

Snake River Land Company

Grand Teton National Park

Wyoming

Historic Structure Report

Prepared for the
National Park Service
Grand Teton National Park

Prepared by
Colorado State University
Architectural Preservation Institute
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Snake River Land Company Historic Structure Report Grand Teton National Park

TABLE OF CONTENTS

1. Study Summary & Administrative Data
2. Project Data

PART 1. DEVELOPMENTAL HISTORY

3. Historical Background and Context
4. Chronology of Development and Use
5. Physical Description
6. Evaluation of Significance
7. Condition Assessment

PART 2. TREATMENT AND USE

8. Historic Preservation Objectives
9. Requirements for Work
10. Short Term Work Recommendations

APPENDICES

Bibliography
Drawings
Photographs
Materials Analysis

Section 1: Study Summary and Administrative Data

Located near the Moran entrance to Grand Teton National Park (GRTE), the Snake River Land Company Headquarters, played a succession of roles in the development of the park over the years and was known by several names. Originally the John W. Hogan Homestead, and later the Snake River Land Company Residence and Office, the Buffalo Fork Ranger Station, Jackson Hole Wildlife Park Headquarters and the Buffalo Dorm, this building is both historically significant in the park's history and is a fine example of rustic style architecture.

The major concerns for the historic building include structural issues and roof integrity. Life safety factors also need to be improved. Addressing these three concerns through rehabilitation would permit reuse of this building by the Grand Teton National Park. Based on park needs this building could be rehabilitated as a residence or office and potentially both. These uses are compatible with the historic nature of this building.

Primary documents were obtained in the Grand Teton National Park archives facilitated by Alice Hart, park curator. Personal communications were conducted with park staff. Copies of maintenance files were obtained at the Western Center for Historic Preservation located in Moose, Wyoming.

Major research findings were corroborated by previously conducted fieldwork and associated reports. The National Register of Historic Places Nomination was completed in 2006 and served as the background for this historic structure report. Historical information was also gleaned from *Crucible for Conservation: The Struggle for Grand Teton National Park* (Righter, 1982) which provided a thorough overview of park history and dynamics.

The information presented herein provides the basis for evaluating future alterations that may be proposed for the Snake River Land Company and will aid in the stabilization and rehabilitation of this significant park structure. The project team has developed a thorough analysis of the structure's place within the context of Grand Teton National Park's history as well as identifying the relevance of the historical modifications from the earliest buildings to the present structural configuration.

The document defines the elements that give Snake River Land Company its architectural and historical character and help convey its significance. The contents of this Historic Structure Report (HSR) are:

- a concise historic context associated with the building;
- a chronology of building development including alterations and notes on maintenance;
- a re-evaluation of the period of significance, historic integrity, and historic significance of the structure;
- an evaluation of building conditions;
- a list of character-defining features;
- updated existing conditions photographs

The historical research portion of the report is based primarily on existing historical material at the Grand Teton National Park Archives and on other materials provided by NPS. Additional secondary research was conducted using materials within the libraries of The University of Wyoming and Colorado State University.. The level of research requested for this report was “thorough”—one of three levels of investigation (exhaustive, thorough, and limited) as directed by NPS Director’s Order #28. “Thorough” is defined by DO-28 as follows:

For historical studies this means research in selected published and documentary sources of known or presumed relevance that are readily accessible without extensive travel and that promise expeditious extraction of relevant data, interviewing all knowledgeable persons who are readily available, and presenting findings in no greater detail than required by the task directive.

Administrative Data

Historic Name: Snake River Land Company
 Common Name: Buffalo Dorm
 Park Structure Number: GRTE/HS-0117
 Location: UTM 12/539141E/4854482N

Cultural Resource Data

Snake River Land Company (Building #117) was individually listed in the National Register of Historic Places in 2006.

Section 2: Project Data

Client

National Park Service
Denver Service Center
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Denver, CO 25287

Grand Teton National Park
PO Drawer 170
Moose, WY 83012-0170

Consultants

Architectural Preservation Institute of Colorado State University, Fort Collins
Principal Investigator, Christopher Koziol, Assistant Professor and Director

Research, field work and subsequent analysis was conducted as a part of ongoing professional education. Participating faculty included:

- Janet Ore, Associate Professor of History, Colorado State University, Fort Collins
- Robert Ogle, Associate Professor and Director. Colorado Mountain College Historic Preservation Program, Leadville, CO
- Ron Anthony, Anthony and Associates

Students responsible for research, analysis and narrative presented here were:

Craig Bisonette, Fay Golson, Steve Harris, Melinda Lueck, Paul Malone

Acknowledgements

Sue Consolo-Murphy, Chief of Science and Resource Management, Grand Teton National Park
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Hank Harlow, Ph.D., Professor of Zoology and Physiology, University of WY
Alice Hart, Museum Curator, Grand Teton National Park
Jamie Schoen, Forest Archaeologist, Supervisor's Office Bridger-Teton N.F.
Craig Struble, Director, Western Center for Historic Preservation
Bob Williams, Supervisory Preservation Woodcrafter, Western Center for Historic Preservation

PART 1. DEVELOPMENTAL HISTORY

Section 3. Historical Background and Context

The Snake River Land Company Residence and Office (buildings #117, 121, 122) was the site of historically significant activities in the development of Grand Teton National Park. John Hogan constructed Building #117, circa 1927, as the principal building in the operation of a small dude ranch as well as a fox farm. The Blacksmith Shop (#121) was also constructed circa 1927. The Hogans sold the property to the Snake River Land Company in 1930. The Garage (#121) was constructed circa 1940. The Snake River Land Company used this property as a residence and office until 1942. During this timeframe, the Snake River Land Company operated as a covert administrative office affiliated with John D. Rockefeller Jr.. The building served as the —“headquarters of the SRLC” that acquired private lands for expansion of the Grand Teton National Park.

The National Register designation (National Register of Historic Places reference no. 99001036 / Smithsonian no. 48TE1155) begun in 1998 and certified on July 7, 2006 defines the registered property as consisting of three contributing and one non-contributing buildings on 0.87 acres (UTM 12/539141E/4854482N) near Moran, Wyoming.

The Snake River Land Company Residence and Office (#117) is the primary in-park, administrative entity associated with J.D. Rockefeller and his Snake River Land Company / Jackson Hole Preserve during the historic period and is therefore historically significant for its association with consolidation of private lands in Jackson Hole and with extension of Grand Teton National Park (criterion A; area of significance: conservation). (Other in-park resources associated with the SRLC include Elk Ranch and the Geraldine Lucas Homestead / Fabian Place.) Constructed as a private residence by well-to-do eastern politician John Hogan and refined by the Snake River Land Company, the residence is also a significant example of late-period vernacular architecture, as defined in the Grand Teton National Park Multiple Property Submission Settlement Context (criterion C). The interior is replete with historic finishes and contributes to the building's architectural significance. The property's period of significance extends from 1927, when Hogan constructed building #117, until the 1950 transfer of ownership and occupancy from the Jackson Hole Preserve to the National Park Service. In accordance with National Register guidelines, the primary residence -- from which the site derives its primary historical and architectural significance -- and the two secondary outbuildings are classified as a "building" rather than a district.¹

¹ Janene Caywood, Ann Hubber and Kathryn Schneid, —“National Register of Historic Places Registration Form: Snake River Land Co Nomination” United States Department of the Interior, National Park Service (2006): 5-6. Wyoming State Historic Preservation Office.

Snake River Land Company Residence and Office - Grand Teton N.P.

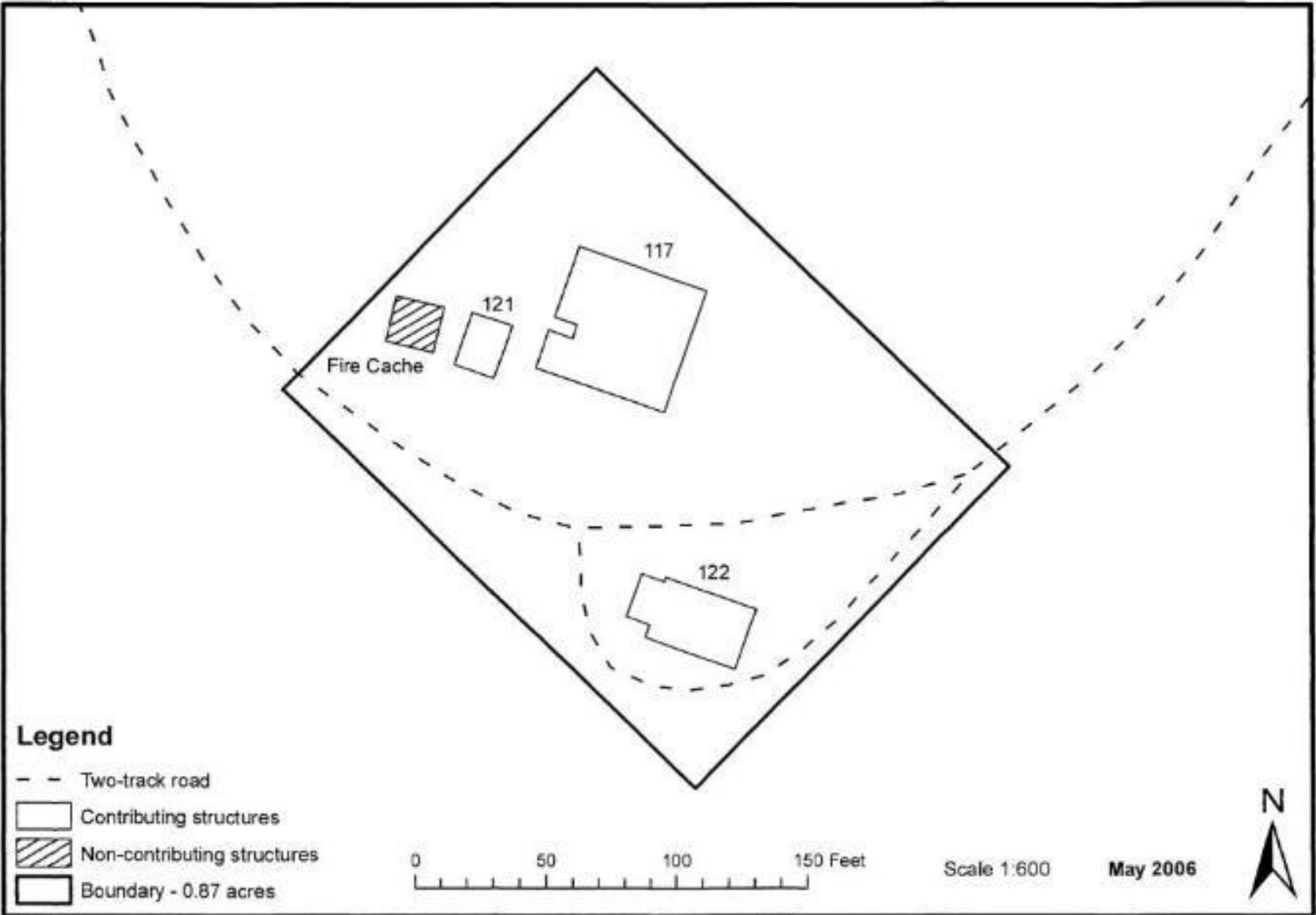


Figure 1 National Register boundary

The Snake River Land Company Residence and Office is related to the creation of Grand Teton National Park by virtue of the roles played by Snake River Land Company (SRLC) employees who used this property as a base of operation. The national park was established in 1929, but only included the mountain range and associated glacial lakes. Presidential proclamation was decreed in 1943 that added surrounding Teton National Forest that created Jackson Hole National Monument and stimulated ongoing public controversy. Coincident with this period the SRLC was acquiring property in the valley. Snake River Land Company Vice President Harold Fabian occupied building #117 from 1932 until 1945.² Immediately prior to this (1929-1933), SRLC foreman, J. Allan, also resided at this property. J. Allan's son, Samuel Allan, who spent his early childhood at the property was interviewed in 1996.

According to [Samuel] Allan, "the building was known as the Headquarters of the SRLC." During this period, the building housed meetings of the SRLC board of Directors: J. D. Rockefeller, Kenneth Chorley, Vanderbilt Webb, and Fabian. (Although SRLC ownership is a matter of record, this administrative use, as recounted by S. Allan, has not been verified in primary documentation.) Modifications associated with the SRLC's tenure include construction of the office addition, kitchen addition, and enclosure of the front porch (against which Josephine Fabian grew abundant flowering vines including, perhaps, the rigosa rose that remains).³

Between 1945 and 1950 the SRLC Residence and Office played a role in one relatively unsuccessful aspect of the park's development. John D. Rockefeller Jr. transferred roughly 30,000 acres of privately acquired land over to his son, Laurance on October 1, 1945. The SRLC was also reincorporated as the Jackson Hole Preserve, Inc.⁴ While the Jackson Hole Preserve Inc. was managing several enterprises in the valley, the one most closely associated with the SRLC property was the Jackson Hole Wildlife Park. Sonny Allen was the NPS ranger who resided in building #117 during this period. He administered the Jackson Hole Wildlife Park, which was officially dedicated in 1948. The lands of the Jackson Hole Wildlife Park were located at the Oxbow Bend of the Snake River one mile upstream of building #117. The wildlife park was a staged viewing area of big game for the public, and ostensibly a scientific research center, although its display of captive animals was widely criticized.⁵

² Historical Research Associates, Inc., "National Park Service Historic Building/Structure Survey Form" GRTE/HS-0122 (1997): 2-7. GTNP Archive: SRLC Complex – General File.

³ Janene Caywood, Ann Hubber and Kathryn Schneid, "National Register of Historic Places Registration Form: Snake River Land Co Nomination" United States Department of the Interior, National Park Service (2006). Wyoming State Historic Preservation Office.

⁴ Robert W. Righter, *Crucible for Conservation: The Struggle for Grand Teton National Park* (Moose, Grand Teton Natural History Association, 2006), 131.

⁵ Robert W. Righter, *Crucible for Conservation: The Struggle for Grand Teton National Park* (Moose, Grand Teton Natural History Association, 2006), 131.

The Rockefeller lands were privately retained until December 16, 1949, when the Grand Teton National Park expansion was ratified. Rockefeller officially donated land to the National Park Service on September 14, 1950 forming the newly expanded and united Grand Teton National Park.⁶ The historical background and context establishes the period of significance for the Snake River Land Company buildings as 1927 through 1950. The areas of significance include both conservation and architecture; conservation due to the donation of private lands that formed Grand Teton National Park, and in the case of building #117 architecture, as this particular building demonstrates late period rustic vernacular architecture.⁷ The official national Register period of significance thus ends with the transfer in 1950.

The Jackson Hole Wildlife Park was unsuccessful and the National Park Service abandoned the wildlife display in 1953. The complex was relinquished to the University of Wyoming in conjunction with the New York Zoological Society. Together they formed the Jackson Hole Biological Station.⁸ The station operated at this location until the summer of 1978. The partnership between the University of Wyoming and the New York Zoological Society terminated and the University of Wyoming relocated to the present location at the AMK ranch on Jackson Lake.

⁶ Creation of Grand Teton National Park (Thumbnail History) Official Website for Grand Teton National Park's 50th Anniversary <http://www.nps.gov/archive/grte/cult/50th/history.shtml> (accessed 5/15/2007).

⁷ Janene Caywood, Ann Hubber and Kathryn Schneid, —National Register of Historic Places Registration Form: Snake River Land Co Nomination” United States Department of the Interior, National Park Service (2006): 5-6. Wyoming State Historic Preservation Office.

⁸ Robert W. Righter, *Crucible for Conservation: The Struggle for Grand Teton National Park* (Moose, Grand Teton Natural History Association, 2006), 147.

Section 4. Chronology of Development and Use

John Hogan developed the area that today constitutes the SLRC Residence and Office for use as a small dude ranch as well as a fox farm in circa 1927. He constructed building #117 as his private residence in 1927. The log building was well crafted and the exterior of the building incorporated numerous unique features. The interior was graced with crafted details and an efficient floor plan.



Figure 2 Building #121

As a part of the original complex a blacksmith shop (#121) and several non-extant buildings that included four guest cabins, an icehouse and a barn were built during the pre SRLC period.⁹ The exterior appearance of building #121 is largely unchanged from the period of its construction.

The Snake River Land Company purchased the property in 1930 and likely completed early additions to the original Hogan residence.¹⁰ Two historic photos document the early changes the building underwent, but it is not clear if the changes occurred during the tenure of the Snake River Land Company or pre-date it.¹¹ Onsite investigation of construction joints and other physical evidence suggests building #117 underwent two notable additions: the one forming the kitchen and the other, bedroom #2. However, specific records dating these have not been located. The Snake River Land Company modified the original open air front porch into a glass enclosed porch ca.1940.¹² Circa 1980 a small frame —~~sed~~” with horizontal imitation half-log siding was added to the northeast corner of the central block.

⁹ Janene Caywood, Ann Hubber and Kathryn Schneid, —National Register of Historic Places Registration Form: Snake River Land Co Nomination” United States Department of the Interior, National Park Service (2006): 5-6. Wyoming State Historic Preservation Office.

¹⁰ Janene Caywood, Ann Hubber and Kathryn Schneid, —National Register of Historic Places Registration Form: Snake River Land Co Nomination” United States Department of the Interior, National Park Service (2006): 5-6. Wyoming State Historic Preservation Office.

¹¹ GRTE archives: —@ House Phc **Figure 3 Building #117 additions** 1930, Jenny Lake 1935, 1936”.

¹² Historical Research Associates, Inc., —National Park Service Historic Building/Structure Survey Form” GRTE/0117 (date?): 2 &7. GTNP Archive: SRLC Complex – General File.

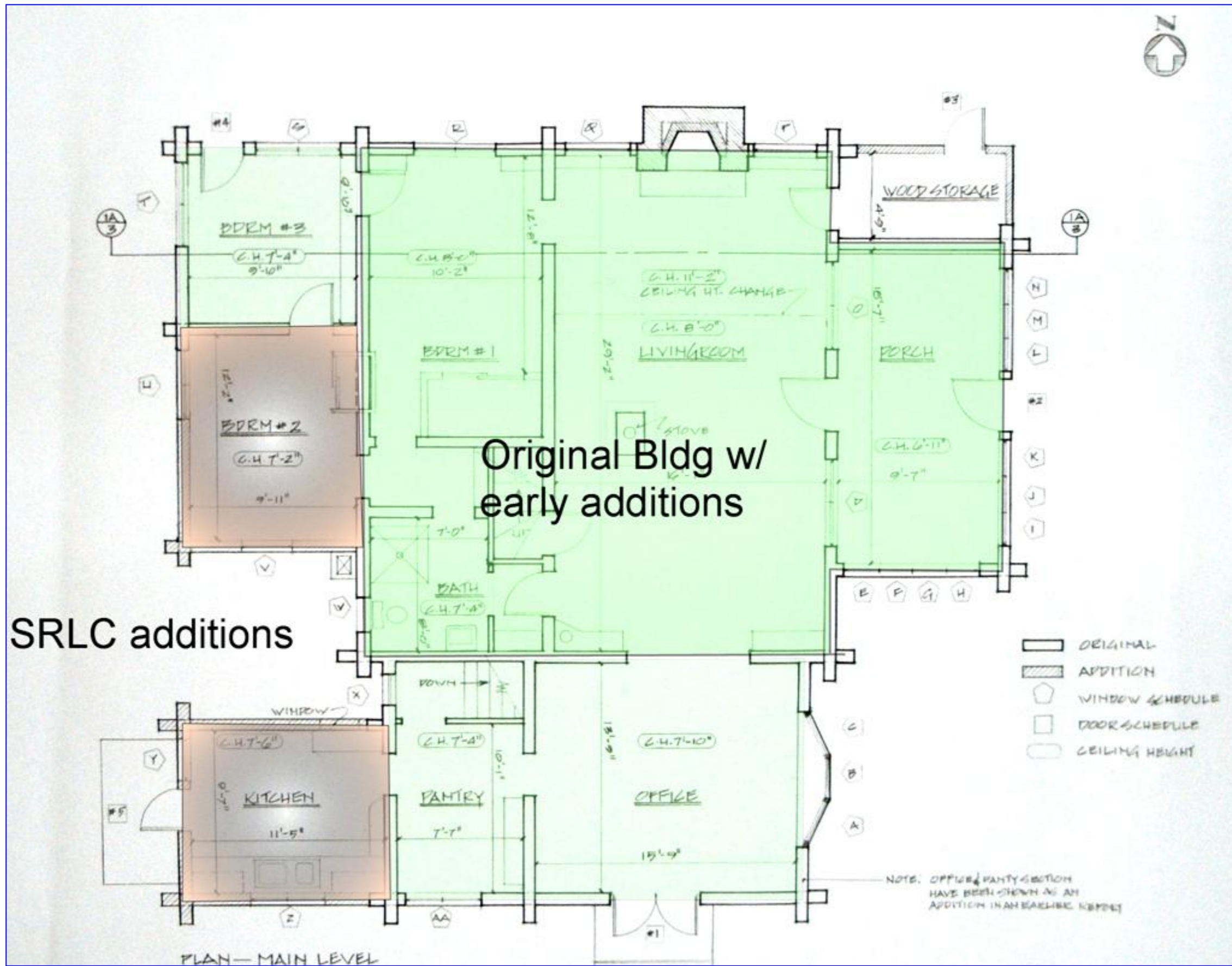




Figure 4 West side of #117 ca. 1930s showing all additions to this side were already in place

Building #117 operated as a National Park Service administrative site named Buffalo Fork Ranger Station from 1978 until 1982. The National Park Service refinished the sunroom/porch ca.1980 as an auxiliary bedroom.¹³ The building was renamed Buffalo Dorm while used for National Park Service housing until 1992 when it was deemed unsuitable living.¹⁴

¹³ Historical Research Associates, Inc., —National Park Service Historic Building/Structure Survey Form” GRTE/0117 (date?): 2 &7. GTNP Archive: SRLC Complex – General File.

¹⁴ Personal Interview May 23rd, 2007 with Marty Meyer NPS river ranger who resided at Buffalo Dorm



Figure 5 East side of #117 ca. 1930s showing absence of glass enclosed porch

An auxiliary building (#122) associated with the primary residence is a two bay log garage constructed in ca. 1940.¹⁵ The garage was constructed of square notched logs that were unique to the existing complex. Building #122 was designed with two distinctive bays providing a garage and a workshop. This structure appears to have undergone a number of subsequent changes, including modifications to the garage doors. These changes may have occurred during the 1978 to 1982 period. The building remains in use today as an auxiliary ranger station and the river ranger storage cache.



Figure 6 Building #122 (photo taken 2006)

¹⁵ Historical Research Associates, Inc., —National Park Service Historic Building/Structure Survey Form” GRTE/HS-0122 (1997): 2-7. GTNP Archive: SRLC Complex – General File.

Section 5. Physical Description

The Snake River Land Company Office and Residence —building” consists of three individual buildings (buildings #117, #121, #122) that have contributed to the National Register designation. (A small structure referred to as the Fire Cache just west of #121 is of later construction (ca. 1968) and considered non-contributing.) This historic structure report (HSR) focuses on building #117, as this has been identified in the National Register nomination as the most significant building in the complex. However, #121 and #122 are photographically documented for context.

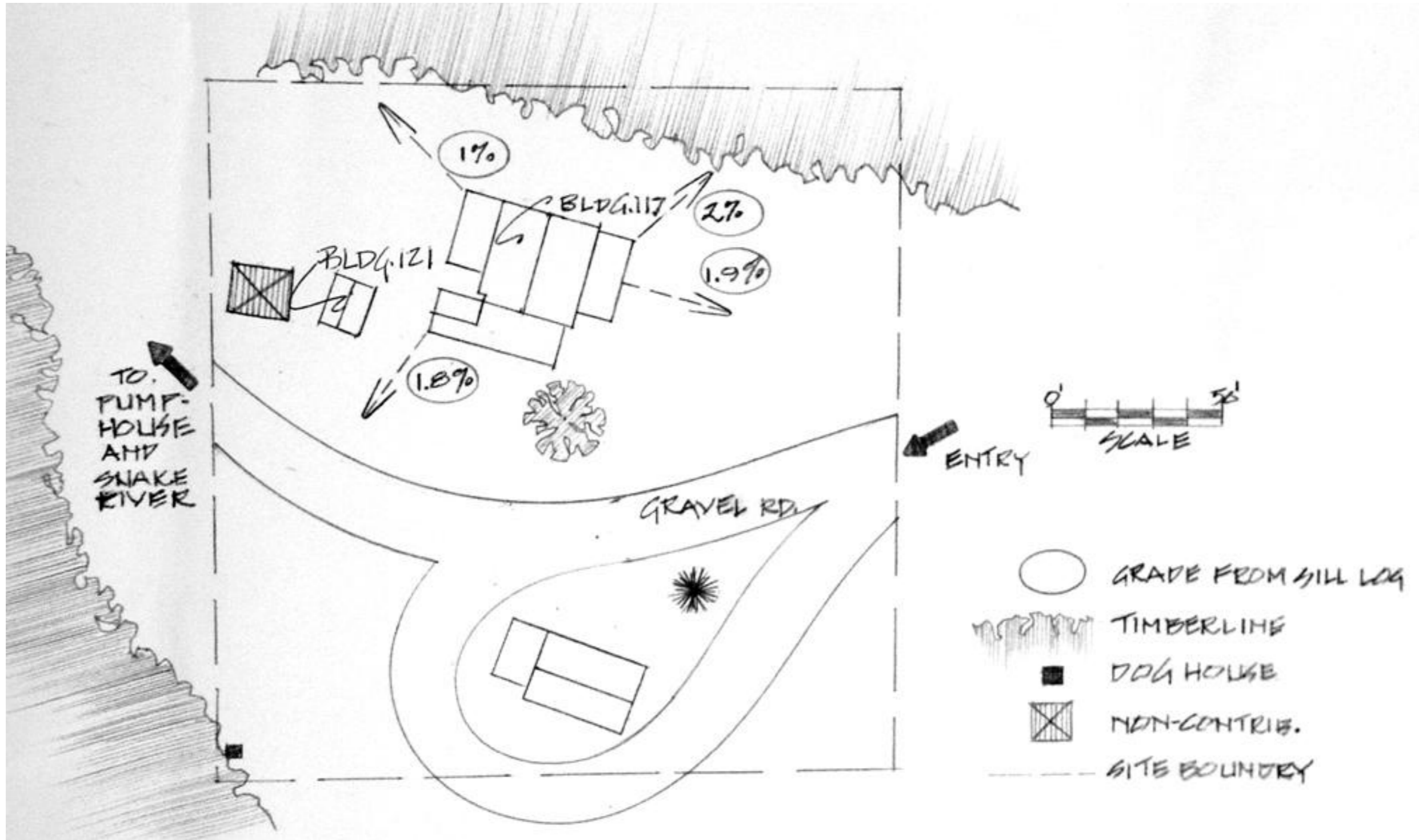


Figure 7 Site plan

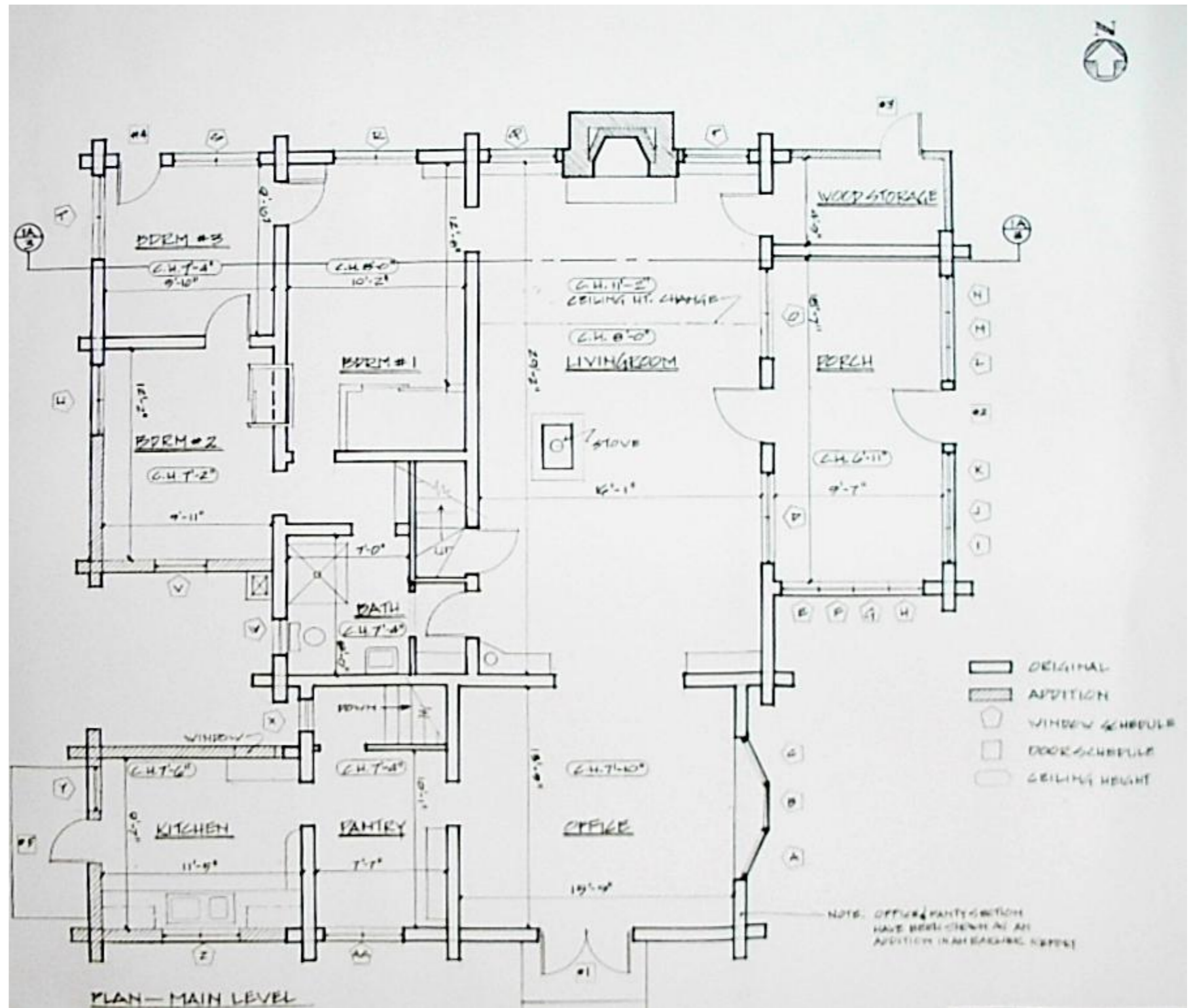


Figure 8 Building #117 first floor plan

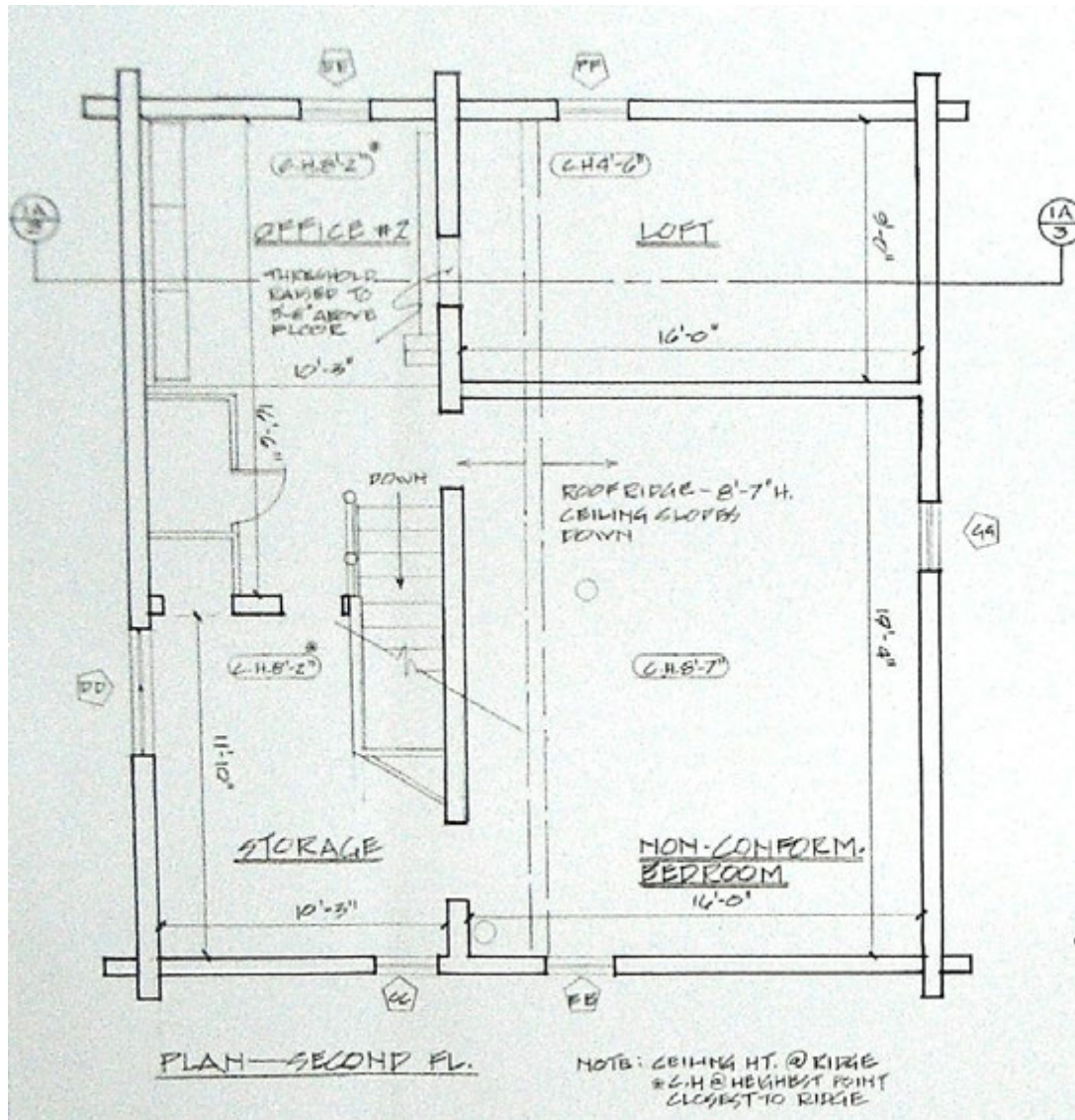


Figure 9 Building #117 second floor plan

Building #117 is a one and one-half story log building in the Rustic Style. The building is located approximately 200 yards southeast of the Moran Jct. entrance gate along the north bank of the Snake River. Building #117 saw several early additions. The original construction consists of rectangular central block with gable roof with a one-story shed roofed wing on the northwest corner and a one-story open-air porch with shed roof on the east side. Later a one-story gabled wing was constructed onto the west wall of this addition. Around the same time the original northwest wing was extended to the south.



Figure 10 Building #117 northwest corner

Building #117 is of irregular shape sitting on a concrete foundation. The logs are joined at the corners with ventral saddle-notches and the log ends were cut flush during construction. The exterior daubing seems to be cement-based and supported by lath stops. The logs of all components have been treated with brown stain and all trim is painted dark brown. The roof is covered with green rolled-asphalt roofing and has wide overhanging eaves with exposed purlins.

Three chimneys extend from the ridge of the main gable roof; two terra cotta flues on the south end and a round metal stovepipe with hood rises from the center. On the west wall a square concrete block chimney ascends between the two additions. Dominating the south elevation is a large exterior irregularly-coursed stone chimney that incorporates a variety of rocks including: tabular sandstone, round river cobble, and even large pieces of petrified wood. Extending from the top of the chimney are two square terra cotta flues covered by a metal hood. The majority of the windows on the first floor are six-by-six-light sliding windows (six-over-six-light double-hung sash windows hung horizontally). A characteristic bay window with three six-light fixed sashes hangs in the south end of the east elevation. A variety of other windows styles including casement, awning, and two fixed —picture” windows can also be found throughout the building.

There are four entries into building #117, one on each elevation. (There is also a vertical plank access door into the northeast 1980 —~~sed~~” addition.) The distinguishing feature of the south elevation is the entry with double two-light by six-light French doors. An entry in this location is visible in the 1930s photograph, but appears to be different from what is there today. The entry on the east elevation is a wooden door with three small rectangular windows in the upper portion and a full length screen door on the exterior. This porch was enclosed in 1940 and made into a bedroom in 1980. This door probably dates from the later period. A solid five-panel door secures the entrance into the northwest wing. This door appears to date from the period of significance. A three-panel door with single light and an exterior door with screened upper enclose the entrance to the kitchen on the southwest side. A small porch supported by two wood poles covers the entrance to the kitchen. This door appears to date from an earlier period.

The interior living space is divided into thirteen rooms, nine on the first floor and four on the second floor, a finished basement on the south end and a crawl space under the central block. The interior walls are of the same log construction and the surfaces have been finished with oil. The chinking, with the exception of the office, is cement with willow stops and the office is sealed with split pole chinking. The majority of the floors on the ground level consist of three and a quarter inch fir flooring. The kitchen and pantry have patterned rolled linoleum and the bathroom has modern vinyl flooring. Solid five-panel doors are typical throughout Building #117 and several have been removed and are currently stored in the pantry.

The south entrance leads into the office (where there are currently French doors) and a bay window is set into the east wall. To the west of the office is the kitchen and pantry. To the north through a wide door-less entry is the main living space dominated by a large stone fireplace on the north wall. A cast iron wood burning stove is centered in the room toward the west wall. The ceilings are

exposed log beams with white painted tongue-and-groove infill. The ceiling in the vicinity of the fireplace is higher and finished with full poles instead of boards. Hanging above the fireplace are three stuffed game heads and a metal chandelier is suspended from the ceiling. Flanking the fireplace are two built-in cases/shelves along the floor and two large fixed picture windows above. Bookcases that extend from floor to ceiling were also built on either side of the entry between the office and living room. On the east wall of the living room are two six-by-six light sliders and a ten-light door that open into the enclosed porch. The porch was refinished sometime in the 1980's and features oak flooring and wide knotty pine paneling. The porch was enclosed with ten 6-light fixed windows. Three bedrooms and the bathroom complete the northwest corner of the building.

The stairs open to a second story landing. Immediately to the right is a large storage loft/bedroom and to the north is a small loft above the raised ceiling of the living room. A room once used as a bedroom in the southwest corner completes the upstairs. The floors are five inch pine flooring and the walls are of the same log construction with cement chinking and willow stops. The ceilings are exposed purlins and wood planks that follow the roofline.





Fig. 11 - South Elevation



Fig. 12 - East Elevation

Fig. 13 - North Elevation

Fig. 14 - West Elevation

Fig. 15 - Northeast Corner

Fig. 16 - Northwest Corner

Fig. 17 – Blacksmith Shop (Building #121)

Fig. 18 – Garage (Building #122)



Fig. 20 – Detail of lower Chimney



Fig. 19
Chimney

replace

Fig. 23 – Living Room into Office



Fig. 24 – French Doors in Office



Fig. 25 – Upstairs Landings

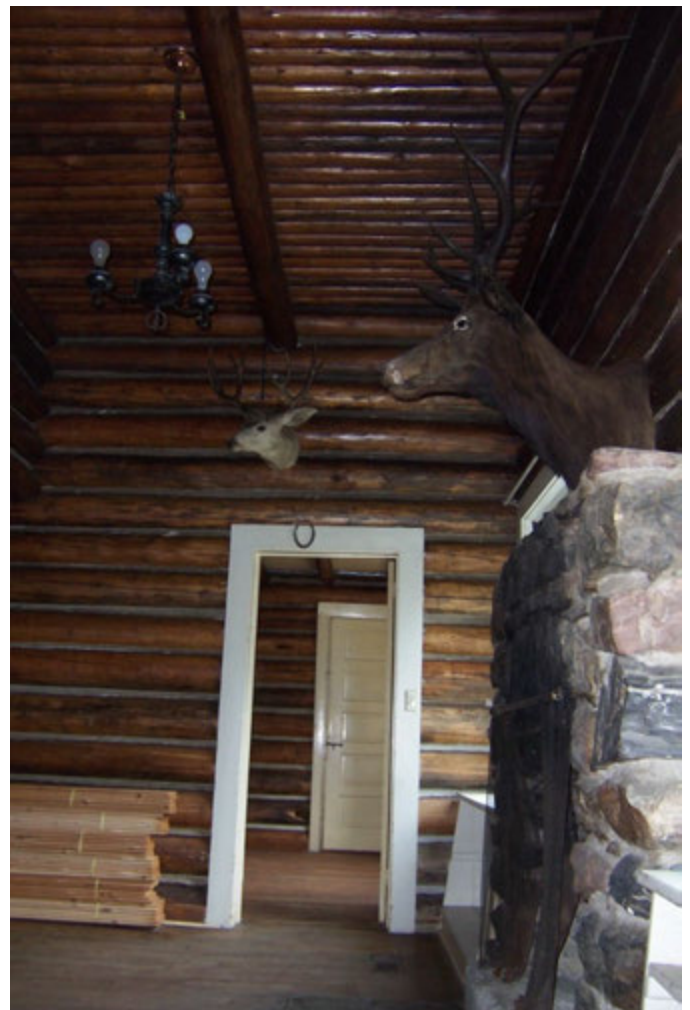


Fig. 26 – Raised Ceiling in Living Room

Section 6. Evaluation of Significance

The significance of the Snake River Land Company Residence and Office is established in National Register nomination prepared and submitted May 2006 (certified July 2006).

Applicable national Register Criteria:	A, C
Areas of Significance:	Conservation, Architecture
Period of Significance:	1927-1950

The Snake River Land Company Residence and Office (#117) is the primary in-park, administrative entity associated with J.D. Rockefeller and his Snake River Land Company/Jackson Hole Preserve during the historic period and is therefore historically significant for its association with consolidation of private lands in Jackson Hole and with extension of Grand Teton National Park (criterion A; area of significance: conservation). (Other in park resources associated with the SRLC include Elk Ranch and the Geraldine Lucas Homestead/Fabian Place.) Constructed as a private residence by well-to-do eastern politician John Hogan and refined by the Snake River Land Company, the residence is also a significant example of late-period vernacular architecture, as defined in the Grand Teton National Park Multiple Property Submission Settlement Context (criterion C). The interior is replete with historic finishes and contributes to the building's architectural significance. The property's period of significance extends from 1927, when Hogan constructed building #117, until the 1950 transfer of ownership and occupancy from the Jackson Hole Preserve to the National Park Service. In accordance with National Register guidelines, the primary residence -- from which the site derives its primary historical and architectural significance -- and the two secondary outbuildings are classified as a "building" rather than a district.

Retired eastern politician John Hogan purchased the William Carter homestead in 1926 and developed the site as a fox farm and small-scale guest ranch. Improvements included the primary residence (#117), a blacksmith shop (# 12 I), four guest cabins (non-extant), an ice house (non-extant), and a barn (non-extant).

The Snake River Land Company purchased the Hogan ranch in 1930. Samuel Allan, who spent his early childhood at the site, reports that between 1929 and 1945, SRLC foreman J. Allan (1929-1933) and SRLC Vice President Harold Fabian (1932-1945) resided in the primary residence and from this base managed the use and development of the SRLC's Jackson Hole properties. According to Allan, "the building was known as the Headquarters of the SRLC." During this period, the building housed meetings of the SRLC board of Directors: J. D. Rockefeller, Kenneth Chorley, Vanderbilt Webb, and Fabian. (Although SRLC ownership is a matter of record, this administrative use, as recounted by S. Allan, has not been verified in primary documentation.) Modifications associated with the SRLC's tenure include construction of the office addition, kitchen addition, and enclosure of the front porch (against which Josephine Fabian grew abundant flowering vines including, perhaps, the rigosa rose that remains). Ca. 1940, the SRLC also constructed the two-bay log garage that currently serves as the NPS river cache (#122). In 1945, when Harold and Josephine Fabian relocated to the Geraldine Lucas Homestead on the west site of the park, the Jackson Hole Preserve (JHP), corporate heir of the Snake River Land Co., converted the site to the primary residence for Sonny Allen (no relation to T. Allan), who administered the JHP's Jackson Hole Wildlife Park located one-mile southwest of the complex, at the Snake River's Ox Bow Bend." The complex served most recently as an NPS dormitory and administrative site (named Buffalo Dormitory or the Buffalo Forks Ranger Station in reference to its proximity to the Buffalo Fork of the Snake River). The secondary buildings remain in use while the residence has been abandoned.

Section 7 Condition Assessment

The purpose of this section is to evaluate elements, features and spaces in terms of their existing condition, current state of repair, and integrity, utilizing the following terms:

Good Condition:

*It is intact, structurally sound, and performing its intended purpose.
There are few or no cosmetic imperfections.
It needs no repair and only minor or routine maintenance.*

Fair Condition:

*There are early signs of wear, failure, or deterioration, although the feature or element is generally structurally sound and performing its intended purpose.
There is failure of a subcomponent of the feature or element.
Replacement of up to 25 percent of the feature or element is required.
Replacement of a defective subcomponent of the feature or element is required.*

Poor Condition:

*It is no longer performing its intended purpose.
It is missing.
It shows signs of imminent failure or breakdown.
Deterioration or damage affects more than 25 percent of the feature or element and cannot be adjusted or repaired.
It requires major repair or replacement.*

Building 117 is in overall **fair** condition. This assessment covers a broad range of the building components from the foundation to the finishes. Some areas are discussed in more detail while others are brief. Some areas are identified that a professional in that field should inspect prior to occupancy or final design criteria are determined.

Foundation:

The original structure sits on a perimeter concrete poured foundation with pier and beam infill structure. The wood joists are 2x8s, spanning from the concrete foundation wall to 6x6 beams resting on piers (see 1st floor framing plan). Identified here is one concern in which a 6x6 beam is not full bearing on the timber pier.

- The 6x6 beam should be bearing fully on the current timber pier. Either an additional concrete pier can be poured under the beam or the beam can be placed back on the timber pier. A structural

engineer should be consulted to help identify the proper solution including the pier size and depth.

Overall the foundation can be considered to be in **fair** condition, however certain areas (identified below) are **poor**.



Figure 27 Improperly bearing beam

One concern in the basement and around the foundation is the evidence of damp and efflorescence on the foundation wall both in the cellar and the crawl space. There are a several reasons for this.

- Improve drainage
 - Grade away from structure. Typical practice requires a minimum of 2%, which is $\frac{1}{4}$ inch per foot.
 - Consider the use of a swale around the structure or the use of French drains that drain away from the structure and into a lower lying area.



Figure 28 Evidence of damp



Figure 29 Evidence of Efflorescence

While moisture is of some concern in the basement areas, it is in those parts of the building which are without proper foundations that are the most problematic. This is particularly true in the northwest corner of the building under bedroom #3 and the adjacent bedroom #2 addition. Bedroom #3 may have originally been an enclosed entry porch and bedroom #2 appears to be an early addition. Neither bedrooms #2 and #3 have the same crawl space foundation



Figure 30 Negative drainage at bedroom 3 (Northwest Corner)

system as the original structure. There is an eighteen-inch concrete wall around the perimeter of this part of the structure supporting the log walls. The southwest corner of the concrete foundation has experienced significant freeze and thaw action causing the foundation to crack and settle in this corner. One can see the settling of the structure and roof system here as well. This part of the foundation is in **poor** condition. Corrective measure should be taken:

- Underpin the foundation extending it to a depth below frost line to prevent further freeze and thaw action.



Figure 31 Bedroom 2 foundation freeze and thaw action and cracks

Framing/Log Structure:

In reporting the assessment of the condition of the wood framing and log elements the building can be divided into two areas: the west side bedrooms, #2 and #3; and the main body of the house. The condition of the west side bedrooms is **poor**, the condition of all other areas is **fair**.

The West Bedrooms (#2 and #3)

The drainage problems cited above have also caused rot in the sill logs of the structure in a few areas. The principal area of concern is the west bedrooms, #2 and #3 (northwest corner). The floor system here is comprised of log sleepers that sit on the ground with the sub floor nailed perpendicular to the logs. The floor covering is then nailed parallel to the log sleepers. On the exterior north side there is a small earthen berm that naturally over time has developed and is not allowing water and snow to drain away from the structure but is actually draining water under the sill log and into the floor system of the bedroom. Due to this there is significant rot in the log sleepers of this floor system. The sill log of the north exterior log is also deteriorated to the point of needing replacement. Again here the drainage needs corrected to allow water to drain away from the foundation and structure.

The corrective measures for the floor system:

- Create a crawl space foundation with the floor joists elevated off the dirt.
- The crawl space should then be properly ventilated to allow any moisture that does get under the floor system to dry out.



Figure 32 Rotting log sleepers and sub floor in Bedroom #3

The upper three logs on the west wall of bedroom #3 have sustained considerable rot. There is evidence from a roof leak that has been corrected but



Figure 34 Bedroom #3 west wall – resistance drilling sample locations #2-6

the rot has deteriorated the logs to the point requiring replacement. Ron Anthony of Anthony and Associates completed several resistance drillings of the top three logs on the west elevation and determined that more than 50% of these logs were rotted with void inside. Maybe the most critical area here is the significant rot in the saddle notches as well. These logs should be replaced in kind. Ron Anthony has identified these logs as lodgepole pine.

The log wall-separating bedroom two and three has experienced significant rot on the top three logs as well from a previous roof leak. The main area of concern here are the saddle notches. Ron Anthony again did resistance



Figure 35 Bedroom 3 saddle notch rot – Resistance drilling #15

drilling on the top three logs in both the saddle notch and the logs extending east inside the building. Resistance drilling number seven indicates a mostly void area in the log inside the building and drilling number fifteen indicates the third log from the top is mostly voids but the log immediately under (fourth from the top) resistance drilling number fourteen indicates only a 1/2" void.

Due to the significant rot in these logs and the fact they are a part of a corner detail,

- These logs need to be replaced.

On another note we observed the ceiling in this room has been dropped and originally the ceiling was vaulted with exposed purlins. The walls as well have been furred out with sheetrock covering the walls and dropped ceiling.

Immediately south of bedroom #3 is bedroom #2. This addition has the same foundation type as Bedroom #3; an eighteen-inch foundation wall with sill and spandrel logs resting on it. The floor system is log sleepers with sub floor and wearing surface as well.

- The floor system should be elevated off the dirt as in bedroom three.



Figure 36 Log walls furred and sheetrock covering

The roof system of bedroom #2 is in principal the same as the rest of the structure, log purlins running from gable ends with 2x4 rafters bearing wall to ridge across the purlins. However, there are two problems with the roof system on this addition. First the purlins are butted into and toe nailed to the original roof overhang of Bedroom #3.

These purlins need to bear on a load-bearing wall and span the whole room. We can see the roof sagging here because they don't

currently span the entire length of the room. The 2x4 rafters are only supporting the roof here.

- Structural engineer should inspect and make a recommendation on corrective action and proper loading.

The second area of concern in this roof system is again with the purlins. The bearing point on the outside south wall has



Figure 37

Bedroom #2-purlin butt connection Bedroom #2 purlin rot – Resistance Drill #1

significant rot. Ron Anthony identified a 50% void in the bearing point with the use of resistance drilling here as well. On the outside of these purlins we can see where the overhang has been cut back due to rot on the ends of the purlin at a previous date.

- Replacement of these purlins is critical to maintain the integrity of the roof system.

On a minor note we observed a replacement log on the west elevation



Figure 38 Bedroom #2 purlin rot at bearing point

southernmost top log. This log is of poor replacement quality, as it does not seem to match the existing logs. It should be replaced with log of same species and quality. We observed the same dropped ceiling and furred walls with sheetrock on the walls and ceiling as noted in bedroom three.

Main body of the house and other appendages

Unlike the west bedroom wing the structural wooden elements elsewhere are either in **fair** or **good** condition. The following section addresses some minor deficiencies.

Wood elements associated with **bedroom #1** are in **good** condition. The only concern here is the west wall has either subsided or the floor structure has heaved. It is roughly one inch out of plumb. This is causing the door between Bedrooms #1 and #3 to not open. Further investigation is required to determine the ultimate cause.



Figure 39 Bedroom #1 floor heaving

The **east porch** was enclosed circa 1933. In 1986 the **porch** was rehabbed to include the current tongue and groove pine paneling seen on the walls as well as the pine ceiling with battens. The only issue with this part of the structure is the foundation and sill log. It was originally designed as an open porch. The foundation was a dry stacked stone that supported only a sill log running the north and south direction of the eastern

most point of the building. The spandrel logs bear on the sill log only. The foundation seems to be in stable condition although it is recommended to provide a foundation below frost depth at this area. Because of overgrowth of vegetation and poor drainage the sill log has deteriorated to the point of needing complete

replacement. Again this is not a major issue but needs to be corrected to support the roof structure and walls properly.

- Drainage in this area needs to be corrected as well to fix any current and future rot and water intrusion problems.
- The floor system here seems to match bedrooms two and three with wood sleepers in direct contact with dirt with a sub floor over it. Again this should be corrected to ensure a long lasting rot free floor system.

The **east porch** is in **fair** condition.



Figure 40

East porch dry-stacked rock foundation,
Deteriorated sill log



Furniture impeding proper drainage

The **utility room and office** also appear to be additions, although it is unclear as to whether they pre-date the SRLC period. Unlike the other additions these are on a poured concrete foundation with a floor system consisting of wood 2x8 wood joists bearing on the concrete foundation walls. The office is a cellar type where as the rest of this foundation system is a crawl space. The concrete foundation is in **good condition** as is the floor joist structure. The log walls on the portion of the structure are also in **good** condition. The kitchen structure is related but seems to be added later. It is **good** condition with no major deficiencies or evidence of repairs apparent.

The floor system as well as the log walls are in **good** condition. However, we have observed a replacement log has been installed on the south elevation, eastern most upper log. The log is not of matching quality and it is recommended to be replaced with a log of equal quality, looks, and species. We did observe that the **office** addition seems to have originally had a vaulted ceiling with exposed purlins, as does the rest of the structure. It currently has a dropped ceiling with vermiculite insulation in the attic space. The utility addition lies between the kitchen and office addition and is under the same roof structure as

the office. The ceiling appears to have been dropped and walls furred and sheet rocked as well.



Figure 41

Original vaulted ceiling above office

Replacement log at office

In summary, the log structure itself is in **good** condition. However, there are a few areas of concern in which the logs do need replacement. On another but related note, we observed some structural concerns that should be further addressed by a structural engineer.

- One is the roof system consisting of the log purlins with 2x4 rafters spanning from wall to ridge and bearing on the purlins. Snow loads can be huge especially in the Teton area and the 3:12 roof pitch does not shed snow effectively.
- Another area of concern is the loft living space. Depending on the use, the floor system may not be adequate to support a living area and or storage area. There are log joists supporting this area and they are spaced at forty-eight inch centers.



There are several ways to correct this such as a steel flint plate down the middle of the log floor joist. Again a structural engineer will need to inspect and design the corrections to be made in these two areas.

Figure 42

Original vaulted ceiling above office, Vermiculite insulation in attic

Roofing:

The roofing components are the most important for the protection of the structure from weather. Some roofing components are in **fair** condition and other are in **poor** condition.

Some recent work has been done to the roof on bedrooms #2 and #3 and the kitchen, utility, and office additions. The roofing material in this area is a standard rolled roofing material and is in **fair** condition. The flashing in these areas seems to be in stable condition. The area of immediate concern here is that another fascia board has been nailed on over the rolled roofing helping hold the rolled roofing over the fascia. While it helps hold the roofing over the fascia it is causing rot on this fascia as well as not allowing the water to drip off the roof as intended.

- These fascia boards should be removed to allow the roof to shed water properly. The rolled roofing lapped over the fascia is a way to help protect the original fascia but is not historically correct for the building.

The main structure roof as well as the enclosed porch on the east elevation roofs are deteriorating

- Replacement as soon as possible to ensure the structure from further problems associated with water infiltration.

This part of the structure has four layers of roofing materials and they are in **poor** condition. The major point of deterioration here is the flashing around roof penetrations and especially the fireplace.

- All layers of roofing should be removed and the roof decking and 2x4 rafters inspected for rot and replaced as needed. Each penetration shall then be flashed properly including the fireplace. This will ensure no water leaking into the structure.



Figure 43
Fascia rotting and roofing not covering



Flashing deteriorating at cinder block flue



Figure 44
Rolled roofing w/ fascia covering flue



Flashing deteriorating at cinder block



Figure 45
Rolled roofing covering fascia



Layers of rolled roofing deteriorating



Figure 46
Flashing deterioration at fireplace



Rolled roofing covering fascia

Exterior Components:

Overall the exterior of the building is in **fair** condition. The windows are in **fair** condition and need work to be made operable and continue to stay watertight. Many appear to be replacements made subsequent to the SRLC era.

- The majority of the windows need reglazing and there are a few windowpanes that are broken or missing.
- The windows should be sanded down and repainted as well.
- Some are missing hardware and should be replaced. The windows were designed to have a removable storm window or screen depending on the season. The majority of storm windows are in place or onsite. There are quite a few screens in the basement as well.
- These should all be re-screened, sanded, and painted as well.
- The hardware may need replacing as well but these are a valuable asset to the building and the efficiency and keeping rain and snow out.
- The windows, storm windows, and screens should all be inspected in more depth and replace missing screens and storm windows.

The exterior doors are in **fair** to condition.

- The hardware needs replaced on most.
- Doors should be sanded and repainted.
- Provide weather-stripping to ensure watertight seal against weather. There is no weather-stripping on any door.



Figure 47
Window with fully intact storm window



East porch enclosure with windows and door

The next main area that needs to be addressed is the daubing of the exterior logs. The original material was a masonry type material with a willow stop. Much of the daubing is deteriorating. Hence, it is considered in **poor** condition. Daubing is often considered a mid-range maintenance issue.

- Loose daubing should be identified throughout the entire structure,
- removed, and those areas re-daubed.



Figure 48
Daubing Deterioration



Daubing Deterioration 2

Another feature of note is the fireplace. It appears as though the foundation under the fireplace is settling on the north edge of the foundation, thus causing the fireplace to pull away from the log structure. There are large identifiable gaps between the masonry and log structure, which will also lead to

water infiltration. This feature is in **fair** condition, as it is in need of attention, but is not damaged to an extreme.

- The foundation of the fireplace should be stabilized and the gaps filled with an appropriate product. The fireplace is also seeing deterioration in the mortar at the top. There are noticeable amounts of mortar falling out.
- Repointing is recommended.



Figure 49

Fireplace pulling away from log structure Fireplace mortar deterioration

The original fascia and sub fascia as well as the soffit material seem to be in **good** condition.

- This should be inspected further at the time of roofing replacement and any rotted material replaced prior to roofing.



Figure 50

South porch deterioration

- The entire exterior needs to be refinished to help seal the logs and wood against further deterioration.

There are two exterior stoops that are both in **poor** condition. The west stoop off the kitchen has a joist system that sits on the ground and being in contact with the ground is subject to rot. The porch columns holding up the shed roof over the stoop are rotting at the base.

- These should be

replaced in kind.

The south stoop off the office is in worse condition than the kitchen porch. We can see a third decking material on the joists.

- Again this porch needs to be replaced and the original decking material matched.

Systems:

The HVAC system in this building is dated, in **poor** condition and needs replacement. The furnace is an oil burning forced air unit.

- This should be updated to a modern energy efficient furnace.

The existing ductwork is rusting, and taped with asbestos at the seams.

- Abate asbestos
- Replace furnace / mechanical system

There is also no supply ducts to the loft area, right now it is designed to be heated from the warm air naturally radiating up and there is one transfer grill in the floor. There is no exhaust fan in the bathroom to provide ventilation. The kitchen also has no external ventilation hood for cooking. The east enclosed porch has a stand-alone wall unit that is missing a flue cap. The flue is located in such an area that water run off from the upper roof pours in the flue and is rusting out the stand alone wall unit.

- This unit and the flue need to be replaced.

There is a wood stove in the living room with a flue that extends through the nonconforming bedroom above. The flue here is also suspect to rust and may need replacement as well. A concern here is if the area we labeled as a nonconforming bedroom is used as living space, caution should be taken for the temperature of the flue. A mechanical engineer should be consulted to design a proper HVAC system for this building that includes proper heating and ventilation.



Figure 51
HVAC duct rusting



HVAC duct rusting 2



Figure 52
Oil burning furnace



HVAC duct joint



Figure 53
Wall heater in east enclosed porch



Wood burning stove

The plumbing system is in **poor** condition will need to be replaced as well. The water supply lines are of galvanized steel and are rusting at the thread joints. The waste lines are cast iron as well as some abs plastic. It is assumed as well that the cast iron has deteriorated over time and is in need of replacement as well. The bathroom has been updated and all fixtures seem to be in working order, although it is not known because the water is turned off to the building. The hot water heater is electric and is dated and it is recommended that it be replaced as well.

- The plumbing systems should all be updated and a mechanical engineer or professional should further inspect the systems and make further recommendations.

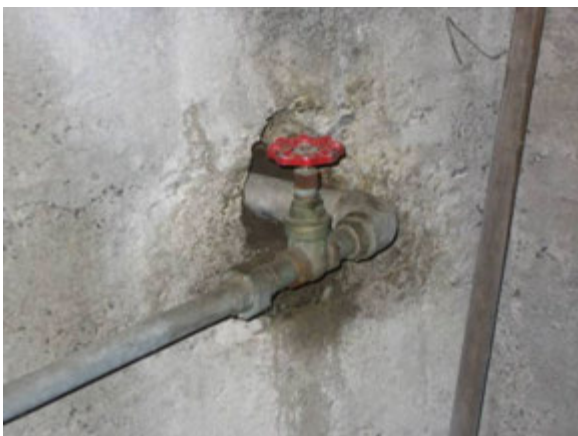


Figure 54
Galvanized water supply and shut off valve



Rust at galvanized water pipe joint



Figure 55
Electric water heater

The electrical system has been updated with copper wiring, new panel, and most outlets seem to be grounded as well. The concerns here are code issues. A good portion of the wiring inside is stapled to the logs and exposed. There is also evidence in the basement and crawl space of rodents chewing on wires with bare wires exposed.

- A licensed electrician should be consulted and do a thorough inspection to determine what needs to be replaced and what is to current code.

The selected use will be a determining factor on the code and what needs to be corrected and or added for the use of the structure.



Figure 56
Bare wiring chewed by rodents



Updated electrical panel



Figure 57

J-box with exposed wires in living space

Updated grounded plugs

Wall Coverings:

Roughly 90% of the structure has exposed logs for the interior walls. The same is true for the ceiling, exposed log rafters, floor joists, or purlins with wood sub decking on the roof structure. However there are five areas where this is not the case. Four areas, bedrooms 2 and 3, kitchen, and utility area have had furring strips nailed to the logs with drywall over the furring. In all of these areas the drywall was then painted except for one wall in the utility area where wall samples were taken. The first layer of covering here was fabric wallpaper. Over the fabric wallpaper was a wallpaper to resemble a faux wood paneling. The correct way to restore these areas is to

- Pull off all the drywall and check for rot behind and replace. Alternatively, it may be acceptable to remove sheetrock and furring strips and leave logs exposed.



Figure 58

Bedroom #3-wall furring with Gypsum board



Utility room wall coverings

Exposed log walls and purlins

The east porch enclosure has a different wall covering than the rest of the rooms. Here, it is assumed, that when the porch was enclosed the logs were furred out and covered with sheetrock as well. At some point in the 1980's a pine tongue and groove paneling was added. The ceiling now has a 4x8 wood paneling with battens covering the seams. This area is in good condition and needs no repair.



Figure 59
East porch enclosure



Second floor loft

Flooring:

The flooring throughout the structure is consistent except in the east porch addition area. Here there is a 2 1/4" plank flooring. The rest of the structure has 3 1/4" planks. The bathroom, downstairs hall, utility room and pantry all have linoleum flooring. These samples were the first layer on the sub-floor and therefore assumed to be the first flooring coverings in these areas.

Summary:

The overall structure is in **fair** condition and can feasibly be reused for a variety of functions. These are discussed in more detail in the suggested use portion of the report. Depending on the time frame for a use and expected start date for construction there are a few recommendations.

- If the structure will be used with construction commencing within the next eighteen months the structure should not need immediate attention in any critical area. If this is the case then the use should determine the importance of items to be corrected. An example is if construction is to start within this eighteen-month schedule it is not necessary to put a new roof on the structure because there are structural issues to be addressed.

A new roof may be torn off at time of construction because of these structural issues.

- If the structure is going to continue to sit with little maintenance for a period eighteen months or more it is suggested that a few critical areas be addressed to maintain the structural integrity of the structure. First and foremost would be the roofing and flashing issues. Water is a buildings worst nightmare and this building is subject to water infiltration in multiple areas. The second thing to correct is the drainage. The building needs to drain properly or it will continue to take on water under the foundation and cause further rot and decay. Lastly are the windows and doors while currently closed, can be sealed more tightly to prevent animals and water infiltration.

For a building built in 1927, and not lived in or maintained for several periods of time since then, it is in **fair** condition and can and should be used.

Part 2 - Treatment and Work Recommendations

Section 7. Historic Preservation Objectives

The Secretary of the Interior's Standards for the Treatment of Historic Properties afford four distinct treatment approaches: rehabilitation, preservation, restoration and reconstruction. On the surface, **rehabilitation** and **preservation** are both defensible treatment strategies for buildings #117, #121, and #122. However, given the park management's desire to identify and utilize available space for contemporary park functions, preservation is at best a short term strategy, while **rehabilitation** becomes the recommended long-term treatment.

Rehabilitation is an appropriate treatment for maintaining historical integrity and retaining features of significance while accommodating new or contemporary uses. Since new uses have not yet been programmed for this building we propose beginning the planning process with three options that have been mentioned in passing at various times.

Buildings #121 and #122 are in current use. Building #121's current use as storage seems appropriate. Other potential active uses are possible, but limited by the building's small size (approximately 15' X 20'). Modifications to building #122 have affected the integrity of the structure. However, its active use has allowed it to be better maintained. Retaining active use and maintenance is recommended.

These possible uses for Building #117 are:

- Option 1: Domestic single family dwelling for GRTE
- Option 2: Domestic multiple resident dwelling for GRTE
- Option 3: Administrative office and conference space for GRTE
- Option 4. Expansion facilities for one of several existing Grand Teton National Park partners such as the Teton Science School, the University of Wyoming-National Park Service Research Center (currently with a field station at the AMK Ranch), or for any number of the Park's concessionaires.

The first three options fulfill needs expressed by park personnel, but are tied to budget, maintenance and scheduling constraints. Option 4, while giving up possible usable space that is needed by the park, can provide more immediate preservation treatment through partnering with a group or agency which may have more flexible and timely funding cycles.

Any one of these four options is in keeping with the building's historical usage and can be accomplished without significant harm to its historic character or its historic fabric. Saving this structure and promoting its historic importance is in accordance with the Mission of the National Park Service which —operates with partners to extend the benefits of natural and cultural resource conservation...throughout this country."

Section 8. Requirements for Work: Short-term and Long-term

Consideration of the current condition of the building taken together with the position of the structure with the Park's planning process suggests the need for short-term and long-term solutions.

Assuming the Park is not in the position to immediately implement all of the remedial actions called for in the assessment portion of this report, a mothball/stabilization preservation treatment is required. Economical roof repairs, such as new rolled roofing and metal flashing, can be utilized as necessary. Minor window and door repairs or boarding up will provide protection from the elements, as well as inhibit rodents, bats and other pests from gaining access. Temporary structural repairs at the foundation and exterior log walls can be accomplished with concrete pads and support posts at areas of failure. To guard against roof failure due to a heavy snow load, temporary mid-span supports can be placed under those purlins deemed vulnerable. Rain gutters and downspouts are another economical, though possibly only partial, solution to further water damage.

Longer-term strategies will require a more intense programming and design process. In addition to determining the park's most immediate needs, those needs must be properly matched to the building's characteristics and potential. For example, the requirements for office occupancy (Option 3) might have more strict structural and mechanical requirements than that for residential (Options 1 & 2). Even assuming residential occupancies there are differences between single household uses (Option 1) and those accommodating several unrelated individuals (Option 2). While the National Park Service is not bound by Teton County Building Codes, it is the Park Service's intention, to comply with relevant codes as they apply to life-safety issues.

Recommendation for ADA compliant accessibility will be partially dependent on the building's future use. Since the first floor entries are at or near existing grade, ramps will be a cost effective solution to wheelchair access. Minimum door sizes and bathroom and kitchen layout will need to be addressed. The second floor access and lack of a bathroom will not be easily upgraded for handicap compliance. Emergency egress at the second story is currently provided by an interior stairway with three winders at the bottom, and one large operable window 9 sf at the upstairs hallway with a steel, exterior ladder descending to the ground. Two other large upstairs rooms do not have compliant emergency or ADA entry/egress. Upgrading of the electrical system should include smoke/carbon monoxide detectors.

The existence of hazardous material is not addressed in this assessment. It is recommended that a qualified contractor do further analysis of lead paint, asbestos, radon, etc.. Bats and wood rats (pack rats) have been a problem for a number of years, but especially since the building's use as housing ended in

1992. Abatement has been performed, but two areas need further treatment: the attic space above the office (access is above the basement stairs) and the crawl space below the kitchen and living room.

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Appendix

Snake River Land Company
Grande Teton National Park, WY

Log Description

5/22/2007

Beam #	Celing Beam	Roof Beam	Spiral Grain	Straight Grn	Beam End Diameter - "				Check Width - "
MAIN LEVEL					N	S	E	W	
1	X		X				6	7 1/2	3/8
2	X			X			6 1/2	6	
3	X			X			6	7	
4	X		X				7 1/4	7 1/2	1/4
5	X		X				7 1/2	7 1/4	1/4
6	X		X				7 3/4	7	1/8
7	X			X			7 3/4	7	
8	X		X				9	7 3/4	1/4
9	X			X			3	3 1/4	
10	X		X				8	7	3/8
11	X			X			6 3/4	8	
12	X			X			5 1/4	4 1/2	
13	X			X			4	4 3/4	
14	X			X			7	7	
15	X			X			4 1/2	4 1/2	
16	X		X				7 1/2	7 3/4	1/8
17	X			X			4	7 1/2	
18	X			X			4 3/4	5	
19	X			X			4 1/4	5	
20	X			X			4 3/4	5 1/4	
21	X			X			4 1/2	4 3/4	
22	X			X			4 1/4	5	
23	X			X			4 1/4	5	
24		X	X		7 1/4	8			1/32
25		X	X		6 1/2	6 1/2			1/32
26		X	X		6 1/4	6 3/4			1/8
27		X	X		7 1/2	7			1/8
28		X	X		6 1/2	7			1/16
29		X	X		7	7 3/4			1/16
30		X		X	8 1/2	7 1/2			
31		X		X	8	7 1/2			
32		X		X	7 3/4	6 1/2			
33		X	"REPLACEMENT"						
34		X		X			6 1/2	9	
35		X		X			7	10	
36		X		X			7 1/4	8	
37		X		X			7 1/4	9	
38		X		X			6 3/4	8	
2ND FLOOR									
1X		X		X	7 1/4	8 3/4			
2X		X	X		7 3/4	8 1/2			3/8
3X		X	X		8 1/2	10 1/4			1/8
4X		X	"TOP LOG"						
5X "RIDGE LOG"		X	X		8 1/2	9 1/2			1/8
6X		X	X		7 1/2	8			1/8
7X		X		X	8 1/2	9 1/2			
8X		X	X		7 1/2	9 1/4			1/4
9X		X		X	7	7 1/2			