regrout the grout joints that are loose or crumbling.

Figure 9 West Side Patio Area



Figure 10 West Side Patio Area

Pedestrian Access – Front Yard Area. The Residence building is on a graded pad, the yard areas south and east of the residence are about 2+- feet lower than the building pad. Leading from the Front Patio are two dry laid stone paver walkways and drylaid stone steps leading south across and down the slope of the raised building pad, the steps terminate in the lower lawn area. Both walkways are in poor condition, the sand filled joints are in poor condition filled in with grass and many of the pavers are uneven or missing. The stone stairs are in very poor condition, stones are missing and uneven.

Treatment Recommendations: Reconstruct the dry laid stone walkways and steps in their current locations. Per conversations with the NPS, the area does not have to be in compliance with accessibility regulations.



Figure 11 West Walkway and Steps



Figure 12 East Walkway and Steps

Roof Drain Canales. There are 7 roof drainage canales, located along the south, east and north wall of the residence. The canales extend out from the parapet wall approx. 2 feet, roof drainage spills out the canales onto the site area below. At each of the canales locations small amounts of erosion are visible. At the southwest corner canales there is a stone rubble splash pad and at the south wall canales there is a plastic rain gutter splash pad.

Treatment Recommendations. Install a splash pad on grade below each canale to reduce erosion and improve drainage. The canales should be extended to proper length per architectural and civil engineering treatment recommendations.



Figure 13 Canale S.W. Corner

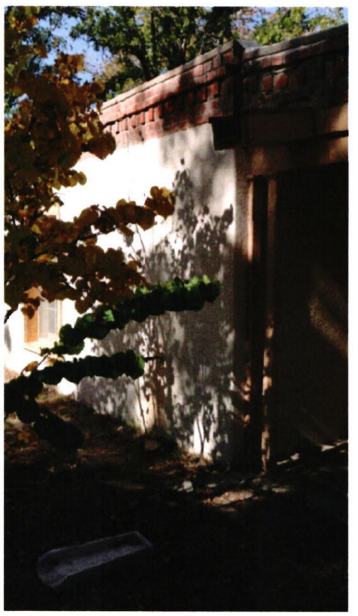


Figure 14 Roof Canale S. Wall



Figure 15 Canale S.E. Corner

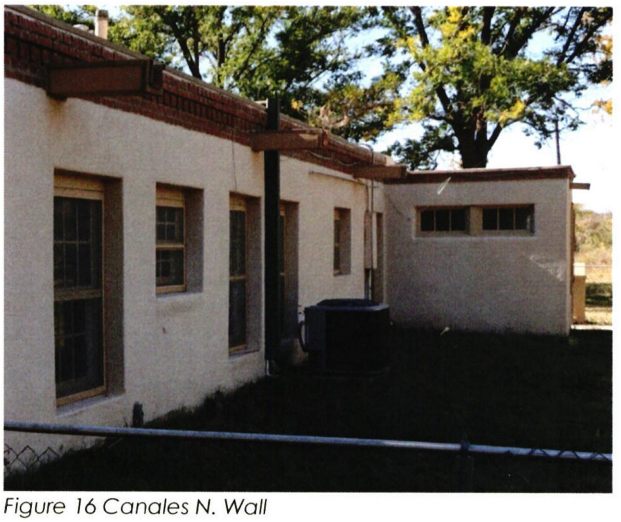


Figure 16 Canales N. Wall



Figure 17 Depression Adjacent to Residence Wall

Site Drainage. Several low areas adjacent to the residence walls and holes in the finished grade are visible along the north and east walls. These areas hold water and do not drain, in several areas there is damage to the exterior stucco.

Treatment Recommendations. These areas should be filled and graded for positive drainage away from the building. A maintenance strip could help correct these drainage issues along the building walls.

Landscape Interface with Residence Walls. There are three conditions where the site finished grade and landscape and the building walls interface.

Paved areas. Adjacent to the paved porch and patio areas.

Treatment Recommendations. No action required.



Figure 18 Existing Stone Edged Bed

Shrub beds. Stone edged planting beds exist along portions of the south and west residence walls. These planting areas have not been maintained and are filled with Bermuda grass and weeds.

Treatment Recommendations. Weeds and grasses should be removed, and beds cleaned out. Mulch shrub bed areas with gravel mulch over a weed barrier geotextile.

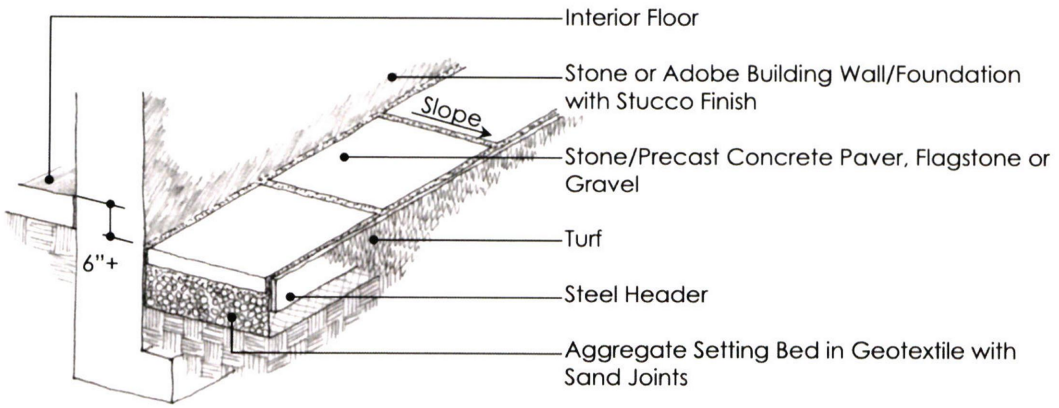


Figure 19 Turfgrass at Residence Wall

Turfgrass areas. The site landscape is generally flood irrigated bermudagrass, that is mowed periodically. Along the east and north building walls grass is growing up against the exterior house walls, requiring hand trimming in areas that a mower cannot reach. Also as stated earlier several of these areas are not sloped properly for surface drainage to drain away from the residence walls. A properly designed maintenance strip (see concept below) could facilitate proper drainage and mitigate building wall damage from mowing equipment. Fence Mow Strip - A mow strip along the bottom of chainlink fence would diminish the need for hand trimming along the fence line.

Treatment Recommendations. A maintenance strip should be installed along the building wall all around the building perimeter. A mow strip should be installed along the bottom of the chainlink yard fence as well. There are several options for the mow strip: stone or precast concrete pavers or stone random cut flagstone over a gravel subbase with a steel edger or gravel mulch over a weed barrier geotextile and steel edging. The maintenance strip would diminish the need for trimming along the building walls, improve drainage and mitigate wall damage from mowing and trimming.

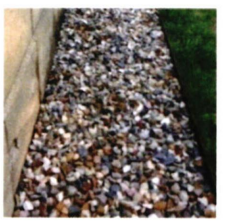
A concept sketch of the maintenance strip:



Material Options:


Stone/Concrete Pavers


Random Cut Flagstone


Gravel

Site Utilities. There are exposed utility lines along the north wall from the utility room to the kitchen area. These appear to be potable water lines.

Recommended Treatment: These should be covered and protected. The exposed utilities could be within the recommended mow strip. Refer to utility observations and recommendations.


Figure 20 Ground Level Exposed Utilities


Figure 21 Ground Level Exposed Utilities

Landscape. The landscape surrounding the Residence is periodically mowed and maintained, flood irrigated from several flood irrigation gates along the adjacent irrigation ditch, the majority of groundcover is bermudagrass and many of the trees are remnants of the area's historic orchards.

Treatment Recommendation: There are exposed soil areas around the residence, these areas should be seeded or plugged with grasses matching the surrounding areas. Temporary surface irrigation should be utilized to establish the grasses in area that are not covered by flood irrigation.

Signage and Site Furnishings

Site Furnishings. Site Furnishings are limited to a bear-proof combination trash and recycling container. Recommend finishing to match CAVE or NPS standard color palette.

Site Signage. Site signage is limited. Recommendation: Future signage as needed, should be developed to meet the CAVE or NPS sign standards.

Site Lighting. There is no visible site lighting. Lighting could enhance security and safe access if desired. If lighting is added it should be Dark Sky compliant.

Pump House and Pond

Future Use. The pump house does not house a pump since a new water well and pump was installed elsewhere on site. This new well and pump supplies potable water to the Park. There is currently no planned use for the pumphouse. Future use may determine required site development.

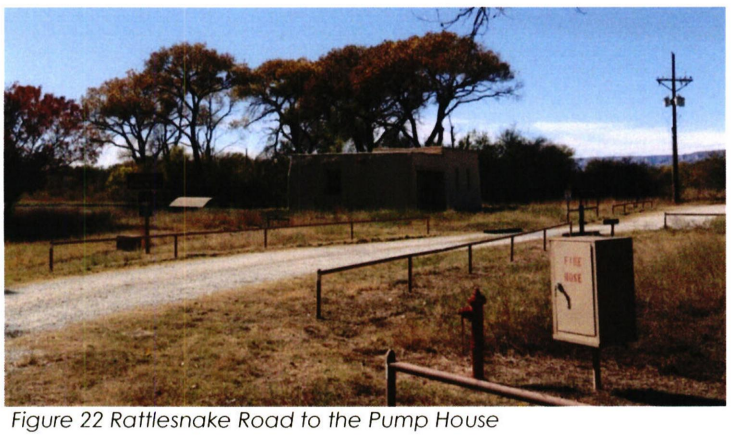


Figure 22 Rattlesnake Road to the Pump House

Vehicle Access and Parking. Rattlesnake Springs Road terminates in a turnaround adjacent to the Pump House. Pipe guardrails define the road edges. There are no developed parking areas, although a section of the road is wide enough to parallel park without blocking thru traffic.

Treatment Recommendations: From discussion with the NPS there is no need to improve the road paving.

Pedestrian Access. The only site paving is at the covered building entry. The paving appears to be in good condition with minor cracking. There is no pedestrian access to the Pump House entry door or to the existing interpretive panel.

Treatment Recommendations: Construct a three to four-foot-wide walkway connecting the road to the entry door. Also develop a walkway from the roadway to the interpretive panel location. Both future walkways could be combined into a single contiguous walkway. The routes do not have to be in compliance with accessibility regulation



Figure 23 Pump House Parking and Road Access



Figure 24 Building Entry Paving

Roof Drain Canales. There is one roof drainage canale and one interior drain canale, the roof drainage spills out the canales onto the site. Small amounts of erosion are visible at these areas.



Figure 25 Canale



Figure 26 Interior Drain Outlet

Treatment Recommendations. Install a stone splash pad on grade below each canale to reduce erosion and improve drainage.

Site Drainage.

Low areas are visible all around the building perimeter. These areas should be filled and graded for positive drainage away from the building. The site area between the road and the pump house appears to drain to the building, a swale should be developed between the road and building directing drainage away from the building to the adjacent irrigation ditch. The site area west of the pump house appears to drain to the building, a swale should be developed directing drainage away from the building to the adjacent Pond.

Treatment Recommendations. These areas should be filled and graded for positive drainage away from the building.



Figure 27 Depressed Site Area



Figure 28 Proposed Location of Drainage Improvements at Front of Pump House

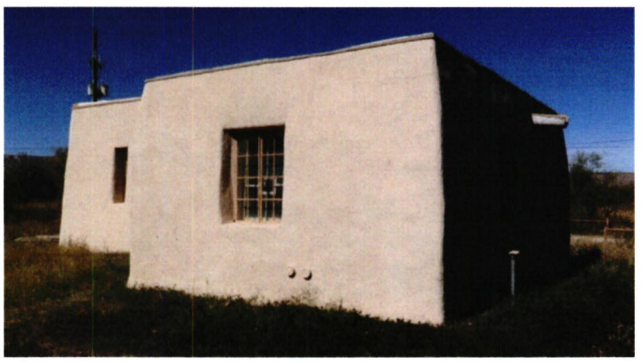


Figure 29 Landscape Interface with Pump House

Landscape Interface with Pump House walls. The site landscape is non-irrigated bermudagrass and weeds, that is mowed periodically. The grass is growing up against all the exterior pump house walls, requiring hand trimming in areas that a mower cannot reach. Also as stated earlier several of these areas are not sloped properly for surface drainage to drain away from the residence walls. A properly designed maintenance strip can facilitate proper drainage.

Treatment Recommendations. A maintenance strip should be installed along the building wall all around the building perimeter. Refer to Residence section for maintenance strip discussion.



Figure 30 Site Utilities

Site Utilities. There are building service utilities located outside the building walls including a hatch covered vault. Recommended Treatment: The exposed utilities could be within the recommended mow strip to minimize hand trimming and potential mower damage.

Refer to utility observations and recommendations.

Landscape. The site area is non-irrigated bermudagrass and weeds, mowed periodically.

Treatment Recommendation: Periodic mowing will give the appearance of a maintained area and help control the weed growth.

Signage and Site Furnishings

Site Furnishings. There is one log bench at the eastern Pond edge. Turf mowing allows for limited access.



Figure 31 Interpretive Panel

Site Signage. Site signage is limited to a single interpretive panel.

Site Lighting. There is no visible site lighting. Lighting could enhance security and safe access if desired. If lighting is added it should be Dark Sky compliant.

Pond. The historic Pond was not assessed in detail. A treatment recommendation is to develop a walkway around the perimeter of the Pond. The walkway would act as a mow strip, reducing hand trimming of the adjacent grass area, protect the stone edge from damage and provide pedestrian access around the Pond.





Figures 32 and 33 Pond

SOHA Engineers
May 2022

CARLSBAD CAVERNS NATIONAL PARK (PMIS 318326)
Historic Structure Report
Rattlesnake Springs Ranger Residence and Pump House

DESIGN CRITERIA

Building Code, the 2021 International Existing Building Code will be the governing code.

Dead and Live Loads Dead loads will be as calculated. Floor and roof live loads will be in accordance with the building code, except where special loading may be required for storage. Typical residential building live load is 40 psf. Snow loads will be based on local requirements, expected to be no more than 5 psf ground snow load.

Seismic Loads The project is located in an area of low seismic risk. The sandy gravel (see below) also contributes to lowering seismic design forces.

Risk Category	I, II
Site Class	D (Stiff Soil)
S_{DS}	0.111g
S_{D1}	0.066g
Seismic Design Category	A

Wind Loads Wind loads will be in accordance with ASCE 7:

Basic Wind Speed (3-Second Gust)	100 mph (V_{ult})
Exposure Category	C

Soils No geotechnical investigation has been prepared for the site. Presumptive allowable soil bearing capacities in accordance with the IBC (without a site-specific geotechnical investigation) are listed below:

Crystalline bedrock	12.0 ksf
Sedimentary and foliated rock	4.0 ksf
Sandy gravel, etc.	3.0 ksf (*appropriate design value*)
Sand, silty sand, clayey sand, etc.	2.0 ksf
Clay, sandy clay silt, etc.	1.5 ksf

BUILDINGS

RANGER RESIDENCE

General Building Description

The Rattlesnake Springs Ranger Residence was constructed in 1940 by the Civilian Conservation Corps (CCC). The building is a one-story structure, rectangular in plan and measuring approximately 65 x 37 feet. A small service building attached to the northwest corner appears to have been built at a later date. The exterior walls are stuccoed adobe with brick and wood trim. The parapet of the roof is articulated with a red brick cornice. Wooden canales project from the portal and from the back and side of the house. The roof is wood framed with timber vigas which are exposed at the interior. (figure 1).



Figure 1 – Ranger Residence, South Elevation

Available Drawings

'Employee's Residence, Rattlesnake Springs, Carlsbad Caverns National Park',

Rattlesnake Springs, dated 1939, 7 sheets total.

Foundations

According to the referenced drawings above, the ground floor of the building consists of a 4-inch-thick concrete slab on grade with 6"x6", #10-#10 welded wire mesh over a 4" thick gravel and sand base. Walls are supported by concrete strip footings between 12 and 16" thick. No reinforcing steel is indicated at these strip footings.

Walls

From the original drawings, the exterior walls are 14-inch-thick adobe with a stucco exterior finish and plaster interior finish. Interior walls are shown to be constructed of 2x4 wood studs at 16" on center with plaster finish.

Roof Framing

From field observations along with information provided in the drawings noted above, the main roof framing consists of 1x8 straight wood sheathing supported by tapered 2x6 wood joists which are supported directly above timber vigas approximately 10" in diameter and spaced at approximately 30" on center. The tapered joists are oriented parallel to the vigas. The ceiling of the main roof consists of exposed viga framing with a coffered plaster ceiling between vigas (figure 2).

The garage roof framing is similar to the main roof construction except that the tapered 2x6 joists are oriented perpendicular to the vigas (figure 3).

The roof above the south entry portal consists of 2x8 wood sheathing supported by 2x4 wood joists spanning approximately 6'-8". The 2x4 joists are supported by an adobe wall at the north end of the portal and 4x8 wood beams at the south end. The wood beams are then supported by 4x4 wood posts spaced at about 6'-9" on center (figure 4).



Figure 2 – Ranger Residence, Interior



Figure 3 — Ranger Residence, Garage Roof Framing.



Figure 4 — Ranger Residence, Portal Roof Framing

Lateral Force-Resisting System

Wind forces are likely to control lateral force demands for this structure as seismic design forces are very low. Although clearly not specifically detailed for lateral resistance, this building is likely to perform as a shear wall building. The wood roof sheathing will act as a horizontal diaphragm to transfer forces to the adobe and plaster sheathed walls, which will in turn transfer forces to the foundations.

Condition

The structure is generally in good condition.

Deficiencies

Damage Conditions

- There are signs of some cracking at portions of the band of brick work that runs along the top of the exterior adobe walls (figure 5). This does not appear to pose a significant structural concern at this time but should be addressed in the near future through possible re-pointing of the grout joint.
- There is a significant crack measured at about 1/8" wide at the garage floor slab that runs the length of the garage (figure 6). The crack is not of structural concern but should be patched with epoxy injection.

Structural Deficiencies

No significant structural deficiencies were noted during my site visit. Note that no structural calculations have been performed for gravity loading of the roof framing and no seismic or wind lateral analysis have been performed.

Treatment Recommendations

The following are recommendations for structural monitoring.

- If monitoring of the garage slab settlement is desired, it is recommended that a monitoring survey be established to document both vertical and lateral movement of the slab over time.



Figure 5 – Ranger Residence, Cracks at Brick Work



Figure 6 – Ranger Residence, Crack at Garage Slab

PUMP HOUSE

The Pump House is a one-story, L-shaped structure with a flat parapeted concrete roof. The original Pump House was built in 1935 and was rectangular in plan and measured about 16 feet x 11 feet. This original structure now comprises the western wing of the Pump House. An addition was added to the east side of the original structure in 1939 and measures approximately 12 x 23 feet. The entrance to the building now faces north (figures 7&8).



Figure 7 – Pump House North Elevation



Figure 8 – Pump House South Elevation

Available Drawings

- Pumping Station, Revised Elevations and Wall Section, Sheet 1 of 1, Carlsbad Caverns National Park, Rattlesnake Springs Water Supply, dated June 5, 1935
- Alterations and Addition to Pump House, Sheet 1 of 1, Carlsbad Caverns National Park, Rattlesnake Spring, dated 1939

Foundations

The Pump House drawings noted above indicate that the foundations for the original Pump House consists of a concrete slab on grade with perimeter concrete footings for support of the exterior walls. Very little specific information is provided. The 1940 addition drawings indicate a 4" thick reinforced concrete slab on grade. Reinforcing of the slab is shown as welded wire mesh - 6"x6" - #10x#10. For the 1940 addition the perimeter stone walls extend below grade with no separate concrete footings shown.



Figure 9 – Original Pumphouse Foundation Form Work 1935

Walls

The drawings indicate walls are constructed of stone with stucco finish. The walls for the original pumphouse are shown as 1'-8" thick at the base tapering to about 1'-0" thick at the top of the wall. Walls of the 1940 addition are shown as 1'-6" thick at the base and maintain this depth nearly to the top of the wall and only taper at the very top to about 1'-0" thick.

Roof Framing

Drawings provide very little specific information about the construction of the roof. Graphically it appears that the roof is a concrete slab. It was not possible to verify this in the field. Note that the drawings indicate roof vigas projecting beyond the exterior face of the walls at some locations. A note is provided on the 1940 addition drawings stating *"existing viga ends to be sawed off at face of wall"*. Field observation confirmed that the vigas appear to have been removed and patched over.

The addition drawings indicate the roof is a 5" thick reinforced concrete slab. The roof at the entry consists of the same slab with 2x6 lagging at the soffit supported by 5" diameter vigas at 26 inch spacing supported by a 10x10 transfer beam. Note that the vigas originally projected beyond the face of exterior face of wall but field observations show that the viga projects were removed at a later date.



Figure 10 – Pump House - South Elevation, Damage at Timber Beam



Figure 11 – Pump House – Close Up of Damage at Timber Beam



Figure 12 – Pump House – Roof at Entry

Lateral Force-Resisting System

Wind forces are likely to control lateral force demands for this structure as seismic design forces are very low. Although clearly not specifically detailed for lateral resistance, this building is likely to perform as a shear wall building.

Condition

The Pump House is generally in good condition structurally. The only significant structural issue observed is at the timber beam adjacent to the North entry. Further discussion below.

Deficiencies

Discussion of deficiencies is divided between damage conditions noted and deficiencies in the lateral or gravity load resisting systems and elements.

Damage Conditions

The existing roof beam at the roof overhang of the north entry shows signs of extensive deterioration. The existing 10x10 timber has extensive cracks, pockets and shows signs of rot. In addition, the end of the some of the vigas show signs of deterioration and rot.

Structural Deficiencies

No calculations have been performed for gravity loading of the building structure and no seismic or wind lateral analysis has been performed. Structural deficiencies noted are based on experience, engineering judgement.

Gravity Load-Carrying System

The only readily apparent deficiencies in the ability of the framing to support the gravity loading is at the roof entry noted above. The existing roof timber has extensive cracks, pockets and shows signs of rot and it is apparent that the load carrying ability of this beam has been compromised (figures 9 & to 11).

Lateral Force-Resisting System

The building generally lacks the features and detailing used in a modern masonry structure to resist lateral forces due to wind or ground shaking. That said, because of the relatively large amount of wall the incurred stresses at the wall elements should be quite small under lateral loading and do not pose a concern. In addition, there were no apparent signs of structural distress the lateral force resisting system.

Treatment Recommendations

The following are recommendations for structural repairs and improvements.

- The roof timber beam and vigas noted above at the Pump House entry should be replaced with like timber.

Appendix J

Mechanical & Plumbing Letter Report

Historical Structures Report

NPS CAVE Rattlesnake Springs HSR

Prepared for:

Architectural Resources Group

Prepared by:

Rick Russell, PE
Mike Estrada, PE
Dominic Pedotto, PE

May 19, 2022

INTERFACE ENGINEERING

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Overview

Interface Engineering conducted a surface-based site investigation on November 9th, 2021, at the 2,400 square foot Ranger Residence and 450 square foot Pump House at Rattlesnake Springs in Carlsbad Caverns National Park in New Mexico. The objective of the site investigation was to assess the existing condition of the building's mechanical and plumbing systems.

During the Civilian Conversation Corps (CCC)-era in 1939, the Ranger Residence was designed by Ken Saunders and Del Jones of the NPS Regional Office, Branch of Plans and Design in Santa Fe. The structure was constructed in 1940 by the Civilian Conservation Corps. This 2,400 square foot New Mexican Territorial Revival Style building includes six rooms, a kitchen and bath, and a garage.

The Pump House was originally designed in 1933 by William G. Carnes of the Western Division Branch of Plans and Design, San Francisco. In 1934 it was redesigned by an architect with the initials "G. F. G." from the same Western Division. The L-shaped 450 square foot Pueblo Revival Style building was constructed between 1934 and 1935 as part of a Public Works project. In 1940, the building was enlarged by Civilian Conservation Corps workers using 1938 plans designed by NPS Architect Trent Thomas.

Division 22 - Plumbing

Existing Conditions

The assessment of the existing plumbing system is based on current conditions, capacity of equipment and piping. Observation on the areas surveyed and recommendations are summarized below.

Ranger Residence

1. Sanitary Sewer/Vent System:
    a. The existing plumbing fixtures are served by a sanitary sewer line that enters the building underground and was not visible for inspection during the site visit.
    b. The existing sanitary sewer piping material was unverifiable at site. Interface Engineering recommends having the sanitary sewer line scoped to confirm material and condition.
    c. It appears that all vent piping is cast iron and travels up the side of the building and terminates above the roof.
2. Storm Water System: The roof is served by canales that daylight out the side of the roof. The canales drain onto landscape below.
3. Domestic Water System: The domestic water system enters in the adjacent Pump House and is routed underground to the Ranger Residence. Service to both buildings is metered at the Pump House (Figure 11).
4. Domestic Hot Water System: There is an electric water heater located Storage 01 at the rear of the Ranger Residence. The unit is partially insulated with an insulation wrap held onto the unit with tape. Nameplate data is partially visible, but a portion has been damaged by the tape. The unit is a Whirlpool type model number E2F40HD045V with a 40-gallon capacity (Figure 5). From observation, the unit and connecting piping appears to be in fair condition and does not appear to need an upgrade. The insulation around the unit is in need of repair. This was the only water heater observed and is therefore assumed to serve all hot water requirements for the building.
5. Propane System:
    a. The propane system is no longer in use and has been abandoned in place.
    b. There was a propane gas system used for this building with a meter located at the exterior on the East side of the building (Figure 6). Building documentation identifies that propane gas was originally provided for kitchen stove and water heater use. Propane was stored underground. The estimated 500-gallon propane tank was observed at the building's exterior which appeared to be in fair to poor condition.
6. Plumbing Fixtures:
    a. Restroom: The restroom was found to be in working order. The sink features a single handle Delta faucet with short spout. The toilet is a floor mounted Kohler with a 1.6 gallon flush capacity. The shower/tub includes a single handle control valve with shower head and tub spout (Figures 1-4).
    b. Kitchen Sink: The kitchen is equipped with a two-basin residential utility sink (Figure 7) that was found to be in working order.

c. Laundry Connection: A laundry connection is provided with domestic cold & hot hose bibbs with shutoff valves and a sanitary sewer connection with a P-trap (Figure 8). Fixtures and connections appear to be in acceptable condition.

d. AC Unit Condensate Pump: A Diverstech CP-22 condensate pump is provided with the AC unit to handle condensate (Figure 9). The unit appears to be in working order.

e. Outside Hose Bibb: A hose bibb is provided outside of the Ranger Residence on the South wall (Figure 10). The fixture was found to be in working order.

Pump House

1. Domestic Water System: The domestic water system enters the Pump House on the West side and is routed around on the wall and underground to the Ranger Residence.
2. Water Supply Pump System:
   a. The water supply pump system is no longer in use and has been selectively demolished and/or abandoned in place.
   b. The existing water supply pump is located in the West portion of the Pump House. It originally served as the water supply for the Carlsbad Caverns Park headquarters area. A turbine sump pump installed within a partially submerged concrete structure in the pond (Figure 12) is piped to the Pump House pump by a buried six-inch pipe. The Pump House pump was installed in 1949 and has a Fairbanks Morse motor rated at 40 HP (Figure 13). A four-inch pipe supplied water to the park headquarters area. The pump is no longer used since a well was installed.
3. Plumbing Fixtures: Domestic Water Meter: The domestic water supply is equipped with a Precision Meters flow meter (Figure 11).

Recommendations

1. Sanitary Sewer System: Visual and camera inspection of the sewer line is recommended to assess its internal condition.
2. Storm Drainage System: Because the system does not use storm/drain piping, no action is required.
3. Domestic Water System: Thorough domestic water assessment is recommended to assess if any damaged pipe requires repair. PVC appears to be used for this system in most cases.
4. Domestic Hot Water System: Domestic water heater at the Ranger Residence is acceptable for continued use because it was updated in 2013, but Interface Engineering recommends repairing the insulation wrapped around the unit.
5. Plumbing Fixtures: Sink and lavatories are functional, but all faucets should be replaced with low flow fixtures including water closets. Plumbing fixtures shall have water consumption as follows:
   a. Flush valve water closets with 1.28 gallons per flush.
   b. Sink with maximum of 1.5 gpm faucet.
   c. Shower head maximum of 2.5 gpm.
6. Propane System: The existing propane tank should be removed and disposed. The existing propane lines should be reclaimed and provided back to the NPS. Provide cost analysis to NPS comparing new propane system described below being installed vs new electric system being provided.

a. Option to provide new propane system to include new above ground propane tank and new underground propane lines to building. New underground lines to be either pro-flex or pro-poly propane lines. Existing building interior propane lines, meter and control/shut-off devices to be investigated to determine if they can be reused or if they need to be replaced.

Plumbing Fixture Exhibit



Figure 1: Restroom Fixtures

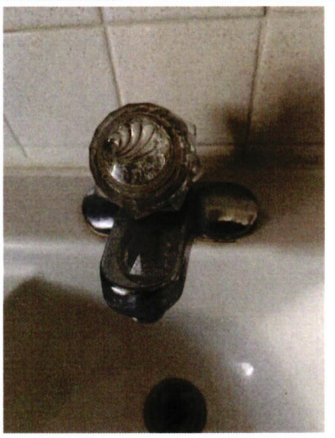


Figure 2: Restroom Fixtures



Figure 3: Restroom Fixtures

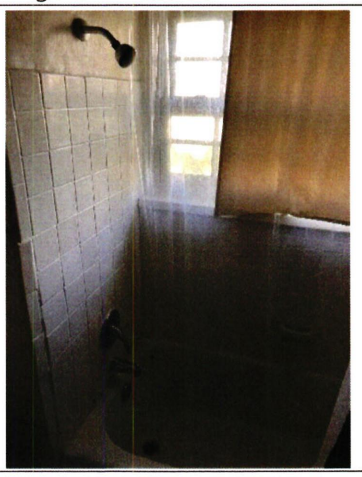


Figure 4: Restroom Fixtures



Figure 5: Water Heater

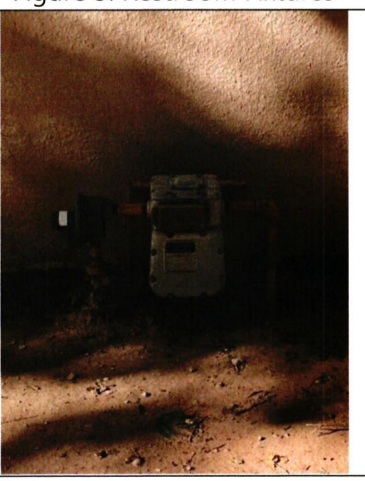


Figure 6: Gas Meter



Figure 7: Kitchen Sink



Figure 8: Laundry Connections



Figure 9: AC Unit Condensate Pump

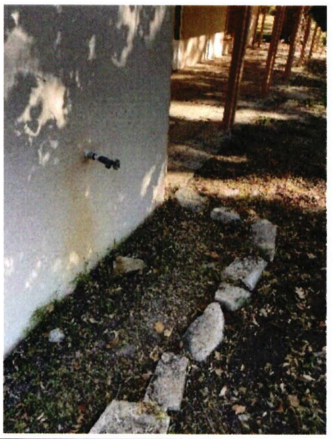


Figure 10: Residence Hose Bibb



Figure 11: Domestic Water Flow Meter



Figure 12: Partially Submerged Sump Pump



Figure 13: Pump House Pump

Division 23 - Heating, Ventilating, and Air Conditioning (HVAC)

A list of the major mechanical equipment and their potential life span is provided in Table 1. The assessment of the existing mechanical system is based on current conditions, capacity of equipment and piping. Observation on the areas surveyed and recommendations are summarized below.

Existing Conditions

Ranger Residence

1. The Ranger Residence building is heated and cooled by an electric direct exchange (DX) split system heat pump unit located within a central closet (Figure 1). It is ducted to sidewall diffusers for supply and has a louvered door for return (Figure 2). The system is controlled by a singlewall mounted programmable thermostat (Figure 3).
2. HVAC Equipment:
    a. One (1) Comfortmaker 3-ton capacity condensing unit is located outside the North side of the building and provides DX refrigerant to the evaporative section of the fan-coil inside with piping entering through the wall (Figure 4). The condensing unit is in close proximity to a canale and should be relocated to prevent future damage to the unit.
    b. One (1) Comfortmaker component fan-coils is located in a mechanical closet. It consists of a blower section and an evaporative coil section (Figure 1). All equipment appears to have been manufactured in 2014.
    c. Return air is routed through a door louver back to the indoor unit's bottom intake and pushed out through the top of the unit.

Pump House

The Pump House building is furnished with an electric direct exchange (DX) split system heat pump unit (Figure 5). The unit is not connected with unit pipe connections cut and taped off. It appears to be abandoned in place.

Table 1: Mechanical Equipment

Manufacturer	Area Served	Equipment Description	Model / Serial Num	Capacity	Mfr. Year	Life Span (years)[1]
Comfortmaker	Residence	AC System Condenser	N4H336GKF200 / E143309246	3.0 ton	2014	15
Comfortmaker	Residence	HVAC System Fan-coil	FEM4P3600AL / A146068783	3.0 ton	2014	15
Trane	Pump House	HVAC System Fan-coil	TWE030C140A1 / K09888565	2.5 ton	1995	15

[1]Estimated lifespan of equipment from *ASHRAE Equipment Life Expectancy Chart 2015.*

[2]Assumed to have been installed with other equipment as a system.

Recommendations

1. The existing system serving the Ranger Residence is within the ASHRAE life expectancy and was functional at the time of the survey. No replacement needed unless desired. In order to utilize the residence, the existing unit should be fully tested by a mechanical contractor to confirm its operation. The existing ductwork has a lifespan of up to 30+ years, and the observed ductwork and diffusers appears to be generally in good condition.
    a. Concern exists regarding the condenser location in relation to the roof drainage canale. It is recommended to install a new concrete pad and to relocate the condenser away from the canale to avoid the potential for high volumes of runoff from compromising the condenser unit.
2. The existing system abandoned in the Pump House is past its life expectancy. Since the spacewill be used for storage, it is recommended the unit and any accessories be demolished.

Mechanical Fixtures Exhibit

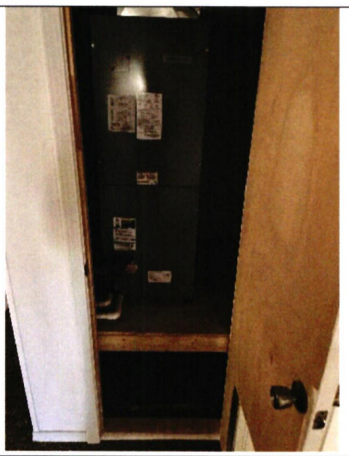


Figure 1: DX Split System Unit in Ranger Residence



Figure 2: Sidewall Supply Diffuser and Door Louver Return Grille in Ranger Residence



Figure 3: Programmable Thermostat in Ranger Residence



Figure 4: DX Split System Condenser Unit at Ranger Residence

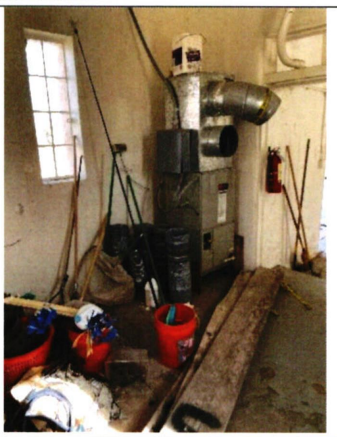


Figure 5: Gas Fired Heater in Pump House

O'MAHONY & MYER
ELECTRICAL ENGINEERING & LIGHTING DESIGN

San Rafael, California
Pacific Harbour, Fiji

Brian O'Mahony
Jan P. Myer
Paul Carey
Pieter Colenbrander
David Orgish

June 28, 2022

Architectural Resources Group
Pier 9 The Embarcadero
San Francisco, CA 94111

Attn: Alicia Virani

Re: Carlsbad Caverns National Park
Rattlesnake Springs Ranger Residence and Pump House
Historic Structures Report - Electrical Systems Assessment

Dear Alicia,

O'Mahony & Myer visited the Rattlesnake Springs site at Carlsbad Caverns National Park on November 9, 2021, to review the existing electrical related conditions at the Ranger Residence and the Pump House buildings. The purpose of our visit was to review the existing conditions of the electrical, lighting, and signal systems, in order to provide this written assessment of the conditions and abilities of each system to support ongoing use.

Following is a summary of our findings.

Main Electric Services:

The Ranger Residence and Pump House are both fed from a dedicated pole mounted Excel Energy utility transformer bank located on a pole just West of the Pump House.

The 3-phase transformer bank is connected for a 240V, Delta, 3-Phase, 4-Wire electric service output and feeds the following Excel energy metered accounts:

A. Ranger Residence: Fed with 1-Phase, 120/240V overhead residential style service wires from the pole mounted transformer bank to a riser pole with a 150A, 120/240V electric service meter and main breaker panel. The Xcel Energy utility meter is an older style analog meter with no "smart" tracking capabilities. The pole mounted meter/main panel then feeds underground to the residence, to a 225A rated branch panel located at the rear exterior. Although the house panel is rated at 225A, the capacity of the residential service is limited to 150A by the main breaker in the Excel meter panel at the pole to the West.

B. Pump House: Fed with a 3-Phase, 120/240V, 3-Phase, 4-Wire underground service conduit and wires from the pole mounted transformer bank to the West exterior of the Pump House. The Pump House includes an exterior Xcel meter, with (2) main breakers; one rated at 200A and one rated at 125A.There is no back-up power at the site and no provision for plugging in a temporary source. The Xcel Energy utility meter appears to be a modern style "smart" meter that should be able to provide load tracking capabilities for peak demand and energy usage.

It is recommended that the older style residence utility meter be replaced by Xcel Energy with a new "smart" meter style, to allow better energy usage tracking in the future.

Building Power Distribution:

The buildings include the following panels and loads:

Ranger Residence Panel:

The Ranger Residence Panel is located at the North exterior of the house, in a Nema 3R weather-proof panel. The panel is a typical 1-phase style, with (40) breaker spaces. Only (17) spaces are occupied by breakers, leaving some additional breaker space capacity.

The load on the panel is reportedly ok (no tripping breakers), but without actual load readings, it is not possible to say how much extra load capacity may exist on the panel during normal operation. The Excel Energy meter out at the pole is not a "Smart Meter" and can, therefor, not provide any historical demand data.

The branch loads on the panel include:

1. 50A Electric Range
2. 30A Electric Water Heater
3. 30A Electric Clothes Dryer
4. 60A Electric Furnace
5. 30A Electric Furnace
6. 30A Electric Heat Pump / AC
7. (5) 20A, 120V branch circuit breakers

Pump House:

The Pump House electric panels are located at the West exterior of the Pump House, in Nema 3R weather-proof panels, as well as just inside the West wall of the Pump House. The panels are rated at 120/240V, 3-Phase to serve the pump loads and miscellaneous 120V loads.

The main 200A panel is a typical 3-phase style, with (30) breaker spaces. Only (12) spaces are occupied by breakers, leaving some additional breaker space capacity.

The 150A service breaker feeds a large disconnect on the opposite side of the wall (inside).

The interior loads at this building appear to have been mostly disconnected and removed. The interior disconnects are open with loose and cut wires hanging loose.

The branch loads in the main 200A panel are not labeled, but include a 50A/2P breaker, an 80A/2P breaker, (4) 20A/1P breakers, and what appears to be a GFCI module.

Branch Power:

Ranger Residence:

The overall integrity of the building wiring systems could not be identified during this visual inspection, but can be assumed to be in rather old condition, based on the age of the building. Wiring systems are hidden in the walls and ceiling and were not visible. It is recommended that the branch wiring be megger tested and ground tested to verify the insulation integrity and system grounding continuity.

Most power receptacle and light fixture locations are original and are still fed with concealed wiring inside the walls.

Some surface mounted low profile Wiremold raceway has been installed from surface mounted bedroom light switches, to the bedroom lights. Extensions are probably from the original locations, to more usable locations that exist now.

The garage includes all surface mounted conduit, wiring, and receptacles / lights, since the wall there are not accessible.

Receptacles in the residence are, for the most part, all flush mounted and are standard 3-prong, grounded type receptacles. Locations appear to be original, but the receptacles have been replaced over time. It could not be verified if ground wires actually exist to the ground prong on these receptacles, during this visual only inspection.

Ground fault interrupting type receptacles do exist at the bathrooms and kitchen, near sinks, as required by code. Each was tested and they are operational. It should be noted that if there are any ungrounded receptacles in the residence, these can be replaced with GFCI style receptacles, which will provide better people protection, where ground wires may be lacking.

Pump House:

As noted above, most interior wiring systems have been disconnected and are no longer functional. All interior power wiring is in surface mounted conduit and boxes, run on the wall and ceilings.

There are several interior surface mounted light switches and receptacles, but the only lighting appears to have been the ceiling screw-in incandescent lamp sockets, which no longer have lamps in them.

The Pump House can be considered to be completely void of any usable electrical or lighting and will need a full interior electrical upgrade to be used for any purpose other than non-lit Storage. The power service panel at the exterior should be suitable to be re-used and re-purposed for whatever new use this structure may get.



Transformer Bank



Residence 150A Meter/Main



Pump House Meter/Mains



Residence 225A Panel



Residence Panel Breakers



Pump House 200A Panel



Pump House 125A Main



Typical Receptacles



Typical Lighting / Switches



Garage Conduit / Devices



Pump House Interior Power



Pump House Interior Power

Lighting Systems:

Ranger Residence:

The lighting systems in the residence generally consist of a mix of original fixture locations and some surface mounted new fixture locations. Numerous fixtures are still incandescent, but other fixtures have newer screw-in type, after-market, LED lamps. There are also several linear fluorescent lamps in the Garage. Significant energy savings could be achieved by replacing the exterior and interior incandescent fixtures with modern LED fixtures or at least new LED lamps throughout.

Lighting controls are limited to standard conventional manual wall switches. There are no automatic occupancy sensor controls for bathroom or garage lighting and no timeclocks for exterior lighting. Additional energy savings would be available by providing automatic controls for these spaces.

Based on the residential occupancy, there are no exit signs and no emergency lighting in the residence. None are required.

Pump House:

As noted above, the Pump House can be considered to be completely void of any usable electrical or lighting and will need a full interior electrical upgrade to be used for any purpose other than non-lit Storage.

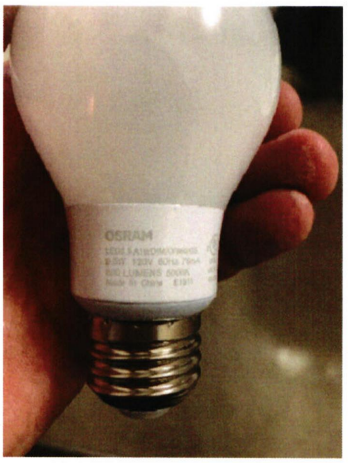
(See Photos – Next Page)



Incandescent Fixtures



Garage Fluorescent



LED Screw-In Lamps

Telephone / Internet / Cable TV / Security Systems:

Ranger Residence:

The residence is fed by a single exterior overhead telephone cable, from the joint overhead power and telephone lines at the West side of the site. There appear to be only (2) activated telephone lines in the residence, terminated in the Dining Room area windowsill.

The overhead telephone service line lands on the building at the West exterior, in a telephone utility service connection box near the roof edge. Three individual telephone cables are routed along the West and North exterior of the structure.

Two of the cables go along the North exterior wall and enter the residence at a window next to the exterior power panel. These are terminated in (2) telephone jack boxes mounted on the interior side of the windowsill of the Dining Room area. These jacks should be relocated to a more suitable location.

The third cable goes along the West exterior, towards the garage, and is hanging loose at the exterior, with no connection.

It is not known if the existing lines can provide any internet connectivity. If they do, it may be very slow DSL service, based on the remote nature of the site.

There is no cable TV system in the residence, but there are (2) satellite dishes located on the roof. The satellite dishes are no longer in service and should be replaced, if TV service is required.

There is no security system at the residence.

Pump House:

The Pump House can be considered to be completely void of any usable telephone, cable TV, or security systems.

Previous telephone service was provided overhead near the electric service meter and entered the building through a loose telephone cable, through the window next to the exterior electric panels. The original overhead service connection has been cut off and no longer exists.



Incoming House Phone Lines



Dining Room Telephone Jacks



Pump House Old Tel Line



Satellite Dishes at Roof



Typical Smoke Detector

Fire Alarm System:

Ranger Residence:

Based on the residential occupancy, the building has no fire alarm system, but none is required by code.

There are residential style battery operated ceiling mounted smoke detectors with local sounder alarms in most rooms, as required by code. These should be checked for proper batteries and operation.

Pump House:

The pump house has no fire alarm system or smoke detectors and will need to be outfitted with specific devices, based on the intended future use.

In order to meet NPS standards, smoke detection should be provided, at a minimum.

Treatment Recommendations:

Power:

1. The power services to each building can remain and should be suitable for re-use in various forms of occupancy.

    a. For the residence, new arc fault interrupting style circuit breakers will be required to meet new code for receptacle circuits. This provides added safety over standard breakers by providing automatic shut-off of circuits that may become damaged from kinked extensions cords, chair, bed, or sofa legs, etc.
    b. Current receptacle locations do not meet current code, for spacing along each wall within 6 feet of any location along the wall. This can be retained and "grandfathered" in as an existing condition or upgraded. Adding receptacles will require surface mounted Wiremold raceways and surface mounted boxes/receptacles, if added. There is no accessible crawl or attic space to fish wiring through.
    c. All new branch electrical systems will be required at the Pump House. Nothing at that building is usable or suitable to be retained, except the exterior electric meter and main panel.
    d. It is recommended that the branch wiring systems in the residence be megger tested and ground tested to verify the insulation integrity and system grounding continuity.
    e. It is recommended that the older style residence utility meter be replaced by Xcel Energy with a new "smart" meter style, to allow better energy usage tracking in the future. The Pump House utility meter already appears to be a smart meter.
    f. Past electrical work orders for work done in the residence should be tracked to establish what was original and what was installed since original.

Lighting:

1. Since the lighting fixtures in the residence are all older style incandescent type, with some screw-in LED, new light fixtures or more screw-in LED lamps can provide significant energy savings.

2. Restrooms should be provided with vacancy sensors for automatic lighting shut-off when the room is not occupied.

3. The Pump House will require all new LED lighting and controls.

4. Based on the occupancy of both structures, no emergency lighting or exit signs are required.

Telephone:

1. The telephone service to the Residence should be tested and verified to be suitable for phone service, at minimum. Internet service may be available through the service provider, otherwise satellite internet may also be an option.

2. The location of the (2) phone jacks at the Dining Room windowsill is not ideal and could be improved. The lines should be relocated to a more suitable location near the Kitchen or in the Living Room.

3. If telephone service is required at the Pump House structure, a new overhead service line will need to be provided by the service provider, with new interior terminations.

4. If television or internet service is required via satellite, the (2) dishes on the roof should be replaced with new, including compatible digital equipment from the service providers. This may be either Dish Satellite or Direct TV.

Fire Alarm:

1. A fire alarm system is not required by code in the Residence. Smoke detectors should be reviewed for proper operation and updated accordingly.

2. Depending on the Pump House use, some form of fire alarm devices may be required. Smoke detection should be considered at a minimum, with phone, satellite, or cell monitoring to an off-site monitoring agency, per NPS guidelines.

If you have any questions or comments on the above assessment or recommendations, please do not hesitate to call.

Sincerely,

P. Colenbrander

Pieter Colenbrander, P.E.
O'MAHONY & MYER

Appendix L

FMSS Spreadsheet

FMSS Spreadsheet

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FMSS LOCATION NAME & NUMBER	HSR TREATMENT COMPONENT	FMSS ASSET NUMBER	HSR TREATMENT RECOMMENDATIONS/ FMSS WORK ORDERS	HSR IMPLEMENTATION TASKS/ FMSS TASKS	MAINTENANCE CYCLE	FMSS WORK TYPE/ SUB-TYPE	UNITS OF MATERIAL	UNITS OF MEASURE
HB #22 Hist Residence 15588	Grading and Site	--	Correct site drainage	▪ Perform minor fine grading along the south façade planter to lower adjacent grade at building and continue positive drainage away from building. ▪ Minor fine grading along the east side of building would be beneficial to remove localized low points and provide consistent positive drainage away from the building. ▪ Regrade the north and west sides of the building to provide positive drainage away from the building. Construct a new drainage swale to achieve positive drainage away from the building and convey the drainage to the east side of the north backyard area and to the south for the westerly side yard area. ▪ Install a concrete apron at sill of the garage door and regrade soil away from door.	--	DM	Field Measure	SF
				▪ Install a 12-inch minimum maintenance strip along the building perimeter.	--	DM	250	SF
				▪ Install permanent splash pads below each canale.	--	DM	7	EA
			Routinely clear plant debris and snow	▪ Clear tree duff and plant growth adjacent to the structure away periodically ▪ Clear snow as soon as possible	Annually	PM	500	SF
			Maintain shrub beds	▪ Remove weeds and grasses. Mulch shrub bed areas with gravel mulch over a weed barrier geotextile.	Annually	PM	Field Measure	SF
			Seed or plant grass plugs	▪ Seed or plant grass plugs in exposed soil areas and provide temporary irrigation to establish new grass in areas not covered by flood irrigation.	Annually	RM	Field Measure	SF
			Refinish trash receptacle	▪ Refinish bear-proof trash receptacle to match CAVE or NPS standard color palette.	--	DM	1	EA
	Porches and Flagstone Paving		Reconstruct Stone Walkways	▪ Reconstruct a stone walkway connecting the driveway to the front door/porch area.	--	DM	Field Measure	SF
				▪ Reconstruct a stone walkway connecting the driveway to the side door patio area.	--	DM	Field Measure	SF
				▪ Reconstruct stone walkway and steps at south of building.	--	DM	Field Measure	SF
			Reconstruct Patio	▪ Reconstruct the dry laid stone patio south of Portal in its current location.	--	DM	300	SF

FMSS LOCATION NAME & NUMBER	HSR TREATMENT COMPONENT	FMSS ASSET NUMBER	HSR TREATMENT RECOMMENDATIONS/ FMSS WORK ORDERS	HSR IMPLEMENTATION TASKS/ FMSS TASKS	MAINTENANCE CYCLE	FMSS WORK TYPE/ SUB-TYPE	UNITS OF MATERIAL	UNITS OF MEASURE
HB #22 Hist Residence 15588 (contd)	Porches and Flagstone Paving (contd)	--	Regrout Paver Joints	▪ Repoint grout joints that are loose or crumbling at stone paving of Portal.	--	DM	Field Measure	SF
				▪ Repoint or regrout grout joints that are loose or crumbling at Service Patio 14 and Patio 13.	--	DM	Field Measure	SF
			Maintain Stone Pavers at Patios and Portal	▪ Wash stone at low pressure with warm water to remove dirt, debris, and stains. If any tenacious stains remain, use a bio cleaner at select locations only.	Annually	RM	600	SF
	Foundations and Floor Framing		Repair Crack at Concrete Slab	▪ Repair crack in garage floor slab.	--	DM	Field Measure	LF
	Exterior Walls		Maintain Stucco	▪ Clean painted finish to remove general soiling and biological growth. ▪ Renew finishes periodically to match existing paint color.	Annually	RMDM	Field Measure	SF
			Repair Stucco	▪ Sound all stucco surfaces to determine extent of cracking and if loss of bond has occurred. ▪ Remove loose stucco and replace or repair cracks as necessary.	--	DM	Field Measure	SF
			Remove Bird Nests	▪ Use exclusion activities to prevent seasonal bird nesting on walls ▪ Remove bird nests in consultation with Park Natural Resources Team.	--	PM	Field Measure	EA
			Repoint Brick Walls	▪ Repoint brick grout joints where mortar is missing or deteriorated.	--	DM	Field Measure	SF
			Clean Mortar	▪ Clean mortar to remove general soiling and biological growth.	Annually	RMDM	Field Measure	SF
			Clean Concrete Surfaces	▪ Clean concrete to remove general soiling and biological growth.	Annually	PM	Field Measure	SF
			Renew Concrete Finishes	▪ Renew painted finishes at concrete walls of storage addition.	5 Years	RMDM	Field Measure	SF
			Routinely Clean Roof	▪ Clean roof to remove dirt, tree duff and biological growth periodically.	Annually	RM	2500	SF
			Routinely Clean Canales	▪ Clean canales to remove dirt and debris and ensure good drainage.	Annually	RM	7	EA

FMSS Spreadsheet

FMSS LOCATION NAME & NUMBER	HSR TREATMENT COMPONENT	FMSS ASSET NUMBER	HSR TREATMENT RECOMMENDATIONS/ FMSS WORK ORDERS	HSR IMPLEMENTATION TASKS/ FMSS TASKS	MAINTENANCE CYCLE	FMSS WORK TYPE/ SUB-TYPE	UNITS OF MATERIAL	UNITS OF MEASURE
HB #22 Hist Residence 15588 (contd)	Roof Structure and Roofing	--	Repair Portal Columns	▪ Perform assessment to determine extent of rot at the base of the Portal columns. ▪ Repair material losses.	---	DM	17	EA
	Chimneys		Perform Exclusion Activities	▪ Use exclusion activities to prevent bats from entering chimneys.	Annually	RM	3	EA
	Exterior Windows		Maintain Windows	▪ Routinely clean windows of dirt, debris, and cobwebs.	Semi-annually	RM	18	EA
			Repair Windows	▪ Losses at the wood sill of Window 14 may be filled with epoxy repair compound, shaped to match adjacent wood.	--	DM	1	EA
				▪ Repair damaged wood screens.	--	DM	2	EA
			Paint Window Trim	▪ Paint trim at Window 02 to match window trim at all other windows of the residence.	--	DM	1	EA
	Exterior Doors		Maintain Doors	▪ Clean doors to remove dirt, debris, and cobwebs periodically.	Semi-annually	RM	4	EA
				▪ Renew painted finish at exterior wood doors.	5 years	RM	3	EA
				▪ Clean and lubricate door hardware to ensure smooth operability.	Annually	RM	4	EA
	Ceilings		Perform Exclusion Activities	▪ Use exclusion activities to prevent bats from roosting at the east end of the portal ceiling.	Annually	RM	Field Measure	SF
	Interior Walls		Maintain Tile	▪ Routinely clean wall tile grout in bathroom.	Monthly	PM	Field Measure	SF
	Interior Walls (contd)		Replace Wall Tile	▪ Replace ceramic wall tile in bathroom.	--	CRDM	Field Measure	SF
	Flooring		Replace Carpeting	▪ Replace carpeting throughout the residence.	7 years	CRDM	720	SF
			Hazardous Material Testing	▪ Test vinyl tile for asbestos.	--	LMLS	43	SF
			Replace Tile	▪ Replace bathroom floor tile.	25 years	CRDM	43	SF
	Interior Doors		Maintain Doors	▪ Clean doors to remove dirt, debris, and cobwebs periodically.	Semi-annually	RM	8	EA

FMSS Spreadsheet

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HB #22 Hist Residence 15588 (contd)	Interior Doors (contd)	--		▪ Renew painted finish at interior wood doors.	7 years	RM	9	EA
				▪ Clean and lubricate door hardware to ensure smooth operability.	Annually	RM	8	EA
	Casework		Maintain Casework	▪ Clean to remove dirt, debris, and stains.	Monthly	PM	Field Measure	SF
				▪ Renew casework finish.	10 years	RM	Field Measure	SF
	Hardware		Maintain Hardware	▪ Clean to remove dirt, debris, and stains from all door, window, and plumbing hardware. ▪ Lubricate hardware periodically.	Semi-annually	PM	Field Verify	EA
				▪ Clean brass door hardware to remove tarnish.	Annually	PM	Field Verify	EA
				▪ Renew hardware finish with clear lacquer.	5 years	RM	Field Verify	EA
	Electrical Power		Install Circuit Breakers	▪ Install arc fault interrupting style circuit breakers.	--	LMCO	Field Verify	EA
			Install Power Receptacles	▪ Install additional receptacles.	--	LMCO	Field Verify	EA
				▪ Megger and ground test branch wiring systems	--	LMCO	Field Measure	LF
				▪ Replace utility meter with new smart meter	--	CR	1	EA
	Lighting		Install LED Lamps	▪ Install LED lamps at existing light fixtures	20 years	CR	Field Verify	EA
	Lighting (contd)		Install Occupancy Sensors	▪ Provide occupancy sensor in the bathroom.	--	CR	1	EA
	Telephone		Test Telecom Service	▪ Test and verify telephone and internet service	--	CR	--	--
			Relocate Telephone Jacks	▪ Relocate telephone jacks closer to Kitchen and Living Room	--	CR	2	EA
	Fire Alarm		Test Smoke Detectors	▪ Routinely test smoke detectors for operability	Monthly	LMLS	Field Verify	EA
	HVAC System		Relocate Condensing Unit	▪ Relocate condensing unit away from roof canale	--	PM	1	EA

FMSS Spreadsheet

FMSS LOCATION NAME & NUMBER	HSR TREATMENT COMPONENT	FMSS ASSET NUMBER	HSR TREATMENT RECOMMENDATIONS/ FMSS WORK ORDERS	HSR IMPLEMENTATION TASKS/ FMSS TASKS	MAINTENANCE CYCLE	FMSS WORK TYPE/ SUB-TYPE	UNITS OF MATERIAL	UNITS OF MEASURE
HB #22 Hist Residence 15588 (contd)	Sanitary Sewer		Inspect Sanitary Sewer System	▪ Visual and camera inspect sewer line to assess internal condition	10 years	PM	Field Verify	LF
	Domestic Water		Inspect Water System	▪ Perform thorough assessment of the domestic water system	20 years	PM	--	--
			Repair Insulation	▪ Repair insulation around domestic hot water system	--	CRDM	--	--
	Plumbing Fixtures		Replace Faucets	▪ Replace faucets with low-flow fixtures	20 years	CR	3	EA
			Replace Water Closet	▪ Replace water closet with low-flow fixture	20 years	CR	1	EA
	Propane System		Remove Propane System	▪ Remove propane tank and propane lines	--	LMLS	1	EA
HB #20 Hist. Pump House 15602	Grading and Site	--	Correct site drainage	▪ Regrade around the building perimeter to provide positive drainage away from the building. Construct new drainage swales to achieve positive drainage away from the building and convey the drainage away from the building. ▪ Complete a topographic survey and prepare a fine grading plan	--	DM	Field Measure	SF
			Soil Testing	▪ Perform exploratory excavation and soil testing on the north side of the Pump House at site of previous fuel tank	--	LMLS	Field Measure	CF
			Provide Access to Building	▪ Construct a compacted aggregate path for pedestrian access to the building and interpretive panel	--	LMAC	Field Measure	SF
				▪ Install a 12-inch minimum maintenance strip along the building perimeter.	--	DM	150	SF
				▪ Install permanent splash pad below each canale.	--	DM	1	EA
			Maintain Site Landscape	▪ Periodically mow around building to control weed growth.	Monthly	PM	Field Measure	SF
	Foundations and Floor Framing		Clean Floor Slab	▪ Remove rust stains from concrete floor of Pump House	Annually	DM	460	SF
	Exterior Walls		Maintain Stucco	▪ Clean painted finish to remove general soiling and biological growth. ▪ Renew finishes periodically to match existing paint color.	Annually	RMDM	Field Measure	SF

FMSS Spreadsheet

FMSS LOCATION NAME & NUMBER	HSR TREATMENT COMPONENT	FMSS ASSET NUMBER	HSR TREATMENT RECOMMENDATIONS/ FMSS WORK ORDERS	HSR IMPLEMENTATION TASKS/ FMSS TASKS	MAINTENANCE CYCLE	FMSS WORK TYPE/ SUB-TYPE	UNITS OF MATERIAL	UNITS OF MEASURE
HB #20 Hist. Pump House 15602 (contd)	Exterior Walls (contd)	--	Repair Stucco	▪ Sound all stucco surfaces to determine extent of cracking and if loss of bond has occurred. ▪ Remove loose stucco and replace or repair cracks as necessary.	--	DM	Field Measure	SF
			Remove Bird Nests	▪ Use exclusion activities to prevent seasonal bird nesting on walls ▪ Remove bird nests in consultation with Park Natural Resources Team.	--	PM	Field Measure	EA
	Roof Structure and Roofing		Routinely Clean Roof	▪ Clean roof to remove dirt, tree duff and biological growth periodically.	Annually	RM	700	SF
			Routinely Clean Canale	▪ Clean canale to remove dirt and debris and ensure good drainage.	Annually	RM	1	EA
			Refresh Canale Paint	▪ Refresh paint at log canale	5 years	RMDM	1	EA
			Replace Timber Beam	▪ Replace the timber beam and vigas of the Pump House entry with like timber.	--	DM	--	--
	Exterior Windows		Repair Steel Windows	▪ Repair and preserve all original windows. Clean, lubricate, and ensure windows operate smoothly and properly. ▪ Remove existing wood screens at interior and replace with low-profile and removable screens. ▪ Remove light rust, flaking, excessive paint, and excessive glazing compound. ▪ Prime exposed metal with rust-inhibiting primer. ▪ Repaint steel sections with two coats of finish paint compatible with primer. ▪ Patch small holes or uneven areas resulting from any rusting of steel windows. ▪ Replace cracked or missing glazing compound. ▪ Provide elastomeric caulk around all steel windows. ▪ Weatherstrip all windows. ▪ Clean window sills to remove soiling, biological growth, and scaling.	--	DM	7	EA
		--	Repair Steel Windows (contd)	▪ Replace the bottom muntin at Window 03 in-kind	--	DM	1	EA
	Exterior Doors		Maintain Doors	▪ Clean doors to remove dirt, debris, and cobwebs periodically.	Semi-annually	RM	2	EA
				▪ Renew painted finish at exterior wood doors.	5 years	RM	2	EA

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HB #20 Hist. Pump House 15602 (contd)	Exterior Doors (contd)	--		▪ Clean and lubricate door hardware to ensure smooth operability.	Annually	RM	2	EA
	Ceilings		Maintain Ceilings	▪ Clean ceilings to remove dirt, debris, and cobwebs periodically.	Annually	RM	460	SF
			Repair Ceilings	▪ Conduct a lead paint analysis before commencement of repair work ▪ Investigate cause of moisture intrusion and damage at the ceiling of the Pump House. Repair existing leaks and ensure proper roof drainage. ▪ Sound ceiling plaster at areas of damaged paint finish to check if the plaster has debonded from the substrate. Loose or detached plaster will need to be removed and the area replastered before painting.	--	DM	460	SF
			Paint Ceilings	▪ Renew painted finish.	5 years	RMDM	460	SF
	Interior Walls		Repair Interior Walls	▪ Investigate cause of moisture intrusion and damage at the interior walls of the Pump House. Repair existing leaks and ensure proper drainage around building perimeter at roof and ground level. ▪ Remove rust stains from the walls of the Pump House using a concrete cleaner formulated to remove such stains. After cleaning, coat walls with a penetrating corrosion inhibitor (such as Sika FerroGard-903).	--	DM	Field Measure	SF
			Paint Interior Walls	▪ Paint all ferrous metal elements in the Pump House, including pipes and free-standing racks.	5 years	RMDM	Field Measure	SF
	Electrical Power		Provide Electrical Systems	▪ Provide all new branch electrical systems at the Pump House.	--	CR	--	--
	Lighting		Install Lighting	▪ Provide new LED lighting and controls	--	CR	--	--
	Fire Alarm		Install Smoke Detection	▪ Provide fire alarm devices and smoke detection with monitoring.	--	PM	--	--
	HVAC System		Remove Gas Heater	▪ Remove gas fired heater in the Pump House	--	DM	1	EA

SAN FRANCISCO
Pier 9, The Embarcadero, Suite 107
San Francisco, California 94111
T: 415.421.1680
F: 415.421.0127

argsf.com

LOS ANGELES
360 E 2nd Street, Suite 225
Los Angeles, CA 90012
T: 626.583.1401
F: 626.583.1414

arg-la.com

PORTLAND
720 SW Washington Street, Suite 300
Portland, OR 97205
T: 971.256.5324

arg-pnw.com