HISTORIC STRUCTURE REPORT

The William Bonner House

110 EAST MAIN STREET
MIDWAY, UTAH

FINAL DRAFT REPORT
OCTOBER 2012

Oldest photo of home here.

Await G. KASLO.

REPORT PREPARED BY
CHRISTOPHER LOBAS ARCHITECTS, P.C.
CLEVELAND, OHIO

October 2012

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110 EAST MAIN STREET
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TABLE OF CONTENTS

3.3 BUILDING STRUCTURAL SYSTEM x
- General Structural System Description
- Basement
- First Floor Structural System
- Second Floor Structural System
- Roof Framing System

3.4 BUILDING ENVELOPE-EXTERIOR WALLS x
- Exterior wall construction and masonry
- Exterior finishes
- Exterior appendages: porch, stoop, portico, etc.

3.5 BUILDING ENVELOPE-ROOFING AND WATERPROOFING x
- Roofing systems
- Sheet metal flashing
- Drainage system, gutters, and downspouts

3.6 WINDOWS AND DOORS x
- Doors, windows, hardware, trim, and finishes

3.7 INTERIOR FINISHES x
- Wall finish materials
- Ceiling finish materials
- Floor finish materials

3.8 MECHANICAL SYSTEMS x
- Heating and air conditioning
- Ventilation
- Water service, plumbing, and sewer utilities
- Fire suppression, sprinkler systems

3.9 ELECTRICAL SYSTEMS x
- Electrical service
- Electrical panels and distribution system
- Lighting
- Fire detection system
- Security alarm system

PREFACE: SUMMARY

William Bonner House. Date Unknown.
Donated by John Told to Utah State History Collections.

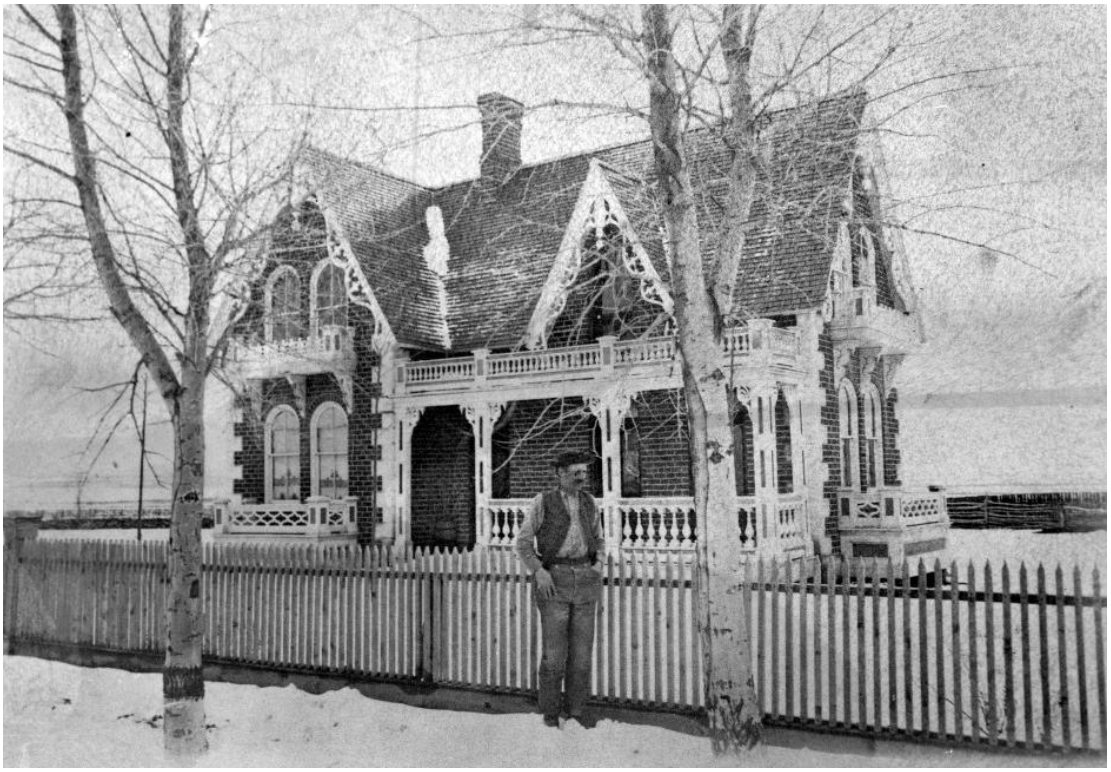
The William Bonner house is a 1-1/2 story (plus partial basement) residence in the historic town of Midway, Utah. The building was first constructed in 1877 in a cross-wing or L-configuration with one forward projecting gable, intersected at a right angle by a side wing. The house grew by accretion with a single gabled wing projecting to the south added first, originally flanked by open porches. The southeast porch was then finished as conditioned space to provide a kitchen and bathroom, and a subsequent mudroom addition was added to the southeast end of the home. In form, the house is an inventive adaptation of English picturesque Gothic Revival style to the needs of a particular frontier family. The street presence is addressed forwardly from both Main Street and 100 East in an asymmetrical manner, with one steeply pitched gabled end, intersected at 90 degrees by a cross-wing and respective porch.

The William Bonner House is one of the seven houses contained in the Architecture of John Watkins Thematic Resource Nomination, designed and built by John Watkins, a local master builder and architect. The Bonner House received recognition in 1986 when it was named to the National Register of Historic Places. (Building #86001361). The nomination describes the house as being significant for its architecture which, is in good condition with minor alterations. Also included in the nomination are two outbuildings located on the W. Bonner property; a large English-type box framed barn built shortly after the house, and a potrock masonry granary dating to the same time as the barn and house. The house along with these contributing buildings are some of the finest architectural gems in Midway, helping to tell the story of the town and the William Bonner Family and to define the legacy of the architect.

Originally trained in England, Watkins developed an understanding architectural forms and styles. Watkins' designs convey his study of traditional architecture. His projects are not simple replications of samples from typical pattern books of the time, which was a common practice. Instead, each design was carefully tailored to the specific needs of the family and site, while still maintaining a certain charm and familiarity. Stylistic and aesthetic elements are handled meticulously, detailed to complement the design of the house.

The William Bonner House was originally built as a wedding gift from George Bonner Sr. to his son William. A double wedding was held in Midway on January 24, 1878 in the beautiful home of George and Margaret Bonner at 103 East Main. George Jr. wed his longtime sweetheart, Phebie Alexander and William married Sarah Bronson. Upon commencement of the ceremony, each couple walked across the street to their respective new homes, complete with furnishings and all the accoutrements. Upon the passing of William and Sarah, the house was passed down through the family, from Everice Bonner, then subsequently to Lois Bonner.

The house was recently purchased by a non-profit agency concerned with historic preservation. Future plans are flexible and may include residential or commercial uses with the intent of restoring, and rehabilitating the home in keeping with its original historical character. The home serves as a link in a chain of several historic landmarks in the town of Midway.



Above: William Bonner House. nd.
Donated by John Told to Utah State History Collections.
Below: William Bonner House as it appears today.

Above: North Elevation. Below: South Elevation

Above: East Elevation. Below: West Elevation

1.0 INTRODUCTION

1.1 RESEARCH BACKGROUND/PARTICIPANTS

The Utah State Historic Preservation Office (SHPO) neither guides nor reviews Historic Structure Reports generated for privately owned properties. However the SHPO advises that the guidelines published by the National Park Service be followed in the generation and presentation of a Historic Structure Report (HSR). See NPS – 28: Cultural Resource Management Guideline, Chapter 8, and Preservation Brief #43 by the National Park Service.

Project Purpose: The goal of this report is to provide a clear description of the building's architectural history; its original appearance; what changes were made and when; and its present condition. In addition, it provides some guidance with respect to any proposed new work. The historic structure strategy selected for the building is restoration, focusing on "the retention of materials from the most significant time in a property's history, while permitting the removal of materials from other periods." *(*USNPS)

The buildings period of significance is during its initial founding and the ensuing several decades. The strategy of a full restoration to the original construction date is not recommended, as the building organically grew over time to meet the needs of the family. The newer and later kitchens tell the tale of growing necessity and advancements in technology while still maintaining the character of the house. The back mudroom, however, was not executed to the same quality level as the earlier additions, and should be carefully studied. The functional needs of the building for its intended purpose, either a home or a business, may be addressed with a subsequent addition. If this is deemed necessary, it should be done with care and sensitivity to existing fabric.

Missing or damaged fabric on the original building may be replaced to help restore the original character of the house. These specific elements are discussed in detail in the structural condition assessment portion of this report.

The architect recommends choices that will lead towards the preservation of this cultural landmark for the benefit of the people of the region. The philosophy will always be based in a careful and attentive study of the existing historic resource and the textures, materials, assemblies, and systems that make up its fabric.

RESEARCH APPROACH:

1. ARCHIVAL RESEARCH:

Books and articles were researched at the University of Utah J. Willard Marriott Library, and in the archives of the Utah Historical Society. The Utah State Historical Preservation Office has also provided information in the form of pictures, drawings, and expert advice.

2. PERSONAL DISCUSSIONS:

For this particular property, one formal interview was held with Kaye Bonner, who resided in the William Bonner House for nearly her entire life. In addition to her interview, information was gathered from a number of personal sources, including.

- Mr. Thomas Carter, Professor of Architecture,
  The University of Utah
- Mr. Dee Halverson, Author
- Mrs. Shayla Snow, Property Manager and Watkins Descendant
- Ms. Julena Bonner, Local Resident

3. EXISTING HABS DOCUMENTATION:

See Appendix for the HABS report including photographs and the 1971 national registry nomination form.

4. PHYSICAL INVESTIGATION:

Exploration of the building as it exists today has been carried out. The configuration and condition of the building structure, envelope, finishes, and systems have been documented through photography and the refinement of existing drawings. Professional architectural, mechanical and electrical engineering evaluations have been conducted.

Consultants involved in the report:

Consulting professional services in preparation of this Historic Structure Assessment have been provided by Christopher Lobas, Architects, P.C. Mr. Lobas, a Utah Registered Architect with over 16 years of professional experience in historic preservation.

Additional personnel include recent graduates of the University of Utah, Mr. Brian Backe, a designer with practical experience in construction, and Mr. Alex Booth, a registered architect. These each contributed field work and some research to the project.

Mr. Mark Burggraaf, P.E., of Burggraaf Associates of Pagosa Springs, Colorado, is a Registered Mechanical and Electrical Engineer and Mr. Shaun Packer is a licensed engineer of Calder Richards Consulting Engineers. Both have expertise in assessments of historic buildings.

Ms. Carolyn Hunter, a registered architect with Context Architecture in Durango, Colorado, wrote a code compliance synopsis for the building using the 2009 International Building Code.

Mr. John Lambert of Abstract Masonry Restoration has contributed the evaluation of the exterior masonry.

Funding partners:
Privately funded.

1.2 BUILDING LOCATION/ SITE PLAN

Midway, Utah. Map from Bing Maps (2010).

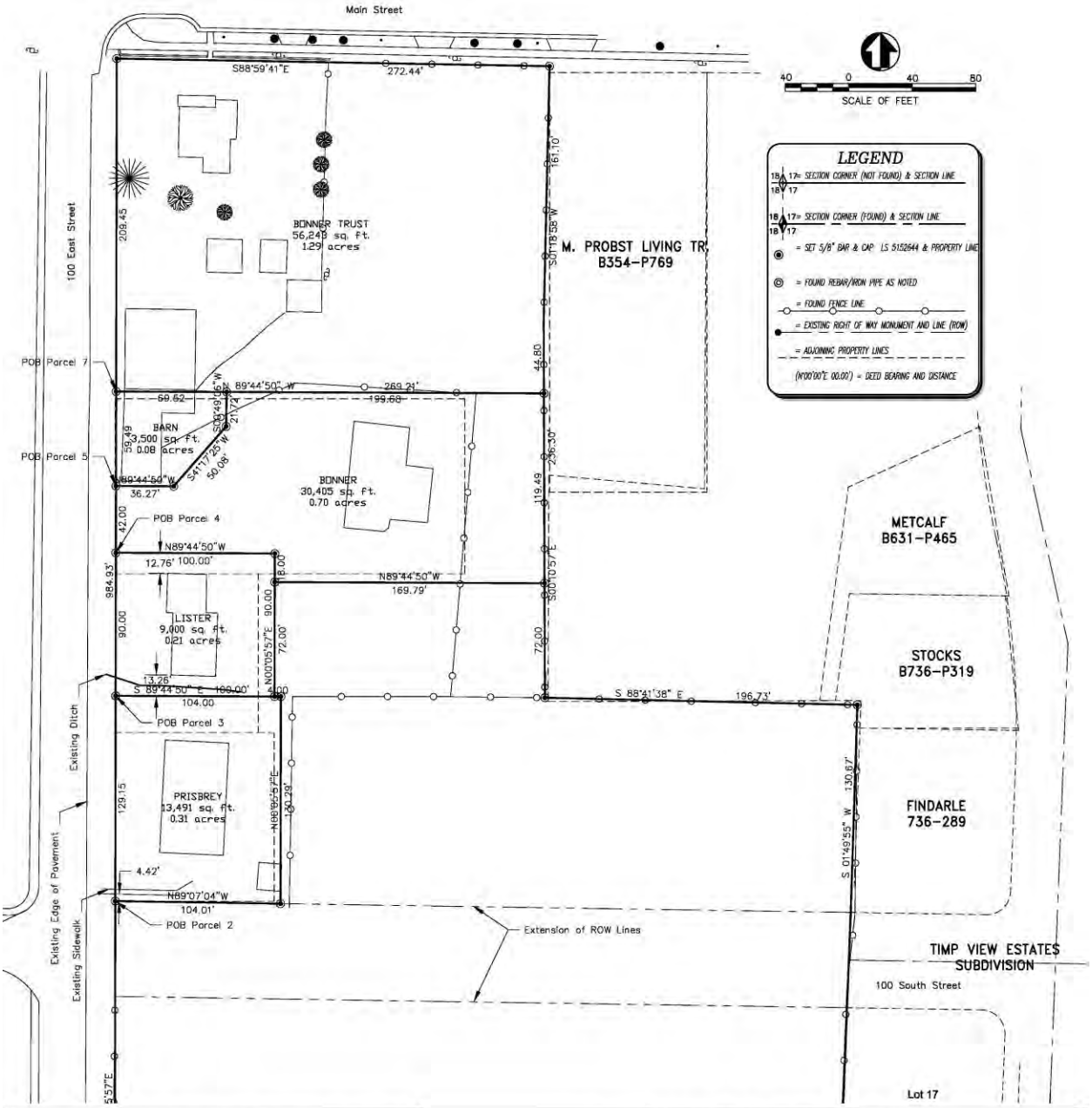
LEGAL DESCRIPTION:

The William Bonner House is located in Lake City at the Northeast corner of 3rd and Silver Streets. The property comprises a full parcel and a partial parcel as described here:

Parcel 4 (Larry and Ellen Bonner Overall Description) and
Parcel 5 (Barn parcel description, a partial parcel)

Parcels of land situated in the Southwest Quarter of Section 35, Township 3 South, Range 4 East, Salt Lake Base and Meridian, for which the Basis of Bearing is South 89*54'29" West 2658.15 feet between the Wasatch County Brass Caps monumentalizing the South line of the Southeast Quarter of said Section 35.

See site plan below. Professional survey of site of Watkins-Coleman House by Focal Point Surveys (2006) is on the following page.


Main Street
100 East Street
S88°59'41"E
272.44'
SCALE OF FEET
LEGEND
= SECTION CORNER (NOT FOUND) & SECTION LINE
= SECTION CORNER (FOUND) & SECTION LINE
= SET 5/8" BAR & CAP LS 5152644 & PROPERTY LINE
= FOUND REBAR/IRON PIPE AS NOTED
= FOUND FENCE LINE
= EXISTING RIGHT OF WAY MONUMENT AND LINE (ROW)
= ADJOINING PROPERTY LINES
(N00°00'E 00.00') = DEED BEARING AND DISTANCE
BONNER TRUST
56,243 sq. Ft.
1.29 acres
M. PROBST LIVING TR
B354-P769
BARN
3,500 sq. Ft.
0.08 acres
BONNER
30,405 sq. Ft.
0.70 acres
LISTER
9,000 sq. Ft.
0.21 acres
PRISBREY
13,491 sq. Ft.
0.31 acres
METCALF
B631-P465
STOCKS
B736-P319
FINDARLE
736-289
TIMP VIEW ESTATES
SUBDIVISION
100 South Street
Lot 17
POB Parcel 7
POB Parcel 5
POB Parcel 4
POB Parcel 3
POB Parcel 2
Existing Ditch
Existing Edge of Pavement
Existing Sidewalk
Extension of ROW Lines
FOCAL POINT
SURVEYS
PO Box 312
Heber City, UT 84032-0312
435.654.1917
RECORD OF SURVEY
BONNER FAMILY PROPERTY
LYING AND SITUATE IN SW¼ SECTION 35, TOWNSHIP 3 SOUTH, RANGE 4 EAST, SALT LAKE BASE AND MERIDIAN

Above: Map of Utah, from Microsoft Bing Website (2012).

2.0 HISTORY AND USE

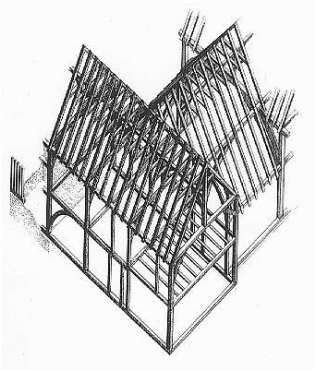
2.1 ARCHITECTURAL SIGNIFICANCE AND CONSTRUCTION HISTORY

Architectural Significance

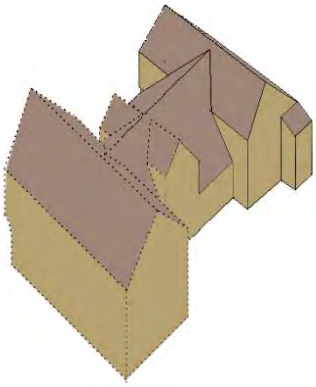
The building was entered in the Utah State Register of Historic Sites (#86001361) in 1986 and the National Register of Historic Places on June 17, 1986.

FORM – MASSING

In plan, the building is a variation of a cross-wing, which derived from a medieval plan for large homes, generally featuring a larger hall flanked by one or two wings intersecting the hall at a right angle. Numerous buildings of this formal category are to be found as "listed" buildings in the United Kingdom, buildings that have been placed on the Statutory List of Buildings of Special Architectural or Historic Interest. The example below is Headstone Manor, a Grade I listed resource in Northwest London. ("Harrow Council - Harrow Museum buildings - Headstone Manor").



Core of Building: 14th Century Framed House. Hall with surviving wing. (Harrow Council – Harrow Museum Buildings – Headstone Manor).



Hall with both wings, approximately 1310 – 1315. (Headstone Manor, Pinner, Middlesex, Archaeology Report).

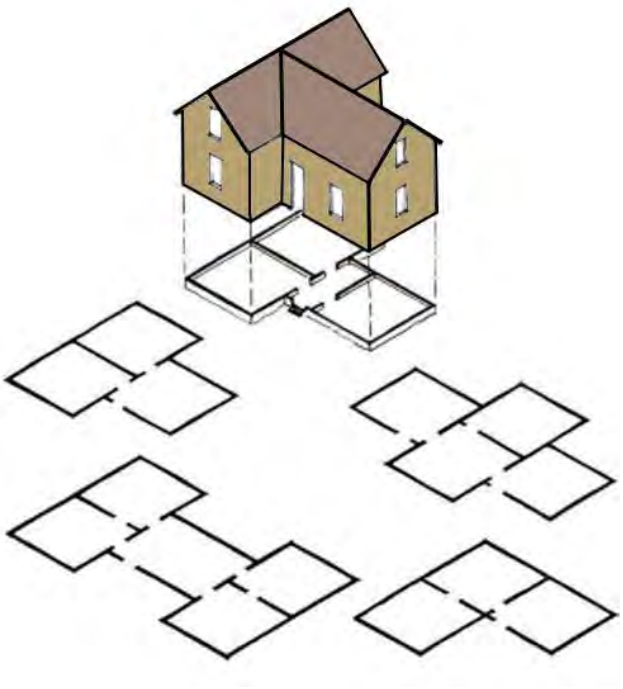
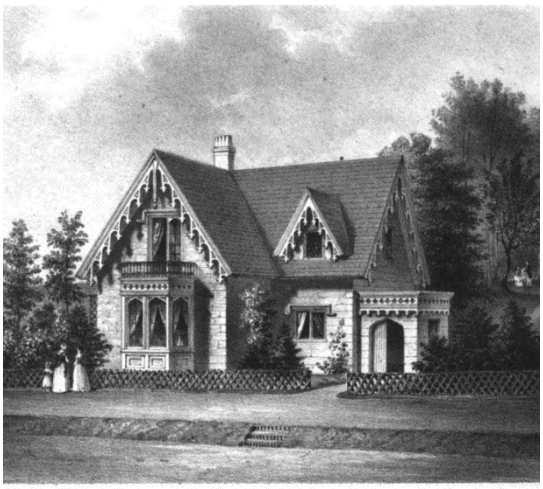


Diagram of Cross-Wing house variations. Depicted here: Asymmetrical Cross-Wing, like the Bonner House. (Carter & Goss, Utah's Historic Architecture, 1847-1940: A Guide)

Cross-wings tended to be of timber-frame construction, with posts and beams carrying gravity loads and tie beams, collars, and internal wind braces handling lateral loads. On the main level, the placement of structure imposed limitations of design elements, entries, and fenestration. Most had second or third stories composed of site-built trusses. The structural composition of these trusses impacted the utilization of space within, and the same tenet held true in later incarnations of the cross wing. While the overall form of the cross-wing was a standard for hundreds of years, the configuration of interior spaces varied. Whereas on the Headstone Manor entries occurred at the center, on later revivals of the cross-wing, entries often appeared on axis with the center hall. (Harrow Council - Harrow Museum buildings - Headstone Manor).

It should be noted that the Bonner house is not a true timber frame, as the masonry is the primary load-bearing structural element. The roof framing is stick-built, 2x stock, with tie beams. These were assembled on site. See structural portion of this report for more information.



Bute Cottage. Lang, W.

Bonner House (Lobas, 2010)

The cross-wing was widely reinterpreted in America as depicted in this Gothic Revival style cottages built in Roxbury, near Boston, by Architect William B. Lang, who practiced throughout the American East, Midwest, and West. His practice centered around Denver. The image is shown next to a photo of the Bonner House to indicate the similar asymmetrical cross-wing form.

The growing utilization of the form was not a trend set by a singular architect. The cross-wing was implemented in numerous pattern books that were the 19th Century equivalent of home plan books sponsored by popular lifestyle magazines today. The pattern book publications, with images reproduced from engraved steel and copper plates, aimed at informing all facets of 19th century domestic design, containing architectural theories, histories, and prescriptions for styles and their corresponding ornaments and details. The patterns were traditional and the proportions classically derived, but the illustrations tended to communicate romantic and casual moods instead of more formal and symmetrical classicism that was prevalent throughout the country. The books, largely published in the United States, ushered in a whole range of new revival styles to America. A particularly important and popular pattern book was Andrew Jackson Downing's The Architecture of Country Houses (1850). The book "influenced thousands of would-be homebuilders through countless editions." (Massey, 85)

Ultimately, the cross-wing form made an arrival in Utah, as chronicled in "Utah's Historic Architecture 1847-1940 A Guide" by architecture professors Thomas Carter and Peter Goss.

CONSTRUCTION OVERVIEW

The building is constructed with a foundation of locally quarried potrock. This soft rock is metamorphic, formed at several nearby "hot pots," slow bubbling geyser like geothermal wells with mounds surrounding. Waters were generally rich in minerals, and bathing in them was considered therapeutic. The rock itself is mottled with numerous fissures and holes. It could be worked with chisel like conventional lime or sandstone, but because of its soft composition was ordinarily cut with a saw.

Local potrock found in Midway
(Lobas, 2010)

The foundation of the original house is composed of limestone blocks resting on potrock stem walls. The potrock masonry is generally uncut and undressed. Because the potrock has a high concentration of calcium carbonate, it was commonly fired in kilns to produce mortar and plaster. The pot-rock was set with this mortar.

The house is a masonry building, with walls constructed of soft bricks. The brick has sometimes been called "adobe," but this is a misnomer, because the brick is kiln-fired rather than sun-dried. The thickness of walls varies, but is generally triple-wythe. The brick pattern is 1/3 running bond. See appendix for historic masonry conditions report.

In form, the house is an asymmetrical cross-wing, ideal for its corner location, so that a gable end meets each street frontage, Main Street to the north and 100 East Street to the west. This formation made the original home L-shaped. Each of these gable ends has nearly identical elevation elements. These consist of two stories of round-arched double-hung windows, wood balconies for decorative purposes only, scrolled bargeboards, and stone quoins. Most details are presently painted white, whereas the brick is painted a light red color. The north facing, front elevation is read left to right as the gable end of the cross-wing, and the side of the main hall. The side consists of three doors sheltered by a shed portico supported by four Tuscan order columns. The shed angles to a hip on the open side.

In the center of the main hall is a dormer of the same pitch. This dormer shelters a round-arched door from an upper level bedroom onto a small square platform over the portico. The dormer has bargeboards pattern to the main gables, but in smaller scale.

On the west elevation, the end of the cross-wing gable is visible, with the window, balcony, and bargeboard detailing previously described. The first addition is immediately visible. The side of a gable frames directly into the cross-wing, and projects to the south. Directly below the eaves of this gable are a door and window, and a concrete porch covered by another portico, this one held aloft by three square wooden columns. To the south towards the back of the property, the last addition to the house is visible, a gable of lower pitch with walls finished in wood siding.

The south elevation shows the first addition framed directly into the cross-wing, the side of the cross-wing, and the back elevation of the steep main gable. The large addition has three windows present, one at the main level and two at the upper level. These are all six-pane windows. The main gable has a single second story window, a double-hung with six-over-six configuration. Stone quoins are present on this side of the gable end, as in the front. The last addition is visible in a symmetrical gable of lower pitch. The walls, as mentioned, are finished in wood siding.

The major mass of the east elevation is the side of the main gable. The walls are brick with quoins to the front and back. Two round-arch windows are in the front face. The tall first addition is visible towards the west, but is overframed with the second addition. The second addition is a shed, made distinctly visible by a roof break formed at the side of a tall brick chimney. The shed extends to cover the kitchen, and then extends even further to cover a bathroom. The kitchen has one window, a double-hung window in a six-over-six configuration. The bathroom has a small square casement window. The side of the latest addition is visible towards the back of the building, finished with wood siding painted red. A door is in this addition, opening to a square concrete stoop with two risers and a simple pipe metal rail.

STYLE and ITS ORIGINS

The period of the house is Victorian, the movement Picturesque, and the specific style Gothic Revival. The original style, Gothic, at its apex represented the highest achievements of all of medieval culture, intellectual and spiritual. The Gothic Revival was a popular style in pattern books used by architects throughout the United States in the mid-19th century. The origins of the Gothic Revival style are discussed in further detail in the appendix.



Three images of houses from Kent, England in the Gothic Revival Style.
(Strutt & Parker, 2010).

All images above are from the architect's former home county. These were acquired from a realtor currently working in Kent, United Kingdom. Note the steeply pitched gables with decorative trim in the first image. The second, a stone residence with a single cross wing form, shows quoined corners and decorative trim at the gabled entry portico. The third house is a largely Numerous other beautiful manors, palaces, and religious buildings in the Gothic style are present, including several in Maidstone, Kent, Mr. Watkins' town of origin.

Architect and his History

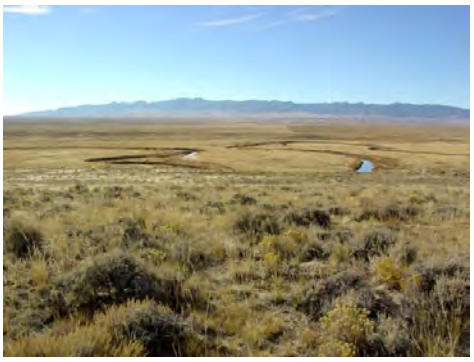
This brings us to the history of the building, which would be incomplete without a telling of the man who designed it. The chronological facts come directly from the articles and bylaws of the Watkins Genealogical Society, which were found directly within the house. These notes were brought together in 1980 by descendants of Mr. Watkins, and are presumed to be organized from accurate sources.

A brief history of the Bonner Family can be found in the appendix.

John Watkins was born to Thomas and Sarah Watkins on April 13, 1834 in Maidstone, in the county of Kent, England. He met his first wife, Margaret Ackhurst in 1851, and married the same year. Shortly thereafter, John moved to London, first working in a law office, and then in that of an architect. His parents moved to Rainham, also in the county of Kent. The same year, at age 18, John was both baptized and confirmed in his faith. His first child, Elizabeth was born in the same year. John looked towards a life of prosperity in his profession, and did not at first want to join the gathering of those following this faith westward to what many enterprising Americans considered a promised land. Within one year, John and Margaret had a second child, John Thomas, and experienced the loss of John's father to a building accident. John let go of projects and holdings in order to finance his family's travels to the United States. Margaret agreed to travel and the couple set forth with Elizabeth and John Thomas on the Ship Horizon on May 25, 1846. One month later it arrived in Boston Harbor, and less than one month from that time, the family was in Iowa City, preparing to travel westward to Utah. (M. Schaer, 1-7).

The family migrated with over five hundred men, women, and children with meager supplies through extreme winter weather and treacherous terrain to arrive to Utah. The story of their travels is told in journals and accounts of the survivors, including that given by Mr. Watkins to his daughter, which is present in the biography she wrote. (M. Schaer, 1-7). It is an event that has been examined by scholars both within and outside of the faith background, and has been chronicled extensively in numerous histories and essays, and in the award-winning documentary film *Sweetwater Rescue* , produced by Groberg Films (2006).

Handcarts crossing the Platte River. Manassa, Colorado. (Re-enactment). (Bosworth, N., 2006).



Sweetwater Valley. (Brigham Young University. Mays, K., 2002).

Cluff's Hall. (Provo Library, 1980).

Provo Coop (Provo Library, 1980).

Upon arriving in Midway, Watkins immediately found work designing and building an Opera House in Provo. He drafted plans and specifications for the Opera House, and the construction began in the following spring. Records indicate that the building was constructed of adobe, but it was much more likely soft fired brick. Archival photographs indicate that whatever the bearing construction, the building was clad in clapboard. The Opera House was known as Cluff's Hall, named for Harvey H. Cluff, president of the theater company. It was setting for concerts, dramatic productions, opera, and dancing. (D. R. Carter, 1-5)

Utah's first cooperative store—the "West Co-Op" was established on Center Street in Provo John Watkins designed the brick and soft brick building and it was built by the town's first merchant, Andrew Stewart, in 1866. Cooperative merchandising was helpful for new families starting out in the west, and was sponsored and supported by the local church.

The West Co-op is to the left in this picture, and adjoined by the "new" East Co-op. The style is formal, and regular, with tall glazed doors and transoms to allow the maximum passage of light into the volume. Detailing included stone lintels, an array of molded millwork on upper and lower cornices, decorative corbels, and a balustraded parapet. Throughout the United States, it was common for storefront owners to remodel every several decades and the same was true of the Co-op building, which was remodeled with a new commercial façade in around 1890. The building still exists, but is no longer recognizable as Watkins' design.

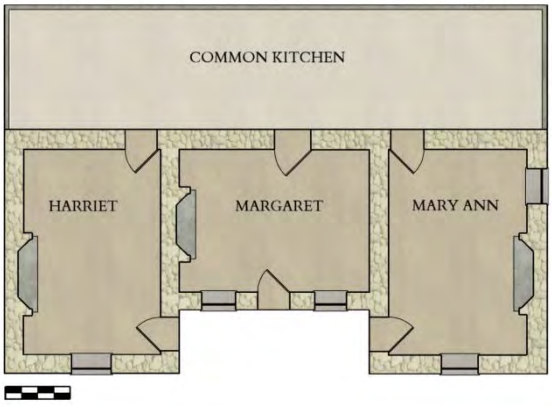
(Brigham Young University Lee Library Archives. Ca. 1900).

The first Tabernacle, called a Meeting House, of Provo, Utah, was of John Watkins' construction, and there is little doubt he aided in its design also. The style was Classical Revival, with a distinct Italian flair. The forms and proportions of the edifice were that of a Roman temple. The octagonal steeple was common in the public and religious architectural works of the time, and the termination in a bell-shape cupola was traditional. John worked nearly to exhaustion on the project, and gave much of his time and effort as tithing and donation. The tabernacle served the community until a much larger one of Gothic Revival style was constructed between 1883 and 1898. The building was demolished in 1919. (Historic Provo Tabernacle site)

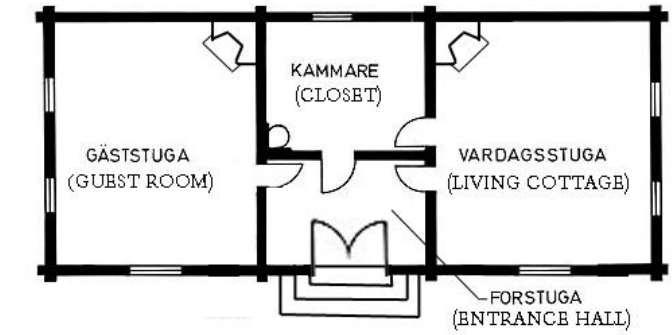
Watkins family photo.
(Palmer, 1980).

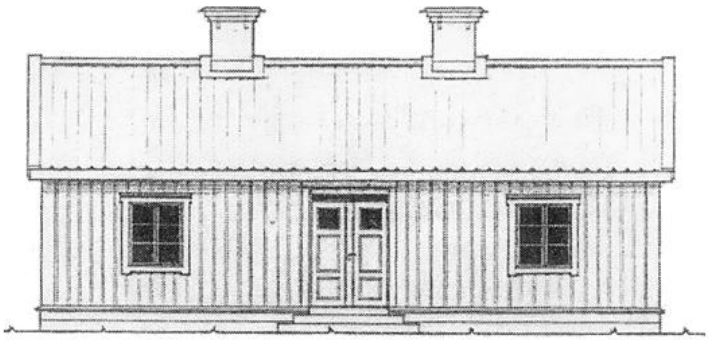
John Watkins original residence, Midway.
(Lobas, 2006).

The photograph above is of the original house in Midway John shared with his growing family, In this house, each woman had her own apartment, and each with its own fireplace for warmth.



Above: John Watkins Home, Midway, Utah, 1867 (Diagram C. Lobas 2011).





Right: Swedish Parastuga House. (Original Plan Image from Stockholm County Museum site 2010. Elevation Image from Bergslagens Timberhouse and Joinery site 2010).

John Watkins built the house for his growing family in Midway based on an extant Swedish model called a parstuga, or pair cottage, a house with three contiguous rooms on one level. The family, at that time one husband with three wives, lived in the three rooms within the house, each of equal size, to provide accommodations for each wife. The house was built with pot rock walls and lodge pole pine, and the walls are now plastered. To the north of the rooms was a frame lean-to kitchen shared by all three wives. The kitchen also served as the only interior connecting passage to all the apartments. (Carter, Utah Builder, 4).

The family soon outgrew this house, and John began his plans for the large brick house at 5 East Main (The Watkins-Coleman House). The two younger women, Mary Ann and Harriet moved into the home with their families, and Margaret remained at the older "rock house." (Palmer, 5). The Watkins-Coleman House, depicted below, is another example of a cross-wing, but in this case a symmetrical form with two equal wings. This house shares numerous characteristics and details with the William Bonner house, but there are distinct differences also. Both are similar formally, with large gabled masses offset by a smaller gable, but of course the Bonner house has an asymmetrical solution. Both houses are brick with stone quoins. Both have intricate bargeboards, but the ones on the Watkins-Coleman house are considerably more delicate and refined. The William Bonner house has gable ends with two arched windows with balconies on both levels, whereas the Watkins-Coleman has gable ends with one window with pointed lintel at each level, without balconies. Overall, the houses have certain similarities of form, detailing, and elements which make them unmistakably the work of the same architect.

Watkins-Coleman House, view from southwest and south elevation. (Lobas, 2010).

(Planning and) Construction History

As previously indicated, the house received numerous additions. The diagrams on the following pages convey the chronological sequence of the additions, and the resulting configuration. The order of the additions was apparent in the construction, but the dates are uncertain. All views are from the southeast.

A) Original home, (date).

B) First addition, south wing (first kitchen).

A

B

C) Second addition, southeast corner shed (second kitchen).
D) Third addition, foyer and bathroom.

C

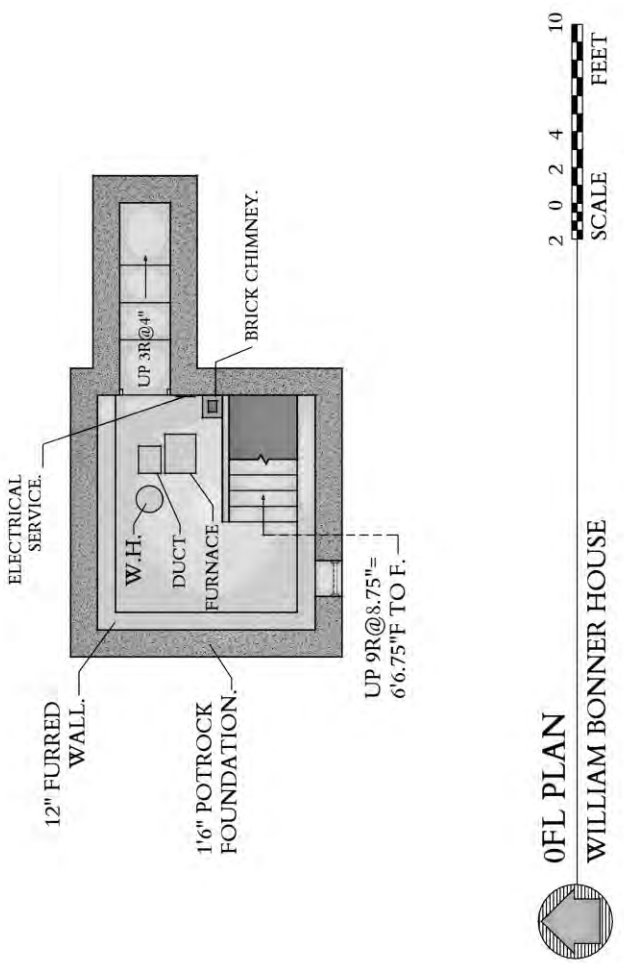
D

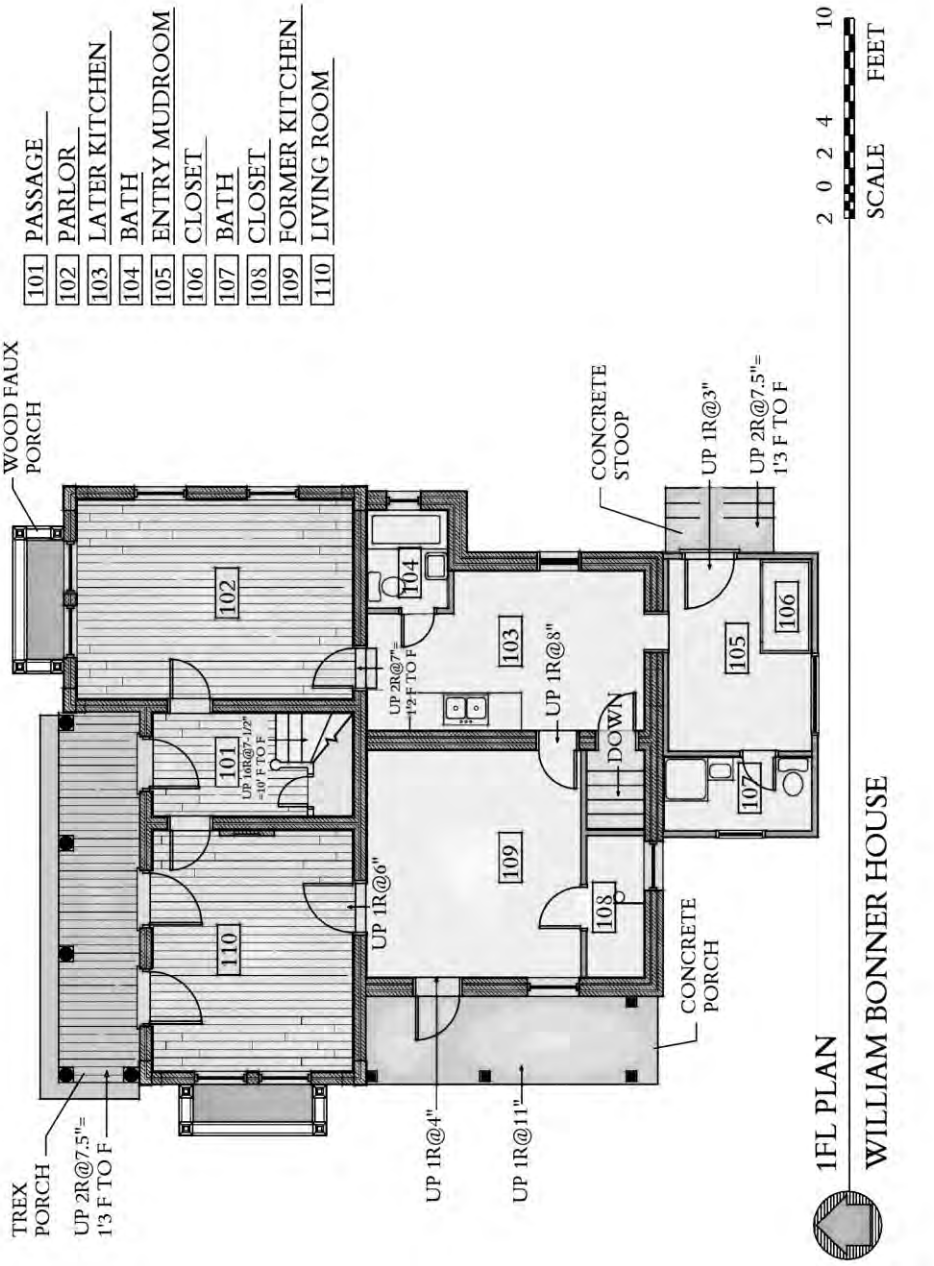
2.2 EXISTING SKETCH PLAN

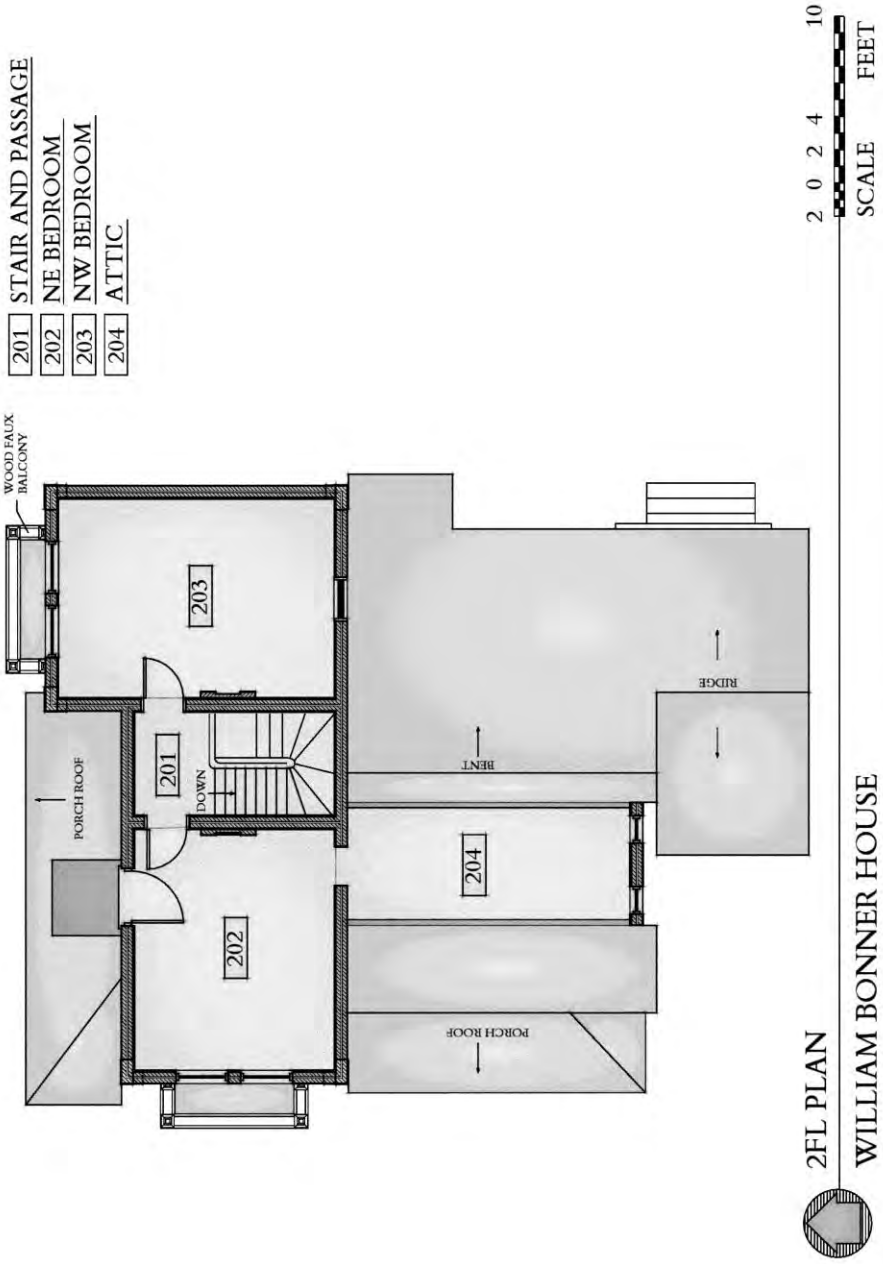
The sketch plans utilized here are produced by Christopher Lobas and Brian Backe from field measurements and photographs made in summer 2009. They were made using AutoCAD Architecture with touch-up in Adobe Photoshop.

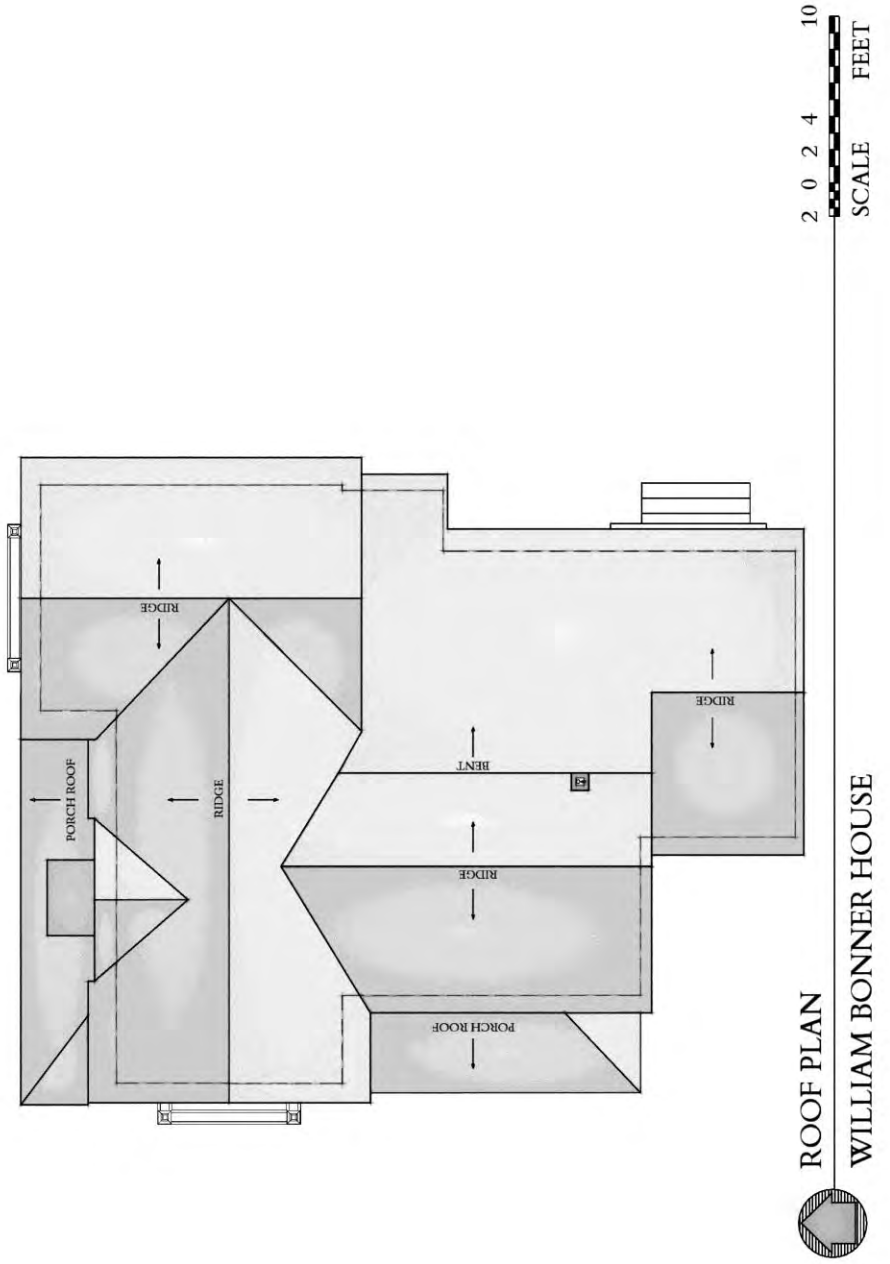
2.3 PROPOSED PROGRAM

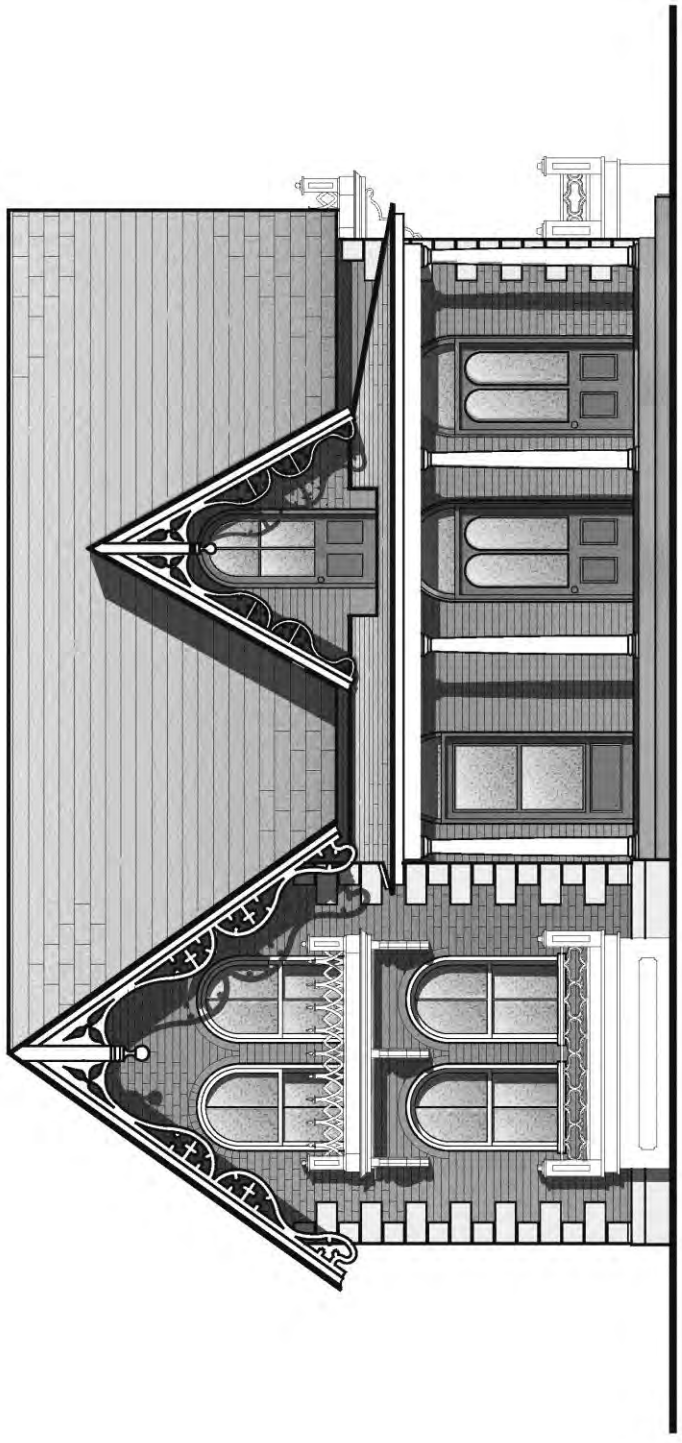
The Hardy Foundation, a non-profit organization, currently owns and maintains the building. The Foundation intends to preserve where possible and rehabilitate where necessary. The objective for all primary, character-defining spaces should be an accurate portrayal of as much historic fabric as possible. The building could be planned as displays and exhibits chronicling the lives of the pioneers and their early settlement are possible.


ELECTRICAL SERVICE.
12" FURRED WALL.
1'6" POTROCK FOUNDATION.
W.H.
DUCT
FURNACE
UP 3R@4"
BRICK CHIMNEY.
UP 9R@8.75"= 6'6.75"F TO F.
0FL PLAN
WILLIAM BONNER HOUSE
SCALE
2 0 2 4 10
FEET


101 PASSAGE
102 PARLOR
103 LATER KITCHEN
104 BATH
105 ENTRY MUDROOM
106 CLOSET
107 BATH
108 CLOSET
109 FORMER KITCHEN
110 LIVING ROOM
WOOD FAUX PORCH
TREX PORCH
UP 2R@7.5"= 1'3 F TO F
UP 16R@7-1/2" =10' F TO F
UP 2R@7"= 1'2 F TO F
UP 1R@8"
UP 1R@6"
UP 1R@4"
UP 1R@11"
DOWN
CONCRETE STOOP
UP 1R@3"
UP 2R@7.5"= 1'3 F TO F
CONCRETE PORCH
2 0 2 4 10
SCALE FEET
1FL PLAN
WILLIAM BONNER HOUSE


201 STAIR AND PASSAGE
202 NE BEDROOM
203 NW BEDROOM
204 ATTIC
WOOD FAUX BALCONY
PORCH ROOF
DOWN
RIDGE
RIDGE
PORCH ROOF
2 0 2 4 10
SCALE FEET
2FL PLAN
WILLIAM BONNER HOUSE

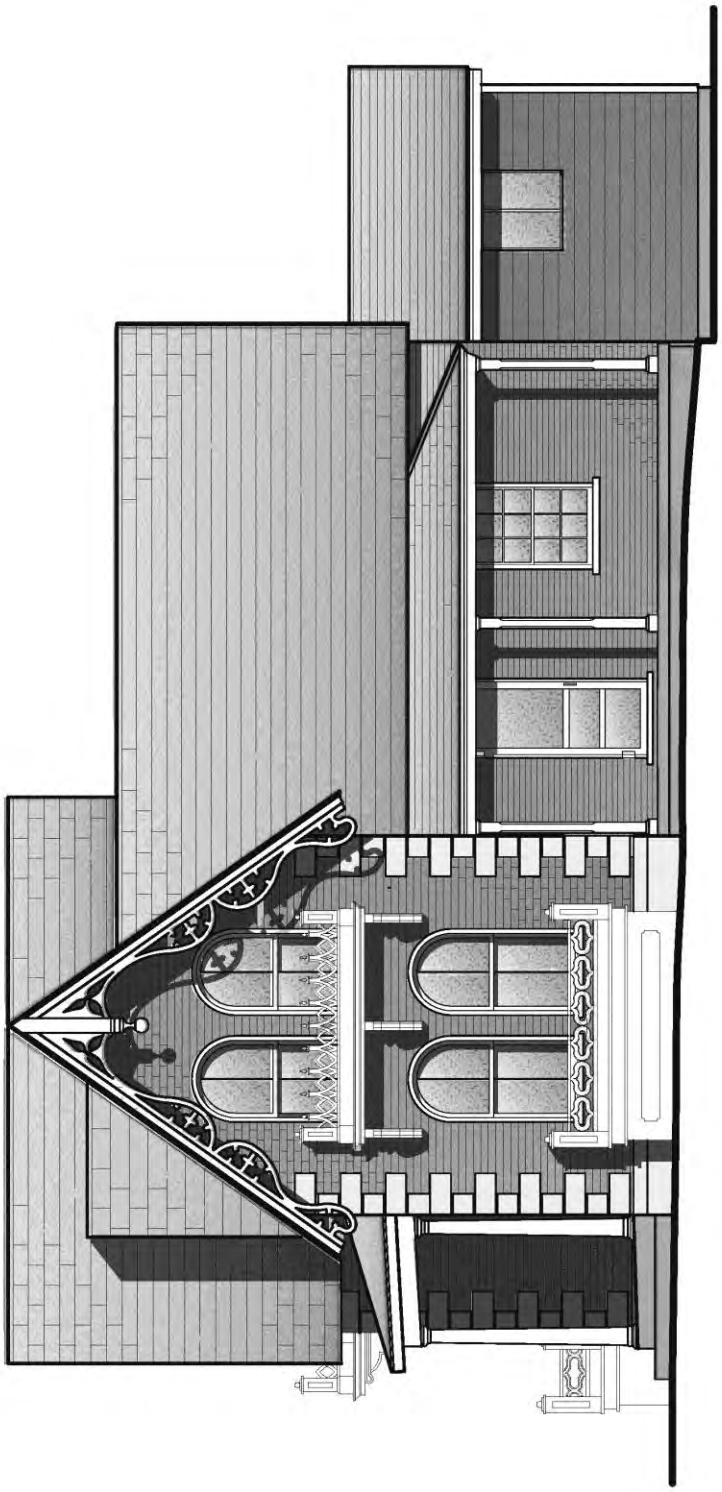

RIDGE
PORCH ROOF
RIDGE
BENT
RIDGE
RIDGE
PORCH ROOF
2 0 2 4 10
SCALE FEET
ROOF PLAN
WILLIAM BONNER HOUSE



NORTH ELEVATION

WILLIAM BONNER HOUSE

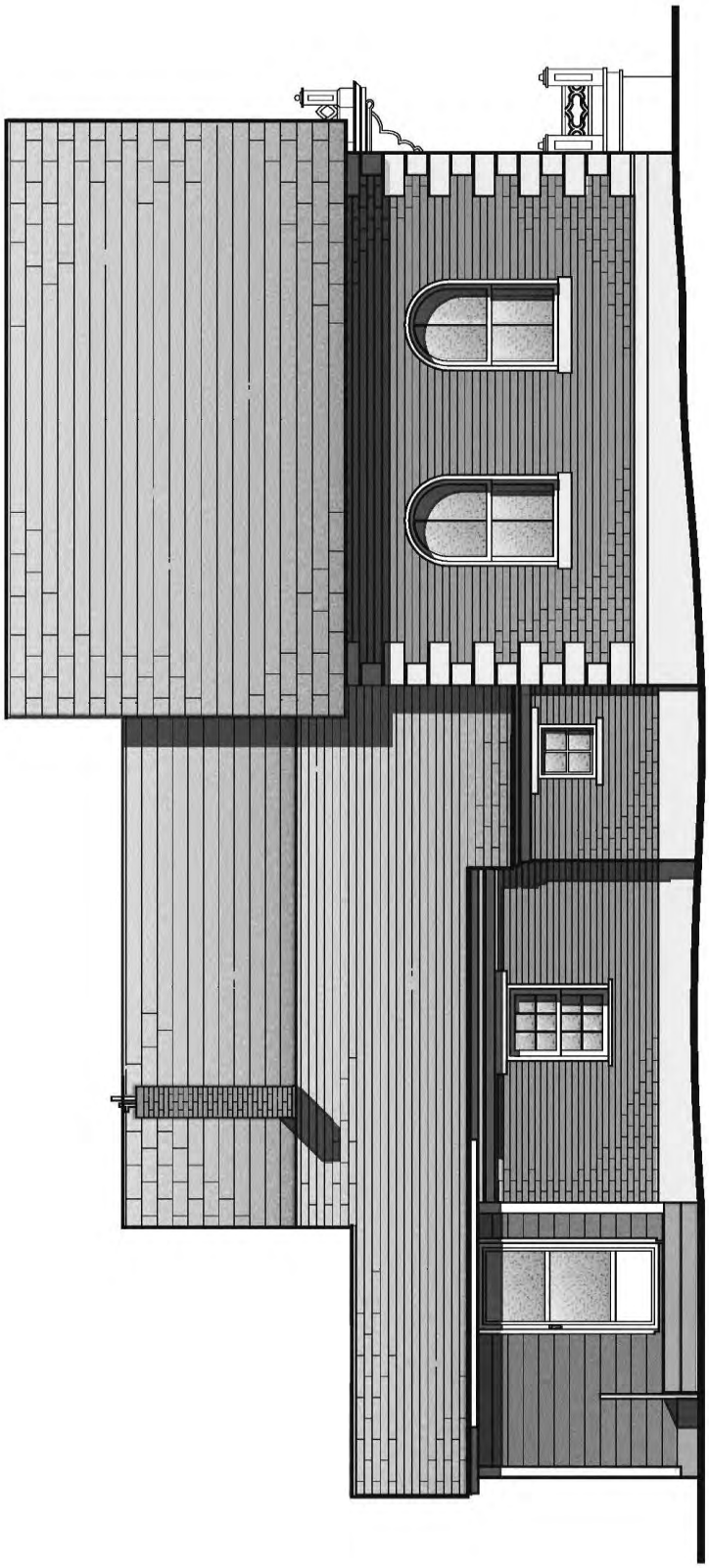
SCALE 2 0 2 4 10 FEET



WEST ELEVATION
WILLIAM BONNER HOUSE

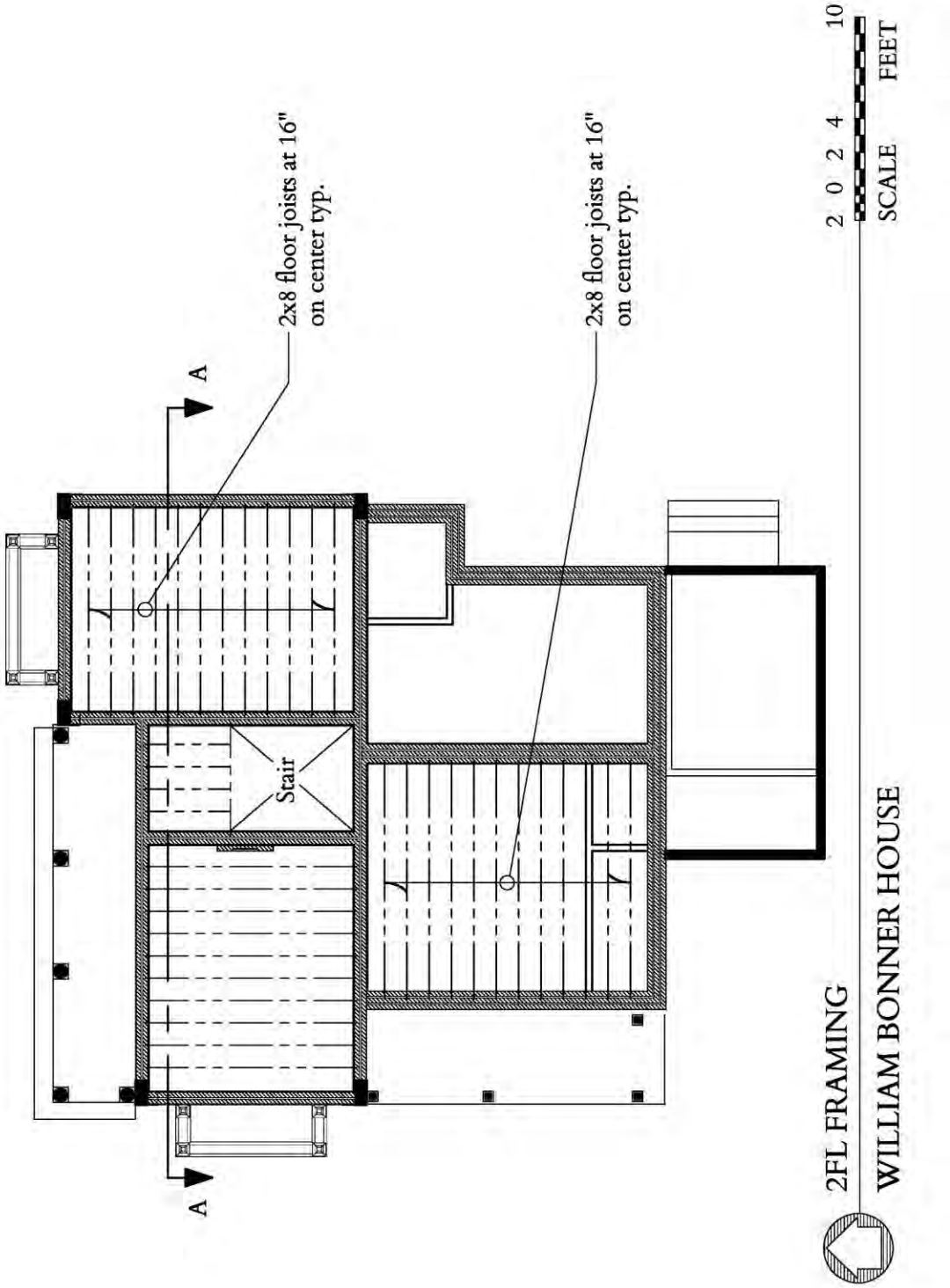
SCALE 2 0 2 4 10 FEET

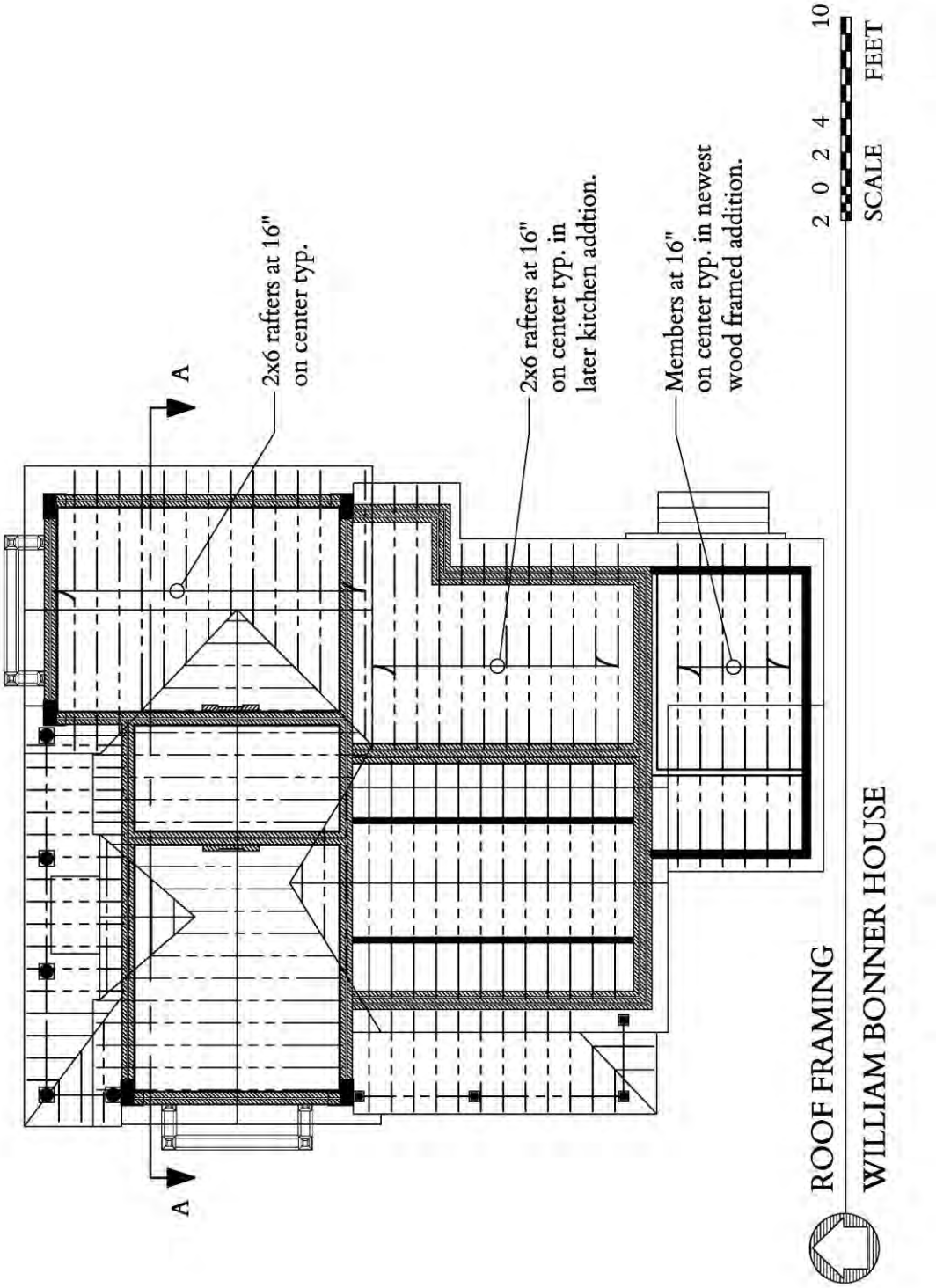

SOUTH ELEVATION
WILLIAM BONNER HOUSE
SCALE
2 0 2 4 10
FEET

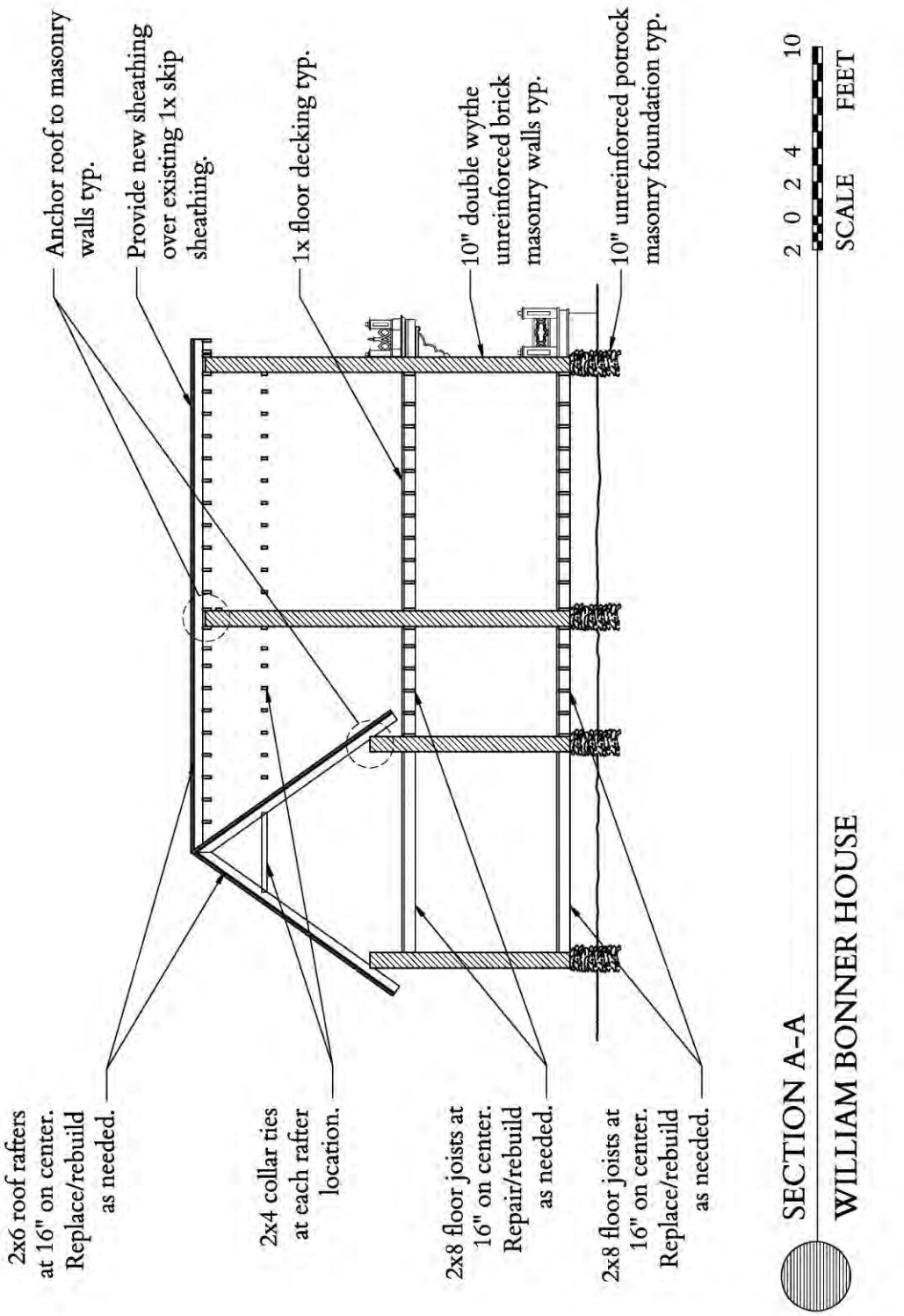


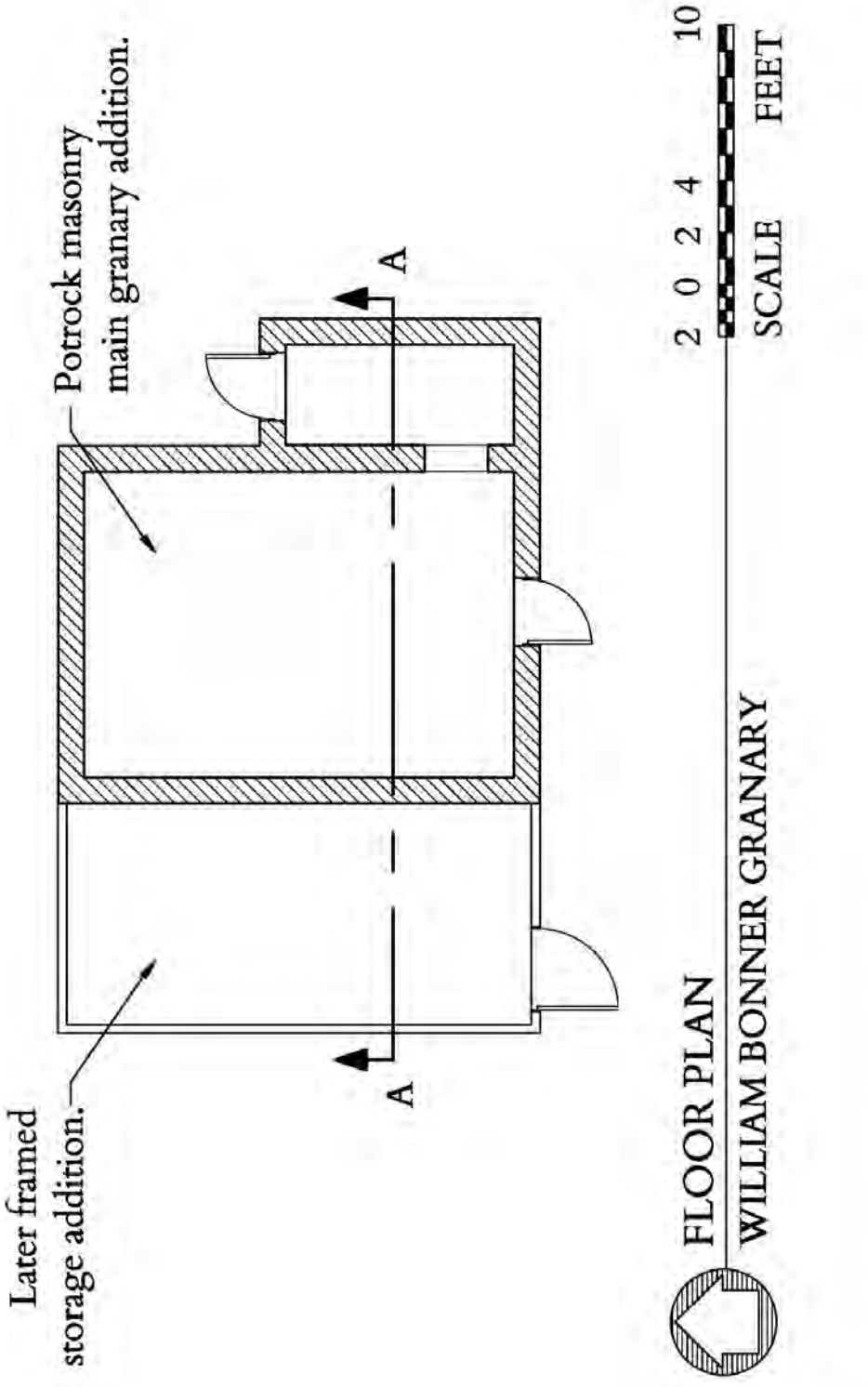
EAST ELEVATION
WILLIAM BONNER HOUSE

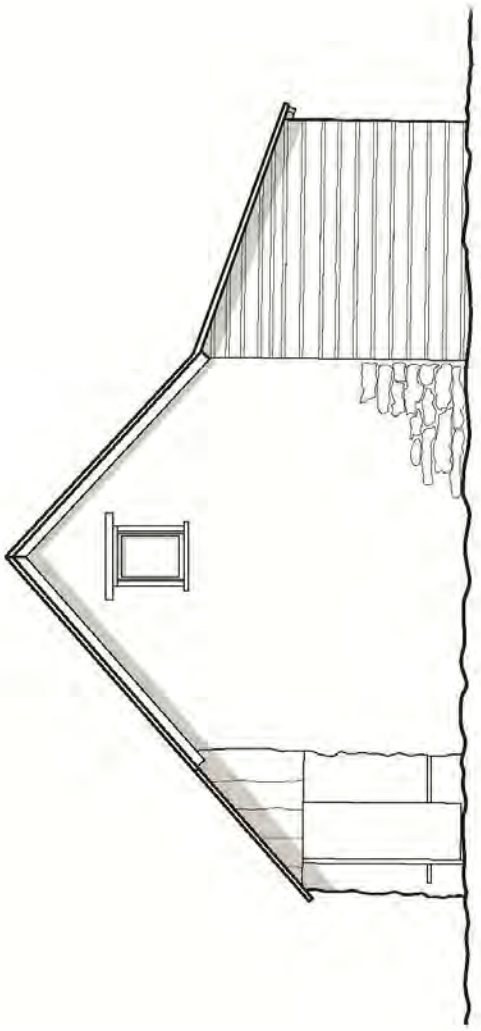
SCALE 2 0 2 4 10 FEET


2x8 floor joists at 16" on center typ.
2x8 floor joists at 16" on center typ.
A
A
Stair
2 0 2 4 10
SCALE FEET
2FL FRAMING
WILLIAM BONNER HOUSE


A
A
2x6 rafters at 16" on center typ.
2x6 rafters at 16" on center typ. in later kitchen addtion.
Members at 16" on center typ. in newest wood framed addition.
2 0 2 4 10
SCALE FEET
ROOF FRAMING
WILLIAM BONNER HOUSE

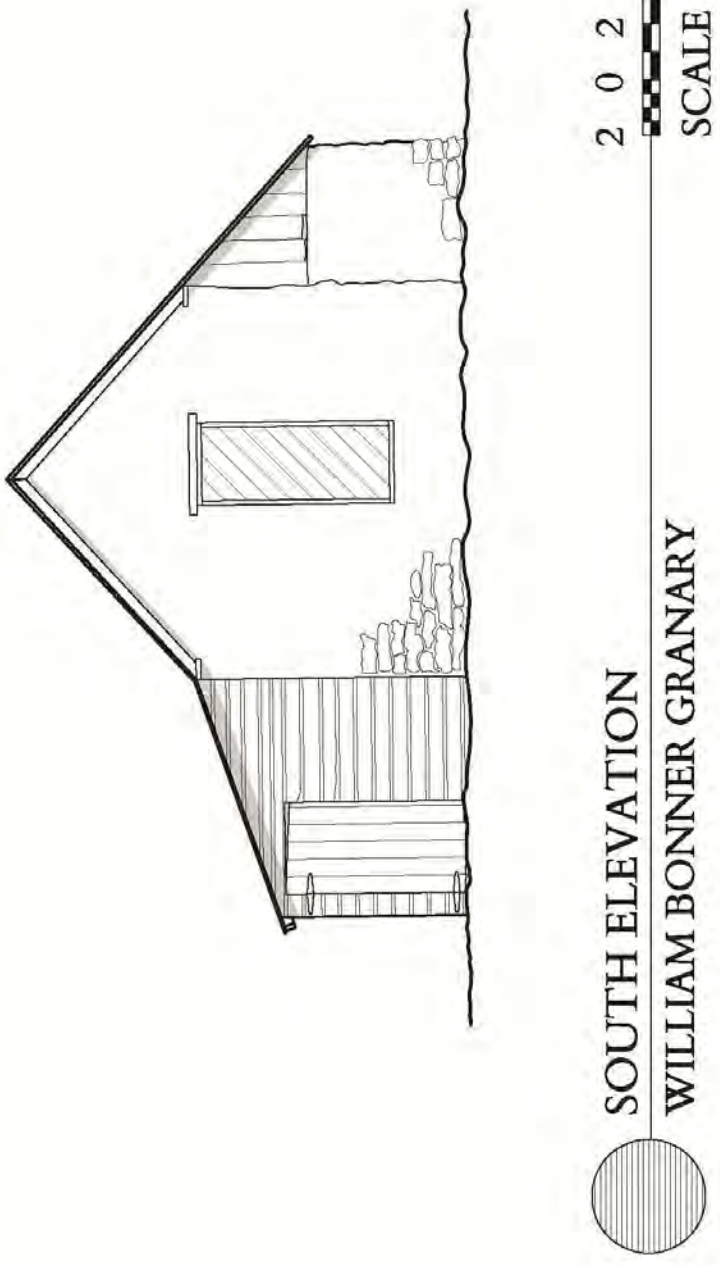

Anchor roof to masonry walls typ.
Provide new sheathing over existing 1x skip sheathing.
1x floor decking typ.
10" double wythe unreinforced brick masonry walls typ.
10" unreinforced potrock masonry foundation typ.
2x6 roof rafters at 16" on center. Replace/rebuild as needed.
2x4 collar ties at each rafter location.
2x8 floor joists at 16" on center. Repair/rebuild as needed.
2x8 floor joists at 16" on center. Replace/rebuild as needed.
2 0 2 4 10
SCALE FEET
SECTION A-A
WILLIAM BONNER HOUSE

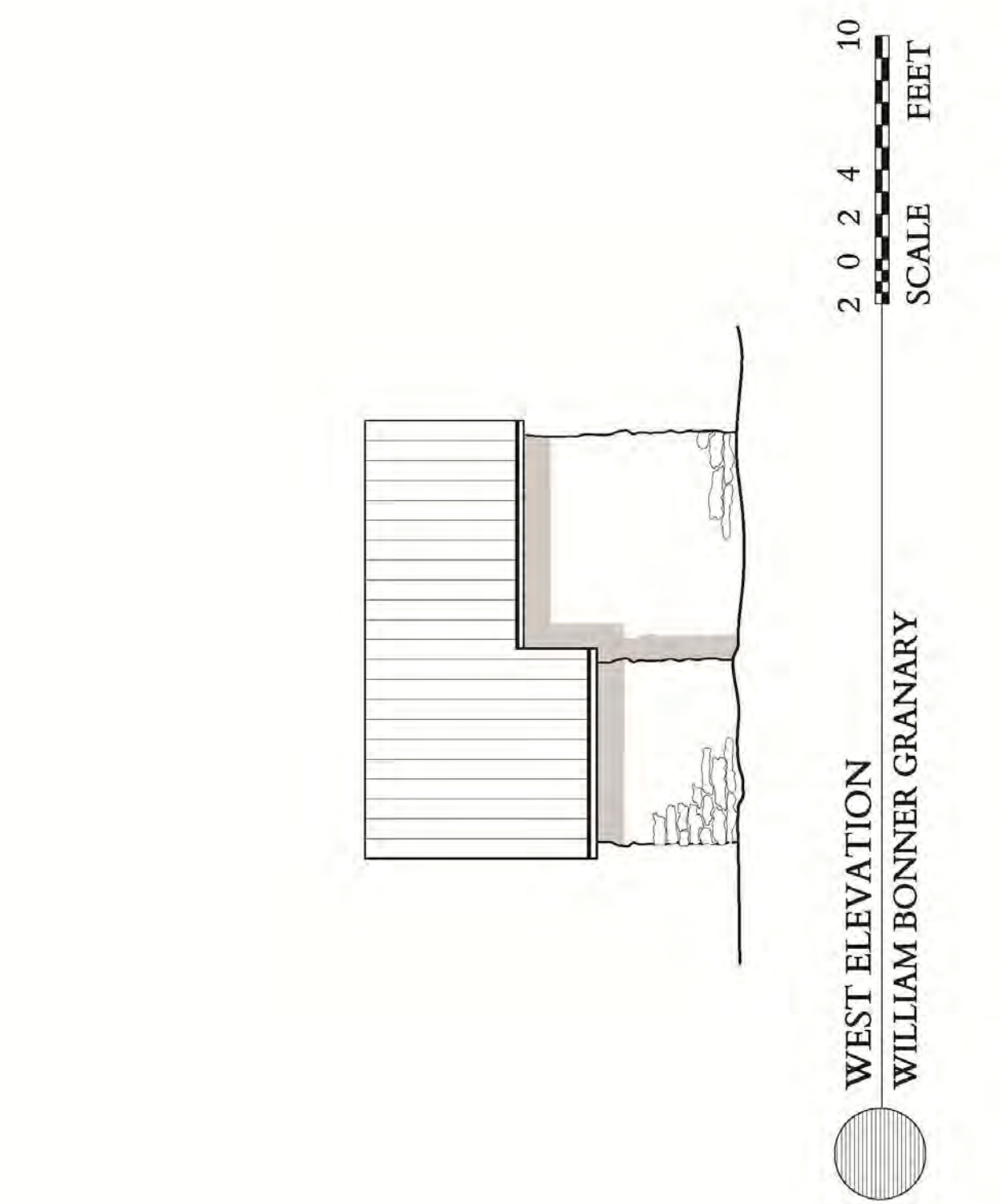

Potrock masonry
main granary addition.
Later framed
storage addition.
A
A
2 0 2 4 10
SCALE FEET
FLOOR PLAN
WILLIAM BONNER GRANARY

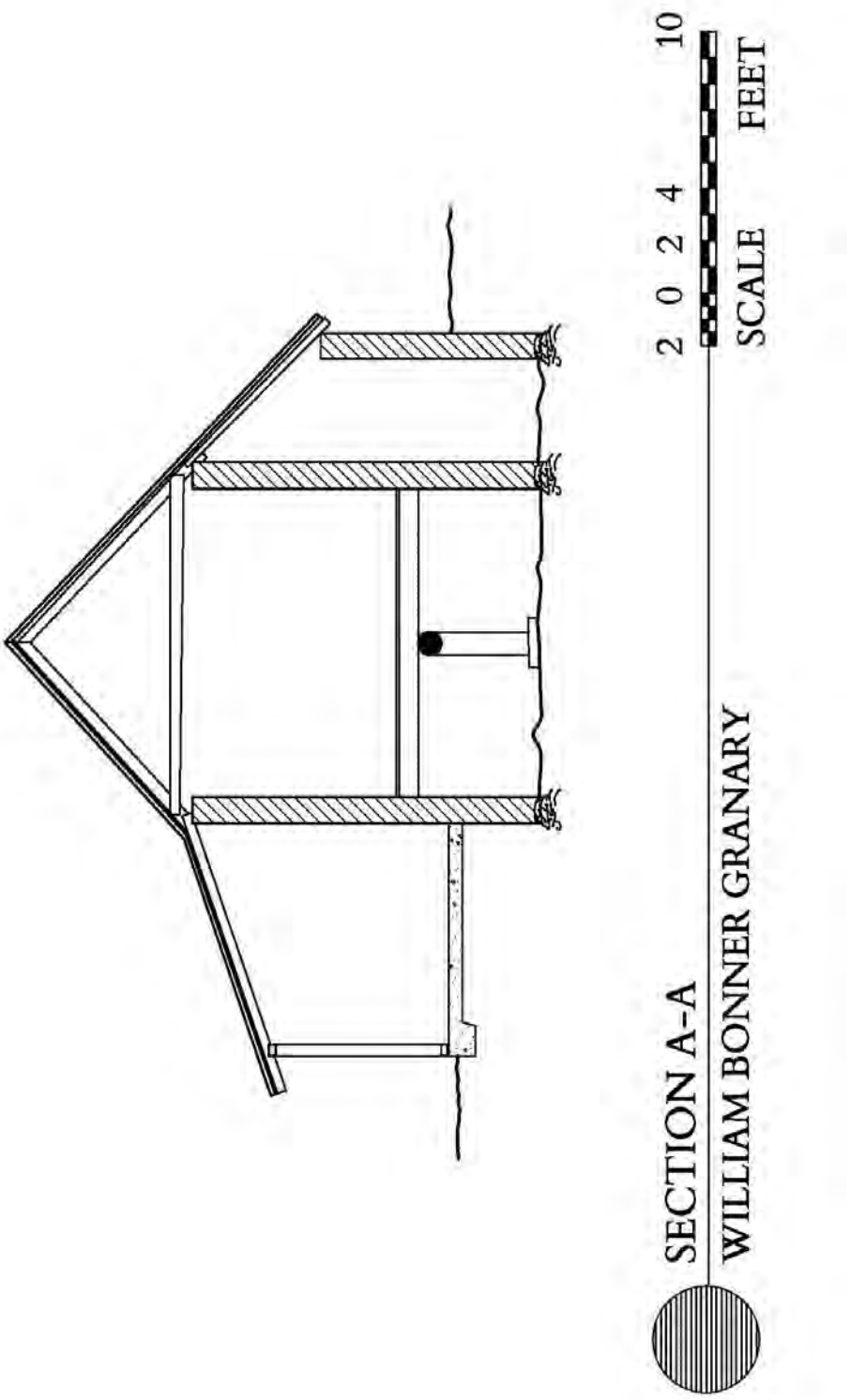


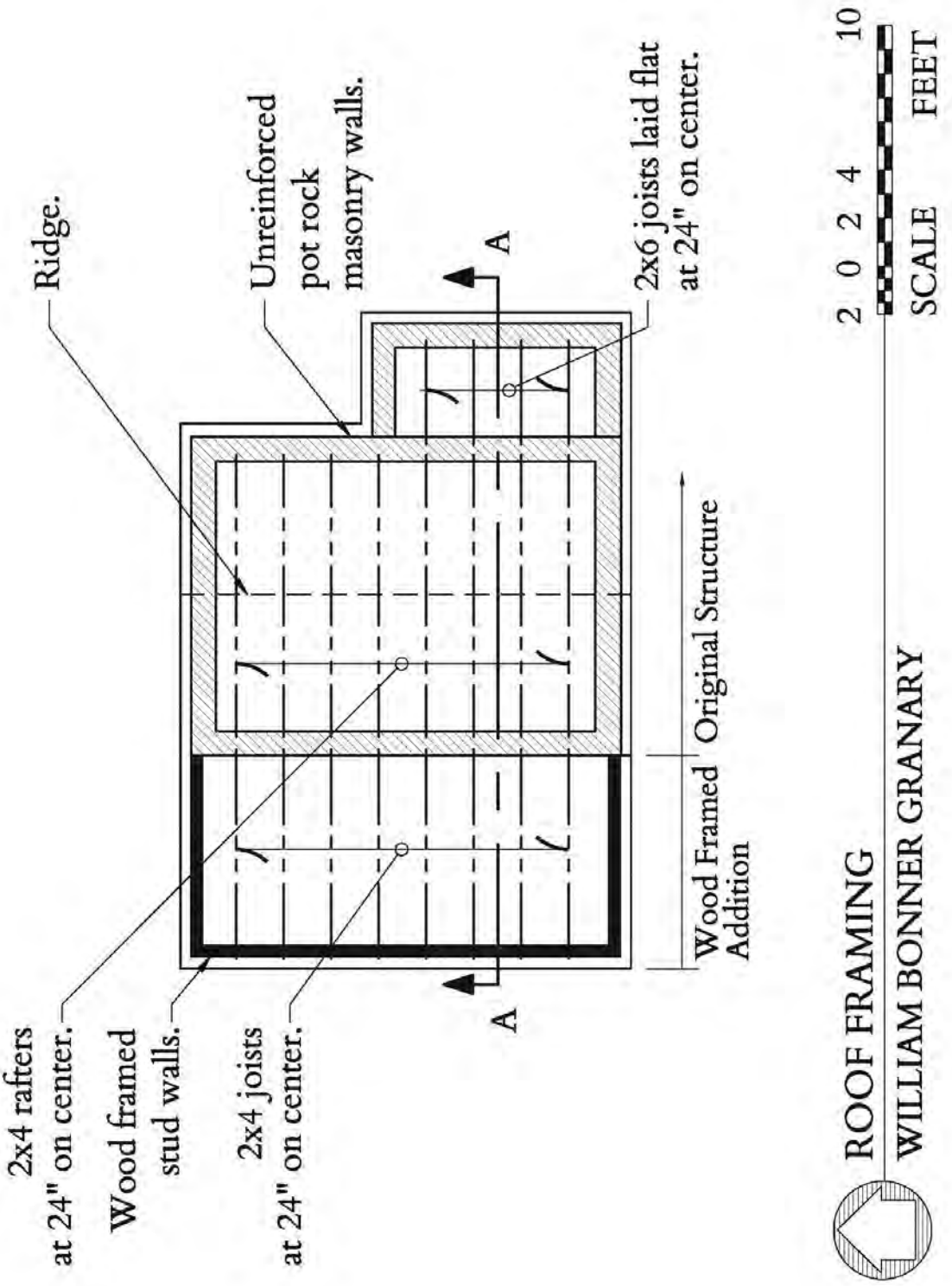
NORTH ELEVATION
WILLIAM BONNER GRANARY

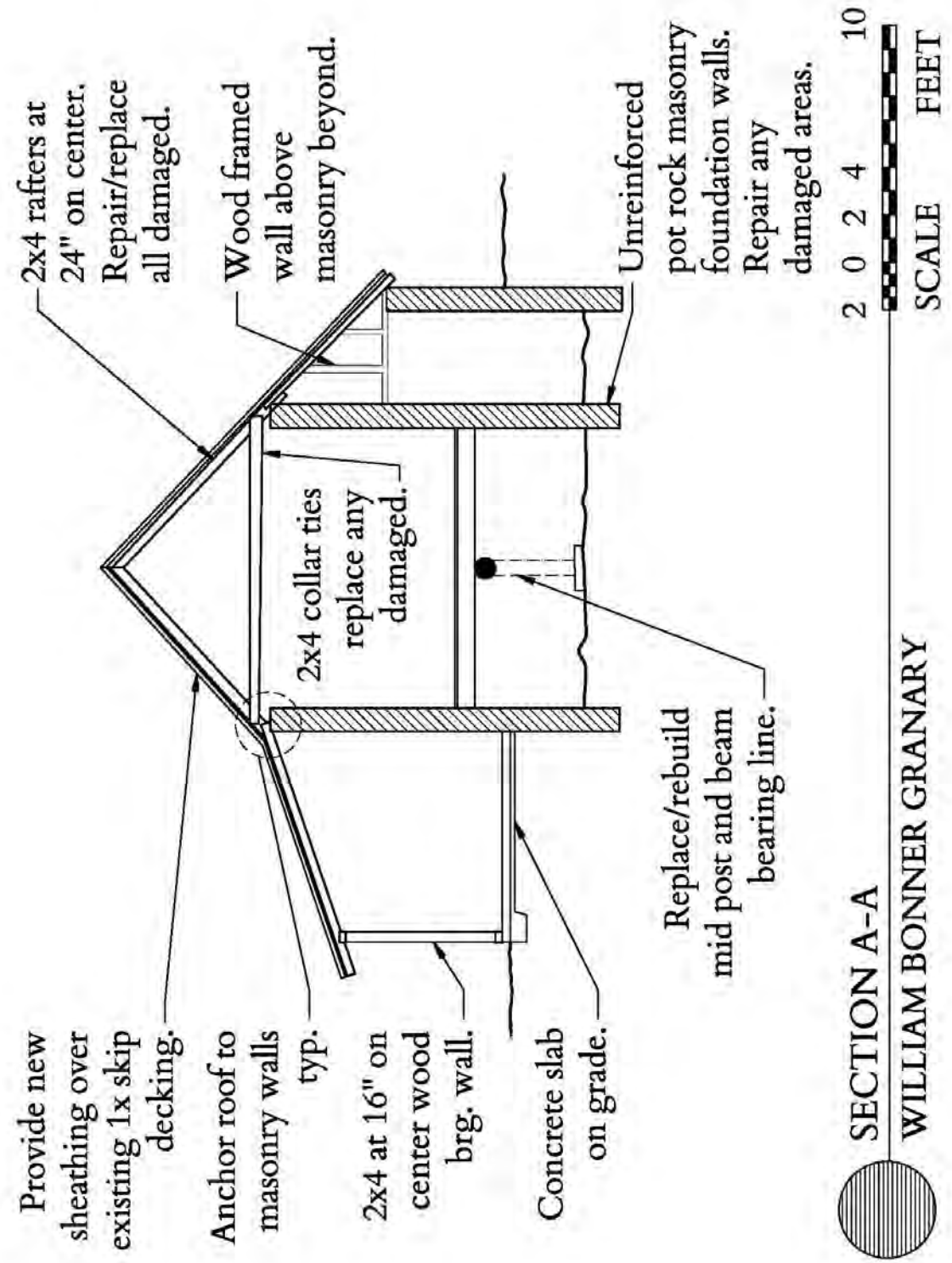
2 0 2 4 10
SCALE FEET

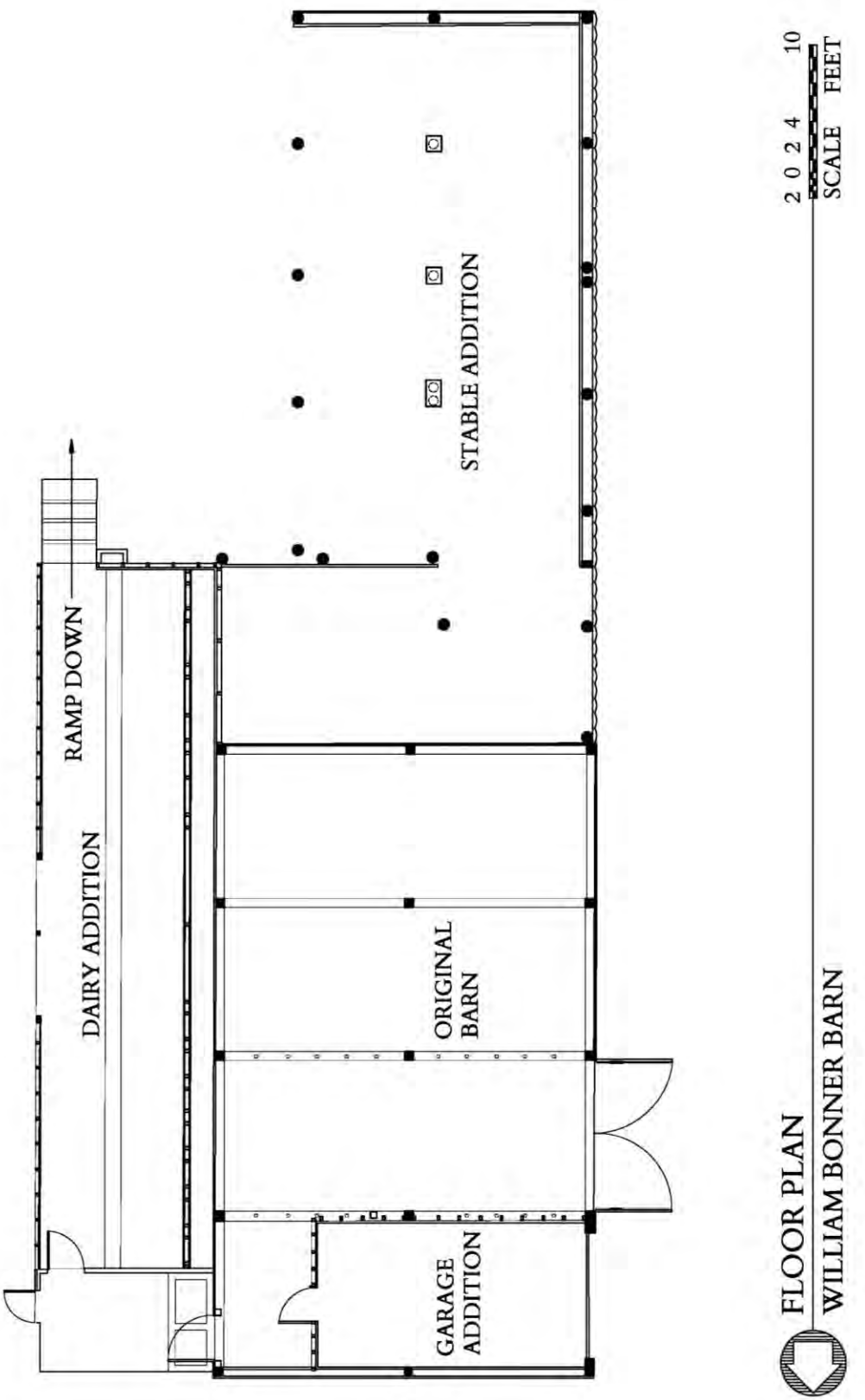

SOUTH ELEVATION
WILLIAM BONNER GRANARY
SCALE
2 0 2 4 10
FEET

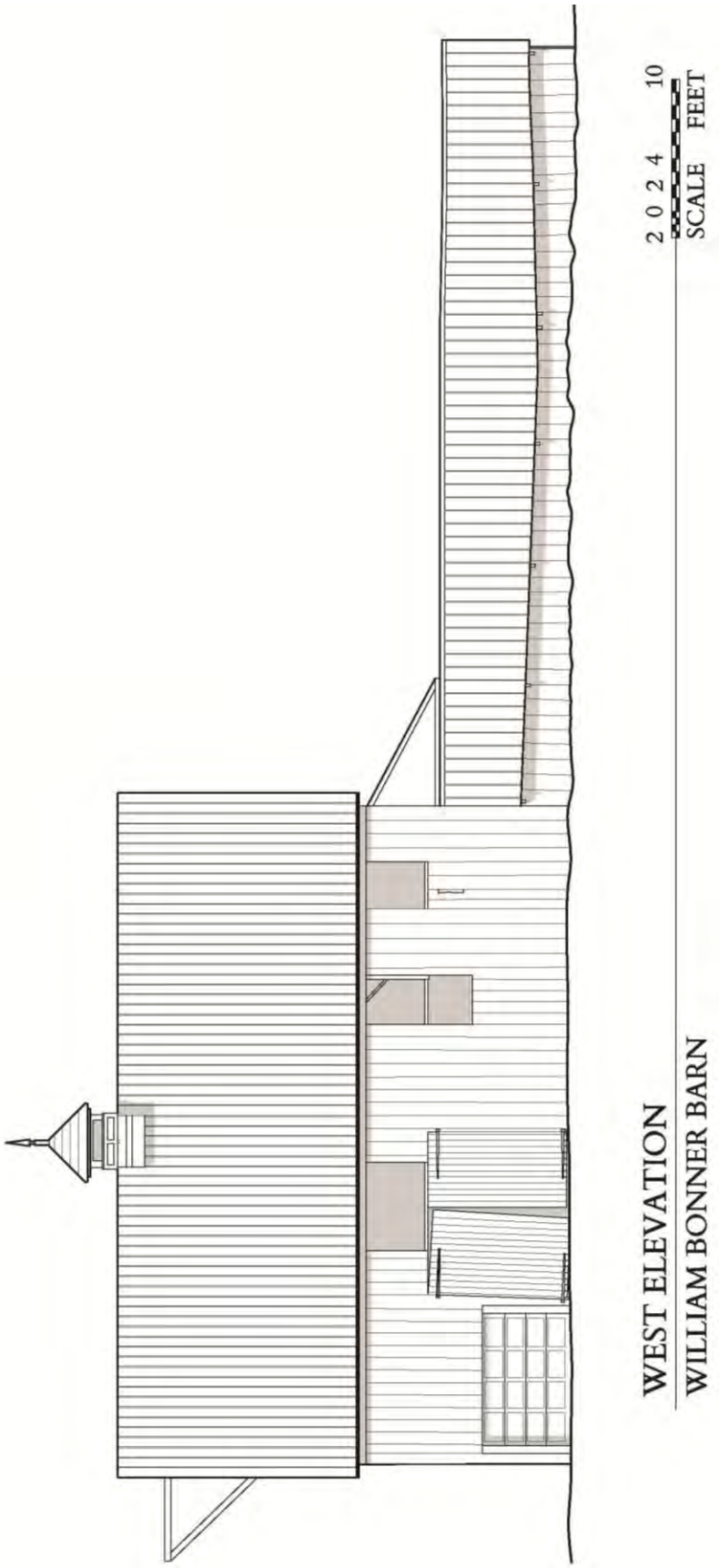

WEST ELEVATION
WILLIAM BONNER GRANARY
SCALE
2 0 2 4 10
FEET

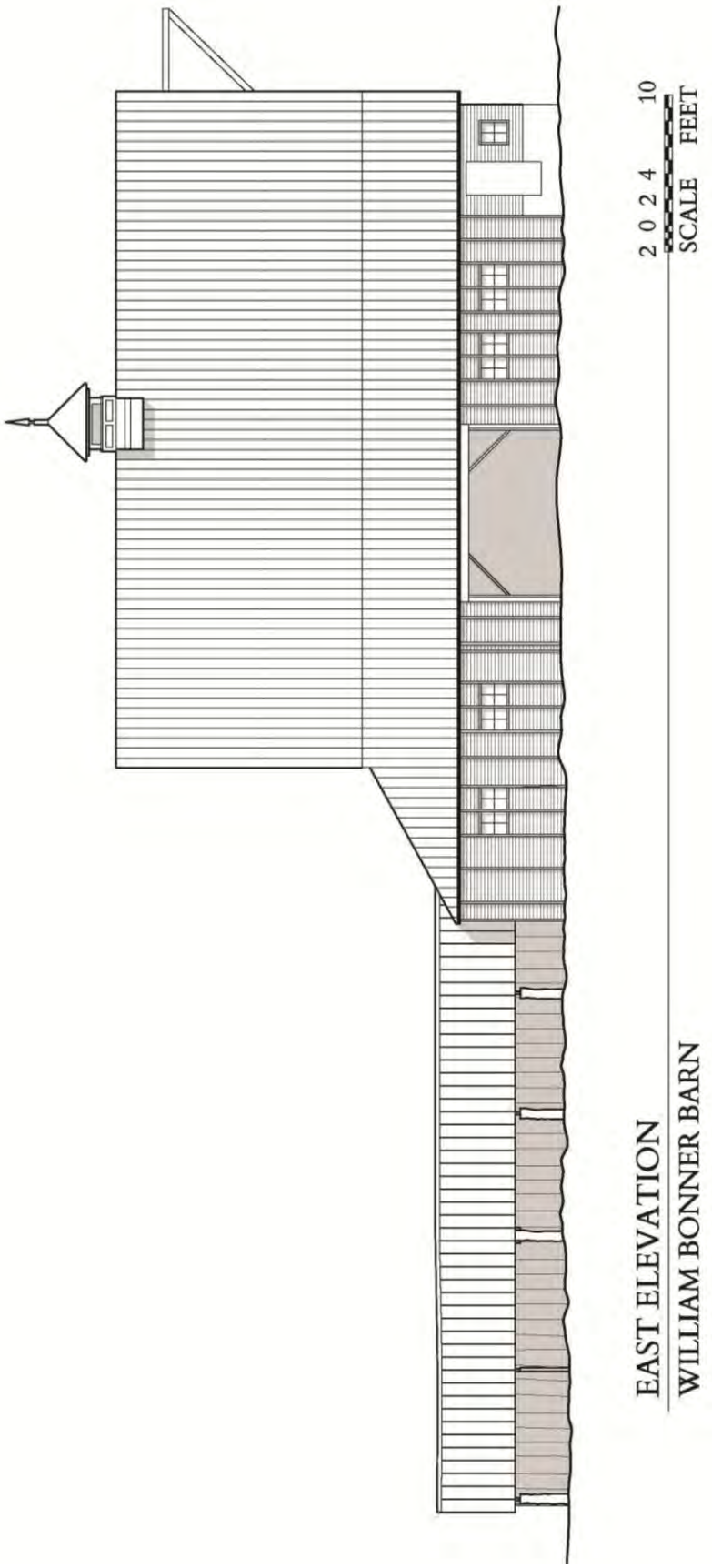

SECTION A-A
WILLIAM BONNER GRANARY
SCALE
2 0 2 4 10
FEET

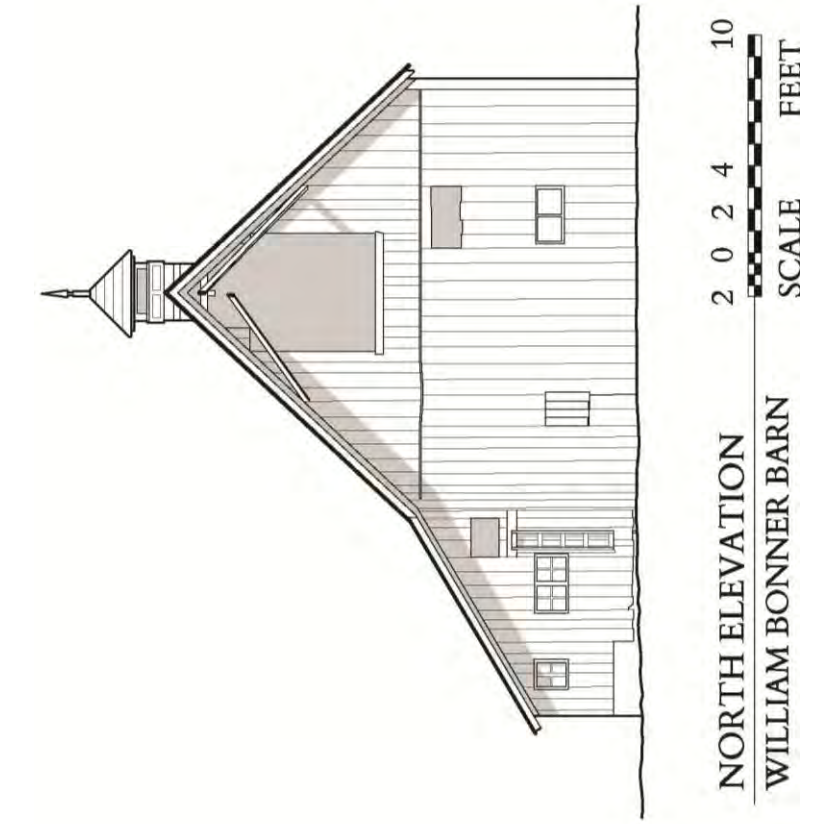

Ridge.
Unreinforced pot rock masonry walls.
A
2x6 joists laid flat at 24" on center.
2x4 rafters at 24" on center.
Wood framed stud walls.
2x4 joists at 24" on center.
A
Wood Framed Addition
Original Structure
2 0 2 4 10
SCALE FEET
ROOF FRAMING
WILLIAM BONNER GRANARY


2x4 rafters at 24" on center. Repair/replace all damaged.
Wood framed wall above masonry beyond.
Unreinforced pot rock masonry foundation walls. Repair any damaged areas.
2x4 collar ties replace any damaged.
Replace/rebuild mid post and beam bearing line.
Provide new sheathing over existing 1x skip decking.
Anchor roof to masonry walls typ.
2x4 at 16" on center wood brg. wall.
Concrete slab on grade.
2 0 2 4 10
SCALE FEET
SECTION A-A
WILLIAM BONNER GRANARY

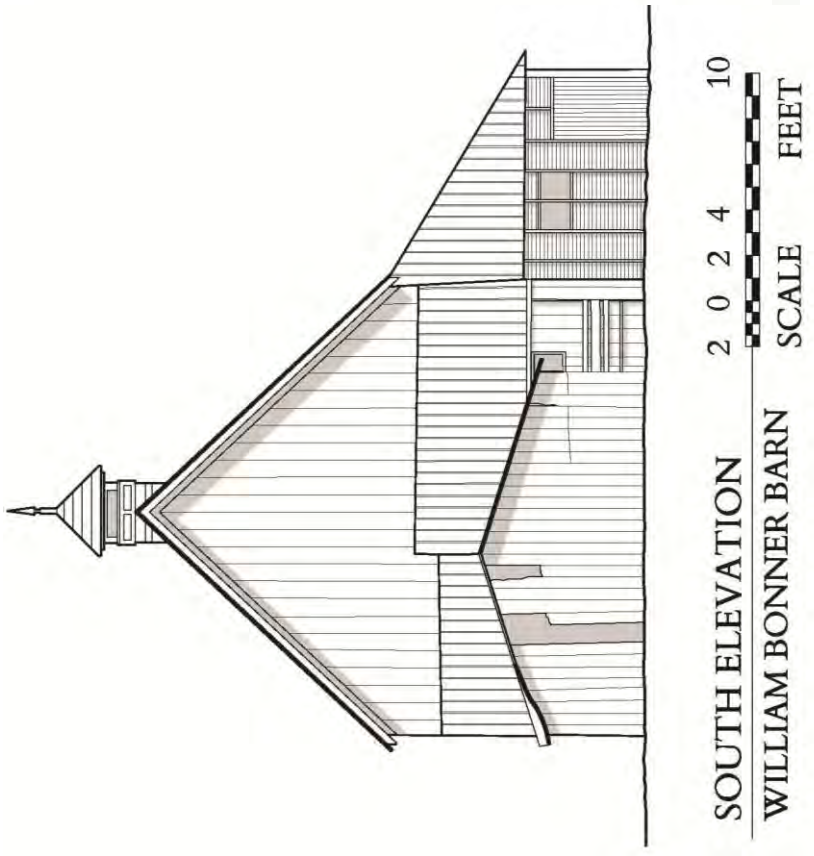

STABLE ADDITION
RAMP DOWN
DAIRY ADDITION
ORIGINAL BARN
GARAGE ADDITION
0 2 4 10
SCALE FEET
FLOOR PLAN
WILLIAM BONNER BARN


WEST ELEVATION
WILLIAM BONNER BARN
SCALE FEET
0 2 4 10

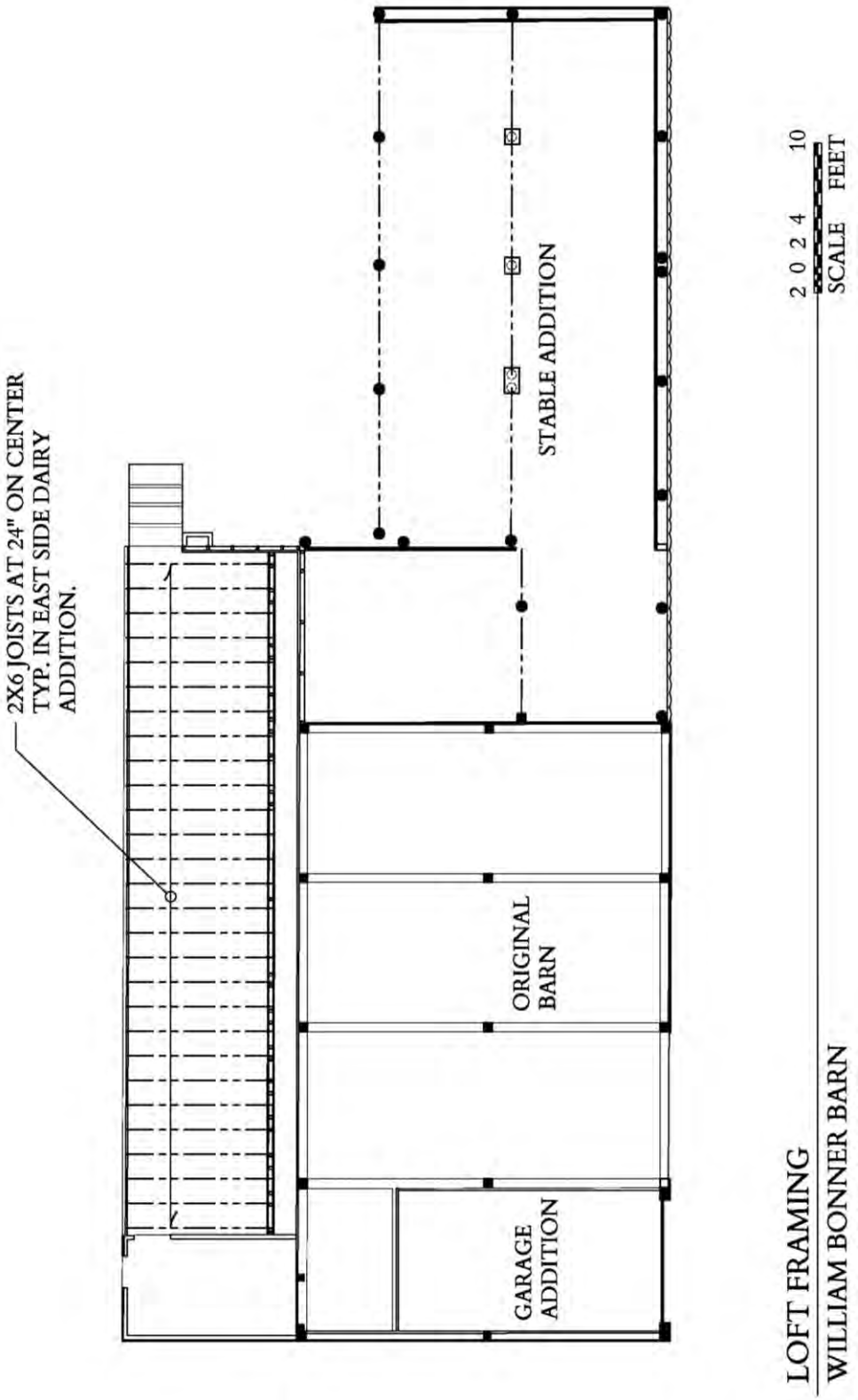

0 2 4 10
SCALE FEET
EAST ELEVATION
WILLIAM BONNER BARN



NORTH ELEVATION
WILLIAM BONNER BARN
SCALE 2 0 2 4 10 FEET

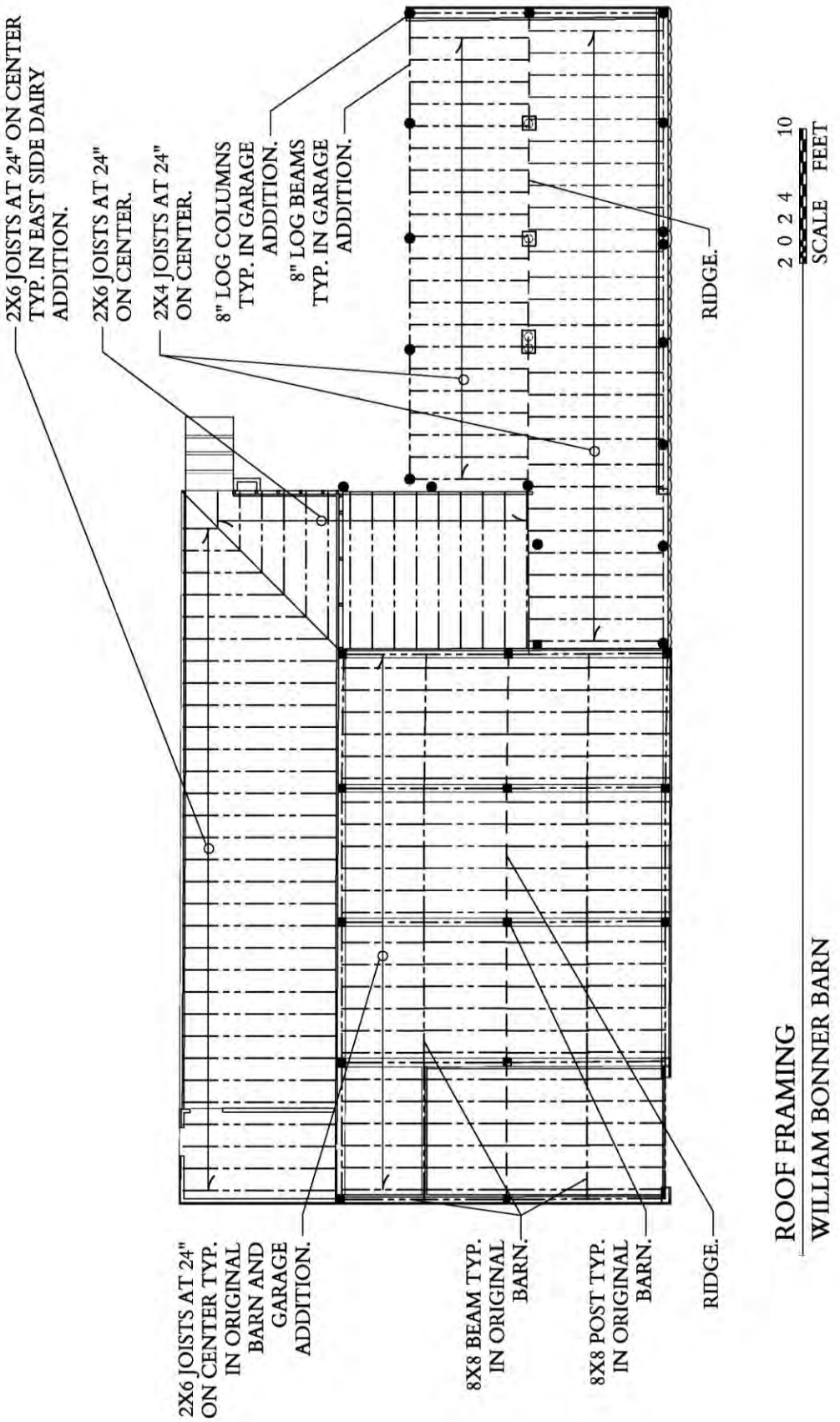


SOUTH ELEVATION
WILLIAM BONNER BARN
SCALE 2 0 2 4 10 FEET

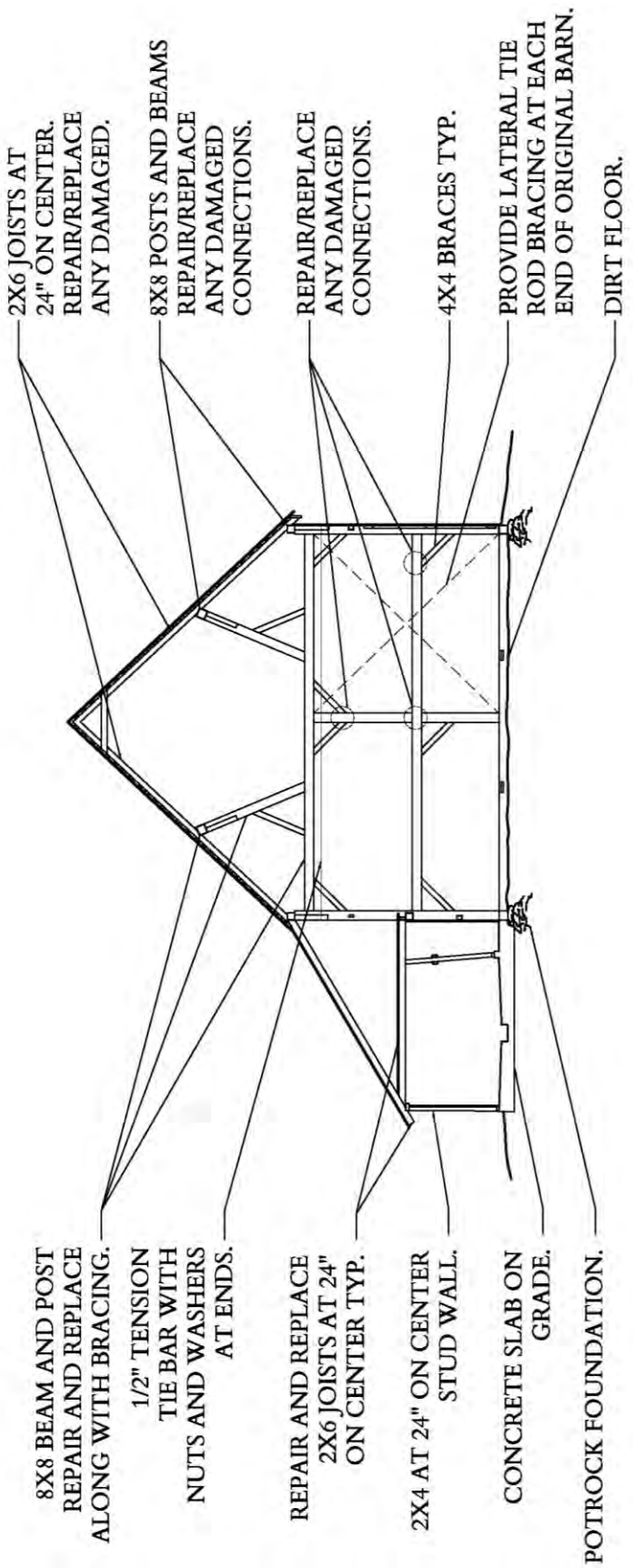


LOFT FRAMING

WILLIAM BONNER BARN



ROOF FRAMING
WILLIAM BONNER BARN



EAST WEST CROSS SECTION

WILLIAM BONNER BARN

3.0 STRUCTURE CONDITION ASSESSMENT

3.1 SITE

DESCRIPTION:

The site consist of one large parcel and a small portion of a another parcel on the Southeast corner of Main St. and 100 East. The primary parcel is Parcel 4, and contains .7 acres of land. The second plot of land, the partial parcel, is Parcel 5. This is in a rectangular shape, but angled at the southwest corner to acknowledge the shape of the barn. The primary building, the William Bonner House, is situated near the front (North) of the lot, centered from East to West. North of the house can be found several outbuildings clustered around the end of the driveway. These outbuildings include a wood-framed shop, a cinder block garage, a wood-framed outhouse, a potrock granary and a box-framed barn, the latter three dating from around the same time as the original house. Behind the house, on the west end of the lot are two large trees, and a main drainage canal runs along the west end of the lot.

There is a concrete walkway leading from the house north to the street sidewalk, where a three-step staircase mediates the transition to the higher street from the lower lot. Along the eastern end of the lot runs a wire fence where several fruit trees are growing. To the rear of the lot, near the outbuildings, a driveway cuts in from west to east, north of the barn and terminates at the east end before the garage. North of the garage, working from east to west, is the outhouse and shop, and to the west of the shop is the granary. The barn is located at the southeast corner of the lot, running parallel with 100 East.

Parking is on the street and can accommodate several cars on 100 East and on Main St.

No archaeological artifacts are believed to be present of the site.

CONDITION:

The site has a slight grade from north to south. The north or front end of the house occupies the highest portion on the site, and the drainage pitches down away from the house to the south. Irrigation channels are located along the western border of the lot. No flooding or site drainage problems were observed.

RECOMMENDATIONS:
A new, more welcoming entry to the home can be considered instead of the poorly executed abrupt staircase on the sidewalk from the street. This sidewalk is the result of the most recent renovation to Midway. It was supposed to make the town more walker friendly, but instead raised grade level of the road to leave all homes south of Main Street lower several feet. A terraced or ramped walkway may be better in place of the existing concrete stair. Accessibility may be addressed if this staircase if redesigned.

3.2 FOUNDATIONS

GENERAL DESCRIPTION:
The perimeter foundation walls are stone, and presumably rest on pot rock footings in a T-shaped configuration. The exact width of the footings cannot be determined without destructive testing, but it is presumed to be slightly wider than brick withes above. For most of the original portion of the house, the pot-rock foundations are often as far as one to two inches outboard from the brick.

The balance of the foundations report is by Shaun Packer, Calder Richards Engineering. It is separated into distinct sections for house, granary, and barn. Other notes in this section are in parentheses. The complete report is found in original format in the appendix.

HOUSE FOUNDATIONS:

DESCRIPTION:
The structural system of the Home is primarily supported by unreinforced limestone type masonry foundations. The limestone masonry is known locally as “Pot Rock”. It was mentioned that the Pot Rock was quarried nearby and is used throughout the area for structural foundations and exterior wall systems. The Pot rock is typically light in color and filled with vesicles. Vesicles are small cavities or air pockets formed by the expansion of gas bubbles or steam during the formation of the rock.

It is not uncommon for the time when this home was built to use local masonry type materials such as loose stones or quarried rock. The Pot rock was relatively inexpensive and suitably strong enough to be used effectively in a foundation system.

CONDITION:
The foundations range in condition from satisfactory to good. The mortar joints within the Pot Rock foundations were observed in some areas to be deteriorated. These areas mostly occurred where the foundation has been exposed to an increased amount of moisture. At the west side for example; it appears that lawn sprinklers have been directed towards the house thus allowing the water to cause deterioration of the mortar within the masonry joints.

RECOMMENDATIONS:
Repair any cracked and damaged areas of masonry foundations. All damaged mortar joints need to be repointed. Repointing is the process of carefully removing and replacing any damaged or deteriorated mortar joints. Care should be taken to redirect any surface drainage away from the home. Watering sprinklers should also be redirected so that they do not spray towards the Home.

GRANARY FOUNDATIONS:

DESCRIPTION:
The structural system of the Granary is primarily supported by unreinforced limestone type masonry foundations. The limestone masonry is known locally as “Pot Rock”. It was mentioned that the Pot Rock was quarried nearby and is used throughout the area for structural foundations and exterior wall systems. The Pot rock is typically light in color and filled with vesicles. Vesicles are small cavities or air pockets formed by the expansion of gas bubbles or steam during the formation of the rock.

It is not uncommon for the time when this home was built to use local masonry type materials such as loose stones or quarried rock. The Pot rock was relatively inexpensive and suitably strong enough to be used effectively in a foundation system.

CONDITION:
The foundations for the Granary range in condition from poor to satisfactory. It was observed in a few spots that the mortar joints have deteriorated to a point that the Pot Rocks have loosened and failed. See photos on following page.

Granary, with loose foundation stones and failed mortar. (Packer, 2010).

RECOMMENDATIONS:

Repair any cracked and damaged areas of masonry foundations. All damaged mortar joints need to be repointed. Repointing is the process of carefully removing and replacing any damaged or deteriorated mortar joints. Care should be taken to redirect any surface drainage away from the Granary. Watering sprinklers should also be redirected so that they do not spray towards the structure.

BARN FOUNDATIONS:

DESCRIPTION:

The structural system of the Barn is primarily supported by unreinforced volcanic limestone type masonry foundations. The limestone masonry is known locally as "Pot Rock". It was mentioned that the Pot Rock was quarried nearby and is used throughout the area for structural foundations and exterior wall systems. The Pot rock is typically light in color and filled with vesicles. Vesicles are small cavities or air pockets formed by the expansion of gas bubbles or steam during the formation of the rock. Mortared joints were not observed between the masonry units. See photo below.

Barn foundation (cropped). (Packer, 2010).

CONDITION:
The masonry foundations for the Barn are in poor condition. Mortared joints were not observed and the exterior foundations did not extend down for frost protection. Without mortared joints, the foundation system does not work together as a single unit and thus the structure is susceptible to differential vertical and some horizontal movement. Without frost protection, the structure is highly susceptible to vertical movement between seasonal temperature fluctuations. Knowing the above information however was probably of no concern to the original owners, since the structure still is and was used as a Barn.

RECOMMENDATIONS:
Due to the lack of an adequate long term foundation system at the Barn, it is recommended that the existing foundations be removed and new reinforced foundations provided.

3.3 BUILDING STRUCTURAL SYSTEM

The building structural system reports are by Shaun Packer, Calder Richards Engineering. Other notes in this section are in parentheses.

The purpose of this investigation was to provide a brief structural condition survey of the subject buildings and provide recommendations to help ensure their long term preservation.

The survey was based on an observation of the existing building structures that were accessible during a site visit. Miscellaneous structural calculations were also performed using the current International Building Code (IBC), International Existing Building Code (IEBC) and American Society of Civil Engineers (ASCE) 07-05 criteria to establish a comparison between existing capacity and current code requirements.

The William Bonner III House is a two story structure with a partial basement and crawl space located at 110 East and Main within the town of Midway, Utah. Also on site are several other ancillary structures. In addition to the home, there is also a large Barn, a Granary, a Garage and a couple other small structures.

Original Home. (Packer, 2010).

Home, showing additions (Packer, 2010).

HOUSE STRUCTURAL SYSTEM:

The original house was built around 1877. Two southern additions were provided later on to the original structure with the last addition being primarily wood framed. (See photo above). The age of their construction is unknown at this time; however, the last addition appears to be less than 50 years old. The house is approximately 1900 SF in size and currently vacant, but it was mentioned that it was used for some time as a rental.

HOUSE BUILDING STRUCTURAL SYSTEM

DESCRIPTION:

The roofs and floors are wood framed. The roof is wood framed with 2x6 rafters and collar ties and sheathed with 1x skip sheathing. See photos below.

Attic trusses in Bonner House (Packer, 2010).

The upper and lower level floors are also wood framed with 2x6 and 2x8 joists respectively. The floors are sheathed with 1x decking.

The roof and floor framing construction used in the home was commonly used in residential construction at the time it was built and in some instances is still used today except that plywood type sheathing is used in lieu of the 1x skip sheathing.

CONDITION:
The overall condition of the Home's roof and floor system appears to be in good condition when considering the age of the structure and the environment in which it has been exposed to.

Observation indicates that the roof and floor framing shows no significant signs of failure or distress. However, due to the age of construction, it's anticipated that some damaged framing will be uncovered with further observations.

Some brief calculations were performed on the structural system for review purposes to determine the loading capacity of the framing at various locations. The self-weight of structure and the Building Department's minimum requirements for live floor and roof snow loading were used in the analysis. Another guideline often used for determining acceptance is the Abatement of Hazardous Buildings Code. It states that if a structural member is loaded in excess of 150% of its capacity, a potentially dangerous hazard may occur within the framing element or structure. If the stress levels are found to be below 150% and the framing is in satisfactory condition, the framing in question is deemed acceptable.

Using residential type loading, the majority of the wood framing within the house calculates to be sufficient. However, the longer roof joists over the eastern first addition are approximately 33% over spanned. Since this is less than 50%, these joists are acceptable.

RECOMMENDATIONS:
Based on the above observations and findings, the majority of framing within the house has adequately supported the loading over their years of use. However, some upgrades will need to be made to ensure life safety and the long term preservation of the existing structures.

Any damaged roof and floor framing should be repaired or replaced. It's recommended that the roof shingles be removed from each structure and the roofs sheathed with ½" sheathing

placed over the existing skip sheathing. The existing 1x skip sheathing does not provide much lateral structural strength.

HOUSE BUILDING ENVELOPE – EXTERIOR WALLS

DESCRIPTION:

The exterior walls and a few interior bearing walls for the Home are framed with unreinforced multiwythe solid brick type masonry commonly referred to as URM walls. The masonry brick units are each approximately 2" x 4" x 8" in size and appeared to be made from fired or kiln dried clay. Each wall is comprised of two layers or wythes of interlocking patterned brick to form a total thickness of approximately 8". The lay-up pattern of the brick masonry appeared to have a good interlocking pattern. This pattern allows the two brick wythes to work effectively as a single thicker wall thus providing increased structural strength in both the vertical and horizontal directions.

Unreinforced Masonry Wall (URM) type construction is generally not used today especially in higher seismic regions. Its behavior during a significant seismic event is typically brittle, lacks any ductility and thusly cannot absorb any seismic energy. In fact, URM type construction is not allowed by the International Building Code (IBC) in any high or moderate seismically prone areas.

In a scale from A to F in which A is a non-seismic area, the William Bonner III site is classified as Seismic Design Category D. Therefore, it is in a high seismically prone region.

CONDITION:

The overall condition of the exterior walls at the Home ranges from good to satisfactory. The masonry walls show only minor signs of distress with only a bit of cracking within the mortar joints.

One area of concern with older masonry buildings is their seismic strength. Unreinforced masonry wall buildings have historically been found to perform poorly during a seismic event. The out-of-plane wall anchorage tying the URM walls to the roof and floor framing is typically missing or insufficient and therefore does not meet current code. It was observed that the out-of-plane wall anchorage was missing on the house.

A brief seismic strength analysis was performed on the home using methods and provisions outlined in the International Existing Building Code (IEBC). The IEBC provisions were established as a minimum standard for "existing buildings" in order to reduce the risk of

injury or loss of life during a seismic event. Based on our analysis it appears that the URM walls may be sufficient in resisting the minimum seismic force levels established in the IEBC code. However, due to the lack of wall anchorage, it's recommended that wall anchorage be provided.

It was mentioned that the owner may adapt the William Bonner House for Business or Mercantile use. Section 907.3.1 of the International Existing Building Code (IEBC) states that, "where such change in occupancy results in a reclassification of a building to a higher hazard category ... the building shall comply with the requirements of the International Building Code level seismic forces".

Per IEBC table 912.4, the change from residential (R-3) occupancy to business (B) occupancy does not qualify as a change in occupancy to a higher hazard category. However, from a residential (R-3) occupancy to Mercantile (M) occupancy does. That being said, Utah's amendment to IEBC has an additional exemption to section 907.3.1 stating, "Where the design occupant load increase is less than 25 occupants and the occupancy category doesn't change".

Our interpretation of the above code criteria indicates that provided the new occupant load within the house is below its original load plus 25, a seismic upgrade should not be required.

RECOMMENDATIONS:
Repair any cracked and damaged areas of masonry walls. All damaged mortar joints need to be repointed. Provide new roof and floor anchorage along the masonry walls. This anchorage is typically installed at 4'0" on center. The tall chimneys above the Home's roof line should also be braced near the top and back down to the roof. Tall URM chimneys do not perform well during a seismic event and are considered falling hazards.

HOUSE STRUCTURE - CONCLUSION

Overall condition of the historic Home is remarkable considering that they have been subjected to heavy snow loading and the harsh exposure for over 130 years of use. That said, considerations should be made in maintaining the building and correcting observed problems within the structure that may jeopardize their integrity, preservation and long term use. Upgrading the historic structure to meet full compliance with code is well beyond the scope of work, is cost prohibitive and may not be completely feasible. Instead it is the

intent to provide cost effective recommendations for correction that will help maintain and ensure the long term preservation of the structures.

It should be noted that the above findings and recommendations were based solely on review of the existing structural conditions that were accessible and exposed at the time of observation. This report does not express nor does it imply any warranty of the structures but only addresses conditions as documented above.

GRANARY STRUCTURAL SYSTEM:

The Granary is a single story masonry structure with a crawlspace below. Attached to the West side of the original structure is a wood framed addition. The Granary is approximately 550 square feet in size and the age of construction is also unknown at this time. The Granary does not currently appear to be in use.

GRANARY BUILDING STRUCTURAL SYSTEM

DESCRIPTION:
The roof and floor joists were observed to be 2x4s and 2x6s respectively and are also sheathed with 1x skip sheathing at the roof and 1x decking at the floor.

The roof and floor framing construction was commonly used in residential construction at the time it was built and in some instances is still used today except that plywood type sheathing is used in lieu of the 1x skip sheathing.

CONDITION:
The Granary's roof and floor system appeared to be in satisfactory to poor condition. Much of the roof and floor framing is damaged and will need to be repaired or replaced. A mid bearing beam line had been installed later on in order to stiffen the floor joists. However, this beam line needs to be repaired or rebuilt. The siding on the west side addition is also in poor shape and needs to be replaced. See photo on following page.

Granary west elevation. (Packer, 2010).

Some brief calculations were performed on the structure for review purposes to determine the loading capacity of the framing at various locations. The self-weight of structure and the Building Department's minimum requirements for live floor and roof snow loading were used in the analysis.

Another guideline often used for determining acceptance is the Abatement of Hazardous Buildings Code. It states that if a structural member is loaded in excess of 150% of its capacity, a potentially dangerous hazard may occur within the framing element or structure. If the stress levels are found to be below 150% and the framing is in satisfactory condition, the framing in question is deemed acceptable.

The roof framing was shown to be adequate except for the 2x6 joists loaded flat wise at the east side. These joists will need to be stiffened or reframed. The floor framing only showed to be adequate as long as a mid-beam / bearing line is provided. However, as mentioned earlier, this mid-beam line needs to be repaired or replaced.

Recommendations:

Based on the above observations and findings, the majority of framing within the granary has adequately supported the loading over their years of use. However, some upgrades will need to be made to ensure life safety and the long term preservation of the existing structures.

Any damaged roof and floor framing should be repaired or replaced. It's recommended that the roof shingles be removed from each structure and the roofs sheathed with ½" sheathing placed over the existing skip sheathing. The existing 1x skip sheathing does not provide much lateral structural strength.

GRANARY BUILDING ENVELOPE – EXTERIOR WALLS

DESCRIPTION:

The Granary's exterior walls are just a continuation of the foundation system in that they are comprised of unreinforced Pot Rock Masonry. Unreinforced Masonry Wall (URM) type construction is generally not used today especially in higher seismic regions. Its behavior during a significant seismic event is typically brittle, lacks any ductility and thusly cannot absorb any seismic energy. In fact, URM type construction is not allowed by the International Building Code (IBC) in any high or moderate seismically prone areas.

In a scale from A to F in which A is a non-seismic area, the William Bonner III site is classified as Seismic Design Category D. Therefore, it's in a high seismically prone region.

CONDITION:

The overall condition of the exterior walls for the Granary walls may be considered as satisfactory. One area of concern with older masonry buildings is their seismic strength. Unreinforced masonry wall buildings have historically been found to perform poorly during a seismic event. The out-of-plane wall anchorage tying the URM walls to the roof and floor framing is typically missing or insufficient and therefore does not meet current code. It was observed that the out-of-plane wall anchorage was missing.

A brief seismic strength analysis was performed on the structures using methods and provisions outlined in the International Existing Building Code (IEBC). The IEBC provisions were established as a minimum standard for "existing buildings" in order to reduce the risk of injury or loss of life during a seismic event. Based on our analysis it appears that the URM walls may be sufficient in resisting the minimum seismic force levels established in the IEBC code. However, due to the lack of wall anchorage, it's recommended that wall anchorage be provided.

RECOMMENDATIONS:
Repair any cracked and damaged areas of masonry walls. All damaged mortar joints need to be repointed. Provide new roof and floor anchorage along the masonry walls. This anchorage is typically installed at 4'0" on center.

GRANARY STRUCTURE - CONCLUSION

Overall condition of the Granary is remarkable considering that they have been subjected to heavy snow loading and the harsh exposure for over 130 years of use. That said, considerations should be made in maintaining the building and correcting observed problems within the structure that may jeopardize their integrity, preservation and long term use.

Upgrading the historic structure to meet full compliance with code is well beyond the scope of work, is cost prohibitive and may not be completely feasible. Instead it is the intent to provide cost effective recommendations for correction that will help maintain and ensure the long term preservation of the structures.

It should be noted that the above findings and recommendations were based solely on review of the existing structural conditions that were accessible and exposed at the time of observation. This report does not express nor does it imply any warranty of the structures but only addresses conditions as documented above.

BARN STRUCTURAL SYSTEM:

The Large Barn is a wood post and beam type structure. Over time, a couple of additions have been provided on to the original barn structure. See photos below. The south side garage addition is also framed with posts and beams but with stripped log type members. The east side addition is framed a bit differently in that the exterior is framed with stud walls. It is unknown at this time when the original barn was built along with its additions. The Barn currently is being used for miscellaneous storage space.


Barn, exterior view and interior showing post-and-beam structure. (Packer, 2010).

BARN BUILDING STRUCTURAL SYSTEM

DESCRIPTION:

The large Barn structural system is wood framed with a post and beam type system. The roof and partial floors are framed with 2x6 joists, sheathed with 1x decking, and supported by solid 8x8 timber beams and posts. The beam to post connections are then stiffened and braced somewhat with the addition of smaller 4x4 timber members. See Appendix Photos 2 and 6. The unique thing about the original Barn construction is that mortise and tenon type connections are used throughout at the posts to beams and bracing. These types of connections are labor intensive and if done properly are aesthetically pleasing and very strong. Post and Beam timber construction is still used today but is typically cost prohibitive due to the time and effort it requires.

CONDITION:

The condition of the large Barn appeared to be poor especially at its southern addition. It was observed in several areas that the post and beam connections have either failed or partially failed.

At some point in time, steel tie rods were installed to help tie/hold the original barn structure from side to side in order to resist bowing of the structure. The steel rods can be seen in the photos on the following page. The upper level floor and roof of the East addition has pulled away from its supporting beams and has been inadequately modified to try and keep the floor system in place.


Interior photos of barn, showing steel tension rods. (Packer, 2010).

The Southern addition has also racked and many of the beams and columns appear under-sized. See photo below.


South barn addition. (Packer, 2010).

Some brief calculations were performed on the structure for review purposes to determine the loading capacity of the framing at various locations. The self-weight of structure and the Building Department's minimum requirements for live floor and roof snow loading were used in the analysis.

Another guideline often used for determining acceptance is the Abatement of Hazardous Buildings Code. It states that if a structural member is loaded in excess of 150% of its capacity, a potentially dangerous hazard may occur within the framing element or structure. If the stress levels are found to be below 150% and the framing is in satisfactory condition, the framing in question is deemed acceptable.

Apart from the many post to beam and bracing connections that need to be repaired, the majority of the original Barn framing members calculated to be sufficient. The framing for the two additions however, are both insufficient. The roof and floor joists for the east side addition are well over stressed and by appearance alone, one can tell that the framing for the south addition is also well over stressed.

RECOMMENDATIONS:
The storage within should be cleaned out and then any nonstructural items removed. This will allow for other damaged structural members and connections to be identified and repaired.

Unstable Portions of the Barn that were added on to the original Barn should be removed. As with the other structures, repair or replace any damaged posts, beams and joists. Any damaged post and beam connections should also be repaired.

BARN BUILDING ENVELOPE – EXTERIOR WALLS

DESCRIPTION:
As mentioned earlier, the structural system for the Barn is a timber post and beam type system. The exterior walls have post and beams sided with 1x wood siding.

CONDITION:
The condition of the Barn's exterior wall framing ranges from poor to satisfactory. The seismic loading on the barn structure is relatively low; however, its ability to resist the loading is suspect.

The majority of the existing post and beam connections have loosened and several have partially failed. The exterior vertical siding is in poor condition. Along with repairing the existing connections, new tension rod bracing is recommended around the original barn structure to help stabilize the building.

RECOMMENDATIONS:
All damaged posts and beams and their connections should be repaired or replaced. Any damaged siding should also be replaced. New tension rod bracing should also be provided around the original Barn structure to help stabilize the building.

BARN STRUCTURE - CONCLUSION

Considerations should be made in maintaining the Barn structure and correcting observed problems within the structure that may jeopardize its integrity, preservation and long term use. However, due to the many concerning items mentioned above, economics of saving the structure must be considered.

Upgrading the historic structure to meet full compliance with code is well beyond the scope of work, is cost prohibitive and may not be completely feasible. Instead it is the intent to provide cost effective recommendations for correction that will help maintain and ensure the long term preservation of the structure.

It should be noted that the above findings and recommendations were based solely on review of the existing structural conditions that were accessible and exposed at the time of observation. This report does not express nor does it imply any warranty of the structures but only addresses conditions as documented above.

EXTERIOR FINISHES

DESCRIPTION:
The primary exterior building material of the William Bonner House is brick. Most brick is currently painted dark red on the original house addition and early kitchen, to a lighter, less saturated tint, on the later kitchen addition. Some portions of the brick have received one or more layers of paint, as have the quoins.

CONDITION:
The exterior brick is for the most part in fair condition.

(Integrate data from Abstract Masonry here)

The paint detracts rather than contributes to the wall surfaces. By that estimation, it is in poor condition.

RECOMMENDATIONS:
All paint on brick and stone should be removed using only non-abrasive methods, with a gentle spray with warm water and light chemical solution as recommended by the masonry

specialist. Sand or water blasting should not be undertaken on the building, nor should the brick be painted.

EXTERIOR APPENDAGES (PORCHES, STOOPS, PORTICOES, ETC.)

DESCRIPTION: A front porch is present, made of concrete covered with synthetic "trex" style decking. A classical colonnade supports the porch roof, which was not original but apparent just several years after the house was built. There is a porch also on the west side of the house similar to the north. The colonnade is slightly different with square posts instead of the classical versions on the front. There is also a concrete stoop on the Southeast end of the house used for entry through the mudroom.

CONDITION:
Both porches are in fair to good condition. Columns for the west porch are wooden and all are noticeably drying out and rotted. The stoop on the Southeast corner is relatively new and in good condition. No water damage is visible–the stoop itself may be considered aesthetically damaging though.

RECOMMENDATIONS:
The structure for both of the porches may want to be redesigned similar to the George Bonner Sr. specifications if restoration of this manner is desired. The columns for the western porch need replacement, and this could provide the opportunity to specify something closer to the original. If the mudroom addition is to be reconstructed, a new entry stoop should be considered. If the house will be intended for commercial use, this reconstruction should include an ADA accessible ramp.
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3.5 BUILDING ENVELOPE–ROOFING AND WATERPROOFING

ROOFING SYSTEMS AND SHEET METAL FLASHING

DESCRIPTION:
The roof system consists of lapped aluminum shingles over skip sheathing. Valley flashing is of sheet metal. Similar metal flashing is to be found at the chimney. One small gutter is present above the stoop used for the rear entry on southeast corner of the house.

CONDITION:
Shingles are mechanically attached by nails to roof sheathing. Most shingles appear to be whole and intact. Very few shingles appear to be defective. The metal flashing for the valleys appears to be well-fastened and in good condition. There are areas near the bottom ends of the fascia on the gabled dormer on the North side where flashing seems in poor condition.

RECOMMENDATIONS:
The aluminum shingles that make up the roof system are a good material choice given the climate, but aesthetically, they are very displeasing. A cedar shake system similar to what the original house had may be a viable option.

3.6 WINDOWS AND DOORS

EXTERIOR AND INTERIOR DOORS, HARDWARE, TRIM, AND FINISHES

DESCRIPTION: CHECK NUMBERS / FINISHES
The building has a total of five wood exterior single doors on the main floor and one on the second floor. The original entry door on the North is a four panel door, which is recessed on the interior side, and revealed on the outside, with an arched transom window above. Two more doors, both two-panel with double arch lites, flank the main entry door under the porch, and provide direct entry and exit for the formal living room. A 2-panel door with a single lite provides entry from the Western porch, along with a wood screen door that seems to be original. The exterior entry door on the East wall of the mudroom addition is a typical hollow core wood door, with an aluminum screen door. The is an round arched 2 on 2 glass over 2 panel door.

On the interior a 4-panel solid core door with a ceramic doorknob is located between the early and later kitchen additions. A similar 4-panel solid core door is located between the early kitchen and formal living room. Upstairs original (what kind of doors) form entries into the boys and girls bedroom and the wood room.

All doors have wood frames. All of the exterior doors are painted in a darker shade of mauve.

The interior doors number seven (existing) single doors and three missing on the lower floor and three single doors on the upper floor. The majority of the interior doors are wood

with wood frames. Most interior doors are either flush or single-panel. These are painted, or left their natural wood color and varnished. Most interior door hardware is original, including several unique locking mechanisms.

CONDITION:
Most doors, both exterior and interior, are in good condition. The exterior round arched door on the second floor balcony is missing some trim. The exterior round arched entry doors for the formal living room have noticeable dry rot present and also have been painted shut.

RECOMMENDATIONS:
Exterior and interior doors and frames should be cleaned with mild non-abrasive cleaners. The second floor round arched balcony door may need to be sanded and painted, along with an installation of missing trim. If exterior formal living doors are wished to be operable, a careful removal and subsequent sanding and painting would be required.

EXTERIOR AND INTERIOR WINDOWS, HARDWARE, TRIM, AND FINISHES

DESCRIPTION:
The building includes windows on both floors above ground. Almost all windows are original, besides those located in the newer mudroom addition on the South. The original main parlor, foyer and living room addition features six windows, and the first early kitchen addition had at least two(over the process of the construction history the west wall on the early kitchen was plastered over and may have originally contained windows. The later kitchen addition features two windows, one of which located in the bathroom. There is also a window, now an alcove in the wall, located in the north wall of the later kitchen addition. The mudroom addition has two windows as well.

The upper floor contains seven windows in total with two windows in the boys' bedroom, three windows in the girls' bedroom, and two windows in the wood room.

The windows located on the main floor in the parlor and formal living room are all round arched, 2 over 2, single hung type. The windows in the early kitchen addition are both 6 over 6, single hung type, along with the window in the later kitchen addition. The window in the bathroom is a 4-pane square casement. Windows located in the newer mudroom addition are aluminum single pane sliders with screens and are not original.

Windows on the second floor boys' bedroom are similar to those below and are single hung, round arched, 2 over 2. The windows on the north wall of the girls' bedroom are the same as the boys bedroom, and the window on the South wall is similar to the 6 over 6 single hung windows on the main floor. The two windows in the wood room are six pane rectangular casement windows.

CONDITION:
All original windows appear to contain their original glazing. Windows generally range from poor to good condition. Most of the windows have been well maintained and painted at the interior, but allowed to succumb to dry rot at the exterior. Paint on the interior of the windows is generally in poor to fair condition, and paint on the exterior of the windows is nearly universally in poor condition.

The single-hung windows in the parlor on the main floor have had their sashes painted shut, and caulking is missing at sash and mullion. The sill trim does not appear to be original. The lower two panes of glass on both of the single hung round arched windows on the East wall formal living room appear to have waviness in the glass. The 6 over 6 single hung window in the later kitchen also has wavy glass panes.

On the upper floor, the single hung round arched windows in the girls bedroom have some trim missing and wavy glass panes. The sill trim on the 6 over 6 window on the South wall of the girls bedroom is not sturdily erected.

RECOMMENDATIONS:
Apply proper caulking to windows, where it is missing. Apply and replace trim to windows where missing, deteriorated or not original.

On exterior doors and several windows, consideration should be given to taking samples for laboratory spectrographic color analysis. Doors should have all peeling paint removed down to the next good paintable surface. Based on color information gained from the laboratory tests, doors should be repainted in a close approximation of their original color.

Refurbish windows as follows: Using gentlest means possible, remove all chipped and peeled paint from sash and frames only down to the next good paintable surface. Use epoxy filler to patch any damaged areas. Remove cracked glazing putty and re-putty. Prime sash and frames. Use epoxy filler on cracked sills as needed. Follow lead paint protocol. If double-hung windows are counterbalanced, replace all ropes and reset or replace any missing

weights. Where necessary, install new copper weather-stripping. Check all sashes for proper operation. Replace any cracked or missing panes with panes fabricated to match existing glass. Check leaded windows, and repair any bent or broken caming. Determine through laboratory spectrographic analysis whether windows and trim were originally painted or stained. Check inside finish. As appropriate to the original window treatment, paint to match the original.

3.7 INTERIOR FINISHES

ROOM FINISH MATERIALS

This portion of the report will be addressed systematically from room to room, addressing floors, walls, interior columns, wood trim, ceilings, stairs, and other finishes and fixtures. Please see plans in Section 2.2 for coordinating room numbers.

000 Basement: The basement floors are concrete, and the walls are stud framed sheathed in gypsum drywall furred over potrock masonry foundation walls. Three steps provide access into the crawlspace on the Eastern side of the basement.

101 Passage: The floors are tongue-and-groove wood; the walls are plaster. Decorative wood trim is present in unpainted wood molding. Ceiling is plaster over lathe similar to walls.

102 Parlor: The parlor is the first character-defining space. Floors are tongue-and-groove wood and walls and ceilings are plaster on lathe, painted white. There is wood base molding present along with floor registers. There is a brass light fixture with translucent glass suspended from the ceiling.

103 Later Kitchen: Floors in the later kitchen are laminate flooring in wood tongue-and-groove pattern. There is wood base molding and chair-rail along with wainscoting, all painted white. The walls are plaster and lather painted tan. Behind the kitchen sink and countertop is a tile backsplash.

104 Bath: The first bathroom has a laminate tile floor with lathe and plaster walls and ceiling, painted white. There is a pedestal sink, toilet, and bathtub. The bathtub has a tile surround which extends halfway up the wall, with a pull-bar.

105 Entry Mudroom: Floors in the mudroom are laminate wood similar to the later kitchen. There is baseboard molding and stud framed walls sheathed in painted gypsum.

106 Closet: The closet floor is a laminate wood pattern and the walls are painted gypsum.

107 Bath: The floors in the second bathroom are laminate wood, similar to the mudroom and later kitchen. The walls are painted gypsum. There is a fiberglass shower, toilet and wall-mounted sink. The ceiling is also painted gypsum.

108 Closet: The closet adjoining the former kitchen has a carpet floor with painted lathe and plaster walls and ceiling. An exposed heating duct runs through the center of the closet space adjacent to a closet partition wall with shelving.

109 Former kitchen: The former kitchen has carpet floors, presumably covering original tongue-and-groove wood floors. Walls and ceiling are painted lathe and plaster. There is baseboard molding around the perimeter.

110 Living Room: Floors in the living room are tongue-and-groove wood, which have been sealed. The walls and ceiling are painted lathe and plaster. On the East side of the room is a fireplace, which has been covered and painted. There is a brass lighting fixture covered in translucent frosted glass, suspended from the ceiling.

201 Stair and Passage: The floor in the passage is carpet. Painted wood baseboard is present. Walls and ceiling are painted lathe and plaster. Stairs treads, and risers are wood with natural stain where exposed covered with a carpet runner. A decorative stair rail twists as it ascends the staircase and is stained dark brown along with the balusters and classical newel.

202 NE Bedroom: Floors in the bedroom are carpet and walls and ceiling are painted lathe and plaster. Naturally stained wood baseboard is present. A fireplace has been covered and features naturally stained wood trim.

203 NW Bedroom: Floors in the bedroom are carpet and walls and ceiling are painted lathe and plaster. Naturally stained wood baseboard is present. A fireplace has been covered and features naturally stained wood trim.

204 Attic: The attic space has carpet floors with painted tongue-and-groove walls. An exposed heating duct runs lengthwise through the West end of the space. Two brass light fixtures with covered with translucent glass are fixed to the ceiling.

CONDITION:

The condition of the aforementioned rooms varies, and is stated generally here. Tongue-and-groove wood floors are on the whole in fair condition, but have been painted in the parlor and living room. Carpet, where it occurs, is in fair to good condition, as it is relatively new and free of stains. Laminate wood flooring in the later kitchen, mudroom and bath is in good condition. Plaster on the walls and ceilings throughout is in fair condition, as it has been repainted in recent history. Wood trim and wainscoting is in fair to good condition. The stair is structurally sound, but the stair rail is not, as noticeable structural reinforcement measures are present in the form of bracing rods. An indoor bath did not exist in the original house, and was an obvious addition with the later kitchen, along with the bath and mudroom to the south end of the house. The bath finishes are in fair condition, but are definitely not period.

RECOMMENDATIONS:

The following recommendations are made in an effort to preserve and restore the character defining features of the home. If the home is deemed for more practical future usage, some recommendations may not apply. It is strongly advised that an interior designer with expertise in period decorative arts be retained, especially one with technical knowledge of finishes and furnishings used in Mormon frontier homes in the mid-nineteenth century. This person should be should be in charge of finish and fixture installation.

Carpet should be removed from all of the floors. These floors should be thoroughly cleaned, and all detritus of previous coverings removed. Floors with exposed tongue-and-groove flooring should have any damaged floorboards patched, and should be restored. The floors should not be aggressively sanded, in order to maintain a patina as indication of age.

Depending upon future usage, the bathroom in the mudroom may want to be configured to comply with handicapped access. The entire mudroom and bath in the Southern end of the house should be redesigned as not to denigrate the historical character of the house. Finishes should be chosen in accordance with the features that help define the historicity of the house. The later kitchen should also be considered for redesign including; floor materials,

kitchen countertops, cabinets furnishings and fixtures.

3.8MECHANICAL SYSTEMS

The existing mechanical systems being used to heat and cool the residence are a modern replacement for what was once a simple heating only system. Due to wholesale changes in the system, is it difficult to determine exactly how the original residence was heated. There doesn't appear to be evidence of a central heating system or a central fireplace, suggesting that the residence was likely heated using multiple small Franklin stoves. There is a remnant of a mantle in the east upper level room, suggesting the possibility of a small built-in fireplace. Given the overall size of the room, however, it is more likely that the mantel is decorative and that a wood stove was set in front of it.

A bathroom is located on the main level off the kitchen. Given the date of the original construction and the relatively small current kitchen area, we question whether the bathroom was part of the original construction or if it was added at a later date. A second ¾ bath has been remodeled into the south addition to the residence and is obviously of much later construction. Based on the relatively small "basement" and its location with regard to the kitchen, it appears that plumbing services may have been brought into the residence at a later date and that the basement space currently being used for mechanical purposes was more than likely an interior storage area / root cellar.

At some time after the initial construction, a ducted forced air heating system was installed, being served from the basement area crawlspace on the south side of the residence. The ductwork is routed in a very limited crawlspace to registers on the main level. A single duct has also been routed up in a closet behind the main level bedroom to the upper level and then extended horizontally in the central attic / storage area to serve the upper level. While serviceable, in general the ductwork installation is poorly done and should be replaced. In general, the existing mechanical system detracts from the overall historic nature of the residence.

The plumbing water and waste systems come into the basement from the east side of the residence, suggesting that they may have been installed at the same time as the original furnace system. The plumbing waste piping is cast iron with lead joints, the vent system has a leaded terminal at the roof, and the water service is galvanized steel, suggesting that no

significant changes to the piping have been made since the installation.

L.P. (Propane) GAS UTILITY SERVICE

DESCRIPTION: The residence is served with natural gas from the local utility company. The meter is located on the west side of the residence with the gas piping being extended through the crawlspace to the furnace and water heater in the basement.

CONDITION: The condition of the natural gas utility service is good and will continue to support any future use of the residence.

RECOMMENDATIONS: None.

MECHANICAL HEATING& VENTILATION SYSTEMS

DESCRIPTION:
Heating for the residence is provided by an 80,000 BtuH, 92% efficient Lennox furnace. Un-insulated supply air ductwork has been installed in the crawlspace and up through the main level. From what is observable, there is very limited space below the floor system to either retrofit the system or to provide for a new installation without tearing up the floor. The furnace uses a direct expansion cooling coil connected to a condensing unit located on the southeast side of the residence for cooling. An Aprilaire evaporative humidifier has been installed on the supply air ductwork.

Ventilation for the residence is limited to that provided by the furnace fan. The crawlspace is not ventilated.

CONDITION:
The furnace is in good condition and will likely meet the overall heating and air conditioning needs of the residence for the foreseeable future if this system continues to be used. Although poorly installed and aesthetically lacking, the overall ductwork system will also continue to function adequately. The use of the evaporative humidifier on the furnace has the capability to maintain a 15-20% relative humidity level throughout the residence. The operation of the humidification system was not verified. As installed, it will be difficult if not impossible to provide for multiple temperature zones in the residence.

RECOMMENDATIONS:

Considering that the residence will either be converted for use as a multiple tenant office space or remodeled for residential use, we recommend that the existing mechanical system be removed and that one of two systems be re-installed.

Option #1:

In the event that the building will be used for office space, the ability to provide for individual tenant temperature control will be critical. This may be done by installing a direct expansion heat pump system with wall mounted heating / cooling units similar to the Mitsubishi City-Multi. The advantages to this system are the lack of ductwork and the ability to provide for multiple temperature zones. The wall mounted units will be visible, but not necessarily obtrusive. In addition, wall mounting the units will allow for more flexibility in the use of limited floor space.

The existing bathrooms, the entry mudroom and the attic space will need heat, but not air conditioning. As such, local electric wall or ceiling heaters should be used to condition these spaces.

The relatively small area of the building and the fact that the building has operable windows makes requirement for a forced ventilation system a non-requirement.

In the event that the building is to be renovated for residential use, the need for multiple temperature zones (particularly for cooling) may be less of an issue. Floor space and overall system comfort are still critical issues. To this end, we recommend that the installation of a hot water heating system with a condensing boiler and a side-arm water heater. Heating distribution should be through the use of a radiant floor "Warm-Board" system which may be installed on top of the existing floor joists. The radiant floor system will provide more even heating throughout the residence, avoiding hot and cold spots. This will significantly improve the overall comfort of the residence, particularly given the relatively low insulating values of the exterior wall systems.

Assuming that air conditioning and humidification are desirable elements in the residence, we are recommending the installation of a high velocity air conditioning system as an added option to the basic heating system described above. The high velocity system uses small (2" diameter) distribution ducts which may be more easily routed through the existing structure

without significant structural modifications. Care must be taken in locating the terminations as experience has shown some localized discomfort due to the discharge velocity. As the high pressure cooling air is supplied into the space, it "induces" warm air into the air stream, effectively providing the required space cooling. The same system may be used for humidification purposes.

Exhaust systems should be added to each of the bathrooms. Although each of the spaces meet current code requirements with the use of the operable window, the exhaust fan will provide for odor and humidity removal during the winter months when the window will likely not be opened and will allow the window to be fixed if desired.

A ventilation system should be installed in the crawlspace. We did not see any signs of mold or mildew, but experience has shown that a naturally ventilated or unventilated crawlspace is prone to moisture related problems. The installation of a simple make-up and exhaust system will ensure that moisture does not become a problem in the future.

DOMESTIC UTILITY WATER SERVICE

DESCRIPTION:
A ¾" domestic water service is extended into the basement area from the east side of the residence. The service is polyethylene with a pressure reducing valve at the service entrance in the basement. After the pressure reducing valve, the piping is a combination of PEX and copper.

CONDITION:
The water service entry condition is in good condition and will continue to adequately serve the needs of the building.

RECOMMENDATIONS: Not applicable

SANITARY WASTE UTILITY SERVICE

DESCRIPTION:
The sanitary waste system is cast iron with lead / oakum joints. It is piped from the basement through the foundation to the east.

CONDITION:
The sewer system is generally in good condition. However, depending on the level of modifications that may be made to the interior plumbing systems, consideration should be given to converting it to PVC DWV in the crawlspace before connecting to the existing cast iron discharge through the foundation wall.

RECOMMENDATIONS:
Make any changes required by new plumbing in the kitchen and bathroom. All changed work should be installed in PVC DWV.

INTERIOR PLUMBING SYSTEMS:

DESCRIPTION:
Interior plumbing provides service to the kitchen, the full bathroom located to the east of the kitchen and to a ¾ bath located in the south addition. There is also service to a clothes washer connection in the south addition.

CONDITION:
In general, while all of the fixtures appear to be serviceable, they have little historical authenticity. The overall condition and appearance would suggest that all of the fixtures be replaced as a part of any renovation.

RECOMMENDATIONS:
All plumbing fixtures should be replaced with either historically accurate units or alternatively with commercially usable units. If the ¾ bath is to be maintained in place, it should be completely remodeled.

FIRE SUPPRESSION - SPRINKLER SYSTEMS

DESCRIPTION: The building does not have a fire suppression / sprinkler system.

CONDITION: Not applicable.

RECOMMENDATIONS:
The use of a residential type fire suppression system should be considered as a part of the overall renovation of the residence. Consideration should take into account the fact that the system is not a part of the historic fabric of the residence and will be a visible reminder of the upgrades. This should be countered by the value of protection that the sprinkler system will bring to both the building and its contents. An insurance underwriter should be contacted to provide a specific value to the installation.

3.9ELECTRICAL SYSTEMS

The electrical system is not a part of the original construction. It does not meet the requirements of the current National Electric Code and will require replacement as a part of any significant remodel or renovation of the residence.

ELECTRICAL UTILITY SERVICE

DESCRIPTION:
The electric utility service is extended overhead from a pole mounted transformer on East Main Street to a meter / disconnect located on the north side of the granary building and then overhead to the residence with a final termination being made to a 125 amp load center in the basement. It appears that the somewhat unorthodox routing is required by the location of the masthead on the south side of the residence with higher roof elements between the masthead and the transformer pole. There is also some indication that at one time power was extended from the service connection at the granary to the barn and to the shop building. At present power is not provided to these secondary buildings.

CONDITION:
The utility service is technically in good condition. However, the overhead wires and the circuitous routing are unsightly and the length of the run leaves the service conductors with a greater exposure to weather damage.

RECOMMENDATIONS:
Consideration should be given to re-routing the service into the site underground. A new meter and main disconnect location could be installed on the south side of the residence

with the service then being extended to the new load center (see notes associated with Electrical Panel and Distribution System).

ELECTRICAL PANELS AND DISTRIBUTION SYSTEM

DESCRIPTION:

The electrical service is extended from the overhead service down to a 125 amp load center in the basement of the residence. Power is distributed from the load center to a fused disconnect which serves the electric range in the kitchen, a 30 amp, 2-pole breaker for the air conditioning condenser, three 20 amp lighting and convenience power circuits, and a small panel in the main level laundry area which has an additional two 20 amp, single pole circuit breakers. Given that the National Electric Code requires that an electric distribution panel be installed in a 6'-6" tall space as a minimum and that the basement has a maximum ceiling height of 6'-2", the installation does not meet the requirements of the code.

The distribution wiring is a combination of non-metallic sheathed electrical cable (generically known as Romex) and cloth covered wire.

The installation appears to have been modified several times. The original installation appears to have provided for lighting and convenience power in the residence with subsequent modifications to provide power to the range and to the air conditioning unit. Convenience receptacles have been located throughout the main level, generally being served from the crawlspace. The two upper level rooms have plug mold installed just above the base boards. Convenience outlets have not been installed on the exterior of the building.

CONDITION:

The overall installation is in poor condition and can't be easily retrofitted to meet the requirements of the National Electrical Code. In addition, although the service is adequately sized for a single family residence, it will not meet the use requirements of a modern office space.

RECOMMENDATIONS:

The electrical panel and distribution system should be re-installed in their entirety in order to meet current code requirements and as required to match the intended use. It may be

possible to re-use a number of the receptacle outlet locations on the existing main level. Where additional outlets are required, consideration should be given to the use of floor outlets. This would allow for code required spacing without installing receptacles in the existing plastered walls. Installing receptacles on the upper level will be difficult, but as with the main level, the use of floor outlets or outlets in the baseboards may allow for code required spacing without cutting into the plastered wall finishes.

LIGHTING SYSTEMS

DESCRIPTION:
Lighting throughout the residence is typically residential incandescent. The lighting fixtures are in fair condition, but have little in the way of historical authenticity.

CONDITION:
As currently installed, the lighting is usable for a residential application, provided that the occupants provided a number of additional lamps. Overall, however, the installation detracts from the historical nature of the building and should be replaced.

RECOMMENDATIONS:
Replace all interior and exterior lighting systems with aesthetically pleasing fixtures which are intended to either be historically accurate reproductions or are designed and installed in a manner to minimize the fixture intrusion into the residence.

FIRE DETECTION SYSTEM

DESCRIPTION:
The building does not have a fire detection system.

CONDITION: Not applicable.

RECOMMENDATIONS:
Although not specifically required by code, the use of a commercial type fire detection system should be considered as a part of the overall renovation of the residence. Consideration should take into account the fact that the system is not a part of the historic

fabric of the residence and will be a visible reminder of the upgrades. This should be countered by the value of protection that the fire detection system will bring to both the residence and its contents. An insurance underwriter should be contacted to provide a specific value to the installation.

TELEPHONE / DATA SYSTEM

DESCRIPTION:
The residence appears to have been provided with a very limited telephone service with a single outlet in the kitchen.

CONDITION:
Currently, the service is extended overhead from the power pole on the north side of the residence to the northeast corner of the residence and from there surface mounted below the eaves to an exterior box on the east wall of the bathroom. The surface mounted wires are unsightly and detract from the front of the residence.

RECOMMENDATIONS:
Given the possible future use of the building as an office, it will be necessary to have telephone service. The telephone service should include capability for data and high speed wireless. As this is definitely not a part of the historical construction, the installation will need to be carefully integrated into the building so as to minimize detracting from the building.

The service should be routed below grade to the south side of the residence and then into the basement to make use of the crawlspace for hard-wiring as required.

4.0 ANALYSIS AND COMPLIANCE

4.1 HAZARDOUS MATERIALS

None of the materials in the building are suspected to contain asbestos. Pipe insulation is not present on the piping. Contractors working on the building are still advised to keep a watchful eye for any evidence of asbestos containing materials. If any are found and are

likely to be disturbed by construction, an asbestos survey is recommended. The composition floor tiles on the main floor, due to their age, are suspected to be asbestos containing. These should be surveyed, and if any are slated to be disturbed by construction, they should be abated by a qualified asbestos contractor.

4.2 EXISTING MATERIALS ANALYSIS

PAINT:
Original paint and clear finishes on the building, because of their age, are understood to be lead-based. Restoration work should follow approved protocol for encapsulation of lead-based paint, varnishes, and other clear finishes. The exterior surfaces have been previously tested for lead, and the report is on file with the owner.

4.3 ZONING CODE COMPLIANCE

The zoning code compliance report is by Ms. Carolyn Hunter of Context Architecture. All other notes in this section are in parentheses.

Michael Henke, of the Midway City Planning & Zoning Dept.(T. 435-654-7441) has confirmed that this home is in the C-2 (commercial) district, meaning that a retail and/or office use can be considered a "use by right" and no rezoning will be necessary. Once the specific use for this historic home has been decided upon, a Site Plan application will need to be submitted to the Planning & Zoning Department, as explained on the City's web-site, www.midwaycityut.org. This Site Plan application could probably be reviewed administratively, meaning no time consuming Public Hearings would be required. In any event, the Site Plan application should be submitted well ahead of submitting plans to the Building Department.

The City's web-site also has historical renovation guidelines, and Mr. Carl Jones T. 435-657-0805 heads up their Historical Preservation Committee. Given that the Bonner House is already on the National Historic Register, the Historical Preservation Committee will probably also be reviewing the Site Plan Application, so it is recommended that Mr. Jones be contacted once the specific use has been determined, but prior to the Site Plan Application submittal.

Mr. Henke stated that the biggest issue for a commercial use is on-site parking – they require 1 space per 250 square feet, meaning that if both levels of the Bonner Home are utilized, there would need to be 7 parking spaces provided. However, Mr. Henke stated that for this historic home, he would like to consider the ample on-street parking on both Main Street and 100 East Street in lieu of paving a large new area of asphalt onto an existing historic property. There is 490' of parallel parking on Main Street, (ample enough for 20 cars), and there could be additional parking on 100 East Street, depending on the location of any existing driveway.

4.4 BUILDING CODE COMPLIANCE

The building code compliance report is by Ms. Carolyn Hunter of Context Architecture. All other notes in this section are in parentheses.

Current Adopted and Applicable Building Codes:
International Building Code (IBC) Family 2009, including the
International Mechanical Code (IMC) and International Plumbing Code (IPC)
International Energy Conservation Code 2009 (IECC) - New Building Additions only
National Electrical Code, (NEC) 2008
No LEED-Certification is being considered at this time for this historic building.

These Architectural Code notes are written to indicate the MINIMUM required compliance.

International Residential Code - Not Applicable:
This home is not anticipated to remain entirely a residential use (if it was, this use would be 'grandfathered' in, and no code review would be necessary). Because this home is contemplated to include a commercial or public use, the International Residential Code cannot apply, instead, the International Building Code is used, with the R-3 (single family or duplex) occupancy of the IBC applying to any part of this home which becomes an apartment or single family or duplex dwelling unit. The 'mixed occupancy' clauses of the IBC 2009 will apply, and are dealt with below.

IBC Exemptions for National Historic Register Buildings:

National Historic Register Alterations:
This home is listed on the National Register of Historic Places.
It has been confirmed with Mr. Cory Jensen, National Historic Register Specialist, T.(801) 533-3559, that alterations may be made to this home so long as they preserve the integrity of any historically important features, especially any feature listed in the homes' nominations.

IBC Section 3409.1 states that for historic buildings (those on the National Historic Register), "The provisions of this code relating to the construction, repair, alteration, addition, restoration and movement of structures, and change of occupancy shall not be mandatory for historic buildings where such buildings are judged by the building official to not constitute a distinct life safety hazard." As agreed upon with the Architect-of-Record, (and as routinely practiced on historic buildings) it is the purpose of this Code Review to indicate what aspects of these historic homes and projected uses already conform, which ones can be made to conform with minimum effort and expense, and then highlight which elements need an exemption consideration from the Building Code Official. As noted below, accessibility provisions DO apply to "change of occupancy, additions and alterations to existing buildings, including those identified as historic buildings" (Sect 3411.1). Also, the IECC (the Energy Code) does apply to new additions, even when made to historic buildings.

Renovation of Existing Buildings:
Level of Compliance determined by Extent of Repair, Alteration or Additions
In general, existing buildings are not required to be brought up to current codes, unless and until they undergo a change in use, or are altered or receive an addition. When one or more of these changes occurs, certain allowances are given regarding code compliance, depending on the extent and type of the renovations, as noted below.

For example, some minor repairs or alterations are exempt from the new code compliance, whereas building additions are generally treated like new construction. Further, Sect 3403.1 states that "Alterations to the existing building or structure shall be made to ensure that the existing building or structure together with the addition are no less conforming with the provisions of this code than the existing building or structure was prior to the addition. An existing building together with its additions shall comply with the height and area provisions of Chapter 5." [explained below]

No alteration shall make the building less compliant with the new codes than it was previously.

International Building Code – Flood Hazard Areas (Sect 3403.2)
Michael Henke of the Midway City Planning & Zoning Department has confirmed that this building is not in a Flood Hazard Area.

International Energy Conservation Code 2009:
Exemption, Sect 101.4.2: Because this home is on the National Register of Historic Places, the existing portions of this building are not required to be brought into compliance with the International Energy Conservation Code 2009. However, it would be prudent to check existing insulation levels, and augment them if necessary, to control operating costs.

Likewise, if any doors, windows, light bulbs or mechanical equipment are replaced, a more energy-efficient element should be considered so long as it preserves the historic integrity of the building, for example, using double-hung windows of the same size, shape and muntin pattern as the original windows, but utilizing double-pane, low-E glazing.

Per Sect 101.4.3 of the IECC, any building addition, for example a new back addition on the Bonner House, must comply with the IECC 2009 requirements for new construction, and must not overload existing systems [mechanical, plumbing and electrical]. This commercial use would follow Chapter 5 of the IECC, and Wasatch County is in Climate Zone 6B. Compliance options include Prescriptive Compliance: meeting the min R values/max U values in Table 502.2(1), a maximum fenestration area of 40% of the exterior wall area, U values and shading co-efficients per Table 502.3, or "Comm-Check" software, or computer modeling of the building addition's energy use. Per 502.4.7, Except 4, a vestibule is not required.

IBC Allowable Heights and Areas for Construction Types/Anticipated Occupancies:
Chapter 5, Table 503: The original building of the Bonner House would qualify as Type III-B Construction, because its exterior brick walls are thick enough to give an inherent 2 hour rating. However, the Bonner House back addition appears to be Type V-B construction, so unless this addition was replaced with Type III-B construction, it is best to treat the whole house as Type V-B.

Bonner House Adaptive Re-use Options:
Per Table 503, the Bonner House could have a Mercantile (Retail) Use only on its first floor, but should consider having an administrative office use (Business, B) or R-3 (Residential) use on its second floor. The second floor administrative office could be related to the first floor use, because this second floor is not wheelchair accessible. Per IBC Section 1104.4, Exception 1, Mercantile occupancies with less than 5 tenants do not need to make levels <3,000 sq ft accessible, so this section would apply if needed.

Per Section 508.3.1, these uses need not have rated occupancy separations, so long as they do not exceed the area limitations for the most stringent use, in this case, Mercantile and Business. (R-3 occupancy is not limited in area.) The base area permitted for these uses is 9,000 square feet, which far exceeds the existing building envelope. Since all the side yards are over 30' wide, the frontage increase calculation (Sect 506.2) would bring the maximum use area up to 9,000 + 9,000 x 0.75 = 15,750 square feet, which could include all the outbuildings, and any size addition. Because the back addition is not in keeping with the historic character of the Bonner House, it is anticipated that it will be removed and replaced, or it could possibly receive exterior alterations such as window sizes and placement, and wall and roof materials. It is safe to say that the addition size would be more limited by historical aesthetics, that is, in keeping with the size of the existing historic building, than by IBC Area restrictions.

Second Floor: the attic space is 6'-8" wide by 17'-0" deep, and depending on headroom and ability to add dormer windows or skylights (check National Historic Register rules), it could possibly be converted to a second floor bathroom and/or kitchen/break room, and possibly add some closet space for the west bedroom.
For the west bedroom's north balcony, either a guardrail should be added here, or convert the door back to a window (which it probably was originally).

Existing second floor guardrails at the other two balconies do not comply with the current IBC, but are definitely part of the historic appearance of this home, and can hopefully be 'grandfathered in' per section 3409.1 as mentioned above. While the first floor planter boxes are also more than 30" above grade, they are not accessed by doors, and therefore should be fine as is.

A Sprinkler System is NOT required by code for The Bonner House, because the height, floor area, and type of construction are all well within the permitted maximums. Further, it could be argued that installing such a system would risk damage and alteration to existing walls and ceilings of the home. Given the extent of renovations being discussed in this Code Report, there are no significant savings to the cost of the new construction in using a sprinkler system: to the contrary, the system itself would add significant cost to this renovation. If the Owner wished to install a sprinkler system, it would be best to verify with the local Planning Department that the current water main line is sized to provide enough water volume for it.

Fire Protection Systems: Per Section 907.2, a Fire Alarm is required on new construction only, and then only for B & M occupancies which exceed certain upper floor and total populations, 100 people and 500 people respectively. The small addition contemplated for this home will not serve this number of people. Per Section 906.1, portable fire extinguishers will need to be installed, located per the Fire Marshall, and/or nearest each exit door. Per Section 907.2.11, if any part of The Bonner House is used as a residence, a smoke detector will be required for each sleeping room, plus one smoke detector in the hallway just outside the sleeping room (either on the ceiling or high on the wall), plus one smoke detector on each level of the home, including the basement. These smoke detectors shall be interconnected such that a fire in one area will set off all the smoke detectors. For existing construction, the smoke detectors need not be hard-wired, but can be the simple battery type.

IBC Chapter 29 Plumbing Requirements:
The First Floor of The Bonner House is 1250 gross sq ft, and using the 30 gross sq ft/occupant (for first floor mercantile use) calculation from Table 1004.1.1, would have a total population of 42 people.

Per Section 2902.2, (due to change in occupancy – there are no exceptions for existing, nor for historic buildings), we need to provide, at a minimum, one restroom for each gender, one accessible drinking fountain (with Hi and Low spouts) – OR – have the staff serve water in paper cups to any visitors who ask for it. Also one 'mop sink' will be required (NOT accessible) for Janitor's use.

4.5 ACCESSIBILITY COMPLIANCE

IBC 2009, Scoping for Accessibility for Existing Buildings (includes Historic Bldgs):
The 2009 IBC handles the scoping requirements for accessible building elements, in Chapter 11, Accessibility, Chapter 34 Existing Structures (which does apply to Historic Structures), and miscellaneous provisions sprinkled around in other chapters like Chapter 10, Egress. The ANSI-117.1-2003 describes the dimensional requirements for each element. Per IBC Chapter 34, Any alterations shall not REDUCE existing accessibility for existing buildings. Alterations do not need to EXCEED requirements for new construction.

Sect 3411.4, Change of Occupancy – This does apply, because changing from Single Family Residence (not built to these codes!) to a 'Mercantile Use' (less than 50 people).

CHOICE: Partial Change in Occupancy (Section 3411.4.1) - meaning downstairs of this building only, upstairs parts still used as Single Family Residence, OR Complete Change in Occupancy (Section 3411.4.2) – Complete Change in Occupancy is considered here, since it gives more freedom of future use, ie administrative offices to support the downstairs (mercantile) use. The Complete Change in Occupancy Section has 6 requirements:

1. At least one accessible building entrance.
The drawings indicate 2 steps and a 15" rise at the north entry porch, facing Main Street. This is the entrance with the least amount of height change, therefore, one 3' wide wheelchair ramp coming off the west side of this porch, ramping west for 15', then using a small footbridge (3' wide, handrails 3' above surface, and guardrails 3'-6" above bridge surface) to span a small ditch which runs parallel to 100 East Street. This route is easier than connecting to Main Street, which has recently been raised a few feet – there are four steps from Main Street down to the front sidewalk. This solution also preserves most of the front porch appearance from Main Street.

2. At least one accessible route from an accessible building entrance to primary function areas. Primary function areas are defined as "a major activity for which the facility is intended . . . [including] customer service area, public use area . . . mechanical rooms, storage rooms, corridors and restrooms are not areas containing a primary function."

After going through front door, ensure there is one 30" x 48" clear space for wheelchair to sit, exclusive of front door swing, to allow them to close front door behind them. The Bonner House entry vestibule is wide enough to handle 'doors in series' to adjacent rooms, and both of these doors fortunately swing into these rooms.

Section 3411.7, states that for 'Alterations affecting an area containing a primary function …the accessible route to the primary function area shall include toilet facilities or drinking fountains serving the area of primary function." If any alterations are done to a primary function area, there will need to be an accessible route to an accessible restrooms for the visitors. Per Section 3411.8.11, "where it is technically infeasible to alter existing toilet . . . facilities to be accessible, an accessible family or assisted-use toilet . . . in accordance with Sect 1109.2.1 is permitted. The family or assisted-use facility shall be located on the same floor and in the same area as the existing facilities." Please see the attached drawing for minimum dimensional requirements for this restroom; also it is recommended to keep the plumbing lines on an interior wall to prevent freezing.

The Bonner Home has a 6" and a 14" level change in the first floor: please refer to Accessibility Options to resolve this, noted below.

3. Signage for accessible entrance, route from inaccessible entrance to accessible entrance, accessible unisex restrooms, and passenger loading zones (if any).

4. Accessible parking, where parking is being provided. Please refer to discussion under Zoning paragraph, above: even if all parking is on-street, it would still be a good idea to have at least one accessible parking spot with a curb cut. If parking is on-site, one accessible parking space (8' wide with 5' wide adjacent aisle, both 18' long) would be required, since only 7 parking spaces are required by the Planning & Zoning Dept.

5. Accessible passenger loading zone.

6. At least one accessible route connecting accessible parking and accessible passenger loading zones to an accessible entrance. Once the parking location is finalized, determine if there will be any sidewalks between parking area and front entrance. If so, they'll need wheelchair 'curb-cuts' per ANSI Fig 406.3. If no sidewalks are planned, ensure the 'path'

from the parking spot to the new entry ramp is min 3' wide, and smooth enough for a wheelchair to travel on, i.e. deep gravel would be too difficult.

For alterations to existing buildings, the IBC does NOT require light switches, kitchen countertops, and the like to be at the accessible heights. Nor does it require the 2nd floor to be wheelchair accessible, since it is <3,000 square feet.

Accessibility Options:
First Floor Interior Circulation (6" and 14" vertical elevation changes) possible choices:
There is a 6" step between the "Former Kitchen" and the front Living Room, and even with the most lenient IBC Table 3411.8.5 renovation guidelines, would need a 5' long ramp to achieve the maximum slope of 1:10. Further, the "Later Kitchen" probably used to be the East Exterior Porch, as this and the new back addition are 14" lower than the rest of the first floor. Because this 14" vertical elevation change exceeds 6", Table 3411.8.5, with more lenient ramp slopes cannot apply, and two new (14' long x 3' wide) ramps would be needed, with guardrails! This would definitely impact the historic feel, and the space allowances for the interior of this building. Therefore, the following choices are offered:

1) Raise the floor level of the "Former Kitchen", "Later Kitchen", existing northern bathroom and the back addition (rebuild) to match the level of the rest of the first floor. Check to ensure that a minimum 7' ceiling height can be maintained in the larger rooms, and min 6'-8" in the northern bathroom. Also ensure the new room heights are tall enough to retain their original historic appeal.

2) Add an exterior ramp (18' ramping length) to the back door on the East side of the home, and the 5' long ramp in the Former Kitchen. Wheelchair-bound people would have to go outside to get from the front of the home to the back of the home, so this is not the preferred accessible option.

3) Keep the "Former Kitchen", "Later Kitchen", existing northern bathroom, and back addition spaces a non-public use, so they don't need to be wheelchair accessible. This would greatly reduce the public usable area of this building.

4) Combining options 2) and 3), make the "Former Kitchen" the only first floor non-public space, and use the 18' long ramp to access all the rooms in the back (south side) of this home.

Accessible Restroom choices:

There are 2 existing bathrooms on the first floor of The Bonner House, but neither are wheelchair accessible. Also, both bathrooms are level with the back, or south side of the house, not with the main first floor level. Several options are noted below to resolve the vertical elevation change and the requirement for at least one wheelchair accessible restroom.

1) If the 14" level change can be resolved using option 1) above, alter existing back restroom. Remove the tub, and move the east wall approx 8" further east to permit a 5' wide wheelchair 'hammerhead' turn-around. Install new barrier-free lavatory so its center is min 15" from the north wall, slightly south of current lavatory location. Install new barrier-free water closet so its center is min 16" from the south wall, slightly north of current water closet location. Install barrier-free grab bars in back of and to the south side of the water closet. The door can remain swinging inwards so long as it does not interfere with the back grab bar.

2) Again, if the 14" level change can be resolved per option 1), and IF the northern restroom is at least 5'-4" wide, and could be enlarged to become at least 7'-6" long, it could be altered similarly to the back restroom as described above. Ensure that 6'-8" headroom is maintained in this northern restroom.

3) If entirely rebuilding the back addition, design two accessible restrooms (one for each gender) into the floor plan, per the attached drawing which shows minimum restroom dimensions.

4) Build one unisex, "Family" accessible restroom into one of the existing outbuildings, or as a new outbuilding located at least 10' away from the property lines, and in compliance with side setback requirements of the Planning Code. If on this property (recommended), the restroom will be within 500' of the main entry.

Second Floor choices:

Unless the existing historic stair railing were replaced with a metal stair rail to support a wheelchair lift, it is unlikely this second floor could become accessible to wheelchairs. Therefore, it would be best to remain a non-public use, such as administrative offices, or compact accessory residence for the mercantile use on the first floor.

Ingress: Due to the smaller grade change at the front (north side) of this house, it would appear easiest to add a 15' long, 3' wide entry ramp with handrails off the west side of the columned front entry porch, with a connecting sidewalk to the Main Street sidewalk. The Bonner House existing Front Entry Door utilizes a 'hinge approach, push side', and does appear to have the necessary 3'-6" wide by 4'-6" deep clearance adjacent to it - - assuming no closers on front door. This clearance cannot have any obstructions up to 6'-8" high. Is there barrier-free curb-side parking? Often a city will let you place a barrier-free parking sign and curb-cut at the appropriate curb-side location. This would be good to resolve with the Midway City Planning Department, once the specific use is finalized.

Egress: Existing buildings are NOT required to provide accessible means of egress, but fortunately, the Bonner House does provide this from most of the first floor.

If the second floor remains a residential use, the winding stairs are grandfathered in. The double-hung windows in each bedroom appear to be large enough to provide a 5.7 sq ft clear opening, with minimum 24" height and 20" width and are less than 44" above the second floor; this will provide the 'emergency escape and rescue' required by Sect 1029.2.

If the second floor becomes administrative offices for the mercantile use below, the existing winding stairs can still be grandfathered in per Sect 3408.4, because "the existing space and construction will not allow a reduction in pitch or slope." These stairs scale as 3' wide, including the existing handrail, a width that will definitely suffice for the second floor population, which will be less than 10 people. (The second floor, including the attic, is approximately 480 square feet.) Further, these winding stairs could be considered an historical element of this house.

5.0 PRESERVATION PLAN

5.1 PRIORITIZED WORK PLAN

Generally, measures to stabilize the existing structural system of the building are give the highest priority. These measures are undertaken from the foundation level working upwards. Once the foundation is stabilized, work on the masonry walls will begin. Next to be addressed are interior structural elements including columns, walls, floor structure, and roof structure. Then, any repairs to the roof will be made.

Next, proposed exterior design elements to meet egress requirements and access for disabled persons will be undertaken. Measures to restore, preserve, and beautify the exterior of the building are the next priorities. These include work on exterior doors and windows. Interior renovations and proposed design for building utilization are next in order. Finally are mechanical and electrical priorities.

Priority 1: Drainage, Cellar, and Foundation Work
Corrective work does not seem to be imperative as no noticeable water infiltration has been noticed. If at any point it is, a soils analysis should be undertaken by a geotechnical engineer. Install a subdrain system in the basement along with a subpump system with drainage to the South away from the building. Again, these are dependent upon any noticeable water damage to the foundation.

Priority 2: Masonry Repairs, Ramp
Replace individual bricks in the main body of the building per recommendations of masonry restoration contractor. Remove and repoint all damaged mortar joints. Provide new anchorage for roof and upper floor along masonry walls. Brace the chimneys above the roof line from the top back down to the roof.

Priority 3: Structural Repairs
Repair or replace or "sister" any damaged roof or floor framing. Stiffen rafters by spiking new members to the side of each. If needed, provide structural bracing for the rear chimney.

Priority 4: Roof
Remove metal shingles. Add ½" plywood sheathing over existing roof members and reroof.

Replace metal shingles with wood shingles, in keeping with original design, preferably from a local source.

Priority 5: Exterior Doors and Windows
Refurbish all exterior and interior doors and windows throughout the building, excepting the entry mudroom door, and those that will be replaced altogether. Undertake restoration with existing fabric maintained and not replaced as much as possible. Windows and sashes should stay in place if necessary, but can be removed for ease of assembly and restoration. Replace any missing or damaged parts of the window assemblies.

Priority 6: Interior Restoration:
Restore wood floors and replace carpet and tile as necessary. Restore woodwork. Repair lath and plaster, and repaint.

Priority 8: Bathroom and Kitchen, and Associated Plumbing Systems
Perform selective demolition of fixtures and finishes in bathroom. Alter bathroom for accessible usage. Replacement of the cast iron and lead plumbing drainage may want to be considered along with the galvanized water supply pipes. Replace existing bathroom and kitchen fixtures with period fixtures and finishes. Replace the laminate wood flooring with tongue and groove or a similar alternative, in keeping with the original character of the house.

Priority 9: Electrical Systems and Lighting
Install new electrical panel and distribution system. Install new floor outlets on main level to meet code compliance for a commercial building. Remove light fixtures not compatible with the period or style. Restore light fixtures determined to be original. Modern direct and indirect lighting fixtures could be used in spaces designated for office use. Install telephone and date service lines to the building and run to pertinent areas.

Priority 10: Mechanical Systems
Replace existing forced air system with one of two alternatives based on future use. If the house shall be used as an office with multiple users, a direct expansion heat pump system with wall mounted temperature controls would be most suitable. If the house remains a residence, and individual climate zones are not as imperative, a hot water heated “warm board” system would suffice.

Priority 11: Fire Detection and Response
Install new fire detection system with remote station dial-up. Install wet pipe sprinkler system throughout the building.

Priority 12: Grounds and Outbuildings
Perform necessary structural repairs on outbuildings. Grounds are mostly in good condition. Clear weeds and overgrown foliage from around the outbuildings. Remove the fence that lines the East boundary of the site and replace with one typical of the era. The front steps mediating the sidewalk should be considered for redesign. Retain a landscape architect to address this area and implement his plan.

5.2 PHASING PLAN

The owners' preliminary plan for the William Bonner House is as follows:

Year	**Priorities**
2012	Priorities 1 through 5
2013	Priorities 6 through 9
2014 forward	Priority 10

It is acknowledged that the building owners have the prerogative to perform the priorities over a longer or shorter period of time than the initial phasing plan indicates, and to elect not to undertake any of the priorities listed.

5.3 ESTIMATE OF PROBABLE COST OF CONSTRUCTION

Historic Structure Assessments are by nature conceptual and do not include plans and specifications sufficient to develop actual quantity takeoffs for purposes of cost estimating. As such, this is approached as a conceptual budgeting effort, based on the level of detail available. Consequently, contingencies ranging from 20% to 30% have been included in each item. Architectural and engineering fees are also included.

The figures in the preliminary concept statement of probable costs listed below were arrived at through several sources. The primary source for these figures was several local trade

consultants, each a respected and well-known contractor in his particular field of expertise. The secondary source was RS Means Building Construction Cost Data.

These consultants were:
Mr. Zach Tanner, Capitol Construction (for general contracting)
Mr. Philip Kearns, American Heritage (for historic windows)
Mr. John Lambert, Abstract Masonry (for masonry)

Construction Priorities		2012	As scheduled*
PRIORITY 1:	Drainage, Cellar, Foundation Work	$ per J.L.	$ x
PRIORITY 2:	Masonry Repairs, Ramp	$ per J.L.	$ x
PRIORITY 3:	Structural Repairs	$ 34,000	$ 34,000
PRIORITY 4:	Roof	$ 24,000	$ 24,000
PRIORITY 5:	Doors and Windows	$ 45,000	$ 45,000
PRIORITY 6:	Interior Restoration	$ 22,000	$ 23,100
PRIORITY 7:	Bathroom, Kitchen, & Associated Plumbing Systems	$ 59,300	$ 62,265
PRIORITY 8:	Electrical Systems and Lighting	$ 26,500	$ 27,825
PRIORITY 9:	Mechanical Systems	$ 38,000	$ 39,900
PRIORITY 10:	Grounds and Outbuildings	$ 278,000	$ 317,520
TOTALS:		$ x	$ x

*As scheduled in phasing plan above. Construction costs are presumed to increase five percent per year, compounded.

6.0 PHOTOGRAPHS AND ILLUSTRATIONS

Photos and illustrations appear where applicable within the text in each section of the report. Photographs were primarily taken by Christopher Lobas, and illustrations were created collaboratively by Brian Backe (modeler) and Christopher Lobas (renderings).

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8.1 CONSULTANT DOCUMENTS

Integrated above are 1) a report from Mark Burggraaf, consulting mechanical and electrical engineer and 2) a report from Shaun Packer, consulting structural engineer and 3) a report from Carolyn Hunter, code consultant. These are included in their entirety in the context of the report, and in their original format and font in the appendix.

8.2 MEASURED DRAWINGS

Architectural drawings appear where applicable within the text in each section of the report.

8.3 A BRIEF HISTORY OF THE BONNER FAMILY

THIS CAN BE INCLUDED OR LEFT OUT AT THE CLIENT'S DISCRETION.

George Bonner, Sr. was born in County Monaghan, Ireland on January 8, 1822. At the age of fourteen he left his native land to find work in Scotland. George earned a living as a coal miner. Life in the mines was difficult and hazardous. In addition to work, George found and married Margaret Edmundson of Whitburn, West Lothian, Scotland in 1849.

The Bonners attended a small branch of The Church of Jesus Christ of Latter-day Saints at Crofthead and later joined the Mormon faith. In the spring of 1856, George, Sr. sailed to America to gather with the Latter-day Saints and to find the means to book passage for his wife and three small children: George, Jr., Christina and William. On November 8, 1856 Margaret and her children started the stormy winter Atlantic crossing which lasted ten weeks. They survived the 3000 mile voyage aboard the Columbia from Liverpool to New York City. Finally the family was reunited in Carbondale, Pennsylvania where Father Bonner had found work in the coal mines.

While living out east, the older Bonner children attended school while also working to help support the family. The family moved to Illinois in 1857. Saving their cumulative earnings for almost five years, the family prepared for the second leg of their journey from Florence, Nebraska to Salt Lake City, Utah. In February of 1861 President Brigham Young announced a new transportation system to pick up emigrants and bring them to Utah-down and back wagon companies. On April 23, 4 wagon companies started from Salt Lake City numbering 203 wagons. They transported 136,000 lbs of Utah flour which they unloaded at four stations along the trail for use on the trip back.

During May, June and July, four large LDS groups (three from and Europe and one from the states) converged in Florence, along with the wagon trains. The trek proved difficult, dusty, and uncomfortable, but the wagons nevertheless arrived successfully in August and September of 1861. The Bonners joined the John R. Murdock Company and together with 500 other Mormon pioneers started their journey on July 11, 1861. Nine weeks later, the family completed the long, hot and dusty march, arriving in the Valley of the Great Salt Lake on September 12, 1861.

After their 9 week trek across the plains, the family was thrilled to finally arrive in Salt Lake City on September 12, 1861. They were shortly sent to Provo but it was quite crowded with immigrants. Wanting to run cattle, George sought a smaller community. He learned

about a newly opened area in the Provo River Valley, and moved quickly to homestead several acres. George built a small log cabin and established a farm along Snake Creek. The cabin was next to a large "hot pot" which was full of hot water. The Bonner family was neighbors with the Henry Coleman family with whom they became very close friends. Several other families settled along the same creek, and formed a settlement called "Mound City" because of the numerous limestone formations in the region.

The settlers cleared a great deal of the porous limestone, known as "pot rock" from the ground in order to clear land proper for farming. The excavated pot rock was used to construct fences and walls for local buildings. The hot springs were also a recreation attraction in the form of swimming and were common attraction in the community. Houses were built of pot rock and logs, usually with dirt floors and dirt roofs. The cabins would usually only contain one room for even large families, with pans strewn about to catch leaking rain water from the roof. Game was plentiful but weapons were scarce.

Fish, however, were easily caught with a pin hook from the nearby river, and sage hens were easily killed using rocks. The first grist mill was built about the time George arrived in Midway. He was employed at the mill for a time and was listed as one of the early millers. The grinding stone from this very mill is located today atop the Fort Midway monument that is currently on the southeast corner of the town square.

In 1864, the San Pete Indians, led by Chief Blackhawk were forced by agreement with the government to move to the reservation in Uintah Valley, about 50 miles south east of Midway. Bitterly resentful, the Indians refused to stay on the reservation land, and soon were involved in raids and killings that caused a state of war. In the summer of 1865, Brigham Young sent a warning to all settlers to move together and build strong forts. The houses of Mound City and the lower Snake Creek settlement were scattered about the creek to utilize irrigation for the land. In this layout, the settlers realized they were vulnerable and agreed to build a fort halfway between the two, calling it Fort Midway.

75 cabins were built facing inward around a central square, heavily fortified around the perimeter. The strategy for dealing with the Indians proved very successful, and before long peace overtures were designed to change the Indians from enemies to friends. After the peace treaties, the people began moving out of the Fort, but instead of returning to their original cabins, families began constructing homes close to the Fort. This became the town of Midway, using the original fort location as the town square.

George acquired property for his house (103 E. Main St.) down to roughly 225 E. Main. He owned nearly the whole block where his house was, and raised a lot of cattle and horses there. George and Margaret's children were each taught to work from the time they were small. Shortly after ore was discovered, the eldest sons, William and George Jr., obtained a contract supplying timber for the Ontario Mine not far from Midway. The contract proved successful and they were able to build a beautiful home for their parents as well as one for each of themselves. These homes were built on three of the corners of Midway's First East and Main Streets, which are now known as "Bonner's Corners."

The Bonners looked to a local architect and builder, John Watkins to design the homes. George's 5-room red brick, 1-1/2 story home was completed in 1876 on the NE corner. An elegant home, the main form is composed of wings projecting on both sides of a central section providing a symmetrical balance and classical harmony, while ornately detailed with Gothic elements, like steep roof pitches, elaborate organic bargeboards, and window detailing. The successful completion of their parent's home and their own marriage plans prompted sons William and George to have Watkins design and build homes for them as well.

William opted for the lot on the Southeast corner and George the Southwest. On January 24, 1878 William Bonner married Sarah Eliza Bronson at his parent's home and his brother George married Phoebe Annette Alexander at the double wedding ceremony. Many guests were present and after the ceremony an elaborate banquet was served at both homes that had been built and completely furnished for their brides. Dancing filled the evening.

The two brothers started a store in the west-front room, called the end room of George's house. When they had built up a considerable business and clientele, in 1879 they built a store originally called "Bonner Brothers Mercantile" across the road to the west where the store "Midway Merc" still stands. It was a typical country store supplying most of the needs of the community.

William and George Bonner Jr. worked quite well together, starting the first grist mill located in Midway. In addition, they owned a considerable amount of ranch property and livestock. They hauled goods from Park City and sometimes even Salt Lake City using ox-led teams and later, pure-bred draft horses. As the brothers grew older, they decided to divide their holdings and George Jr. took sole ownership of the store, while William continued to operate the farm. William and his five sons continued with their livestock

ranching business. Their cattle and sheep ranching operation declined after World War I, and they were forced to sell a large tract of pasture land and all of their livestock to make ends meet.

William Bonner and his wife, Sarah, also remained at the house on 110 E Main Street all of their lives. Together they raised ten children: William Jr., Ida, Mary, George, Charles, Eva, Luella, Floyd, Francis, and Wilmer. William died on July 18, 1925 at the age of seventy. Sarah died on September 6, 1946 at the age of eighty-eight. Floyd, Kaye Bonner's father, took ownership of the house after his parents had passed.

The William Bonner House was vibrant and always the sounds of chatter, laughter and an occasional piano and singing would fill the rooms consistently. The family was not afraid to take in a friend needing a place to stay, or occasionally a stranger. Ida Bonner Wootten, one of William and Sarah Bonner's daughters, later recalled:

> "I can remember being taken out of my bed with my sister and crowded into another bed full of my siblings in order to make room for a guest that dropped in for the night. Mother always insisted that no one-friend or stranger should ever be turned away."

Kaye Bonner, granddaughter of William and Sarah, revealed in an interview that each space within the house had a specific functional requirement. The Northwest room was not for use by children. It was intended for formal occasions or to play the piano. The Northeast room was or the living room saw plenty of use. This was the main gathering space for the family throughout the years. Upstairs the bedrooms were divided by gender. The East room was designated for girls, West room for boys. The attic space, South of the boys bedroom, was used for storage space, and was called the "wood room."

The William Bonner House, similar to many other houses in the town of Midway, grew by accretion, over time, to accommodate needs for newer technology like modern plumbing, water, and electricity, and greater space. In fact the George Bonner Sr. house clearly followed this pattern. "As the family prospered, the house was enlarged with a kitchen on the back and an additional room with fireplace." (Bonner Family History). Similarly, the first addition added (visible in historic photos dated to 1880, 2 years after the house was constructed) to the William Bonner House, was used for a kitchen, and the subsequent addition supplied a more adequate kitchen along with a bathroom.

The primary source for this history was an interview with Ms. Kaye Bonner by Mr. Brian Backe, Spring 2010. Other sources include are listed in the general bibliography, and include Carter's Utah historic site nomination form and the Bonner Family History.

(Brian, please identify this text…Bonner Family History).

8.4 A NOTE ON GOTHIC AND GOTHIC REVIVAL STYLES

The origins of the American version of the Gothic Revival style are traced through pattern books and other inspirational sources to the European equivalent of the same movement. There are specific examples from the architect's original home from the same period that could have served as possible models or inspiration. They will be shown here, but lacking any of the architect's notes to that regard, their actual influence is only conjectural. It can be said that this revival style was well on its way to becoming a fixture in both Europe and the Eastern United States prior to its adaptation in the frontier Watkins-Coleman home depicted here.

The original Gothic can be traced to one building and truly to one man, but this man was devoutly studied the works that had come before, both from his own tradition and far afield. In the 12th century, the Abbot Suger was working towards his vision of a building that would allow light to flow through the walls and fill up the church and its congregation. From the 10th to the 13th Century, the entire early medieval period, architects had built massive churches with thick masonry bearing walls, close together for short spans by round heavy arches. In Watkins' own time, these churches were coined "Romanesque" because their stylistic elements descended from the Romans. It was sturdy, and strong, and its forms and detailing evocative enough to warrant its own revival in America in the early twentieth century. However, Suger's vision was of a bright, uplifting architecture, and in his spiritual understanding, the light was equivalent to the presence of God.

At his Abbey Church of St. Denis, begun in 1136 A.D., Suger created tall and skeletal columns, arches that curved towards a point, and great tall vaults. Vaults composed of these pointed arches were better able to distribute the roof loads downwards than the previous round vaults, and they were often further reinforced by flying buttresses placed on the outside of the building. The pitched arches can be plainly seen in earlier Islamic architecture in the Northern Africa and the Middle East, but had not previously been used to such structural effect. (e.g., Ibn Tulun Mosque in Cairo (879), visited by the author of this report in 2009). Whether Eastern examples actually influenced the use of the pointed arch in churches is not known. (Scott, 113). The Gothic structural system was capable of usurping the place of heavy structural walls, meaning that walls need only carry their own weight. This allowed walls of windows and the flood of God-light that Suger desired. Each Gothic cathedral became a competitive challenge to both neighboring churches and ones far afield, until these monumental devotional cathedrals were built throughout Europe, for the grandeur of the nobility, and the edification and inspiration to the masses.
(Victorian Web, Britain Express)

Gothic received an aesthetic bad rap from its first day, however. Whereas Abbot Suger preferred "The Modern Style," the lasting moniker was pejorative, a term from the style's critics. Gothic was equivalent to "Barbaric" or "Vandal." Using gothic elements in architecture, even centuries later, was met with disapproval and indeed perceived to be a rather rude thing to do.

The early 15th Century brought forward an architecture at once yearning for the balance and symmetry of the ancients an for the cultural and scientific achievement of an age yet to come. The background material of this new Renaissance were the temples and tombs of the ancient Romans and Greeks, and the new dawn arising was that of the new architect, a scholar instead of a mason, at once a mathematician, scientist, sculptor, artist, and painter. Renaissance architects carefully divided plans into modules, and integrated the design of the plan with that of the façade. They classified the orders of classical architecture, columns and their capitols, and characterized them to their respective systems of proportion. Arches, vaults, and domes and their details were all measured, drawn, and carefully implemented on projects. The Renaissance and ensuing eras brought forth first a refinement and later an exhaustive experimentation with the classical elements, and the style was brought to expressive fruition.

But centuries of classical design resulted in highly exacting stylistic formulae, and ultimately in scrolls upon scrolls of rules and maxims for good design. This regulated form of perfectionism in a profession that truly consisted almost entirely of perfectionists created a milieu ripe for an artistic rebellion. The real advantage of the Gothic was the lack of a fixed module, freeing the designer to create and work with his own system of proportion.

As is not uncommon in realms of the aesthetic, several forces were working at once. The style emerging in literature and art was the picturesque, which spoke of the beauties of the landscape and of unadorned nature. Writers in the style strove to remove intellectualizing from an understanding of beauty, towards admittance that beauty is strictly a matter of instinct. John Ruskin, English artist and critic, wrote of the Picturesque as a genuine category of art in his texts "Seven Lamps of Architecture" and "The Stones of Venice." Ruins were often the center of British picturesque paintings, and there were numerous available in Seventeenth Century England. Natural materials, asymmetry, and decoration were hallmarks. This hearkening for a naturalistic approach found much agreement both public and private, and it is not surprising that England was the center of a new Gothic Revival. This was a Romantic style with leanings towards an imagined idyllic past. Architects, however, did not desire to apply form and detail of past projects, but to create new original works.

The overall forms utilized were asymmetrical, but balanced. Architects of the Gothic Revival sought after the structural clarity of the building that could clearly be seen in the Gothic predecessors. A.W.N. Pugin wrote in support of Gothic detailing to the same level of craftsmanship of the medieval gothic. (Pugin). Gothic was embraced by the Church of England, and soon after numerous Christian churches throughout Europe and the United States. The style was not simply for residences, but for all manner of religious, academic, public buildings. Many American architects believed, as Pugin did, that the Gothic Revival to be the "only proper style" for ecclesiastical projects. (Head, Hand, and Heart). The approach taken on large, monumental buildings was decidedly different from residences. Architects of the Gothic Revival, such as Ralph Adams Cram, strove to integrate knowledge of modern structural materials, techniques, and science to create modern Christian edifices. Modern, streamlined buildings by his time were emerging on every front, but he was still reviewed positively. A reviewer of his work stated in 1916, "hears its living music, and it is to him not past but eternal." (Milliner, N. American Churches).

An underpinning of the style, understood on every scale, is that the Gothic Revival was a godly architecture. The pattern books that purveyed its designs and detailing also tended to include treatises in architectural theory and its ties to religious philosophy. The previously mentioned "The Architecture of Country Houses," by Downing features several chapters of the goodness of country living, with sections on morals and ethics. Forms either found in the Islamic world, translated or independently discovered in medieval France, were brought to the Americas as the architectural equivalent of Romantic picturesque poetry. These forms were indeed seen as vessels inherently full of godliness, goodness, and truth.

CALDER RICHARDS
CONSULTING ENGINEERS

William Bonner III Residence

Structural Investigation
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June 8, 2011

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Table of Contents

WILLIAM BONNER III HOME

INTRODUCTION

The purpose of this investigation was to provide a brief structural condition survey of the subject building and provide recommendations to help ensure its long term preservation.

The survey was based on an observation of the existing building structures that were accessible during a site visit. Miscellaneous structural calculations were also performed using the current International Building Code (IBC), International Existing Building Code (IEBC) and American Society of Civil Engineers (ASCE) 07-05 criteria to establish a comparison between existing capacity and current code requirements.

The William Bonner III House is a two story structure with a partial basement and crawl space located at 110 East and Main within the town of Midway, Utah. Also on site are several other ancillary structures. In addition to the home, there is also a large Barn, a Granary, a Garage and a couple other small structures. This report will focus on the Home. **See Appendix Photo 1.**

The original home was built around 1877. Two southern additions were provided later on to the original structure with the last addition being primarily wood framed. **See Appendix Photo 2.** The age of their construction is unknown at this time; however, the last addition appears to be less than 50 years old. The home is approximately 1900 SF in size and currently vacant, but it was mentioned that it was used for some time as a rental.

STRUCTURAL CONDITION ASSESSMENT

FOUNDATIONS

Description:

The structural system of the Home is primarily supported by unreinforced volcanic limestone type masonry foundations. The limestone masonry is known locally as “Pot Rock”. It was mentioned that the Pot Rock was quarried nearby and is used throughout the area for structural foundations and exterior wall systems. The Pot rock is typically light in color and filled with vesicles. Vesicles are small cavities or air pockets formed by the expansion of gas bubbles or steam during the formation of the rock.

It’s not uncommon for the time when this home was built to use local masonry type materials such as loose stones or quarried rock. The Pot rock was relatively inexpensive and suitably strong enough to be used effectively in a foundation system.

Condition:

The foundations range in condition from satisfactory to good. The mortar joints within the Pot Rock foundations were observed in some areas to be deteriorated. These areas mostly occurred where the foundation has been exposed to an increased amount of moisture. At the west side for example; it appears that lawn sprinklers have been directed towards the house thus allowing the water to cause deterioration of the mortar within the masonry joints.

Recommendations:

Repair any cracked and damaged areas of masonry foundations. All damaged mortar joints need to be repointed. Repointing is the process of carefully removing and replacing any damaged or deteriorated mortar joints.

Care should be taken to redirect any surface drainage away from the home. Watering sprinklers should also be redirected so that they do not spray towards the Home.

Estimate of Construction Costs: $10,000

BUILDING STRUCTURAL SYSTEM

Description:

The roofs and floors are wood framed. The roof is wood framed with 2x6 rafters and collar ties and sheathed with 1x skip sheathing. **See Appendix Photos 3 and 4.** The upper and lower level floors are also wood framed with 2x6 and 2x8 joists respectively. The floors are sheathed with 1x decking.

The roof and floor framing construction used in the home was commonly used in residential construction at the time it was built and in some instances is still used today except that plywood type sheathing is used in lieu of the 1x skip sheathing.

Condition:

The overall condition of the Home's roof and floor system appears to be in good condition when considering the age of the structure and the environment in which it has been exposed to. Observation indicates that the roof and floor framing shows no significant signs of failure or distress. However, due to the age of construction, it's anticipated that some damaged framing will be uncovered with further observations.

Some brief calculations were performed on the structural system for review purposes to determine the loading capacity of the framing at various locations. The self weight of structure and the Building Department's minimum requirements for live floor and roof snow loading were used in the analysis. Another guideline often used for determining acceptance is the Abatement of Hazardous Buildings Code. It states that if a structural member is loaded in excess of 150% of its capacity, a potentially dangerous hazard may occur within the framing element or structure. If the stress levels are found to be below 150% and the framing is in satisfactory condition, the framing in question is deemed acceptable.

Using residential type loading, the majority of the wood framing within the house calculates to be sufficient. However, the longer roof joists over the eastern first addition are approximately 33% over spanned. Since this is less than 50%, these joists are acceptable.

Recommendations:

Based on the above observations and findings, the majority of framing within the house has adequately supported the loading over their years of use. However, some upgrades will need to be made to ensure life safety and the long term preservation of the existing structures.

Any damaged roof and floor framing should be repaired or replaced. It's recommended that the roof shingles be removed from each structure and the roofs sheathed with ½" sheathing placed over the existing skip sheathing. The existing 1x skip sheathing does not provide much lateral structural strength.

Estimate of Construction Costs: $14,000

BUILDING ENVELOPE – EXTERIOR WALLS

Description:

The exterior walls and a few interior bearing walls for the Home are framed with unreinforced multiwythe solid brick type masonry commonly referred to as URM walls. The masonry brick units are each approximately 2" x 4" x 8" in size and appeared to be made from fired or kiln dried clay. Each wall is comprised of two layers or wythes of interlocking patterned brick to form a total thickness of approximately 8". The lay up pattern of the brick masonry appeared to have a good interlocking pattern. This pattern allows the two brick wythes to work effectively as a single thicker wall thus providing increased structural strength in both the vertical and horizontal directions.

Unreinforced Masonry Wall (URM) type construction is generally not used today especially in higher seismic regions. Its behavior during a significant seismic event is typically brittle, lacks any ductility and thusly cannot absorb any seismic energy. In fact, URM type construction is not allowed by the International Building Code (IBC) in any high or moderate seismically prone areas. In a scale from A to F in which A is a non seismic area, the William Bonner III site is classified as Seismic Design Category D. Therefore, it's in a high seismically prone region.

Condition:

The overall condition of the exterior walls at the Home ranges from good to satisfactory. The masonry walls show only minor signs of distress with only a bit of cracking within the mortar joints.

One area of concern with older masonry buildings is their seismic strength. Unreinforced masonry wall buildings have historically been found to perform poorly during a seismic event. The out-of-plane wall anchorage tying the URM walls to the roof and floor framing is typically missing or insufficient and therefore does not meet current code. It was observed that the out-of-plane wall anchorage was missing on the house.

A brief seismic strength analysis was performed on the home using methods and provisions outlined in the International Existing Building Code (IEBC). The IEBC provisions were established as a minimum standard for "existing buildings" in order to reduce the risk of injury or loss of life during a seismic event. Based on our analysis it appears that the URM walls may be sufficient in resisting the minimum seismic force levels established in the IEBC code. However, due to the lack of wall anchorage, it's recommended that wall anchorage be provided.

It was mentioned that the owner may adapt the William Bonner House for Business or Mercantile use. Section 907.3.1 of the International Existing Building Code (IEBC) states that, "where such change in occupancy results in a reclassification of a building to a higher hazard category ... the building shall comply with the requirements of the International Building Code level seismic forces". Per IEBC table 912.4, the change from residential (R-3) occupancy to business (B) occupancy does not qualify as a change in occupancy to a higher hazard category. However, from a residential (R-3) occupancy to Merchantile (M) occupancy does. That being said, Utah's amendment to IEBC has an additional exemption to section 907.3.1 stating, "Where the design occupant load increase is less than 25 occupants and the occupancy category doesn't change". Our interpretation of the above code criteria indicates that provided the new occupant load within the house is below its original load plus 25, a seismic upgrade should not be required.

Recommendations:

Repair any cracked and damaged areas of masonry walls. All damaged mortar joints need to be repointed. Provide new roof and floor anchorage along the masonry walls. This anchorage is typically installed at 4'0" on center.

The tall chimneys above the Home's roof line should also be braced near the top and back down to the roof. Tall URM chimneys do not perform well during a seismic event and are considered falling hazards.

Estimate of Construction Costs: $20,000

CONCLUSION

Overall condition of the historic Home is remarkable considering that they have been subjected to heavy snow loading and the harsh exposure for over 130 years of use. That said, considerations should be made in maintaining the building and correcting observed problems within the structure that may jeopardize their integrity, preservation and long term use.

Upgrading the historic structure to meet full compliance with code is well beyond the scope of work, is cost prohibitive and may not be completely feasible. Instead it is the intent to provide cost effective recommendations for correction that will help maintain and ensure the long term preservation of the structures.

It should be noted that the above findings and recommendations were based solely on review of the existing structural conditions that were accessible and exposed at the time of observation. This report does not express nor does it imply any warranty of the structures but only addresses conditions as documented above.

Photo 1

Photo 2

Appendix

Photo 3

Photo 4

Appendix

CALDER RICHARDS
CONSULTING ENGINEERS

William Bonner III Granary

Structural Investigation
Midway, Utah

June 8, 2011

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Table of Contents

WILLIAM BONNER III GRANARY STRUCTURE

INTRODUCTION

The purpose of this investigation was to provide a brief structural condition survey of the subject building and provide recommendations to help ensure its long term preservation.

The survey was based on an observation of the existing building structure that was accessible during a site visit. Miscellaneous structural calculations were also performed using the current International Building Code (IBC), International Existing Building Code (IEBC) and American Society of Civil Engineers (ASCE) 07-05 criteria to establish a comparison between existing capacity and current code requirements.

The William Bonner III Residence is located at 110 East and Main within the town of Midway, Utah. Also on site are several other ancillary structures. In addition to the home, there is also a large Barn, a Granary, a Garage and a couple other small structures. This report will focus on the Granary. **See Appendix Photos 1 and 2.**

The Granary is a single story masonry structure with a crawlspace below. Attached to the West side of the original structure is a wood framed addition. The Granary is approximately 550 square feet in size and the age of construction is also unknown at this time. The Granary does not currently appear to be in use.

STRUCTURAL CONDITION ASSESSMENT

FOUNDATIONS

Description:

The structural system of the Granary is primarily supported by unreinforced volcanic limestone type masonry foundations. The limestone masonry is known locally as “Pot Rock”. It was mentioned that the Pot Rock was quarried nearby and is used throughout the area for structural foundations and exterior wall systems. The Pot rock is typically light in color and filled with vesicles. Vesicles are small cavities or air pockets formed by the expansion of gas bubbles or steam during the formation of the rock.

It’s not uncommon for the time when this home was built to use local masonry type materials such as loose stones or quarried rock. The Pot rock was relatively inexpensive and suitably strong enough to be used effectively in a foundation system.

Condition:

The foundations for the Granary range in condition from poor to satisfactory. It was observed in a few spots that the mortar joints have deteriorated to a point that the Pot Rocks have loosened and failed. **See Appendix Photos 2 and 3.**

Recommendations:

Repair any cracked and damaged areas of masonry foundations. All damaged mortar joints need to be repointed. Repointing is the process of carefully removing and replacing any damaged or deteriorated mortar joints.

Care should be taken to redirect any surface drainage away from the Granary. Watering sprinklers should also be redirected so that they do not spray towards the structure.

Estimate of Construction Costs: $5,000

BUILDING STRUCTURAL SYSTEM

Description:

The roof and floor joists were observed to be 2x4s and 2x6s respectively and are also sheathed with 1x skip sheathing at the roof and 1x decking at the floor.

The roof and floor framing construction was commonly used in residential construction at the time it was built and in some instances is still used today except that plywood type sheathing is used in lieu of the 1x skip sheathing.

Condition:

The Granary's roof and floor system appeared to be in satisfactory to poor condition. Much of the roof and floor framing is damaged and will need to be repaired or replaced. A mid bearing beam line had been installed later on in order to stiffen the floor joists. However, this beam line needs to be repaired or rebuilt. The siding on the west side addition is also in poor shape and needs to be replaced. **See Appendix Photo 1.**

Some brief calculations were performed on the structure for review purposes to determine the loading capacity of the framing at various locations. The self weight of structure and the Building Department's minimum requirements for live floor and roof snow loading were used in the analysis. Another guideline often used for determining acceptance is the Abatement of Hazardous Buildings Code. It states that if a structural member is loaded in excess of 150% of its capacity, a potentially dangerous hazard may occur within the framing element or structure. If the stress levels are found to be below 150% and the framing is in satisfactory condition, the framing in question is deemed acceptable.

The roof framing was shown to be adequate except for the 2x6 joists loaded flat wise at the east side. These joists will need to be stiffened or reframed. The floor framing only showed to be adequate as long as a mid beam / bearing line is provided. However, as mentioned earlier, this mid beam line needs to be repaired or replaced.

Recommendations:

Based on the above observations and findings, the majority of framing within the granary has adequately supported the loading over their years of use. However, some upgrades will need to be made to ensure life safety and the long term preservation of the existing structures.

Any damaged roof and floor framing should be repaired or replaced. It's recommended that the roof shingles be removed from each structure and the roofs sheathed with ½" sheathing placed over the existing skip sheathing. The existing 1x skip sheathing does not provide much lateral structural strength.

Estimate of Construction Costs: $5,000

BUILDING ENVELOPE – EXTERIOR WALLS

Description:

The Granary's exterior walls are just a continuation of the foundation system in that they are comprised of unreinforced Pot Rock Masonry.

Unreinforced Masonry Wall (URM) type construction is generally not used today especially in higher seismic regions. Its behavior during a significant seismic event is typically brittle, lacks any ductility and thusly cannot absorb any seismic energy. In fact, URM type construction is not allowed by the International Building Code (IBC) in any high or moderate seismically prone areas. In a scale from A to F in which A is a non seismic area, the William Bonner III site is classified as Seismic Design Category D. Therefore, it's in a high seismically prone region.

Condition:

The overall condition of the exterior walls for the Granary walls may be considered as satisfactory.

One area of concern with older masonry buildings is their seismic strength. Unreinforced masonry wall buildings have historically been found to perform poorly during a seismic event. The out-of-plane wall anchorage tying the URM walls to the roof and floor framing is typically missing or insufficient and therefore does not meet current code. It was observed that the out-of-plane wall anchorage was missing.

A brief seismic strength analysis was performed on the structures using methods and provisions outlined in the International Existing Building Code (IEBC). The IEBC provisions were established as a minimum standard for "existing buildings" in order to reduce the risk of injury or loss of life during a seismic event. Based on our analysis it appears that the URM walls may be sufficient in resisting the minimum seismic force levels established in the IEBC code. However, due to the lack of wall anchorage, it's recommended that wall anchorage be provided.

Recommendations:

Repair any cracked and damaged areas of masonry walls. All damaged mortar joints need to be repointed. Provide new roof and floor anchorage along the masonry walls. This anchorage is typically installed at 4'0" on center.

Estimate of Construction Costs: $8,000

CONCLUSION

Overall condition of the Granary is remarkable considering that they have been subjected to heavy snow loading and the harsh exposure for over 130 years of use. That said, considerations should be made in maintaining the building and correcting observed problems within the structure that may jeopardize their integrity, preservation and long term use.

Upgrading the historic structure to meet full compliance with code is well beyond the scope of work, is cost prohibitive and may not be completely feasible. Instead it is the intent to provide cost effective recommendations for correction that will help maintain and ensure the long term preservation of the structures.

It should be noted that the above findings and recommendations were based solely on review of the existing structural conditions that were accessible and exposed at the time of observation. This report does not express nor does it imply any warranty of the structures but only addresses conditions as documented above.

Photo 1

Photo 2

Appendix

Photo 3

CALDER RICHARDS
CONSULTING ENGINEERS

William Bonner III Barn

Structural Investigation
Midway, Utah

June 8, 2011

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Table of Contents

WILLIAM BONNER III BARN

INTRODUCTION

The purpose of this investigation was to provide a brief structural condition survey of the subject buildings and provide recommendations to help ensure their long term preservation.

The survey was based on an observation of the existing building structures that were accessible during a site visit. Miscellaneous structural calculations were also performed using the current International Building Code (IBC), International Existing Building Code (IEBC) and American Society of Civil Engineers (ASCE) 07-05 criteria to establish a comparison between existing capacity and current code requirements.

The William Bonner III site is located at 110 East and Main within the town of Midway, Utah. Also on site are several other ancillary structures. In addition to the home, there is also a large Barn, a Granary, a Garage and a couple other small structures. This report will focus on the Barn structure. **See Appendix Photos 1 and 3.**

The Large Barn is a wood post and beam type structure. **See Appendix Photo 2.** Over time, a couple additions have been provided on to the original barn structure. **See Appendix Photos 3 and 4.** The south side garage addition is also framed with posts and beams but with stripped log type members. The east side addition is framed a bit differently in that the exterior is framed with stud walls. It's unknown at this time when the original barn was built along with its additions. The Barn currently is being used for miscellaneous storage space.

STRUCTURAL CONDITION ASSESSMENT

FOUNDATIONS

Description:

The structural system of the Barn is primarily supported by unreinforced volcanic limestone type masonry foundations. The limestone masonry is known locally as "Pot Rock". It was mentioned that the Pot Rock was quarried nearby and is used throughout the area for structural foundations and exterior wall systems. The Pot rock is typically light in color and filled with vesicles. Vesicles are small cavities or air pockets formed by the expansion of gas bubbles or steam during the formation of the rock. Mortared joints were not observed between the masonry units. **See Appendix Photo 5.**

Condition:

The masonry foundations for the Barn are in poor condition. Mortared joints were not observed and the exterior foundations did not extend down for frost protection. **See Appendix Photo 5.** Without mortared joints, the foundation system does not work together as a single unit and thus the structure is susceptible to differential vertical and some horizontal movement. Without frost protection, the structure is highly susceptible to vertical movement between seasonal temperature fluctuations. Knowing the above information however was probably of no concern to the original owners, since the structure still is and was used as a Barn.

Recommendations:

Due to the lack of an adequate long term foundation system at the Barn, it's recommended that the existing foundations be removed and new reinforced foundations provided.

Estimate of Construction Costs: $150,000

BUILDING STRUCTURAL SYSTEM

Description:

The large Barn structural system is wood framed with a post and beam type system. The roof and partial floors are framed with 2x6 joists, sheathed with 1x decking, and supported by solid 8x8 timber beams and posts. The beam to post connections are then stiffened and braced somewhat with the addition of smaller 4x4 timber members. **See Appendix Photos 2 and 6.**

The unique thing about the original Barn construction is that mortise and tenon type connections are used throughout at the posts to beams and bracing. These type of connections are labor intensive and if done properly are aesthetically pleasing and very strong. Post and Beam timber construction is still used today but is typically cost prohibitive due to the time and effort it requires.

Condition:

The condition of the large Barn appeared to be poor especially at its southern addition. It was observed in several areas that the post and beam connections have either failed or partially failed. At some point in time, steel tie rods were installed to help tie/hold the original barn structure from side to side in order to resist bowing of the structure. **The steel rods can be seen in Appendix Photos 2 and 6.** The upper level floor and roof of the East addition has pulled away from its supporting beams and has been inadequately modified to try and keep the floor system in place. The Southern addition has also racked and many of the beams and columns appear under sized. **See Appendix Photo 4.**

Some brief calculations were performed on the structure for review purposes to determine the loading capacity of the framing at various locations. The self weight of structure and the Building Department's minimum requirements for live floor and roof snow loading were used in the analysis. Another guideline often used for determining acceptance is the Abatement of Hazardous Buildings Code. It states that if a structural member is loaded in excess of 150% of its capacity, a potentially dangerous hazard may occur within the framing element or structure. If the stress levels are found to be below 150% and the framing is in satisfactory condition, the framing in question is deemed acceptable.

Apart from the many post to beam and bracing connections that need to be repaired, the majority of the original Barn framing members calculated to be sufficient. The framing for the two additions however, are both insufficient. The roof and floor joists for the east side addition are well over stressed and by appearance alone, one can tell that the framing for the south addition is also well over stressed.

Recommendations:

The storage within should be cleaned out and then any nonstructural items removed. This will allow for other damaged structural members and connections to be identified and repaired. Unstable Portions of the Barn that were added on to the original Barn should be removed. As with the other structures, repair or replace any damaged posts, beams and joists. Any damaged post and beam connections should also be repaired.

Estimate of Construction Costs: $70,000

BUILDING ENVELOPE – EXTERIOR WALLS

Description:

As mentioned earlier, the structural system for the Barn is a timber post and beam type system. The exterior walls have post and beams sided with 1x wood siding.

Condition:

The condition of the Barn's exterior wall framing ranges from poor to satisfactory. The seismic loading on the barn structure is relatively low, however, its ability to resist the loading is suspect. The majority of the existing post and beam connections have loosened and several have partially failed. The exterior vertical siding is in poor condition. Along with repairing the existing connections, new tension rod bracing is recommended around the original barn structure to help stabilize the building.

Recommendations:

All damaged posts and beams and their connections should be repaired or replaced. Any damaged siding should also be replaced. New tension rod bracing should also be provided around the original Barn structure to help stabilize the building.

Estimate of Construction Costs: $30,000

CONCLUSION

Considerations should be made in maintaining the Barn structure and correcting observed problems within the structure that may jeopardize its integrity, preservation and long term use. However, due to the many concerning items mentioned above, economics of saving the structure must be considered.

Upgrading the historic structure to meet full compliance with code is well beyond the scope of work, is cost prohibitive and may not be completely feasible. Instead it is the intent to provide cost effective recommendations for correction that will help maintain and ensure the long term preservation of the structure.

It should be noted that the above findings and recommendations were based solely on review of the existing structural conditions that were accessible and exposed at the time of observation. This report does not express nor does it imply any warranty of the structures but only addresses conditions as documented above.

Photo 1

Photo 2

Appendix

Photo 3

Photo 4

Appendix

Photo 5

Photo 6

Appendix

Photo 7

3.8 MECHANICAL SYSTEMS

The existing mechanical systems being used to heat and cool the residence are a modern replacement for what was once a simple heating only system. Due to wholesale changes in the system, is it difficult to determine exactly how the original residence was heated. There doesn't appear to be evidence of a central heating system or a central fireplace, suggesting that the residence was likely heated using multiple small Franklin stoves. There is a remnant of a mantle in the east upper level room, suggesting the possibility of a small built-in fireplace. Given the overall size of the room, however, it is more likely that the mantel is decorative and that a wood stove was set in front of it.

A bathroom is located on the main level off the kitchen. Given the date of the original construction and the relatively small current kitchen area, we question whether the bathroom was part of the original construction or if it was added at a later date. A second ¾ bath has been remodeled into the south addition to the residence and is obviously of much later construction. Based on the relatively small "basement" and its location with regard to the kitchen, it appears that plumbing services may have been brought into the residence at a later date and that the basement space currently being used for mechanical purposes was more than likely an interior storage area / root cellar.

At some time after the initial construction, a ducted forced air heating system was installed, being served from the basement area crawlspace on the south side of the residence. The ductwork is routed in a very limited crawlspace to registers on the main level. A single duct has also been routed up in a closet behind the main level bedroom to the upper level and then extended horizontally in the central attic / storage area to serve the upper level. While serviceable, in general the ductwork installation is poorly done and should be replaced. In general, the existing mechanical system detracts from the overall historic nature of the residence.

The plumbing water and waste systems come into the basement from the east side of the residence, suggesting that they may have been installed at the same time as the original furnace system. The plumbing waste piping is cast iron with lead joints, the vent system has a leaded terminal at the roof, and the water service is galvanized steel, suggesting that no significant changes to the piping have been made since the installation.

NATURAL GAS UTILITY SERVICE

DESCRIPTION: The residence is served with natural gas from the local utility company.

The meter is located on the west side of the residence with the gas piping being extended through the crawlspace to the furnace and water heater in the basement.

CONDITION: The condition of the natural gas utility service is good and will continue to support any future use of the residence.

RECOMMENDATIONS: None.

MECHANICAL HEATING, VENTILATING AND AIR CONDITIONING SYSTEMS

DESCRIPTION: Heating for the residence is provided by an 80,000 BtuH, 92% efficient Lennox furnace. Un-insulated supply air ductwork has been installed in the crawlspace and up through the main level. From what is observable, there is very limited space below the floor system to either retrofit the system or to provide for a new installation without tearing up the floor. The furnace uses a direct expansion cooling coil connected to a condensing unit located on the southeast side of the residence for cooling. An Aprilaire evaporative humidifier has been installed on the supply air ductwork.

Ventilation for the residence is limited to that provided by the furnace fan. The crawlspace is not ventilated.

CONDITION: The furnace is in good condition and will likely meet the overall heating and air conditioning needs of the residence for the foreseeable future if this system continues to be used. Although poorly installed and aesthetically lacking, the overall ductwork system will also continue to function adequately. The use of the evaporative humidifier on the furnace has the capability to maintain a 15-20% relative humidity level throughout the residence. The operation of the humidification system was not verified. As installed, it will be difficult if not impossible to provide for multiple temperature zones in the residence.

RECOMMENDATIONS: Considering that the residence will either be converted for use as a multiple tenant office space or remodeled for residential use, we recommend that the existing mechanical system be removed and that one of two systems be re-installed.

Option #1:

In the event that the building will be used for office space, the ability to provide for individual tenant temperature control will be critical. This may be done by installing a direct expansion heat pump system with wall mounted heating / cooling units similar to the Mitsubishi City-Multi. The advantages to this system are the lack of ductwork and the

ability to provide for multiple temperature zones. The wall mounted units will be visible, but not necessarily obtrusive. In addition, wall mounting the units will allow for more flexibility in the use of limited floor space.

The existing bathrooms, the entry mudroom and the attic space will need heat, but not air conditioning. As such, local electric wall or ceiling heaters should be used to condition these spaces.

The relatively small area of the building and the fact that the building has operable windows, makes requirement for a forced ventilation system a non-requirement.

ESTIMATE OF CONSTRUCTION COST: $ 25,000

In the event that the building is to be renovated for residential use, the need for multiple temperature zones (particularly for cooling) may be less of an issue. Floor space and overall system comfort are still critical issues. To this end, we recommend that the installation of a hot water heating system with a condensing boiler and a side-arm water heater. Heating distribution should be through the use of a radiant floor "Warm-Board" system which may be installed on top of the existing floor joists. The radiant floor system will provide more even heating throughout the residence, avoiding hot and cold spots. This will significantly improve the overall comfort of the residence, particularly given the relatively low insulating values of the exterior wall systems.

Assuming that air conditioning and humidification are desirable elements in the residence, we are recommending the installation of a high velocity air conditioning system as an added option to the basic heating system described above. The high velocity system uses small (2" diameter) distribution ducts which may be more easily routed through the existing structure without significant structural modifications. Care must be taken in locating the terminations as experience has shown some localized discomfort due to the discharge velocity. As the high pressure cooling air is supplied into the space, it "induces" warm air into the air stream, effectively providing the required space cooling. The same system may be used for humidification purposes.

ESTIMATE OF CONSTRUCTION COST:

- Basic heating system $ 25,000
- Ventilation / humidification $ 10,000

Exhaust systems should be added to each of the bathrooms. Although each of the spaces meet current code requirements with the use of the operable window, the exhaust fan will provide for odor and humidity removal during the winter months when the window will likely not be opened and will allow the window to be fixed if desired.

ESTIMATE OF CONSTRUCTION COST: $ 1,000

A ventilation system should be installed in the crawlspace. We did not see any signs of mold or mildew, but experience has shown that a naturally ventilated or un-ventilated crawlspace is prone to moisture related problems. The installation of a simple make-up and exhaust system will ensure that moisture does not become a problem in the future.

ESTIMATE OF CONSTRUCTION COST: $ 2,000

DOMESTIC UTILITY WATER SERVICE

DESCRIPTION: A ¾" domestic water service is extended into the basement area from the east side of the residence. The service is polyethylene with a pressure reducing valve at the service entrance in the basement. After the pressure reducing valve, the piping is a combination of PEX and copper.

CONDITION: The water service entry condition is in good condition and will continue to adequately serve the needs of the building.

RECOMMENDATIONS: Not applicable

ESTIMATE OF CONSTRUCTION COST: Not applicable

SANITARY WASTE UTILITY SERVICE

DESCRIPTION: The sanitary waste system is cast iron with lead / oakum joints. It is piped from the basement through the foundation to the east.

CONDITION: The sewer system is generally in good condition. However, depending on the level of modifications that may be made to the interior plumbing systems, consideration

should be given to converting it to PVC DWV in the crawlspace before connecting to the existing cast iron discharge through the foundation wall.

RECOMMENDATIONS: Make any changes required by new plumbing in the kitchen and bathroom. All changed work should be installed in PVC DWV.

ESTIMATE OF CONSTRUCTION COST: $ 4,000

INTERIOR PLUMBING SYSTEMS:

DESCRIPTION: Interior plumbing provides service to the kitchen, the full bathroom located to the east of the kitchen and to a ¾ bath located in the south addition. There is also service to a clothes washer connection in the south addition.

CONDITION: In general, while all of the fixtures appear to be serviceable, they have little historical authenticity. The overall condition and appearance would suggest that all of the fixtures be replaced as a part of any renovation.

RECOMMENDATIONS: All plumbing fixtures should be replaced with either historically accurate units or alternatively with commercially usable units. If the ¾ bath is to be maintained in place, it should be completely remodeled.

ESTIMATE OF CONSTRUCTION COST: $ 11,000

FIRE SUPPRESSION - SPRINKLER SYSTEMS

DESCRIPTION: The building does not have a fire suppression / sprinkler system.

CONDITION: Not applicable.

RECOMMENDATIONS: The use of a residential type fire suppression system should be considered as a part of the overall renovation of the residence. Consideration should take into account the fact that the system is not a part of the historic fabric of the residence and will be a visible reminder of the upgrades. This should be countered by the value of protection that the sprinkler system will bring to both the building and its contents. An insurance underwriter should be contacted to provide a specific value to the installation.

ESTIMATE OF CONSTRUCTION COST: $ 10,000

3.9 ELECTRICAL SYSTEMS

The electrical system is not a part of the original construction. It does not meet the requirements of the current National Electric Code and will require replacement as a part of any significant remodel or renovation of the residence.

ELECTRICAL UTILITY SERVICE

DESCRIPTION: The electric utility service is extended overhead from a pole mounted transformer on East Main Street to a meter / disconnect located on the north side of the granary building and then overhead to the residence with a final termination being made to a 125 amp load center in the basement. It appears that the somewhat unorthodox routing is required by the location of the masthead on the south side of the residence with higher roof elements between the masthead and the transformer pole. There is also some indication that at one time power was extended from the service connection at the granary to the barn and to the shop building. At present power is not provided to these secondary buildings.

CONDITION: The utility service is technically in good condition. However, the overhead wires and the circuitous routing are unsightly and the length of the run leaves the service conductors with a greater exposure to weather damage.

RECOMMENDATIONS: Consideration should be given to re-routing the service into the site underground. A new meter and main disconnect location could be installed on the south side of the residence with the service then being extended to the new load center (see notes associated with Electrical Panel and Distribution System).

ESTIMATE OF CONSTRUCTION COST: $ 7,500

ELECTRICAL PANELS AND DISTRIBUTION SYSTEM

DESCRIPTION: The electrical service is extended from the overhead service down to a 125 amp load center in the basement of the residence. Power is distributed from the load center to a fused disconnect which serves the electric range in the kitchen, a 30 amp, 2-pole breaker for the air conditioning condenser, three 20 amp lighting and convenience power circuits, and a small panel in the main level laundry area which has an additional two 20

amp, single pole circuit breakers. Given that the National Electric Code requires that an electric distribution panel be installed in a 6'-6" tall space as a minimum and that the basement has a maximum ceiling height of 6'-2", the installation does not meet the requirements of the code.

The distribution wiring is a combination of non-metallic sheathed electrical cable (generically known as Romex) and cloth covered wire.

The installation appears to have been modified several times. The original installation appears to have provided for lighting and convenience power in the residence with subsequent modifications to provide power to the range and to the air conditioning unit. Convenience receptacles have been located throughout the main level, generally being served from the crawlspace. The two upper level rooms have plug mold installed just above the base boards. Convenience outlets have not been installed on the exterior of the building.

CONDITION: The overall installation is in poor condition and can't be easily retrofitted to meet the requirements of the National Electrical Code. In addition, although the service is adequately sized for a single family residence, it will not meet the use requirements of a modern office space.

RECOMMENDATIONS: The electrical panel and distribution system should be re-installed in their entirety in order to meet current code requirements and as required to match the intended use. It may be possible to re-use a number of the receptacle outlet locations on the existing main level. Where additional outlets are required, consideration should be given to the use of floor outlets. This would allow for code required spacing without trying to install receptacles in the existing plastered walls. Installing receptacles on the upper level will be difficult, but as with the main level, the use of floor outlets or outlets in the baseboards may allow for code required spacing without cutting into the plastered wall finishes.

ESTIMATE OF CONSTRUCTION COST: $ 10,000

LIGHTING SYSTEMS

DESCRIPTION: Lighting throughout the residence is typically residential incandescent. The lighting fixtures are in fair condition, but have little in the way of historical authenticity.

CONDITION: As currently installed, the lighting is usable for a residential application, provided that the occupants provided a number of additional lamps. Overall, however, the installation detracts from the historical nature of the building and should be replaced.

RECOMMENDATIONS: Replace all interior and exterior lighting systems with aesthetically pleasing fixtures which are intended to either be historically accurate reproductions or are designed and installed in a manner to minimize the fixture intrusion into the residence.

ESTIMATE OF CONSTRUCTION COST: $ 5,000

FIRE DETECTION SYSTEM

DESCRIPTION: The building does not have a fire detection system.

CONDITION: Not applicable.

RECOMMENDATIONS: Although not specifically required by code, the use of a commercial type fire detection system should be considered as a part of the overall renovation of the residence. Consideration should take into account the fact that the system is not a part of the historic fabric of the residence and will be a visible reminder of the upgrades. This should be countered by the value of protection that the fire detection system will bring to both the residence and its contents. An insurance underwriter should be contacted to provide a specific value to the installation.

ESTIMATE OF CONSTRUCTION COST: $ 4,000

TELEPHONE / DATA SYSTEM

DESCRIPTION: The residence appears to have been provided with a very limited telephone service with a single outlet in the kitchen.

CONDITION: Currently, the service is extended overhead from the power pole on the north side of the residence to the northeast corner of the residence and from there surface mounted below the eaves to an exterior box on the east wall of the bathroom. The surface mounted wires are unsightly and detract from the front of the residence.

RECOMMENDATIONS: Given the possible future use of the building as an office, it will be necessary to have telephone service. The telephone service should include capability for data and high speed wireless. As this is definitely not a part of the historical construction, the installation will need to be carefully integrated into the building so as to minimize detracting from the building.

The service should be routed below grade to the south side of the residence and then into the basement to make use of the crawlspace for hard-wiring as required.

ESTIMATE OF CONSTRUCTION COST: $ 4,000

Context Architecture Inc.

Pre-Design Code Report for:

The Bonner House – to become a Business or Mercantile Use.

Midway City, Wasatch County, Utah

February 9, 2011

4.3 ZONING CODE COMPLIANCE

Michael Henke, of the Midway City Planning & Zoning Dept.(T. 435-654-7441) has confirmed that this home is in the C-2 (commercial) district, meaning that a retail and/or office use can be considered a "use by right" and no rezoning will be necessary. Once the specific use for this historic home has been decided upon, a Site Plan application will need to be submitted to the Planning & Zoning Department, as explained on the City's web-site, www.midwaycityut.org. This Site Plan application could probably be reviewed administratively, meaning no time consuming Public Hearings would be required. In any event, the Site Plan application should be submitted well ahead of submitting plans to the Building Department.

The City's web-site also has historical renovation guidelines, and Mr. Carl Jones T. 435-657-0805 heads up their Historical Preservation Committee. Given that the Bonner House is already on the National Historic Register, the Historical Preservation Committee will probably also be reviewing the Site Plan Application, so it is recommended that Mr. Jones be contacted once the specific use has been determined, but prior to the Site Plan Application submittal.

Mr. Henke stated that the biggest issue for a commercial use is on-site parking – they require 1 space per 250 square feet, meaning that if both levels of the Bonner Home are utilized, there would need to be 7 parking spaces provided. However, Mr. Henke stated that for this historic home, he would like to consider the ample on-street parking on both Main Street and 100 East Street in lieu of paving a large new area of asphalt onto an existing historic property. There is 490' of parallel parking on Main Street, (ample enough for 20 cars), and there could be additional parking on 100 East Street, depending on the location of any existing driveway.

National Historic Register Alterations:

This home is listed on the National Register of Historic Places.
It has been confirmed with Mr. Cory Jensen, National Historic Register Specialist, T.(801) 533-3559, that alterations may be made to this home so long as they preserve the integrity of any historically important features, especially any feature listed in the homes' nominations. In fact, alterations which correct previous inaccurate alterations, such as the back addition on the Bonner House are actually encouraged.

4.4 BUILDING CODE COMPLIANCE

Current Adopted and Applicable Building Codes:

International Building Code (IBC) Family 2009, including the
International Mechanical Code (IMC) and International Plumbing Code (IPC)
International Energy Conservation Code 2009 (IECC) - New Building Additions only
National Electrical Code, (NEC) 2008
No LEED-Certification is being considered at this time for this historic building.

These Architectural Code notes are written to indicate the MINIMUM required compliance; both the Client and the Architect-of-Record, Christopher Lobas, can determine where their renovations would like to exceed these minimum requirements to achieve future benefits, such as reduced utility bills or greater accessibility.

The appropriate Consuting Engineers are being consulted for structural, mechanical, plumbing and electrical compliance with the appropriate codes for this project. Shaun A. Packer, P.E., is the Structural Engineer for this project, and Mark Burggraaf, P.E., is the Mechanical, Plumbing and Electrical Engineer for this project. For example, a first floor change in use from the residential loading of 40 lbs per SF to retail loading of 100 lbs per SF would require a Structural Engineer's review.

International Residential Code - Not Applicable: This home is not anticipated to remain entirely a residential use (if it was, this use would be 'grandfathered' in, and no code review would be necessary). Because this home is contemplated to include a commercial or public use, the International Residential Code cannot apply, instead, the International Building Code is used, with the R-3 (single family or duplex) occupancy of the IBC applying to any part of this home which becomes an apartment or single family or duplex dwelling unit. The 'mixed occupancy' clauses of the IBC 2009 will apply, and are dealt with below.

IBC Exemptions for National Historic Register Buildings:

IBC Section 3409.1 states that for historic buildings (those on the National Historic Register), "The provisions of this code relating to the construction, repair, alteration, addition, restoration and movement of structures, and change of occupancy shall not be mandatory for historic buildings where such buildings are judged by the building official to not constitute a distinct life safety hazard." As agreed upon with the Architect-of-Record, (and as routinely practiced on historic buildings) it is the purpose of this Code Review to indicate what aspects of these historic homes and projected uses already conform, which ones can be made to conform with minimum effort and expense, and then highlight which elements need an exemption consideration from the Building Code Official. As noted below, accessibility provisions DO apply to "change of occupancy, additions and alterations to existing buildings, including those identified as historic buildings" (Sect 3411.1). Also, the IECC (the Energy Code) does apply to new additions, even when made to historic buildings.

Renovation of Existing Buildings:
Level of Compliance determined by Extent of Repair, Alteration or Additions

In general, existing buildings are not required to be brought up to current codes, unless and until they undergo a change in use, or are altered or receive an addition. When one or more of these changes occurs, certain allowances are given regarding code compliance, depending on the extent and type of the renovations, as noted below. For example, some minor repairs or alterations are exempt from the new code compliance, whereas building additions are generally treated like new construction. Further, Sect 3403.1 states that "Alterations to the existing building or structure shall be made to ensure that *the existing building or structure together with the addition are no less conforming with the provisions of this code* than the existing building or structure was prior to the addition. An existing building together with its additions shall comply with the height and area provisions of Chapter 5."

No alteration shall make the building less compliant with the new codes than it was previously.

International Building Code – Flood Hazard Areas (Sect 3403.2)

Michael Henke of the Midway City Planning & Zoning Dept has confirmed that this building is not in a Flood Hazard Area.

International Energy Conservation Code 2009:

Exemption, Sect 101.4.2: Because this home is on the National Register of Historic Places, the existing portions of this building are not required to be brought into compliance with the International Energy Conservation Code 2009. However, it would be prudent to check existing insulation levels, and augment them if necessary, to control operating costs. Likewise, if any doors, windows, light bulbs or mechanical equipment are replaced, a more energy-efficient element should be considered so long as it preserves the historic integrity of the building, for example, using double-hung windows of the same size, shape and muntin pattern as the original windows, but utilizing double-pane, low-E glazing.

Per Sect 101.4.3 of the IECC, any building addition, for example a new back addition on the Bonner House, must comply with the IECC 2009 requirements for new construction, and must not overload existing sytems [mechanical, plumbing and electrical]. This commercial use would follow Chapter 5 of the IECC, and Wasatch County is in Climate Zone 6B. Compliance options include Prescriptive Compliance: meeting the min R values/max U values in Table 502.2(1), a maximum fenestration area of 40% of the exterior wall area, U values and shading co-efficients per Table 502.3, or "Comm-Check" software, or computer modeling of the building addition's energy use. Per 502.4.7, Exceptn 4, a vestibule is not required.

IBC Allowable Heights and Areas for Construction Types/Anticipated Occupancies:

Chapter 5, Table 503: The original building of the Bonner House would qualify as Type III-B Construction, because its exterior brick walls are thick enough to give an inherent 2 hour rating. However, the Bonner House back addition appears to be Type V-B construction, so unless this addition was replaced with Type III-B construction, it is best to treat the whole house as Type V-B.

Bonner House Adaptive Re-use Options:

Per Table 503, the Bonner House could have a Mercantile (Retail) Use only on its first floor, but should consider having an administrative office use (Business, B) or R-3 (Residential) use on its second floor. The second floor administrative office could be related to the first floor use, because this second floor is not wheelchair accessible. Per IBC Section 1104.4, Exception 1, Mercantile occupancies with less than 5 tenants do not need to make levels <3,000 sq ft accessible, so this section would apply if needed.

Per Section 508.3.1, these uses need not have rated occupancy separations, so long as they do not exceed the area limitations for the most stringent use, in this case, Mercantile and Business. (R-3 occupancy is not limited in area.) The base area permitted for these uses is 9,000 square feet, which far exceeds the existing building envelope. Since all the side yards are over 30' wide, the frontage increase calculation (Sect 506.2) would bring the maximum use area up to 9,000 + 9,000 x 0.75 = 15,750 square feet, which could include all the outbuildings, and any size addition. Because the back addition is not in keeping with the historic character of the Bonner House, it is anticipated that it will be removed and replaced, or it could possibly receive exterior alterations such as window sizes and placement, and wall and roof materials. It is safe to say that the addition size would be more limited by historical aesthetics, that is, in keeping with the size of the existing historic building, than by IBC Area restrictions.

Second Floor: the attic space is 6'-8" wide by 17'-0" deep, and depending on headroom and ability to add dormer windows or skylights (check National Historic Register rules), it could possibly be converted to a second floor bathroom and/or kitchen/break room, and possibly add some closet space for the west bedroom.
For the west bedroom's north balcony, either a guardrail should be added here, or convert the door back to a window (which it probably was originally).

Existing second floor guardrails at the other two balconies do not comply with the current IBC, but are definitely part of the historic appearance of this home, and can hopefully be 'grandfathered in' per section 3409.1 as mentioned above. While the first floor planter boxes are also more than 30" above grade, they are not accessed by doors, and therefore should be fine as is.

IBC Chapter 29 Plumbing Requirements:

The First Floor of The Bonner House is 1250 gross sq ft, and using the 30 gross sq ft/occupant (for first floor mercantile use) calculation from Table 1004.1.1, would have a total population of 42 people.
Per Section 2902.2, (due to change in occupancy – there are no exceptions for existing, nor for historic buildings), we need to provide, at a minimum, one restroom for each gender, one accessible drinking fountain (with Hi and Low spouts) – OR – have the staff serve water in paper cups to any visitors who ask for it. Also one 'mop sink' will be required (NOT accessible) for Janitor's use.

4.5 ACCESSIBILITY COMPLIANCE

IBC 2009, Scoping for Accessibility for Existing Buildings (includes Historic Bldgs):
The 2009 IBC handles the scoping requirements for accessible building elements, in Chapter 11, Accessibility, Chapter 34 Existing Structures (which does apply to Historic Structures), and miscellaneous provisions sprinkled around in other chapters like Chapter 10, Egress.
The ANSI-117.1-2003 describes the dimensional requirements for each element.

Per IBC Chapter 34, Any alterations shall not REDUCE existing accessibility for existing buildings. Alterations do not need to EXCEED requirements for new construction.

Sect 3411.4, Change of Occupancy – This does apply, because changing from Single Family Residence (not built to these codes!) to a 'Mercantile Use' (less than 50 people).

CHOICE: Partial Change in Occupancy (Section 3411.4.1) - meaning downstairs of this building only, upstairs parts still used as Single Family Residence, OR Complete Change in Occupancy (Section 3411.4.2) – Complete Change in Occupancy is considered here, since it gives more freedom of future use, ie administrative offices to support the downstairs (mercantile) use. The Complete Change in Occupancy Section has 6 requirements:

1. At least one accessible building entrance.
The drawings indicate 2 steps and a 15" rise at the north entry porch, facing Main Street. This is the entrance with the least amount of height change, therefore, one 3' wide wheelchair ramp coming off the west side of this porch, ramping west for 15', then using a small footbridge (3' wide, handrails 3'

above surface, and guardrails 3'-6" above bridge surface) to span a small ditch which runs parallel to 100 East Street. This route is easier than connecting to Main Street, which has recently been raised a few feet – there are four steps from Main Street down to the front sidewalk. This solution also preserves most of the front porch appearance from Main Street.

2. At least one accessible route from an accessible building entrance to primary function areas.
Primary function areas are defined as "a major activity for which the facility is intended . . . [including] customer service area, public use area . . . mechanical rooms, storage rooms, corridors and restrooms are not areas containing a primary function."
After going through front door, ensure there is one 30" x 48" clear space for wheelchair to sit, exclusive of front door swing, to allow them to close front door behind them. The Bonner House entry vestibule is wide enough to handle 'doors in series' to adjacent rooms, and both of these doors fortunately swing into these rooms.

Section 3411.7, states that for 'Alterations affecting an area containing a primary function . . . the accessible route to the primary function area shall include toilet facilities or drinking fountains serving the area of primary function." If any alterations are done to a primary function area, there will need to be an accessible route to an accessible restrooms for the visitors. Per Section 3411.8.11, "where it is technically infeasible to alter existing toilet . . . facilities to be accessible, an accessible family or assisted-use toilet . . . in accordance with Sect 1109.2.1 is permitted. The family or assisted-use facility shall be located on the same floor and in the same area as the existing facilities." Please see the attached drawing for minimum dimensional requirements for this restroom; also it is recommended to keep the plumbing lines on an interior wall to prevent freezing.

The Bonner Home has a 6" and a 14" level change in the first floor: please refer to Accessibility Options to resolve this, noted below.

3. Signage for accessible entrance, route from inaccessible entrance to accessible entrance, accessible unisex restrooms, and passenger loading zones (if any).

4. Accessible parking, where parking is being provided. Please refer to discussion under Zoning paragraph, above: even if all parking is on-street, it would still be a good idea to have at least one accessible parking spot with a curb cut. If parking is on-site, one accessible parking space (8' wide with 5' wide adjacent aisle, both 18' long) would be required, since only 7 parking spaces are required by the Planning & Zoning Dept.

5. Accessible passenger loading zone (if tour buses are anticipated).

6. At least one accessible route connecting accessible parking and accessible passenger loading zones to an accessible entrance. Once the parking location is finalized, determine if there will be any sidewalks between parking area and front entrance. If so, they'll need wheelchair 'curb-cuts' per ANSI Fig 406.3. If no sidewalks are planned, ensure the 'path' from the parking spot to the new entry ramp is min 3' wide, and smooth enough for a wheelchair to travel on, ie. deep gravel would be too difficult.

For alterations to existing buildings, the IBC does NOT require light switches, kitchen countertops, and the like to be at the accessible heights. Nor does it require the 2nd floor to be wheelchair accessible, since it is <3,000 square feet.

Accessibility Options:

First Floor Interior Circulation (6" and 14" vertical elevation changes) possible choices:

There is a 6" step between the "Former Kitchen" and the front Living Room, and even with the most lenient IBC Table 3411.8.5 renovation guidelines, would need a 5' long ramp to achieve the maximum slope of 1:10. Further, the "Later Kitchen" probably used to be the East Exterior Porch, as this and the new back addition are 14" lower than the rest of the first floor. Because this 14" vertical elevation change exceeds 6", Table 3411.8.5, with more lenient ramp slopes cannot apply, and two new (14' long x 3' wide) ramps would be needed, with guardrails! This would definitely impact the historic feel, and the space allowances for the interior of this building. Therefore, the following choices are offered:

1) Raise the floor level of the "Former Kitchen","Later Kitchen", existing northern bathroom and the back addition (rebuild) to match the level of the rest of the first floor. Check to ensure that a minimum 7' ceiling height can be maintained in the larger rooms, and min 6'-8" in the northern bathroom. Also ensure the new room heights are tall enough to retain their original historic appeal.

2) Add an exterior ramp (18' ramping length) to the back door on the East side of the home, and the 5' long ramp in the Former Kitchen. Wheelchair-bound people would have to go outside to get from the front of the home to the back of the home, so this is not the preferred accessible option.

3) Keep the "Former Kitchen", "Later Kitchen", existing northern bathroom, and back addition spaces a non-public use, so they don't need to be wheelchair accessible. This would greatly reduce the public usable area of this building.

4) Combining options 2) and 3), make the "Former Kitchen" the only first floor non-public space, and use the 18' long ramp to access all the rooms in the back (south side) of this home.

Accessible Restroom choices:

There are 2 existing bathrooms on the first floor of The Bonner House, but neither are wheelchair accessible. Also, both bathrooms are level with the back, or south side of the house, not with the main first floor level. Several options are noted below to resolve the vertical elevation change and the requirement for at least one wheelchair accessible restroom.

1) If the 14" level change can be resolved using option 1) above, alter existing back restroom. Remove the tub, and move the east wall approx 8" further east to permit a 5' wide wheelchair 'hammerhead' turn-around. Install new barrier-free lavatory so its center is min 15" from the north wall, slightly south of current lavatory location. Install new barrier-free water closet so its center is min 16" from the south wall, slightly north of current water closet location. Install barrier-free grab bars in back of and to the south side of the water closet. The door can remain swinging inwards so long as it does not interfere with the back grab bar.

2) Again, if the 14" level change can be resolved per option 1), and IF the northern restroom is at least 5'-4" wide, and could be enlarged to become at least 7'-6" long, it could be altered similarly to the back restroom as described above. Ensure that 6'-8" headroom is maintained in this northern restroom.

3) If entirely rebuilding the back addition, design two accessible restrooms (one for each gender) into the floor plan, per the attached drawing which shows minimum restroom dimensions.

4) Build one unisex, "Family" accessible restroom into one of the existing outbuildings, or as a new outbuilding located at least 10' away from the property lines, and in compliance with side setback requirements of the Planning Code. If on this property (recommended), the restroom will be within 500' of the main entry.

Second Floor choices:
Unless the existing historic stair railing were replaced with a metal stair rail to support a wheelchair lift, it is unlikely this second floor could become accessible to wheelchairs. Therefore, it would be best to remain a non-public use, such as administrative offices, or compact accessory residence for the mercantile use on the first floor.

Ingress: Due to the smaller grade change at the front (north side) of this house, it would appear easiest to add a 15' long, 3' wide entry ramp with handrails off the west side of the columned front entry porch, with a connecting sidewalk to the Main Street sidewalk. The Bonner House existing Front Entry Door utilizes a 'hinge approach, push side', and does appear to have the necessary 3'-6" wide by 4'-6" deep clearance adjacent to it - - assuming no closers on front door. This clearance cannot have any obstructions up to 6'-8" high. Is there barrier-free curb-side parking? Often a city will let you place a barrier-free parking sign and curb-cut at the appropriate curb-side location. This would be good to resolve with the Midway City Planning Dept, once the specific use is finalized.

Egress: Existing buildings are NOT required to provide accessible means of egress, but fortunately, the Bonner House does provide this from most of the first floor.

If the second floor remains a residential use, the winding stairs are grandfathered in. The double-hung windows in each bedroom appear to be large enough to provide a 5.7 sq ft clear opening, with minimum 24" height and 20" width and are less than 44" above the second floor; this will provide the 'emergency escape and rescue' required by Sect 1029.2.

If the second floor becomes administrative offices for the mercantile use below, the existing winding stairs can still be grandfathered in per Sect 3408.4, because "the existing space and construction will not allow a reduction in pitch or slope." These stairs scale as 3' wide, including the existing handrail, a width that will definitely suffice for the second floor population, which will be less than 10 people. (The second floor, including the attic, is approx 480 square feet.) Further, these winding stairs could be considered an historical element of this house.

A Sprinkler System is NOT required by code for The Bonner House, because the height, floor area, and type of construction are all well within the permitted maximums. Further, it could be argued that installing such a system would risk damage and alteration to existing walls and ceilings of the home. Given the extent of renovations being discussed in this Code Report, there are no significant savings to the cost of the new construction in using a sprinkler system: to the contrary, the system itself would add significant cost to this renovation. If the Owner wished to install a sprinkler system, it would be best to verify with the local Planning Department that the current water main line is sized to provide enough water volume for it.

Fire Protection Systems: Per Section 907.2, a Fire Alarm is required on new construction only, and then only for B & M occupancies which exceed certain upper floor and total populations, 100 people and 500 people respectively. The small addition contemplated for this home will not serve this number of people. Per Section 906.1, portable fire extinguishers will need to be installed, located per the Fire Marshall, and/or nearest each exit door. Per Section 907.2.11, if any part of The Bonner House is used as a residence, a smoke detector will be required for each sleeping room, plus one smoke detector in the hallway just outside the sleeping room (either on the ceiling or high on the wall), plus one smoke detector on each level of the home, including the basement. These smoke detectors shall be interconnected such that a fire in one area will set off all the smoke detectors. For existing construction, the smoke detectors need not be hard-wired, but can be the simple battery type.

END OF THE WILLIAM BONNER HOUSE CODE REVIEW.