HISTORIC STRUCTURE REPORT

I. G. BAKER RESIDENCE

1600 Block of Front Street
Fort Benton
Montana

PREPARED BY SIEVERT & SIEVERT CRC; 1602 3RD WESTHILL DRIVE; GREAT FALLS, MT
MAY 30, 2019

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Prepared For the Administration, Officers, and Directors
of the
FORT BENTON COMMUNITY IMPROVEMENT ASSOCIATION

BY
Sievert & Sievert CRC
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This Historic Structures Report for the I. G. Baker Residence, listed on the National Register of Historic Places and a contributing property in the Fort Benton National Historic Landmark, was sponsored by:

The Montana History Foundation
1750 N Washington Street
Helena, Montana 59601

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INTRODUCTION

I. DIRECTIVE

This report was prepared at the direction of representatives of the Fort Benton Community Improvement Association (CIA) in accordance with a contractual agreement dated January 14, 2019. The intent of this project is to define recommended treatments to be used as part of an overall strategic plan to protect and restore the I. G. Baker residence at Fort Benton to the period of significance identified in the National Landmark designation, and accompanying documents. The report follows the recommended outline within Preservation Brief # 43, "The Preparation and use of Historic Structure Reports" published by the Technical Preservation Services branch of the National Park Service – U. S. Department of the Interior. Professional and technical services for this Historic Structures Report were provided by Sievert & Sievert CRC, offering professional services in the fields of Historic Architecture, Architecture and Structural Design.

This Historic Structures Report [HSR] is intended to provide a detailed cultural and technical evaluation of the building, to identify and prioritize the deficiencies that exist for the structure, and to derive a plan to stabilize and restore the building for future generations**.** To accomplish these goals, this report includes (1) a narrative history of the residence, (2) a statement of the historic significance of the property, (3) a condition assessment of all materials including an assessment of which materials are original, and (4) a preservation plan that outlines care of those materials based on their originality and condition.

The methodology used in the preparation of the report included research and documentary actions as follows:

II. METHODOLOGY

A. Visual on-site observations were made on the following dates: 11/15/18, 11/29/18, 3/26/19, 4/1/19, 5/10/19, 5/22/19 and 4/23/19. The observations were limited to what could be seen with minimal disturbance to the structure and minimal on-site destructive testing was done. On-site destructive testing was limited to (2) small openings into the walls of the vault / storage space and the rear vestibule to determine the construction of the walls.

B. The facility was photographed during the trips as noted above. Many of those photos are contained within the body of this report.

C. Although efforts were made to find design drawings and drawings for proposed modifications to the building, none have been found to date. As a consequence, the drawings contained in this report are from field measurements taken during site visits as noted above and compiled by S&S CRC. The building was field measured with tape measures and hand held devices.

D. Sanborn Fire Insurance Maps were consulted during research of the residence. The maps revealed valuable information regarding the footprint of the building as well as some of the materials used in its construction for the years 1884, 1888, 1902, 1910, and 1920.

E. All materials were assessed on site in regard to condition. The assessment methods and conclusions are reported on in the Evaluation / Assessment section of this report. Historic documentation and significance of the structure was reviewed to provide a basis for evaluation and to understand the importance of on-site materials, assemblies, and systems.

F. Representative structural calculations were done for typical supporting members to confirm their adequacy for continued use. The building was evaluated for resistance to earthquake forces.

G. A building code "overview" is incorporated with this report; specifically to consider code related implications of permitting public visitation to the building. Accessibility guidelines are discussed within the building code evaluation as they apply to the residence.

H. Historic architectural and engineering methods and practices were reviewed and evaluated as they pertain to the construction of this building. Existing materials on site were compared with those construction methods, materials, and technology that were in use at the time the residence was constructed, and as understood and interpreted by architectural, engineering, and preservation disciplines.

I. Visual observations of defects were made and incorporated into this report.

J. Assemblies that have failed or are approaching failure were recorded photographically.

K. An Electrical evaluation was conducted and is reported on within this report.

L. A hazardous materials survey was initiated by the owner under separate contract. This report co-ordinates with that survey and includes results of the survey within this report.

M. Significant effort was expended to read historic journals and narratives from early inhabitants at the fort to determine the sources of building materials and descriptions of the structures, when they could be found.

III. CURRENT USE

Currently, the I. G. Baker residence is used as a house museum. Viewing is limited to the front two parlors of the house and security is achieved by a plexiglass barrier that restricts visitors to a single viewing location of the interior that is located inside of the front door. The spaces that are not visible to the public from the plexiglass enclosure have not been restored, and they exhibit contemporary finishes in various stages of deterioration from disuse. Currently the house is opened daily during the tourism season, visitors are ‘self-guided’ by the interpretive panels within the viewing enclosure, and the facility is not staffed.

The residence was the home of Dorothy McLeish from 1942 until 1968. After Dorothy passed away, her family transferred the property to the City of Fort Benton with the goal of the house being utilized as a house / museum. A major restoration effort took place in the 1973 – 1976 period of time resulting in the condition of the residence as it exists today.

EXECUTIVE SUMMARY

I. ADMINISTRATIVE DATA

The I. G. Baker Residence plays an essential role in telling the story of the impetus from the world – wide fur trade during the formative years of our nation, as well as the story of later settlement and westward expansion into the Northern Plains and Southwest Canada. Fort Benton was the transportation hub that became the distributor of goods and services that initially served the trapper / traders and later served agriculture, mining, commerce, and the military. The presence of the navigable Missouri River and the vision of the entrepreneurs that knew how to capitalize on it set the stage for the emergence of Fort Benton Trading Post, including the I. G. Baker Residence as the home of one of those visionaries.

The residence was individually listed in the National Register of Historic Places on November 20, 1980 largely due to the perseverance of local educator and historian John G. Lepley, with the assistance of Montana's State Historic Preservation Office.

The NHL designation, initially listed in 1961 and having the boundaries finally determined by the Secretary of the Interior in 2011, further recognizes the historic role of Fort Benton; particularly the area adjacent to the river levee and along Front Street. The NHL listing includes the site of the Baker residence as a contributing property.

The criteria for significance of this structure, as well as the period of significance, is discussed in greater detail within the 'Historic Significance' section of this report.

Characteristically, the residence has experienced several transfers of ownership in its 152 years of existence as documented within the historic section of this report. Following the transfers of title of the resource is challenging due to the placement of the house on multiple lots, or partial lots. This condition underscores the fact that although the property was constructed after the town was initially laid out in 1865, it occurred before the survey of Edward Bonnell in 1876, and lot lines were later superimposed over existing improvements. The family of Dorothy McLeish became the last private owners of the property, and they placed the I. G. Baker Residence in the hands of the Fort Benton Community Improvement Association in 1969.

The Community Improvement Association subsequently transferred ownership to the City of Fort Benton with the understanding that care and management of the property would be done by the Fort Benton Community Improvement Association (CIA); that management structure remains in effect.

This Historic Structure Report was created to guide the CIA in the preservation and appropriate treatment for the I. G. Baker Residence.

II. MAJOR FINDINGS

The I. G. Baker Residence has experienced significant impacts and changes over time; nevertheless, the fundamental building materials retain a relatively high degree of historic integrity and the core values of the property are evident. The fundamental form of the structure has been altered in the course of its history, most notably by the alteration of the roof line that occurred early in its history with the change from a sod roof to a water shedding roof. The plan configuration has also been changed; however, the two rooms of the first campaign construction remain intact and the adjacent two spaces that were appended very early in the history of the structure follow the original footprint, although finishes have been altered. The configuration of the interior was altered by the superimposed bathroom at one end of the original kitchen and attributed to the 1940's; this alteration is reversible. There have been various configurations of additions along the west side of the residence during the course of its history. The purpose of these additions remains unknown but it is believed that they were not central to the purpose of the house based on the relatively short lengths of time they were attached to the house, as well as the minimal amount of description given to them on the Sanborn Fire Insurance Maps.

Condition of the exterior materials is generally good although most surface materials were introduced in 1973 – 76 during a previous restoration. It is important to note that the previous restoration followed Department of the Interior standards and involved the guidance of the Montana SHPO.

Original materials within the interior remain to a sufficient extent that the historic record still exists, or is traceable. The overall condition of interior materials would be rated as poor–to–fair and they will require substantial restoration to protect and preserve the cultural values within the house.

RECOMMENDED CULTURAL IMPROVEMENTS

EXTERIOR

1. Return the roofing type to 'Tin' as shown on the 1884, 1888, 1902, 1910, and 1920 Sanborn Maps and historic photographs.
2. Reconstruct the south brick chimney serving the marble fireplace.
3. Remove the tin corners at the siding; replace with corner boards.
4. Reconstruct the pyramidal roof ventilator serving the original kitchen.
5. Replace the roof drainage system with period appropriate materials.
6. Reconstruct the window configuration at the Kitchen projection to include [3] windows as shown on historic photographs.
7. Remove the west addition housing the rear entrance and storage areas; salvage surface materials and reapply to original west wall.

INTERIOR

1. Complete the shell (north wall) of Parlor 103; include interpretive window for the adobe fireplace.
2. Raise the floor of Parlor 103 to it s original height; surface floor with period appropriate material; mitigate fireplace hearths.
3. Remove the bathroom configuration from within the residence; restore the Kitchen to its configuration during the period of significance.
4. Complete rebuilding of the south Kitchen wall.
5. Reconstruct the wood ceiling within the Private Quarters.
6. Restore historic finishes in Kitchen and Private Quarters; remove temporary viewing enclosure at entrance and permit public access to entire house.

In addition to the identification and significance of historic materials, this HSR looks in detail at the condition of the building. The evaluation included building code comparisons, related fire ratings, limitations on mobility impaired accessibility, materials conservation, and structural requirements for supporting members. In general, the building was evaluated for use as a Museum / Public Viewing / Interpretive site. Work that would be required to restore the building to be suitable for these uses was compiled within this report and is summarized below.

V. RECOMMENDATIONS FOR TREATMENT AND USE: A Summary of Required Improvements to Restore the Building, **in addition** to the cultural topics identified above:

Administrative Requirements

■ Complete a life - safety analysis of the property for the Building Official as described in the IEBC. (This report may be used for that purpose).

Fundamental Protection of at-risk elements

■ Stabilize SE corner of the residence that has failed.
■ Brace roof ridge to take load off of 1867 roof purlin.
■ Introduce stability bracing or realign west wall of Kitchen that is significantly out–of–plumb.
■ Complete roof diaphragm of Kitchen ceiling and re-level.
■ Mitigate asbestos containing materials as identified within the hazardous materials report.
■ Mitigate lead-based paint materials as identified within the hazardous materials report.

Fire safety and Security

■ Upgrade electrical power and distribution system; eliminate unsafe or non-code compliant conditions.
■ Provide fire alarm and detection systems.
■ Provide security system.

Weatherization and Sealing of the Exterior Building Envelope

■ Replace roofing system in its entirety.
■ Replace roof drainage system in its entirety.
■ Rehabilitate windows including glazing and sealants.
■ Apply caulking (sealants) throughout exterior joinery.
■ Replace tin corners at siding with corner boards; complete siding where missing.

Interior restoration

■ Repair marble fireplace.
■ Replace / provide wallpaper where damaged or missing (period appropriate).
■ Repair or stabilize adobe walls; including whitewash.
■ Repair or replace plaster wall finishes that exhibit damage or have been removed.
■ Provide dust barrier above existing wood ceilings.
■ Provide borate treatment to exposed wood.
■ Accommodate concealed electrical along with finishing operations.
■ Provide paints / preservative coatings to finished materials.
■ Rehabilitate hardware; clean, lubricate, adjust, make operational.
■ Replace selected light fixtures with period appropriate assemblies.

Providing for ADA accessibility

■ Provide for ADA access at rear vestibule door; mitigation could include changing door swing to provide adequate side set, push / pull operation with self-closing feature, or plate operated opening mechanism. Provide lever lock.
■ Mitigate requirement for ADA lever lock at primary front door; mitigation could include door not latched but with self-closing hinges during hours of operation, supervision by attendant, or variance from building official.
■ Provide ramps at interior steps to facilitate wheelchair passage (note: these are small dimension heights and intrusion would be minimal).
■ Signage to ADA compliant restrooms at nearby public park.
■ Reconstruct short section of front access walk to eliminate step and provide ramp to allow

wheelchair passage.

Site

- Correct negative drainage across west side of building.
- Remove / replace concrete stoop at rear entrance door.
- Replace concrete mow strip across west wall.

General

- Provide ventilation beneath existing wood floors.
- Remove west hallways / storage areas; reconstruct exposed west wall
- Repair wrought iron fence at Front Street.
- Archaeological study of west lawn area.
- General cleaning.

Other detailed recommendations that are minor in nature, or are repetitive, can be found within the Treatment and Use section of this report (restoration priority matrix of the Preservation Plan).

The I. G. Baker residence provides opportunities to enhance visitor appreciation of the time period of 1860 – 1890 within the "inland port" of Fort Benton. It is essential that the interior and exterior appearance of this structure be restored and maintained to provide the context for understanding that time period and the activities associated with it.

Although the existing interpretive panels are informative, there is opportunity to expand the interpretive program for this resource, including audio elements for visually impaired. The subject of interpretation is outside of the scope of this report; however, the FBCIA may wish to explore this topic in greater detail.

RELEVANT HISTORY OF THE I. G. BAKER RESIDENCE

PROLOGUE

Steeped in antiquity, the 'fur-trade' became a worldwide industry after markets and trading evolved between nations during the 1500 AD to 1800 AD time period. This market **stimulated the exploration and colonization of northern North America** to compete with fur supplies that were previously provided from northern Europe and Asia and, after 1819, the cold climate regions of the southern hemisphere.

The discovery of North America, with its abundant forests and wildlife, notably the beaver, led to the continent becoming a major supplier of fur pelts in this burgeoning industry.

> *The fur trade was one of the earliest and most important industries in North America. The fur trading industry played a major role in the development of the United States and Canada for more than 300 years.*[1]

A brief look at the discovery routes of the early explorers of the Americas, as well as their purposes for the journey, leads to the conclusion that the lucrative fur-trade was indeed a factor in these adventures. Initial efforts by the French, then the Spanish, and belatedly the British focused on this market, and that market was a factor in the competition for control of the territories and ultimate claims to ownership of the new world. For America, engagement in the fur-trade marketplace was facilitated by the Louisiana Purchase. The vivid descriptions of the fauna of the region in the journals of Lewis & Clark enticed further exploration, hunting, and trading. A timeline of the fur-trade in North America would be filled with the names of wealthy European, and later American, investors along with the names of the explorers, and the 'Fur Companies' that were created. These efforts were initially an international pursuit and remained so until the market subsided due to the use of silk and fabric in place of furs, as well as the depletion of the fur bearing mammals that furnished the pelts. Demand in the latter decades of the century was also fluidly shifting from beaver and fur to the era of the buffalo robe; that transition extended the presence of the companies in the region, concurrent with changes in ownership from international to regional for some of the companies.

CONTEXT

The events described above had a prolific impact to the Northern Plains. The Hudson Bay Company, Northwest Fur Company, and John Jacob Astor's American Fur Company were the major enterprises engaged with the fur-trade within the region during the late seventeenth century through the first half of the nineteenth century. The development model for the companies was similar; penetrate the interior, recognize the locations amenable to the most favorable commerce, and establish trading outposts that encouraged trade with North American Indians as well as act as a base of operations for enterprising white trappers and explorers. This was the pattern at Fort Benton; it was a trading post at the outset having been moved to the present site in 1846, and did not become a military post until 1869[2]. The Upper Missouri Outfit of Pierre Chouteau Jr. & Co. assumed ownership of the western markets of the American Fur Company after 1834, and the combination of those enterprises was responsible for the construction of eleven trading forts (or posts) within the region from 1828 until 1865, depending on the definition as to what constitutes a 'fort'. A listing of these fur trading forts is attached at the end of this section of the report. The trading posts facilitated contact between the traders and Indigenous peoples, but settlement could not happen until immigrants learned to live with

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[1] History of the Fur Trade; Montana Trappers; website found at www.montanatrappers.org

[2] Old Fort Benton, What it Was, and How it Came to Be; W. S. Bell; 1909; available from Archives & Special Collections, Mansfield Library, University of Montana-Missoula; pp. 23 (also available at the Overholser Historical Research Center in Fort Benton).

those that occupied the land, mainly with the nomadic tribes of the Blackfoot confederation. Many of the posts were short lived or were moved and re-named; however, Forts Union, McKenzie, and Benton endured for the greatest lengths of time. Although Fort Union has been reconstructed as a historic site, only Fort Benton remains with significant original resources including the original Blockhouse, and the site of the trading post and its accouterments ultimately evolved into the permanent community that exists today.

Nearly half of a century after the Lewis & Clark Expedition, the U. S. Congress authorized four surveys to determine a route for the northern Pacific transcontinental railroad. Isaac Ingalls Stevens, the first Governor of the newly established Washington Territory, was selected to serve as Commander of the Pacific Railroad Survey's northern route between the 47th and 49th parallels. His duties also included serving as Superintendent of Indian Affairs for the region.

Stevens wanted to make contact with as many tribes as possible and a particular objective was contact with the various divisions of the Blackfoot Nation, whose warlike nature was legend; their hostility to whites dated from the Lewis and Clark Expedition and had continued through the fur-trade era. He hired Alexander Culbertson to serve as an Indian advisor. Culbertson, an American Fur Company employee, who was married to a Blood woman, had for many years acted as mediator between the two races.

Stevens was the architect of the Lame Bull Treaty in 1855, which encouraged peace between indigenous tribes and the U. S. government and several warring tribes. At the conclusion of the great Indian council at the Judith, some 3500 Indians went off to their fall hunt with new "blankets, beads, and calico." That same year, Fort Benton became the first Indian Agency for the U.S. government. The agent, quartered at the Fort, dispersed annuities to the tribes of the Blackfoot Nation and maintained peaceful relations between them and the white population in the area.

Stevens had enlisted John Mullan to explore much of the land along the proposed northern route for a railroad and as a result of his work on the survey, he was chosen, in 1857, to begin construction of a 624-mile military wagon road through the region, connecting Fort Benton with Fort Walla Walla, Washington Territory. The Mullan Road, completed in 1860, provided the Northwest Passage through the Rocky Mountains; the first improved route of traffic or interstate through what, in 1864, would become Montana Territory.

As the fur and robe trade began its decline, gold strikes southwest of Fort Benton fueled the upper Missouri River steamboat era (1860-1890) bringing life to the town of Fort Benton and the new Montana Territory. Steamboats transported thousands of passengers and massive cargo from St. Louis up the Missouri to Fort Benton.

The following statement of significance from the National Landmark nomination, justifies the area and periods of Significance for the Fort Benton National Landmark

> *Strange indeed must it have seemed to the Indians and to the old trappers to behold upon this spot, where for so many years there had been only a single palisade—sole habitation of white men within five hundred miles—buildings of metropolitan style and quality, trains of wagons coming and going, and lines of noble steamboats lying at the bank along the entire front of the town. It was a wonderful metamorphosis, scarcely paralleled in any other city of the country. Mushroom towns have sprung up all over the West, but no permanent city from causes like those which built up Fort Benton. Her rise and greatness were due solely to her position as a strategic point in the commerce of the far Northwest, not from any great mineral discovery in her neighborhood. Her supremacy she maintained until other commercial routes had rendered useless the*

great natural highway which found terminus at her door.[3]
--Hiram M. Chittenden

Fort Benton, Montana, is nationally significant under Criterion 1 in the area of transportation, for its service as the head of steamboat navigation on the Missouri River during the period 1860-1890. The town functioned as the intermodal hub of a transportation network serving the northern United States plains and Western Canada. During the three decades of commercial steamboat operations, more than six hundred steamboat landings occurred, carrying more than 195,000 tons of cargo and over 40,000 passengers. Vessels initially traveled upriver nearly 2,300 miles to reach Fort Benton; as transcontinental railroads intersected the Missouri River, boats made the trip from such closer points as Sioux City, Iowa; Yankton, South Dakota; and Bismarck, North Dakota. Wagon roads extended from Fort Benton in several directions: westward over the Mullan Road to Fort Walla Walla (the head of navigation on the Columbia River); northwest over the Whoop-Up Trail to Fort Macleod and northeast over the Fort Walsh Road to Fort Walsh (both in Canada); southwest over wagon roads to the Montana goldfields at Helena, Virginia City, and Bannack; and east over the Montana-Minneapolis road. In the era before railroads spanned the northern tier of the nation, the steamboat link moved emigrants, freight, goldseekers, and military troops from the East to distant frontier outposts.

Great mercantile firms, such as I.G. Baker & Co. and T.C. Power & Brother, were established in Fort Benton to handle the transshipment of cargo to points in the hinterland. The freight and passenger commerce of an expanding nation was carried by mule and bulltrains and stagecoaches from Fort Benton. I.G. Baker & Co. reportedly shipped $2.5 million in goods through Fort Benton in 1878, and was the largest mercantile firm in the northwest by the end of the nineteenth century. The company had outlets in Montana, several adjacent states, and in Canada. Historian Paul F. Sharp judged that "Few towns have played so important a part in the growth of a region, for through Fort Benton flowed the commerce of a great inland empire. From Wyoming deep into British North America, the plains country paid tribute to the little inland port." [4]

Steamboat commerce to Fort Benton fostered the development of Montana gold mining in the 1860s, by transporting miners and mining equipment to the goldfields and carrying gold dust and ore to the East. The Upper Missouri transportation linkage also importantly facilitated the trade in fur and buffalo robes and impacted Native American tribes through the trade of such items for a variety of trade goods including whiskey. More than 800,000 buffalo robes were shipped through Fort Benton. In addition to carrying trade goods, the steamboats also brought annuity supplies to Indian agencies for distribution to tribes under treaty provisions.

Steamboat transportation to Fort Benton fostered agricultural development on the plains of Montana and Alberta in Canada. The mountain steamboats brought settlers, farm implements, wagons, and livestock. The downriver trade provided access to Eastern markets, to which wool, crops, and livestock were shipped. Provisions and supplies for agricultural settlements on the Northern Plains of both nations flowed through Fort Benton, which also served as a center for banking and credit services. In 1894, the Daily Independent of Helena, Montana, reflected that in pre-railroad days Fort Benton was "the heart of commerce, the shipping and supply center for the whole upper Missouri country and all of the regions in the north." Historian and journalist Emerson Hough, reflecting in 1918 on the demise of the frontier, described Fort Benton as "the great northern supply post."[5]

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[3] Hiram M. Chittenden, History of Early Steamboat Navigation on the Missouri River, vol. 1 (New York: Francis P. Harper, 1903), 238.

[4] Paul F. Sharp, Whoop-Up County: The Canadian-American West, 1865-1885 (Norman, Oklahoma: University of Oklahoma Press, 1955), 5.

[5] Emerson Hough

U.S. Army troops and stores brought to Fort Benton contributed to the nation's military preparedness and to the expansion of communication on the Northern Plains. In the early 1860s, the Mullan Road connected Fort Benton to Fort Walla Walla, the head of navigation on the Columbia, and comprised a means of moving troops against hostile Native American tribes. In the 1870s, military supplies were delivered by steamboat to the infantry company of soldiers at Fort Benton, as well as to the chain of Army posts to the north and upriver. Similarly, Canada's North West Mounted Police in the Alberta area relied on Fort Benton steamboats for the receipt of supplies and payroll and for the movement of recruits. The water route was preferable to the undeveloped lines of communication across the plains from Winnipeg. Historian Robert Archibald stated that after the arrival of steamboats, Fort Benton became "the entrepot for a vast region encompassing much of Montana and an international post for an enormous region of Canada directly to the north. The small adobe fur trading post became the terminus for a lifeline from St. Louis which connected Montana and regions north and west to eastern economic centers."[6]

The I. G. Baker Residence fits into this pattern as having been built in 1867 when Fort Benton was still a trading post, it was built by I. G. Baker who had accepted the responsibility as chief trader (or factor) of the post in 1864 until he left that position in the spring of 1865, and the residence was built of adobe reflecting the construction of the fort proper. Remarkably, this structure remains as one of the few original manifestations of the fur trade in our region as well as the private quarters of the former chief trader of the post. Pertinent to this study, much of the original construction of the house is extant.

Change to the region, however, was in the wind. Although the emphasis from "skins and pelts" was shifting to "robes and hides" during the early decades of the nineteenth century, the total production from the combination of these articles increased during every decade from 1830 until 1890 [7]. However, steamboats were bringing more and more settlers and their goods into the region, the reduced appetite for furs on the world market was being felt, and the depletion of the resources of beaver and buffalo had its effects. In America, ownership of the firms plying the fur trade was also changing from multi-national to national or regional firms in this same period of time. Many of the former employees of the fur companies shifted their focus on the fur trade to providing services for the growing population on the plains. The list of entrepreneurs thus motivated included I. G. Baker, George Baker, T. C. Power, J. W. Power, William Conrad, John Conrad, and Charles Conrad. The Bakers' were former employees of the American Fur Company, T. C. Power was associated with supplying Fort Benton from Sioux City prior to moving to the area[8], and the Conrad's' were initially employed by the newly formed I. G. Baker & Brother Company.[9] This group of individuals came to be known as the merchant princes of the plains. Isaac Baker was first to initiate this series of events, followed shortly thereafter by Thomas Power, and both represented local ownership and control of the new style of free trade.

The impact of steamboat navigation was notable during the 1830 - 1890 period. In 1831 the American Fur Company boat, the Yellowstone, began making annual trips to Fort Union at the mouth of the

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[6] NPS Form 10-900 USDI/NPS NRHP Registration Form (Rev. 8-86) OMB No. 1024-0018 FORT BENTON HISTORIC DISTRICT Page 19 United States Department of the Interior, National Park Service National Register of Historic Places Registration Form

7 The Growth and Economic Significance of the AMERICAN FUR TRADE, 1790-1890; JAMES l. CLAYTON; Minnesota Historical Society

[8] Shaping the Growth of the Montana Economy:TC. Power & Bro. And The Canadian Trade 1869-93; Henry C. Klassen; University of Calgary; 1991

[9] Business, Enterprise, and the National Policy: the role of T. C. Power & Brother and I. G. Baker & Company in the Political and Economic Development of the Southwestern Canadian Prairies and Northern Montana 1870-1893; James M. Francis; University of British Columbia; 1978; pp. 8

Yellowstone river. The first boats to actually reach Fort Benton, which was for all practical purposes the head of navigation on the Missouri, were the Chippewa and the Key West in 1860 [10]. Four steamboats arrived in 1862 and the number steadily increased. By 1869 there were 42 arrivals and the 1868 records purport that 4823 tons of freight had been discharged on the levee[11] that year.

I. G. Baker first came to Fort Benton in 1864 as a representative of the Pierre Chouteau Jr. & Company, still popularly called the American Fur Company, and shortly thereafter succeeded Andrew Dawson as Factor of the post. He left the position of Factor in the spring of 1865 and in 1866 he and his brother George formed the I. G. Baker & Bro mercantile firm.

> *The Senior member of the firm [I. G. Baker] was formerly connected with the American Fur Company, and was one of the most trusted and valuable members of that great corporation. Such business skill and energy as Mr. Baker possessed was a guarantee of success in almost any enterprise that he might undertake[12].*

Isaac G. Baker

Recognizing the importance of river transportation to Fort Benton, the brothers eventually engaged in ownership of steamboats beginning with their 1875 joint acquisition of the "Benton", along with T. C. Power & Co., and their individual purchases of the steamboats "Red Cloud (1877)", the "Nellie Peck", and the "Colonel Macleod".

> *The key to the growth of Fort Benton during the last half of the 1870s was the expanding merchant community and the creation of a small class of wealthy merchants.[13]*

During the zenith of their companies and respective careers, the 'princes' had expanded into merchandising and retail endeavors at multiple levels, including banking and investment, and their influence extended to Montreal and New York as well as the emerging centers of population within the region.

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[10] BOONE'S LICK HERITAGE; Vol 5, No. 2, June 1997; Boonslick Historical Society; Robert L. Dyer

[11] Contributions To The Historical Society of Montana; Volume 8; 1917; Bradley Manuscript pp. 29

[12] Benton Record Weekly April 28, 1883, available from the Archives & Special Collections, Mansfield Library, University of Montana-Missoula

[13] Shaping the Growth of the Montana Economy: T. C. Power & Bro. And The Canadian Trade 1869-93; Henry C. Klassen; University of Calgary; 1991

THE I. G. BAKER RESIDENCE

Built in 1867 by the former chief Factor of the fur trading post of Fort Benton and constructed of the same materials as the fort, the I. G. Baker Residence was constructed as private quarters for Baker's family; including his wife and son who had recently arrived from 'the states' on the steamboat Waverly on May 25, 1867. Construction began on the house that spring[14].

The house was completed sufficiently to invite the former acting Governor of the newly established Territory of Montana, Thomas Francis Meagher, to dine there on July 1st. General Meagher drowned later that night after falling from the deck of the steamboat G. A. Thompson that was tied up to the levee. This ordinary act of having "supper" underscores the prominence of Baker and Meagher in their respective roles of the formation and development of the region and the State. Meagher was a hero of the Irish revolution, leader of the Irish Brigade during the Civil War, former Montana Territorial Secretary, and was acting Governor of the territory until he relinquished that role to Green Clay Smith during the trip on the way to Fort Benton.

Near the end of the year, on the 4th of December, daughter Francis Wilson "Fanny" Baker was born in the house. "Fanny" has been attributed to be the first white child to have been born in Fort Benton[15]. Mrs. Baker did not find conditions agreeable for her in Fort Benton however, and on the 6th of July 1868 she, son George, daughter Francis, and their servant departed from Fort Benton by steamboat Columbia to return to the 'states'[16]. I. G. (Isaac Gilbert) Baker and his brother George also reversed their respective duties in 1868; I. G. returned to St. Louis to assume administrative duties and George ventured west to Fort Benton to engage in on-site work[17]. It is presumed that George occupied the home in Fort Benton at that time.

In 1869 the Army established Fort Benton Military Reservation, acquired Fort Benton Trading Post, which became a Military Fort, and initially stationed one company there from the 13th Infantry Regiment at Fort Shaw and Camp Cooke. In 1870 the army post at Camp Cooke was abandoned. The army continued to station one company at Fort Benton until 1881.

George Baker returned to St. Louis in 1874[18], the same year that the army personnel moved out of the fort proper and took up quarters within the town, and the same year that I. G. Baker and Brother ceased operations and was reconstituted as I. G. Baker and Company with I. G. Baker, W.G. Conrad, and C. E. Conrad as principals.

Occupancy of the residence is unclear between the years of 1874 through 1879. A report from the Surgeon General's Office to the War Department in 1875 includes a detailed description of Fort Benton and housing of the command[19]. Included in the description are the following paragraphs:

> *A new house was built in 1873 [at the fort] for the family of the commanding officer. At latest accounts it was still unfinished, but had two good rooms and a kitchen ready for occupation.*
>
> *Authority has been given for renting suitable buildings in the town of Benton, for the accommodation of the command, at a maximum cost of $235 per month.*

---

[14] Personal Communication; Kenneth G. Robison; April 10, 2019

[15] National Register of Historic Places Inventory-Nomination Form; United States Department of the Interior; Heritage Conservation and Recreation Service; John G. Lepley; 1979

[16] Montana Post, July 17, 1868, p. 2; research provided by Ken Robison

[17] Fort Benton's I. G. Baker First of the Free Traders; Montana Magazine; John G. Lepley; pp. 12

[18] Business, Enterprise, and the National Policy: the role of T. C. Power & Brother and I. G. Baker & Company in the Political and Economic Development of the Southwestern Canadian Prairies and Northern Montana 1870-1893; James M. Francis; University of British Columbia; 1978; pp. 8

[19] A Report on the Hygiene of the United States Army with Descriptions of Military Posts; War Department Surgeon General's Office; May 1, 1875; pp. 397 - 398

This would suggest that the I. G. Baker Residence was not used by the commanding officer between 1874 – 79 but may have been rented by the military during that time. However, on October 24, 1879 the Fort Benton River Press (pp. 3) reported that Captain Moale " *has moved into his new quarters on I. G. Baker & Co.'s property*". Captain Moale was the newly appointed commander of the Military Post and both the River Press and Benton Record reported on the social activities of the family as well as the Military Post.

> *It was our fortune to receive a polite invitation to be present at a birth-day party given by Master Sam Moale, on Front street, last Wednesday night. All our little folks almost were there; and danced or played games all evening. We could not speak too highly of the grace of the young ladies waltzing, and the beauty of their costumes. We noticed among those present, Misses Conrad, Ford, Schultz, Brinkman, Kanouse. Wright, and Masters Moale, Conrad Kanonse, Stanford and others.*
>
> *Of course the Benton gentlemen of a corresponding age were as gallant as usual and paid all attention to their lovely partners. The young folks had a very prettily served, and delicious supper, after which they danced "Dan Tucker" and the reel all evening. "Endearing waltz, to thy more melting tune, the little ones reveilled" and it was nearly midnight before the party broke up. Together with all the guests, we congratulated Master Sam upon the happy event of his eleventh birthday and the success of his charming entertainment and bowed our departure. [BRW November 5, 1880][20]*

Captain Moale was reassigned in 1881 and the family, as well as the troops, left Fort Benton early in May of that year. Military Post Fort Benton was closed in 1881, and the company returned to Fort Shaw. At nearly the same time, Charles E. Conrad wed Alicia Stanford in January and after a visit to the states, the June 8th edition of the Fort Benton River Press (pp. 8) reported:

> *"The house formerly occupied by Col. Moale will be used as a private residence by C. E. Conrad."*

1876 is frequently cited as the date of the major addition to the residence and is the date previously attributed to modification of the roofline as well as the added rooms. The following quote adds an aura of mystery to construction of the addition because of the date of the following newspaper article:

> *"Jones & Merrill are putting up a 14 x 28 addition to C. E. Conrad's house on Front street. They have just finished a neat lattice fence for Mr. Conrad." [p. 5] [Fort Benton River Press 19 Jul 1882]*

The stated size in the quote above is problematic, along with the date of publication; the two rooms added to the west side of the residence have a footprint of 42' x 14' (rounded) which describes a greatly different sized addition than the news report. However, the extension of the Kitchen shown on the 1888 Sanborn Map, if combined with the original Kitchen, does occupy a 14' x 28' space and the extension of the kitchen may be what the news report was referencing. Based on the above quotes and review of the Sanborn Maps of 1884 and 1888, the conclusion is that the date of the addition definitely occurred before 1882, and it is reasonable to assume that it occurred prior to the occupancy by Captain Maole's family (1879). The last written record of the use of adobe in the town that has been found by the authors is from the Surgeon General's report that references a new house being built for the commanding officer in 1873; since many of the walls of the addition are adobe the addition could be as recent as 1873 but no later than 1882.

Like their predecessors the Moale family, social activities of the Conrads' were reported on in local newspapers.

> *We take pleasure in announcing the marriage of Miss Phoebe Wright and Mr. A. E. Rogers, which took place last evening at the residence of Mr. and Mrs. Charles E. Conrad. The wedding was private, only a few friends of the bride and groom attending. Mr. Rogers is one of our most*

[20] research and quotes provided by Ken Robison

esteemed residents and his bride one of the most amiable and accomplished ladies in Benton. The happy couple have our hearty congratulations and earnest wishes for unlimited prosperity[21].

I. G. Baker and wife sold the residence and adjoining lots to the Conrad brothers in 1886 via Warranty deed although, as noted above, the Conrad family occupied the premises earlier. Charles Conrad moved his family to the Flathead Valley in the early 1890's; and moved into their new mansion in Kalispell (designed by Kirtland Cutter) in 1895. The Conrad brothers and their respective families then sold the property to Charles W. Price on October 3, 1900. Several transfers of ownership of the property along with other lots (or partial lots) on the same block occurred thereafter, and by 1916 the I. G. Baker property was solely owned by Arthur Edmund McLeish and his wife Dorothy Johnstone McLeish, prominent local sheep ranchers[22]. The legal descriptions of the transfer of the I. G. Baker Residence property during this period of time graphically illustrate that although the house was built after the townsite was laid out by Colonel W. W. DeLacy in 1865, the construction did not respect exact lot lines and the legal descriptions 'borrow' a few feet from lots to either side of the home to accommodate the residence. A Chain–of–Title documenting these transfers is appended to this section of the report.
Families of the respective owners occupied the house during this transitional period. Another child, Worrel P "Buster' Sullivan was born in 1913 in the house[23].

Memory of the Baker home lingered with the Moale family, as reported in the River Press on September 19, 1923 (pp. 5):

letter from Col. Edward Moale (little Eddie): I see mention of the Price house next to the Chouteau House. Suppose that is the I. G. Baker house [and the Choteau house is] next door to where we lived. Is that old shack still standing. It does not seem possible that it could have stood up so long."

Although Arthur & Dorothy McLeish became owners of the Baker house in 1916, they did not live in it. However, after Arthur passed away in 1942 'Dollie' (Dorothy) sold their residence next door and moved into the Baker house[24] in 1944. She continued to live there until her death in 1968; the following year her heirs transferred the historic home to the Community Improvement Association of Fort Benton recognizing the cultural value of the property.

The CIA quickly initiated efforts to assess the property:

A major item is work on the I. G. Baker house, known also as the McLeish house, which was deeded to the CIA by Wm. McLeish. This building dates back to the mid-1860s, being the residence of Fort Benton's first businessman, aside from the fur post, in gold rush days. It was originally built of adobe, and workers found adobe walls, adobe brick fireplaces, back to back, between living room and bed room, and beamed ceilings. Plans are too furnish this house in the style of the Baker period and open to the public as a major adjunct to the museum.

The work study program included above provides matching funds and summer jobs for Fort Benton youngsters who help at the museum and on the Baker house and other projects, helping CIA get things done which otherwise wouldn't be. . . [River Press, December 2, 1970, p. 1]

---

[21] Benton Record Weekly April 28, 1883, p. 5

[22] Personal communication; Dan Nelson, member of the McLeish family

[23] River Press, August 14, 1974, p. 3; research from Ken Robison

[24] River Press August 9, 1944, p. 5

The CIA enlisted the services of Montana's congressional delegation as well as the State Historic Preservation Office (SHPO) in their goal to preserve the structure, and its history. At that time (1970) the duties of SHPO within the State Of Montana were administered by the Montana Fish and Game Department under the supervision of Wes Woodgerd. Those outreach efforts were rewarded, as follows:

> *The River Press last week received a telegram from Senator Metcalf advising that Montana congressmen had learned of a grant by the environmental protection agency of $6,500 for work on the McLeish (Baker) house in this city, which it is planned to add to museum facilities. The grant was to Montana fish and game, Wesley Woodgerd, to install foundation under adobe walls and replace floor in the old building. The adobe and log structure was built in 1866 as a residence for I. G. Baker, later used by one of the Conrad families and a few years ago deeded by Wm. McLeish, last private owner, to the Fort Benton CIA. [River Press, March 29, 1972]*

Responding to this stimulus, the CIA initiated a program to stabilize and preserve the structure. They commissioned the architectural firm of Jacobson and Shope, Helena, to prepare construction documents for the anticipated restoration of the Baker property. Those plans, dated June 1, 1973, are on file at the River and Plains Society – Overholser Research Center in Fort Benton. These actions were coordinated in Fort Benton by John (Jack) Lepley, and correspondence regarding the contract can be found at the Research Center.

The Jacobson – Shope plans followed the then current edition of the ***"Secretary of the Interior's Standards for the Treatment of Historic Properties (36 CFR Part 68)"***. The plans addressed the major work elements of:

1. Installation of a protective foundation buttress wall around 3 sides of the structure.
2. Replacement of the floor in Parlor 103 with a concrete slab-on-grade
3. Re-roofing of the structure in its entirety, including supplemental bracing within the attic area, replacement of deficient roof rafters, and new roof drainage system along the east side.
4. Relocation of selected roof members to their original locations
5. Reconstruction of the porch
6. Interpretation of the two primary parlors originally constructed in 1867
7. Providing an enclosed viewing area adjacent to the front (primary) entrance so that the public could see the original portions of the residence without requiring supervision.
8. Resurfacing of the exterior walls with new siding, including new nailers to support the siding.
9. Ceiling replacement in Parlor 103
10. Plaster replacement on selected plastered walls; whitewash on exposed adobe walls.
11. New extensions at windows to integrate with new wall siding

As outlined above, the work of this project was extensive. It did <u>not</u> address restoration or interpretation of the kitchen / utility area, the bath, private quarters, or adjacent storage / vestibule areas across the west wall; presumably due to funding limitations. Related elements to the major tasks outlined also took place; an example would be repair to selected areas of the exposed adobe walls. There are selected elements to the drawings that were not followed; removal of corner boards at the siding, and removal of the historic roof ventilator are noted.

Subsequent to the 1973-76 major restoration, there have been other modifications that have occurred at the house. The 1882 brick wall extension of the kitchen exhibited distress, became unstable, and was replaced with a wood frame enclosure at the same location; and the brick chimney that served the marble fireplace in parlor 103 has been removed in the intervening years since 1976. One highly visible site feature that has been the subject of considerable discussion during the preparation of this report is the provenance of the metal decorative picket fence that extends across the east side of the property. Further inspection of the River Press archives revealed:

The museum committee, Bob Leinart chairman, would like to secure an old iron picket fence for the street front to the old McLeish home beside the Chouteau House. …..
Anyone willing to give a suitable fence is asked to contact Mr. Leinart. (River Press April 29, 1970).

Although the fence is not original it is period appropriate, and it is recommended that it remain. An area of this study that did not result in adding to the knowledge of the property relates to the 'wing' additions on the west side of the house that are illustrated on the Sanborn maps. Although some of the construction materials are identified on the maps, they do not explain the use of the enclosures or when they were originally constructed.

CONCLUSION

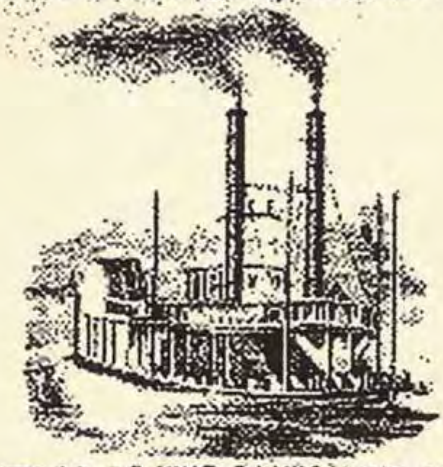
Although a modest domicile, the I. G. Baker residence stands as a testament to the sweeping changes overtaking the territory beginning in the 1860's – much of which was facilitated by the 'merchant princes'. It also witnessed the changes brought on by the 'merchant princes' and the house changed accordingly.

The house has remained as evidence of both western exploration and western expansion, and is a residual fixture in the history of Fort Benton, as documented. It is vitally important that the I. G. Baker Residence be protected and preserved with a high degree of integrity; it is representative of, and exists as evidence of, the 1860 – 1890 period of the western development of our nation.

Endnote: A **factor** is a type of trader who receives and sells goods on commission (called factorage). The title 'Factor' refers to the chief trader for the trading post.

I. G. BAKER & CO.

FORT BENTON, MONTANA.



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CHAIN OF TITLE

Establishment of legal title to the land occurred as outlined below:

> *They were all squatters on Indian territory in Fort Benton's first years, and after the federal government assumed title in 1874 through an April 14 law that constricted the Blackfeet to north of the Marias and Missouri rivers, no occupant or holder of property yet had legal title to any real property.*
>
> *Presumably Fort Benton's early settlers didn't give a hoot about such things as titles, and they did have certain legal protection through a federal preemption act of 1841, which provided preferential rights to settlers who were citizens, indicated they would be if aliens, and had done certain improvement work on land claimed. When the law finally caught up with them, such settlers could buy up to 100 acres at $1.25 per acre.*
>
> *The squatters above were not too concerned, since 1867 U. S. surveyors had been mapping Montana, starting near Three Forks and working through the settled areas. But the act of 1874 which ended federal recognition of the area as Indian land speeded the survey.*
>
> *Edward B. Bonnell, U. S. deputy surveyor, surveyed the townsite [of Fort Benton] in 1876. His chains and degrees described an area of 185.69 acres of which about two thirds was in section 23, one third in section 26, township 24 north, range 8 east, and it was approved by the county commissioners July 1, 1876.*
>
> *A United States patent for the area was issued to John W. Tattan as probate judge of Chouteau county, and his successors in trust, 'for the several use and benefit of the occupants of the townsite of Fort Benton," dated September 26, 1877.*
>
> *The 3rd 4th and 5th entries by the Chouteau County Abstract Co. show quit claim deeds by Judge Tattan to L G. Baker (sic. I. G. Baker), W. G. Conrad and C. E. Conrad on December 16, 1878, for $10 each, to the various lots of land the Baker business occupied. These include lots 13, 14 and 15, block 18, original townsite, which the abstract follows through various deeds, estate distributions, and other legal instruments down to Dorothy McLeish in 1947*[25]*.*

Legal instruments that were created, and filed, showing transfer of ownership of the property since 1878 are as follows:

1886 26 Jan Warranty Deed: Isaac G. Baker and Frances W. Baker, to Charles E. Conrad and William G. Conrad for $5,000. Filed Dec. 7, 1895. Sells lots [6, 7,] 14 and 15, Block 18 and other lots not here abstracted, also describes lot 13.

1900 3 Oct Warranty Deed dated Oct. 30, 1900, filed Jan. 8, 1910. For $1 etc. William G. Conrad and Fannie E. Conrad, and Charles E. Conrad and Alicia D. Conrad, to Charles W. Price. Sells Lots 6 & 7 and 7. 7 feet of Northeast side of Lot 8; 5.0 feet of Northeast side of Lot 13, and Lots 14 & 15, all in Block 18. Being strip of land which has been 75.3 feet on Main and frontage of 70.8 on Front. [Abstract]

1910 8 Jan Warranty Deed dated Oct. 30, 1900, filed Jan. 8, 1910. For $1 etc. William G. Conrad and Fannie E. Conrad, and Charles E. Conrad and Alicia D. Conrad, to Charles W. Price. Sells Lots 6 & 7 and 7. 7 feet of Northeast side of Lot 8; 5.0 feet of Northeast side of Lot 13, and Lots 14 & 15, all in Block 18. Being strip of land which has been 75.3 feet on Main and frontage of 70.8 on Front. [Abstract]

1911 20 Jul Will of Charles W. Price dated May 23, 1907, filed July 20, 1911, giving half property to wife Mary B. Price, half to son Howard C. Price. [*River Press*, July 20, 1911]

1912 9 Mar Warranty Deed, dated March 9, 1912, filed March 20, for $2250 by Mollie B. and Howard C. Price to A. E. McLeish and Jere Sullivan. All lots 6, 7 and 7 ½ feet northeast side Lot 8, all of Lots 14 and 15, and 5 feet northeast side of Lot 13, all in Block 18, OT.

---

[25] Written comments attributed to Joel Overholser

Deed by W. G. Conrad administrator WWA Charles W. Price to Sullivan and McLeish for $23,000. Same property.

1911 21 Dec Jere Sullivan and A. E. McLeish bid $2300 for Lots 6 and 7, Block 18, OT with house, Lots 14 and 15, Block 18, 7.7 feet. Lot 8, Black 18, NE 5 ft. Lot 13, Block 18, OT and Lots 11 and 12, Block 147, MR. Sale confirmed day of filing. Copy order filed here March 15, 1944.

1916 10 Jun Warranty Deed: May 28, 1916, filed June 10: Jere Sullivan and Sophia Sullivan, A. E. McLeish and Dorothy McLeish, to A. E. and Dorothy McLeish for $1 sells 30.4 feet Lot 14, 5 feet Lots 13, 29.95 feet Lot 7, 7.70 feet Lot 8, Block 18 OT.

1916 20 Jun Warranty Deed: May 28. 1916, filed June 20: Sullivans and McLeishes to Jere Sullivan and Sophia Sullivan, sells all Lot 15 , 2.5 feet Lot 14, . . .

1923 29 May Quit Claim Deed: Feb. 10, 1923, filed May 29, $1 etc. Harry C. Sullivan and Francis G. Sullivan to John Francis Sullivan, Executor of Estate of Jeremiah Sullivan: Quit claims an undivided ½ interest all Lot 15, and 2.5 feet of Lot 14 . . .

1931 8 Jun Affidavit of identity of original owners by James Bartley.

1942 4 Jan Arthur Edmund McLeish died in Havre.

1942 10 Jan Quit Claim Deed, Jan 10, 10\942, filed January 27, Johanna Veronica Widele to Estate of Jeremiah Sullivan, all right to all Lot 15, 2.5 feet Lot 14 . . . $1 etc.

1944 4 Jan Estate Arthur E. McLeish Sr., filed Jan. 17, 1942, died Jan 4. Distribution Jan. 4, 1944: To Dorothy McLeish, Arthur E., William J., J. Merlin, Idabel Jordan, Antoinette Woodcock, 1-6 of ½ interest in NE 5 feet Lot 13, SW 30.4 of Lot 14, Block 18.

1945 21 Sep Estate of Eugene A. Sullivan, filed Sept. 21, 1945: by H. F. Miller. Appraises undivided 2-21 interest in all Lot 15, 2.5 feet Lot 14 . . . Appraised at $109.52. Sept. 9, 1947, estate distributed ½ to Adelaide Sullivan, ½ to Patricia Maxine Sullivan, daughters Eugene.

1946 11 May Estate Sophia Sullivan, filed May 11, 1946 by Miller (died April 5, 1928). Johanna Veronica Weldele, daughter, believed heir. Aug. 23, 1947 appraisal, all Lot 15, 2.5 feet Lot 14, . . . valued at $383.32. A 7-21 interest. Distributed to Veronica Sept 10, 1947.

1947 28 Jul Warranty Deed dated July 28, 1947, filed Nov. 29, by five children to Dorothy McLeish of above property.

1947 9 Sep Estate Jeremiah Sullivan, filed Dec. 1, 1919 (died Nov. 11, 1919). Distribution Sept. 9, 1947" July 21to Sephia Sullivan Estate; Feb 21 to Earl D. B., John Francis, Eugene A. Sullivan Estate, Johanna Norah Walton, Mary Agnes Sullivan Wilford, Johanna Veronica Sullivan Weldele. Includes All Lot 15, 2.5 feet Lot 14 . . .

1947 16 Sep Quit Claim Deed dated Sept. 12, 1944, filed Sept. 16, 1947, 1947, for $1 etc. John Francis Sullivan and Maude Sullivan (wife), Jeremiah Jacob Sullivan, Earl D. B. Sullivan and Mae Brady Sullivan (wife), Johanna Nora Walton, Mary Agnes Wilford, Adelaide Sullivan, Patricia Maxine Sullivan and Johanna Veronica Weldele, to Dorothy McLeish, strip of land 2.5 feet wide and 124 feet long on northerly side of Lot 14, all lot 15, Block 18 OT

1947 22 Dec Warranty Deed: Dated Dec. 22, 1947, filed March 1, 1948. Dorothy McLeish to William Silvius, $1 etc., to Northerly 10 feet Lot 15, Block 18 OT, reserving 20 foot right of way in rear of said 10 foot strip to alley behind 16-20 of Block 18.

1948 8 Apr Right of Way Easement by William Silvius and Mae Belle Silvius as above. Abstract date April 8, 1948

1968 15 Mar Mrs. Dollie McLeish passes away

1969 Baker House given to Fort Benton Community Improvement Association.

FUR TRADING FORTS OF THE AMERICAN FUR COMPANY **

1828 – construction of Fort Union

1831 – construction of Fort Piegan at the mouth of the Marias; abandoned in 1832

1832 – construction of Fort McKenzie a few miles upstream from the site of Fort Piegan; abandoned in 1842

[** 1834 – American Fur Company sells to Bernard Pratt and Pierre Chouteau; Pratt retains name of American Fur Company in the midwest; Chouteau adopts name of Pierre Chouteau Jr. & Co. in the west. However, the popularity of the name American Fur Company persists].

1842 – construction of Fort Chardon (F.A.C.) at the mouth of the Judith River; abandoned for Fort Lewis in 1843

1843 (January) – original Fort Benton (Fort Lewis) built at location of first rapids above present townsite [5 miles upstream from Fort Benton]

1845 – Fort Campbell built on the river bottom about a mile upriver from the final location of Fort Benton; This was the major opposition trading post of St. Louis-based trader Robert Campbell [not constructed by the American Fur Company]

1846-47 Fort Lewis moved to present site of Fort Benton by Culbertson; renamed Fort Benton in 1850 after Missouri Senator Thomas Hart Benton.
Adobe work took from 1849 to 1859

1848 – [3] outposts built
Willow Round [built at the mouth of the Marias]
Flatwillow [30 miles upstream from mouth of the Marias]
Milk river [built at the mouth of the Milk River]
** All [3] abandoned in 1856

1862 – Fort Andrew built 15 mi above mouth of Mussellshell river; abandoned 1863 for Fort Gilpin

1863 – Fort Gilpin built 15 mi above the mouth of Milk River

SALIENT DATES

[1865 – American Fur Company (Chouteau and Company) sells Fort Benton Trading Post to the Northwest Fur Company]
[1870 Northwest Fur Company closes its stores in Fort Benton, dissolving the business]
[1869 / 1870 – Fort Benton becomes military post]
[Hudson Bay Company remains in business at the time of this writing; however, they moved out of the prairie provinces in 1869, thus leaving the market for the Fort Benton free traders]
[1881 – military leaves Fort Benton]

SIGNIFICANCE

In 1961, the National Park Service (NPS) designated Fort Benton as a **National Historic Landmark**, important to the history of the nation as the official head of navigation on the Missouri River. It was designated under the subtheme "Transportation and Communication" of the "Westward Expansion, 1830-1898" theme, because of its significant role in the developing nation. The Fort Benton National Historic Landmark was designated before standards were developed to establish boundaries, so it was not until a 2003-2004 study conducted by the Front Range Associates of Denver that a boundary was defined that encompasses the resources that were witness to and developed during the steamboat era, from 1860 through 1890. The landmark registration was completed March 23, 2011 as listing # 66000431 for the district which encompasses the heart of the riverfront commercial area and includes the fort, levee, bridge, firehouse and city hall, mercantile, hotels, Masonic Hall, saloon, hardware store, banks, and a residence that are linked to the nationally significant history of the community.

The I.G. Baker house is that residence. Built in 1867, of adobe, it is thought to be one of the first homes to be built outside the walls of the fort.

The significance of the Fort Benton National Historic Landmark District relates the history of Fort Benton to a larger area. The town functioned as the intermodal hub of a transportation network serving the northern United States plains and Western Canada. Within this framework the National Historic Landmark nomination states that Fort Benton complies with Criterion 1:

> *Districts that possess a high degree of integrity of location, design, setting, materials, workmanship, feeling, and association; and that are associated with events that have made a significant contribution to, and are identified with, or that outstandingly represent, the broad national patterns of United States history and from which an understanding and appreciation of those patterns may be gained.*

The nomination further relates the historic importance as being associated with the contexts of transportation, commerce, and architecture and relates the Steamboat Era of the Upper Missouri (1860 – 1890) as being central to that theme.

During the 1860-90 period of commercial steam boating, Fort Benton recorded 614 steamboat landings. Nearly 200,000 tons of cargo passed through the town, 161,531 tons upriver and 33,813 tons downriver. Included in the tonnage were more than 800,000 buffalo robes. More than 40,000 passengers traveled through the settlement, 24,279 travelers upriver and 16,360 downriver. Fort Benton played an important role in opening up the Montana goldfields in the 1860s, bringing in miners and mining equipment and shipping out gold ore. The great mercantile houses, banks, and other businesses of the town were critical in the settlement of the plains of Montana and Alberta in the 1870s and 1880s, carrying in supplies and equipment and providing financial and other services. The I. G. Baker house was witness to and participant in the commerce and development of an expanding nation as documented within the National Landmark.

The I. G. Baker Residence was additionally listed on the **National Register of Historic Places**, November 20, 1980 as individual listing #80002403. The National Register of Historic Places nomination additionally documents the significance of the residential property:

> *"The I.G. Baker House is significant for its association with two of the major mercantile families in Montana and in the Northwest. I.G. Baker and the Conrad family were two of the most prominent families to live and do business in Montana from 1865 to the 1900's. The house is also significant for the many historical figures who visited there and was the home of the first white child born outside the walls of the fort."*

ARCHAEOLOGICAL CONSIDERATIONS:

In addition to summarizing the documented history of the I. G. Baker Residence, this report is intended to raise the awareness of all cultural values and to create a foundation for continued research into the building; its occupants, designers, and founders; its site or location; and the history of events surrounding the building. Although not the primary purpose of this report, it must be recognized that understanding the occupation of the site over time has the potential to yield additional information that can contribute to the story of this location from both the standpoint of pre-history as well as history. For this reason, it is recommended that all ground disturbing activities be observed with sensitivity regarding archaeological values.

If buried features related to history or pre-history are encountered or if artifacts are unearthed that are thought to have the potential to add to the history of the facility or occupation of the site prior to construction of the current building we recommend consultation with the Historic Architect and representatives of the Community Improvement Association of the town of Fort Benton.

Previous archaeological investigations at the I. G. Baker site have not been identified to the authors of this report. Review of the nomination to the National Register of Historic Places, the nomination for the National Landmark, as well as the survey work recorded for the National Landmark did not reveal site numbers from previous archaeological work at the site of the I. G. Baker Residence. The authors were advised that Gar Wood, Montana archaeologist, had performed work at the site of the Fort (only).

HISTORIC PHOTO

This photograph is identified as “Baker House Before 1908 – 600” in the files of the River & Plains Society archives. Note the metal roofing (confirming the information on the Sanborn maps) and the different style of fence across the front of the property. This photograph also shows shutters on either side of the front windows and a wood screen door over the main entry door. It appears that a hanging metal gutter extended across the porch edge only and that the downspout / leader carried water over to the corner of the house.

Photo: Courtesy of the River & Plains Society

HISTORIC PHOTO

This photograph is attributed to a pre – 1950 date based on comparison with photos reproduced on the following pages. Half-round 'cavalry' style gutters are visible along the eaves; Half-round gutters were being produced in the latter part of the 19th century so it is possible that the I. G. Baker residence had hanging metal gutters during the period of significance.

Photo: Courtesy of the River & Plains Society

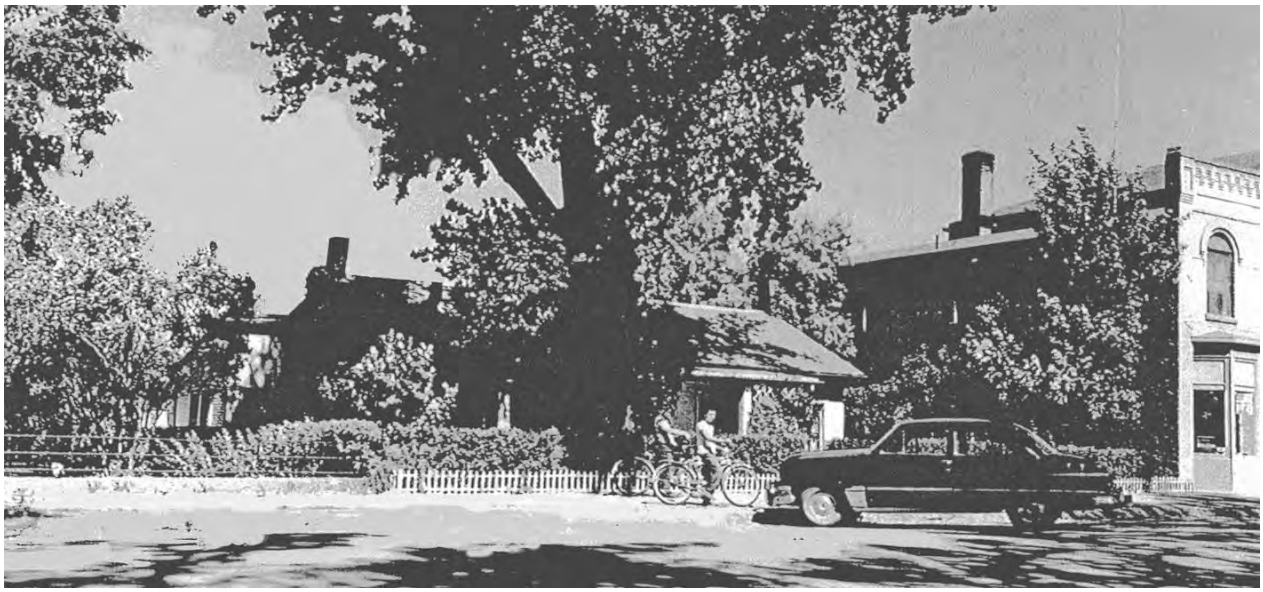
HISTORIC PHOTO

This photograph is believed to have been taken circa 1950 (note the similarity of the hedge height and the appearance of the decorative fence as compared to the photo on the following page). A chimney is visible on the extreme right side of the roof ridge that is no longer there; the chimney is attributed to a post 'period of significance' installation, and has since been removed.

The pair of windows on the North end of the wall were introduced after 1900 – they were replaced with a single window during the 1973 restoration to reconstruct the historic appearance of the residence.

Photo: Courtesy of the River & Plains Society

HISTORIC PHOTO



This photograph is attributed to 1950 +/- based on the model of Ford automobile in the image. The chimney on the South end of the roof ridge is visible in this photograph; the brick chimney is related to the 1876 marble fireplace in the South parlor and it is recommended that it be reconstructed.

Photo: Courtesy of the River & Plains Society

HISTORIC PHOTO

This photograph is dated 1977 and was taken after the 1973-76 restoration efforts. Note that the decorative wrought iron fence has been added next to the sidewalk on Front Street.

Photo: Courtesy of the River & Plains Society

HISTORIC PHOTO

This photograph of the I. G. Baker Warehouse was taken in 1973. The warehouse was located on the SE corner of 16th & Main; the structure has been demolished since this photograph was taken.

Although not specific to the Historic Structure Report for the I. G. Baker residence, the warehouse underscores the magnitude and scope of the I. G. Baker empire within North Central Montana and Southern Canada.

The following quote is from pp. 29 of the National Historic Landmark Nomination for the Fort Benton Historic District:

> *I.G. Baker enlarged its facilities in 1876 by erecting a large brick store and warehouse (no longer standing). Joel Overholser described 1877 as the beginning of a "seven year building spree."*

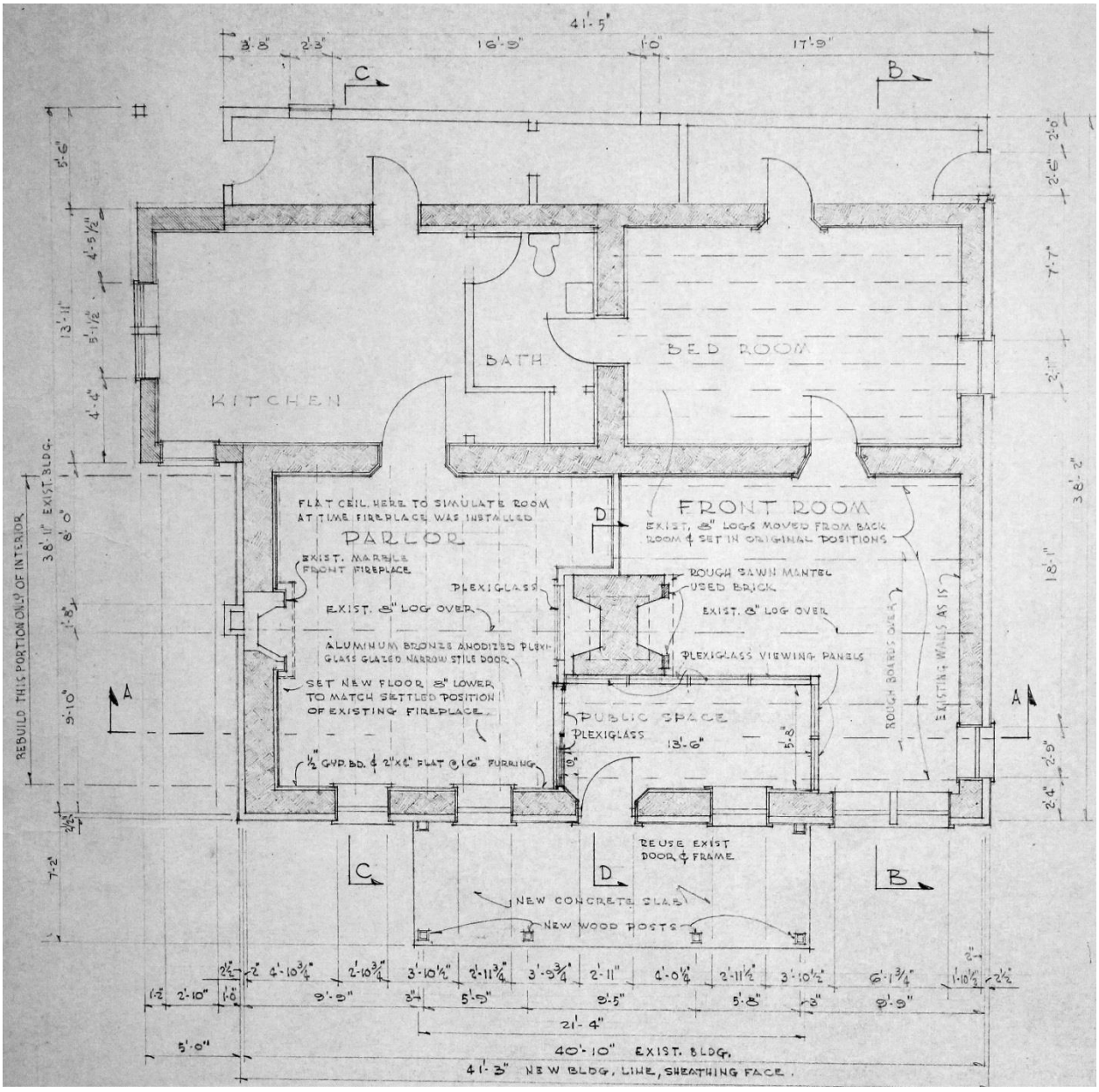
Photo: Kenneth R. Sievert

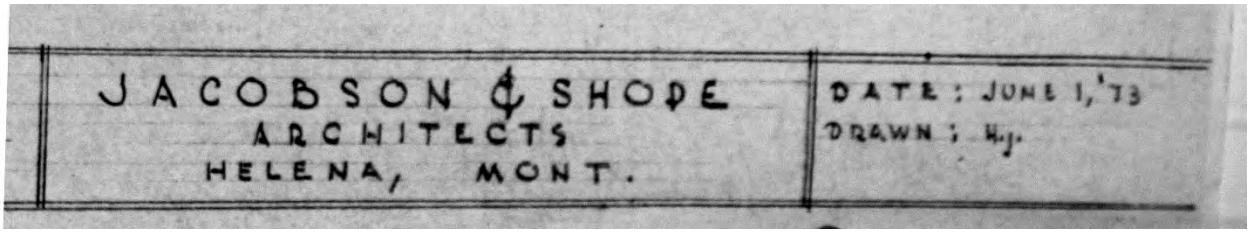
HISTORIC PLANS:

Other than Sanborn Maps, there were no historic plans found during the preparation of this report.

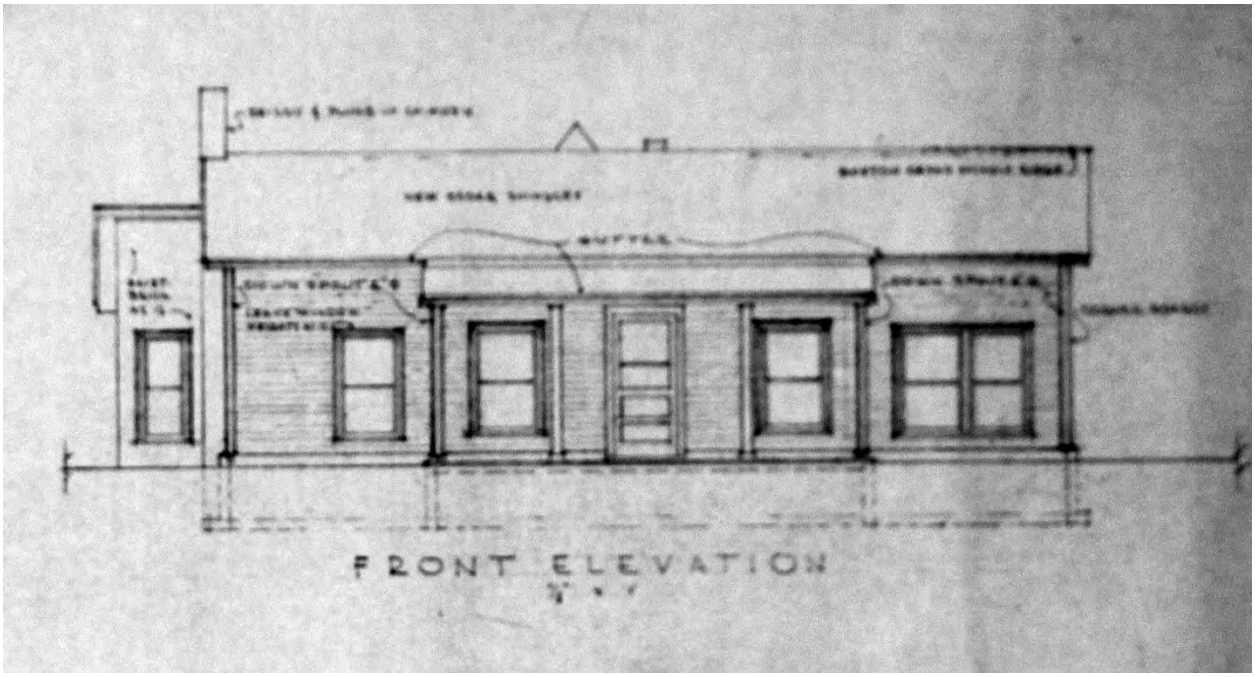
There were plans created for the 1973 – 76 restoration project by Jacobson and Shope for the historic house, and excerpts from those plans are attached on the following pages. Pertinent portions of the Sanborn Maps that relate to the structure are included within the "description" section of the following chapter of this report.

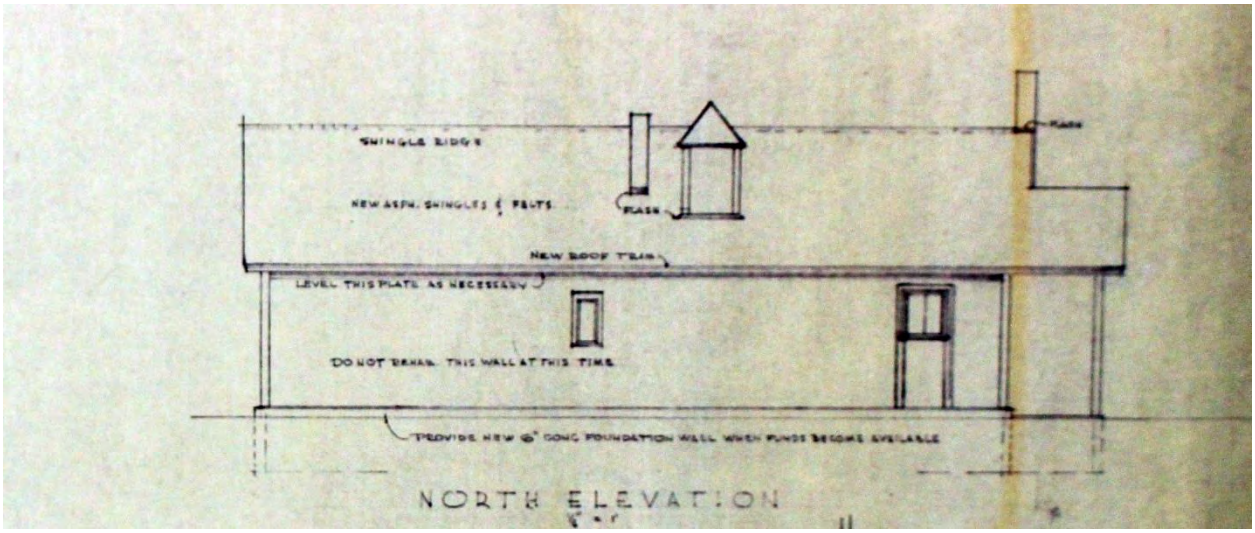
EXCERPTS – 1973 PLANS



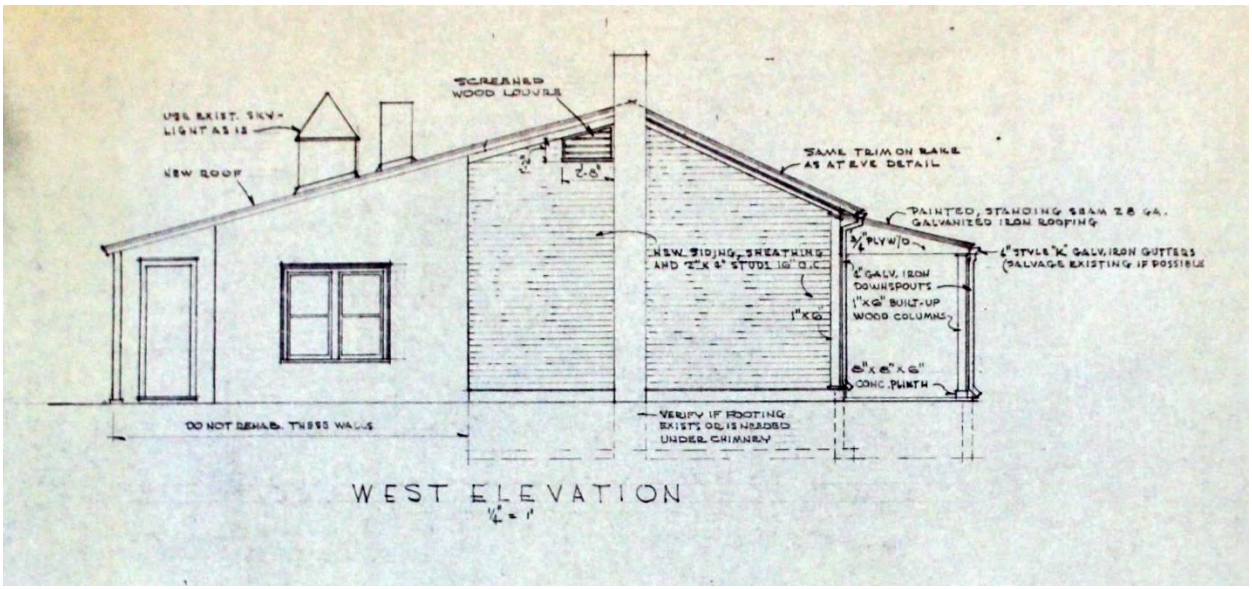


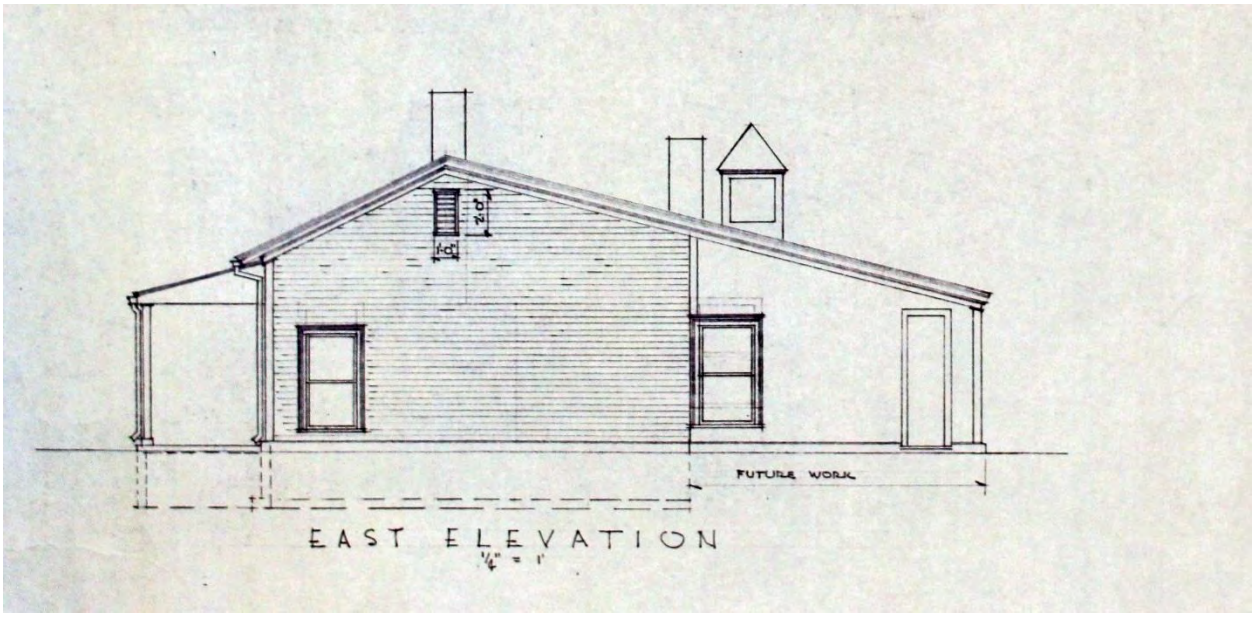
EXCERPTS – 1973 PLANS



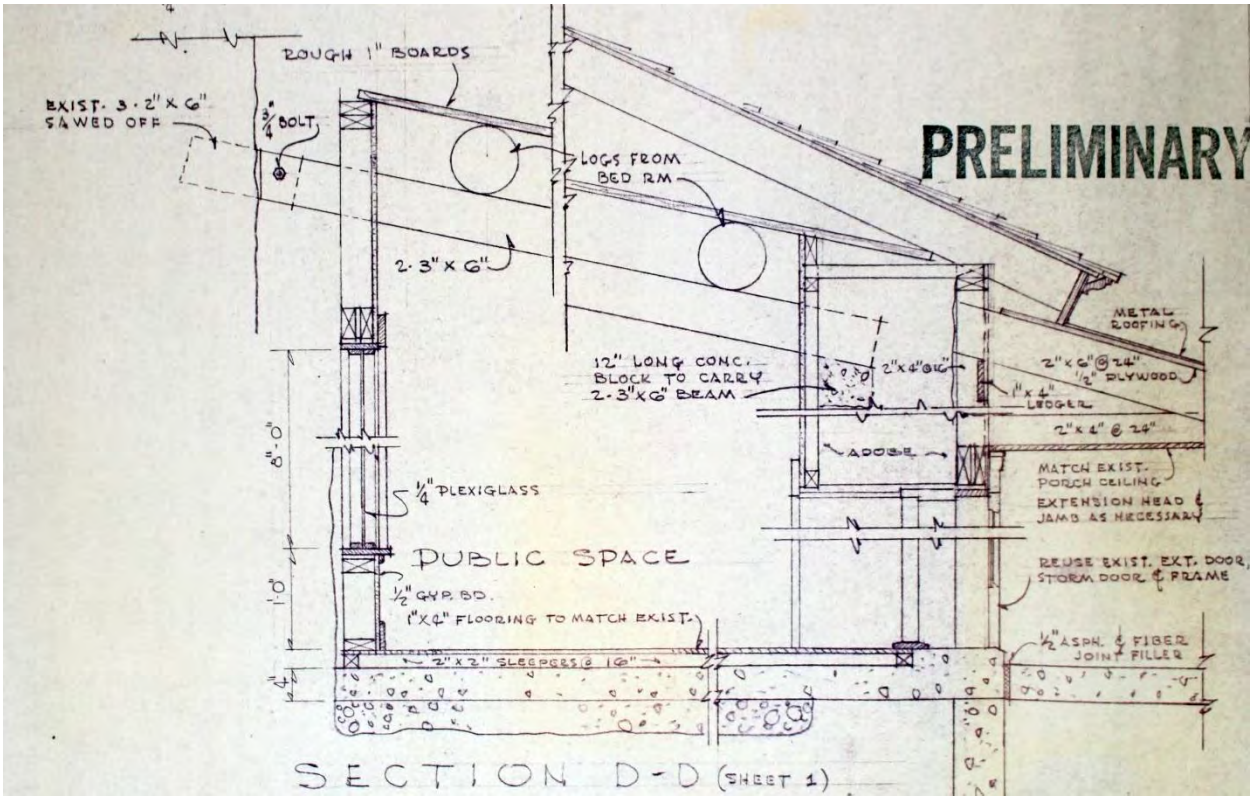


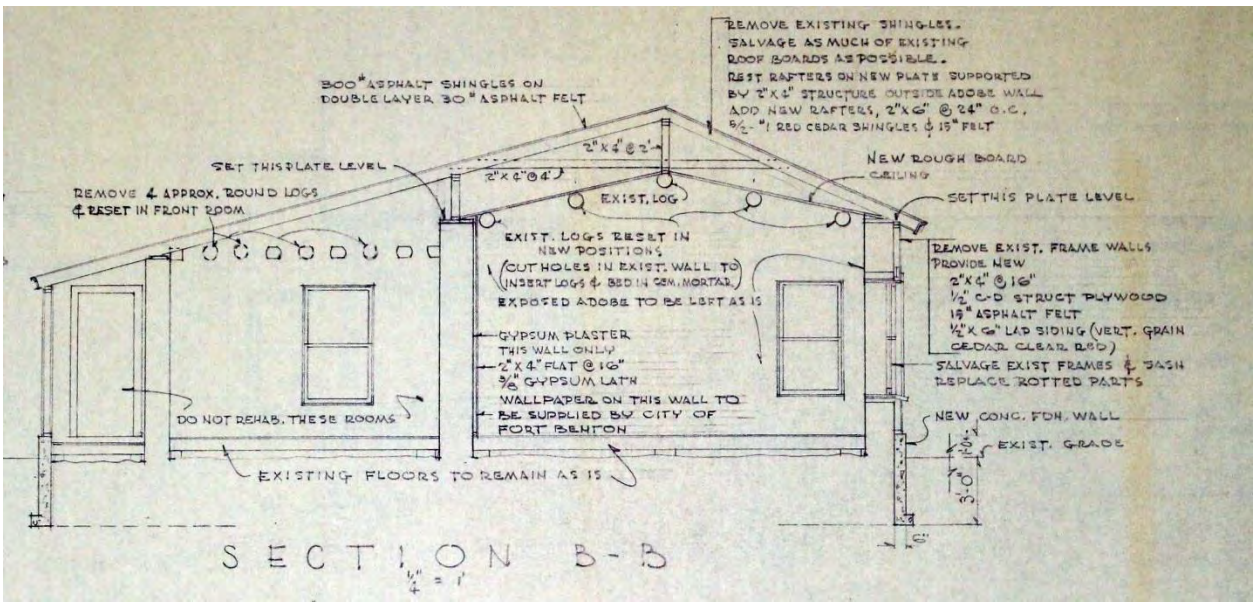
EXCERPTS – 1973 PLANS





EXCERPTS – 1973 PLANS





PHYSICAL DESCRIPTION

LOCATION

From the Fort Benton National Historic Landmark nomination:

"Fort Benton, the historic official head of steamboat navigation on the Missouri River, is located on the west bank of the river in north-central Montana, about thirty-four miles northeast of Great Falls and eighty-four miles south of the Canadian border."

THE SITE

Understanding the evolution of the site of the Fort at Fort Benton adds insight into the construction of the I. G. Baker Residence. There were two factors that coincided to create the circumstances that caused the creation of the Fort at Fort Benton; (1) there was a lucrative market for furs and robes that was recognized by entrepreneurs interested in capitalizing on that market, and (2) free spirited men with a bent for exploration that were already pushing into the west that could implement that vision. It is worth stating that this fur / robe trade was a nationally significant enterprise that involved substantial markets, international trade with the attendant international politics, and cultural exchanges that experienced varied degrees of success. The following quote captures the environment of the first white habitations related to this changing frontier:

> *Here and there in favorable localities, where pleasant groves furnish the needed timber; where luxuriant meadows proffer their verdant stores for the subsistence of their cattle; where some considerable stream furnished convenient transport for their furs and merchandise to and from the mouth of civilization, they erect rude cabins and palisades, dignify the structures with the name of fort, .. invite the surrounding tribes to friendly traffic, take wives from among the fairest of their dusky women and rearing up families of mongrel blood, impart to their palisaded hovels some of the airs of domestic life.*[1]

The site of the Fort (and the I. G. Baker Residence) is situated far enough away from the surrounding river bluffs to be defensible, has a commanding view of the river, and is close to the mouths of the Marias and Teton rivers that were routes for nomadic traders of the plains as well as habitats for wildlife.

The resource quoted above continues to comment on the condition of the Fort in Fort Benton, is germane to our understanding of buildings constructed during the fur and robe trading era, and is testimony to the task of retaining cultural values.

> *At the time of this writing (sic 1917), but one perhaps of all the old-time trading forts of the region, with which we deal, is in existence-Fort Benton; and that· is hastening rapidly to decay.*

[1] Contributions to the Historical Society of Montana; Volume 8 (1917); Bradley Manuscript, Book 2; pp. 178

HISTORY OF THE SITE - POST FRONTIER EXPANSION

The fur / robe trade continued to flourish, Fort Benton evolved, and improvements were initiated to the community including the I. G. Baker properties. A description of the market conditions that drove this economy is recited below:

> *The key to the growth of Fort Benton during the last half of the 1870s was the expanding merchant community and the creation of a small class of wealthy merchants. Although the dominance of the Power and Baker concerns and several other mercantile houses such as Kleinschmidt & Bro. in the port's economic life was obvious, the number of retail businesses grew significantly in these years. Because Fort Benton was the center of the buffalo robe commerce with Canada, its expansion was also closely linked to the international trade routes that emerged in the buffalo period. The value of these routes, one leading to the Cypress Hills region and the other to the Oldman River country, was most evident in the late seventies and early eighties when the buffalo robe boom and the export trade in supplies for the Mounted Police and the Canadian Indians both crested*[2]*.*

The reference quoted above offers the following perspective with this concluding statement:

> *The most complete picture of Fort Benton's export trade with the [sic: Canadian] southwestern prairies, and one that includes both the domestic exports and the bonded re-exports without making a distinction between them, comes in 1878. In this year, of the total of 500 tons of eastern merchandise destined for Canada, the Powers shipped 100 tons (valued at $25,000), or 20 percent. By contrast, the Baker company's shipment, 400 tons (valued at $90,000), represented 80 percent of the total. The evidence suggests that in 1878 Baker & Co. and Power & Bro. were the only Fort Benton firms involved in exporting goods to the prairies. During the rest of the period under review, their shipments to Canada represented virtually all, if not all, of the total export of these goods from Fort Benton. Power & Bro.'s and Baker & Co.'s participation in the trade with the southwestern Canadian prairies In the last quarter of the nineteenth century was organized on an extensive interregional and international scale. This allowed these merchant houses a means to promote economic development in Montana during this period and later. Even though their original vision of making Fort Benton into a great trading center did not materialize, the immediate effects of their trade with Canada were widely reflected in increased jobs and income in north-central Montana. The long-run importance of the trans-border commerce to the Montana economy is also clear. The savings generated by their business abroad helped the former major players in the Montana-Canada trade influence long-term investment in the Fort Benton region, as well as in the Helena, Great Falls, and Kalispell areas, from the early 1890s into the twentieth century. Probably it is to Power & Bro.'s Canadian commerce, along with that of Baker & Co., that we should look for a better understanding of the foundations upon which Montana's economy was built.*

[2] Shaping the Growth of the Montana Economy:TC. Power & Bro. And The Canadian Trade 1869-93; Henry C. Klassen; *University of Calgary;* 1991

Physical descriptions of the I. G. Baker Residence are included on following pages for each of the dates pertinent to the evolution of the residence, including its original construction, major additions or modifications, and restoration efforts. With the exception of the original 1867 2-room house, the other dates listed are based upon Sanborn maps and the written record from previous investigators.

PHYSICAL DESCRIPTION - ARCHITECTURAL STYLE

Classification of the I. G. Baker Residence into a distinct architectural style is difficult because of the lack of ornamental detail as well as the utilization of on-site materials in its construction. The date of the construction of the building occurred near the end of the use of the Colonial / Georgian / Federal styles of architecture (sometimes referred to as the 'National' styles), and just at the beginning of the use of the high styles of Gothic Revival, Romanesque Revival, and Victorian styles and their derivatives (sometimes referred to as the Romantic Styles).

Because the building was constructed with adobe and local timber, a case can be made that the residence could be classified as vernacular architecture; Vernacular architecture is defined by a reliance on needs, construction materials, and traditions specific to a particular locality. It is a type of architecture which is indigenous to a specific time and place and not replicated from anywhere else.

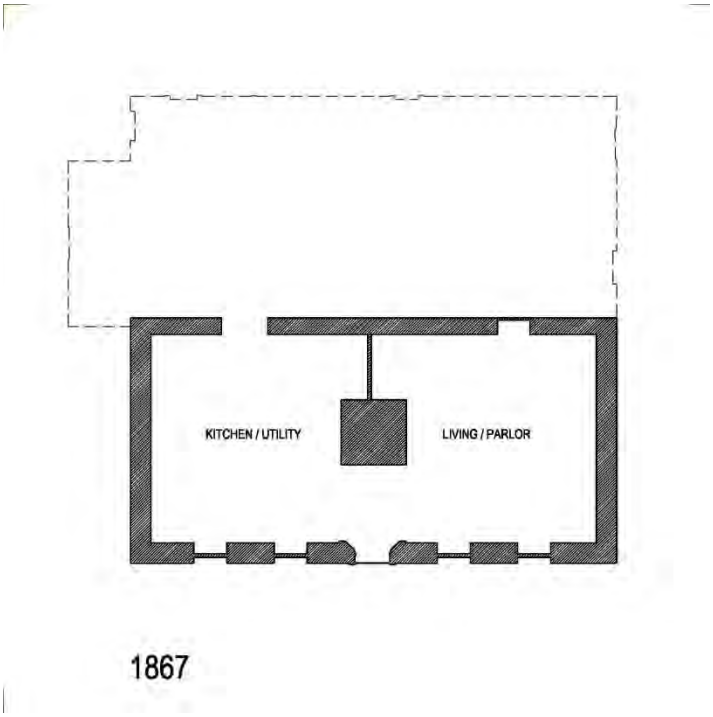
However, the massing of the building is the studied formalism of symmetry. The wood bevel siding originally incorporated corner boards in the manner of Greek Revival structures, although other details or decorative appointments are restrained (or absent).

Because of the massing, simplicity, and symmetry of the structure, the conclusion is that the predominant influence of the style of the original 1867 building was vernacular, and that it incorporated elements of the 'Federal' style of architecture in the re-surfacing during the 1876 remodeling - but that the influence was restrained and minimal.

The arrangement of the floor plan was direct, practical, and rigid in its uniformity and symmetry; the style of the interior appointments was austere but substantial. The totality of the original exterior and interior construction presented itself as a sense of permanence at this outpost on the American frontier.

PHYSICAL DESCRIPTION

Strategically placed within the protective shadow of the stockade of Fort Benton; located adjacent to the river levee and the commerce that occurred thereon; and positioned to absorb the amenities of the prairie coulee delta and its attendant flora and fauna, the original I. G. Baker Residence exhibited the characteristics of early fur trading posts with the juxta positioning of rawness, ingenuity, and humility.



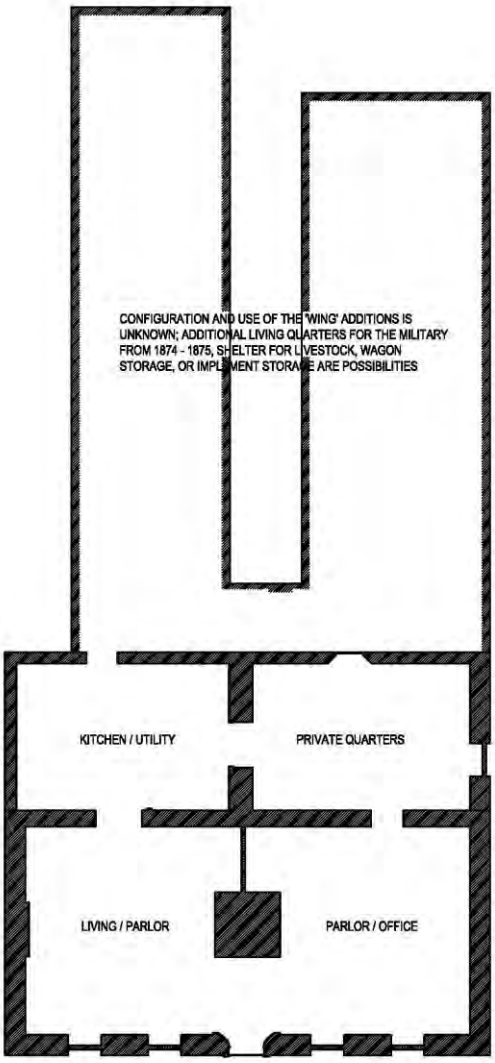
This is the plan configuration of the original structure based on documentation submitted for the 1973-76 restoration project. The space assignments are speculative as no written record describing the interior use of space or describing the furnishings was found during the preparation of this report.

The following is quoted from the nomination to the National Register of Historic Places for the residence.

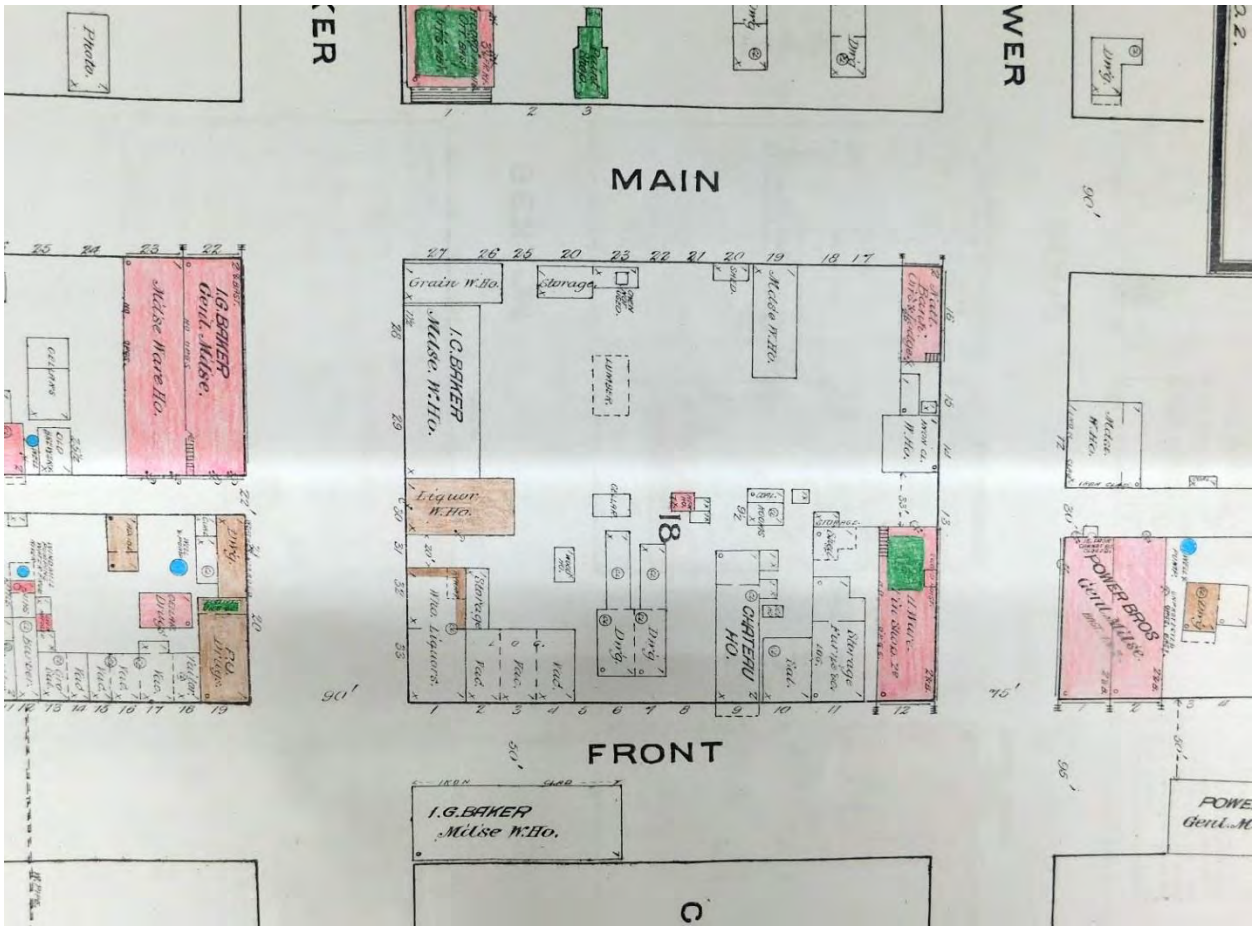
> *"The original building was a two-room adobe building with four windows to the front, a front door and one rear door. The original roof was gabled with a very low pitch [roof], boarded, then covered with sod. There was a large double-faced fireplace in the center to heat the two rooms".*

The provenance of the existing windows and door that currently remain on site are not known; they exhibit a level of design sophistication that normally would be related to late 1800's construction, and may have been added during modifications to the residence that occurred during the 1876 (attributed) remodeling that is referenced in the nomination.

PHYSICAL DESCRIPTION (continued)

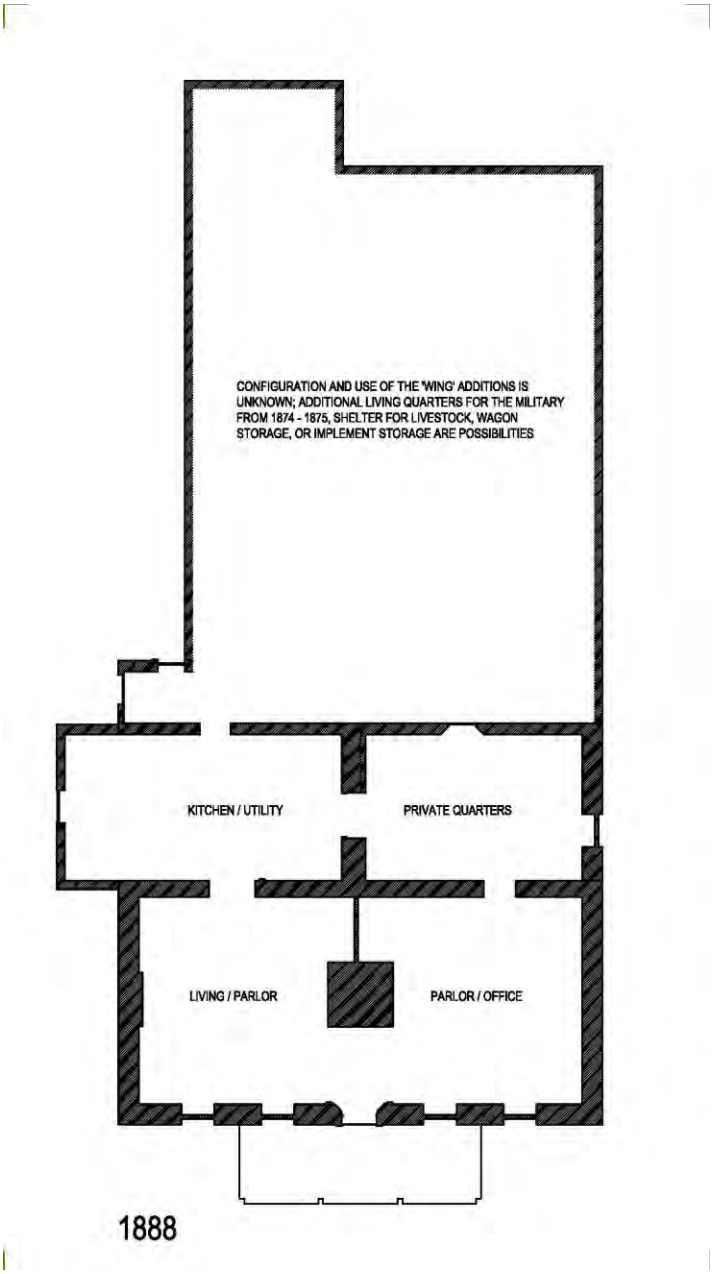


The configuration shown to the left incorporates the addition of (2) rooms on the west side that were constructed sometime between 1867 and 1884 and that were also constructed of adobe. Based on site investigation of remaining materials (specifically adobe) that reflect construction practices expected during the early years of Fort Benton, the addition of these rooms is attributed to having occurred near the earlier part of the period.

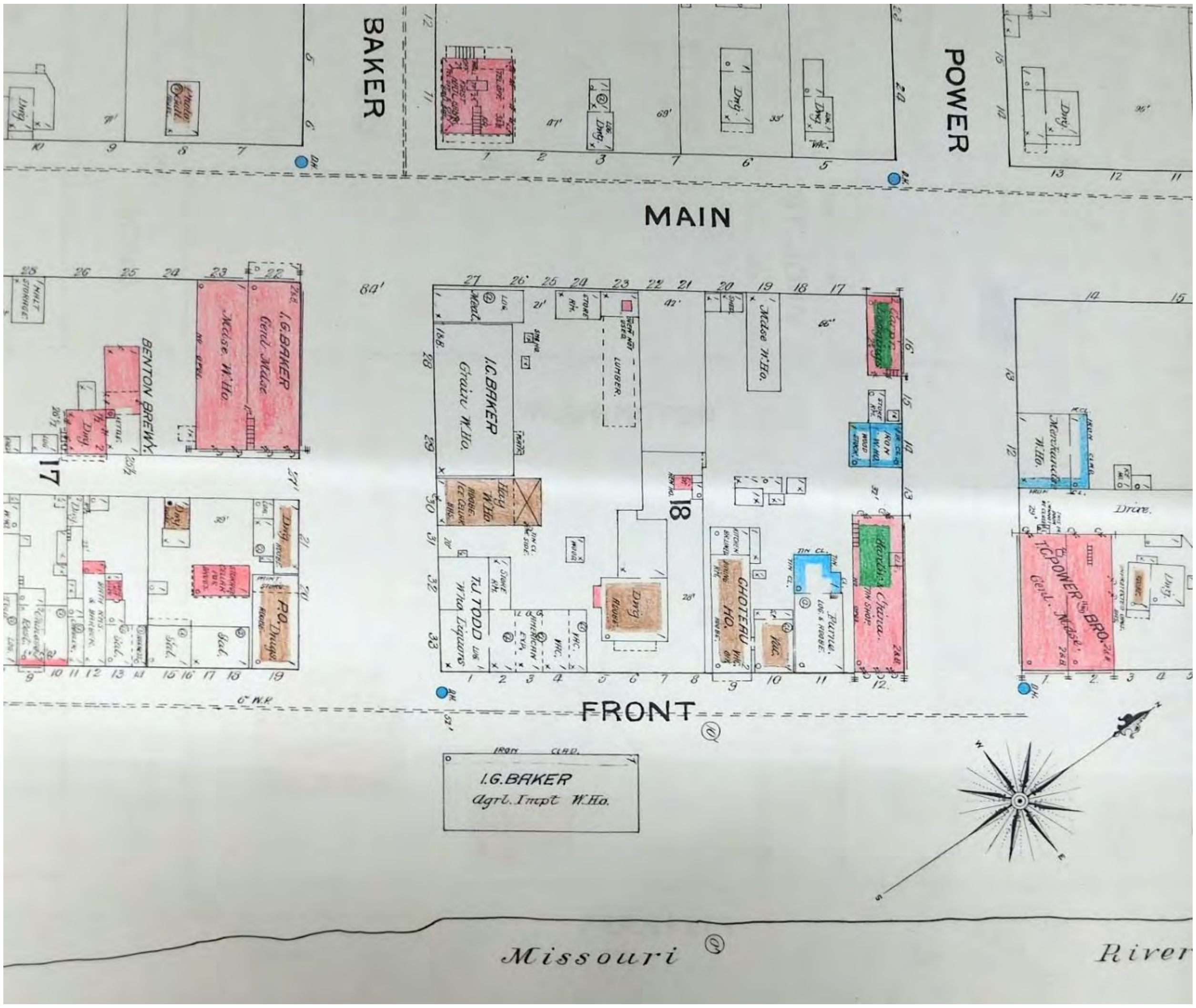


The 1884 Sanborn map identifies the I. G. Baker Residence as a side-by-side dwelling that is 1 – story in height and is clad with siding. The legend indicates a metal roof (open circle) with the exception of the wing additions to the west that have a wood shingle roof ('x' notation). This map does not define the basic construction of the house (wood frame, masonry, adobe, etc.).

The side-by-side configuration suggests that occupancy was as a duplex or billeting quarters; however, the date of 1884 is after the military left Fort Benton.



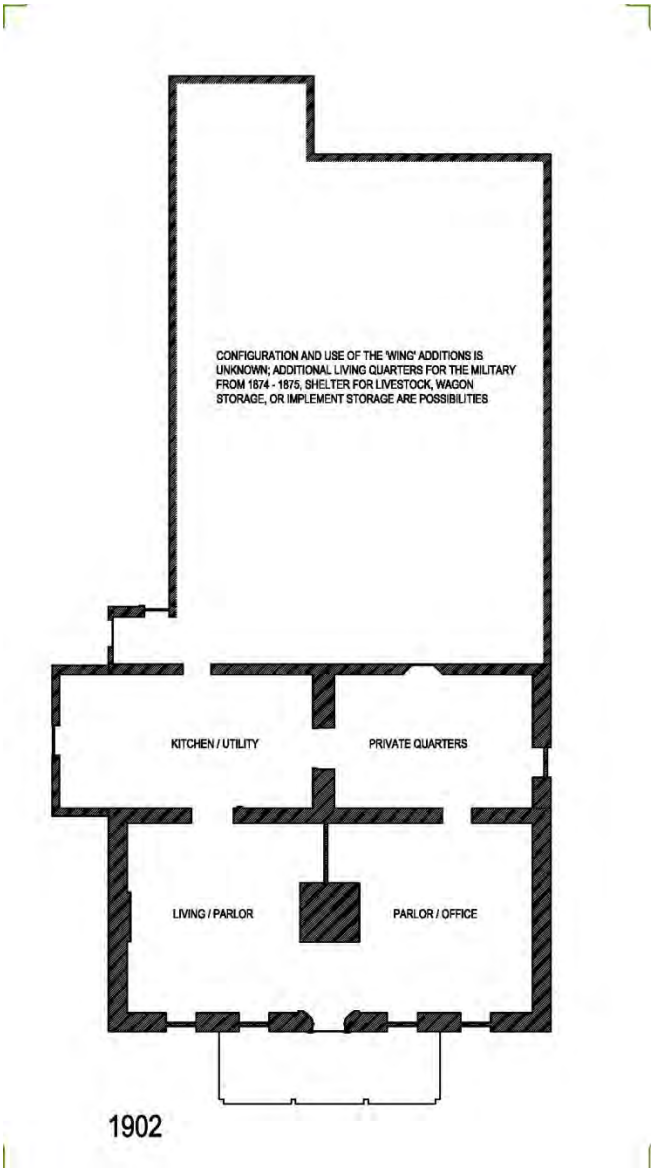
Minor modifications were made to the configuration of the footprint of the I. G. Baker residence between 1884 and 1888; as noted below.



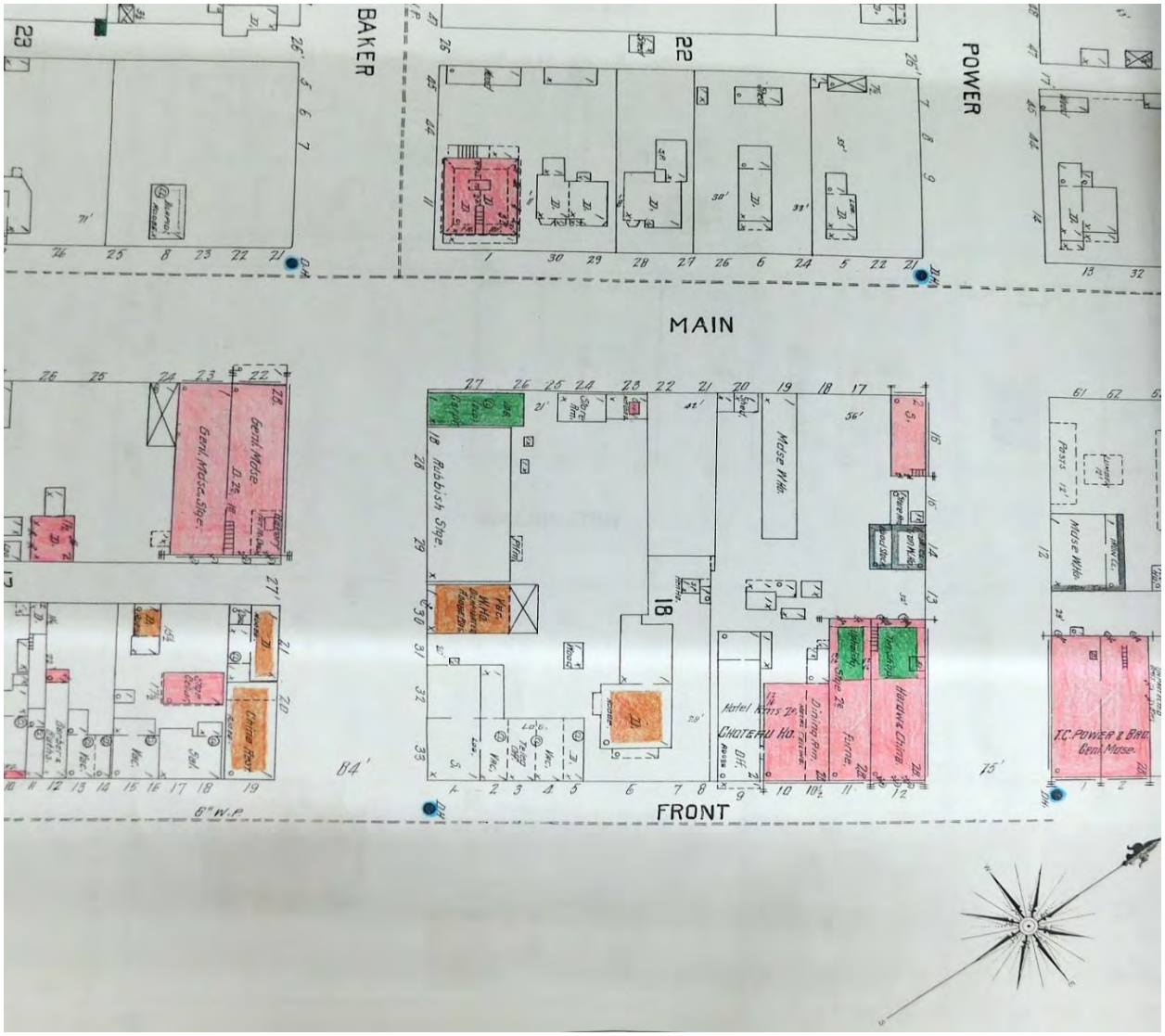
The 1888 Sanborn map shows that an open porch has been added to the East side, a brick addition has been added to a portion of the South side, and the structure is identified as 'fireproof' (indicated by the brown color). The 1888 description identifies the central mass of the structure as adobe, indicates it is a 1 – story building, and denotes a metal roof over the primary building with a wood shingle roof over the west wing(s).

Note that fire hydrants appear on this map along Front Street and have been added since previous editions of the maps were published.

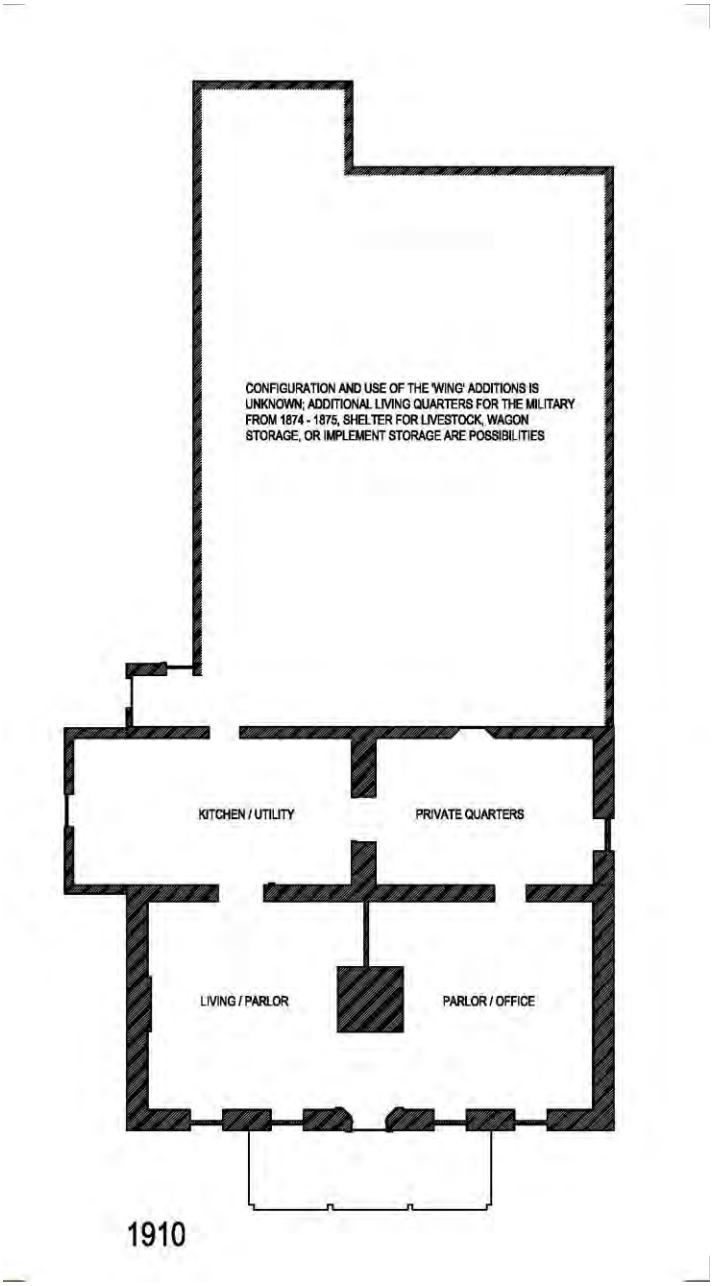
PHYSICAL DESCRIPTION (continued)



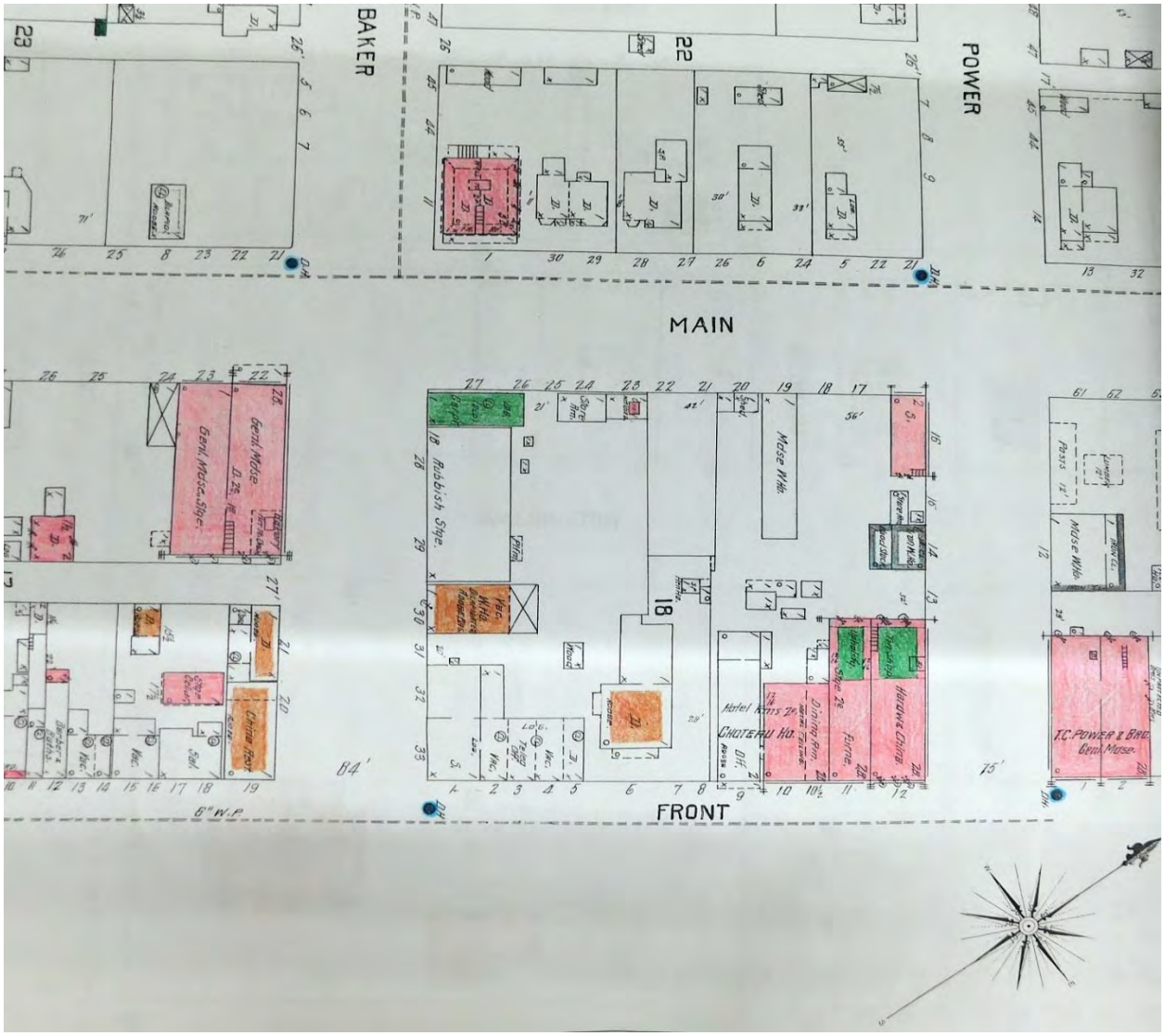
The configuration of the footprint on the 1902 Sanborn map did not significantly change between 1888 and 1902.



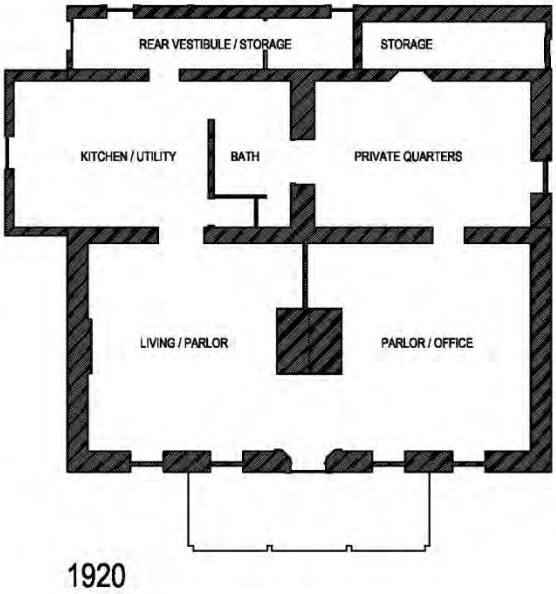
The 1902 Sanborn map for the I. G. Baker Residence is identical to the 1888 map indicating that major changes were not made to the structure during that period of time.



Plan configuration of the I. G. Baker residence in 1910.



Excerpt from the 1910 Sanborn map for Fort Benton. No significant changes have been noted from the 1902 map. The I. G. Baker warehouse structure on the levee has been removed.

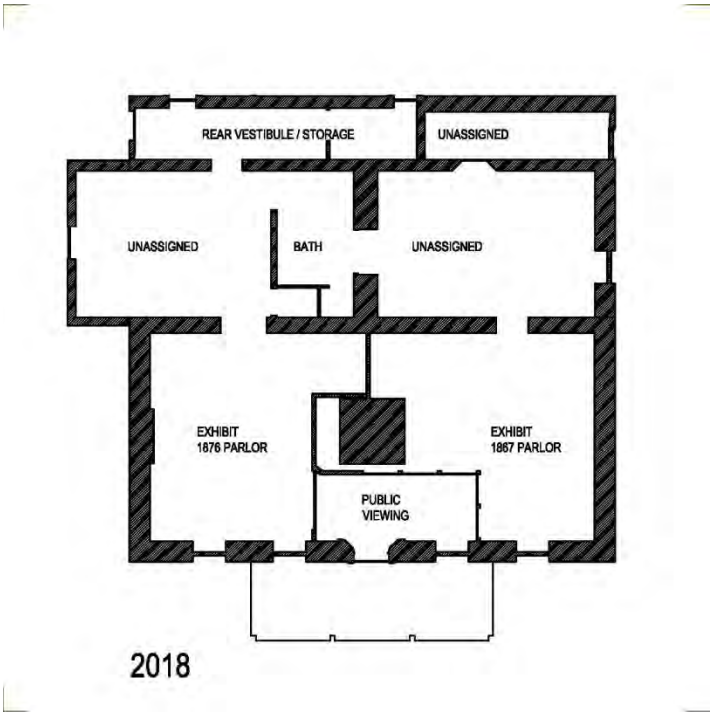


The floor plan arrangement for the residence changed by 1920; the illustration to the left shows the passageways across the west side resulting from the removal of the long west wing additions that were first recorded on the 1884 Sanborn map. These passageways are of wood frame construction and appear to be clad with salvaged materials.

A bathroom has been included in this illustration although the exact date of this improvement is not known. A water system was introduced in this part of Fort Benton beginning in the 1888 – 1891 period of time suggesting that the house may have had bath and kitchen utilities by this date.

The 1920 Sanborn map for the residence indicates that the primary central mass for the structure is basically unchanged; however, the additions along the west side of the structure have been removed. The notation ‘weather boarded’ has been added to the footprint; presumably this indicates covering of the west side where the addition was removed, or it could indicate that the projecting brick element along the south wall was clad between 1910 and 1920. The symbol along the south projection denotes a single window at that location. Curiously, none of the other windows are shown, and are also not shown on other editions of the Sanborn maps.

PHYSICAL DESCRIPTION (continued)



The floor plan illustrated to the left shows the configuration of spaces as they exist as of the date of preparation of this report.

Primary changes to the residence since it was vacated are the result of the 1973 – 76 restoration; plan configuration changes primarily consisted of adding a public viewing area immediately inside of the front door. Currently public visitors are restricted to the viewing area; the remainder of the residence is not available to visitors.

The authors of this report were advised that the projecting south wall of the Kitchen / Utility has been replaced since 1976. The brick wall added in the mid 1880's had failed, and has since been replaced with a wood frame wall.

PHYSICAL DESCRIPTION – CURRENT CONFIGURATION

The I.G. Baker House currently exists as a modest one-story structure with a nearly square 46' x 40' (+/-) footprint that is sheltered by a low slope gable roof with offset ridge. The south wall of the former kitchen projects a few feet past the basic square plan and a 2/3 width open porch extends across the front (east) wall of the basic mass.

The roof was originally a sod roof of very low slope with the ridgeline oriented parallel to the main elevation, and centered on the 21' (+/-) width of the original structure. At the time that the first significant addition was appended to the house (during the 1867 – 1876 period of time), a new roof was constructed over the original roof. The new roof maintained the same eave elevation as the original on the front wall, matched the original eave height at the new back wall, and aligned the new roof ridge directly over the original, except at a higher elevation. The resulting roof profile can be described as an off center ridge with unequal downslopes. The sod was removed from the lower roof; however, the wooden structure was left in-place. The new roof at the primary building featured a roof that was clad with metal roofing. Fire insurance maps list the roofing material for the primary mass as metal during the dates of 1884 – 1920 (the year when the last fire map was published). A review of historic photos reveals that composition shingles replaced the metal sometime before 1950; the composition shingles were replaced by wood shingles during the 1973 – 76 restoration and are the current roof surfacing.

The long linear additions on the west side of the residence that can be viewed on the 1884, 1888, 1902, and 1910 fire insurance maps indicate that the roofs of these additions were always surfaced with wood shingles. The authors did not find descriptions or photographs of the west wing additions during their research of this historic property, and other than the fire insurance maps little is known about their construction or the purpose of the additions. Future investigation may reveal greater insight into this topic; an archaeological investigation is recommended for this purpose.

The original building and the first addition were constructed of adobe brick. The plan revision that extended the kitchen to the south (during the 1884 – 1888 period of time) was constructed with fired

brick. Other changes or modifications to the house have since been accomplished with conventional wood framing assemblies.

EXTERIOR FENESTRATION:
East wall openings - Four 2/2 double-hung wood windows are symmetrically deployed across the main east elevation, and an ornate wood entrance door is centered on this wall between the inner phalanx of windows. The door features a pair of round top half-lites in the upper door; the lower half of the door is decorated with applied moldings surrounding (2) bulls-eye patterns that are umbrellaed by an arched molding pattern.
The north window of this grouping was replaced by a pair of windows at one time; the original single window configuration was reconstructed during the 1973-76 restoration. A photograph in the collection of the Overholtzer museum dated “pre – 1908” also shows wood shutters alongside of the windows.

South wall openings - The east one – half of the south wall is without openings; the offset kitchen wall on the western end of the south wall includes a single 2/2 double hung window. Window locations in this offset have varied over time. The circa 1930 photograph shows windows in both the east and south walls of the projection and a photograph from the early 50’s shows a double window in the south facing wall of the projection. The extreme west end of the south wall steps back to the original wall line and is the location of the rear entrance into the residence. The existing door and screen door exhibit characteristics of contemporary materials.

West wall openings – This long, low west wall includes (2) fixed wood windows. One window is located at the center of the wall and is a 4 – lite window; the other is located approx.. 4’-6” from the south end of the wall and is a single fixed pane.

North wall openings – The only door opening in the north wall is the doorway at the extreme west corner of the wall. Currently, the opening has been boarded over with oriented strand panel. A single 2/2 double-hung wood window is located approx. 14’ from the west end of the wall.

All windows that are currently existing have profiles and hardware that is similar throughout. Since the date of a substantial remodeling has been stated as circa 1876, and since the windows exhibit the characteristics of factory production, it is believed that the windows date to 1876 and that the (4) front windows were changed at that time.

Siding – The east, north, and south walls are clad with beveled cedar siding that was replaced in-kind during the 1973-76 restoration. Corners of the siding are capped with tin caps that are not period appropriate and do not reflect the traditional wood corner boards that are visible in the historic photographs. The west wall is sheathed with T & G 6” wood and is covered with dropped wood siding. The south 10” +/- of the wall has been sided with a combination of beveled cedar siding and Masonite siding implying that the construction of this part of the wall has been altered.

Gutters – The front (east) wall and the edge of the porch affect drainage with ‘K’ style galvanized gutters and downspouts. These gutters are contemporary; however, half – round gutters drained the same roof edges as early as 1908 as referenced by historic photographs, and may have been in place prior to that time. It is recommended that the gutter system be returned to the half-round appearance.

Roofing – The original roof of the low-profile roof was sod covered, and the original roof of the higher profile roof was ‘V’ crimp galvanized metal. The tin roof system continued until the 1920 Sanborn map and may have continued longer. Review of roofing visible in a photograph entitled “Baker House 1930’s” in the Overholtzer collection is inconclusive, but photographs from the 1950’s clearly show composition shingle roof surfacing. The current wood shingle roofing appears to be the only time period when the residence was covered with wood shingles. The simple, square – cut, painted wood fascia appears to have been consistent throughout the service of the building and should be retained. At one time the roof included a 30” (+/-) square ventilator that was located over the kitchen (remnants of the ventilator are still visible above the ceiling) and it is recommended that the ventilator be reconstructed. The ventilator had a steep pyramidal roof profile.

INTERIOR DESCRIPTION:
Parlor 102 (interpreted as 1867) – All walls are of original or repaired adobe that has been whitewashed. The flooring is matched T&G wood flooring oriented north-south and the ceiling is exposed structure. (5) Log purlins extend from the north wall to a girder supported by the center fireplace, and wide sawn board sheathing spans between the logs following the pitch of the roof. The ruff-sawn boards show the raker marks of a very large sawmill. Interior running and standing trim is of plain painted wood boards. The enclosure around the interior viewing area that was added in1976 is constructed of plexiglass that is framed with salvaged weathered wood. It should be noted that plexiglass is not a good choice for housing museum objects because of its outgassing characteristics.

A double-faced adobe fireplace occupies the exact center of the original (2) room domicile. Designed to provide heat to each of the two rooms each firepit was constructed with a floor hearth and adobe mantles. Steel lintels (replete with carriage bolts) span the fireplace opening, the smaller size chimneys that extend above the mantle were plastered, and the tops of the original chimney can still be seen between the two roof systems.

Parlor 103 (interpreted as 1876) – this space features walls that were plastered and then covered with wallpaper. The wallpaper that currently adorns the walls was installed during the 1976 restoration and "a close match to [remnants of] the wallpaper was achieved". The North wall of this space was never completed and exists as exposed 2x4 wood studs. It is recommended that the wall be completed and that an interpretive window be installed for viewing of the original center firepit. The floor of this space was removed during the 1976 restoration; it was replaced with a concrete slab-on-grade at a lower elevation that has been surfaced with sleepers and plank flooring above. The floor is currently covered with carpet. The plaster ceiling in this space was applied over added ceiling joists to result in a flat ceiling; it was replaced in 1976 by drywall. With the exception of the cornice mold and the wainscot cap, the standing and running trim in this space is of painted flat woodwork. The wood wainscot around the room was installed in-kind to match remnants that were found on site during the 1976 restoration. A carved marble fireplace was added to the center of the south wall of the room in 1876 and remains; it is in very poor condition and will require re-setting and restoration.

Kitchen / Utility (104) – This space was not addressed during the 1976 restoration and exhibits numerous contemporary materials as well as remnants of several unfinished repairs. Sinks and cabinets have been removed, the south replacement wall is unfinished on the interior side, and there are several generations of 1940 – current wallpaper patterns applied to the walls. The ceiling is painted cane fiber board (Celotex) and the north wall has been surfaced with the same material. Celotex was not invented until 1924 so the installation, although within the age allowed for historic materials, is not within the period of significance for the residence. The west wall is partially constructed with wood lath and plaster beneath the wallpaper, and the adobe east wall of this space was plastered prior to the application of wallpaper. The floor is matched T&G wood flooring that has been covered with contemporary resilient sheet vinyl flooring. The floor and ceiling need to be extended to engage the replacement south wall (the ceiling also requires leveling). A thimble for a wood burning stove exists in the SW corner of the room, and broken fragments of the original brick wall used to expand the space (pre-1884) is visible next to the thimble.

Bath (105) – All walls of this space are painted / papered Celotex, and the ceiling is painted Celotex. Painted Masonite wainscot surrounds the entire room. The floor is finished with 8x8 vinyl tile and may contain asbestos. An access hole has been cut into the center of the floor and allows access to the earthen pit used to service water lines below. Research reveals that a municipal water system was installed in this section of Fort Benton in 1888 (reference minutes of the city council dated may 12, 1888 and an article in the River Press dated April 14, 1888) and it is reasonable to assume that the I. G. Baker Residence would have connected to this supply. Two end-to-end closets occupy the east wall of the Bath; one served to house a water heater and was accessed from the Bathroom, and the other provided storage for the kitchen and was accessed from the kitchen side of the wall.

Private Quarters (106) – All walls within this space are original adobe. The base of the adobe walls on the west and north elevations exhibit significant deterioration and are in need of restoration. The adobe walls were plastered and painted / papered over; fragments of the plaster are still visible on the surface of the walls and can also be seen surrounding the casing of the door into the adjacent bathroom. Free floating log purlins remain at the original ceiling level and evidence of a lath and plaster finish is visible on the bottom of the logs. The underside of the elevated wood framed roof is exposed above the log purlins. The visible roof sheathing is plywood and is attributed to the 1976 restoration (although the concept of plywood has existed for centuries it was not produced commercially until the late 1920's). There is a single window centered on the north wall of this space that includes a contemporary metal security grille affixed to the interior. The space between the original sod covered roof and the newer wood framed roof along the east side of the space has not been enclosed.

Storage / Vault (107) – The finish of the walls is Celotex that has been wallpapered and / or painted. The ceiling is similarly finished with painted Celotex. Rising damp is visible at the base of the walls and will require remediation. The exit door to the north is protected on the interior with a contemporary metal security grille, and the floor is concrete covered with resilient sheet vinyl flooring.

Storage (108) – All walls are surfaced with painted wood boards; the north wall utilizes various widths of drop siding, the east wall is beveled wood siding, and the west wall is T&G 1x6. The ceiling is also T&G wood with some areas utilizing bead pattern wood boards. The floor in this space is concrete with resilient sheet vinyl flooring.

Rear Vestibule (109) – The west wall of this space is similar to the kitchen with a Celotex substrate and wallpaper covering; the wall features random painted vertical wood trims that 'panelize' the surface. Remaining walls are T&G 1x6. The ceiling is also painted T&G 1x6 and the floor is concrete covered with resilient sheet vinyl flooring.

Porch – The porch was reconstructed in 1976 to reflect the original design. It is an open sided portico supported by (4) equally spaced plain wooden columns across the front which in turn support a low-slope shed roof that is attached to the east wall of the house. The columns are constructed with flat painted boards and are hollow. The roof is covered with roll roofing with a white / grey mineral surface and the underside (soffit) is 1x4 painted beveled wood. The flat painted wood fascia mimics the fascia on the house and visually is an extension of the primary fascia. The flooring of the porch is stained 4" nominal width beveled wood T & G decking; the decking also forms the walkway to connect the house to Front Street.

Wrought Iron Fence (site) – Fencing across the front of the property appears to have varied over time. A photograph entitled "2008-JL-135-500 EST 1900" archived in the Overholtzer collection shows a wrought iron fence that appears to be similar to the fence that exists on-site today; and a photograph entitled "Baker Hose 1930's" from the same collection shows a metal fence with predominantly vertical appointments and regularly spaced flat iron braces (that do not occur with the other design); however, the photograph is poor quality and details cannot be confirmed. Another photo from that same collection that is entitled "Baker House before 1908" captures a decorative appointed wooden fence, and other photographs during the 1930 – 1950 period show a variety of wooden low-height picket fences. All post 1973 photographs show the wrought iron decorative fence that currently exists on-site. On April 29, 1970 the River Press published a request from the Community Improvement Association stating that they "would like to secure an old iron picket fence for the street front to the old McLeish home beside the Chouteau House" suggesting that the fence is not original; however the existing fence is appropriate to the period of the circa 1870's work done to the house.

Additional detailed information about the materials described above can be found within the "Materials and Sources" section of this report.

BUILDING MATERIALS AT THE I. G. BAKER RESIDENCE

GENERAL

Adobe and Lumber materials used in the construction of the I. G. Baker Residence were of local origin. Labor in the production of these materials largely fell to the trappers, traders, and laborers in the employ of I. G. Baker; clearly there were skills available during the construction, as the laying of the adobe brick was accomplished to result in plumb and straight walls. Carpentry skills exhibited in the original construction was characteristically rough and focused on creating fundamental shelter in a pioneer environment. Materials that were not available locally were imported, arriving at the project site VIA steamboats delivering materials to the levees at Fort Benton.

The descriptions of adobe materials, lumber, sheet metal, Celotex, and Masonite are expanded within this report. In addition to the materials noted above there are other materials that warrant comment, as described in subsequent paragraphs. Selected contemporary materials that have been introduced into the residence that will not be preserved or replaced are not included with this discussion, for brevity.

EXTERIOR MATERIALS

Roofing – The written description of the house within the National Register Nomination states that the roofing on the original 2 room footprint of the house was sod. The Sanborn maps dated 1884, 1888, 1902, 1910, and 1920 all indicate that the roof surfacing was tin; and tin roofing is visible on the earliest historic photos of the house. The change in roof surfacing from sod to tin is attributed to have occurred when the roof profile was changed. The date of this change is undocumented but has been previously attributed to the 1870's renovations. Photos of the residence taken during the period of 1940's to 1973 show the roof surfacing had been changed from tin to composition shingles. The current roof is surfaced with wood cedar shingles that were applied during the 1973-76 restoration. It is recommended that the roofing be returned to tin as the material that was used during the period of significance, and is documented.

The soffit and fascia surrounding the roof were replaced during the 1973-76 restoration with in-kind materials and treatments. They consist of plain flat painted wood board assemblies.

Roof Drainage – The gutter and downspout system that is currently visible along the East side of the house consists of a 'K' style gutter and accessory downspout assembly. This system is attributed to the restoration work of 1973-76; it is recommended that the system be replaced with hanging half round gutters that are period appropriate. (also refer to section "sheet metal" contained in this report).

Siding – Siding that is currently on the E, S, & N walls of the residence consists of beveled 1x6 cedar siding that was installed during the 1973-76 restoration project. Although a specific date could not be found as to when the adobe structure was first sided with wood siding, it is believed to have occurred at the time that the roof profile was altered. It has been documented that sawmills were in the area by 1864; however, the production of bevel siding is related to the invention of the steam powered bandsaw so it is likely that the siding was imported by steamboat to the site of the house. Comparing photographs throughout the history of the home suggests that the pattern of siding has remained the same over time and it is recommended that the current materials be retained. It is further recommended that the tin corners be removed and corner boards be installed to restore the historic appearance, and in accordance with the 1973 restoration drawings. Siding on the west wall of the residence is primarily drop siding and may have been salvaged from earlier applications or additions to the residence. It is older than the bevel siding but its provenance is not known.

A section of wall at the NW corner of the house requires the addition of siding where it is missing. The door at that location also needs to be made operable at that location.

Windows – Examination of the window assemblies reveals that all windows on-site are factory produced and all appear to be of the same (or similar) vintage suggesting that windows were replaced during a major renovation or addition. It is believed that the windows date to the period of significance (1860-1890) based on the hardware style and the profiles of the mullions and muntin's. It is recommended that they be restored and retained. Restoration will require paint removal (LBP) and reglazing.

Glass within the windows exhibits various dates of manufacture; there are a few panes of pre-float glass remaining in some windows and panes of post-float glass in others. It is recommended that all panes be returned to pre-float historic glass. Evidence of crown glass or early broad glass was not observed.

Concrete – All concrete at the property post-dates the period of significance, and some elements are of relatively recent origin. The perimeter foundation backing / buttress wall at the East, South, and North sides of the structure were added in the 1973-76 restoration, the concrete apron at the rear entrance is attributed to post 1900 work as is the concrete floor of the west vestibule and storage rooms, and the concrete mow strip along the west wall is also believed to be post 1900. The newer grade beam under the kitchen window projection is attributed to have been constructed after the 1973-76 restoration based on review of the Jacobson – Shope construction drawings for the restoration.

Supplemental concrete work is anticipated for future restoration of the residence. The apron at the back door needs replacement (along with correction of negative drainage at this corner of the site); the mow strip along the west side of the house, although not historic, is recommended to be replaced to protect the base of the west wall; and the front access walk requires modification to eliminate the small step at the public sidewalk and provide for ADA access.

Stone - Use of stone was not observed in the construction of the I. G. Baker Residence, although it was not uncommon to fill the bottom of the trench for adobe foundation walls with rubble stone. Some of the structures built later along Front Street and Main Street in Fort Benton incorporate stone foundations or cut stone walls. Stone materials for these adjacent structures could be sandstone, or shonkinite if a harder stone was desired.

INTERIOR

Plaster – Three types of plaster were found within the house; as follows:

1. Pre-1970 plaster directly applied to the adobe walls. This application was utilized in rooms 102, 103, 106, and the east wall of 104. During the 1973-76 restoration it was removed in room 102 with the exception of the fireplace chimney; removed and replaced with a thicker application in room 103; and was removed in room 106 (although fragments remain). It continues to remain on a portion of the east wall of room 104. The exposed adobe in room 102 has been whitewashed as part of the current interpretive program for the house.

The photo at the left is of the whitewash material that was used for the 1973-76 interpretive program.

[photo: Kenneth Sievert]

2. Post -1970 plaster directly applied to the adobe walls. This application was limited to the restoration of the walls in Parlor 103. It was used on all walls with the exception of the north wall of the room that is currently unfinished. The application consisted of a skim coat of finishing plaster over a single base coat and the aggregate thickness of all coats is approx. one-half inch.

Neither the new or historic plaster that was applied directly to the adobe bonded well to the substrate and visual inspection shows it to be loose within room 103 at areas adjacent to cracks; there is also little evidence of prying or scarring in the remaining exposed adobe in rooms 102 and 106 which would indicate that removal of the plaster was not destructive to the adobe.

3. Pre – 1970 plaster applied over wood lath. This application was limited to the west wall of Kitchen / Utility room 104 and continues to remain on the center portion of the wall. The overall thickness of the plaster is relatively thin and the application may have been one-coat plaster.

Wallpaper – There are many patters of wallpaper or wallpaper fragments scattered throughout the house. Many of the patterns are attributed to the post 1900 period and can be removed.

The current pattern in Parlor 103 is also not original. However, written correspondence during the 1973-76 restoration indicates that it was a close match to original materials and, if no additional documentation is found, should remain the basis for proposed restoration work.

During inspection the west wall of the Kitchen / Utility room 104 was opened up to reveal that the wall had been furred out during the period of occupancy of the house.

Behind the furred wall (that was constructed of plaster and lath) the original wall was found and the original wall has 1st campaign wallpaper applied to it. That wallpaper should be carefully removed in a panel large enough to preserve an entire pattern and the pattern used to make reproduction wallpaper.

Wallpaper patterns (or remnants of wallpaper patterns) found within rooms 106 and 107 should be recorded photographically, and further studied for appropriateness if these spaces are to be restored to reflect the latter part of the period of significance.

Moldings and Wood Wainscot – There are very few shaped moldings within the residence. They are limited to a cornice rail in room 103, wainscot and wainscot cap in room 103, and applied moldings to the exterior of the main entrance door. Correspondence dated august 20, 1979 from John Lepley notes that the wainscot and wainscot cap were salvaged from another property in Fort Benton, and that the materials that were used match remnants of the wainscot found on site. There is no description of the cornice rail so it is unknown if this is an in-kind profile; however, it is period appropriate and there is no reason to not continue use of the profile. The entrance door is remarkable, dates (based on style) to the late 1800's, and is appropriate for continued use; it is not known if it is original to the I. G. Baker residence.

Wood Flooring – The most extensive flooring within the residence is Tongue & Groove fir flooring (nominal 3-1/2" width). It is found in rooms 101, 102, 104, and 106. Matched flooring was produced after the application of steam power within industrial settings and became common in the last half of the nineteenth century. Prior to that a tongue and groove profile would have been created with hand molding planes. The material at the I. G. Baker residence is machined, and it is likely that this material was imported by steamboat and its application to the house is attributed to the 1870's renovations that occurred. Room 104 (South Parlor) has plank flooring that is now covered by carpet. Plank flooring would be the most typical floor treatment at the time of original construction (1867) and matched flooring would be period appropriate toward the latter part of the period of significance.

It should be noted that carpet during the period of significance would have been limited to expensive woven woolen carpets; it should be further noted that, because of the increased use of matched flooring, floor treatments in the latter part of the nineteenth century were gravitating to exposed hardwood floors with smaller accent carpets. The carpeting within this specific room is exhibiting significant wrinkling and one consideration would be to adopt more exposed wood along with accent carpets in this space, including covering of the planks with finish flooring.

Doors – With the exception of the door into the Bathroom 105, the door accessing the water heater closet, and the aluminum sliding door within the viewing area, all doors within the house are period appropriate. Doors used at this period of time would typically be rail and stile doors as the ability to create wide boards was limited to the diameter of available trees, and the processes of creating

plywood and peeling logs had not yet been perfected. Doweled assemblies were possible and used on occasion, but planar doors made in this manner were very expensive and not commonly used in the area.

The screen door accessing the rear entrance is attributed to being a contemporary door; however, the pattern and style is fitting to the style of the house. It is recommended that the horizontal panel half-lite rear entrance door be replaced with a 2 over 2 rail and style pattern to be consistent with the remainder of the house.

Two doors at the site are worthy of further discussion. The main entrance door (see comments under molding) is unique and elegant and features a pair of glass lites in the upper half of the door. The communicating door between Parlor 103 and the Kitchen is also notable because of its extreme width and the use of true beveled panels within the pattern.

The door serving room 107 and that accesses the NW corner of the house requires restoration and removal of the security panel at the interior if it is to be viewed by the public. (see also comments under 'siding').

It is recommended that another solution be explored for the aluminum sliding door within the viewing area, due to the visual intrusion into the historic character of the house.

Fireplace(s) - The central adobe fireplace that features fire chambers on both the north and south sides is original to 1867; and it is an essential element to understanding the history of the residence as well as conditions at the fur trading post at that time. The steel lintels above the fire chamber openings are of interest and reflect a character that speaks to adaptive use of available material rather than standardized rolled steel shapes. It is not recommended that this element be restored to a "like new" condition but that the current presentation be continued that includes imperfections in the plaster coating of the chimney and exhibits wear of the adobe and brick masonry; however, stabilization of these materials will be required. It is recommended to clean the exterior and the firepit taking care to retain the 'blackened' back walls of the fire pit. The brick in the bottom of the firepit may have been added after 1867 and may not be firebrick; however, it would be appropriate for 1870 and if locally produced during the era when Fort Benton produced brick it should remain.

The shaped marble fireplace in Parlor 103 is believed to have been imported from the 'states' and is attributed to the 1870's renovations to the property. Stylistically, the fireplace would fit nicely into a Regency (British) or Federal (American) architectural home; the presentation is simple, straightforward, and restrained. Provenance of the marble stone is not known; likely sources of domestic materials that were being produced at that time could be from quarries in Vermont or Georgia, although active quarries existed in New York, Tennessee, and (by the 1870's) Colorado. There was also an area describing a geological deposit of marble that stretches along the borders between New York state and the western borders of Connecticut, Massachusetts and Vermont called the "Marble Border" that was widely used in the early 1800's[1]. If the source of the stone was foreign, a likely source would be an Italian quarry. The fireplace is in extremely poor condition and will require extensive re-setting of the stone and related glazed tile that finishes the surfaces within the surround and also covers the hearth. The poor condition is primarily from displacement of the wall and, fortunately, the stonework can be salvaged.

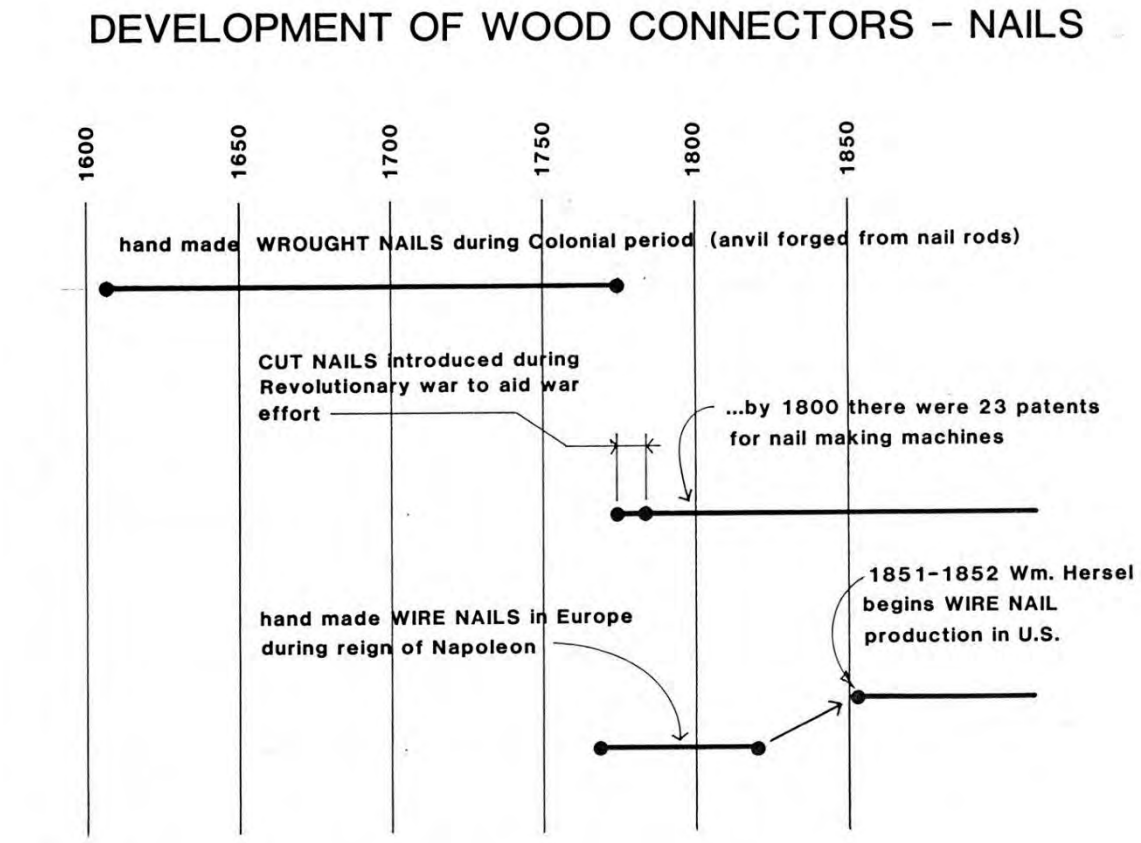
The insert at the marble fireplace is a "Buckeye – 035 – 20". The insert may have been made by Peerless and marketed under the tradename of Buckeye; a search of internet sources did not reveal further information about the history or availability of the insert. The insert is in relatively good condition and can be re-used with cleaning.

[1] The Lustrous Stone; White Marble in America, 1780 – 1860; Elise Madeleine Ciregna; U Deleware Thesis; 2015; pp. 39

Hardware – The extent of visual hardware related to doors is very limited within the residence. There are (12) openings in total at the house; (5) are operable and have hardware, (1) is inoperable at the NW entrance, (1) is a contemporary sliding door, and the remaining (5) openings are without a door. Of the five doors with hardware, three are recommended to remain and the existing hardware can continue in use although it requires cleaning and lubrication. The inoperable NW exit door can be fitted with hardware from restoration supply houses that specialize in period appropriate mechanisms. Hardware needs to be cleaned of overpainting, particularly the hinges.

Generally, window hardware is original to the (6) in-situ windows and is suitable for continued use. It requires cleaning, paint removal, and lubrication as noted for the doors above. The security grille over the north window serving room 106 should be removed if the space is opened to public viewing.

Connectors – A variety of nail types occur at the I. G. Baker Residence and they include everything from connectors used in the original construction through contemporary nails used for recent repairs. It is not recommended that newer connectors be replaced with historic connector types in a search for authenticity unless they occur in a highly visible location. A timeline of nails is included for reference by reviewers.



Replacement screws or bolts should reflect the time period accurately; square or carriage bolts at bolted connections, and flat blade screws at hinges etc.

Plexiglass – The use of plexiglass as a surround of the public viewing area can have detrimental effects on any artifacts in the adjoining parlors. The following quote summarizes the concern:

> *…. Can off gas harmful pollutants- Newer fabrication techniques such as extruded and melt cast (a fancy name for extruded) add plasticizers that off gas and harm your exhibits. Standard extruded acrylic will often fail an Oddy test. In many instances there is no way to tell if acrylic is cast or extruded. Because of this NARA (the National Archive and Records Administration, which is in charge of protecting documents like the declaration of Independence and Presidential libraries) has removed acrylic from its acceptable materials list*[2]*.*

If the viewing area is expected to remain on-site long term, then replacement of the plexiglass should be considered to protect the exhibits within the rooms. Ultimately, if the entire house is opened to the public (long term recommended goal) the material would be removed. Other factors that limit the practicality of plexiglass include the propensity to scratch easily, cloud with constant cleaning, and exhibit crazing and surface defects.

Furnishings – Related to the discussion of exhibits in the preceding paragraph, opening the spaces to greater public access raises additional security concerns. An inventory of all artifacts needs to be created and maintained, more extensive use of security cameras is implied, and use of reproduction artifacts of very valuable artifacts (the piano as an example) may be necessary.

Porch – The porch was replaced in its entirety during the 1973-76 restoration. The restoration faithfully reconstructed the original pattern and it is recommended that the porch continue in use without further modification. Comments regarding the roofing and the roof drainage system outlined above also apply to the porch.

Fence – A handsome wrought iron fence adorns the east side of the building lot, fronting on the street and levee. It is not original but is period appropriate and it is recommended that it remain. Minor repair and realignment will be required.

Mechanical – There are no heating or ventilating appliances contained within the house and it is recommended that the visible plumbing be removed along with the bathroom by the proposed restoration. There is a need to provide ventilation of the underfloor spaces to facilitate stabilization of moisture beneath the wooden floor assemblies. This is envisioned as being accomplished by the installation of period appropriate and discrete floor grilles at selected locations.

Electrical – An independent study of electrical systems was conducted for the I. G. Baker Residence and reviewers are directed to that report (attached).

[2] http://museumdisplaycase.com; pp.3

BUILDING MATERIALS AT THE I. G. BAKER RESIDENCE

ADOBE

INGREDIENTS
The typical ingredients for adobe are sand, clay, and an organic binder (grass, straw, etc.). Samples of the adobe used at the I. G. Baker Residence were taken, examined, and a 'mason jar' ingredients test is in the process of being conducted to approximate the composition of the materials used to make the adobes.

An adobe mixture with too much clay produces too many shrinkage cracks. A mixture that is too sandy crumbles easily. Straw, the third ingredient, doesn't add strength but binds the adobe together and allows it to shrink without cracking.

Contemporary adobe mixes may contain a small percentage of cement or asphalt to improve the structural performance and wall surface durability. The admixtures speed up the brick making process because of shorter curing times, and also have better resistance to water in regions with rainy climates.

STRENGTH
The strength of adobe brick masonry is provided for in the building codes, as unreinforced masonry. Selected excerpts from the 2015 IBC are repeated herein for reference.

> *CHAPTER 2 - DEFINITIONS*
> *ADOBE CONSTRUCTION. Construction in which the exterior load-bearing and nonloadbearing walls and partitions are of unfired clay masonry units, and floors, roofs and interior framing are wholly or partly of wood or other approved materials.*
> *Adobe, stabilized. Unfired clay masonry units to which admixtures, such as emulsified asphalt, are added during the manufacturing process to limit the units' water absorption so as to increase their durability.*
> *Adobe, unstabilized. Unfired clay masonry units that do not meet the definition of "Adobe, stabilized."*

The adobe at the I. G. Baker house would be classified as unstabilized adobe.

> *2109.3 Adobe construction.*
> *Adobe construction shall comply with this section and shall be subject to the requirements of this code for Type V construction ……*
> *2109.3.1 Unstabilized adobe ……...*
> *2109.3.1.1 Compressive strength.*
> *Adobe units shall have an average compressive strength of 300 psi when tested in accordance with ASTM C 67. Five samples shall be tested and no individual unit is permitted to have a compressive strength of less than 250 psi .*

2109.3.1.2 Modulus of rupture.
Adobe units shall have an average modulus of rupture of 50 psi when tested …… Five samples shall be tested and no individual unit shall have a modulus of rupture of less than 35 psi.

2109.3.4.1 Number of stories.
Adobe construction shall be limited to buildings not exceeding one story, except that two-story construction is allowed when designed by a registered design professional.

2109.3.4.4 Wall thickness.
The minimum thickness of exterior walls in one-story buildings shall be 10 inches. The walls shall be laterally supported at intervals not exceeding 24 feet. The minimum thickness of interior load-bearing walls shall be 8 inches. In no case shall the unsupported height of any wall constructed of adobe units exceed 10 times the thickness of such wall.

2109.3.4.5.1 Foundation support.
Walls and partitions constructed of adobe units shall be supported by foundations or footings that extend not less than 6 inches above adjacent ground surfaces and are constructed of solid masonry (excluding adobe) or concrete. Footings and foundations shall comply with Chapter 18.

2109.3.4.5.2 Lower course requirements.
Stabilized adobe units shall be used in adobe walls for the first 4 inches above the finished first-floor elevation.

By current standards, adobe could not be used for foundation walls. This requirement underscores the need to protect the existing adobe foundations.

Adobe is a notoriously poor performer when subjected to lateral loading, either from wind or seismic events. Significant loss of life has occurred around the globe in recent history from failure of adobe structures when impacted by earthquakes. As a consequence, the allowable stresses permitted for this material are very low and, although Fort Benton is in a moderate-to-low earthquake hazard zone, this behavior must be considered for the long-term preservation of the structure.

Adobe materials used for the I. G. Baker Residence are attributed as being gathered from on-site materials, or nearby sites. The bluffs, cut-banks, and coulees in the immediate area would contain soil materials suitable for making adobe brick. The authors of this report were advised that there was an adobe pit at the 900 Block of Franklin Street that was believed to have been the source of adobe for the Fort and likely also the I. G. Baker Residence.[1]
All of the shallow foundations and bearing walls of the house were constructed with adobe brick. There are references in the written record regarding when the adobe brick was made for the Fort structures, but documentation regarding the manufacture of adobe brick for the house, or the location of the ingredients, was not found during the preparation of this report.

[1] Personal communication: Dave Parchen; April 23, 2019

BUILDING MATERIALS AT THE I. G. BAKER RESIDENCE

LUMBER

There are selected references in the written record regarding the availability of lumber in the area that relate to the roof structure of the I. G. Baker residence; as follows:

From the JAN 1ST 1883 New Year's Edition of 'THE BENTON RECORD'
(on file at the Mansfield Library U-M)

Excerpt from the Introductory paragraph:
OLD FORT BENTON'; … we have in our possession a journal of daily incidents at Fort Benton, commencing the 28th day of September (1854), a few of which we quote below will show the uneventful sort of life that was passed on this spot in the service of the American Fur Company.

Excerpts from paragraph entitled 'DIARY OF THE OLD FORT';
Monday, Oct. 9 (1854) - Very hard frost last night, but a clear morning, and towards noon it was warm enough to commence work again on our adobes. Started nine men with double yoke of oxen and wagon to the mountain for eighty logs for building purposes.

Nov. 4 (1854) - We have received forty logs from the mountains.

Excerpt from paragraph entitled 'INVESTMENT FOR CAPITAL' ….. with timber in quantity, and within reasonable distance from the principal markets, lumber mills, properly conducted, cannot fail to give profitable return to capital, especially in view of our ever-increasing demand for building material.

From a booklet entitled 'OLD FORT BENTON, WHAT IT WAS, AND HOW IT CAME TO BE'
Author: Bell, W. S. (William S.), 1832-
Available at University of Montana—Missoula; Mansfield Library
Original Publication - 1909

pp. 9 - material for both the building and the stockade (for the original Fort Lewis) were found in the cottonwood trees growing near the site chosen (approx. 5 miles upstream from the current town of Fort Benton).

pp. 13 - Looking southward from the fort the Highwood Mountains, some twelve miles distant, an isolated range about thirty miles long, were plainly visible.

Excerpts from 'CONTRIBUTIONS TO THE HISTORICAL SOCIETY OF MONTANA'.
VOLUME III; 1900

pp. 252 (1846) - Major Culbertson resolved upon attempting the construction of a keel-boat. He consulted with his carpenter, Charles Rondin, as to its feasibility, who expressed a willingness to at least attempt it; and proceeded to range the Highwood Mountains for timber suited to his purpose.

pp. 281 (1862) …. the Labarges, had come prepared with material for the establishment of a rival post at Fort Benton under the firm of Labarge, Harkness & Jallard. They had brought a steam sawmill, which was speedily erected and at work cutting timber for the new post, being the first sawmill and the first steam engine erected within the limits of Montana.

pp. 285 (1864) - Fort Labarge with all its appurtenances, including the sawmill and a considerable quantity of peltries was attached and sold at Sheriff's sale the following summer. The Fort was purchased by the American Fur Company, while the sawmill was knocked down to a bidder, from the mining regions, whither it was carried.*

The references to mountains in the above quotes do not specifically identify a location where timber was obtained; as a consequence, written documentation from the Lewis and Clark expedition was briefly reviewed to see if there were annotations about visible forests and mountains from the Fort Benton area in the various journals. The following excerpt from Sergeant Ordway's journal is typical of what was recorded by the expedition (original spelling, grammar, and syntax has been retained):

> *Saturday 8th June 1805. Some cloudy. the wind blew cold from the N. W. Several men went out from Camp to hunt— about 9 oClock A. M. cleared off pleasant. the Indian goods &.C. put out to air. we Saw the high Mountains to the West. our Camp covered with Snow the greater part of which has fell within a fiew days. the South fork of the Missourie is high & of a yallow coulour. the N. fork is more white than common owing as we expect to the late rain which has melted the Snow on the mountains. about 3 oClock P. M. Capt. Lewis & his party returned to Camp, & Informed us that they had walked through high plains for about 60 miles up the north fork. they found that it holds its bigness, & depth of water bottoms of timber which is covered with game. they killed a nomber of buffalow, 16 Deer 6 Elk & a brarow. they Saw a range of Mountains [4] to the South of them. Capt. Lewis think that the N. fork bears too far north for our course for if we Should take the wrong fork we Should have much further to go by land & more mountains to cross to git over the Columbia River which descends to the western ocean. So our Captains conclude to assend the South fork and burry Some articles which we can do without & leave the largest perogue. they named the North fork River Mariah and the middle or little River named Tanzey River .*

Footnote [4] identifies the range of mountains as the Highwood's.
Source: https://lewisandclarkjournals.unl.edu/item/lc.jrn.1805-06-08#ln15060804

Other than river-bottom Cottonwood, and based on review of published USGS and USFS maps, as well as the quotes above, the nearest source of log building materials would be from the Highwood Mountains.

The USDA – Forest Service publications of the Highwood Mountains (now a part of the Lewis and Clark National Forest - Region 1) that includes this area lists Douglas Fir and Ponderosa Pine as the dominant tree species with a variety of other species contributing to the remainder of the forest.[1] Although stronger, Douglas Fir is more difficult to mill than Ponderosa Pine and the larger and straighter timbers from Ponderosa Pine could be harvested with greater productivity. In addition, the Ponderosa species occupies the lower edges of the forest whereas the zone for Douglas Fir occurs at a higher elevation on the slopes of the mountains which would require more effort during harvesting. Visual inspection of exposed framing members at the I. G. Baker Residence suggests that the structural members were produced from **Douglas Fir**. The larger boards used for roof sheathing are believed to be Ponderosa Pine due to their large size. Properties and characteristics for both Douglas-Fir and Ponderosa Pine are included in appendices at the end of this report.

[1] Forest Regions of Montana; USDA Forest Service Research Paper INT-218; Stephen F. Arno; April 1979

SHEET METAL MATERIALS

Gutters:

As of this writing, it is not known when metal gutters were incorporated around the roof of the I. G. Baker Residence. What is known is that the style of gutters currently on the house are of recent origin and are not period-appropriate for the landmark house. The following excerpts from **'MAINTAINING THE GUTTERS ON YOUR HISTORIC HOUSE'; Wisconsin Historical Society, 816 State Street, Madison, WI 53706** are pertinent to the history of metal rain gutters:

> *"If your historic house originally had gutters, they were most likely metal hanging gutters. Metal hanging gutters were available throughout the last half of the 19th century right up to 1940. Hanging metal gutters are one of two main types: half-round gutters and K-style gutters.*
>
> *K-style gutters were invented in the 1940s and became the standard gutter we use today".*

(The invention of metal rolling machines in the 19th century is attributed to the technology that led to the manufacture of half-round steel gutters.)

A review of numerous articles and websites indicates that although the dates attributed to the manufacture of gutters may vary from those cited by the Wisconsin Historical Society quoted above, all references consulted agree that metal hanging half-round gutters were in use from the latter part of the 19th century until the middle of the 20th century, and 'K' style gutters entered the marketplace sometime between 1940 and 1960. In conclusion, the 'K' style gutters should be removed and replaced with half-round gutters.

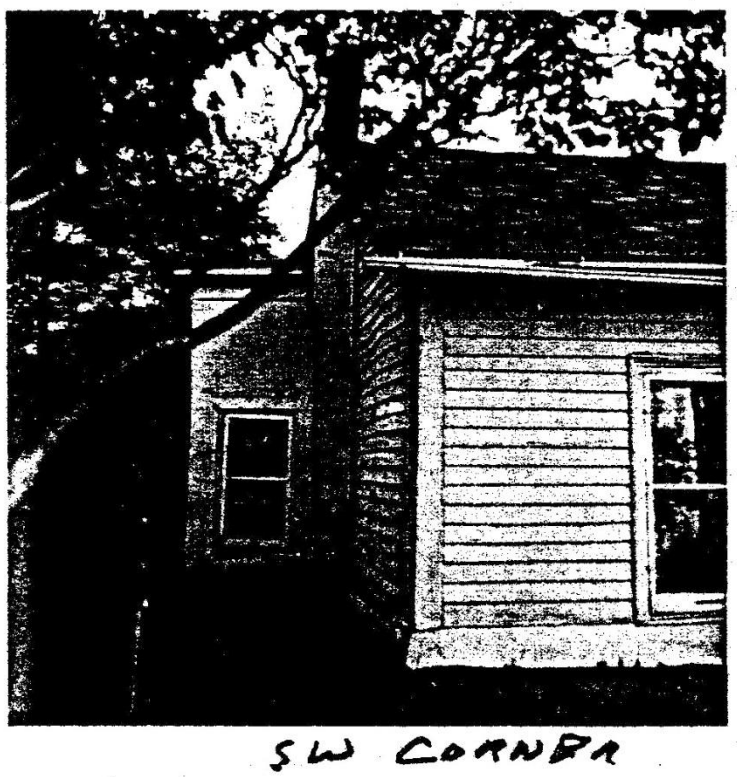
Metal Siding Corners:

A review of correspondence between Jack Lepley, Edrie Vinson (SHPO), and the State of Montana Department of Fish and Game (now FWP) indicates that wood siding was applied to the adobe structure sometime between 1870 and 1876 implying that the original appearance of the structure was of exposed adobe. For comparison, the two remaining adobe structures at Fort Shaw also exhibited exposed adobe for several years before siding was applied. The original wood siding at the I. G. Baker Residence was removed and replaced in-kind as specified on the 1973 Jacobson / Shope restoration construction documents. The siding pattern is compatible with the period of significance; however, the use of stamped metal siding corners is inconsistent with available technology in the 1870's and does not represent the original appearance or profiles. Visual observation of the siding corners suggests that they are machine produced, mass produced, and pre – punched.

Excerpts from the trade journal **'The FABRICATOR February 2019; February 8, 2019; By Steve Benson** outline the evolution of sheet metal brakes used throughout that industry.

> *The first "brake" as we know it was the cornice brake patented in 1882. It relied on a manually operated leaf that forced a clamped piece of sheet metal to be bent in a straight line. Over time these have evolved into the machines we know today as leaf brakes, box and pan brakes, and folding machines.*
> *The first powered press brakes appeared just about 100 years ago, in the early 1920s, with flywheel-driven machines. These were followed by various versions of hydromechanical and hydraulic press brakes in the 1970s and electric press brakes in the 2000s.*

Photographs attached to the Lepley correspondence show vertical wooden corner boards in lieu of the metal siding corners, and it is recommended that corner boards be applied to the residence.



Photograph extracted from Jack Lepley correspondence (1979).

BUILDING MATERIALS AT THE I. G. BAKER RESIDENCE (continued)

The following excerpt from the 1930 Sweet's Architectural Catalog describes the Celotex materials used at the I. G. Baker Residence. The material originated in 1924 in Louisiana as a by-product of the sugar cane industry, and was manufactured up until the 1980's.

CELOTEX INSULATING CANE BOARD

Manufactured by
THE CELOTEX COMPANY
919 North Michigan Avenue, CHICAGO, ILL.

MILLS: NEW ORLEANS, LA.

BRANCH SALES OFFICES
(See Telephone Books for Addresses)

ATLANTA, GA. DALLAS, TEX. DETROIT, MICH. MINNEAPOLIS, MINN. PHILADELPHIA, PA.
BOSTON, MASS. DENVER, COLO. KANSAS CITY, MO. NEW YORK, N. Y. ST. LOUIS, MO.
CLEVELAND, OHIO LOS ANGELES, CAL. SEATTLE, WASH.
LONDON, ENGLAND ANTWERP, BELGIUM SYDNEY, AUSTRALIA TOKYO, JAPAN BUENOS AIRES, ARGENTINA
MEXICO, D. F., MEXICO ROME, ITALY BERLIN, CHARLOTTENBURG, GERMANY

CANADIAN REPRESENTATIVES: ALEXANDER MURRAY & COMPANY, LTD.
MONTREAL TORONTO ST. JOHN HALIFAX WINNIPEG VANCOUVER

Products

CELOTEX STANDARD BUILDING BOARD.
CELOTEX LATH.
CELOTEX CARPET LINING.
CELOTEX LINOLEUM BASE and ¼-IN. CARPET LINING.

CELOTEX BRAND INSULATING CANE BOARD

CELOTEX ROOF INSULATION BOARD.
CELOTEX INDUSTRIAL INSULATION BOARD.
ACOUSTI-CELOTEX.
CELOTEX REFRIGERATING INSULATION BOARD.

Celotex Standard Building Board and Celotex Lath—General Information

Description and Size of Boards

Celotex is manufactured by felting or weaving strong cane fibers into boards 12 ft. wide, $\frac{7}{16}$ in. thick, and over 1000 ft. long. It is cut to standard sizes 4 ft. wide, 7, 8, 8½, 9, 9½, 10 and 12 ft. long weighing approximately 60 lb. per hundred sq. ft. and furnished in thicknesses of $\frac{7}{16}$ and $\frac{7}{8}$ in. Celotex has a pleasing gray-brown or tan color and an attractive semismooth fabric-like texture. It combines high thermal insulating value with considerable structural strength, having ample rigidity to fulfill all structural requirements for which it is used. Its strength is derived solely from its structure as it does not contain any adhesive.

Physical Characteristics

Thermal Conductivity—The thermal conductivity of Celotex has been established by many nationally known laboratories (U. S. Bureau of Standards, Armour Institute of Technology, and others). The average conductivity established by test in these laboratories is 0.33 B.t.u. per hour, per sq. ft., per degree F., per in. thickness.

Structural Strength—Tests made by the Armour Institute of Technology, The University of Minnesota, The R. W. Hunt Company, Columbia University, and other laboratories have shown that Celotex used as sheathing in buildings provides greater bracing against distortion of the building than is obtained with horizontal wood sheathing.

Moisture Resistance—In the manufacture of Celotex the fibers are chemically treated and waterproofed so that the entire board throughout its thickness is highly water resisting.

Fire Resistance—Celotex is slow-burning. Due to its high insulating value, light weight, and the absence of open joints it retards the spread of fires.

Vermin Resistance—In the process of manufacturing Celotex, soluble contents of the fibers are completely removed, leaving no food value whatsoever for rodents or other vermin. Celotex is a sterile product.

Permanence—Cane fibers are known to be extremely durable. With the same protection accorded to other building materials, Celotex will retain its physical characteristics for the life of the building in which it is used. It is now in place in more than 250,000 buildings.

Uniformity—The manufacture of Celotex is closely controlled by chemical and physical tests. Hourly tests are made and records kept of its strength, water-resistance, and other physical characteristics. Uniform quality is maintained and improvements made from time to time.

Practicality—Celotex is made in boards that are light in weight and of size convenient to handle on the job. It is sawed and nailed like wood.

Manufacturing Facilities

Celotex is established throughout the world as a standard building material. The Company produced in 1922 some 18 million sq. ft., in 1927 about 257 million sq. ft., and its present capacity is approximately 350 million sq. ft. per year. Production increases have been made necessary by demand and the Company will increase its production to keep abreast of the demand.

Service

THE CELOTEX COMPANY maintains a large and well equipped Research, Development and Control Department. All problems of application, decoration, and new uses are handled by this department which has an experienced personnel of engineers, architects, chemists, and decorators. Details of application are tested out by this department in the laboratories, but in addition, before issuing specifications, they are tested out on a practical scale so that only reliable, well established specifications are introduced into general use.

SWEET'S

Continued on next page

MASONITE

The Masonite used in the I. G. Baker Residence is attributed to be post-1929 material as discussed below:

A product resembling Masonite (hardboard) was first made in England in 1898 by hot-pressing waste paper. Masonite was patented in 1924 in Laurel, Mississippi, by William H. Mason, who was a friend and protégé of Thomas Edison. ***Mass production started in 1929****. In the 1930s and 1940s, Masonite was used for applications including doors, roofing, walls, desktops, and canoes. It was sometimes used for house siding. Similar "tempered hardboard" is now a generic product made by many forest product companies.*

[Wikipedia, the free encyclopedia]

An excerpt from 1930 Sweet's Architectural Catalogue, insert published by Masonite Corporation, describes the application of the material as viewed a year after mass production was initiated.

MASONITE CORPORATION

Manufacturers of Masonite Structural Insulation and Presdwood

111 West Washington Street

CHICAGO, ILL.

PRODUCTS

MASONITE STRUCTURAL INSULATION.
MASONITE INSULATING LATH.

MASONITE PRESDWOOD 1/8 INCH THICK.

MASONITE QUARTERBOARD.
MASONITE PRESDWOOD 3/16 INCH THICK.

INDEX

MASONITE

Its Manufacture and Adaptability

Masonite is a manufactured board, made entirely of wood fibre. It retains the natural strength and composition of wood, but is so made that a high degree of insulation value is added.

In the Mason Process of producing this scientific wood product, clean wood chips are exploded under high steam pressure, so that the wood is reduced to fibre. The product thus produced consists entirely of long cellulose fibre, with their strength unimpaired and the lignins, or natural cementing structure of the wood, entirely retained. No chemicals are used; the exploding process is purely a physical one, so that there is no change in the wood except tearing it apart into natural fibres.

Because the Mason Process has succeeded in producing a long fibre of unimpaired strength without the use of chemicals, the MASONITE CORPORATION is able to fabricate a board with the natural strength and composition of wood—an achievement never before attained.

Masonite Structural Insulation, as you buy it, is simply these long fibres thoroughly felted together and pressed into board form. No binder is added to the product. The natural cementing matter of the wood being unharmed, nothing but pressure and heat is needed to form the fibres into structural board. The pressure is applied hydraulically until the required degree of density is obtained. It is possible, therefore, to fabricate Masonite in various degrees of density, suiting the formation to the service the board is to perform.

Masonite Structural Insulation is pressed to a point which gives it the proper amount of structural rigidity, but still maintains great insulating value by leaving a myriad of minute air cells in and between the fibres. As a result, this material combines structure and insulation to a degree that has heretofore been difficult to find.

Its Insulation Value

The thermal conductivity of Masonite Structural Insulation for 1-inch thickness as determined by the G. F. Gebhardt Laboratories, expressed in B.t.u.'s per hour, per square foot of surface, per degree Fahrenheit difference in temperature between the two surfaces of the material is 0.328. Tested by Prof. Frank B. Rowley, testing engineer, University of Minnesota, it was found to have a co-efficient of heat conductivity of 0.321. Both of these tests were made by the flat plate method. According to hot box tests made by Gebhardt Laboratories, the coefficient of conductivity is 0.253.

Where to Use Masonite

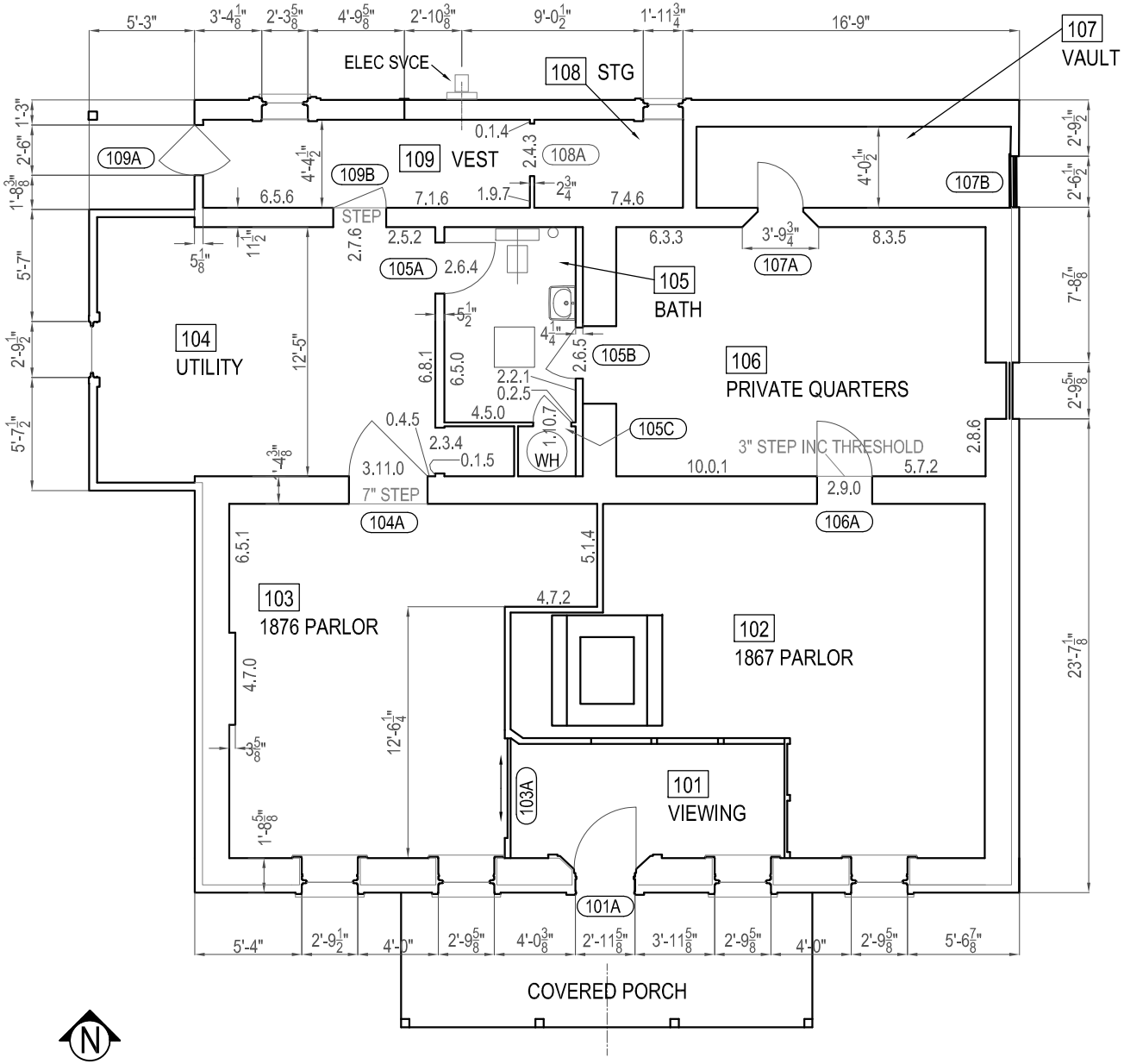
The specifications listed in the following pages indicate the great spread of uses of Masonite Structural Insulation. Probably no other building material fits such a great variety of jobs as this one. Its smooth, uniform boards, 7/16 inch thick, 4 feet wide and 8, 9, 10 or 12 feet long, and with a density of about 19 pounds per cubic foot, can be handled, sawed, cut and nailed like wood, because they are wood.

Only the most common uses are discussed in these pages, the more unusual ones being reserved for special bulletins.

Masonite as Sheathing

Probably the most common use of Masonite in building is sheathing. Under frame, brick, stone or stucco exterior walls it replaces other materials without increase in cost, but with a great increase in the value of the building. The added insulation meets every demand of the present day trend toward insulated buildings, and shows amazing results in the reduction of heating costs, additional comfort in winter and summer, and greater rigidity and strength in the structure.

Continued on next page



reference north

FLOOR PLAN

SCALE 0 1 2 4 8

LEGEND

DIMENSIONS

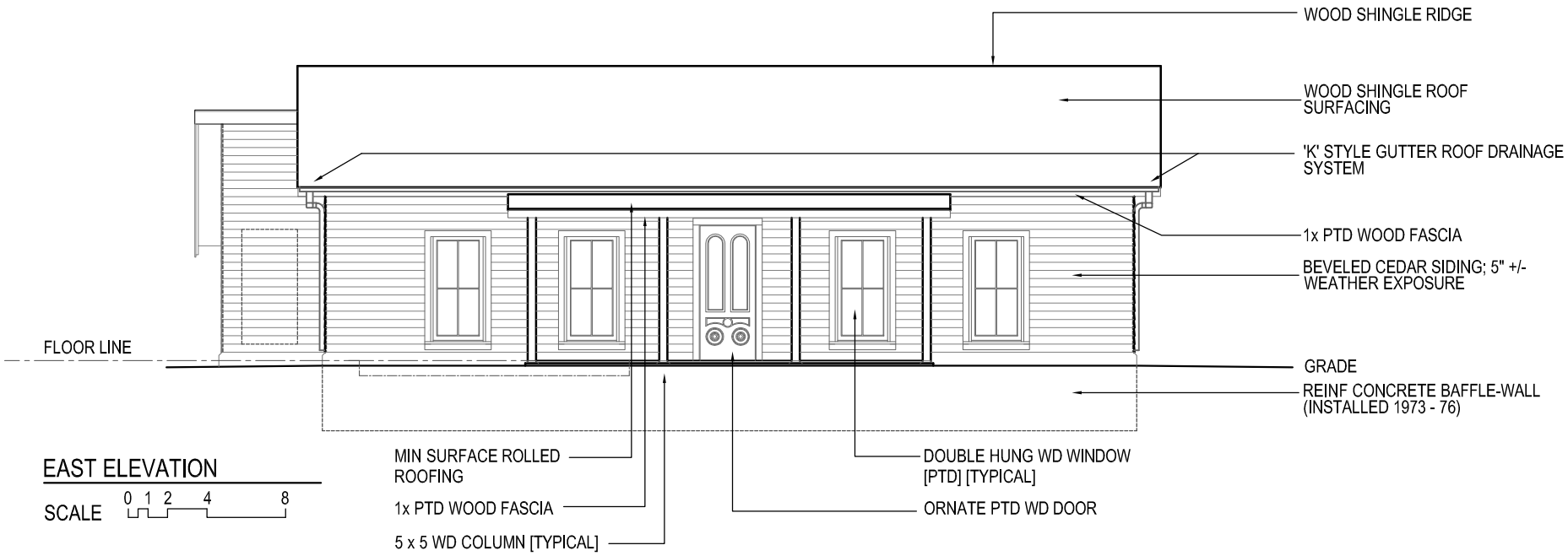
FEET
INCHES
NUMBER OF 1/8" INCREMENTS

4 : 5 : 6

4 : 5 : 6 = 4' - 5 3/4"

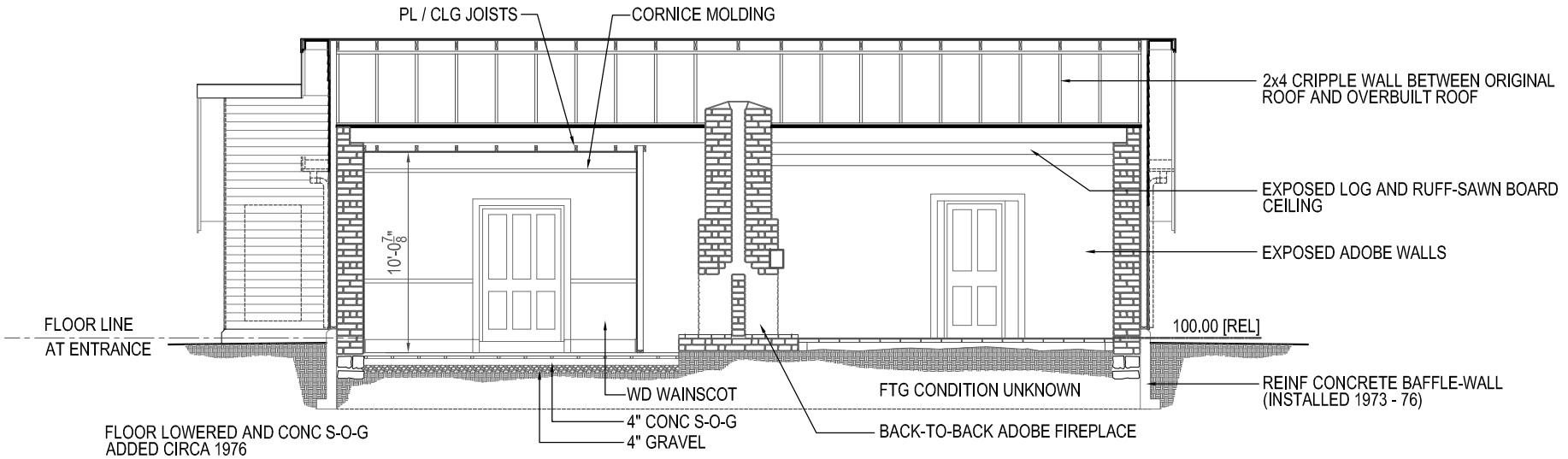
ALL DIMENSIONS SHOWN ON THIS DRAWING ARE BASED ON FIELD MEASUREMENTS TAKEN BY THE ARCHITECT. MEASUREMENTS WERE LIMITED TO HAND HELD TAPES AND OTHER DEVICES; IT WAS ASSUMED THAT WALL THICKNESSES ARE CONSISTENT AND IT IS NOT KNOWN IF THE BUILDING OR PARTS OF THE BUILDING ARE SQUARE OR PLUMB. IT IS THE RESPONSIBILITY OF ANYONE WORKING ON THE BUILDING TO VERIFY ALL DIMENSIONS SHOWN AT THE TIME MODIFICATIONS ARE MADE TO THE STRUCTURE.

sievert & sievert CRC
historic architect / architect
architectural historian
structural design



EAST ELEVATION

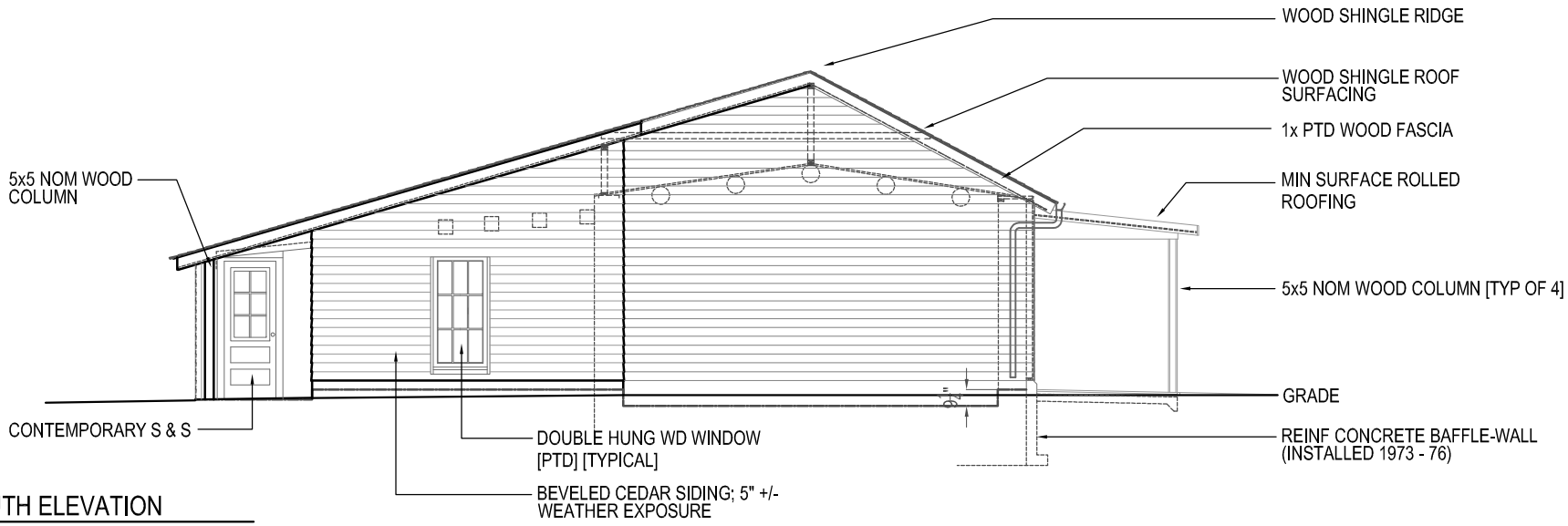
SCALE 0 1 2 4 8



LONGITUDINAL SECTION

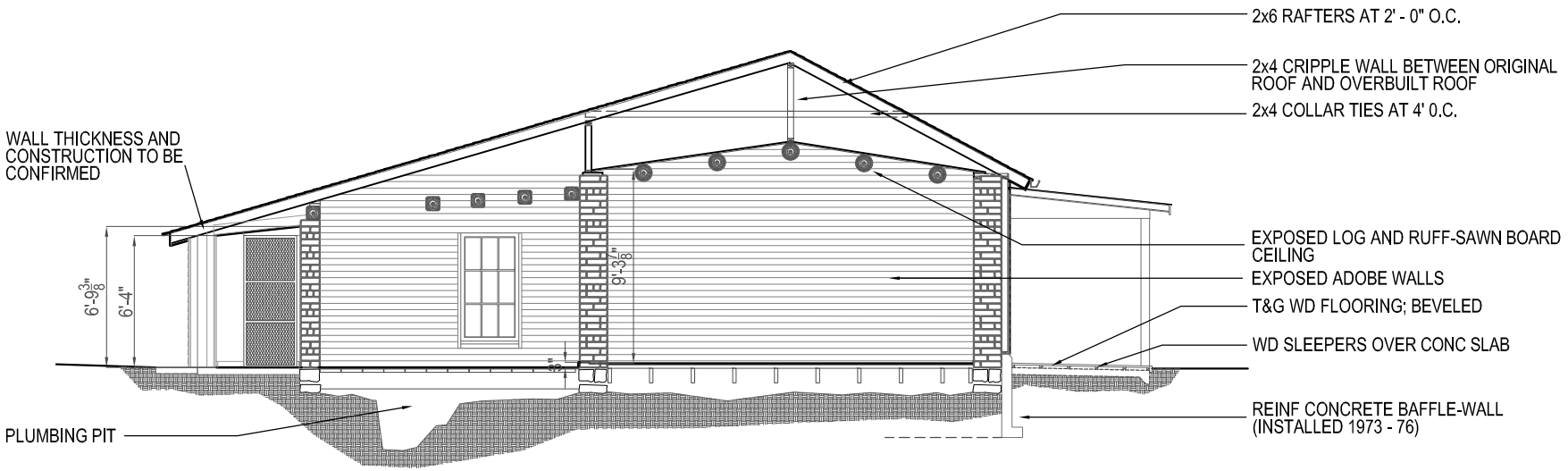
SCALE 0 1 2 4 8

sievert & sievert CRC
historic architect / architect
architectural historian
structural design



SOUTH ELEVATION

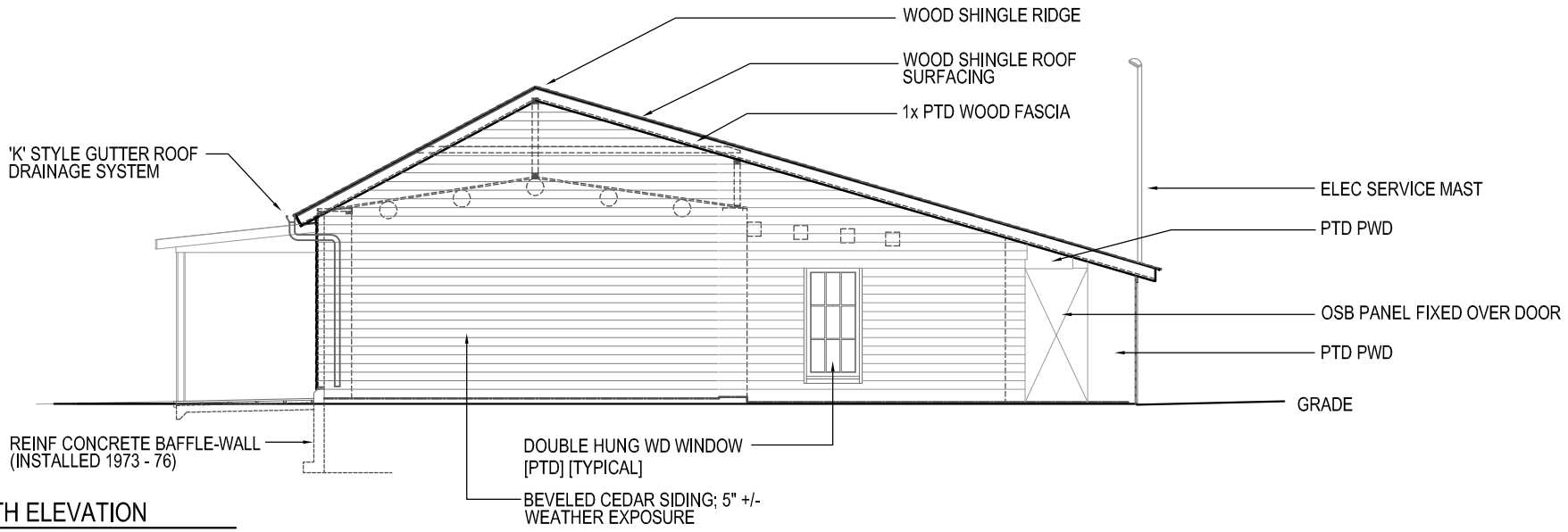
SCALE 0 1 2 4 8



TRANSVERSE SECTION

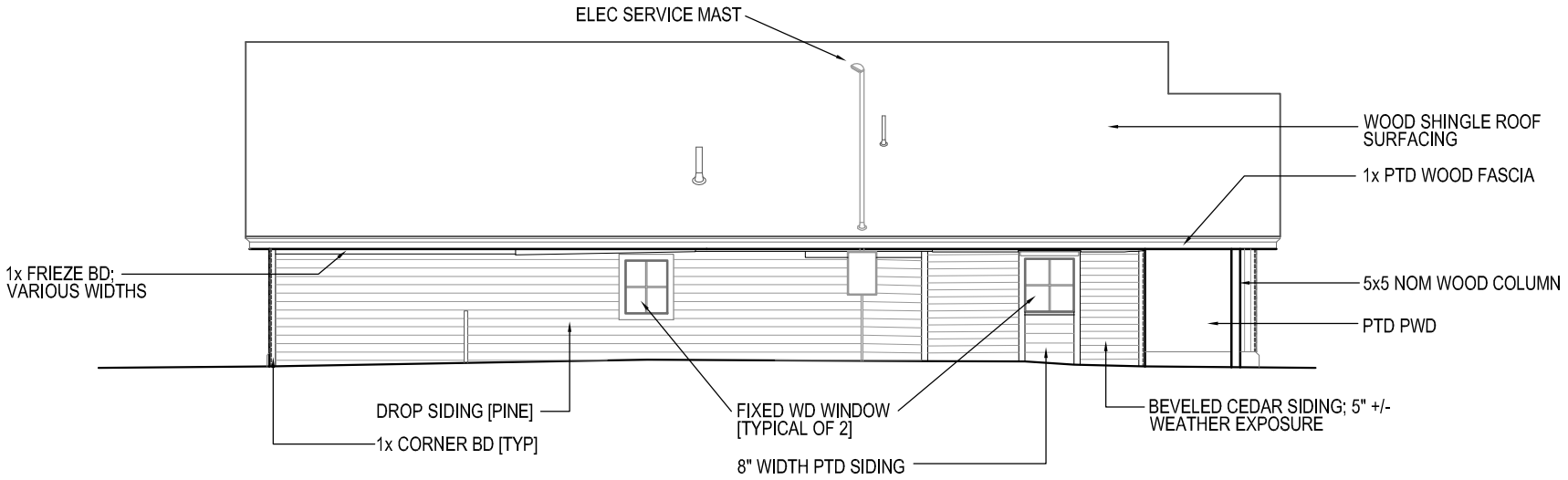
SCALE 0 1 2 4 8

sievert & sievert CRC
historic architect / architect
architectural historian
structural design



NORTH ELEVATION

SCALE 0 1 2 4 8



WEST ELEVATION

SCALE 0 1 2 4 8

sievert & sievert CRC
historic architect / architect
architectural historian
structural design

CONDITION ASSESSMENT

Building materials were assessed on site in regard to their historic significance as well as their condition. A cultural rating method and condition priority system has been used for assessing the materials within the structure and is described below:

MATERIALS CULTURAL RATING SYSTEM

1 - Historic Material - Preserve (in place)
2 - Historic Material - Preserve wherever possible; replace with in-kind
3 - Historic Material - Preserve wherever possible; replace with compatible
4 –Preserve where there is no reason for removal
5 – (Sensitively) Remove/alter/replace inappropriate materials.
6 - Specified treatment not required
7 – Mixed treatment (for composite assemblies)

Materials that are not historic but are considered to not be an adverse effect to the building are generally treated as Rating # 4. Materials where the provenance of the material could not be established may also be assigned to category # 4.

PRIORITY RATING SYSTEM (CONDITION)

1. Critical *- Requires immediate action to preserve essential historic features and materials experiencing advanced deterioration, or to assure the stability of the building, or to preclude a threat to health or safety.*

2. Serious *- Materials or assemblies are approaching an advanced state of degradation, or will soon pose a threat to health or safety.*

3. Minor *- Degradation is minimal and preventative maintenance has not been followed; life expectancy of the material is reduced. Ongoing maintenance is to be expected.*

3R Minor *– Minor degradation; however, restoration is recommended.*

4. No Action Required.

5. Replace *– remove and replace material due to condition.*

6. Mixed *– For composite assembly; some portions in poor condition.*

The rating system described above was developed by the National Park Service, specifically at Rocky Mountain National Park, and adopted for use with NPS sites at selected locations in the west in the 1970's. It combines cultural ratings with condition ratings and is intended to be used as a planning tool for the preservation of historic properties. Reviewers are advised that actions 4 through 6 of the 'condition' priority analysis have been added to the system by the author for materials that do not require any work, for new and existing materials that have deteriorated to the extent that they cannot be reused, or for elements of the building that require greater detail than is shown in the table to describe all parts of the element.

The table on the following page summarizes the cultural analysis and condition rating for the I. G. Baker Residence.

CULTURAL RATINGS AND CONDITION OF MATERIALS IN-PLACE - [ASSUMING RESTORATION TO PERIOD OF SIGNIFICANCE]

CULTURAL RATINGS	
1	HISTORIC MATERIAL; PRESERVE IN PLACE
2	HISTORIC MATERIAL; PRESERVE WHEREVER POSSIBLE; REPLACE WITH IN-KIND
3	HISTORIC MATERIAL; PRESERVE WHEREVER POSSIBLE; REPLACE WITH COMPATIBLE
4	PRESERVE WHERE THERE IS NO REASON FOR REMOVAL
5	REMOVE I ALTER I REPLACE (SENSITIVELY)
6	SPECIFIED TREATMENT NOT REQUIRED
7	MIXED TREATMENT

CONDITION OF MATERIALS	
1	CRITICAL; IMMEDIATE ACTION REQUIRED
2	SERIOUS; ACTION PENDING
3	MINOR; MAINTENANCE TO CONTINUE
3R	MINOR; RESTORATION RECOMMENDED
4	NO ACTION REQUIRED
5	TO BE REPLACED AS PART OF RESTORATION
6	MIXED CONDITION

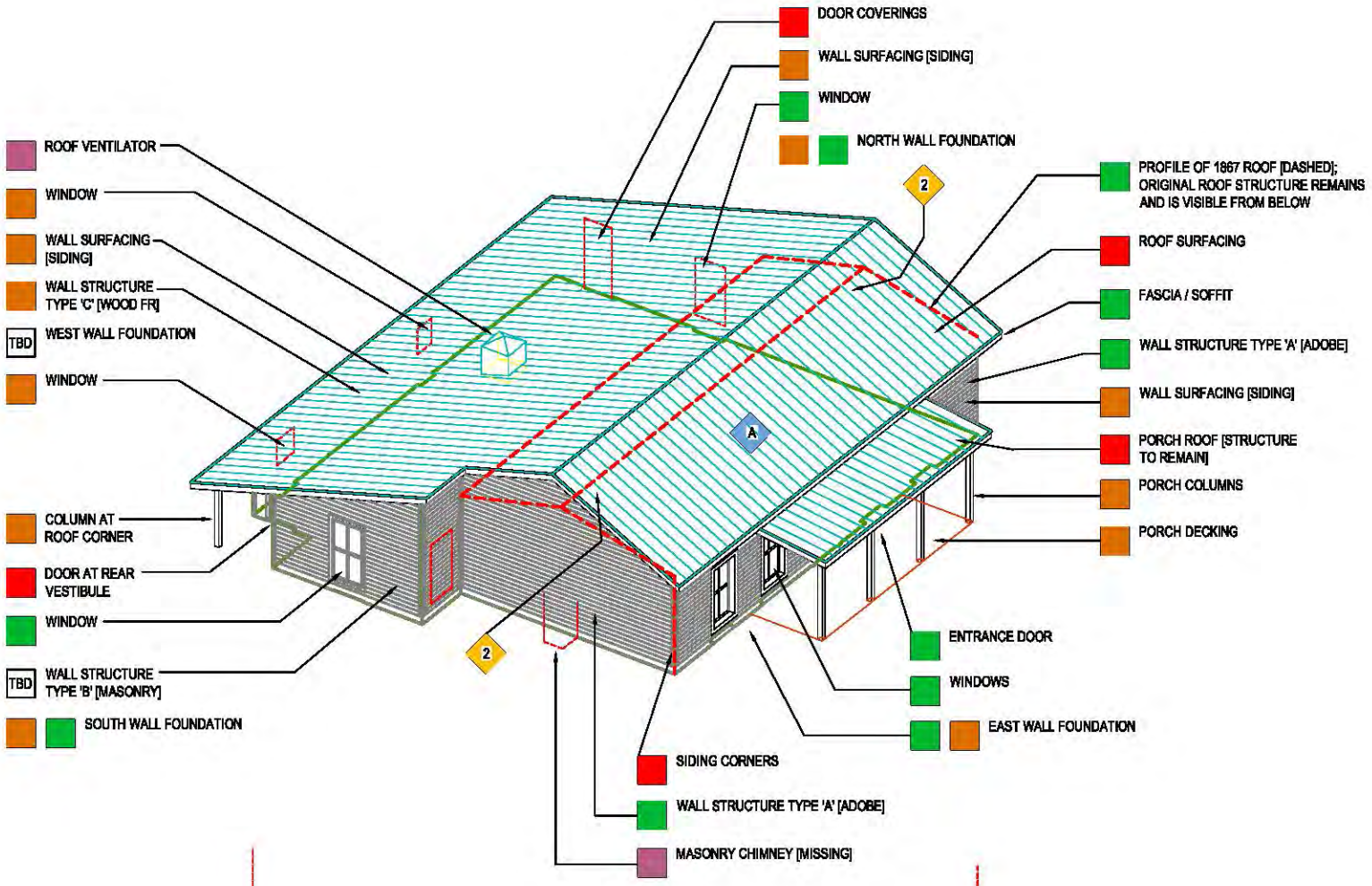
RM NO.	ROOM NAME	FLOOR						BASE			WALLS															CEILING				
											NORTH				EAST				SOUTH				WEST								
		SUBSTR / SUPPORT	DATE (ATTRIB)	FINISH	DATE (ATTRIB)	RATE	COND	MTL	RATE	COND	WALL	WNSCT	RATE	COND	WALL	WNSCT	RATE	COND	WALL	WNSCT	RATE	COND	WALL	WNSCT	RATE	COND	MATERIAL	HEIGHT	RATE	COND	REMARKS
B1	MECHANICAL PIT	EARTH	NAT	N	-	4	3	N	-	-	EARTH	-	4	3	EARTH	-	4	3	EARTH	-	4	3	EARTH	-	4	3	EWS		3	4	
101	VIEWING	S-WF	1867	WDF	1885+	4	3	N	-	-	PXG	EWS/WD	[4/5]	[5/3]	ADOBE	N	1	3	GL	N	[4/5]	[5/3]	PXG	EWS/WD	[4/5]	[5/3]	EWS	VARIES	1	3	
102	1867 PARLOR	S-WF	1867	WDF	1885+	4	3	N	-	-	ADOBE	-	1	3	ADOBE	-	1	3	MIXED	-	[1/5]	3	ADOBE	-	1	3	EWS	VARIES	1	3	Floor not from 1867 date
103	1876 PARLOR	C / WDFP	1973	CPT	1973	5	5	WD-1(P)	5	2	EWS	-	5	5	GP/WP	WDP	5	1	GP/WP	WDP	4	3	GP/WP	WDP	[4/5]	[1/5]	GP	10'-2"	4	3R	
104	KITCHEN / UTILITY	S-WF/WDF	1876	SV	UKN	5	5	WD-1(P)	5	2	GP/WP	-	5	5	MIXED	-	7	6	EWS	-	5	5	GP/WP	-	7	6	CTX	7'-0"	4	3R	
	KITCHEN CLOS	S-WF/WDF	1876	SV	UKN	5	5	QR	5	5	CTX	-	5	5	CTX	-	5	5	CTX	-	5	5	CTX	-	5	5	CTX	7'-1"	5	5	
105	BATHROOM	OSB	(CONT)	VT-8	(CONT)	5	5	QR	5	5	CTX	MS	5	5	CTX	MS	5	5	CTX	MS	5	5	CTX	MS	5	5	CTX	7'-1"	5	5	Celotex is circa 1920 material
	BATHRM CLOS	S-WF/WDF	1876	SV	UKN	5	5	QR	5	5	CTX	-	5	5	CTX	-	5	5	CTX	-	5	5	CTX	-	5	5	CTX	7'-1"	5	5	
106	PRIVATE QTRS	S-WF	1876	WDF	1885+	1	3	N	-	-	ADOBE	-	1	3	ADOBE	-	1	3	ADOBE	-	1	3	ADOBE	-	1	2	EWS	VARIES	1	3	
107	STORAGE / HALL	C	(CONT)	SV	(CONT)	5	5	WD-1(P)	4	3R	CTX	-	5	5	CTX	-	5	5	CTX	-	5	5	CTX	-	5	5	CTX	VARIES	4	5	
108	STORAGE / HALL	C	(CONT)	SV	(CONT)	[4/5]	5	N	-	-	WD	-	4	3R	WD	-	4	3R	WD	-	4	3R	WD	-	4	3R	WD	VARIES	4	3R	
109	REAR VEST	C	(CONT)	SV	(CONT)	[4/5]	5	N	-	-	GP	-	4	3R	WD	-	4	3R	CTX	-	5	5	CTX	-	5	5	WD	VARIES	4	3R	
MISCELLANEOUS AND RELATED FEATURES																														
-	PORCH	CONC	1973	WDF	1973	4	4	-	-	-	***	-	4	4	***	-	4	4	***	-	4	4	E wall house	-	-	-	WDF	1973	4	4	*** WD COLUMNS - PTD (1973)
SITE	TURF / TREES	-	VARIOUS	-	UKN	4	4&1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
SITE	AREA LIGHTING	**																													** Streetlights only
SITE	SIDEWALKS	*																													* Public walk at street (only)
SITE	APRON-BACK DR	CONC	UKN	-	-	5	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Site grading poor this area

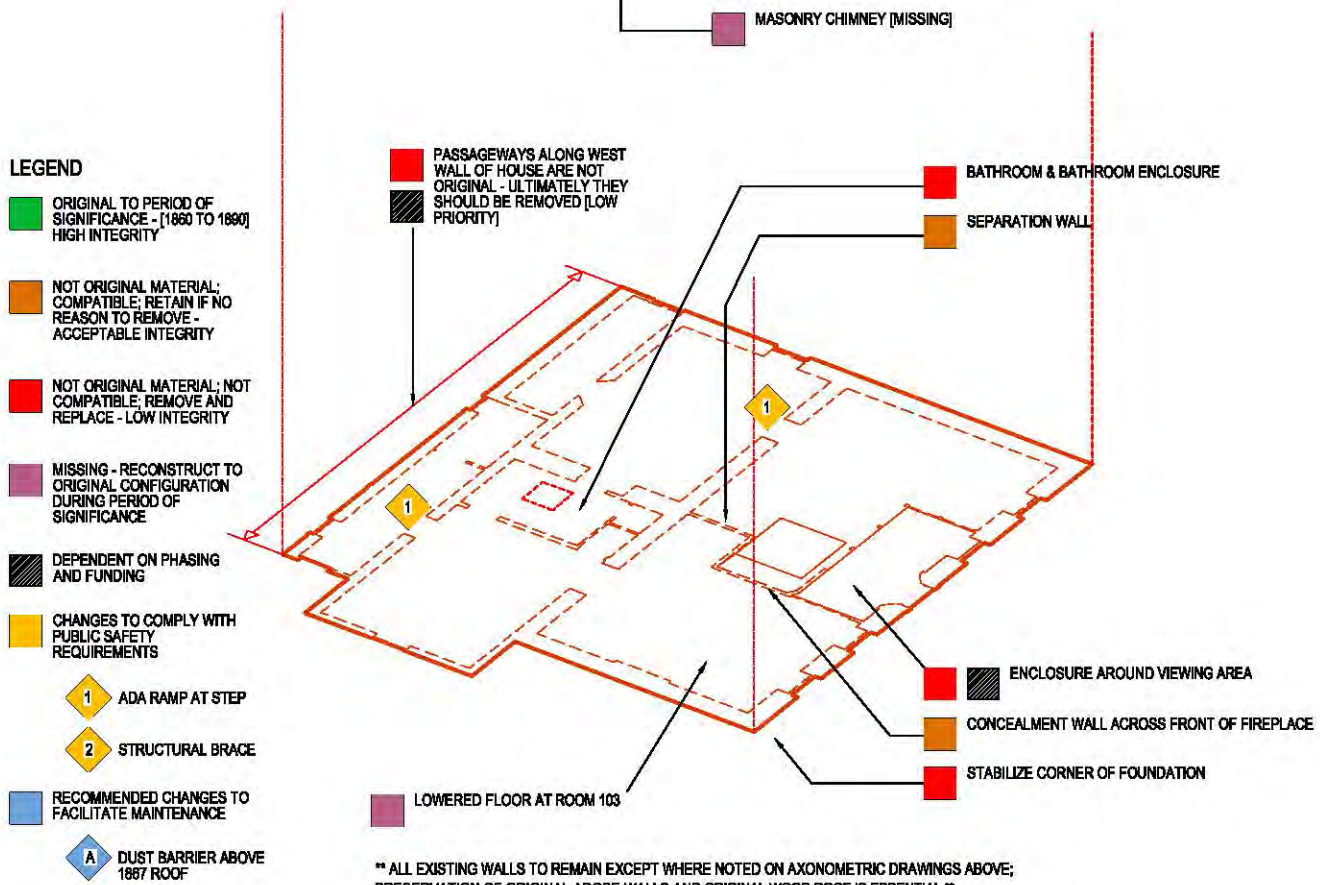
EXT		Substr	DATE (attrib)	Finish	DATE (attrib)	RATE	COND	
	ROOF	PWD	1973	WD-SH	1973	5	5	Restore ventilator; replace gutters & DS
	E. WALL	PWD	1973	Siding	1973	4	4	Remove tin corners; add corner boards
	S. WALL	PWD	1973	Siding	1973	4	4	Remove tin corners; add corner boards
	W. WALL	WD	UKN	Siding	UKN	4	4	
	N. WALL	PWD	1973	Siding	1973	4	4	Remove tin corners; add corner boards

(SEE TEXT FOR OTHER EXTERIOR MATERIALS AND THEIR RATINGS

KEY TO MATRIX FOR CULTURAL RATINGS, CONDITION RATINGS, AND MATERIALS INVENTORY.

MATERIAL ABBREVIATIONS			
ACT	ACOUSTICAL TILE	N	NONE
AWC	ACOUSTIC WALL COVERING	PL	PLASTER
BR	BRICK	PLB	PLASTER OVER PLASTER BOARD
BG	GLAZED BRICK	PNL	PANELING
BW	BEAD PATIERN FINISH WOOD	PR-MT	PRESSED METAL
C	CONCRETE	PT	PAINT
CTO	CONCRETE TOPPING	PWD	PLYWOOD
C-PT	PAINTED CONCRETE	PXG	PLEXIGLASS
CMU	CONCRETE MASONRY UNIT	QR	QUARTER ROUND
CPT	CARPET	QT-1	QUARRY TILE; PATIERN 1
CT	CERAMIC TILE	R4	4" RUBBER BASE
CT-1	CERAMIC MOSAIC TILE	R6	6"RUBBER BASE
CTX	CELOTEX	S-WF	STRUCTURE-WOOD FRAMING
E	EXISTING	SV	RESILIENT FLOORING
EARTH	EARTH W/ POLY VAPOR BARRIER	SVC	COVED RESILIENT FLOORING
EWS	EXPOSED WOOD STRUCTURE	UKN	UNKNOWN
GL	GLASS	VT-8	8 x 8 VINYL TILE
GP	GYPSUM WALLBOARD	VT-12	12 x 12 VINYL TILE
GPF	FURRED GYPSUM WALLBOARD	VWC	VINYL WALL COVERING
HDWD	HARDWOOD	WD	WOOD
IL	INLAID LINOLEUM	WD-1	1 PIECE WOOD
KC	KEENE'S CEMENT	WD-2	2PIECEWOOD
LIC	LAY-IN-CEILING (2x4)	WD-3	3-PIECE WOOD
LG	EXIST LOG – ROUND	WDP	WOOD-PATTERNED
LG-S	EXIST LOG – SQUARED (BLOCKBAU)	WD-QR	1-PIECE WOOD W/ QTR ROUND
MBL	MARBLE	WDF	T&GFIR
MFB	MINERAL FIBER BOARD	WDFP	WOOD FLOOR - PLANK
MS	MASONITE	WP	WALLPAPER; WALL COVERING
		WD-SH	WOOD SHINGLES





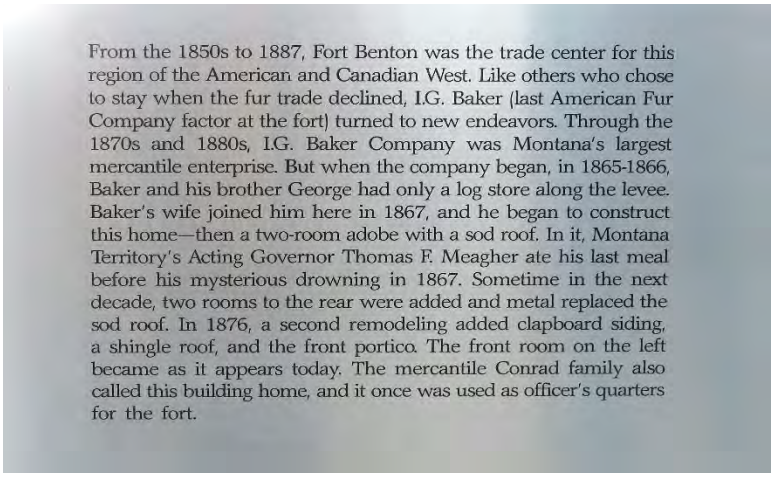
** ALL EXISTING WALLS TO REMAIN EXCEPT WHERE NOTED ON AXONOMETRIC DRAWINGS ABOVE; PRESERVATION OF ORIGINAL ADOBE WALLS AND ORIGINAL WOOD ROOF IS ESSENTIAL **

GRAPHIC INTEGRITY ANALYSIS

SITE

Image from googleearth

Located on Front Street and facing the Missouri River, the I. G. Baker house is located between the McLeish residence and the 2-story Choteau House.



From the 1850s to 1887, Fort Benton was the trade center for this region of the American and Canadian West. Like others who chose to stay when the fur trade declined, I.G. Baker (last American Fur Company factor at the fort) turned to new endeavors. Through the 1870s and 1880s, I.G. Baker Company was Montana's largest mercantile enterprise. But when the company began, in 1865-1866, Baker and his brother George had only a log store along the levee. Baker's wife joined him here in 1867, and he began to construct this home—then a two-room adobe with a sod roof. In it, Montana Territory's Acting Governor Thomas F. Meagher ate his last meal before his mysterious drowning in 1867. Sometime in the next decade, two rooms to the rear were added and metal replaced the sod roof. In 1876, a second remodeling added clapboard siding, a shingle roof, and the front portico. The front room on the left became as it appears today. The mercantile Conrad family also called this building home, and it once was used as officer's quarters for the fort.

Photo: Kenneth R. Sievert

Text of the National Register sign affixed to the front wall of the I. G. Baker Residence

SITE

Photo of original well uncovered at the SW corner of the site during investigation of the I. G. Baker Residence.

Photo: Courtesy of Dan Nelsen

EXTERIOR

East Elevation of the I. G. Baker residence facing Front Street and the Missouri River. Although the wrought iron fence is period appropriate, it is a recent addition to the property.

South Elevation. The window visible on this wall has been relocated; it originally was in the offset wall facing Front Street. Note that the chimney on this end wall has also been removed.

Photos: Kenneth R. Sievert

EXTERIOR (continued)

West Elevation of the I. G. Baker residence. A spacious back yard occupies the lot behind the residence; different configurations of the back (West) side of the house have occurred over time (see text).

Southwest corner of the West Elevation. Note the use of corner boards, the different types of siding, and the splice location in the wall visible on the left side of the photo.

Photos: Kenneth R. Sievert

EXTERIOR (continued)

North Elevation of the residence. The concrete foundation / weather wall that was constructed in 1973-1976 is visible along the bottom of the wall in this photograph; note that it ends at the edge of the door opening (behind the bag). Painted plywood has been used for the wall surfacing at the West end of the wall, and the unfinished particle board denotes the door opening at this corner of the residence.

Photo: Kenneth R. Sievert

EXTERIOR (continued)

View of the porch that is centered on the main elevation facing Front Street. The porch was rebuilt during the 1973 – 1976 restoration, based on the 1973 restoration drawings. The reconstruction was specified to match existing profiles and the overall scale, configuration, and placement is consistent with historic photographs.

View of the reconstructed porch roof. The style 'K' roof gutter is not period appropriate, and the metal edge trim along the roof is an adverse visual element. The painted wood soffit conveys the historic appearance and is in good condition.

Photos: Kenneth R. Sievert

EXTERIOR (continued)

Close-up view of the porch ceiling / soffit. The surface needs to be prepped and re-painted; however, the substrate does not exhibit any areas of failure or deterioration and additional work is not anticipated for this surface.

The style ‘K’ roof gutter, transition, and leader detract from the historic character of the residence and it is recommended that they be replaced with circa 1870 drainage features. It is not known if the structure ever had drainage elements during the period of significance.

This photo also shows the offset wall that originally encompassed a window (since removed) that offered a view toward Front Street. It is recommended that the window be reconstructed to reflect the historic appearance.

Photos: Kenneth R. Sievert

ROOF

Gutter above the porch roof at the intersection of the porch roof with the east wall. Note the use of mineral surfaced roll roofing above the porch and the condition of the wood shingles.

Intersection of the Porch roof fascia and the fascia of the primary roof over the residence. Note the 'D' style metal roof edge (contemporary) along the porch roof.

SE corner of the Porch roof. The plywood soffit is painted; and a quarter-round has been installed at the corner of the fascia.

Photos: Kenneth R. Sievert

EXTERIOR DETAILS

Detail at the edge of the roof at the SE corner of the house. The roof is in need of replacement, the fascia requires prepping and painting, and the mitered fascia corner would benefit by application of a sealant.

NW corner of the house; the photo illustrates how the T & G drop siding is installed and shows a typical 1x corner board to trim out the end of the wall.
The McLeish residence can be seen in the background.

Photos: Kenneth R. Sievert

Typical detailing of the current siding and current casing / trim details at openings. Original siding may have been drop siding rather than beveled (based on the West elevation); however, the pattern could not be verified during this study. The flat casing and size is appropriate to the period of significance.

The metal corners are attributed as not being original to the house (bending of sheet metal, other than hand forged, was not common until the late 19th century). Historic treatment of the exterior corners of the house would likely have used corner boards, or possibly alternating lapped butt joints if the siding material was of sufficient thickness.

Photos: Kenneth R. Sievert

EXTERIOR DETAILS (continued)

The top of the protective concrete weather wall (circa 1973-76) can be seen at the NE corned of the residence. Note the watershed profile at the top of the offset weather wall.

Failed section of the 1973 weatherwall adjacent to the SE corner of the residence. Note that this location coincides with the crack pattern in the interior wall finish of the 1876 Parlor.

Photos: Kenneth R. Sievert

PUBLIC VIEWING – ROOM 101

Overall view of the public viewing enclosure that was installed in the early 1970's. The enclosure is accessible from the main (Front Street) entrance.

All of the materials related to this enclosure are circa 1970 with the exception of the flooring and the ceiling construction, shown on following pages. The surfaced wood studs, ruff-sawn wood wainscot, plexiglass relites, carpet, and aluminum sliding door are included in the recent materials; the postured mannequin is also part of the post 1970 interpretive program for the house.

Photo: Kenneth R. Sievert

ROOM 101 [cont.]

View within the public viewing enclosure looking South into the South Parlor. Currently, the South Parlor has been interpreted to exhibit the interior of the residence as it appeared in 1876 +/-.

View within the public viewing enclosure looking North into the North Parlor. Currently, the North Parlor has been interpreted to exhibit the interior of the residence as it appeared in 1867 +/-.

Photos: Kenneth R. Sievert

Ceiling within the public viewing enclosure. Note the original hand hewn wood beam, log purlins, and the wood board sheathing. Splices in the log purlins can be seen below center in the photograph.

Ceiling detail showing the intersection of the 1970's plexiglass enclosure with the historic ceiling materials.

The T&G flooring from the North parlor continues on through to the viewing enclosure beyond. The wall construction and plexiglass relites are from the 1970's work.

Photos: Kenneth R. Sievert

ROOM 102 – NORTH PARLOR (interpreted to circa 1867)

Current view within the parlor looking South. Note the original adobe walls.

View looking North; the adobe has been whitewashed in a manner that is described in early written descriptions.

Photos: Kenneth R. Sievert

ROOM 102 – NORTH PARLOR (continued)

Current view looking West.

Current view looking East.

Photos: Kenneth R. Sievert

ROOM 102 – NORTH PARLOR (continued)

Top of fireplace chimney; note parging over adobe.

Base of fireplace

Photos: Kenneth R. Sievert

Detail of end of log purlin; note some of these purlins were re-set in the 1970's (see text)

Window detail; note wooden lintel that supports the adobe wall.

Photos: Kenneth R. Sievert

ROOM 103 – SOUTH PARLOR

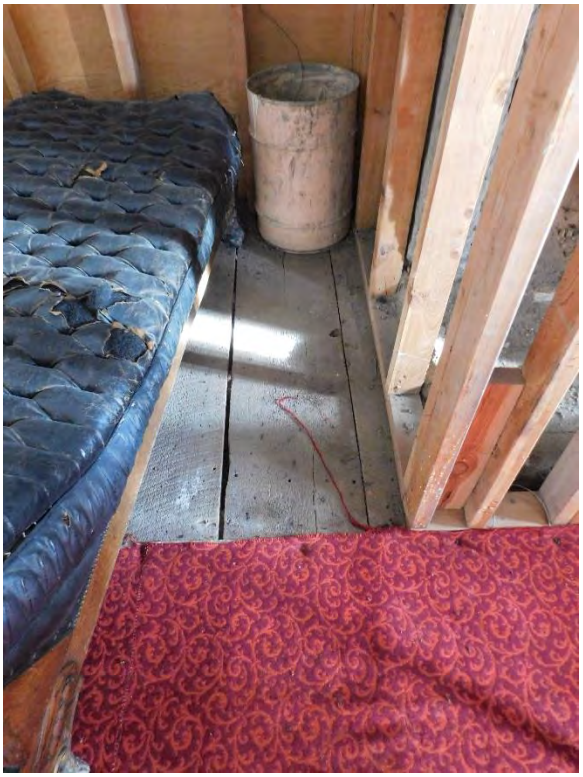
Looking South; note crack in plaster at left corner. Wallpaper and carpet are from the 1970's; marble fireplace is circa 1876.

View looking West. Step at door is from floor being lowered in the 1970's. Door is unusually wide (4'). Bare wood studs are not historic.

Photos: Kenneth R. Sievert

ROOM 103 – SOUTH PARLOR (continued)

View looking North. The open fireplace was discontinued in more recent times and adapted to the type of heating appliance shown here. The ceiling was re-done using gypsum drywall in the 1970's.



NW corner alcove of Room 103. Note the wood plank floor. Although the plank flooring was installed during the 1970's restoration, the documents used for the work indicate that it was to "match existing".

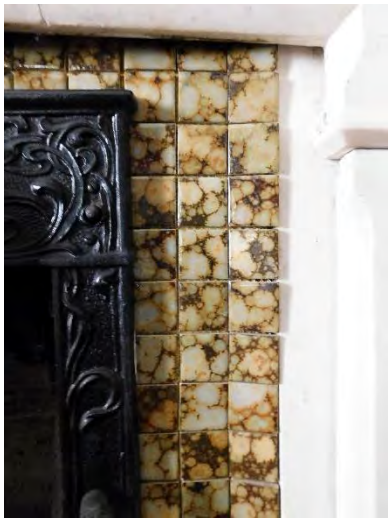
Photos: Kenneth R. Sievert

ROOM 103 – SOUTH PARLOR (continued)

Upper portion of chimney serving fireplace in the South Parlor.

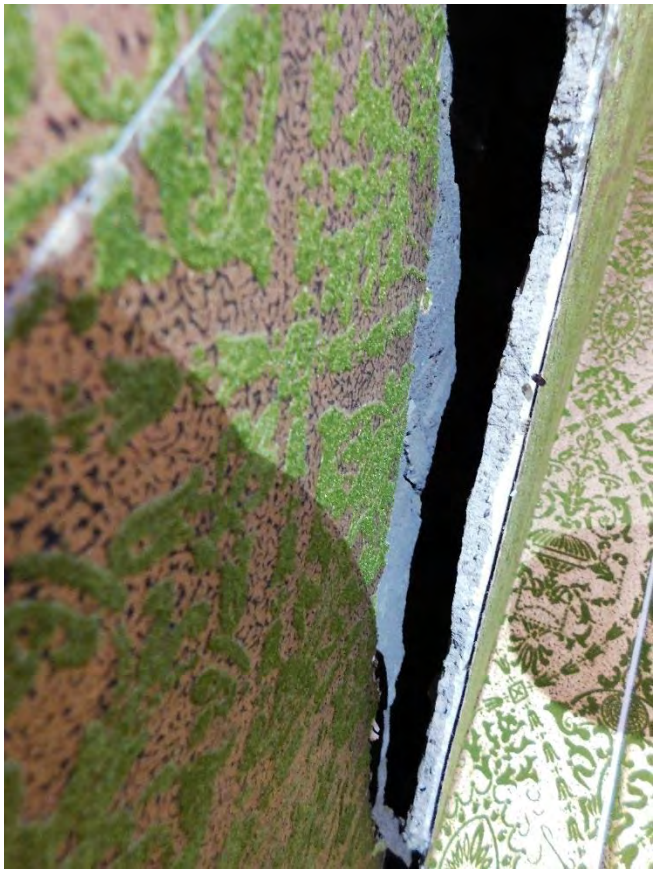
Fireplace in Room 103. The adobe construction, parging, and char and residue from smoke is still visible.

Photos: Kenneth R. Sievert



Details of the marble fireplace in Parlor 103; including views of the marble carving, temporary repair at the center of the marble headed, the 1-7/16” square marble tile surround and hearth (replaced in 1973), and the cast iron “Buckeye” fireplace insert.

Photos: Kenneth R. Sievert



View showing the wall construction in Parlor 103. A coat of smoothing plaster was applied over the adobe substrate before installing wallpaper during the circa 1876 renovations. During the 1973 – 76 restoration, original wall paper was removed (or missing) and a hard coat finishing plaster was applied o the surface (shown by the narrow white material in the cross section). The final step was to apply new wallpaper over the wall.

The description of construction above is also visible where the wainscot was not completed along the North wall of the space.

Photos: Kenneth R. Sievert

ROOM 104 – KITCHEN / DINING

View of West wall; note variety of materials.

South end of East wall; the plywood indicates the location where the kitchen offsets past the plane of the South wall of the Parlor. The offset was originally built with brick walls but has been replaced with a wood frame wall in recent years.

Photos: Kenneth R. Sievert

ROOM 104 – KITCHEN / DINING (continued)

West end of the North wall; note variety of materials. Gypsum drywall ceiling was installed in the 1970's.

East end of the North wall.

Photos: Kenneth R. Sievert

ROOM 104 – KITCHEN / DINING (continued)

Extra wide [4’] door into South parlor from the East wall of Room 104.

Detail of exposed adobe brick at the East wall of Room 104.

Photos: Kenneth R. Sievert

ROOM 104 – KITCHEN / DINING (continued)

Thimble for stove located near the South end of the West wall of Room 104.

South end of West wall showing where original brick ends and replacement wood frame wall begins.

Photos: Kenneth R. Sievert

Intrusion from plumbing at ceiling along North wall of room.

Looking down at base of South wall showing edge and forming of replacement concrete grade beam that supports new wood framed replacement wall. Note the ends of the original T&G fir flooring that can be seen on the right hand side of the gap.

Photos: Kenneth R. Sievert

ROOM 105 –BATHROOM

View of South Wall; all wall surfaces in this room are contemporary materials.

View of North wall; the door at the extreme right in the photograph accesses a closet for the water heater (recent installation).

Photos: Kenneth R. Sievert

ROOM 105 –BATHROOM (continued)

View of West Wall; flooring material is 8 x 8 tile that has been introduced into the historic residence in recent times.

View of East wall.

Photos: Kenneth R. Sievert

ROOM 105 –BATHROOM (continued)

Access panel in ceiling (see plan for location). It is unclear as to how this was intended to function since the interstitial space above is open to the adjacent Room 106 on the North end. Note that the ceiling appears to be painted mineral fiber board (Celotex).

Photo: Kenneth R. Sievert

ROOM 106 – PRIVATE QUARTERS

View of South Wall looking toward Bath; note that all walls are original exposed adobe, some log purlins from the historic ceiling remain, and that the door in the center of the wall has been altered from the original width

Detail at top of door in South wall – the wall exhibits remnants of different finishing materials (including wallpaper) and the wood infill used to narrow the door can be seen. View of East wall.

Photos: Kenneth R. Sievert

View of East Wall; note crack pattern in original adobe above door. The paint pattern on the bottom of the log purlins suggest that a lath and plaster ceiling may have finished the ceiling at one time in the structure's history.

Closer view of the crack above the North edge of the door into Room 102. The void above the log burlin occurs between the upper and lower roof systems and allows for access into the attic space above Parlors 102 and 103.

Photos: Kenneth R. Sievert

View of West Wall; note wood infill at top of original adobe on the right side of the door.

Photo: Kenneth R. Sievert

Closer view of repair at top of section of the West Wall.

The adobe at the base of this wall exhibits substantial erosion. Refer to comments within the materials section of this HSR.

Photos: Kenneth R. Sievert

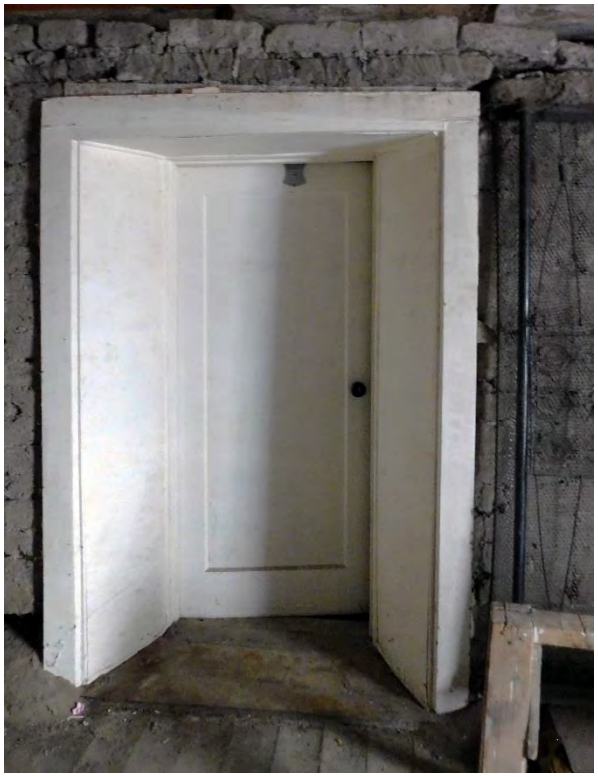
View of the upper part of the North wall; note the random size adobe blocks used to repair the top of the wall when the roof line was changed.

Window in the North wall; a contemporary metal security grille has been added. The adobe window sill exhibits damage.

Photos: Kenneth R. Sievert

Access panel in the floor of Room 106.

Door into parlor 102



Door into Vault

Photos: Kenneth R. Sievert

ROOM 107 – VAULT

View of North end of space; note security barrier over door opening (contemporary).

South end of Room 106. Damage from water is evident at the base of the wall.

Photos: Kenneth R. Sievert

Close-up view of water damage. Note the wallpaper pattern.

Straight-on view of the existing wallpaper pattern.

Photos: Kenneth R. Sievert

ROOM 108 – STORAGE

View looking North

Photo: Kenneth R. Sievert

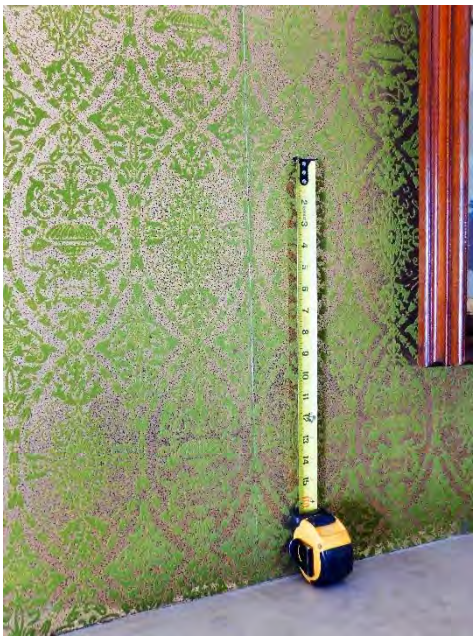
ROOM 109 – BACK ENTRANCE / VESTIBULE

Overall view of the back entry.

Surface mounted mortise lock on the door accessing the Kitchen / Dining area.

Photos: Kenneth R. Sievert

GENERAL – WALLPAPER PATTERNS



Left: Flocked Damascus Pattern in Parlor 103

Right: linear floral Pattern in room 107 – Date unknown.

West wall of Kitchen / Utility 104. This wall was concealed by a newer furred wall and the wallpaper was found underneath. This is believed to be an 1876 wallpaper pattern.

Remnant of border at top of south wall in room 106 (Private Quarters). The date of this wallpaper pattern is unknown.

Photos: Kenneth R. Sievert

Core taken from the lower west wall of room 107. Starting from the interior – there was a layer of wallpaper, then a layer of Celotex, and then the T & G wood sheathing shown in these photos. Remnants of the Celotex are visible on the surface of the lower photo.

This material was either exposed to the weather (implying an open alleyway) or it was salvaged material as both sides of the wood show weathering and the upper photo shows a painted surface.

A cavity exists between this sheathing and the outside wall which is believed to be a wood framed wall; it has been filled with cellulose insulation (which was wet at the time of the investigation).

Photos: Kenneth R. Sievert

Electrical services located on the West wall of Room 109 [rear entrance]

Irrigation controller located on the West wall of the rear vestibule. Note the various generations of exposed wiring.

Photos: Kenneth R. Sievert

Main entry door into the I. G. Baker residence, facing Front Street. Note the elaborate detailing and glass profiles used in the construction of the door.

Ornate (original or period appropriate) door hardware on Primary entrance door.

Photos: Kenneth R. Sievert

Door accessing the rear vestibule at the SW corner of the residence. Provenance of this door is not known; however, it is compatible with the period of significance and there is no reason to remove it.

Closer view of the door above. Re-working of the casing / trim at the head of the door is recommended.

Photos: Kenneth R. Sievert

DOORS AND WINDOWS (continued)

Typical window treatment at the residence. Note the deep recess of the window resulting from the extraordinary thickness of the exterior walls. This recess is important to the historic character of the residence.

Detail of the historic sash lock typical used on the South facing window of the Kitchen / Utility area. This photo also illustrates the need for maintenance / prepping / painting at the historic landmark structure.

Photos: Kenneth R. Sievert

STRUCTURAL

Roof structure above South end of original building; the original log roof purlin remains – all other parts of the original roof have been removed. Note that the newer roof is transferring load onto the log, the suspended ceiling above parlor 103 is hung from the log, and that the log exhibits deflection.

Photos: Kenneth R. Sievert

ULTIMATE TREATMENT AND USE – HISTORIC PRESERVATION OBJECTIVES

PROCEEDURAL ALTERNATIVES: As a Historic Structure that has been listed on the National Register of Historic Places and is part of a National Historic Landmark, any work undertaken on the I. G. Baker Residence must be done in compliance with ***"The Secretary Of The Interior's Standards For The Treatment Of Historic Properties"*** to retain those designations, as administered by the United States Department Of Interior. Those standards include guidelines for four optional treatment approaches for historic properties as outlined below:

■ Preservation – retains all historic fabric through conservation, maintenance, and repair. This approach includes preservation of changes and alterations that have been made over time.
■ Rehabilitation – retains all preservable fabric through conservation, maintenance, and repair but allows greater latitude for replacement if the property is more deteriorated. Rehabilitation standards focus attention on the elements that give a property its historic character. Rehabilitation also provides for a historic property undergoing a change in use.
■ Restoration – Retains only materials from the most significant time in a property's history while permitting removal of materials applied to the property from other periods of time.
■ Reconstruction – Re-creation of a non-surviving site, landscape, building, structure, or object utilizing all new materials.

RECOMMENDED PRESERVATION TREATMENT: The recommended treatment option for the Baker residence is the **Restoration** classification as outlined in the "Secretary's Standards for Historic Preservation Projects" noted above. As documented within the Part I Section "Significance", the period of significance for this structure is 1860 – 1890. Facilitators are advised that because of [A] the lengthy period of time within the period of significance and acknowledgement that the house changed during that period of time, and, [B] the lack of extensive documentation for the property before 1884, some of the restoration actions for the house will be judgmental in nature.

It is the intent for the I. G. Baker Residence to continue to be used as a museum exhibit for the foreseeable future, and implementing the recommendations of the Preservation Plan within this report are consistent with the Secretary's Standards.

As it specifically applies to the residence / museum, the following quotes are from DOI Standards and Guidelines for the **Restoration** classification (emphasis added):

> ***Restoration*** *is defined as the act or process of accurately depicting the form, features, and character of a property as it appeared at a particular period of time by means of the removal of features from other periods in its history and reconstruction of missing features from the restoration period. The limited and sensitive upgrading of mechanical, electrical, and plumbing systems and other code-required work to make properties functional is appropriate within a restoration project.*
>
> *When the property's design, architectural, or historical significance during a particular period of time outweighs the potential loss of extant materials, features, spaces, and finishes that characterize other historical periods; when there is substantial physical and documentary evidence for the work; and when contemporary alterations and additions are not planned, Restoration may be considered as a treatment. Prior to undertaking work, a particular period of time, i.e., the restoration period, should be selected and justified, and a documentation plan for Restoration developed.*
>
> *Rather than maintaining and preserving a building as it has evolved over time, the expressed goal of the* ***Standards for Restoration and Guidelines for Restoring Historic Buildings*** *is to make the building appear as it did at a particular--and most significant--time in its history. First, those*

materials and features from the "restoration period" are identified, based on thorough historical research. Next, features from the restoration period are maintained, protected, repaired (i.e., stabilized, consolidated, and conserved), and replaced, if necessary. As opposed to other treatments, the scope of work in ***Restoration*** *can include removal of features from other periods; missing features from the restoration period may be replaced, based on documentary and physical evidence, using traditional materials or compatible substitute materials. The final guidance emphasizes that only those designs that can be documented as having been built should be re-created in a restoration project.*

The guidance for the treatment Restoration begins with recommendations to identify the form and detailing of those existing architectural materials and features that are significant to the restoration period as established by historical research and documentation. Thus, guidance on ***identifying, retaining, and preserving features from the restoration period*** *is always given first. The historic building's appearance may be defined by the form and detailing of its exterior materials, such as masonry, wood, and metal; exterior features, such as roofs, porches, and windows; interior materials, such as plaster and paint; and interior features, such as moldings and stairways, room configuration and spatial relationships, as well as structural and mechanical systems; and the building's site and setting.*

After identifying those existing materials and features from the restoration period that must be retained in the process of ***Restoration*** *work, then* ***protecting and maintaining*** *them is addressed. Protection generally involves the least degree of intervention and is preparatory to other work. For example, protection includes the maintenance of historic material through treatments such as rust removal, caulking, limited paint removal, and re-application of protective coatings; the cyclical cleaning of roof gutter systems; or installation of fencing, alarm systems and other temporary protective measures. Although a historic building will usually require more extensive work, an overall evaluation of its physical condition should always begin at this level.*

Next, when the physical condition of restoration period features requires additional work, ***repairing*** *by* ***stabilizing, consolidating, and conserving*** *is recommended.* ***Restoration*** *guidance focuses upon the preservation of those materials and features that are significant to the period. Consequently, guidance for repairing a historic material, such as masonry, again begins with the least degree of intervention possible, such as strengthening fragile materials through consolidation, when appropriate, and repointing with mortar of an appropriate strength. Repairing masonry as well as wood and architectural metals includes patching, splicing, or otherwise reinforcing them using recognized preservation methods. Similarly, portions of a historic structural system could be reinforced using contemporary material such as steel rods. In* ***Restoration****, repair may also include the limited replacement in kind--or with compatible substitute material--of extensively deteriorated or missing parts of existing features when there are surviving prototypes to use as a model. Examples could include terra-cotta brackets, wood balusters, or cast iron fencing.*

In Restoration, replacing an entire feature from the restoration period (i.e., a cornice, balustrade, column, or stairway) that is too deteriorated to repair may be appropriate. Together with documentary evidence, the form and detailing of the historic feature should be used as a model for the replacement. Using the same kind of material is preferred; however, ***compatible substitute material*** *may be considered. All new work should be unobtrusively dated to guide future research and treatment. If documentary and physical evidence are not available to provide an accurate re-creation of missing features, the treatment Rehabilitation might be a better overall approach to project work.*

In summary, the I. G. Baker Residence will continue to be used as a publicly visited exhibit for the foreseeable future, and it is recommended that the property be restored.

TREATMENT AND USE

REQUIREMENTS FOR CONTINUED USE, TREATMENT, & CHANGES TO THE I. G. BAKER RESIDENCE

GENERAL

Unless a dangerous condition is identified by the building official, the I. G. Baker Residence could remain as-is under current use from the perspective of public safety. Any **future alteration or restoration** of the residence (including any scope of repairs that would require a building permit) will require approval of the proposed work by the Fort Benton Building Official and the local Historic Preservation Advisory Committee. In addition, if any federal funding is used during restoration, then additional approval would be required from the State Historic Preservation Office. These reviews would cover the topics detailed below and are in addition to the cultural recommendations that were addressed in the preceding section; however, note that cultural values are recognized by the respective regulating agencies within their compliance documents.

Topic 1: Life – Safety issues

Irrespective of the current or proposed use of the residence, life / safety concerns that are identified must be addressed. These are building code requirements that exist to protect owners as well as the public. Generally, life / safety issues fall into the categories of **structural stability and / or fire.**

The following section of this report outlines the requirements that may be applicable, and includes recommended alternatives to alleviate these concerns. Separate sections are devoted to the specific topics of structural safety and electrical systems.

Topic 2: General Building Code Requirements

Additional building code requirements may apply to the residence, depending upon the extent that repair / rehabilitation / restoration is envisioned for the building. Those additional requirements are outlined in following sections of this report.

Topic 3: Access for mobility impaired individuals (ADA)

Repair / rehabilitation / restoration of the residence will require access to the building for mobility impaired to be considered since the structure is used by, and visited by, the public. Discussion of the impacts resulting from ADA requirements is included in a following section of this report, including alternative accessibility provisions that may apply to historic properties.

Topic 4: Hazardous materials survey and abatement

Any demolition, removal of material, or construction associated with existing materials in structures suspected of containing hazardous materials must be done by utilizing “safe work practices” for handling hazardous materials. A hazardous materials survey is the accepted method for determining the presence of, and amounts of hazardous materials. A hazardous materials survey by a certified entity has been conducted for the residence under separate contract and is appended to this report.

Topic 5: Historical / cultural compliance

As noted above, if any federal funds are used for repair / rehabilitation / restoration of the residence, then a section 106 compliance review will be done by the State Historical Preservation Office (SHPO) to assure that the historical integrity and cultural values of the property are retained. It is strongly recommended that compliance with the applicable DOI requirements be adhered to irrespective of the funding source, to protect cultural values.

Impacts from the proposed restoration of the residence are developed in greater detail on following pages. Refer to the ‘Preservation Plan’ section of this report for a tabulation of critical work elements to be implemented to restore the I. G. Baker Residence.

BUILDING CODE REVIEW

A building code analysis was done for the I. G. Baker Residence to determine if there were major areas of concern to be addressed as part of the restoration / preservation plan. Although the code analysis performed for this report is general in nature, it does include the primary code topics that would impact current and future use of the building. Minor detailed requirements would be considered during subsequent phases of project development; minor requirements are defined as specific topics of limited scope that would not significantly impact decisions or costs regarding this building.

Currently, the State of Montana and local jurisdictions that have a certified building official allow applicants to select a code compliance method from one of two options described below.

Option 1. *International Existing Building Code (**IEBC**).* The provisions of this Code constitute the minimum standards for repair, alteration, or change of occupancy of existing buildings and structures (including Historic structures). The purpose of this code is to encourage the continued use or reuse of existing buildings and structures.

Option 2. *International Building Code **(IBC)**:* This Code provides minimum standards to safeguard life or limb, health, property and public welfare by regulating and controlling the design, construction, quality of materials, use and occupancy, location and maintenance of all buildings and structures. This code is primarily intended for use with new structures, but may be utilized for existing structures, and is a source of criteria for the IEBC by reference.

The IBC and its companion code, the IEBC, were first adopted during the 2000-2002 time period in the Western United States and the 2012 Editions of the two codes were adopted by the State of Montana in October of 2014. Recent discussion with representatives from the Building Codes Division of the Montana Department of Labor indicate that the State intends to adopt the 2015 edition of these codes soon.

Because of the anticipated change to building codes in the very near future, this report has used the 2015 editions of the IBC and IEBC for the building code evaluations contained herein.

Compliance with the IBC as well as the IEBC were evaluated and compared during the preparation of this report, and the results are tabulated on following pages.

Discussion: The requirements of IBC are generally more specific than those of the IEBC due to the fact that they focus on contemporary materials, means, and methods of new construction rather than the reuse of existing buildings; however, the two codes are very similar in regard to topics dealing with life – safety issues. As noted above, both codes were reviewed in the interest of allowing the Community Improvement Association to evaluate the benefits of attaining a higher standard of safety if cultural values are not compromised, and if the cost / benefit ratio is low.

The IEBC is usually the preferred code of choice for historic and cultural properties; it is more lenient in regard to recognized historic structures that are to remain as-is or are to be repaired, and it offers greater flexibility when developing solutions to issues that impact public welfare or safety. However, a significant alteration or rehabilitation of an existing building progressively adds more compliance requirements. Generally, the more a structure is changed then the more restrictive the application of the IEBC; e.g. an existing building that is repaired (only) is not required to meet as many provisions of the building code as one that will be significantly altered.

To define the appropriate level of code compliance when applying the IEBC owners and their advisors / designers must differentiate between repair, alteration, change of use, additions, or relocation of existing buildings. The IEBC has further established three optional procedures that may be followed within the (5) categories listed; 1) Prescriptive Compliance method, 2) Work – Area compliance method, and 3) Performance Compliance method.

Permit applicants are allowed to choose which of the building code options outlined above they wish to use, with the understanding that once a code approach is selected the mandates of that selection must be followed throughout.

In summary, doing a comprehensive code analysis on an existing building using the IEBC is dependent on knowing how much change is planned for the structure in the future.

To assist in understanding the options that are available for evaluating code compliance for the I. G. Baker Residence as described above, a code flowchart has been developed and is attached as the following page of this section of the report.

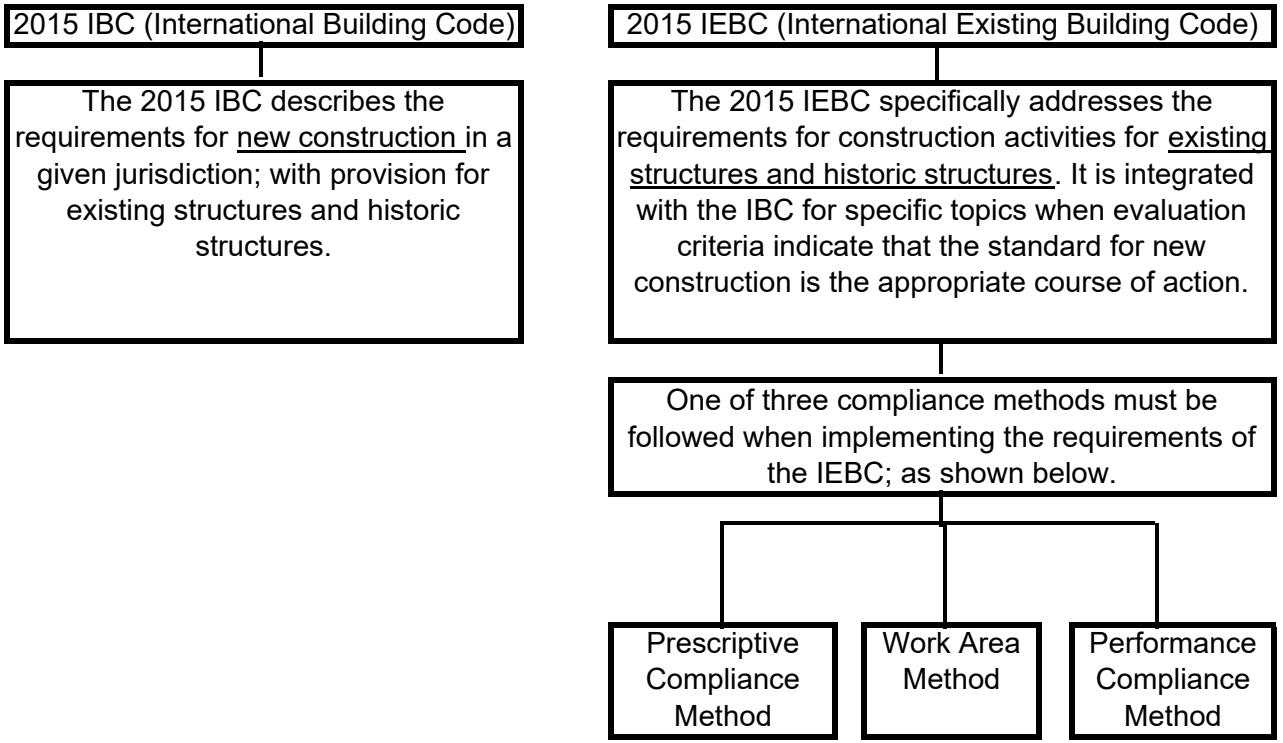
Currently adopted editions of both the IBC and the IEBC require automatic fire sprinkler systems to a much greater extent than previously used codes. It is not anticipated that restoration of the I. G. Baker house will require installation of fire sprinkler systems.

Reviewers are cautioned that the code information contained in this document is informational only; as projects are developed further research and consultation of the building code is warranted, particularly if a significant period of time occurs between the time of preparation of the Preservation Plan and implementation of the plan. Building codes are subject to change; they are generally updated on a three-year cycle.

In addition to the (2) primary building codes compared, the fire code identified as NFPA 101 - Life Safety Code was also consulted where appropriate.

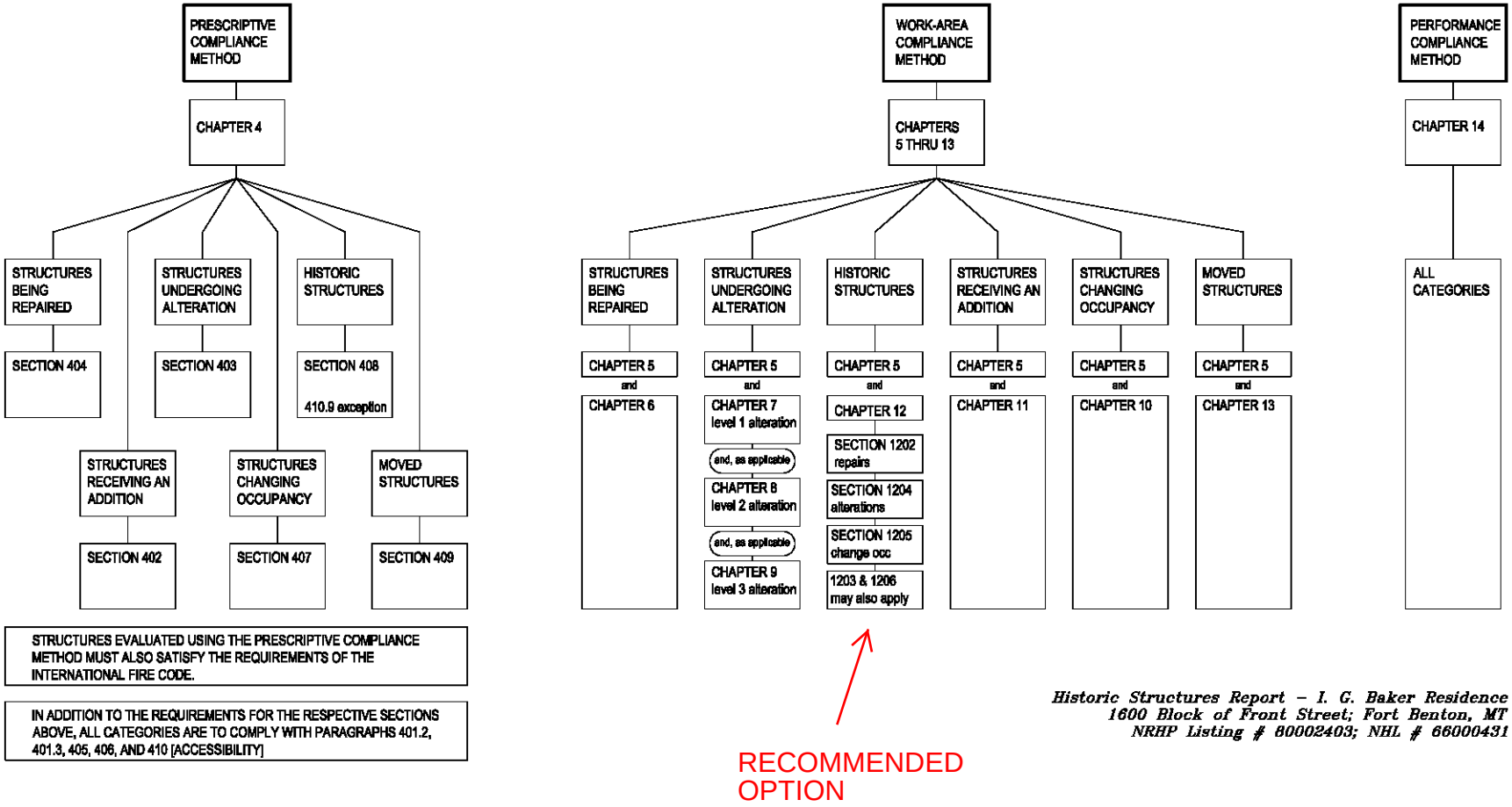
BUILDING CODE SELECTION

Comparison of the 2015 IBC and the 2015 IEBC



** The 2015 IBC has been used to determine the occupancy classification of the I. G. Baker Residence (see attached text).

THE **2015 IEBC** PROVIDES (3) OPTIONS FOR COMPLIANCE WITH BUILDING CODES FOR EXISTING BUILDINGS, AS INDICATED BELOW.



Historic Structures Report – I. G. Baker Residence
1600 Block of Front Street; Fort Benton, MT
NRHP Listing # 80002403; NHL # 66000431

BUILDING CODE EVALUATION OF THE I. G. BAKER RESIDENCE - 2015 IEBC

Basic Requirements
Chapter 12 - Historic Buildings (paraphrased)(emphasis added)

SECTION 1201 GENERAL		IMPACT TO PROJECT
1201.1 Scope.	This chapter is for the preservation of Historic buildings.	informational
1201.2 Report.	If it is intended that the historic building meet the requirements of this chapter, a **written report shall be prepared and filed with the code official by a registered design professional when such a report is necessary in the opinion of the code official**. The report shall identify each required safety feature that is in compliance with this chapter and where compliance with other chapters of these provisions would be damaging to the contributing historic features.	Fort Benton building official may require a report before work on the building is begun; *this HSR may satisfy that requirement.*
1201.3 Special occupancy **exceptions — museums.**	When a building in Group R-3 is also used for Group A, B, or M purposes such as museum tours, exhibits, and other public assembly activities, or for museums less than 3,000 square feet, the code official may determine that the **occupancy is Group B** when life-safety conditions can be demonstrated in accordance with Section 1201.2. Adequate means of egress in such buildings, which may include a means of maintaining doors in an open position to permit egress, a limit on building occupancy to an occupant load permitted by the means of egress capacity, a limit on occupancy of certain areas or floors, or supervision by a person knowledgeable in the emergency exiting procedures, shall be provided.	APPLIES
1201.4 Flood hazard areas.	In flood hazard areas, if all proposed work, including repairs, work required because of a change of occupancy, and alterations, constitutes substantial improvement, then the existing building shall comply with Section 1612 of the IBC. Exception: If an historic building will continue to be an historic building after the proposed work is completed, then the proposed work is not considered a substantial improvement	APPLIES

SECTION 1202 REPAIRS		
1202.1 General.	Repairs to any portion of an historic building or structure shall be **permitted with original or like materials and original methods of construction**, subject to the provisions of this chapter. Hazardous materials, such as asbestos and lead-based paint, shall not be used where the code for new construction would not permit their use in buildings of similar occupancy, purpose and location.	APPLIES
1202.2 Unsafe Conditions	Conditions determined by the *code official* to be ***unsafe*** shall be remedied. No work shall be required beyond what is required to remedy the *unsafe* conditions.	APPLIES
1202.3 Relocated Buildings	Foundations of relocated *historic buildings* and structures shall comply with the *International Building Code.* Relocated *historic buildings* shall otherwise be considered an *historic building* for the purposes of this code. Relocated *historic buildings* and structures shall be sited so that exterior wall and opening requirements comply with the *International Building Code* or with the compliance alternatives of this code.	DOES NOT APPLY
1202.4 Replacement.	**Replacement of existing or missing features using original materials shall be permitted**. Partial replacement for repairs that match the original in configuration, height, and size shall be permitted. Replacement glazing in hazardous locations shall comply with the safety glazing requirements of Chapter 24 of the International Building Code. Exception: Glass block walls, louvered windows, and jalousies repaired with like materials.	APPLIES Replacement 'in-kind' that meets DOI standards is permitted.

SECTION 1203 FIRE SAFETY

1203.1 Scope	*Historic buildings* undergoing *alterations, changes of occupancy,* or that are moved shall comply with Section 1203.	(APPLIES to alterations; Does not apply to repairs).
1203.2 General	Every *historic building* that does not conform to the construction requirements specified in this code for the occupancy or use and that constitutes a **distinct fire hazard** as defined herein shall be provided with an approved automatic fire-extinguishing system as determined appropriate by the *code official*. However, an automatic fire-extinguishing system shall not be used to substitute for, or act as an alternative to, the required number of exits from any *facility*.	DOES NOT APPLY; an automatic fire extinguishing system would be an 'ADVERSE EFFECT' to the I. G. Baker Residence.
1203.3 Means of egress.	Existing **door openings and corridor and stairway widths less than those specified elsewhere in this code may be approved**, provided that, in the opinion of the code official, there is sufficient width and height for a person to pass through the opening or traverse the means of egress. When approved by the code official, the front or main exit doors need not swing in the direction of the path of exit travel, provided that other approved means of egress having sufficient capacity to serve the total occupant load are provided.	Concurrence by the building official that selected widths are acceptable for some locations will be necessary. See text or other sections of the HSR for descriptions
1203.4 Transoms.	In fully sprinklered buildings of Group R-1, R-2 or R-3 occupancy, existing transoms in corridors and other fire-resistance-rated walls may be maintained if fixed in the closed position. A sprinkler shall be installed on each side of the transom.	DOES NOT APPLY; there are no transoms.
1203.5 Interior finishes.	The existing finishes of walls and ceilings shall be accepted when it is demonstrated that they are the historic finishes.	APPLIES; see ratings schedules within this report.
1203.6 Stairway enclosure		DOES NOT APPLY
1203.7 One-hour fire-resistant assemblies.	Where 1-hour fire-resistance-rated construction is required by these provisions, it need not be provided, regardless of construction or occupancy, where the existing wall and ceiling finish is wood or metal lath and plaster.	APPLIES to corridors (only) - existing construction may exceed code requirement
1203.8 Glazing in fire-resistance-rated systems.	Historic glazing materials are permitted in interior walls required to have a 1-hour fire-resistance rating where the opening is provided with approved smoke seals and the area affected is provided with an automatic sprinkler system.	DOES NOT APPLY
1203.9 Stairway railings.	Grand stairways shall be accepted without complying with the handrail and guard requirements. Existing handrails and guards at all stairs shall be permitted to remain, provided they are not structurally *dangerous*.	DOES NOT APPLY; there are no grand stairways.
1203.10 Guards.	Guards shall comply with Sections 1203.10.1 and 1203.10.2	DOES NOT APPLY; there are no guardrails.
1203.10.1 Height.	Existing guards shall comply with the requirements of Section 605.	DOES NOT APPLY; there are no guardrails.
1203.10.2 Guard openings.	The spacing between existing intermediate railings or openings in existing ornamental patterns shall be accepted. Missing elements or members of a guard may be replaced in a manner that will preserve the historic appearance of the building or structure.	DOES NOT APPLY; there are no guardrails.
1203.11 Exit signs.	Where exit sign or egress path marking location would damage the historic character of the building, alternative exit signs are permitted with approval of the *code official*. Alternative signs shall identify the exits and egress path.	Alternative exit signs are recommended.
1203.12 Automatic fire-extinguishing systems.	Every historical building that cannot be made to conform to the construction requirements specified in the International Building Code for the occupancy or use and that constitutes a distinct fire hazard shall be deemed to be in compliance if provided with an approved automatic fire-extinguishing system. Exception: When the code official approves an alternative life-safety system.	DOES NOT APPLY; an automatic fire extinguishing system would be an 'ADVERSE EFFECT' to the I. G. Baker Residence.

SECTION 1204 ALTERATIONS

1204.1 Accessibility requirements	The provisions of Section 806 regarding accessibility would apply to a Level 2 alteration. These requirements are the same as those listed in the ADA evaluation portion of this report (see ADA).	APPLIES

SECTION 1205 CHANGE OF OCCUPANCY

1205.1 through 1205.15		DOES NOT APPLY; a change in occupancy of the I. G. Baker Residence is not anticipated in the foreseeable future.

SECTION 1206 STRUCTURAL

1206.1 General.	***Historic buildings*** **shall comply with the applicable structural provisions for the work as classified in Chapter 5.** **Exception:** The *code official* shall be authorized to accept existing floors and approve operational controls that limit the live load on any such floor.	APPLIES; Refer to the structural section of this report for loading requirements and capacities.
1206.2 Dangerous conditions.	Conditions **determined by the *code official* to be *dangerous*** shall be remedied. No work shall be required beyond what is required to remedy the ***dangerous*** condition.	Refer to the structural section of this report for loading requirements and capacities; and for structural safety checks of selected structural members.

EVALUATION FOR COMPLIANCE WITH THE AMERICANS WITH DISABILITIES ACT.

The I. G. Baker Residence was reviewed for accessibility provisions required by the **2015 IEBC** for a registered historic property. The full text of those requirements is repeated below (with edits for topics that would not apply to this property).

> *1204.1 Accessibility requirements.*
> *The provisions of Sections 705 & 806, as applicable, shall apply to facilities designated as historic structures that undergo alterations, unless technically infeasible. Where compliance with the requirements for accessible routes, entrances or toilet rooms would threaten or destroy the historic significance of the building or facility, as determined by the code official, the alternative requirements of Sections 1204.1.1 through 1204.1.4 for that element shall be permitted.*
> *1204.1.1 Site arrival points.*
> *At least **one accessible route** from a site arrival point to an accessible entrance shall be provided.*
> *1204.1.2 N/A this project*
> *1204.1.3 Entrances.*
> *At least **one main entrance shall be accessible**.*
> *Exceptions:*
> *If a main entrance cannot be made accessible, an accessible nonpublic entrance that is unlocked while the building is occupied shall be provided; or a locked accessible entrance with a notification system or remote monitoring shall be provided.*
> *1204.1.4 Toilet and bathing facilities.*
> *Where toilet rooms are provided, at least one accessible family or assisted-use toilet room complying with Section 1109.2.1 of the International Building Code shall be provided.*

Pertinent paragraphs within the IEBC code that are referenced above have also been extracted, and are repeated here for the benefit of the reviewers.

> *705.1 General [Level 1 project - remove, replace, cover existing materials or assemblies].*
> *A facility that is altered shall comply with the applicable provisions in Sections 705.1.1 through 705.1.14, and **Chapter 11** of the International Building Code unless it is technically infeasible. Where compliance with this section is technically infeasible, the alteration shall provide access to the maximum extent that is technically feasible.*

> *806.1 General [Level 2 project - reconfiguration of space].*
> *A building, facility, or element that is altered shall comply with this section and Section 705.*

The recommended Preservation Plan for the I. G. Baker Residence includes work elements that fall within the definition of a 'Level 2 Alteration' project. As outlined above, this determination will require that the residence comply with the requirements summarized above unless technically infeasible.

Although the dates of publication of the applicable codes and regulations vary, the alternatives listed above generally agree with provisions of the ***"2010 ADA Standards for Accessible Design"*** that also addresses historic properties. The following quote from the 2010 Standards describes the procedure to be used to qualify for the alternative requirements:

> ***Advisory 202.5 Alterations to Qualified Historic Buildings and Facilities***
> ***Exception.*** *State Historic Preservation Officers are State appointed officials who carry out certain responsibilities under the National Historic Preservation Act. State Historic Preservation Officers consult with Federal and State agencies, local governments, and private entities on providing*

access and protecting significant elements of qualified historic buildings and facilities. There are exceptions for alterations to qualified historic buildings and facilities for accessible routes (206.2.1 Exception 1 and 206.2.3 Exception 7); entrances (206.4 Exception 2); and toilet facilities (213.2 Exception 2). When an entity believes that compliance with the requirements for any of these elements would threaten or destroy the historic significance of the building or facility, the entity should consult with the State Historic Preservation Officer. If the State Historic Preservation Officer agrees that compliance with the requirements for a specific element would threaten or destroy the historic significance of the building or facility, use of the exception is permitted. Public entities have an additional obligation to achieve program accessibility under the Department of Justice ADA regulations. See 28 CFR 35.150. These regulations require public entities that operate historic preservation programs to give priority to methods that provide physical access to individuals with disabilities. If alterations to a qualified historic building or facility to achieve program accessibility would threaten or destroy the historic significance of the building or facility, fundamentally alter the program, or result in undue financial or administrative burdens, the Department of Justice ADA regulations allow alternative methods to be used to achieve program accessibility. In the case of historic preservation programs, such as an historic house museum, alternative methods include using audio-visual materials to depict portions of the house that cannot otherwise be made accessible. In the case of other qualified historic properties, such as an historic government office building, alternative methods include relocating programs and services to accessible locations. The Department of Justice ADA regulations also allow public entities to use alternative methods when altering qualified historic buildings or facilities in the rare situations where the State Historic Preservation Officer determines that it is not feasible to provide physical access using the exceptions permitted in Section 202.5 without threatening or destroying the historic significance of the building or facility. See 28 CFR 35.151(d).

Discussion: Due to (1) public visitation to this historic destination, (2) in the interest of thoroughly reviewing ADA requirements, and (3) in the interest of providing the highest level of visitor experience the Baker residence was (A) initially evaluated for compliance with the minimum alternatives cited above and (B) further evaluated for compliance with the 2010 Standards applicable to new construction.

(A) Initial evaluation for historic structures:

Site arrival and route

1. Accessible route for Path of Travel includes (1) small step at the intersection with the public sidewalk; this must be removed and a short section of ramp installed.
2. Entry at Porch is in compliance.
3. Marked Accessible Parking spaces. There are no marked accessible parking spaces on-site
4. A hard surfaced path exists from the vehicular way to the front entrance ramp.

Accessible Route(s) from Entrance to Public Spaces

1. Currently, visitors are restricted to a single viewing area. In the future if the entire building is open to the public, then the depressed floor in room 103 should be raised to its original height to facilitate full access throughout.
2. In the future if the entire building is open to the public, a 2nd exit for fire safety located at the back entrance into the building is recommended. This exit would have to be operable by mobility impaired individuals.

Main ADA entrance
The primary entryway from the porch into the residence was evaluated for compliance with ADA criteria, and the following deficiencies were noted:
1. ADA Signage for the entry door was not present.
2. The entry door is not power assisted.
3. The entry door does not have a lever operated latch (to meet the "closed fist" test).
4. The primary entrance door opening exceeds the 32" minimum requirement for ADA entry doors.

The hardware on the entrance door is attributed to be original. It is recommended that this hardware be reused and a variance be requested for the door hardware.

Accessible Toilet Room
There are no public toilets within the residence; public toilets are available at the adjacent museum.

(B) Additional evaluation for new construction (2010 Standards) included the following ADA deficiencies:

1. Public pay phones – Currently there are no telephones on-site; if provided one phone is required to have a text telephone and TTY symbol.
2. Means of Egress directional signs. Tactile character exit signs must be located at the exit door.
3. Alarm systems – Installation of additional audible and visible alarms to space (see electrical).

Summary:

Minimum requirements –
1. Resolve hardware requirements at accessible main entrance (and at accessible fire exit in the future). Mitigate power assisted door requirement (button activated door operation or notification to full-time attendant).

Installation of contemporary hardware on this door would constitute an "adverse effect" to the residence and is not recommended. The use of remote operation latches, spring loaded hinges, or paddle latches should be explored.

4. Provide ADA signage at entrances and exits.

Additional requirements if brought into compliance with 2010 Standards –
1. Recommend ADA communication phone (not required).
2. Install audible and visible alarms.

STRUCTURAL CONSIDERATIONS

CRITERIA FOR SELECTED STRUCTURAL SYSTEMS

STRUCTURAL BUILDING CODES

Building codes and requirements applicable to the engineering evaluation of this structure are as follows:

- 2015 International Building Code (the occupancy classification was established in the Building Code section of this report)
- 2015 International Existing Building Code (applicable provisions only)
- ASCE 7-10
- Recommended Lateral Force Requirements - Structural Engineers Association of California (reference only)
- MSU CE & EM publication: Snow Loads for Structural Design in Montana (Videon - reference only)
- Montana Department of Labor and Industry; Building Codes Bureau; "Montana Ground Snow Load Finder"

LOADS

Loading and factors pertinent to this structure include:

VERTICAL LOADS
Snow - USE 23.9 PSF for roof snow load (general)

Floor Live Loads
Residential Occupancy - 40 PSF
Museum (type 'B') Occupancy – 50 PSF

Mechanical & Electrical Equipment loads - Actual Weight

LATERAL LOADS
Wind - 115 MPH basic wind speed
Basic wall wind pressure P = 14.0 PSF
(see Appendix for wind forces on roof)

Seismic (earthquake);
Design Earthquake Factors (% of gravity; adjusted for site and structural type)
SDS = 0.139g (short period earthquake)
SD1 = 0.085g (long period earthquake)
Evaluate structure based on worst load from (2) factors calculated above.

Based on the building code and calculation (attached), the I. G. Baker Residence is a Seismic Design Category 'A' classification for short period events, and a Seismic Design Category 'B' classification for long period events.

Interior walls and partitions - 5 PSF lateral load (minimum) – IBC 1607.13
Concrete / masonry wall base anchorage - 280 PLF – IBC 1604.8.2

STRUCTURAL CONSIDERATIONS (CONTINUED)

SOILS

A soils investigation has not been done at this site.

OTHER CONSIDERATIONS

Hazardous materials: - obvious hazards were not identified at the site during the preparation of this report; however, survey of hazardous materials will be done by separate agreement between the owner and an independent firm; the results are appended to this report.

Movement of the structure: it is recommended that thermal, shrinkage, and time - dependent factors continue to be monitored at the facility.

FACTORS PERTAINING TO STRUCTURAL EVALUATIONS:

Live load reduction factors were not applicable to this review because the spans and supported areas in the facility are smaller than the minimums established by the building code.

Duration of Load factors:

1. A duration of load factor [DOL] of 1.15 may be assigned for Snow Loads.
2. A duration of load factor of 1.33 may be assigned for Seismic and Wind Loads.

Deflection is a measure of rigidity and is significant to safety for structures that are continuous frame systems; it is not generally a safety consideration for structures like the Baker residence but is rather a measure of performance. Performance criteria for new construction can be found in Chapter 16 of the 2015 IBC for comparison. Deflections were noted at the long span purlins supporting the lower roof based on visual observation.

FINDINGS:

For this report, selected calculations were done to preliminarily assess the ability of the structure to withstand forces as defined by applicable building codes and as outlined above; however, additional engineering calculations will be required to verify strengths and resistance of repair methods at the time that remedial construction occurs. Determining the magnitude of forces and the capacity of the existing structural members is useful for giving insight into potential areas of deficiency that may ultimately have to be addressed. Results from those preliminary assessments are as follows:

- Roof rafters were investigated on a preliminary basis by using simple beam analogies; the rafters were found to be marginal for the snow loads and dead loads tabulated for this structure at the spans over rooms 104 and 106. The addition of a knee brace to effectively shorten the span over these spaces should be considered.

STRUCTURAL CONSIDERATIONS (CONTINUED)

■ Typical log purlins were checked for safety; they were found to be adequate with the exception of the ridge log discussed below.

■ The log ridge member spanning north-south through parlors 102 and 103 was checked for adequacy. This member carries superimposed loads from the newer roof above; this transfer of loads is accomplished by 2x cripple studs between the two roofs that are described on the 1973 drawings, and that are visible above the original sod roof. The log ridge was found to be *inadequate* for code-mandated loads and it is recommended that load carrying braces be installed in the concealed attic above to limit the amount of superimposed loading.

■ Ceiling joists above the Kitchen / utility space were checked, and it is assumed that the ceiling in Parlor 103 would be similar based on information found on the 1973 restoration drawings. These members are adequate with a minimal attic load (20 PSF); it is recommended that they remain as-is with the understanding that there is a policy (and signage) indicating that these areas are not to be used for heavy storage.

■ Earthquake loading as required by building codes is based on statistic probability that is determined from the history of seismic activity in a region, the presence of known faults in the area, and the geology of the underlying soils. The coefficients used in the formulas are then developed by the National Earthquake Center and published in the building codes as maps or tables. Seismic forces are considered to be very low at Fort Benton.

The lateral resistance of the I. G. Baker Residence can be characterized as being a massive shear wall / bearing wall system comprised of unreinforced adobe brick masonry and supported by an unreinforced adobe brick masonry foundation of shallow depth. Horizontal diaphragms are constructed of light weight conventional wood / log framing and would be rated as flexible diaphragms.

The structure does not exhibit characteristic crack patterns and separation between adjacent adobes that are indicators of lateral failure from earthquake forces. The crack patterns observed on-site within the adobe are more characteristic of soils movements (see below). The patterns do not exhibit the diagonal patterns usually associated with shear failure (from earthquakes) and the cracks tend to follow mortar joints as opposed to fracturing the individual adobes, suggesting separation rather than settlement.

Background calculations for seismic analysis of the structure were done to determine the magnitude of lateral forces that the structure would be subjected to in the event it experienced a code-defined seismic event (those calculations are attached in the structural appendix).
It was concluded that the structure in its current condition would comply with building code requirements for seismic loading; however, it is recommended that additional stiffening be introduced at the time that other restoration activities are done and in locations where the added stiffening could be concealed and not detract from the integrity of the restored structure to simply add to the stability of the structure.

STRUCTURAL CONSIDERATIONS (CONTINUED)

■ Soils related movements: There is evidence of failure of the foundation at the SE corner of the residence. There is noticeable sag in the interior and exterior wall at this location and the adobe wall is fractured adjacent to the corner. It is essential that this condition be stabilized.

Discussion: The factor that is attributed to be the cause of the failure of this corner relates to a broken underground water line that occurred at that corner of the site in the late 1970's; accounts from local observers state that the corner and adjacent fireplaces immediately settled, and the wall fractured.

West wall of rooms 104 and 105: There is noticeable displacement (leaning) of this wall particularly at the NW corner of room 104. This wall is a composite of masonry and wood frame and has been altered significantly over time; it is suspected that openings may have been moved and the thickness of the wall varies along its length. Brick masonry can be observed at the south end of the wall, evidence of a narrow course of adobe was found left-of-center in the wall, and wood frame furred construction was used for other portions of the wall. It is recommended that this wall be rebuilt at the time that the south end of the kitchen (room 104) is completed.

■ Floor joists were not checked for this report because the majority of the floor is inaccessible, reviewers did not want to cut openings into the historic materials, it was felt that they could easily be supported or repaired if they exhibited distress in the future. Even if the members failed there would not be a life-safety danger to occupants.

■ Uneven floors: There is noticeable unevenness in the floor surfaces throughout the residence. Correcting this condition would require major construction impact to the building, and since there is not a safety concern with the condition, it is not recommended that the floors be re-levelled.

■ Adobe repairs: Numerous locations within the house require repair of the adobe material, including but not limited to:

1. Crack pattern above door 106A (west side)
2. Crack at SE corner of room 103 (see comments under soil related movements, above).
3. Cracks in adobe fireplace base in room 103.
4. Crack pattern above door 104A
5. Crack pattern above door 107A
6. Top of west wall of room 106
7. Replace deteriorated adobe bricks at base of west wall of room 106
8. replace adobe bricks at window sill of window at north wall of room 106

Although these cracks are not structural per se, they are listed here in the interest of restoring continuity and integrity to the plane of the wall and, consequently, the structural performance of the respective wall assemblies.

ELECTRICAL SYSTEMS

I.G. Baker Residence

Electrical Service. The existing electrical service consists of a new service mast through the west roof overhang, with an overhead drop from a Northwestern Energy power pole located in the north-east corner of the property. The service characteristics are 120/240 volt, single phase. The meter is rated for a 200 amp electrical service, but the main breaker is only 70 amps and the service conductors appear to be rated for no more than a 100 amp service. Considering the current amount of electrical demand load in the building, this is more than adequate, but consideration should be given to increasing the main breaker to at least 100 amps to insure that there is adequate capacity to accommodate building upgrades for lighting, power and possible electric heating.

Distribution. The building is fed from the meter/main with Aluminum conductors to a fusible disconnect switch inside of the building. A bare neutral accompanies the insulated phase conductor and there is no visible grounding conductor or neutral bond. The disconnect switch feeds an adjacent load center with a cloth covered feeder with estimated #4 tinned copper conductors and a bare ground. The load center is missing the dead front cover and there are numerous taps and taped connections for branch circuits and feeders. Some of the conductors are disconnected from the circuit breakers and are simply abandoned with stripped wire left exposed in the enclosure. There is no directory and nothing is identified. ***This is far from being code compliant and is a safety and fire hazard.***

Branch Circuiting. Many branch circuits have been cut off and abandoned, although a few lighting and receptacle circuits are still energized. One of these circuits consists of a duplex receptacle that is hung by the non-metallic cable sheathing over the top of the load center. It is used to provide power to an adjacent lawn irrigation controller. Most of the branch circuit wiring is of the non-metallic sheathing style and is not supported properly nor has it been run where it is not susceptible to damage. ***This is a code violation.*** Non-metallic conduit must either be concealed, where it is susceptible to physical damage or conductors must be run in conduit or raceway.

Boxes, Wiring Devices and Lighting. Several boxes were seen that are either abandoned or active without proper covers. The lighting consists mostly of adjustable cast bases or porcelain receptacles. Many of these are broken or are not functional. Some were simply hanging from the conductors, but not attached to the box. There are very few power receptacles available for maintenance or temporary power. Other than the previously noted receptacle for the lawn irrigation, there is an exterior receptacle that is part of an indoor extension cord assembly that is run through a window opening***. The National Electrical Code does not allow portable cords to be installed in a permanent manner.***

Proposed Modifications to the Electrical Systems

Other than the outdoor meter/main and service mast, this building needs a completely new electrical system. The aforementioned code violations and safety deficiencies are too numerous and costly to repair. New equipment, branch circuiting, wiring devices and lighting will be less costly to install, maintain and operate than the existing system.

A new 24 to 42 circuit load center is recommended to replace the fusible disconnect and load center. The load center should have adequate capacity to support lighting and power receptacles for maintenance activities associated with preservation of the building, as well as minimal display/interpretive lighting and security. The panel will also provide capacity to support possible electric baseboard heaters for heating the Utility Area.

All new wiring for the building will be run concealed where possible. In order to control cost and provide a more durable system, AC (armor-clad) flexible cable will be used. This cable can be fished into concealed spaces and provides a slightly higher level of protection than non-metallic cable (Romex). EMT conduit can be used in exposed locations or where the AC cable could be damaged.

All new lighting will consist of LED sources. The Utility, Bath and Viewing areas will use a low-profile, surface mounted pancake style down light with a white opal lens. The Private Quarters and the 1867 Parlor will be provided with a surface LED fixture that has an adjustable aiming ability. The 1876 Parlor will use a recessed 2” diameter micro down light that will provide accent for displays, including the fire place. Lighting on the exterior of the building will consist of small LED wall packs for safety and security and larger LED flood lights with motion sensors to deter vandalism. All lighting will be switched from one location in the Utility Area with separate switches for control of each area.

Duplex receptacles will be provided for maintenance with GFI and lockable weather proof covers for outdoor receptacles in the front and back. Indoor maintenance receptacles will be provided in inconspicuous locations in the Parlor and Viewing areas. Additional receptacles will be provided in the Utility Area for maintenance and support activities.

Three 4-foot long electric baseboard heaters with a line voltage wall mounted thermostat will be installed in the Utility Area so that the maintenance staff can use the room during the winter.

Proposed Security and Alarm System

A small commercial/residential security and alarm system is being proposed for the building. The system uses 24 volt cable and devices to protect the building from illegal entry and vandalism. Smoke detectors can be added as well. With a phone line or internet connection, the system can be monitored by an alarm service for a nominal monthly fee.

HAZARDOUS MATERIALS

< THIS SECTION IS CURRENTLY NOT COMPLETE; SUMMARY STATEMENT TO BE INSERTED BEFORE FINAL PUBLICATION. REVIEWERS ARE ALSO INSTRUCTED TO REFER TO COMPLETE ENVIRONMENTAL STUDY COMPLETED UNDER SEPARATE CONTRACT >

TREATMENT OF USE / RESTORATION PLAN

BASIS FOR THE PRESERVATION PLAN

The **Preservation Plan** is derived from researching historic materials used in the construction of, and extant materials at, the I. G. Baker residence. The cultural rating, condition assessment, and the technical evaluations of fire, code compliance, accessibility, hazardous materials, and structural safety all impact the recommendations listed within the Preservation Plan.

The extent of work to be accomplished at the property must be consistent with a high standard of preservation ethics and integrity as mandated by the ***Secretary of the Interior's Standards for the Treatment of Historic Properties.***

The recommendations contained within this Restoration Plan are based on the following:

The proposed treatment of the building is preservation of existing fabric dating to the period of significance of 1860 – 1890 to the maximum extent feasible, replacement with in-kind or period appropriate materials at missing features, and with consideration to protection of persons and property from life - safety issues. The intent is to sensitively integrate repair materials, incorporate life - safety elements, and provide for continued use of the structure without compromising the historic character.

1. Exterior elements will be rehabilitated with in-kind materials at locations where they cannot be preserved, and restored whenever possible.
2. All interior habitable spaces will be restored.
3. Except as noted, it is anticipated that Site features will be minimally impacted.

The final appearance of the residence is intended to be the same as it appeared during the period of time of 1860 - 1890. The building has retained a significant part of that appearance throughout its history, and continues to exhibit the character created by I. G. Baker as well as the modifications introduced by the Conrad brothers later in the period of significance.

RECOMMENDATIONS FOR TREATMENT AND USE:

GENERAL - Administrative Requirements

1. Complete a life - safety analysis of the property required by the IEBC building code. (This report may be used for that purpose).
2. Mitigate asbestos containing materials as identified within the hazardous materials section of this report.
3. Mitigate lead-based paint materials as identified within the hazardous materials section of this report, as impacted by the following restoration activities.

PRIORITY 1 - Fundamental Protection of at-risk elements

1. Provide supplemental support for roof loads by installing bracing in attic.
2. Replace roofing; include roof drainage and reconstruction of historic roof ventilator.
3. Air / dust barrier above wood ceilings.
3. Repair / stabilize failed SE corner of residence; include repair of finishes at corner only.
4. Stabilize leaning west wall in room 104 (Kitchen).
5. Correct negative drainage along west wall of residence.
6. Correct deficiencies preventing mobility impaired from gaining access to the residence.

PRIORITY 2 - Fire safety and Security

1. Replace defective electrical power and distribution assemblies.
2. Provide fire alarm and detection systems.
3. Provide security system, or provision for future security system, as directed by owner.
4. Update interpretive lighting; provide for future interpretive lighting.

PRIORITY 3 - Interior restoration of [2] primary spaces currently visible to the public [parlors 102 and 103].

1. Repair Marble fireplace.
2. Complete North wall of Parlor 103; include interpretive window of fireplace.
3. Raise floor of Parlor 103 to its original height; provide period appropriate finish flooring.
4. Interior walls have been covered with circa 1973 wallpaper in Parlor 103. Replacement with reproduction wallpapers will be required at repair areas.
5. All original plaster ceilings were replaced by gypsum drywall in 1973 and refinished. The drywall installation lacks the feeling of a hand applied finish that is characteristic of historic plaster and an application of hand texturing is recommended.
6. Touch-up / repair finishes to wainscot, walls, and ceilings as required.

PRIORITY 4 – Exterior Restoration

1. Remove tin corners; install corner boards.
2. Rebuild south chimney.
3. Painting and sealants; restore windows.

PRIORITY 5 – Accessibility

1. Mitigate ADA access to primary front door; mitigation could include hardware replacement, supervision by attendant, or variance from officials.
2. Plan for ADA access to rear entry.

PRIORITY 6 – Interior restoration of remaining interior spaces

1. Rehabilitate Kitchen room 104 including completion of south wall and removal of bathroom and closets.
2. Rehabilitate room 106 in its entirety.
3. Remove viewing enclosure; open up all spaces to public.
4. Remove spaces 107, 108, and 109.
5. Rehabilitate doors and hardware.
6. Introduce mechanical ventilation beneath floors.

PRIORITY 7 – Miscellaneous / Errata

1. Upgrade interpretive elements.
2. Signage.
3. Period appropriate furnishings for rooms 104 and 106.

OTHER PRIORITIES:

A listing of other related work to be done to the Baker residence and a prioritization of that work is shown on the accompanying tables

It is realized that budgetary restraints as well as the logistics of construction sequencing will have an effect on the implementation of this plan; however, the table does reflect the order of importance of restoration activities as determined by this report.

Work that is a related task to the 'serious' or 'critical' priority but is less urgent is often "packaged" together with the Priority in anticipation of how construction activities are performed, sequenced, and managed; as a consequence, 'minor' priorities may be included with (or adjacent to) work elements that are more critical.

PRESERVATION PLAN

Scope of Restoration to the period of significance

I. G. Baker Residence; Fort Benton, Montana

Priority	Location		Description	QTY	Unit	
0.01	ADMIN-Fees and administrative costs???					
0.02	HAZMAT-Asbestos mitigation					
0.03	HAZMAT-Asbestos training / program					
0.04	HAZMAT-Lead based paint mitigation					
0.05	General		Remove extraneous materials from attic; execute removal with curator present to ascertain provenance of materials (minor number of materials).	1	Lump	75.00
0.06	General		Air / dust barrier above wood ceilings	496	SF	235.00
1.09	STRUCTURAL-Attic braces		Install to take load off of 1867 ridge purlin	1	Lump	625.00
1.10	Roof		Remove [E] wood shingle roofing; replace w/ metal roofing including water barrier below, and related flashings. Replace sheathing where water damaged	2038	SF	24456.00
1.11	Roof		Reconstruct historic ventilator	1	Lump	400.00
1.12	Roof		Remove [E] 'K' style gutters and downspouts; replace with hanging half-round gutters	44	LF	880.00
1.13	Roof		Downspouts	24	LF	144.00
2.05	STRUCTURAL-Sagging SE corner		Open up wall; restore integrity	1	Lump	
2.06	Ext East Wall (windows, foundation, and doors listed separately)		Remove and reinstall portion of siding at SE corner to permit repair of broken adobe behind	120	SF	
2.07	East Foundation		No work anticipated			
2.08	South Foundation		No work anticipated			
2.09	West Foundation		Examine during correction of mowstrip and replacement of mow strip (see site)			
2.10	North Foundation		No work anticipated			
2.13	Room 103 - Parlor	E wall	Repair cracked plaster wall; open up as required to repair adobe	126	SF	
2.14	Room 103 - Parlor	E wall	Replace wallpaper	126	SF	
2.15	Room 103 - Parlor	E wall	Touch up finish at wood wainscot	42	SF	pp. 3 - III - 3

PRESERVATION PLAN

Scope of Restoration to the period of significance

I. G. Baker Residence; Fort Benton, Montana

Priority	Location		Description	QTY	Unit
3.10	STRUCTURAL-Leaning west wall		Brace; stabilize	143	SF
3.11	Room 104 - Kitchen / Utility	W wall	Replaster; prep and paint	10.67	SY
3.12	Room 109 - Rear Vestibule	E wall	Repair, plaster, and repaint	12.5	SY
4.10	Site		Correct negative drainage around west side of structure	11	SY
4.11	Site		Replace concrete stoop at rear entry	30	SF
4.12	Site		Remove and replace concrete mow strip	82	SF
4.14	Site		Modify front access walk to eliminate step and allow ADA access	12	SF
5.10	ELEC-Power and Distribution				
5.11	ELEC-Lighting				
5.12	ELEC-Alarms				
5.13	ELEC-Detection				
5.14	ELEC-Security				
6.10	Room 103 - Parlor	Fplace	re-set in its entirety [marble and tile]	1	Lump
7.10	Room 103 - Parlor	N wall	Reconstruct wall in its entirety	200	SF
7.11	Room 103 - Parlor	N wall	Interpretive window of fireplace	1	Lump
7.12	Room 103 - Parlor	Ceiling	Repair and repaint; extend where reqd at N wall [35 SF extension]	266	SF
7.13	Room 103 - Parlor	Floor	Raise floor [fir] or add ramps	266	SF
7.14	Room 103 - Parlor	Floor	Remove wall-to-wall carpeting; replace w/ fir & area carpets [area carpets FIO]	266	SF
8.10	Room 103 - Parlor	W wall	Repair cracked plaster wall	1	Lump
8.11	Room 103 - Parlor	W wall	Replace wallpaper	180	SF
8.12	Room 103 - Parlor	W wall	Touch up finish at wood wainscot	55	SF
8.13	Room 103 - Parlor	S wall	Replace wallpaper	175	SF
8.14	Room 103 - Parlor	S wall	Touch up finish at wood wainscot	54	SF
8.15	Room 103 - Parlor	Trim	Prep and paint	106	LF
8.16	Room 103 - Parlor	Dr-opg 104A	Prep and paint	18	LF
9.02	Ext East Wall (windows, foundation, and doors listed separately)		Prep and repaint trim including fascia, soffit, corner boards, water table, and casings.	158	LF

PRESERVATION PLAN

Scope of Restoration to the period of significance

I. G. Baker Residence; Fort Benton, Montana

Priority	Location	Description	QTY	Unit
9.03	Ext East Wall (windows, foundation, and doors listed separately)	Remove tin corners; replace w/ corner boards	20	LF
9.04	Ext South Wall (windows, foundation, and doors listed separately)	Reconstruct brick chimney serving marble fireplace 16 X 16 X 17.33' inc 3x3 ftg	91	SFCA
9.05	Ext South Wall (windows, foundation, and doors listed separately)	Prep and repaint trim including fascia, soffit, corner boards, water table, and casings.	132	LF
9.06	Ext South Wall (windows, foundation, and doors listed separately)	Remove tin corners; replace w/ corner boards	54	LF
9.07	Ext South Wall (windows, foundation, and doors listed separately)	Rebuild projecting wall at Kitchen with brick as described in Lepley notes	225	SFCA
9.08	Ext South Wall (windows, foundation, and doors listed separately)	Apply cladding to column supporting overhang at back door	24	LF
9.09	Ext West Wall (windows, foundation, and doors listed separately)	Repair drop siding (2 men 2 days)	1	Lump
9.10	Ext West Wall (windows, foundation, and doors listed separately)	Install corner boards	12	LF
9.11	Ext West Wall (windows, foundation, and doors listed separately)	Prep and repaint wall and trim in its entirety	233	SF
9.12	Ext North Wall (windows,	Complete siding at NW corner adjacent	50	SF
9.13	Ext North Wall (windows, foundation, and doors listed separately)	Prep and repaint trim including fascia, soffit, corner boards, water table, and casings.	67	LF
9.14	Ext North Wall (windows, foundation, and doors listed separately)	Remove tin corners; replace w/ corner boards	15	LF
9.15	East Wall Windows	Restore windows including prep, painting, hardware, and glazing.	4	EA

PRESERVATION PLAN

Scope of Restoration to the period of significance

I. G. Baker Residence; Fort Benton, Montana

Priority	Location		Description	QTY	Unit
9.16	South Wall Windows		Restore windows including prep, painting, hardware, and glazing.	1	EA
9.16			Reinstall Kitchen window to match historic configuration	2	EA
9.17	West Wall Windows		Restore windows including prep, painting, hardware, and glazing.	2	EA
9.19	North Wall windows		Restore windows including prep, painting, hardware, and glazing.	1	EA
9.20	Front [East] entrance door		No work anticipated		
9.21	Replace rear entrance door		Install period appropriate door	1	EA
9.22	Refinish rear entrance storm door.		Prep and paint	1	EA
9.23	Door at NW corner of house		Make operable; rehabilitate	1	Lump
10.005	Room 105 - Bathroom	General	Remove in entirety including fixtures and finishes; cap utilities in crawl space; replaster and paint walls to 1870's appearance	1	Lump
10.01	Room 104 - Kitchen / Utility	E wall	Replaster; prep and paint	10.67	SY
10.02	Room 104 - Kitchen / Utility	E wall	complete S end w/ masonry [brick included above]	6.67	SY
10.03	Room 104 - Kitchen / Utility	E wall	restore wall orig part of Bath	6.67	SY
10.04	Room 104 - Kitchen / Utility	S wall	Rebuild w/ masonry; plaster; prep and paint (see exterior)(masonry inc above)	13.33	SY
10.05	Room 104 - Kitchen / Utility	W wall	complete S end w/ masonry wall [brick included above]	4.44	SY
10.06	Room 104 - Kitchen / Utility	W wall	restore wall orig part of Bath	6.67	SY
10.07	Room 104 - Kitchen / Utility	N wall	To be removed	125	SF
10.08	Room 104 - Kitchen / Utility	N wall	[N] north wall to be painted plaster	13.89	SY
10.09	Room 104 - Kitchen / Utility	Ceiling	Re-level; repair / extend at south; prep and paint	206	SF
10.10	Room 104 - Kitchen / Utility	Ceiling	[N] Ceiling where Bath removed	92	SF
10.11	Room 104 - Kitchen / Utility	Floor	Repair; extend at south; restore where Bath removed; preservative coating	298	SF
10.12	Room 104 - Kitchen / Utility	Trim	Prep and paint (inc [N] wdws)(inc bath)	124	LF
10.13	Room 104 - Kitchen / Utility	Doors	Prep and paint (3 Doors)	3	EA
10.14	Room 104 - Kitchen / Utility	Dr-opg 105A	door @ Bath (remove)**	1	EA
10.15	Room 104 - Kitchen / Utility	Dr-opg 105B	Dr to Pvt Qtrs	1	EA

PRESERVATION PLAN

Scope of Restoration to the period of significance

I. G. Baker Residence; Fort Benton, Montana

Priority	Location		Description	QTY	Unit
10.16	Room 104 - Kitchen / Utility	Interp	Provide historic cabinets and appliances	1	Lump
11.02	Room 106 - Private Quarters	E wall	Repair adobe cracks	1	Lump
11.03	Room 106 - Private Quarters	S wall	Repair; interpret plaster finish	1	Lump
11.04	Room 106 - Private	W wall	Repair; replace adobes at base of wall	1	Lump
11.05	Room 106 - Private	N wall	Repair	1	Lump
11.06	Room 106 - Private	N wall	Remove window security grille	1	EA
11.07	Room 106 - Private Quarters	Ceiling	Reinstall wood ruff-sawn ceiling	229	SF
11.08	Room 106 - Private	Floor	Preservative treatment	229	SF
11.09	Room 106 - Private	Trim	Prep and paint	54	LF
11.10	Room 106 - Private	Dr-opg 106A	Prep and paint	17	LF
11.11	Room 106 - Private	Dr-opg 105B	Prep and paint	17	LF
11.12	Room 106 - Private	Dr-opg 107A	Provide period appropriate door	1	EA
12.02	Room 102 - Parlor	E wall	Whitewash - touch up	190	SF
12.03	Room 102 - Parlor	S wall	Whitewash - touch up;	55	SF
12.04	Room 102 - Parlor	S wall	Stabilize plaster at chimney	18	SF
12.05	Room 102 - Parlor	S wall	replace selected firebrick	6	SF
12.06	Room 102 - Parlor	W wall	Whitewash - touch up	175	SF
12.07	Room 102 - Parlor	N wall	Whitewash - touch up	175	SF
12.08	Room 102 - Parlor	Ceiling	Borate preservative	267	SF
12.09	Room 102 - Parlor	Floor	preservative coating	267	SF
12.10	Room 102 - Parlor	Trim	Prep and paint		
12.11	Room 102 - Parlor	Dr-opg 106A	Prep and paint	18	LF
12.12	Room 102 - Parlor	FPlace	minor repair	1	EA
13.02	Room 101 - Viewing	E wall	No work anticipated		
13.03	Room 101 - Viewing	S wall	Remove aluminum sliding door	1	Lump
13.04	Room 101 - Viewing	W wall	Remove / replace plexiglass	140	SF
13.05	Room 101 - Viewing	N wall	Remove / replace plexiglass	57	SF
13.06	Room 101 - Viewing	Ceiling	Borate preservative	78	SF
13.07	Room 101 - Viewing	Floor	preservative coating	78	SF

PRESERVATION PLAN

Scope of Restoration to the period of significance

I. G. Baker Residence; Fort Benton, Montana

Priority	Location		Description	QTY	Unit
13.08	Room 101 - Viewing	Trim	Prep and paint	31	LF
13.09	Room 101 - Viewing	Dr-opg ext	Prep and paint	17	LF
14.02	Room 109 - Rear Vestibule	S wall	Repair and repaint	26	SF
14.03	Room 109 - Rear Vestibule	W wall	Repair and repaint	71	SF
14.04	Room 109 - Rear Vestibule	N wall	Repair and repaint	26	SF
14.05	Room 109 - Rear Vestibule	Ceiling	Repair and repaint	72	SF
14.06	Room 109 - Rear Vestibule	Floor	Remove flooring; paint concrete	72	SF
14.07	Room 109 - Rear Vestibule	Trim	Prep and paint	52	LF
14.08	Room 109 - Rear Vestibule	Dr-opg 109B	Prep and paint	18	LF
14.09	Room 109 - Rear Vestibule	Dr-opg ext	see comments at exterior		
14.51	Room 108 - Storage	E wall	Repair and repaint	53	SF
14.52	Room 108 - Storage	S wall	Repair and repaint	26	SF
14.53	Room 108 - Storage	W wall	Repair and repaint	45	SF
14.54	Room 108 - Storage	N wall	Repair and repaint	26	SF
14.55	Room 108 - Storage	Ceiling	Repair and repaint	33	SF
14.56	Room 108 - Storage	Floor	Remove flooring; paint concrete	33	SF
14.57	Room 108 - Storage	Trim	Prep and paint	49	SF
14.58	Room 108 - Storage	Dr-opg 108A	No work anticipated		
15.02	Room 107 - Vault / Passage	E wall	Repair	112	SF
15.03	Room 107 - Vault / Passage	S wall	Repair	28	SF
15.04	Room 107 - Vault / Passage	W wall	Repair	71	SF
15.05	Room 107 - Vault / Passage	N wall	Repair	28	SF
15.06	Room 107 - Vault / Passage	Walls	Wallpaper	239	SF
15.07	Room 107 - Vault / Passage	Ceiling	Repair	64	SF
15.08	Room 107 - Vault / Passage	Floor	Remove flooring; paint concrete	64	SF
15.09	Room 107 - Vault / Passage	Trim	Prep and paint	39	LF
15.10	Room 107 - Vault / Passage	Dr-opg ext	Rehabilitate door; make operable	1	EA
16.09	MECHANICAL-HVAC		Provide ventilation below wooden floors		
16.10	MECHANICAL-Plumbing		(see notes for Room 105 Bathroom)		
17.02	ELEC-Interp Lighting				
17.03	ELEC-Virtual Tour				
17.04	INTERP-Drapery???				
17.05	INTERP-Furnishings???				
18.02	ELEC-Site lighting				

PRESERVATION PLAN

Scope of Restoration to the period of significance

I. G. Baker Residence; Fort Benton, Montana

Priority	Location	Description	QTY	Unit
18.03	STRUCTURAL-Re-level kitchen ceiling	include with repair of Kitchen ceiling and reconstruction of S wall of Kitchen [addn allowance for shoring only]	1	Lump
18.04	STRUCTURALUneven	Leave for now		
18.05	Site	Repair wrought iron fence (minor)(allow)	58	LF
18.06	Site	Archeological study of west lawn**	1	Lump
18.07	General	Clean, polish (or strip), and lubricate operating hardware as directed by curator / historic architect.	1	Lump
	Site	Make lawn irrigation operable	1	Lump

RECORD OF TREATMENT

Preservation Treatment and Recommendations
I. Completion Report
II. Technical Data

THIS SECTION INTENTIONALLY LEFT BLANK; TO BE COMPLETED WHEN WORK IS IMPLEMENTED AT THE I. G. BAKER RESIDENCE

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The authors were welcomed by many of the residents and stakeholders in Fort Benton who expressed an interest in the I. G. Baker Residence, and we are truly appreciative of the counsel and encouragement of those residents and specifically the board members of the Community Improvement Association during the preparation of the document.

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Dan Nelsen – Dan met with us every time we visited the site, opened up the house for us, arranged for meetings with other interested parties, advised us on availability of resources at the River and Plains / Overholser / Ag Museum center in Fort Benton, ad was our point of contact for the preparation of the report.

Ken Robison – Ken provided research on the timeline of events for the residence, researched the chain of title for the property, provided quotes that have been included within the body of the report, and reviewed the history sections of the report before publication.

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USGS; Regional Minimum and Maximum Seismic Design Map Values; United States Geologic Survey; based on earthquake ground motion maps and coordinated with the 2009 NEHRP Recommended Seismic Provisions, the 2010 ASCE-7 Standard, and the 2012 International Building Code.

Western Wood Products Association; Douglas Fir & Western Larch Species Facts; Jan 1996 (rev. may 2002)

Western Wood Products Association; WWPA Online Technical Guide; Portland, Oregon; 1997
Wisconsin Historical Society; Maintaining the Gutters on Your Historic House; a publication of the Wisconsin Historical Society, 816 State Street, Madison, WI 53706

PERSONAL COMMUNICATIONS

In addition to the resources listed above, the authors met with or interviewed the following individuals during the preparation of the report:

Keith Ballantyne

Dave Parchen

Merle Anne McLeish

Randal Morger

Mark Ball

Henry Schnackenberg

Connie Jenkins

Tom Carrels

APPENDIX 'A'

WOOD SPECIES

DOUGLAS FIR

Douglas Fir (Pseudotsuga menziesii) is not a true fir at all, nor a pine or spruce. It is a distinct species named after Archibald Menzies, a Scottish physician and naturalist who first discovered the tree on Vancouver Island in 1791, and David Douglas, the Scottish botanist who later identified the tree in the Pacific Northwest in 1826. The
species is known by a number of common names including Oregon Pine, British Columbian Pine, Red Fir and even Douglas tree; however, the U.S. Forest Service settled on Douglas Fir some years ago. Douglas Fir is North America's most plentiful softwood species, accounting for one fifth of the continent's total softwood reserves.
When architects and engineers look for the best in structural lumber, their first choice repeatedly is Douglas Fir. It is dimensionally stable and universally recognized for its superior strength-to-weight ratio. Its high specific gravity provides excellent nail and plate holding ability. The species also enjoys a documented superior performance against
strong forces resulting from natural phenomena such as winds, storms and earthquakes. It is truly the ideal structural and general purpose wood for framing lumber in residential, light commercial, multistory and industrial construction. The Douglas Fir/Western Larch species combination has the highest modulus of elasticity (E or MOE) of the North American softwood species. This is the ratio of the amount a piece of lumber will deflect in proportion to an applied load; it is a reflection of the species' high degree of stiffness, an important consideration in the design of floors and other systems.
In strength properties, Douglas Fir/Western Larch has the highest ratings of any Western softwood for extreme fiber stress in bending (Fb); for tension parallel-to-grain (Ft); for horizontal shear (Fv); for compression perpendicular-to-grain (Fc); and for compression parallel- to- grain ($F_{c\perp}$).
These physical working properties, as well as to the moderate durability of its heartwood and its excellent dimensional stability, provide the reasons many builders use Douglas Fir as the standard against which all other framing lumber is judged. It is also tight knotted and close-grained, adding the bonus of beauty to its structural capabilities.[1]

Douglas Fir has excellent dimensional stability (giving "green" DF products the ability to season well in service), the moderate decay resistance of its heartwood, and documented excellent performance have given Douglas Fir its reputation. Color, grain pattern, knot size and type are addressed in the rules for appearance grades.
Douglas Fir is the major species produced in the West, with more volume shipped than any other species, and its sterling performance history is recognized the world over. It is abundant and widely available in second and third-growth stands yielding products in multiple grade classifications: dimension and other framing products, engineered structural products such as MSR, finger-jointed, and glu-laminated products, high (clear) to low (economy) grade appearance products, and industrial and specialty grades.
DF doors, manufactured from products in the Factory & Shop grade classification, are renowned for their beauty and performance.
Douglas Fir's light rosy color is set off by its remarkably straight and handsome grain pattern. Sapwood is white to pale yellow; heartwood is russet with high contrast between the springwood and summerwood.
Douglas Fir grows throughout Western forests with the most abundant region being in the coastal climates of Oregon, Washington and northern California. In the Inland Region, east of the crest of the Cascade Mountains, Douglas Fir and Western Larch often grow in intermixed stands. Coastal and Inland Douglas Fir and Western Larch share similar structural performance characteristics and are often combined in dimension lumber structural products.
While DF products from the various parts of the vast Western Region are virtually indistinguishable in terms of appearance, the growing conditions of different parts of the region contribute to the

[1] Douglas Fir & Western Larch Species Facts; Western Wood Products Association; Jan 1996 (rev. may 2002)

physical working properties of the species. Consequently, Douglas Fir's growing region is identified in the grade stamp. Douglas Fir from the US coastal and inland regions is designated as DF, or when combined with Western Larch as DF-L. (Canadian DF products are identified as DF-North and have different design values.) Douglas Fir originating from Arizona, Colorado, Nevada, New Mexico and Utah is designated as Douglas Fir-South, or DF-S. Coastal DF represents 73%, inland DF-L represents 26%, and DF-S represents 1% of the species' production in the Western U.S.[2]

The USDA Forest Products Laboratory in Madison, Wisconsin publishes the "*Wood Handbook – Wood as an Engineered Material"* book that is considered to be the definitive resource for many species of wood materials in the U. S. The FPL manual describes Douglas Fir as follows:

"Douglas-fir (Pseudotsuga menziesii) is also known locally as red-fir, Douglas-spruce, and yellow-fir. Its range extends from the Rocky Mountains to the Pacific Coast and from Mexico to central British Columbia.
Sapwood of Douglas-fir is narrow in old-growth trees but may be as much as 7 cm (3 in.) wide in second-growth trees of commercial size. Young trees of moderate to rapid growth have reddish heartwood and are called red-fir. Very narrow-ringed heartwood of old-growth trees may be yellowish brown and is known on the market as yellow-fir. The wood of Douglas-fir varies widely in weight and strength.
Douglas-fir is used mostly for building and construction purposes in the form of lumber, marine fendering, piles, plywood, and engineered wood composites. Considerable quantities are used for railroad crossties, cooperage stock, mine timbers, poles, and fencing.
Douglas-fir lumber is used in the manufacture of sashes, doors, laminated beams, general millwork, railroad-car construction, boxes, pallets, and crates. Small amounts are used for flooring, furniture, ship and boat construction, and tanks."

The FPL manual lists the following strength properties for Douglas Fir on pp. 5-12:

Common species names	Moisture content	Specific gravity	Modulus of Rupture (lbf in–2)	Modulus of elasticity (x 10-6 lbf in–2)	Work to maximum load (in-lbf in–3)	Impact bending (in.)	Compression Parallel to grain (lbf in-2)	Compression perpendicular to grain (lbf in–2)	Shear parallel To grain (lbf in–2)	Tension perpendicular to grain (lbf in–2)	Side hardness (lbf)
Douglas-fir											
Interior North	Green	0.45	7400	1.41	8.1	22	3470	360	950	340	420
Interior North	12%	0.48	13100	1.79	10.5	26	6900	770	1400	390	600

Although the strength values tabulated above are based on exhaustive laboratory tests, reviewers are advised that they must be cognizant that these figures represent laboratory tests of samples that have not been compromised by defects, time-dependant factors, environmental factors, or limitations in grading. Since wood is a directional material the slope of grain alone can have a significant effect on performance during testing.

The National Design Specification for Wood Construction (NDS) publishes allowable stress factors to be used by Architects and Engineers in the design of wood structures that accounts for service

[2] *WWPA Online Technical Guide;* Western Wood Products Association; Portland, Oregon; 1997 (copyrighted)

factors and variations in individual wood members. The NDS values are adopted by most building codes and become the required standard that is applied to wood structures and members. The allowable values for Douglas Fir are listed within the following table[3]:

DOUGLAS FIR-LARCH (NORTH)

Grade	Bending FB (PSI)	Tension Parallel To Grain Ft	Shear Parallel To Grain Fv	Compression Perpendicular To Grain Fct	Compression Parallel To Grain Fcp	Modilis Of Elasticity E	Modulus Of Elasticity Emin	Grading Rules Agency
Select Structural	1350	825	180	625	1900	1900000	690000	NLGA
No.1 & Btr	1150	750	180	625	1800	1800000	660000	NLGA
No.1 / No. 2 2" & wider	850	500	180	625	1400	1600000	580000	NLGA
No.3	475	300	180	625	825	1400000	510000	NLGA
Stud - 2" & wider	650	400	180	625	900	1400000	510000	NLGA
Construction	950	575	180	625	1800	1500000	550000	NLGA
Standard – 2" - 4" wide	525	325	180	625	1450	1400000	510000	NLGA
Utility	250	150	180	625	950	1300000	470000	NLGA

SHRINKAGE[4]

Shrinkage (%) from green to oven dry moisture content			
	Radial	Tangential	Volumetric
Douglas-fir,			
Interior north	3.8	6.9	10.7

Aging

In relatively dry and moderate temperature conditions where wood is protected from deteriorating influences such as decay, the mechanical properties of wood show little change with time. Test results for very old timbers suggest that significant losses in clear wood strength occur only after several centuries of normal aging conditions. The soundness of centuries-old wood in some standing trees (redwood, for example) also attests to the durability of wood[5].

[3] 2005 Edition of *the National Design Specification® (NDS®) for Wood Construction Supplement: Design Values for Wood Construction; pp. 32*

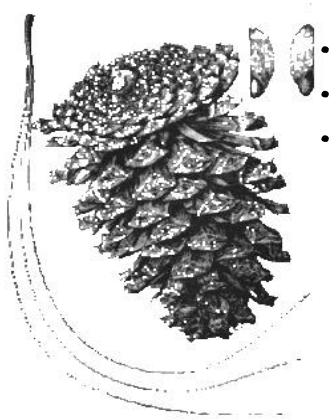
[4] Table 4-3; pp. 4-6 *"Wood Handbook – Wood as an Engineered Material";* USDA Forest Products Laboratory in Madison, Wisconsin; 2005

[5] ibid; pp. 5-41

Ponderosa Pine (Pinus ponderosa)

The ponderosa pine, also known as the yellow pine, is one of the most widely distributed tree species in the West, growing from southern Canada into Mexico, and from Nebraska and Oklahoma all the way to the Pacific Coast.

The largest recorded diameter was over 8 1/2 feet. The tallest tree was 232 feet, and the oldest tree was 600 years.



Ponderosa Pine Identification:

Needles are 5 to 10 inches long and in bundles of three, forming tufts at the end of each branch.
Cones are oval, 3 to 6 inches long and 2 to 4 inches in diameter, with outwardly curved spines that make them prickly to handle.
Bark is dark brown and rough textured in young trees and orange-brown with distinctive large plates in mature trees.

Climate

Ponderosa pine is typically dominant on warm, dry sites with a short growing season and very low summer precipitation. Temperatures annual
average 41° to 50° F with extremes ranging from -40° to 100° F. Being drought tolerant, it out competes other species to occupy the transition zone between grassland and forest.

Summer soil moisture most often determines whether ponderosa pine will grow in a particular area. Ponderosa pine grows on a wide variety of soils, including those of igneous, metamorphic, and sedimentary parent materials. Its distribution on drier sites depends on soil moisture, which depends on soil texture and depth. The species grows better on soils which are medium in texture and, hence, release their moisture to plants readily. Because ponderosa pine needs less nitrogen and phosphorus to grow its needles, the tree can grow well in soils which are not fertile enough for other species.

Regeneration

Ponderosa pine regenerates by seed, with cones maturing in a two-year cycle. The tree flowers from April to June of the first year, and cones mature and shed seeds in August and September of the second year. Seeds are relatively small (7,000 to 23,000 in one pound) and fall only about 100 feet from the parent tree.

Trees may start to bear cones as early as seven years old and continue for 350 years, and those over 25 inches in diameter are the best producers. Cones may bear up to 70 seeds each. Seeds are damaged or eaten by insects, birds, and small mammals such as mice, chipmunks, and tree squirrels.

Young ponderosa pine seedlings are threatened by moisture stress. Competition from shrubs can reduce their height and diameter growth. Young seedlings can withstand higher temperatures than most associates including Douglas- fir, white fir, and sugar pine but are more easily damaged from frost (23° F) than other trees.

One reason ponderosa pine is able to grow on dry sites is its vigorous rooting system. Seedlings put out a taproot which can grow up to 20 inches or more in the first two months, in well-watered soils. Mature trees have roots down to 6 feet in porous soils and may extend laterally 150 feet in open stands. In denser stands, roots are generally as wide as the tree's crown.

Growth

At lower elevations, ponderosa pine grows in relatively pure stands while higher up it grows mixed with other conifer species. In the Coast Range, it grows as a component of the mixed-evergreen forest type, rarely in pure stands.

Fire has a profound effect on ponderosa pine distribution. Although seedlings are killed by fire, larger trees possess thick bark, which protects them from fire damage. Fire resistance is also fostered by the species' characteristically open crown and tendency to self-prune limbs when mature, which reduces fuel ladders.

Saplings and large pines are more fire resistant than many true firs and Douglas-fir. Pines can survive and grow after fires even when half of their crowns have been scorched.

In the past, frequent low-intensity fires kept many pine forests open and park-like and helped to maintain ponderosa pine in areas where more shade-tolerant species would have predominated. Fire suppression over the last 100 years has allowed unnaturally high buildup of fuels and allowed ponderosa pine dominated stands to be crowded with white fir. Prescribed burning has been used in some areas to restore species balance.

Ponderosa pine is shade intolerant. When underneath a light overstory which casts 50% shade, its growth slows by half from full sun conditions. In shade, ponderosa pine grows at half the rate of associated species including Douglas-fir, sugar pine, white fir, and incense cedar.

Because of this intolerance to shade, ponderosa pine often grows in even-aged patches. It is vulnerable to overcrowding but may respond to thinning between ages 70 to 100. A growth response has even been noted at age 200.

On productive sites, trees can reach 26 inches in diameter in 30 years (8.7 inches/decade). Trees with a diameter of
30 to 50 inches and height of 90 to 130 feet are common throughout its range.

Competition from other plants, including neighboring trees and shrubs can reduce diameter growth markedly, especially on droughty soils. Trees grown with intense competition are also subject to more insect damage.

Damaging Agents

Approximately 200 insect species affect ponderosa pine from its cone stage to maturity. Pine beetles (*Dendroctonus* spp.) cause tree death by transmitting blue stain fungus to the tree and by consumption of the phloem by their larvae. Western pine beetle (*Dendroctonus brevicomis*) is a common cause of death for older trees and drought stressed trees, as well as for healthy, vigorous trees during epidemics.

Bark beetles (*Ips* spp.) are naturally present in all stands. Harvesting methods which leave large amounts of logging slash can allow their populations to explode and kill vigorous trees up to 26 inches in diameter. Parasites, root diseases, rusts, trunk decays, and needle and twig blights also cause significant damage. The most widespread parasite is dwarf mistletoe which causes branch and stem deformation.

Uses

Native Americans used the inner bark of ponderosa pine as food and its resin as a medicinal salve for rheumatism, backaches, and dandruff. Ponderosa pine forests today are important for timber production, livestock grazing, and recreation. Big game such as deer and elk use the forests for food and shelter as do many other wildlife species.

The mature tree's uniform grain makes it desirable when appearance rather than strength is important. The wood does not shrink and swell much after processing, making it valuable for close fitting joints in applications such as molding, doors, window frames and drawers, paneling, furniture, and other wood work. It is also used in home construction for framing, floor and roof decking, and outdoor applications when treated.

This text was largely summarized from an article originally by William W. Oliver Project Leader, Pacific Southwest Forest and Range Experiment Station, Berkeley, CA and Russell A. Ryker Principal Silviculturist (retired), Intermountain Research Station, Ogden, UT that appears in Burns, Russell M., and Barbara H. Honkala, tech. coords. 1990. Silvics of North America: 1. Conifers. Agriculture Handbook 654. U.S. Department of Agriculture, Forest Service, Washington, DC. vol. 1, 675 p.

APPENDIX 'B'

STRUCTURAL CRITERIA DETAILS
STRUCTURAL SAFETY CALCULATIONS
SEISMIC / WIND BASIC VALUES

SUPPORTING DOCUMENTATION FOR STRUCTURAL EVALUATION

LOADS

VERTICAL LOADS

Snow - For comparison: From MSU CE & EM publication:
Pg = .008 x elevation of 2772'
= 22.18 PSF unfactored ground snow load; thermal factor Ct = 1.2
Exposure 'B';
Ce = 1.2 for 20' ht. structure
Importance factor of 1.0; Category II
Pf = (0.7) (Ce)(Ct)(Iw)(Pg) = 22.36 PSF roof snow load
Low roof slope (typical); unheated; not slippery; Cs = 1.0
Resultant snow load = 22.36 PSF (unoccupied) (w/o DOL factor)
(Drifted snow must be accounted for as applicable)

From "Montana Ground Snow Load Finder" – 29.88 PSF
Slope factor Cs = 0.8 (ave) ASCE
(29.88 x 0.8 = 23.9)

USE 23.9 PSF for roof snow load

LATERAL LOADS

Wind - 115 MPH basic wind speed; exposure 'C' (river side); importance factor of 1.00
(reference - ASCE Table 6-1)
Basic wall wind pressure P = 14.0+/- PSF (calculated)
Force on roof P = (+/-) 12.1 (typical); (-)17.9 (worst condition); overhang; (-) 36.10 PSF uplift.
[Wind forces on corners increase from values listed].

Seismic (earthquake); Static Lateral Force Procedure - section 12.6 – ASCE 7 – 10
Occupancy Group - II (non-essential; table 1.5.1)
Importance factor I.0 (table 1.5.2)
Site Class D (assumed); (used in lieu of Soils investigation)
From published "USGS Regional Minimum and Maximum Seismic Design Map Values" for 47.834 degrees North latitude; 111.67 degrees West longitude; 2772' elevation (Fort Benton).

Maximum Considered Earthquake (MCE) - Short Period Response Coefficient = Ss = 0.13g
Maximum Considered Earthquake (MCE) - Long Period Response Coefficient = S1 = 0.053g
Soil / Structure interaction factors:
Fa = 1.6
Fv = 2.4
SMS = Fa (x) MCES = 0.208;
SM1 = Fv (x) MCEL = 0.127
Design Earthquake Factors (% of gravity; adjusted for site and structural type)
SDS = 2/3 (x) SMS = 0.139g (short period earthquake)
SD1 = 2/3 (x) SM1 = 0.085g (long period earthquake)

The I. G. Baker Residence is a
Seismic Design Category 'A' classification for short period events, and a Seismic Design Category 'B' classification for long period events.

Date: ***05/27/19***

WEIGHT OF STRUCTURE - I. G. BAKER RESIDENCE

WEIGHTS OF MATERIALS
Perimeter of building = 171'-7.5" LF; Area = 1694.92 SF

DESCRIPTION LOCATION		UNIT	AMT	UNIT WEIGHT	TOTAL WEIGHT
UPPER ROOF	Roof surfacing - composition shingles	SF		2.45	
	Roof air barrier / building paper	SF		0.50	
	Roof replacement sheathing - OSB bd (7/16)	SF		0.00	
	Roof sheathing - 1/2" CD PWD	SF		1.50	
	Roof rafters (allowance) - vary; see plan	SF		1.00	
	1695 (X) 1.17 =		1983	5.45	10807.35
LOWER ROOF [A] [RM 102]	Roof air barrier / building paper	SF		0.50	
	Roof sheathing - 3/4" RS boards	SF		2.67	
	Log Purlins - 104 LF (x) 14.14 / 414 = PSF	SF		3.55	
	379.75 (X) 1.09 =		414	6.72	2782.08
LOWER ROOF [B] [RM 103]	Roof air barrier / building paper	SF		0.50	
	Roof sheathing - 3/4" RS boards	SF		2.67	
	Log Purlins [sim to above]	SF		3.55	
	Ceiling joists - 2X6 @ 16"	SF		1.50	
	Plaster / GPDW	SF		5.00	
	M / E Allowance	SF		1.00	
	265.68 (X) 1.09 =		290	14.22	4123.80
CEILING [RM 105 & RM 106]	Ceiling joists - 2X6 @ 16"	SF		1.50	
	Plaster / GPDW	SF		5.00	
	M / E Allowance	SF		1.00	
	296.58 (X) 1.00 =		297	7.50	2227.50
CEILING [RM 107]	Plaster / GPDW	SF		5.00	
	63.3 (X) 1.00 =		64	5.00	320.00
CEILING [RM 108 & RM 109]	Finish Ceiling - 3/4" bead pattern boards	SF		2.67	
	104.7 (X) 1.00 =		105	2.67	280.35
WALL [A]	Adobe - 20" (81.2 LF BASIC) @ 110 PCF	SF		165.00	
	Wd bevel siding	SF		3.00	
	1/2" Plywood sheathing	SF		1.50	
	2X4 wood studs at 16" o.c.	SF		1.00	
	Plaster	SF		5.00	
	Trim / air barrier (allowance)	SF		1.00	
	S, E, & N walls of Parlors [81.2 x 9' ave ht,]	SF	731	176.50	129021.50

WALL	Adobe - 16" (19.4 LF) @ 110 PCF	SF		146.00	
[B]	Plaster [side 1]	SF		5.00	
	Plaster	SF		5.00	
	Trim (allowance)	SF		1.00	
	W wall of Parlor 103	SF	155	157.00	24335.00
WALL	Adobe - 16" (20 LF) @ 110 PCF	SF		146.00	
[C]	Plaster [side 1]	SF		-	
	Plaster	SF		-	
	Trim (allowance)	SF		1.00	
	W wall of Parlor 102	SF	160	147.00	23520.00
WALL	Adobe - 16" (12.4 LF) @ 110 PCF	SF		146.00	
[D]	GPDW [side 1]	SF		5.00	
	Furring	SF		0.60	
	Trim (allowance)	SF		1.00	
	N, W, & S wall of Quarters 106	SF	432	152.60	65923.20
WALL	Brick bearing wall (8") - 19.4' length	SF		92.00	
[E]	Furring	SF		0.60	
	Plaster [side 1]	SF		5.00	
	Plaster	SF		5.00	
	Trim (allowance)	SF		1.00	
	W wall Kitchen 104	SF	155	103.60	16058.00
WALL	***UNKNOWN*** WALL - 24.75' length	SF		92.00	
[F]	Wd Bd siding	SF		3.00	
	Furring	SF		0.60	
	Plaster	SF		5.00	
	Trim (allowance)	SF		1.00	
	W wall Vault 107	SF	155	101.60	15748.00
WALL	Single 2x6 wd framed wall [48.82']	SF		1.50	
[G]	Wd bevel siding	SF		3.00	
	Air infiltration barrier	SF		0.50	
	Sheathing - 1/2" plywood	SF		1.50	
	Plaster (allowance)	SF		5.00	
	Trim (allowance)	SF		1.00	
	S end Kitchen; W wall rear entry & storage	SF	391	12.50	4887.50
WALL	Double 2x4 wd framed wall [16.75' length]	SF		2.00	
[H]	Wd bevel siding	SF		3.00	
	Air infiltration barrier	SF		0.50	
	Sheathing - 1/2" plywood	SF		1.50	
	GPDW / Plaster (allowance)	SF		5.00	
	Trim (allowance)	SF		1.00	
	W wall Vault	SF	134	13.00	1742.00

WALL	Single 2x4 wd framed wall [23.3']	SF		1.00	
[I]	GPDW / Plaster (allowance)(side 1)	SF		5.00	
(interior)	GPDW / Plaster (allowance)(side 2)	SF		5.00	
	Trim (allowance)	SF		1.00	
	Typical interior walls	SF	187	12.00	2244.00
	Surface area-all walls [one side]		5653		
CHIMNEY [ADOBE]	Ave. 3' (x) 4' (x) 10' adobe masonry [110 PCF]	CF	1	13200.00	13200.00
PORCH	2x6 Rafters [23.3']	SF		1.50	
	Roof surfacing - composition shingles	SF		2.45	
	Air infiltration barrier	SF		0.50	
	Finish Ceiling - 3/4" bead pattern boards	SF		2.67	
	Collateral - wd cols, trim etc.	SF		1.00	
	Total porch dead load		137.5	8.12	1116.50
	TOTAL ABOVE FLOOR WEIGHT				**318336.78**
1ST FLOOR	Floor joists			2.00	
	Floor finish (allowance) T&G fir flooring			2.67	
	Sheathing (1x RS)			2.67	
	Area w/ suspended floor	SF	1329	7.34	9754.86
	Add for porch decking	SF	137.5	4.67	642.13
	Add for Concrete slab-on-grade	SF	290	50.00	14500.00
	TOTAL FLOOR WEIGHT				**24896.99**

***** Foundation weight is not included in above figures***

SEISMIC ANALYSIS PROCEDURE

From ASCE 7-10

Table 12.6-1 Permitted Analytical Procedures

Seismic Design Category	Structural Characteristics	Equivalent Lateral Force Analysis, Section 12.8[a]	Modal Response Spectrum Analysis, Section 12.9[a]	Seismic Response History Procedures, Chapter 16[a]
B, C	All structures	P	P	P
D, E, F	Risk Category I or II buildings not exceeding 2 stories above the base	P	P	P
	Structures of light frame construction	P	P	P
	Structures with no structural irregularities and not exceeding 160 ft in structural height	P	P	P
	Structures exceeding 160 ft in structural height with no structural irregularities and with $T < 3.5T_s$	P	P	P
	Structures not exceeding 160 ft in structural height and having only horizontal irregularities of Type 2, 3, 4, or 5 in Table 12.3-1 or vertical irregularities of Type 4, 5a, or 5b in Table 12.3-2	P	P	P
	All other structures	NP	P	P

[a]P: Permitted; NP: Not Permitted; $T_s = S_{D1}/S_{DS}$.

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As shown by the criteria above, the I. G. Baker Residence can be evaluated for seismic loads and resistance by using the Equivalent Lateral Force Analysis.

SEISMIC FACTORS - IBC 2015 (ASCE 7-10)						
PROJECT:	***I. G. Baker Residence***					
DATE:	***April 2, 2019***					
	Occupancy Category / Importance Factor		I		Ie =	1.00
	[ASCE table 1.5.1 & 11.5.1]	X	II		Ie =	1.00
			III		Ie =	1.25
	Site Class:.....		A			
			B			
			C			
			D			
			E			
			F			
	Assumed Class (ASCE 11.4.2)	X	D			
	Soil properties unknown					
	Spectral Response (from NEHRP) - MCE					
	Ss (0.2 sec-site B - 5%)	=	0.13	g	Short Period Acceleration	
	S1 (1.0 sec-site B - 5%)	=	0.05	g	(1) Second Acceleration	
	Site Coeffecient Fa (ASCE table 11.4-1)	=	1.6			
	Site Coeffecient Fv (ASCE table 11.4-2)	=	2.4			
	Maximum Considered Earthquake (adjusted) Sms	=	0.21		Fa(Ss)	(ASCE 11.4.3)
	Maximum Considered Earthquake (adjusted) Sm1	=	0.13		Fv(S1)	
	Design Earthquake (short period) SDs=2/3 Sms	=	0.14			(ASCE 11.4.4)
	Design Earthquake (short period) SD1=2/3 Sm1	=	0.08			
	SEISMIC DESIGN CATEGORY					
	For Short Period Response Structures	X	A		minimal risk	
	(ASCE table 11.6-1)		B		low-to-moderate risk	
			C		moderate risk	
			D		high risk	
			E		high risk-near source	
			F		high risk-near source	
	For 1-sec. Period Response Structures		A		minimal risk	
	(ASCE table 11.6-2)	X	B		low-to-moderate risk	
	do		C		moderate risk	
	do		D		high risk	
	Occ I, II, III w/ S1 > 0.75		E		high risk-near source	
	Occ IV, w/ S1 > 0.75		F		high risk-near source	

	Design Response Spectrum - MCE					
	Period Of Vibration					
	Fundamental Period T:					
	(ASCE 12.8.2.1) Ta = Ct x hnx					
	Height of structure		20.00			
	Ct from table 12.8-2		0.02		(hn)3/2 =	89.4427191
	x from table 12.8-2		0.75		(hn)3/4 =	9.45741609
	category: all other structural systems					
	Calculated - Ta = T =		0.19			
	To = 0.2 x SD1/SDS		0.12			
	Ts = SD1 / SDS		0.61			
	TL = (see figure 22-15 in chapter 22)		6.00			
	Design Response Spectrum					
	Acceleration Sa; T < To					
	Sa = SDS(0.4 + 0.6 T/To)				1.3279	
	Acceleration Sa; To < T < Ts					
	Sa = SDS	X			0.139	
	Acceleration Sa; Ts < T < TL					
	Sa = SD1/T				0.44833	
	Acceleration Sa; TL < T					
	Sa = SD1 x TL / T x T				14.2215	

SEISMIC ANALYSIS PART III: EARTHQUAKE FORCE - (ASCE 7-10)

SEISMIC - IBC-EQUIVALENT STATIC FORCE PROCEDURE - (STATIC)

PROJECT: ***I. G. BAKER RESIDENCE***

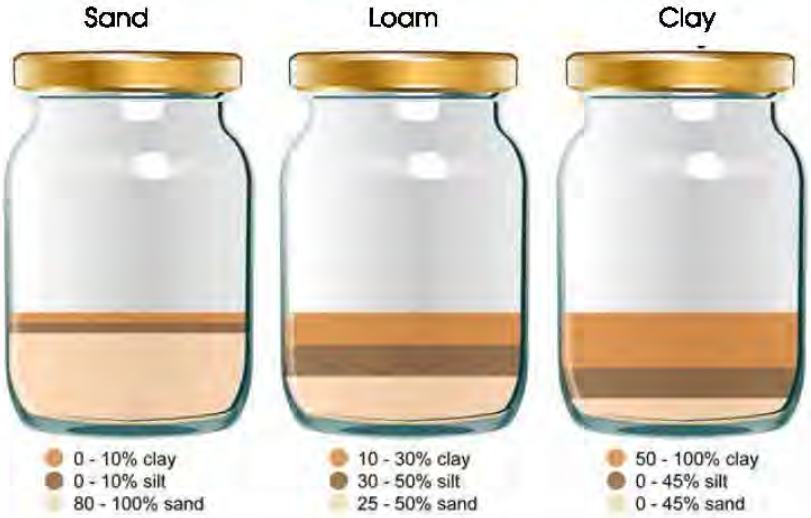
DATE: ***April 2, 2019***

STRUCTURE PERIOD (T) - (APPROXIMATE FORMULA METHOD)			
Coeffecient Ct:			
Steel Moment Frames; Ct = ...	0.035		
Concrete Moment Frames; Ct = ...	0.03		
Eccentrically Braced Steel Frames; Ct =	0.03		
All Other Buildings; Ct = ...	0.02	0.02	
Ct selected for use on this structure =	0.02		
Height of Structure (hn) = ...	20		(hn)3/2 =
			(hn)3/4 =
Structure Period T = Ct(hn)3/4 = ...	0.19		
STRENGTH / DUCTILITY COEFFECIENT FOR SELECTED LATERAL RESISTING SYSTEM (R)			
Response Modification Coefficient R =	1.50		
Source: Table 12.14-1 ASCE 7-10			
IMPORTANCE FACTOR (Ie) from previous page =	1.00		
DESIGN EARTHQUAKE FACTOR (SDS) previous page =		0.139	Short Period R
DESIGN EARTHQUAKE FACTOR (SD1) previous page =		0.085	1 - sec. Respo
SEISMIC RESPONSE COEFFICIENT (Cs)			
Basic: Cs = SDS / (R / Ie)	0.09267		R / Ie =
Limit: need not exceed SD1 / (R / Ie)(T)	0.29959		
Limit: may not be less than 0.044(SDS)(Ie)	0.00612		
For SDC of either E or F:			
Enter S1 from previous page =	0		
Cs = (0.5)(S1) / (R / Ie) =	0		
APPLICABLE Cs TO BE USED FROM ABOVE PROCEDURE =			0.09267
DESIGN BASE SHEAR			
Basic Calculation: V = CsW			
SEISMIC WEIGHT of building from previous tabulation =			
318337 (bldg) + 0.75 (x) snow load =			346813
Design Base Shear this structure =			32139.16

LATERAL FORCE DISTRIBUTION									*I. G. BAKER RESIDENCE*
Total Base Shear Coefficient									4/2/19
(from previous page)									
	VCO=	0.093							
Seismic Weight Of Building - By Level			Seismic Force of Building - By Level						
(from previous page)			(undistributed)						
1	VR=	53855	5008.515	INC SNOW					
2	VW1=	297796	27695.028						
3	VF1=	0	0						
TOTAL	VWT=	351651							
TOTAL BASE		32703.543	32703.543						
SHEAR									
Force at Top (Whiplash)									
(from calculation)									
	Ft=	0.00							
	V - Ft =	32703.54							
DISTRIBUTION MATRIX									
	MK	COMPONENT	WEIGHT	DISTANCE	WxH	(V-Ft)	Fx	FORCE	FORCE (ACCUMULATIVE)
			(LB)	TO GROUND					BY LEVEL
	1	VR	53855	15	807825	32703.543	2.642E+10	8686.674	8686.674467
	2	VW1	297796	7.5	2233470	32703.543	7.304E+10	24016.87	32703.543
	3	VF1	0	0	0	32703.543	0	0	32703.543
					3041295				
		OTM (roof) =	130300	OK BY INSP					
		OTM (walls) =	245277	OK BY INSP					

APPENDIX 'C'

TESTING



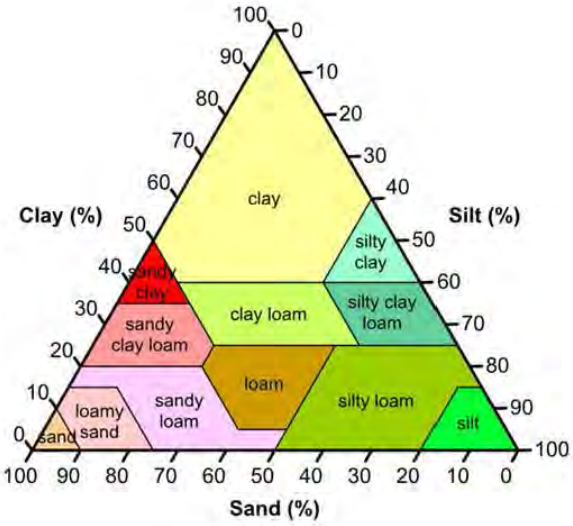
Jar Test

To perform a "jar test" to determine your soil suitability. Fill a jar (or plastic bottle - make sure it's see-through) halfway with the soil sample. Fill it the rest of the way with water. Shake vigorously for at least a minute, then let it sit overnight.

The next day, the soil will have settled into distinct bands. The bottom of the jar will have the larger-sized materials - sand and small pebbles - with smaller and smaller sized particles banding towards the top. The top band will be the clay or different silt. Ideally, the three bands will be about the same size. If your sample has more than a third sand (the bottom layer), you may not need to add any sand to your adobe.

The New Mexico State University (an expert on Adobe structures) recommends a mix of not more than 1/3 clay, not less than 1/2 sand, and never more than 1/3 silt. Can you draw a circle on the USDA chart opposite of the soil type range perfect for adobe?

Image source for the soil diagram: www.guaduabamboo.com



Soil Survey

- Soil Survey - Home
- Soil Surveys by State
- Partnerships
- Publications
- Soil Classification
- Soil Geography
- Tools
- Soil Survey Regional Offices
- Soil Climate Research Stations

Soil Texture Calculator

Download Excel Version (XLSM; 155 KB)

Percent Sand:
40

Percent Clay:
20

*Very Coarse Sand:
0

Graph Color:
Red

*Coarse Sand:
0

Get Type Reset

*Medium Sand:
5

Percent Silt:
40

*Fine Sand:
10

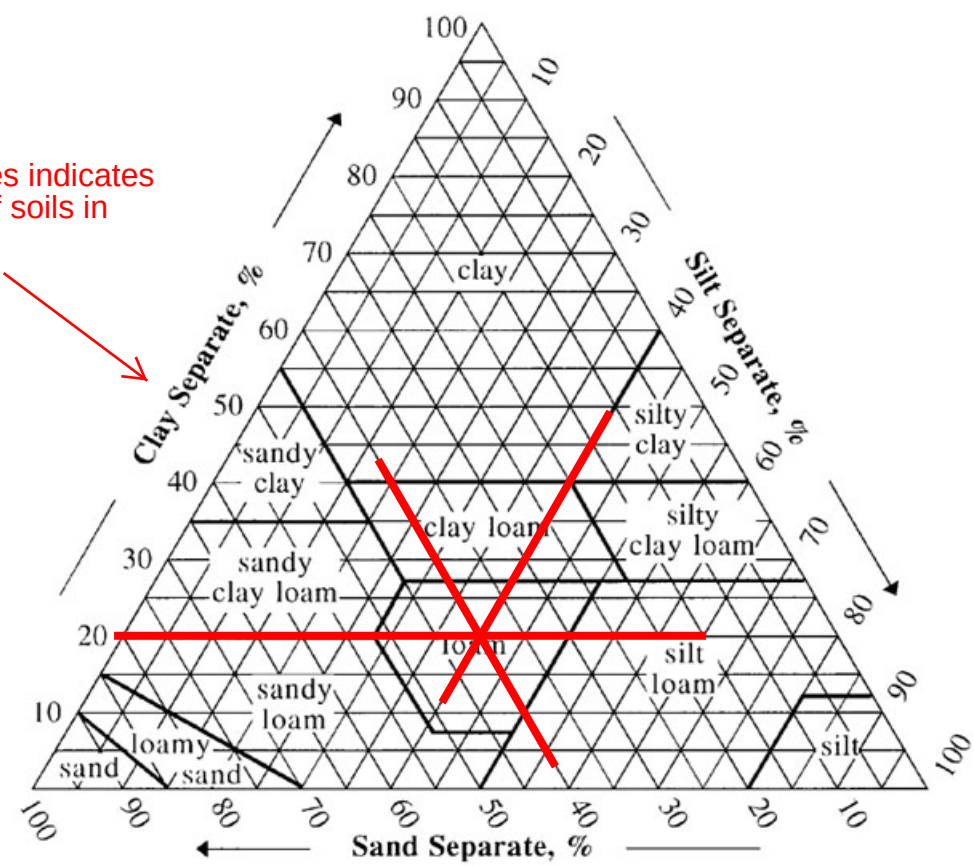
Texture:
Loam

*Very Fine Sand:
25

Clear Graph

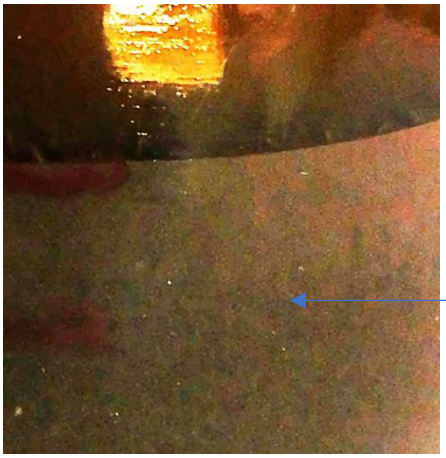
*Optional

Intersection of Red lines indicates approximate mixture of soils in the adobe bricks at the I. G. Baker Residence



TESTING

Results from a “Jar Test” of materials taken from an adobe brick retrieved from the site of the I. G. Baker Residence.



Differentiation between the soil layers for this example were difficult to see because of the subtle differences in the color of the various soil types.

APPENDIX 'D'

IEBC LEVEL 1 – COMPARISON
IEBC LEVEL 2 – COMPARISON
IBC – COMPARISON
BACKGROUND REQUIREMENTS FOR ADA

BUILDING CODE EVALUATION OF THE I. G. BAKER RESIDENCE - 2015 IEBC

Requirements for Existing Buildings
undergoing **LEVEL 1 ALTERATIONS** (Chapter 7)

SECTION			IMPACT TO PROJECT
701 GENERAL	**701.1 Scope.**	Level 1 alterations as described in Section 503 shall comply with the requirements of this chapter. **Level 1 alterations to historic buildings shall comply with this chapter, except as modified in Chapter 12.**	APPLIES
	701.2 Conformance.	An existing building or portion thereof shall not be altered such that the building becomes **less safe** than its existing condition.	**no less safe
		Exception: Where the current level of safety or sanitation is proposed to be reduced, the portion altered shall conform to the requirements of the International Building Code.	DOES NOT APPLY
	701.3 Flood hazard areas.	In flood hazard areas, alterations that constitute substantial improvement shall require that the building comply with Section 1612 of the International Building Code, or Section R322 of the International Residential Code, as applicable.	APPLIES
702 BUILDING ELEMENTS AND MATERIALS	**702.1 Interior finishes**	All newly installed interior wall and ceiling finishes shall comply with Chapter 8 of the International Building Code.	APPLIES
	702.2 Interior floor finish.	New interior floor finish, including new carpeting used as an interior floor finish material, shall comply with Section 804 of the International Building Code.	APPLIES
	702.3 Interior trim.	All newly installed interior trim materials shall comply with Section 806 of the International Building Code.	APPLIES
	702.4 Window opening control devices.	Pertains to Occupancy Group R-2 and R-3 only; requirements do not affect this project.	DOES NOT APPLY
	702.5 Emergency escape and	Pertains to Occupancy Group R-2 and R-3 only; requirements do not affect this project.	DOES NOT APPLY
	702.6 Materials and methods.	All new work shall comply with the materials and methods requirements in the International Building Code, International Energy Conservation Code, International Mechanical Code, and International Plumbing Code, as applicable, that specify material standards, detail of installation and connection, joints, penetrations, and continuity of any element, component, or system in the building.	APPLIES
	702.6.1 International Fuel Gas Code.	See text in code for requiremnents	APPLIES
703 FIRE PROTECTION	**703.1 General**	Alterations shall be done in a manner that maintains the level of fire protection provided.	NO LESS SAFE
704 MEANS OF EGRESS	**704.1 General**	Alterations shall be done in a manner that maintains the level of protection provided for the means of egress.	NO LESS SAFE

705 ACCESSIBILITY	**705.1 General**	A facility that is altered shall comply with the applicable provisions in Sections 705.1.1 through 705.1.14, and Chapter 11 of the International Building Code unless it is technically infeasible. Where compliance with this section is technically infeasible, the alteration shall provide access to the maximum extent that is technically feasible.	APPLIES
		A facility that is constructed or altered to be accessible shall be maintained accessible during occupancy. Exceptions: 1. The altered element or space is not required to be on an accessible route unless required by Section 705.2. 2. Accessible means of egress required by Chapter 10 of the International Building Code are not required to be provided in existing facilities. 3. Type B dwelling or sleeping units required by Section 1107 of the International Building Code are not required to be provided in existing facilities undergoing less than a Level 3 alteration. 4. The alteration to Type A individually owned dwelling units within a Group R-2 occupancy shall meet the provisions for Type B dwelling units.	APPLIES
	705.1.1 Entrances	Where an alteration includes alterations to an entrance, and the facility has an accessible entrance on an accessible route, the altered entrance is not required to be accessible unless required by Section 705.2. Signs complying with Section 1111 of the International Building Code shall be provided.	APPLIES
	705.1.2 Elevators	Altered elements of existing elevators shall comply with ASME A17.1/CSA B44 and ICC A117.1. Such elements shall also be altered in elevators programmed to respond to the same hall call control as the altered elevator.	DOES NOT APPLY
	705.1.3 Platform Lifts	Platform (wheelchair) lifts complying with ICC A117.1 and installed in accordance with ASME A18.1 shall be permitted as a component of an accessible route.	DOES NOT APPLY
	705.1.4 Ramps	RAMPS - Where steeper slopes than allowed by Section 1012.2 of the International Building Code are necessitated by space limitations, the slope of ramps in or providing access to existing facilities shall comply with Table 705.1.4.	APPLIES; 3" max for slopes from 1/8 to 1/10; 6" max for slopes from 1/10 to 1/12
	705.1.5 Dining Areas	DINING AREAS-An accessible route to raised or sunken dining areas or to outdoor seating areas is not required provided that the same services and decor are provided in an accessible space usable by any occupant and not restricted to use by people with a disability.	DOES NOT APPLY
	705.1.6 Jury Boxes and Witness Stands	JURY BOXES & WITNESS STANDS-In alterations, accessible wheelchair spaces are not required to be located within the defined area of raised jury boxes or witness stands and shall be permitted to be located outside these spaces where ramp or lift access poses a hazard by restricting or projecting into a required means of egress.	DOES NOT APPLY
	705.1.7 Accessible Dwelling or Sleeping Units	ACCESSIBLE DWELLING OR SLEEPING UNITS-Where Group I-1, I-2, I-3, R-1, R-2 or R-4 dwelling or sleeping units are being altered, the requirements of Section 1107 of the International Building Code for Accessible units apply only to the quantity of the spaces being altered.	DOES NOT APPLY

705.1.8 Type A Dwelling or Sleeping Units	TYPE A DWELLING OR SLEEPING UNITS-Where more than 20 Group R-2 dwelling or sleeping units are being altered, the requirements of Section 1107 of the International Building Code for Type A units and Chapter 9 of the International Building Code for visible alarms apply only to the quantity of the spaces being altered.	DOES NOT APPLY
705.1.9 Toilet Rooms	TOILET ROOMS-Where it is technically infeasible to alter existing toilet and bathing rooms to be accessible, an accessible family or assisted-use toilet or bathing room constructed in accordance with Section 1109.2.1 of the International Building Code is permitted. The family or assisted-use toilet or bathing room shall be located on the same floor and in the same area as the existing toilet or bathing rooms. At the inaccessible toilet and bathing rooms, directional signs indicating the location of the nearest family or assisted-use toilet room or bathing room shall be provided. These directional signs shall include the International Symbol of Accessibility and sign characters shall meet the visual character requirements in accordance with ICC A117.1.	TOILET ROOM RQMT WAIVED BY FORT BENTON BUILDING OFFICIAL
705.1.10 Dressing, Fitting, and Locker Rooms	DRESSING, FITTING, AND LOCKER ROOMS-Where it is technically infeasible to provide accessible dressing, fitting, or locker rooms at the same location as similar types of rooms, one accessible room on the same level shall be provided. Where separate sex facilities are provided, accessible rooms for each sex shall be provided. Separate sex facilities are not required where only unisex rooms are provided.	DOES NOT APPLY
705.1.11 Fuel Dispensers	FUEL DISPENSERS-Operable parts of replacement fuel dispensers shall be permitted to be 54 inches (1370 mm) maximum measured from the surface of the vehicular way where fuel dispensers are installed on existing curbs.	DOES NOT APPLY
705.1.12 Thresholds	THRESHOLDS-The maximum height of thresholds at doorways shall be 3/4" inch (19.1 mm). Such thresholds shall have beveled edges on each side.	APPLIES
705.1.13 Extent of Application	EXTENT OF APPLICATION-An alteration of an existing element, space, or area of a facility shall not impose a requirement for greater accessibility than that which would be required for new construction. Alterations shall not reduce or have the effect of reducing accessibility of a facility or portion of a facility.	APPLIES
705.1.14 Amusement Rides	AMUSEMENT RIDES-Where the structural or operational characteristics of an amusement ride are altered to the extent that the amusement ride's performance differs from that specified by the manufacturer or the original design, the amusement ride shall comply with requirements for new construction in accordance with Section 1110.4.8 of the International Building Code.	DOES NOT APPLY

	705.2 Alterations Affecting an Area Containing a Primary Function	ALTERATIONS AFFECTING AN AREA CONTAINING A PRIMARY FUNCTION- Where an alteration affects the accessibility to a, or contains an area of, primary function, the route to the primary function area shall be accessible. The accessible route to the primary function area shall include toilet facilities and drinking fountains serving the area of primary function. Exceptions: 1. The costs of providing the accessible route are not required to exceed 20 percent of the costs of the alterations affecting the area of primary function. 2. This provision does not apply to alterations limited solely to windows, hardware, operating controls, electrical outlets and signs. 3. This provision does not apply to alterations limited solely to mechanical systems, electrical systems, installation or alteration of fire protection systems and abatement of hazardous materials. 4. This provision does not apply to alterations undertaken for the primary purpose of increasing the accessibility of a facility. 5. This provision does not apply to altered areas limited to Type B dwelling and sleeping units.	APPLIES
706 RE-ROOFING	**706.1 General**	Materials and methods of application used for recovering or replacing an existing roof covering shall comply with the requirements of Chapter 15 of the International Building Code. Exception: Reroofing shall not be required to meet the minimum design slope requirement of one-quarter unit vertical in 12 units horizontal (2-percent slope) in Section 1507 of the International Building Code for roofs that provide positive roof drainage.	IGB ESIDENCE to be re-roofed; loading will not be increased.
	706.2 Structural and Construction Loads	Structural and construction loads. Structural roof components shall be capable of supporting the roof-covering system and the material and equipment loads that will be encountered during installation of the system.	APPLIES
	706.3 Recovering Versus Replacement	Recovering versus replacement - New roof coverings shall not be installed without first removing all existing layers of roof coverings down to the roof deck where any of the following conditions occur: 1. Where the existing roof or roof covering is water soaked or has deteriorated to the point that the existing roof or roof covering is not adequate as a base for additional roofing. 2. Where the existing roof covering is wood shake, slate, clay, cement or asbestos-cement tile. 3. Where the existing roof has two or more applications of any type of roof covering. Exceptions: A. Complete and separate roofing systems, such as standing-seam metal roof systems, that are designed to transmit the roof loads directly to the building's structural system and that do not rely on existing roofs and roof coverings for support, shall not require the removal of existing roof coverings. B. Metal panel, metal shingle and concrete and clay tile roof coverings shall be permitted to be installed over existing wood shake roofs when applied in accordance with Section 706.4. C. The application of a new protective coating over an existing spray polyurethane foam roofing system shall be permitted without tear-off of existing roof coverings. D. Where the existing roof assembly includes an ice barrier membrane that is adhered to the roof deck, the existing ice barrier membrane shall be permitted to remain in place and covered with an additional layer of ice barrier membrane in accordance with Section 1507 of the International Building Code.	APPLIES

	706.4 Roof Recovering	Roof recovering - Where the application of a new roof covering over wood shingle or shake roofs creates a combustible concealed space, the entire existing surface shall be covered with gypsum board, mineral fiber, glass fiber or other approved materials securely fastened in place.	DOES NOT APPLY
	706.5 Reinstallation of Materials	Reinstallation of materials - Existing slate, clay or cement tile shall be permitted for reinstallation, except that damaged, cracked or broken slate or tile shall not be reinstalled. Existing vent flashing, metal edgings, drain outlets, collars and metal counterflashings shall not be reinstalled where rusted, damaged or deteriorated. Aggregate surfacing materials shall not be reinstalled.	DOES NOT APPLY
	706.6 Flashings	Flashings shall be reconstructed in accordance with approved manufacturer's installation instructions. Metal flashing to which bituminous materials are to be adhered shall be primed prior to installation.	APPLIES
707 STRUCTURAL	**707.1 General**	STRUCTURAL - Where alteration work includes replacement of equipment that is supported by the building or where a reroofing permit is required, the provisions of this section shall apply.	APPLIES
	707.2 Addition or replacement of roofing or replacement of equipment.	Where addition or replacement of roofing or replacement of equipment results in additional dead loads, structural components supporting such reroofing or equipment shall comply with the gravity load requirements of the International Building Code. Exceptions: 1. Structural elements where the additional dead load from the roofing or equipment does not increase the force in the element by more than 5 percent. 2. Buildings constructed in accordance with the International Residential Code or the conventional lightframe construction methods of the International Building Code and where the dead load from the roofing or equipment is not increased by more than 5 percent. 3. Addition of a second layer of roof covering weighing 3 pounds per square foot (0.1437 kN/m2) or less over an existing, single layer of roof covering.	APPLIES
	707.3 Additional requirements for reroof permits.	The requirements of this section shall apply to alteration work requiring reroof permits.	DOES NOT APPLY
	707.3.1 Bracing for unreinforced masonry bearing wall parapets -	Where a permit is issued for reroofing for more than 25 percent of the roof area of a building assigned to Seismic Design Category D, E or F that has parapets constructed of unreinforced masonry, the work shall include installation of parapet bracing to resist the reduced International Building Code level seismic forces as specified in Section 301.1.4.2 of this code, unless an evaluation demonstrates compliance of such items.	DOES NOT APPLY

	707.3.2 Roof diaphragms resisting wind loads in high-wind regions -	Where roofing materials are removed from more than 50 percent of the roof diaphragm or section of a building located where the basic wind speed is greater than 90 mph or in a special wind region, as defined in Section 1609 of the International Building Code, roof diaphragms, connections of the roof diaphragm to roof framing members, and roof-to-wall connections shall be evaluated for the wind loads specified in the International Building Code, including wind uplift. If the diaphragms and connections in their current condition are not capable of resisting at least 75 percent of those wind loads, they shall be replaced or strengthened in accordance with the loads specified in the International Building Code.	APPLIES
708 ENERGY CONSERVATION	**708.1 Minimum Requirements**	Level 1 alterations to existing buildings or structures W/ AC are permitted without requiring the entire building or structure to comply with the energy requirements of the International Energy Conservation Code or International Residential Code. The alterations shall conform to the energy requirements of the International Energy Conservation Code or International Residential Code as they relate to new construction only.	DOES NOT APPLY

Requirements for Existing buildings
undergoing **LEVEL 2 ALTERATIONS** (chapter 8)

SECTION			IMPACT TO PROJECT
801 GENERAL	**801.1 Scope.**	Level 2 alterations as described in Section 504 shall comply with the requirements of this chapter. Exception: Buildings in which the reconfiguration is exclusively the result of compliance with the accessibility requirements of Section 705.2 shall be permitted to comply with Chapter 7.	DOES NOT APPLY
	801.2 Level 1 compliance	In addition to the requirements of this chapter, all work shall comply with the requirements of Chapter 7.	APPLIES
	801.3 Compliance [general]	All new construction elements, components, systems, and spaces shall comply with the requirements of the International Building Code. Exceptions: 1. Windows may be added without requiring compliance with the light and ventilation requirements of the International Building Code. 2. Newly installed electrical equipment shall comply with the requirements of Section 808. 3. The length of dead-end corridors in newly constructed spaces shall only be required to comply with the provisions of Section 805.6. 4. The minimum ceiling height of the newly created habitable and occupiable spaces and corridors shall be 7 feet (2134 mm).	** superceded by 1202.1 & 1202.4 for historic buildings
802 SPECIAL USE AND OCCUPANCY	**802.1 General**	Alteration of buildings classified as special use and occupancy as described in the International Building Code shall comply with the requirements of Section 801.1 and the scoping provisions of Chapter 1 where applicable.	DOES NOT APPLY
803 BUILDING ELEMENTS AND MATERIALS	**803.1 Scope**	The requirements of this section are limited to work areas in which Level 2 alterations are being performed and shall apply beyond the work area where specified.	Information
	803.2 Vertical Openings	Existing vertical openings shall comply with the provisions of Sections 803.2.1, 803.2.2 and 803.2.3.	DOES NOT APPLY
	803.2.1	All existing interior vertical openings connecting two or more floors shall be enclosed with approved assemblies having a fire-resistance rating of not less than 1 hour with approved opening protectives. Exceptions: 1. Where vertical opening enclosure is not required by the International Building Code or the International Fire Code. 2. Interior vertical openings other than stairways may be blocked at the floor and ceiling of the work area by installation of not less than 2 inches (51 mm) of solid wood or equivalent construction.	

3. The enclosure shall not be required where:
3.1. Connecting the main floor and mezzanines; or
3.2. All of the following conditions are met:
3.2.1. The communicating area has a low hazard occupancy or has a moderate hazard occupancy that is protected throughout by an automatic sprinkler system.
3.2.2. The lowest or next to the lowest level is a street floor.
3.2.3. The entire area is open and unobstructed in a manner such that it may be assumed that a fire in any part of the interconnected spaces will be readily obvious to all of the occupants.
3.2.4. Exit capacity is sufficient to provide egress simultaneously for all occupants of all levels by considering all areas to be a single floor area for the determination of required exit capacity. 3.2.5. Each floor level, considered separately, has at least onehalf of its individual required exit capacity provided by an exit or exits leading directly out of that level without having to traverse another communicating floor level or be exposed to the smoke or fire spreading from another communicating floor level.

4. In Group A occupancies, a minimum 30-minute enclosure shall be provided to protect all vertical openings not exceeding three stories.

5. In Group B occupancies, a minimum 30-minute enclosure shall be provided to protect all vertical openings not exceeding three stories. This enclosure, or the enclosure specified in Section 803.2.1, shall not be required in the following locations:
5.1. Buildings not exceeding 3,000 square feet (279 m2) per floor.
5.2. Buildings protected throughout by an approved automatic fire sprinkler system.

6. In Group E occupancies, the enclosure shall not be required for vertical openings not exceeding three stories when the building is protected throughout by an approved automatic fire sprinkler system.

7. In Group F occupancies, the enclosure shall not be required in the following locations:
7.1. Vertical openings not exceeding three stories.
7.2. Special purpose occupancies where necessary for manufacturing operations and direct access is provided to at least one protected stairway.
7.3. Buildings protected throughout by an approved automatic sprinkler system.

8. In Group H occupancies, the enclosure shall not be required for vertical openings not exceeding three stories where necessary for manufacturing operations and every floor level has direct access to at least two remote enclosed stairways or other approved exits.

9. In Group M occupancies, a minimum 30-minute enclosure shall be provided to protect all vertical openings not exceeding three stories. This enclosure, or the enclosure specified in Section 803.2.1, shall not be required in the following locations:
9.1. Openings connecting only two floor levels.
9.2. Occupancies protected throughout by an approved automatic sprinkler system.

	10. In Group R-1 occupancies, the enclosure shall not be required for vertical openings not exceeding three stories in the following locations: 10.1. Buildings protected throughout by an approved automatic sprinkler system. 10.2. Buildings with less than 25 dwelling units or sleeping units where every sleeping room above the second floor is provided with direct access to a fire escape or other approved second exit by means of an approved exterior door or window having a sill height of not greater than 44 inches (1118 mm) and where: 10.2.1. Any exit access corridor exceeding 8 feet (2438 mm) in length that serves two means of egress, one of which is an unprotected vertical opening, shall have at least one of the means of egress separated from the vertical opening by a 1-hour fire barrier; and 10.2.2. The building is protected throughout by an automatic fire alarm system, installed and supervised in accordance with the International Building Code.	
	11. In Group R-2 occupancies, a minimum 30-minute enclosure shall be provided to protect all vertical openings not exceeding three stories. This enclosure, or the enclosure specified in Section 803.2.1, shall not be required in the following locations: 11.1. Vertical openings not exceeding two stories with not more than four dwelling units per floor. 11.2. Buildings protected throughout by an approved automatic sprinkler system. 11.3. Buildings with not more than four dwelling units per floor where every sleeping room above the second floor is provided with direct access to a fire escape or other approved second exit by means of an approved exterior door or window having a sill height of not greater than 44 inches (1118 mm) and the building is protected throughout by an automatic fire alarm system complying with Section 804.4.	
	12. One- and two-family dwellings. 13. Group S occupancies where connecting not more than two floor levels or where connecting not more than three floor levels and the structure is equipped throughout with an approved automatic sprinkler system. 14. Group S occupancies where vertical opening protection is not required for open parking garages and ramps.	
803.2.2 Supplemental shaft and floor opening enclosure requirements.	Where the work area on any floor exceeds 50 percent of that floor area, the enclosure requirements of Section 803.2 shall apply to vertical openings other than stairways throughout the floor. Exception: Vertical openings located in tenant spaces that are entirely outside the work area.	DOES NOT APPLY
803.2.3 Supplemental stairway enclosure requirements.	Where the work area on any floor exceeds 50 percent of that floor area, stairways that are part of the means of egress serving the work area shall, at a minimum, be enclosed with smoke-tight construction on the highest work area floor and all floors below. Exception: Where stairway enclosure is not required by the International Building Code or the International Fire Code.	DOES NOT APPLY
803.3 Smoke Compartments	In Group I-2 occupancies where the work area is on a story used for sleeping rooms for more than 30 patients, the story shall be divided into not less than two compartments by smoke barrier walls in accordance with Section 407.5 of the International Building Code as required for new construction.	DOES NOT APPLY
803.4 Interior finish	The interior finish of walls and ceilings in exits and corridors in any work area shall comply with the requirements of the International Building Code. Exception: Existing interior finish materials that do not comply with the interior finish requirements of the International Building Code shall be permitted to be treated with an approved fire-retardant coating in accordance with the manufacturer's instructions to achieve the required rating.	APPLIES

SECTION			IMPACT TO PROJECT
	803.4.1 Supplemental interior finish requirements.	Where the work area on any floor exceeds 50 percent of the floor area, Section 803.4 shall also apply to the interior finish in exits and corridors serving the work area throughout the floor. Exception: Interior finish within tenant spaces that are entirely outside the work area.	APPLIES
	803.5 Guards	The requirements of Sections 803.5.1 and 803.5.2 shall apply in all work areas.	DOES NOT APPLY
	803.5.1 Minimum requirement - Guards	Every portion of a floor, such as a balcony or a loading dock, that is more than 30 inches (762 mm) above the floor or grade below and is not provided with guards, or those in which the existing guards are judged to be in danger of collapsing, shall be provided with guards.	DOES NOT APPLY
	803.5.2 Design - Guards.	Where there are no guards or where existing guards must be replaced, the guards shall be designed and installed in accordance with the International Building Code.	DOES NOT APPLY
	803.6 Fire Resistance ratings	Where approved by the code official, buildings where an automatic sprinkler system installed in accordance with Section 903.3.1.1 or 903.3.1.2 of the International Building Code has been added, and the building is now sprinklered throughout, the required fire-resistance ratings of building elements and materials shall be permitted to meet the requirements of the current building code. The building is required to meet the other applicable requirements of the International Building Code. Plans, investigation and evaluation reports, and other data shall be submitted indicating which building elements and materials the applicant is requesting the code official to review and approve for determination of applying the current building code fire-resistance ratings. Any special construction features, including fire-resistance-rated assemblies and smoke-resistive assemblies, conditions of occupancy, meansof-egress conditions, fire code deficiencies, approved modifications or approved alternative materials, design and methods of construction, and equipment applying to the building that impact required fire-resistance ratings shall be identified in the evaluation reports submitted.	See 1202.4 & 1202.1; sprinkler system would be an ADVERSE EFFECT to the historic property
804 FIRE PROTECTION	**804.1 Scope**	The requirements of this section shall be limited to work areas in which Level 2 alterations are being performed, and where specified they shall apply throughout the floor on which the work areas are located or otherwise beyond the work area.	Information
	804.1.1 Corridor ratings.	Where an approved automatic sprinkler system is installed throughout the story, the required fire-resistance rating for any corridor located on the story shall be permitted to be reduced in accordance with the International Building Code. In order to be considered for a corridor rating reduction, such system shall provide coverage for the stairway landings serving the floor and the intermediate landings immediately below.	DOES NOT APPLY
	804.2 Automatic Sprinkler Systems	Automatic sprinkler systems shall be provided in accordance with the requirements of Sections 804.2.1 through 804.2.5. Installation requirements shall be in accordance with the International Building Code.	DOES NOT APPLY; individual exits serve fewer than 30 occupants [804.2.2] and fire area is less than 12000 SF; fire area has occupant load less than 300 [903.2.1.3 of IBC]
	804.2.1 High-rise buildings.	In high-rise buildings, work areas that have exits or corridors shared by more than one tenant or that have exits or corridors serving an occupant load greater than 30 shall be provided with automatic sprinkler protection in the entire work area where the work area is located on a floor that has a sufficient sprinkler water supply system from an existing standpipe or a sprinkler riser serving that floor.	DOES NOT APPLY
	804.2.1.1 Supplemental automatic sprinkler system requirements - high rise buildings	Where the work area on any floor exceeds 50 percent of that floor area, Section 804.2.1 shall apply to the entire floor on which the work area is located. Exception: Occupied tenant spaces that are entirely outside the work area.	DOES NOT APPLY

SECTION		IMPACT TO PROJECT
804.2.2 Groups A, B, E, F-1, H, I, M, R-1, R-2, R-4, S-1 and S-2.	In buildings with occupancies in Groups A, B, E, F-1, H, I, M, R-1, R-2, R-4, S-1 and S-2, work areas that have exits or corridors shared by more than one tenant or that have exits or corridors serving an occupant load greater than 30 shall be provided with automatic sprinkler protection where all of the following conditions occur: 1. The work area is required to be provided with automatic sprinkler protection in accordance with the International Building Code as applicable to new construction; and 2. The work area exceeds 50 percent of the floor area. Exception: If the building does not have sufficient municipal water supply for design of a fire sprinkler system available to the floor without installation of a new fire pump, work areas shall be protected by an automatic smoke detection system throughout all occupiable spaces other than sleeping units or individual dwelling units that activates the occupant notification system in accordance with Sections 907.4, 907.5 and 907.6 of the International Building Code.	DOES NOT APPLY
804.2.2.1 Mixed uses.	In work areas containing mixed uses, one or more of which requires automatic sprinkler protection in accordance with Section 804.2.2, such protection shall not be required throughout the work area provided that the uses requiring such protection are separated from those not requiring protection by fire-resistance-rated construction having a minimum 2-hour rating for Group H and a minimum 1-hour rating for all other occupancy groups.	DOES NOT APPLY
804.2.3 Windowless stories.	Work located in a windowless story, as determined in accordance with the International Building Code, shall be sprinklered where the work area is required to be sprinklered under the provisions of the International Building Code for newly constructed buildings and the building has a sufficient municipal water supply without installation of a new fire pump.	DOES NOT APPLY
804.2.4 Other required automatic sprinkler systems.	In buildings and areas listed in Table 903.2.11.6 of the International Building Code, work areas that have exits or corridors shared by more than one tenant or that have exits or corridors serving an occupant load greater than 30 shall be provided with an automatic sprinkler system under the following conditions: 1. The work area is required to be provided with an automatic sprinkler system in accordance with the International Building Code applicable to new construction; and 2. The building has sufficient municipal water supply for design of an automatic sprinkler system available to the floor without installation of a new fire pump.	DOES NOT APPLY
804.2.5 Supervision.	Fire sprinkler systems required by this section shall be supervised by one of the following methods: 1. Approved central station system in accordance with NFPA 72; 2. Approved proprietary system in accordance with NFPA 72; 3. Approved remote station system of the jurisdiction in accordance with NFPA 72; or 4. When approved by the code official, approved local alarm service that will cause the sounding of an alarm in accordance with NFPA 72. Exception: Supervision is not required for the following: 1. Underground gate valve with roadway boxes. 2. Halogenated extinguishing systems. 3. Carbon dioxide extinguishing systems. 4. Dry- and wet-chemical extinguishing systems. 5. Automatic sprinkler systems installed in accordance with NFPA 13R where a common supply main is used to supply both domestic and automatic sprinkler systems and a separate shutoff valve for the automatic sprinkler system is not provided.	DOES NOT APPLY

SECTION		IMPACT TO PROJECT
804.3 Standpipes.	Where the work area includes exits or corridors shared by more than one tenant and is located more than 50 feet (15 240 mm) above or below the lowest level of fire department access, a standpipe system shall be provided. Standpipes shall have an approved fire department connection with hose connections at each floor level above or below the lowest level of fire department access. Standpipe systems shall be installed in accordance with the International Building Code. Exceptions: 1. No pump shall be required provided that the standpipes are capable of accepting delivery by fire department apparatus of a minimum of 250 gallons per minute (gpm) at 65 pounds per square inch (psi) (946 L/m at 448KPa) to the topmost floor in buildings equipped throughout with an automatic sprinkler system or a minimum of 500 gpm at 65 psi (1892 L/m at 448KPa) to the topmost floor in all other buildings. Where the standpipe terminates below the topmost floor, the standpipe shall be designed to meet (gpm/psi) (L/m/KPa) requirements of this exception for possible future extension of the standpipe. 2. The interconnection of multiple standpipe risers shall not be required.	DOES NOT APPLY
804.4 Fire alarm and detection.	An approved fire alarm system shall be installed in accordance with Sections 804.4.1 through 804.4.3. Where automatic sprinkler protection is provided in accordance with Section 804.2 and is connected to the building fire alarm system, automatic heat detection shall not be required. An approved automatic fire detection system shall be installed in accordance with the provisions of this code and NFPA 72. Devices, combinations of devices, appliances, and equipment shall be approved. The automatic fire detectors shall be smoke detectors, except that an approved alternative type of detector shall be installed in spaces such as boiler rooms, where products of combustion are present during normal operation in sufficient quantity to actuate a smoke detector.	APPLIES
804.4.1 Occupancy requirements.	A fire alarm system shall be installed in accordance with Sections 804.4.1.1 through 804.4.1.7. Existing alarm-notification appliances shall be automatically activated throughout the building. Where the building is not equipped with a fire alarm system, alarm-notification appliances within the work area shall be provided and automatically activated. Exceptions: 1. Occupancies with an existing, previously approved fire alarm system. 2. Where selective notification is permitted, alarmnotification appliances shall be automatically activated in the areas selected.	APPLIES
804.4.1.1 Group E.	A fire alarm system shall be installed in work areas of Group E occupancies as required by the International Fire Code for existing Group E occupancies.	DOES NOT APPLY
804.4.1.2 Group I-1.	A fire alarm system shall be installed in work areas of Group I-1 residential care/ assisted living facilities as required by the International Fire Code for existing Group I-1	DOES NOT APPLY
804.4.1.3 Group I-2.	A fire alarm system shall be installed throughout Group I-2 occupancies as required by the International Fire Code.	DOES NOT APPLY
804.4.1.4 Group I-3.	A fire alarm system shall be installed in work areas of Group I-3 occupancies as required by the International Fire Code.	DOES NOT APPLY
804.4.1.5 Group R-1.	A fire alarm system shall be installed in Group R-1 occupancies as required by the International Fire Code for existing Group R-1 occupancies.	DOES NOT APPLY
804.4.1.6 Group R-2.	A fire alarm system shall be installed in work areas of Group R-2 apartment buildings as required by the International Fire Code for existing Group R-2 occupancies.	DOES NOT APPLY
804.4.1.7 Group R-4.	A fire alarm system shall be installed in work areas of Group R-4 residential care/ assisted living facilities as required by the International Fire Code for existing Group R-4 occupancies.	DOES NOT APPLY
804.4.2 Supplemental fire alarm system requirements.	Where the work area on any floor exceeds 50 percent of that floor area, Section 804.4.1 shall apply throughout the floor. Exception: Alarm-initiating and notification appliances shall not be required to be installed in tenant spaces outside of the work area.	APPLIES

SECTION			IMPACT TO PROJECT
	804.4.3 Smoke alarms.	Individual sleeping units and individual dwelling units in any work area in Group R and I-1 occupancies shall be provided with smoke alarms in accordance with the International Fire Code. Exception: Interconnection of smoke alarms outside of the work area shall not be required.	DOES NOT APPLY
805 MEANS OF EGRESS	**805.1 Scope**	The requirements of this section shall be limited to work areas that include exits or corridors shared by more than one tenant within the work area in which Level 2 alterations are being performed, and where specified they shall apply throughout the floor on which the work areas are located or otherwise beyond the work area.	DOES NOT APPLY
	805.2 General	The means of egress shall comply with the requirements of this section. Exceptions: 1. Where the work area and the means of egress serving it complies with NFPA 101. 2. Means of egress conforming to the requirements of the building code under which the building was constructed shall be considered compliant means of egress if, in the opinion of the code official, they do not constitute a distinct hazard to life.	DOES NOT APPLY
	805.3 Number of Exits	The number of exits shall be in accordance with Sections 805.3.1 through 805.3.3.	DOES NOT APPLY
	805.3.1 Minimum number	Every story utilized for human occupancy on which there is a work area that includes exits or corridors shared by more than one tenant within the work area shall be provided with the minimum number of exits based on the occupancy and the occupant load in accordance with the International Building Code. In addition, the exits shall comply with Sections 805.3.1.1 and 805.3.1.2.	DOES NOT APPLY
	805.3.1.1 Single-exit buildings.	Only one exit is required from buildings and spaces of the following occupancies: 1. In Group A, B, E, F, M, U and S occupancies, a single exit is permitted in the story at the level of exit discharge when the occupant load of the story does not exceed 50 and the exit access travel distance does not exceed 75 feet (22 860 mm). 2. Group B, F-2, and S-2 occupancies not more than two stories in height that are not greater than 3,500 square feet per floor (326 m2), when the exit access travel distance does not exceed 75 feet (22 860 mm). The minimum fire-resistance rating of the exit enclosure and of the opening protection shall be 1 hour. 3. Open parking structures where vehicles are mechanically parked. 4. In Group R-4 occupancies, the maximum occupant load excluding staff is 16. 5. Groups R-1 and R-2 not more than two stories in height, when there are not more than four dwelling units per floor and the exit access travel distance does not exceed 50 feet (15 240 mm). The minimum fire-resistance rating of the exit enclosure and of the opening protection shall be 1 hour. 6. In multilevel dwelling units in buildings of occupancy Group R-1 or R-2, an exit shall not be required from every level of the dwelling unit provided that one of the following conditions is met: 6.1. The travel distance within the dwelling unit does not exceed 75 feet (22 860mm); or 6.2. The building is not more than three stories in height and all third-floor space is part of one or more dwelling units located in part on the second floor; and no habitable room within any such dwelling unit shall have a travel distance that exceeds 50 feet (15 240 mm) from the outside of the habitable room entrance door to the inside of the entrance door to the dwelling unit. 7. In Group R-2, H-4, H-5 and I occupancies and in rooming houses and child care centers, a single exit is permitted in a one-story building with a maximum occupant load of 10 and the exit access travel distance does not exceed 75 feet (22 860 mm).	APPLIES

	8. In buildings of Group R-2 occupancy that are equipped throughout with an automatic fire sprinkler system, a single exit shall be permitted from a basement or story below grade if every dwelling unit on that floor is equipped with an approved window providing a clear opening of at least 5 square feet (0.47 m2) in area, a minimum net clear opening of 24 inches (610 mm) in height and 20 inches (508mm) in width, and a sill height of not more than 44 inches (1118 mm) above the finished floor. 9. In buildings of Group R-2 occupancy of any height with not more than four dwelling units per floor; with a smokeproof enclosure or outside stairway as an exit; and with such exit located within 20 feet (6096 mm) of travel to the entrance doors to all dwelling units served thereby. 10. In buildings of Group R-3 occupancy equipped throughout with an automatic fire sprinkler system, only one exit shall be required from basements or stories below grade.	
805.3.1.2 Fire Escapes Required	For other than Group I-2, where more than one exit is required, an existing or newly constructed fire escape complying with Section 805.3.1.2.1 shall be accepted as providing one of the required means of egress.	DOES NOT APPLY
805.3.1.2.1 Fire escape access and details.	Fire escapes shall comply with all of the following requirements: 1. Occupants shall have unobstructed access to the fire escape without having to pass through a room subject to locking. 2. Access to a new fire escape shall be through a door, except that windows shall be permitted to provide access from single dwelling units or sleeping units in Group R-1, R-2 and I-1 occupancies or to provide access from spaces having a maximum occupant load of 10 in other occupancy classifications. 2.1. The window shall have a minimum net clear opening of 5.7 square feet (0.53 m2) or 5 square feet (0.46 m2) where located at grade. 2.2. The minimum net clear opening height shall be 24 inches (610 mm) and net clear opening width shall be 20 inches (508 mm). 2.3. The bottom of the clear opening shall not be greater than 44 inches (1118 mm) above the floor. 2.4. The operation of the window shall comply with the operational constraints of the International Building Code. 3. Newly constructed fire escapes shall be permitted only where exterior stairways cannot be utilized because of lot lines limiting the stairway size or because of the sidewalks, alleys, or roads at grade level. 4. Openings within 10 feet (3048 mm) of fire escape stairways shall be protected by fire assemblies having minimum 3/4 -hour fire-resistance ratings. Exception: Opening protection shall not be required in buildings equipped throughout with an approved automatic sprinkler system. 5. In all buildings of Group E occupancy, up to and including the 12th grade, buildings of Group I occupancy, rooming houses and childcare centers, ladders of any type are prohibited on fire escapes used as a required means of egress.	DOES NOT APPLY
805.3.1.2.2 Construction - fire escapes	The fire escape shall be designed to support a live load of 100 pounds per square foot (4788 Pa) and shall be constructed of steel or other approved noncombustible materials. Fire escapes constructed of wood not less than nominal 2 inches (51 mm) thick are permitted on buildings of Type V construction. Walkways and railings located over or supported by combustible roofs in buildings of Types III and IV construction are permitted to be of wood not less than nominal 2 inches (51 mm) thick.	DOES NOT APPLY
805.3.1.2.3 Dimensions - fire escapes	Stairways shall be at least 22 inches (559 mm) wide with risers not more than, and treads not less than, 8 inches (203 mm). Landings at the foot of stairways shall be not less than 40 inches (1016 mm) wide by 36 inches (914 mm) long and located not more than 8 inches (203 mm) below the door.	DOES NOT APPLY

SECTION		IMPACT TO PROJECT
805.3.2 Mezzanines	Mezzanines in the work area and with an occupant load of more than 50 or in which the travel distance to an exit exceeds 75 feet (22 860 mm) shall have access to at least two independent means of egress. Exception: Two independent means of egress are not required where the travel distance to an exit does not exceed 100 feet (30 480 mm) and the building is protected throughout with an automatic sprinkler system.	DOES NOT APPLY
805.3.3 Main entrance Group A.	All buildings of Group A with an occupant load of 300 or more shall be provided with a main entrance capable of serving as the main exit with an egress capacity of at least one-half of the total occupant load. The remaining exits shall be capable of providing one-half of the total required exit capacity. Exception: Where there is no well-defined main exit or where multiple main exits are provided, exits shall be permitted to be distributed around the perimeter of the building provided that the total width of egress is not less than 100 percent of the required width.	DOES NOT APPLY
805.4 Egress doorways.	Egress doorways in any *work area* shall comply with Sections 805.4.1 through 805.4.5.	APPLIES
805.4.1 Two egress doorways required.	Work areas shall be provided with two egress doorways in accordance with the requirements of Sections 805.4.1.1 and 805.4.1.2.	APPLIES
805.4.1.1 Occupant load and travel distance.	In any *work area* , all rooms and spaces having an occupant load greater than 50 or in which the travel distance to an exit exceeds 75 feet (22 860 mm) shall have a minimum of two egress doorways. Exceptions: 1. Storage rooms having a maximum occupant load of 10. 2. Where the work area is served by a single exit in accordance with Section 805.3.1.1.	DOES NOT APPLY
805.4.1.2 Group I-2.	In buildings of Group I-2 occupancy, any patient sleeping room or suite of patient rooms greater than 1,000 square feet (93 m) within the work area shall have a minimum of two egress doorways.	DOES NOT APPLY
805.4.2 Door Swing	In the *work area* and in the egress path from any *work area* to the exit discharge, all egress doors serving an occupant load greater than 50 shall swing in the direction of exit travel.	DOES NOT APPLY
805.4.2.1 Supplemental requirements for door swing.	Where the *work area* exceeds 50 percent of the floor area, door swing shall comply with Section 805.4.2 throughout the floor. Exception: Means of egress within or serving only a tenant space that is entirely outside the work area.	APPLIES
805.4.3 Door Closing	In any *work area* , all doors opening onto an exit passageway at grade or an exit stairway shall be self-closing or automatic-closing by listed closing devices. Exceptions: 1. Where exit enclosure is not required by the International Building Code. 2. Means of egress within or serving only a tenant space that is entirely outside the work area.	APPLIES
805.4.3.1 Supplemental requirements for door closing.	Where the *work area* exceeds 50 percent of the floor area, doors shall comply with Section 805.4.3 throughout the exit stairway from the work area to, and including, the level of exit discharge.	DOES NOT APPLY
805.4.4 Panic hardware.	In any *work area* , and in the egress path from any *work area* to the exit discharge, in buildings or portions thereof of Group A assembly occupancies with an occupant load greater than 100, all required exit doors equipped with latching devices shall be equipped with approved panic hardware.	DOES NOT APPLY

SECTION		IMPACT TO PROJECT
805.4.4.1 Supplemental requirements for panic hardware.	Where the *work area* exceeds 50 percent of the floor area, panic hardware shall comply with Section 805.4.4 throughout the floor. Exception: Means of egress within a tenant space that is entirely outside the *work area.*	DOES NOT APPLY
805.4.5 Emergency power source in Group I-3.	Power-operated sliding doors or power-operated locks for swinging doors shall be operable by a manual release mechanism at the door. Emergency power shall be provided for the doors and locks in accordance with Section 2702 of the *International Building Code* . Exceptions: 1. Emergency power is not required in facilities with 10 or fewer locks complying with the exception to Section 408.4.1 of the International Building Code. 2. Emergency power is not required where remote mechanical operating releases are provided.	DOES NOT APPLY
805.5 Openings in corridor walls.	Openings in corridor walls in any *work area* shall comply with Sections 805.5.1 through 805.5.4. Exception: Openings in corridors where such corridors are not required to be rated in accordance with the International Building Code.	APPLIES
805.5.1 Corridor doors.	Corridor doors in the *work area* shall not be constructed of hollow core wood and shall not contain louvers. All dwelling unit or sleeping unit corridor doors in work areas in buildings of Groups R-1, R-2, and I-1 shall be at least 1-3/8-inch (35 mm) solid core wood or approved equivalent and shall not have any glass panels, other than approved wired glass or other approved glazing material in metal frames. All dwelling unit or sleeping unit corridor doors in *work areas* in buildings of Groups R-1, R-2, and I-1 shall be equipped with approved door closers. All replacement doors shall be 1-3/4-inch (44 mm) solid bonded wood core or approved equivalent, unless the existing frame will accommodate only a 1-3/8-inch (35 mm) door. Exceptions: 1. Corridor doors within a dwelling unit or sleeping unit. 2. Existing doors meeting the requirements of *Guidelines on Fire Ratings of Archaic Materials and Assemblies (IEBC Resource A) for a rating of 15 minutes or more shall be accepted as meeting the provisions of this requirement.* 3. Existing doors in buildings protected throughout with an approved automatic sprinkler system shall be required only to resist smoke, be reasonably tight fitting, and shall not contain louvers. 4. In group homes with a maximum of 15 occupants and that are protected with an approved automatic detection system, closing devices may be omitted. 5. Door assemblies having a fire protection rating of at least 20 minutes.	APPLIES
805.5.2 Transoms.	In all buildings of Group I-1, I-2, R-1 and R-2 occupancies, all transoms in corridor walls in work areas shall be either glazed with 1/4-inch (6.4 mm) wired glass set in metal frames or other glazing assemblies having a fire protection rating as required for the door and permanently secured in the closed position or sealed with materials consistent with the corridor construction.	DOES NOT APPLY
805.5.3 Other corridor openings.	In any *work area* , any other sash, grille, or opening in a corridor and any window in a corridor not opening to the outside air shall be sealed with materials consistent with the corridor construction.	DOES NOT APPLY

SECTION		IMPACT TO PROJECT
805.5.3.1 Supplemental requirements for other corridor opening.	Where the *work area* exceeds 50 percent of the floor area, Section 805.5.3 shall be applicable to all corridor windows, grills, sashes, and other openings on the floor. Exception: Means of egress within or serving only a tenant space that is entirely outside the work area.	APPLIES
805.5.4 Supplemental requirements for corridor openings.	Where the *work area* on any floor exceeds 50 percent of the floor area, the requirements of Sections 805.5.1 through 805.5.3 shall apply throughout the floor.	APPLIES
805.6 Dead-end corridors.	Dead-end corridors in any work area shall not exceed 35 feet (10 670 mm). Exceptions: 1. Where dead-end corridors of greater length are permitted by the International Building Code. 2. In other than Group A and H occupancies, the maximum length of an existing dead-end corridor shall be 50 feet (15 240 mm) in buildings equipped throughout with an automatic fire alarm system installed in accordance with the International Building Code. 3. In other than Group A and H occupancies, the maximum length of an existing dead-end corridor shall be 70 feet (21 356 mm) in buildings equipped throughout with an automatic sprinkler system installed in accordance with the International Building Code. 4. In other than Group A and H occupancies, the maximum length of an existing, newly constructed, or extended dead-end corridor shall not exceed 50 feet (15 240 mm) on floors equipped with an automatic sprinkler system installed in accordance with the International Building Code.	APPLIES
805.7 Means-of-egress lighting.	Means-of-egress lighting shall be in accordance with this section, as applicable.	APPLIES
805.7.1 Artificial lighting required.	Means of egress in all work areas shall be provided with artificial lighting in accordance with the requirements of the *International Building Code*.	APPLIES
805.7.2 Supplemental requirements for means-of-egress lighting.	Where the *work area* on any floor exceeds 50 percent of that floor area, means of egress throughout the floor shall comply with Section 805.7.1. Exception: Means of egress within or serving only a tenant space that is entirely outside the work area.	APPLIES
805.8 Exit signs.	Exit signs shall be in accordance with this section, as applicable.	APPLIES
805.8.1 Work areas.	Means of egress in all work areas shall be provided with exit signs in accordance with the requirements of the *International Building Code* .	APPLIES
805.8.2 Supplemental requirements for exit signs.	Where the *work area* on any floor exceeds 50 percent of that floor area, means of egress throughout the floor shall comply with Section 805.8.1. Exception: Means of egress within a tenant space that is entirely outside the work area.	APPLIES
805.9 Handrails.	The requirements of Sections 805.9.1 and 805.9.2 shall apply to handrails from the *work area* floor to, and including, the level of exit discharge.	DOES NOT APPLY
805.9.1 Minimum requirement.	Every required exit stairway that is part of the means of egress for any *work area* and that has three or more risers and is not provided with at least one handrail, or in which the existing handrails are judged to be in danger of collapsing, shall be provided with handrails for the full length of the stairway on at least one side. All exit stairways with a required egress width of more than 66 inches (1676 mm) shall have handrails on both sides.	DOES NOT APPLY
805.9.2 Design.	Handrails required in accordance with Section 805.9.1 shall be designed and installed in accordance with the provisions of the *International Building Code* .	DOES NOT APPLY

SECTION			IMPACT TO PROJECT
	805.10 Refuge areas.	Where alterations affect the configuration of an area utilized as a refuge area, the capacity of the refuge area shall not be reduced below that required in Sections 805.10.1 and 805.10.2.	DOES NOT APPLY
	805.10.1 Capacity.	The required capacity of refuge areas shall be in accordance with Sections 805.10.1.1 through 805.10.1.3.	DOES NOT APPLY
	805.10.1.1 Group I-2.	In Group I-2 occupancies, the required capacity of the refuge areas for smoke compartments in accordance with Section 407.5.1 of the *International Building Code* shall be maintained.	DOES NOT APPLY
	805.10.1.2 Group I-3.	In Group I-3 occupancies, the required capacity of the refuge areas for smoke compartments in accordance with Section 408.6.2 of the *International Building Code* shall be maintained.	DOES NOT APPLY
	805.10.1.3 Ambulatory care.	In ambulatory care facilities required to be separated by Section 422.2 of the *International Building Code* , the required capacity of the refuge areas for smoke compartments in accordance with Section 422.4 of the *International Building Code* shall be maintained.	DOES NOT APPLY
	805.10.2 Horizontal exits.	The required capacity of the refuge area for horizontal exits in accordance with Section 1026.4 of the *International Building Code* shall be maintained.	DOES NOT APPLY
	805.11 Guards.	The requirements of Sections 805.11.1 and 805.11.2 shall apply to guards from the *work area* floor to, and including, the level of exit discharge but shall be confined to the egress path of any *work area* .	DOES NOT APPLY
	805.11.1 Minimum requirement.	Every open portion of a stairway, landing, or balcony that is more than 30 inches (762 mm) above the floor or grade below and is not provided with guards, or those portions in which existing guards are judged to be in danger of collapsing, shall be provided with guards.	DOES NOT APPLY
	805.11.2 Design.	Guards required in accordance with Section 805.11.1 shall be designed and installed in accordance with the *International Building Code* .	DOES NOT APPLY
806 ACCESSIBILITY	**806.1 Accessibility**	A building, facility, or element that is altered shall comply with this section and Section 705.	APPLIES
	806.2 Stairways and escalators in existing buildings	In *alterations* where an escalator or stairway is added where none existed previously, an accessible route shall be provided in accordance with Sections 1104.4 and 1104.5 of the *International Building Code* .	DOES NOT APPLY
807 STRUCTURAL	**807 Structural**	Structural elements and systems within buildings undergoing Level 2 alterations shall comply with this section.	APPLIES
	807.2 New Structural elements	New structural elements in alterations, including connections and anchorage, shall comply with the IBC	APPLIES
	807.3 Minimum design loads.	The minimum design loads on existing elements of a structure that do not support additional loads AS A RESULT OF THE ALTERATION SHALL BE THE LOADS APPLICABLE AT THE TIME THE BUILDING WAS CONSTRUCTED.	APPLIES

SECTION			IMPACT TO PROJECT
	807.4 Existing structural elements carrying gravity loads.	Alterations shall not reduce the capacity of existing gravity load-carrying structural elements unless it is demonstrated that the elements have the capacity to carry the applicable design gravity loads required by the International Building Code. Existing structural elements supporting any additional gravity loads as a result of the alterations, including the effects of snow drift, shall comply with the International Building Code. Exceptions: 1. Structural elements whose stress is not increased by more than 5 percent. 2. Buildings of Group R occupancy with not more than five dwelling or sleeping units used solely for residential purposes where the existing building and its alteration comply with the conventional light-frame construction methods of the International Building Code or the provisions of the International Residential Code.	APPLIES
	807.5 Existing structural elements resisting lateral loads.	Except as permitted by Section 807.6, where the alteration increases design lateral loads, or where the alteration results in prohibited structural irregularity as defined in ASCE 7, or where the alteration decreases the capacity of any existing lateral load-carrying structural element, the structure of the altered building or structure shall be shown to meet the wind and seismic provisions of the International Building Code. Reduced International Building Code-level seismic forces in accordance with Section 301.1.4.2 shall be permitted. Exception: Any existing lateral load-carrying structural element whose demand-capacity ratio with the alteration considered is not more than 10 percent greater than its demand-capacity ratio with the alteration ignored shall be permitted to remain unaltered. For purposes of calculating demand-capacity ratios, the demand shall consider applicable load combinations with design lateral loads or forces in accordance with International Building Code Sections 1609 and 1613. Reduced International Building Code level seismic forces in accordance with Section 301.1.4.2 shall be permitted. For purposes of this exception, comparisons of demand-capacity ratios and calculation of design lateral loads, forces and capacities shall account for the cumulative effects of additions and alterations since original construction.	APPLIES
	807.6 Voluntary lateral force-resisting system alterations.	Alterations of existing structural elements and additions of new structural elements that are initiated for the purpose of increasing the lateral force-resisting strength or stiffness of an existing structure and that are not required by other sections of this code shall not be required to be designed for forces conforming to the International Building Code, provided that an engineering analysis is submitted to show that:. 1. The capacity of existing structural elements required to resist forces is not reduced; 2. The lateral loading to existing structural elements is not increased either beyond its capacity or more than 10 percent; 3. New structural elements are detailed and connected to the existing structural elements as required by the International Building Code; 4. New or relocated nonstructural elements are detailed and connected to existing or new structural elements as required by the International Building Code; and 5. A *dangerous* condition as defined in this code is not created. Voluntary *alterations* to lateral force-resisting systems conducted in accordance with Appendix A and the referenced standards of this code shall be permitted.	APPLIES
808 ELECTRICAL	**808.1New installations**	[N]-All newly installed electrical equipment and wiring relating to work done in any work area shall comply with all applicable requirements of NFPA 70 except as provided for in Section 808.3.	APPLIES
	808.2 Existing installations.	[E]-Existing wiring in all work areas in Group A-1, A-2, A-5, H and I occupancies shall be upgraded to meet the materials and methods requirements of Chapter 7.	DOES NOT APPLY
	808.3 Residential occupancies.	In Group R-2, R-3 and R-4 occupancies and buildings regulated by the *International Residential Code* , the requirements of Sections 808.3.1 through 808.3.7 shall be applicable only to work areas located within a dwelling unit.	DOES NOT APPLY

SECTION			IMPACT TO PROJECT
	808.3.1 Enclosed areas.	All enclosed areas, other than closets, kitchens, basements, garages, hallways, laundry areas, utility areas, storage areas and bathrooms shall have a minimum of two duplex receptacle outlets or one duplex receptacle outlet and one ceiling or wall-type lighting outlet.	APPLIES
	808.3.2 Kitchens.	Kitchen areas shall have a minimum of two duplex receptacle outlets.	DOES NOT APPLY
	808.3.3 Laundry areas.	Laundry areas shall have a minimum of one duplex receptacle outlet located near the laundry equipment and installed on an independent circuit.	DOES NOT APPLY
	808.3.4 Ground fault circuit interruption.	Newly installed receptacle outlets shall be provided with ground fault circuit interruption as required by NFPA 70.	APPLIES
	808.3.5 Minimum lighting outlets.	At least one lighting outlet shall be provided in every bathroom, hallway, stairway, attached garage, and detached garage with electric power, and to illuminate outdoor entrances and exits.	APPLIES
	808.3.6 Utility rooms and basements.	At least one lighting outlet shall be provided in utility rooms and basements where such spaces are used for storage or contain equipment requiring service.	DOES NOT APPLY
	808.3.7 Clearance for equipment.	Clearance for electrical service equipment shall be provided in accordance with the NFPA 70.	APPLIES
809 MECHANICAL	**809.1 Reconfigured or converted spaces.**	All reconfigured spaces intended for occupancy and all spaces converted to habitable or occupiable space in any *work area* shall be provided with natural or mechanical ventilation in accordance with the *International Mechanical Code* . Exception: Existing mechanical ventilation systems shall comply with the requirements of Section 809.2.	DOES NOT APPLY
	809.2 Altered existing systems.	In mechanically ventilated spaces, existing mechanical ventilation systems that are altered, reconfigured, or extended shall provide not less than 5 cubic feet per minute (cfm) (0.0024 m3/s) per person of outdoor air and not less than 15 cfm (0.0071 m3/s) of ventilation air per person; or not less than the amount of ventilation air determined by the Indoor Air Quality Procedure of ASHRAE 62.	DOES NOT APPLY
	809.3 Local exhaust.	All newly introduced devices, equipment, or operations that produce airborne particulate matter, odors, fumes, vapor, combustion products, gaseous contaminants, pathogenic and allergenic organisms, and microbial contaminants in such quantities as to affect adversely or impair health or cause discomfort to occupants shall be provided with local exhaust.	DOES NOT APPLY
810 PLUMBING	**810.1 Minimum fixtures.**	Where the occupant load of the story is increased by more than 20 percent, plumbing fixtures for the story shall be provided in quantities specified in the International Plumbing Code based on the increased occupant load.	DOES NOT APPLY
811 ENERGY CONSERVATION	**811.1 Minimum requirements.**	Level 2 alterations to existing buildings or structures are permitted without requiring the entire building or structure to comply with the energy requirements of the International Energy Conservation Code or International Residential Code. The alterations shall conform to the energy requirements of the International Energy Conservation Code or International Residential Code as they relate to new construction only.	APPLIES

I. G. BAKER RESIDENCE
NRHP Listing # 80002403; NHL # 66000431
FORT BENTON; MONTANA

BACKGROUND DATA FOR CODE ANALYSIS -IBC comparison (only).

Determination of occupancy, classification, and construction type from the 2015 IBC.

Primary Occupancy Group - Type 'R-2' (originally); change in use in 1972 to Type 'A-3' (Museum);
Qualifies for **Type 'B' Occupancy** under Exception 1 — ***Section 303.1.1***

Occupancy Category: IBC **classification II** — ***Table 1604.5***

Type Of Construction (Existing) - **Type V-B** — ***Section 602.5***

Area Separation: None required — ***Table 508.4, Sec 706.5***

Allowable height and area: Height Allowed 40'-0"; 2 stories — ***Table 504.3, 504.4***
Area Allowed 9000 SF **(without area increases)** 9000>1083 (— ***Table 506.2***

Occupant Load (Summary) ** does not include area taken up by walls.

	NSF**	Occupants	Total Exit Width (in.) req'd @ 0.2/occ.	
1ST FL	1300.93	43.36	43.36	8.672
TOTAL	1300.93	43.36	*Note: min width Is 44" (36" if occupancy < 50)*	

Sec 1017.2; 1023.2

Tabulation of Spaces — ***Table 1004.1.2***

FIRST FLOOR

RM	NAME	NSF	EXHIBIT SF	OCCUPIED SF	OCCUPANCY CATEGORY	SF/OCC	OCC LOAD	EXIST EXITS	EXITS REQD	REMARKS
101	Viewing	79.92	0.00	79.92	B	30	2.66	1	1	
102	N 1867 Parlor	266.41	0.00	266.41	B	30	8.88	1	1	
103	S 1876 Parlor	265.04	0.00	265.04	B	30	8.83	1	1	
104	Utility / Kitchen	222.96	0.00	222.96	B	30	7.43	1	1	inc. [1] closet
105	Bathroom	71.18	0.00	71.18	B	30	2.37	1	1	inc. [1] closet
106	Priavate Quarters	228.42	0.00	228.42	B	30	7.61	1	1	
107	Vault	63.29	0.00	63.29	B	30	2.11	1	1	
108	Storage	32.36	0.00	32.36	B	30	1.08	1	1	
109	Vestibule	71.35	0.00	71.35	B	30	2.38	1	1	

BACKGROUND DATA FOR CODE ANALYSIS – IBC comparison (continued)

SPACE TABULATION	NSF	EXHIBIT SF	OCCUPIED SF	SF/OCC	OCC LOAD	EXIST EXITS	EXITS REQD
TOTALS	1300.93	0.00	1300.93	30	43.36	2 (active)	1

* Two (2) exits required when occupant load per exit > 29; or travel distance > 75feet. ***Table 1021.2(2)***

* Stair - N/A

*Accessible means of egress are not required in alterations to existing buildings ***Sec 1009.1; exception 1***

EXITING CONSIDERATIONS

2015 IBC Assembly Group A.

Assembly Group A occupancy includes, among others, the use of a building or structure, or a portion thereof, for the gathering of persons for purposes such as civic, social or religious functions; recreation, food or drink consumption; or awaiting transportation.

Exceptions:

1 A building used for assembly purposes with an occupant load of less than 50 persons shall be classified as a **Group B** occupancy. ***Sec 303.1.1***

Minimum number of exits. ***Sec 1006; TABLE 1006.3.1***

1014.2 Egress through intervening spaces.

Egress through intervening spaces shall comply with this section.

1 Egress from a room or space shall not pass through adjoining or intervening rooms or areas, except where such adjoining rooms or areas are accessory to the area served, are not a high-hazard occupancy and provide a discernible path of egress travel to an exit.

Exception: Means of egress are not prohibited through adjoining or intervening rooms or spaces in a Group H, S or F occupancy when the adjoining or intervening rooms or spaces are the same or a lesser hazard occupancy group.

2 Egress shall not pass through kitchens, storage rooms, closets or spaces used for similar purposes.

Exceptions:

1 Means of egress are **not prohibited** through a kitchen area serving adjoining rooms constituting part of the same dwelling unit or sleeping unit.

2 An exit access shall not pass through a room that can be locked to prevent egress. ***

3 M' occupancy - Not applicable – this project.

BACKGROUND DATA FOR CODE ANALYSIS – IBC comparison (continued)

REQUIRED FIRE RATINGS FOR TYPE V-B CONSTRUCTION CLASSIFICATION ***Table 601***

Required rating (hrs).	Description
0	Exterior bearing walls
0	Interior bearing walls
0	Interior non-bearing walls
0	Floor construction
0	Roof construction
1	Corridors ***Table 1020.1***

DOORS (EGRESS)	1010.1.1	32" width required (R-3 excepted)
	1010.1.2.1	swing in direction of travel if more than 50 occupants (N/A this project)
	1010.1.3	5 lb. opening force
	1010.1.7	3/4" max threshold height
	1010.1.9.2	hardware mounted between 34" & 48"
	1010.1.10	panic hardware not required unless occupant load exceeds 50. (N/A this project)

INTERIOR FINISHES ***Table 803.11***

	Index (Class)	Description	Rating
Museum use of bldg	B	Exit passageways	A
"	B	Corridors	B
"	B	Rooms	C
Original use of bldg	R-2	Exit passageways	B
"	R-2	Corridors	B
"	R-2	Rooms	C

Any introduced wall coverings in corridors would require 'B' class finish

ROOF Type V-B construction requires a Class 'C' roof covering classification. ***Table 1505.1***

Allowed variance:
Buildings that are not more than two stories in height and having not more than 6,000 square feet of projected roof area and where there is a minimum 10-foot fire-separation distance from the leading edge of the roof to a lot line on all sides of the building, except for street fronts or public ways, shall be permitted to have roofs of No. 1 cedar or redwood shakes and No. 1 shingles.

BACKGROUND DATA FOR CODE ANALYSIS – IBC comparison (continued)

MISCELLANEOUS

Toilets	Customers, patrons and visitors shall be provided with public toilet facilities in structures and tenant spaces intended for public utilization. (includes signage)	***2902.3***
Attic Rqmt's	Draftstops (not required this project)	

COMPLIANCE ALTERNATIVE - REGISTERED HISTORIC STRUCTURE

3407.1 Historic buildings.
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.

BUILDING CODE EVALUATION OF THE I. G. BAKER RESIDENCE [PARAPHRASED]

BUILDING CODE COMPARISONS - SUMMARY

[rqmts that apply to new work]

LEGEND
me-maintain (E)
nr-no rquirment
n/a-does not apply
**-integral
P-partial rqmt
ada-control by ada
N - NO
Y - YES

	NO.	COMPLIANCE CATEGORY	2015 IEBC (historic)	2015 IEBC (Level 1)	2015 IEBC (Level 2)	2015 IBC	ADA (see separate section)
Derived From IBC	1	Structure Qualifies for Primary Occupancy type 'B' (business)	Y	Y	Y	Y	n/a
	2	Structure is type V-B construction (combustible without automatic fire	Y	Y	Y	Y	n/a
	3	Area separation is not required within building	Y	Y	Y	Y	n/a
	4	Structure is within allowable height for occupancy and construction height	Y	Y	Y	Y	n/a
	5	Structure is within allowable area for occupancy and construction height	Y	Y	Y	Y	n/a
	5	Does building have required number of exits	Y	Y	Y	Y	n/a
	6	Exit widths meet IBC building code requirement	Y	Y	Y	Y	n/a
	7	Does building comply with code if means-of-egress are not accessible	Y*	N	N	N	N
	8	Does egress fom building meet intent of code of not passing through Kitchen	nr	nr	nr	N	n/a
	9	Does egress from building meet intent of code of not passing through spaces with locked doors	N	N	N	N	n/a
	10	Does building meet intent of code to have 1-hour fire rated corridors	nr	me	N	N	n/a
	11	Does building meet intent of code to not have bathroom next to kitchen	nr	nr	nr	N	n/a
	12	Are exit doors of sufficient width to comply with building code	Y	N	N	N	**
	13	Do exit doors meet the intent of the code regarding direction of swing	Y	Y	Y	Y	
	14	Does building meet the intent of the code regarding flame spread / smoke developed for finishes in corridors	Y	N	N	N	n/a
	15	Will building code permit the use of wood shingles on the roof [N/A this project]	Y	Y	Y	Y	n/a
	16	Does building code allow facility to be used without public toilet(s)	nr	N	N	N	**
	17	Does building meet intent of code regarding attic draft stops	Y	Y	Y	Y	n/a
	18	Does building meet intent of code regarding insulation / energy conservation	Y	Y	P	N	n/a
	19	Is building compliant with restrictions regarding common atmosphere between attic and Living Quarters 106 (* not required by building official)	n/a	n/a	n/a	n/a	n/a
	20	Does building meet intent of code regarding crawl space ventilation (underfloor ventilation)	Y	nr	nr	N	n/a
	21	Does building code permit shallow foundation system	Y	Y	Y	N	n/a
Derived From LEVEL 1	22	Does the code permit construction without a written safety report for the building official regarding fire resistance of materials and assemblies	Y	Y	N	Y	n/a
	23	Does building code permit structure to remain in a flood hazard area without	Y	N	N	N	n/a
	24	Does building code permit repairs to match existing materials if non-compliant	Y	P	N	N	n/a
	25	Does building code permit unsafe condition to remain if pre-existing	N	N	N	N	n/a
	26	Does building code permit replacement glazing that does not meet safety glazing regulations	N	N	N	N	n/a
	27	Would structure meet builing code without a fire sprinkler system	Y	Y	Y	Y	n/a
	28	Does building code permit exit corridors to less than 44" wide for this project	Y	Y	Y	Y	**
	29	Does building code permit exit doors to be less than 32" wide	Y	ada	ada	N	**
	30	Will building code accept [E] finishes of walls and ceilings if they are historic	Y	P	N	N	**
	31	Will building code accept [E] plaster as compliant with 1-hour rating regardless of thickness	Y	N	N	N	**
	32	Will building code accept alternative exit signs along path of egress	Y	N	N	N	**
	33	Will building code accept existing floor structure if supplemented with operational controls	Y	N	N	N	**
	34	Does building code accept structural work if limited to dangerous conditions	Y	P	P	N	**
	-	Number of ADA compliant bathrooms required (waived by bldg official this	1	1	1	all	
	-	Number of ADA compliant entrances required	1	1	1	all	

BUILDING CODE EVALUATION OF THE I. G. BAKER RESIDENCE [PARAPHRASED]

BUILDING CODE COMPARISONS - SUMMARY

[rqmts that apply to new work]

LEGEND
me-maintain (E)
nr-no rquirment
n/a-does not apply
**-integral
P-partial rqmt
ada-control by ada
N - NO
Y - YES

	NO.	COMPLIANCE CATEGORY	2015 IEBC (historic)	2015 IEBC (Level 1)	2015 IEBC (Level 2)	2015 IBC	ADA (see separate section)
Derived From LEVEL 2	35	Does building code permit new construction elements if they do not meet IBC standards	Y	Y	P	N	**
	36	Will building code allow this project without smoke compartments	Y	Y	Y	Y	**
	37	Will building code accept finishes of walls and ceilings if do not meet IBC	Y	Y	P	N	**
	38	Does the code permit construction without a written safety report for the building official regarding fire resistance of materials and assemblies	Y	Y	N	Y	**
	39	Does building code allow construction without including or adding fire alarms and fire detection	Y	Y	N	N	**
	40	Will the building code allow a single exit building	Y	Y	Y	Y	**
	41	Does the building code meet the requirement for exiting from mezzanines	n/a	n/a	N	N	?
	42	Will the building code accept doors accessing exit passages to be non-closing	Y	nr	N	N	**
	43	Does the building code permit egress doors for this project without panic	Y	Y	Y	Y	**
	44	Does the building code permit corridors that are not rated as 1-hour corridor walls for this project	Y	Y	Y	Y	**
	45	Will the building code permit corridor doors that are noted rated as 20-min rated doors for this project (corridor is not fire rated due to number of occupants)	Y	Y	Y	Y	**
	46	What is the maximum length of dead-end corridors listed for the building code	nr	nr	35	20	**
	47	Does building code permit means-of-egress without artificial lighting	nr	nr	N	N	**
	48	Does building code allow new structural elements that are not in compliance	nr	nr	N	N	**
	49	Will building code accept structure that is not in compliance with the International Energy Conservation Code	Y	Y	Y	N	**
Derived From IEBC CH 12	50	Does the code permit construction without a written safety report for the building official	N	Y	Y	Y	n/a
	51	Will building code permit use of Historic glazing materials in interior walls required to have a 1-hour fire-resistance rating if provided with approved smoke seals and the area affected is provided with an automatic sprinkler system.	Y	N	N	N	n/a

APPENDIX

ACCESSIBILITY GUIDELINES

BACKGROUND (Excerpted from UFAS Unit 2 - Regulatory issues)

The four federal standard setting agencies, the General Services Administration, the Department of Defense, the Postal Service, and the Department of Housing and Urban Development developed the Uniform Federal Accessibility Standards (UFAS) to be consistent with the Minimum Guidelines and Requirements for Accessible Design (MGRAD). As such, when introduced in 1984, UFAS was the most comprehensive standard to date and is still the referenced standard for all buildings designed, constructed, altered, or leased with federal funds.

Cities, counties, or states develop their own building construction regulations, and most have added accessibility provisions by adopting in whole or in part the current technical specifications of ANSI 117.1, UFAS, MGRAD, or those in one of the model codes. All states have some form of access standards.

If no federal money is used in the design, construction, or renovation of the facility, then the Architectural Barriers Act (1968) does not apply. However, if no federal money is used in the renovation of the facility then the provisions of the local / state building code must be complied with. In recent times most states have adopted the latest edition of the International Building Code. The 2009 edition of IBC contains provisions for accessibility that are referenced from CABO/ANSI 117.1. In summary, the ADA requirements are very similar regardless of the source of funding.

HISTORIC STRUCTURES

In regard to historic structures, UFAS provides the following guidance in UNIT 2 - Regulatory Issues:

> ***The general approach to application of [A.D.A.] standards is to require a cooperative analysis of each renovation/alteration to a "qualified structure" (i.e. a property already listed or declared eligible for listing on the National Register of Historic Places) by interested parties, state and local advisory councils on historic preservation, and others to determine the extent and methods for compliance. The procedures for completing this analysis are described in Section 106 of the National Historic Preservation Act of 1966, as amended.....***
>
> ***.... The agency can use alternate means to create program access .....***
>
> ***.... Nevertheless (considering the procedure described above) those historic buildings covered by the Architectural Barriers Act must adhere to the provisions of UFAS when renovations are undertaken.***

Under MINIMUM REQUIREMENTS FOR PROJECT TYPE the UFAS standard continues:

> ***In the special case of historic buildings the requirements for providing access are detailed in Subsection 4.1.7 of UFAS, pages 13-14.** The general approach to application of standards at historic sites is to require a cooperative analysis of each renovation/alteration to a "qualified structure" to determine the extent and methods for compliance. The procedures for completing this analysis are described in Section 106 of the National Historic Preservation Act of 1966, as amended, 16 United States Code 470 (including Executive Order 11593, Protection and Enhancement of the Cultural Environment); and "Protection of Historic and Cultural Properties", 36 CFR Part 800.***

Each federal agency is responsible for taking into account the effect of an undertaking on any property included (or eligible for inclusion) in the National Register of Historic Places. As a general rule, an official from the federal agency will work with the State Historic Preservation Officer and other interested parties to identify potential conflicts and propose methods for resolving the conflicts during the early planning stages of the project. The goal of this initial planning is to determine what effects (either None, Not Adverse, or Adverse), the proposed undertaking will have on the property.

If it is determined that there will be some effect on the property, the Advisory Council on Historic Preservation reviews and comments on the proposed plans and either amends or accepts the plan. If it is determined that some adverse effect will occur, it is necessary to draw up a Memorandum of Agreement outlining how the effects will be taken into account. An understanding is considered to have an adverse effect when the effect on a historic property may diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association. Only after the Council has determined that accessibility requirements for accessible routes, ramps, entrances, toilets, parking, displays, and signage have an adverse effect can the special application provisions of Subsection 4.1.7(2), page 14, be utilized. And even then, all requirements which do not have an adverse effect must be met.

(** applicable portions of Pages 13 & 14 of Subsection 4.1.7 have been attached below for reference.)

Note that the preceding paragraphs apply only to federally funded projects; projects funded through State, local, or Private sources must comply with CABO/ANSI 117.1.

The Federal Standards (as well as CABO/ANSI 117.1) both have provisions for implementing 'Alternative Measures' to compliance requirements.

Alternative measures: The wording in ANSI regarding alternative measures is identical to the federal standard (UFAS); the only difference being that a state or local preservation officer can apply the criteria and the involvement of the president's Advisory Council is not required. A condensation of the Alternative Measures is listed below:

Accessible routes: Can be limited to (1) for historic properties if multiple routes create adverse impacts.

Accessible Entrance: Only (1) accessible entrance is required to be provided and it does not have to be the primary public entrance.

Accessible toilets: Only (1) accessible toilet is required within a facility if adverse effects are caused by providing multiple toilets; it can also be of uni-sex design.

All publicly used spaces on the accessible floor of the facility must be accessible; not all floors within the facility have to be accessible if vertical access causes adverse effects although it is strongly encouraged.

TIMELINE

Note to reviewers: this Timeline is acknowledged to be incomplete and could be expanded in greater detail; it is intended to provide a framework of the early history of Fort Benton Trading Post

YEAR	NATIONAL / FEDERAL EVENTS	STATE / REGIONAL EVENTS	FORT BENTON SIGNIFICANT DATES	LOCAL / COUNTY EVENTS	SOURCE
1794		Fort Edmonton/Rocky Mtn House			Wikipedia
1803	LOUISIANA PURCHASE				General Knowledge
1805-06	Lewis and Clark Expedition				General Knowledge
1807		Post Manuel Lisa at mouth of Big Horn River			Old Fort Bento; Rell; UM Library
1808	American Fur Company organized				Old Fort Bento; Rell; UM Library
1822		Rocky Mtn Fur Co expedition - upper Missouri			Old Fort Bento; Rell; UM Library
1828		Fort Union constructed			Old Fort Bento; Rell; UM Library
1832		Fort McKenzie built (trading post)			Old Fort Benton; Bell; UM Library
		Prince Maximillian visits American West			Old Fort Benton; Bell; UM Library
1832		Fort Piegan burned			Contributions; MHS 1917 pp.250
1837		Smallpox epidemic; Bloods, Assinniboines, & Blackfeet reduced by 2/3			Contributions; MHS 1900
1839		Last Mackinaw's set to St Louis from Ft Union			Contributions; MHS 1900; pp. 230
1841		John J. Audobon spends time at Fort Union			Contributions; MHS 1900 pp.234
1845		Father DeSmet visits Fort Lewis			Contributions; MHS 1900
1845		Fort Lewis built (later moved to Ft Benton)			Legends of America
1846		Fort Campbell (old adobe fort) built			Old Fort Benton; Bell; UM Library
1846	Oregon Territory created			Father DeSmet stays at Fort Benton	Contributions; MHS 1900
1846-47		Fort Lewis (Clay) moved to Fort Benton site			Legends of America
1850		Fort Lewis renamed to Fort Benton			General Knowledge
1850		Fort Alexander abandoned			Contributions; MHS 1900
1850		Fort Sarpy constructed			Contributions; MHS 1900
1852		Presbyterian Mission attempted at FB (abandoned)			Old Fort Benton; Bell; UM Library
1853	Washington Territory created				General Knowledge
1853	Maj Isaac Stevens stationed at Fort Benton				Old Fort Benton; Bell; UM Library
1854			Andrew Dawson placed in charge of Fort Benton		Old Fort Benton; Bell; UM Library
1855		Fort Sarpy abandoned			Contributions; MHS 1900
1859	Washington State created				
1860		1st site of St Peters established			
1859-60	Mullan Road constructed				General Knowledge
1860		First Steamboat reaches Fort Benton			State His Soc of N Dakota ex 88-2
1861		Culbertson resigns from American Fur Co.			Old Fort Benton; Bell; UM Library
1862		Fort Andrew (hell's point) built			Old Fort Benton; Bell; UM Library
1862		Fort LaBarge construction (short lived)		Mar 13 - Aug 9: St Peter's 8 mi above Fort Site	Old Fort Benton; Bell; UM Library
1862			Fisk overland train passes through		
1862			Tabacco Famine' in Fort Benton		Old Fort Benton; Bell; UM Library
1863	Idaho Territory created	May 26 - Gold discovered at Virginia City		Father DeSmet at St Peter's Mission	General Knowledge
1863		Fort Gilpin built			Old Fort Benton; Bell; UM Library
1864	May 26 - Montana becomes Territory				General Knowledge
1864	June 22 - Lincoln appoints Edgerton Mt Gov.				General Knowledge
1864			Dawon leaves; IG Baker put in charge of Fort Benton		Old Fort Benton; Bell; UM Library
1864			Carroll & Steele build store in Fort Benton		Old Fort Benton; Bell; UM Library
1864	Charles M. Russell born				General Knowledge
1864-65	Western Military Campaigns				
1865		Aug 4 - Thos Meagher appointed Sec. (Mt Terr)			

TIMELINE

Note to reviewers: this Timeline is acknowledged to be incomplete and could be expanded in greater detail; it is intended to provide a framework of the early history of Fort Benton Trading Post

YEAR	NATIONAL / FEDERAL EVENTS	STATE / REGIONAL EVENTS	FORT BENTON SIGNIFICANT DATES	LOCAL / COUNTY EVENTS	SOURCE
1865	April 9 - Army of Northern Virginia surrenders				
	April 14 - Lincoln assassinated				
1865			Fort Benton townsit laid out by Col. W.W. DeLacy		
1866		Fort C.F. Smith built		St Peter's mission moves to 3rd location	
1866	August 20 - Civil War officially Ends	Camp Cooke (Judith) built (Fort Clagget)			
1867	Confederation of Canada created				Canadian Encyclopedia
1867		Fort Shaw Built			
1867		Ft Peck trading post built			
1867		July 1 - Gov. Thomas Meagher dies			
do		Aug 1 - Hayfield Fight			
do		Aug 27 - Fort Ellis built (2nd Calvary)			
1868		Fort Browning built (decom in 73)			
1869		Fort Hamilton (Whoop-Up) built			
1869	May 11 - Transcontinental RR completed	Fort Logan built		Robert Vaughn moves to Sun River Valley	
1869		Fort Clagett abanconed			
1869-70				Stage Stop at 'Leavings' run by M/M Armstrong	
1870		Jan 23 - Baker Massacre			
1870		Fort Benton becomes military post; camp Judith abandoned, 7th infantry transferred to Benton			Old Fort Benton; Bell; UM Library
1871		Fort Belknap built			
1873		NW Mounted Police formed			
1873		Fort Macleod created			
1873		Reed & Bowle's trading post			
1874		Boundary btwn Mt & Canada surveyed			
1875		State Capitol moves to Helena from VC			
1875		RCMP tracking Cypress Hills combatants			
1875		Fort Benton abandoned			Old Fort Benton; Bell; UM Library
1876		Fort Keogh built			
1876	June 25-26 Battle of the Little Big Horn				
1877	Chief Joseph flight to freedom	Battle of the Big Hole	Lt. Bradley killed		
1877		Northwest Fur Co. closes business; leases Fort to Government			Old Fort Benton; Bell; UM Library
1877		Fort Missoula built			
1877		"Treaty # 7" signed in Canada			
1879		UP Railroad reaches Dillon			
1879		Fort Assinniboine established			
1879		Steamboats 'Montana', 'Wyoming', & 'Dakota' built		Town of Cascade est.	
1880		Fort Maginnis established		Vaughn est. as coal siding for RR	
1881				4th site of St Peters Mission est.(bird Tail)	
1882		NP Railroad reaches Billings			
1884	Northwest Rebellion - Louis Reil	Great Falls formed			
1885				1st issue of Great Falls Tribune	
1886		Fort Yellowstone built			
1887				Oct 15-St Paul, Minn, & Manitoba RR to GF	
1887				May 13 - steamboat from GF to Helena	
1887		Sept 12 - Cascade County formed			
1888				Silver Smelter at Giant Springs	
1888				GF Leader publishes first issue	

TIMELINE

Note to reviewers: this Timeline is acknowledged to be incomplete and could be expanded in greater detail; it is intended to provide a framework of the early history of Fort Benton Trading Post

YEAR	NATIONAL / FEDERAL EVENTS	STATE / REGIONAL EVENTS	FORT BENTON SIGNIFICANT DATES	LOCAL / COUNTY EVENTS	SOURCE
1889		Nov 8 - Montana becomes state.			
1890		Last Steamboat leaves Fort Benton			State His Soc of N Dakota ex 88-2
1891		Hudson Bay Co. buys I. G. Baker & Co. [Canada]			
1892		Fort Harrison built			
1898	Spanish American War				
1907		Steamboat 'Josephine' founders			
1907		St Legislature passes bill to restore Fort Benton	Ms's. Browne, Renisch, Condon (all DAR) trustees		Old Fort Benton; Bell; UM Library
1908				Sun River Floods	
1908				Anaconda smelter stack constructed	
do				Severe flooding in Great Falls	
1909		11th St Legislature appropriates $1000.00 for Fort			Old Fort Benton; Bell; UM Library
1911				Sunnyside renamed Vaughn after R. Vaughn	
1915				1st energy produced at Ryan Dam (Volta)	
1937				Regular Air Mail service to Great Falls	

NewFields

July 9, 2019

Ms. Samantha Chagnon
Brownfields Coordinator
Bear Paw Development Corporation
P.O. Box 170
48 2nd Avenue, Suite 202
Havre, Montana 59501

Subject: **Phase II Environmental Site Assessment – Building Materials Investigation**
Baker House
1608 Front Street
Fort Benton, Montana 59422

Dear Ms. Chagnon:

Please find enclosed an electronic copy of the Phase II Environmental Site Assessment Report (ESA) for the Baker House. One paper copy and an electronic copy have been sent to the landowner. NewFields is also submitting an electronic copy to Barbara Benoy at EPA and Ken Sievert, the architect for the project. We appreciate the opportunity to work with you on this project. Please contact me if you have any questions.

Sincerely,

Christin Hileman

Christin Hileman
Project Manager

Enclosure

cc: Barbara Benoy, US EPA Region 8 (electronic copy)
Dan Nelsen, Fort Benton Community Improvement Association (paper copy and electronic copy)
Ken Sievert, Architect (electronic copy)

Phase II Environmental Site Assessment (ESA)
Building Materials Inspection

Baker House
1608 Front Street
Fort Benton, Montana

Bear Paw Development Corporation
of Northern Montana

NewFields

July 2019

Phase II Environmental Site Assessment Report
Building Materials Inspection

Baker House
1608 Front Street
Fort Benton, Montana 59442

Prepared for:
Bear Paw Development Corporation
48 2nd Avenue
Havre, Montana 59501

Prepared by:
NewFields Companies, LLC
700 SW Higgins Avenue, Suite 15
Missoula, Montana 59803

NewFields

July 2019
NewFields Project #350.0044.005

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1.0 INTRODUCTION

On May 22, 2019, NewFields completed a Phase II Environmental Site Assessment (ESA) – Building Material Inspection of the Baker House located at 1608 Front Street in the City of Fort Benton, Chouteau County, Montana (**Figures 1** and **2**). The inspection was conducted in accordance with the Sampling and Analysis Plan (SAP) prepared by NewFields (NewFields 2019a), which was approved by the U.S. Environmental Protection Agency (USEPA) in May 2019. The Phase II ESA was performed on behalf of Bear Paw Development Corporation (Bear Paw) and the City of Fort Benton (site owner), using USEPA Brownfields Program funds. A signed Site Access Agreement allowing NewFields access to the property to complete the inspection is included in **Appendix A.** The City of Fort Benton owns the Baker House (acquired in 1973), which is one of the oldest remaining structures in Montana. The City plans to renovate the historic building to expand the museum space from two rooms to five rooms. Planned building upgrades include electrical and plumbing improvements, removal of hazardous building materials, and structural upgrades for safety and accessibility. NewFields performed this inspection in order to:

- Identify Asbestos-Containing Building Materials (ACBM) associated with the structure; and,
- Determine if interior or exterior building surfaces contain Lead-Based Paint (LBP), and if so, if this condition has contributed to elevated concentrations of lead in soil below LBP exterior building components.

This report identifies the potentially hazardous building materials listed above, and provides information related to proper removal and disposal of these materials prior to future renovation activities.

1.1 BACKGROUND AND GENERAL SITE DESCRIPTION

The Baker House (the "Site") is located at 1608 Front Street, west of the Missouri River between Front Street and Main Street. The Baker House is a one-story slab-on-grade building construction, and there are no other structures on the parcel. Constructed in 1867, the original building is comprised of two rooms made from adobe bricks and a sod roof. Sometime in the decade following construction, two rooms were added to the north of the structure and the sod roof was replaced with metal. In 1876, a second remodel added clapboard siding, a shingle roof and front portico. Currently, the Baker House is a museum with two rooms open for public viewing.

1.2 Regulatory Background

1.2.1 Asbestos

Asbestos is a trade name for a group of naturally occurring minerals which were used in many building materials that are commonly referred to as Asbestos-Containing Building Materials (ACBM). Asbestos consists of long, thin fibers that are durable, chemically resistant, have a high insulation capacity and tensile strength, and are fireproof. These qualities, combined with its relatively low cost, resulted in the production of an estimated 3,600 different products containing asbestos. Asbestos has been widely used in thermal system insulation for boilers, pipes, and other high-temperature applications, as well as resilient floor coverings (vinyl floor tile and vinyl sheet flooring), cement products, roofing materials, and surfacing materials.

When left intact and undisturbed, ACBM does not pose a significant health risk to people working or living in buildings or homes. However, if ACBMs deteriorate, or are disturbed by construction or demolition activities, asbestos fibers can be released into the air, and inhalation of these fibers is a significant health concern. Inhaled asbestos fibers can become entrapped in the lungs and cause many diseases, including asbestosis, lung cancer and mesothelioma.

ACBM is defined in 40 CFR, Part 763-Asbestos Model Accreditation Plan and Section 202, Toxic Substance Control Act, as a material containing greater than one percent (>1%) asbestos which has been applied to ceilings, walls, structural members, piping, duct work, or any other part of a building. ACBM is classified as either friable or non-friable which categorizes the material based on the strength of the binding material matrix. Friable ACBM is defined as any building material containing >1% asbestos that may be crushed, crumbled, or reduced to powder by hand pressure when dry. Building materials that contain >1% asbestos fall into one of the following three (3) categories:

Category I Non-friable ACBM: includes packing and gasket materials, resilient floor coverings, and asphalt roof products which contain greater than one percent (>1%) asbestos;

Category II Non-friable ACBM: are non-friable materials other than Category I non-friable ACBM, such as cement asbestos board, cement asbestos pipe, and window glazing or window putty materials which contain greater than one percent (>1%) asbestos; and,

Regulated Asbestos Containing Material (RACM): includes 1) all friable materials, 2) Category I non-friable ACBM that will or may be subjected to sanding, grinding, cutting, or abrading or 3) Category II non-friable ACBM that have a high probability of becoming or have become crumbled, pulverized, or reduced to powder by forces acting on or expected to act on the ACBM through the course of renovations and/or demolition activities.

The U.S. Occupational Safety and Health Administration (OSHA) (29 CFR Parts 1910 and 1926) defines ACBM slightly differently. ACBM under OSHA is defined as any material that contains >1% asbestos, or which is presumed to contain asbestos (OSHA, 1994). The *presumed* designation applies to thermal system insulation, sprayed-on or troweled-on surfacing material and debris where such material is present. The term *"presumed"* was added to allow compliance with the hazard communication provisions of OSHA, particularly for buildings constructed prior to 1980.

Current guidelines from EPA, the Montana Department of Environmental Quality – Asbestos Control Program (MDEQ-ACP), and OSHA indicate that wood, glass, and metal are not suspected to contain asbestos; all other building materials used in construction, including poured concrete, are considered to contain asbestos until laboratory results prove otherwise.

1.2.2 Lead-Based Paint

Lead-Based Paint (LBP) was used in most buildings constructed prior to World War II and up until 1978. Regulations enforced by the Consumer Product Safety Commission (CPSC) banned the use of all but small amounts of lead in paints starting in 1978; however, manufacturers are still allowed to produce paints containing up to 600 parts per million lead. LBP is a concern as a source of exposure to lead through ingestion of paint chips and lead in soil or settled dust (primarily a risk to children under the age of seven), and through inhalation of dust or fumes produced during renovation or demolition activities.

The EPA and the U.S. Department of Housing and Urban Development (HUD, 1995) define LBP as paint containing greater than 0.5% lead by weight (i.e., 5,000 milligrams of lead per kilogram of paint chips) or 1.0 milligram per square centimeter (mg/cm^2) of a painted surface.

1.2.3 Toxicity Characteristic Leaching Procedure (TCLP)

Disposal of lead-containing wastes, such as building components with LBP covered surfaces, is regulated under the Resource Conservation and Recovery Act (RCRA). RCRA requires demolition debris to be tested using the Toxicity Characteristic Leaching Procedure (TCLP) to determine whether the material could potentially leach high concentrations of hazardous chemicals. If leachable lead is present above the TCLP threshold of 5.0 milligrams per liter (mg/L), the material must be managed as a hazardous waste.

2.0 SITE INSPECTION PROCEDURES

2.1 ASBESTOS

The asbestos inspection was performed on May 22, 2019, by Mr. Ryan McGee. Mr. McGee is a Montana-accredited asbestos inspector and an EPA-accredited lead inspector/risk assessor. Mr. McGee's certifications are provided in **Appendix B**. Photos documented during the inspection are included in the project photo log in **Appendix C**.

The asbestos inspection was performed in accordance with the Administrative Rules of Montana (ARM) §17.74.354 and the Asbestos Hazard Emergency Response Act (AHERA) (40 CFR §763.85, .86, and .87). The inspection process is also prescribed in NewFields' Standard Operating Procedures (SOP's) for Building Materials Inspections (BMI; NewFields, 2019b), the EPA-approved Programmatic Quality Assurance Project Plan (NewFields, 2015) and the Programmatic Sampling Guide for Building Materials Inspection (NewFields, 2019b) for Bear Paw Development Corporation. The asbestos inspection also met current criteria for renovation and/or demolition under EPA regulation 40 CFR 61, the National Emissions Standards for Hazardous Air Pollutants (NESHAP; EPA, 1975a). The asbestos inspection included:

- Identifying homogeneous areas of suspect ACBM for the structure;
- Determining the required number of samples from each homogenous material, and identification of random sampling locations that would provide the least post-sampling visual impact; and,
- Collecting and analyzing building material samples to confirm whether they contain asbestos at a concentration >1% by weight.

Prior to sampling, the inspector completed an initial walkthrough of the building and identified twenty-two (22) building materials considered suspect for containing asbestos. In accordance with specifications in the Phase II Environmental Site Assessment (ESA) Sampling and Analysis Plan (SAP; NewFields, 2019a), and consistent with MDEQ-ACP sampling guidelines, building material samples were categorized, coded, and sampled at the frequencies described below:

- **Surfacing Materials** (sample code S): A minimum of three (3) samples for surfacing materials less than 1,000 square feet (sf), a minimum of five (5) samples for surfacing materials between 1,000-5,000 sf, and a minimum of seven (7) samples for surfacing materials greater than 5,000 sf;
- **Thermal System Insulation** (sample code T): A minimum of three (3) samples from each homogeneous area of thermal system insulation (TSI); or
- **Miscellaneous Material** (sample codes M, F, or R): A minimum of three (3) samples from each homogeneous area of miscellaneous material, such as ceiling tile, floor tile, vinyl sheet flooring, cement asbestos board, and roofing materials.

The inspector used sample codes to differentiate between building materials as follows: surfacing materials (S); thermal system insulation (T); and miscellaneous materials (M). The miscellaneous designation is further broken down to differentiate between flooring materials (F) and roofing materials (R).

A total of fifty-five (55) building material samples were collected of the twenty-two (22) suspect materials as part of the asbestos inspection. Building material sample locations are shown on **Figure 3**. Samples were then shipped under chain-of-custody protocol to Eurofins CEI (CEI) Labs in Cary, North Carolina for analysis of asbestos by Polarized Light Microscopy (PLM). The laboratory analyzed the samples using the following positive-stop approach: if one sample (and all layers that may be present) within a group of homogeneous samples tested positive for asbestos, the remaining samples within that group were not analyzed, and were assumed to be positive for asbestos.

2.2 Lead-Based Paint

The Lead-Based Paint (LBP) inspection was performed in accordance with EPA regulations and NewFields' standard operating procedures (SOP's) for BMI Inspections (NewFields, 2019a), the EPA-approved Quality Assurance Project Plan (NewFields, 2015), and the Programmatic Sampling Guide for Building Materials Inspection (NewFields, 2019b). Interior and exterior painted surfaces were analyzed for the presence of lead using a portable X-ray fluorescence (XRF) instrument. XRF instruments expose painted surface(s) to X-rays which causes lead (if present) to fluoresce with a characteristic frequency. The intensity of this fluorescence is measured by the instrument's detector and is then converted into a number that represents the amount of lead in the paint per unit area (milligrams per square centimeter - mg/cm^2). The XRF instrument has the capability to analyze the lead content of multiple layers of paint at one time, and has a limit of detection of 0.1 mg/cm^2. A measurement greater than 1.0 mg/cm^2 of lead indicates the paint is a lead-based paint per EPA/HUD guidelines.

Upon inspection of the building, NewFields identified and tested one-hundred and four (104) painted surfaces for lead concentrations using the XRF (42 exterior and 62 interior surfaces). A total of forty-one (41) out of the 104 tests were confirmed positive for lead-based paint.

Inconclusive XRF readings are possible when completing an XRF survey due to multiple layers of paints and substrates. When this occurs, the inspector acquires additional XRF measurements of the same material to determine if the paint is positive for LBP (i.e. > 1.0 mg/cm^2) or negative (< 1.0 mg/cm^2). If through additional measurements, a conclusive measurement cannot be made, a sample of the paint is collected and submitted for laboratory analysis of total lead. For this inspection, no inconclusive readings were obtained requiring paint-chip samples to be collected for laboratory analysis. A recorded measurement of "Null" means that the instrument did not record a measurement and the inspector retested the painted finish. A result of "Null" does not require a paint-chip sample to be collected; it merely means that during the testing the XRF was inadvertently lifted from the surface, and requires that the area be retested.

2.3 Lead in Soil Sampling

Since LBP was found on exterior building component surfaces, surface soil samples were collected in accordance with SOP-13 (NewFields, 2015). Surface soil samples were collected from beneath the LBP positive windows and siding located along the north exterior wall as shown on **Figure 3**. Soils were collected approximately 15 inches from the exterior wall of the building from a depth of 0-2 inches. All surface soil samples were combined into one composite sample with equal proportions of soil from each sub-sample location. The composite sample was shipped under chain-of-custody protocol to CEI for analysis of lead by EPA method SW-846 7000B.

2.4 Lead on Building Materials for Disposal Consideration

NewFields understands the City of Fort Benton intends to renovate the existing building. Demolition or waste materials generated may potentially containing leachable lead. Once renovation plans are complete, a representative sample can be collected of the future waste stream for analysis of leachable lead using the Toxicity Characteristic Leaching Procedure (TCLP) method. The objective of sampling would be to determine if the future waste debris contains lead at a concentration that poses a risk of leaching to groundwater when placed in a landfill. A Toxicity Characteristic Leaching Procedure (TCLP) result greater than 5.0 mg/L would suggest that leaching might occur, and therefore the waste debris, or a portion thereof, may require disposal in a hazardous waste landfill.

3.0 FINDINGS

3.1 ASBESTOS

Consistent with MDEQ and EPA guidance concerning completion of asbestos inspections, the inspection of the building identified several building materials that are not suspected of containing asbestos, including metal piping, wood siding and wood windows. Twenty-two (22) other building materials were suspected to contain asbestos. Of these, fifty-five (55) samples were analyzed for asbestos and four (4) were determined to contain asbestos greater than 1%, as listed in **Table 3-1**. Sample locations for this asbestos inspection are depicted on **Figure 3**. Laboratory reports are presented in **Appendix D.**

Table 3-1. Asbestos-Containing Building Materials (ACBM)

Sample ID	Material Description	Asbestos Type	Asbestos Content	Regulatory Category
F3.1	Green Vinyl Floor Tile (VFT) Mastic	Chrysotile	5%	Category I
M1.3	Joint Compound Patch Material	Chrysotile	3%	RACM
M7.1	Window Glazing	Chrysotile	2%	Category II
M9.1	Beige Ceramic Tile Adhesive	Chrysotile	10%	Category I

Description of Regulatory Categories:

Sample ID's are utilized to differentiate between different types of building materials included in the inspection.
Category I = Non-friable ACBM consisting of packing, gaskets, resilient floor covering, and asphalt roofing products.
Category II = Non-friable ACBM, excluding Category I materials, such as cement asbestos board (CAB) panels, window putty.
RACM = Regulated Asbestos-Containing Material including: Friable ACBM; Category I material that has become friable; Category I material subject to sanding, grinding, cutting, or abrading; or Category II material that has a high probability of becoming friable.
OSHA = Building materials not currently regulated by EPA or MDEQ-ACP, but regulated under 29 CFR 1926.1101, generally building materials containing less than one percent asbestos are still regulated by OSHA.

Photographs of building materials identified for this inspection are included in the project photo log in **Appendix C**. Building materials confirmed to be positive for asbestos included yellow mastic beneath green 9-inch VFT (VFT is negative for asbestos). The VFT is located within the bathroom, which is comprised of approximately 70 square feet (sq. ft.). Asbestos-containing joint compound/patching material is located on the interior wood siding of the vestibule (back porch). The joint compound (patch material) is estimated to cover approximately 160 sq. ft. Asbestos-containing window glazing was identified on six window systems of the Baker House. In addition to these windows, one double frame window was being stored in the building and should also be considered positive for asbestos.

3.2 LEAD-BASED PAINT

As shown in **Table 1** (attached), five (5) paints were determined to be Lead-Based Paint (LBP), including white paint on variety of wood building components and concrete walls, black paint on wood doors and casings, yellow paint on brick walls, and green and beige painted wood walls. All of the remaining XRF measurements obtained for additional painted surfaces within or on the building were below 1.0 mg/cm^2 (non-lead containing). The locations of positive LBP XRF readings are shown on **Figure 3.**

3.3 Lead in Soil Sampling

A composite of soil samples collected beneath positive LBP locations on the exterior of the building was collected and submitted to CEI for total lead analysis by a third party American Industrial Hygiene Association (AIHA) Environmental Lead Laboratory Accreditation Program (ELLAP) accredited laboratory. The composite sample contained 710 milligrams per kilogram (mg/kg) of total lead. This concentration is above the DEQ commercial and industrial screening level of 669 mg/Kg. The locations of composite soil samples are shown on **Figure 3.** Analytical results for total lead in surface soils can be found in **Appendix D.**

3.4 Lead on Building Materials for Disposal Consideration

NewFields understands the City of Fort Benton intends to renovate the existing building. Demolition or renovation waste materials generated may potentially contain leachable lead. Once renovation plans are complete, a representative sample can be collected of the future waste stream for leachable lead analysis to determine the appropriate disposal location for the waste material.

3.5 PCBs Light Ballasts and Mercury-Containing Thermostats

NewFields did not observe any florescent light fixtures, light ballast or thermostats in the building. Consequently, these potential sources of polychlorinated biphenyls (PCBs) and/or mercury in renovation or demolition waste streams are not of concern for this building.

3.6 Deviations from Sample and Analysis Plan (SAP)

NewFields asbestos inspector identified four building materials generally considered suspect for asbestos that were not sampled following DEQ regulations due to their limited areal extent. These materials would normally require three bulk materials samples of each material to be collected to confirm or deny the presence of asbestos. However, based on the limited amount of material (e.g., less than 3 square feet) only one sample of the material was obtained for analysis. All four building materials were negative for asbestos. The four building materials included:

- (M1.1) Joint compound on FESCO board (Perlite-Based Cover Board) kitchen ceiling material;
- (T2.1) Pipe insulation located on the east side of the kitchen ceiling;
- (M7.2) Window glazing on southwest corner (exterior window); and,
- (M7.3) Window glazing on stored windows in northeast corner room (Private Quarters).

NewFields did not collect a building material sample to evaluate disposal options for waste streams generated during future renovations of the building. At the time of the inspection, the City had not finalized their renovation plans for the building. The City wants to use the findings of this inspection to finalize plans for renovation. When demolition is scheduled, additional leachable lead testing of the waste stream generated during renovation should be completed using the EPA TCLP analytical method. Additional clearance air sampling (for asbestos) and wipe testing (for lead) should also be completed following abatement/renovation prior to re-occupancy of the building.

4.0 RECOMMENDATIONS

4.1 ASBESTOS

NewFields recommends that all ACBM (material containing >1% asbestos, **Table 3-1**) be removed (abated) prior to planned renovations of the Baker House. Abatement should be completed in accordance with State and Federal asbestos abatement rules and regulations. Prior to scheduling asbestos abatement, an asbestos abatement bid specification should be prepared to select a licensed abatement contractor capable of performing the work. As required in advance of a planned asbestos abatement project, the abatement contractor hired, in accordance with the ARM 17.74.355, will be required to provide Notification of Renovation and/or Demolition to the Montana Department of Environmental Quality – Asbestos Control Program (MDEQ-ACP) within 10-days (2-weeks) prior to commencing abatement activities. Following asbestos abatement activities, final clearance air sampling is required in accordance with ARM 17.74.357.

4.2 LEAD-BASED PAINT

Painted building components removed during renovation should be tested using the EPA TCLP analysis prior to renovation once renovation plans are finalized. The lead abatement should be completed by a 40-hour EPA trained lead abatement contractors certified to carry out lead abatement activities. Lead abatement activities would include removal and containerization. In addition, when the City renovates the Baker House, clearance testing (lead wipe and air sampling) should be completed by a third party (firm not hired by the abatement contractor) to insure safe reuse of the building.

4.3 LEAD IN SOIL SAMPLING

Results for total lead in soil indicate that lead is present in soil along the north side of the building above the DEQ commercial/industrial action level of 669 mg/kg. NewFields recommends additional soil sampling be conducted to evaluate whether a soil removal action is necessary. NewFields recommends 10 surface soil grab samples be collected on the facility in a random fashion north of the building to quantify an Upper Confidence Limit (UCL) of the mean. If the UCL is above 669 mg/kg, the data should be used to define an area of soil removal to lower the overall UCL to a level below 669 mg/kg. If the UCL is below 669 mg/kg, no removal action would be necessary. Costs associated with the additional soil sampling, including labor, materials, analytical fees, reporting, and project management are included in the abatement cost estimate in **Appendix E**.

4.4 LEAD ON BUILDING MATERIALS FOR DISPOSAL CONSIDERATION

Subject to the City of Fort Benton renovation plans for the structure, including plans for painted building components and other renovation-derived waste, the renovation waste stream should be tested for total lead using the EPA TCLP method to determine whether the waste stream generated from the renovation project should be disposed as a hazardous waste or a non-hazardous waste.

5.0 ABATEMENT COST ESTIMATE

Pre-renovation/demolition asbestos abatement for the Baker House includes abatement of interior asbestos-containing mastic beneath vinyl floor tile, joint compound on wood paneled walls, window glazing (including removal of lead-based paint), and ceramic tile adhesive on the decorative fireplace. Lead-based paint abatement is necessary for all windows and doors associated with the Baker House.

Total asbestos and lead-based paint costs, including engineering oversight are estimated at $57,438 (see **Appendix E**). Engineering oversight and clearance testing includes completion of bid specifications, contractor oversight, TCLP testing of generated waste materials, visual and air clearance testing, reporting, and project management. Costs associated with these services are estimated to be $26,198.

As reported herein, lead was detected in surface soil along the north side of the building. It is recommended additional assessment be completed to determine if soil removal actions are necessary. Costs to complete the lead soil assessment are estimated at $8,949 (see **Appendix E**).

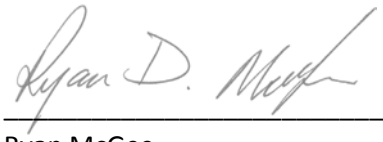
The above estimates assume that an EPA Brownfields funds would be acquired from Bear Paw Development for the abatement of asbestos and LBP and assessment of lead in surface soil. The abatement cost estimate should be considered budgetary and may be higher or lower based on bids received by abatement contractors.

6.0 LIMITATIONS

NewFields completed this Phase II ESA Building Materials Inspection in a professional manner in accordance with generally accepted practices, using the degree of skill and care ordinarily exercised by environmental consultants under similar circumstances. No other warranties, expressed or implied, are made.

No site Inspection can wholly eliminate uncertainty regarding the potential for the presence of hazardous materials in connection with a property. The Inspection was completed in order to reduce, but not eliminate, this uncertainty. Due to physical limitations inherent to this inspection, or any environmental assessment, NewFields does not warrant that the building or the Site are free of hazardous materials or that all hazardous materials have been identified at the Site. Some features may have been hidden from plain view during Inspections due to debris pile storage or other obstructions. Some hazardous materials may be present behind finished walls, ceilings, or floors that were not surveyed or sampled. As such, no absolute determination concerning the presence of hazardous materials and/or the human health risks they pose is made concerning the Site.

This report has been prepared by NewFields for Bear Paw Development Corporation, which may rely on the findings of the report. No other party shall rely on this report without the written consent of NewFields.



Ryan McGee
Senior IH Manager / Environmental Scientist
Asbestos / Lead Inspector
MTA-1705

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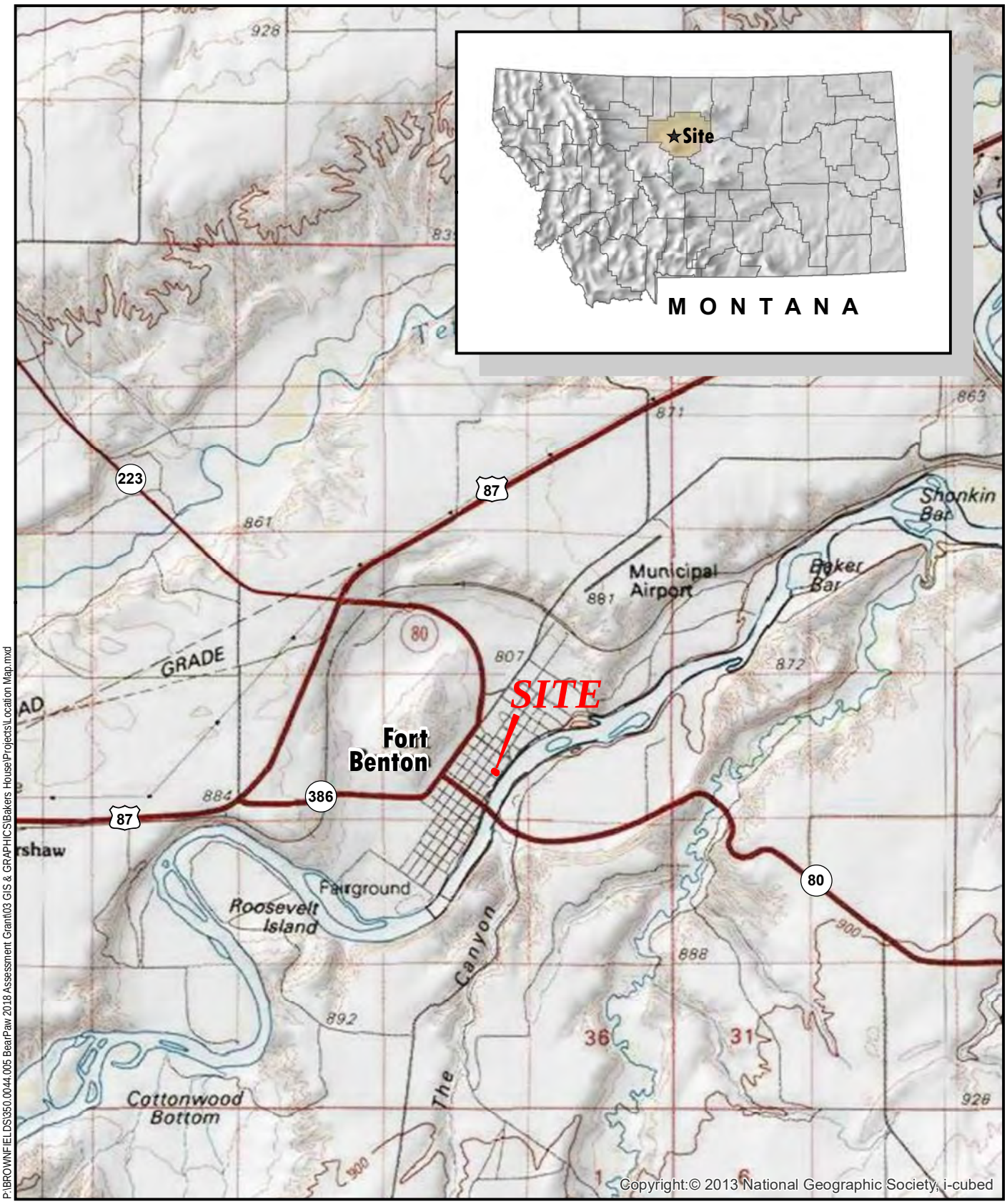
FIGURES



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0 5,000 Feet

NewFields

Location Map
Baker House
1608 Front Street
Fort Benton, MT
FIGURE 1

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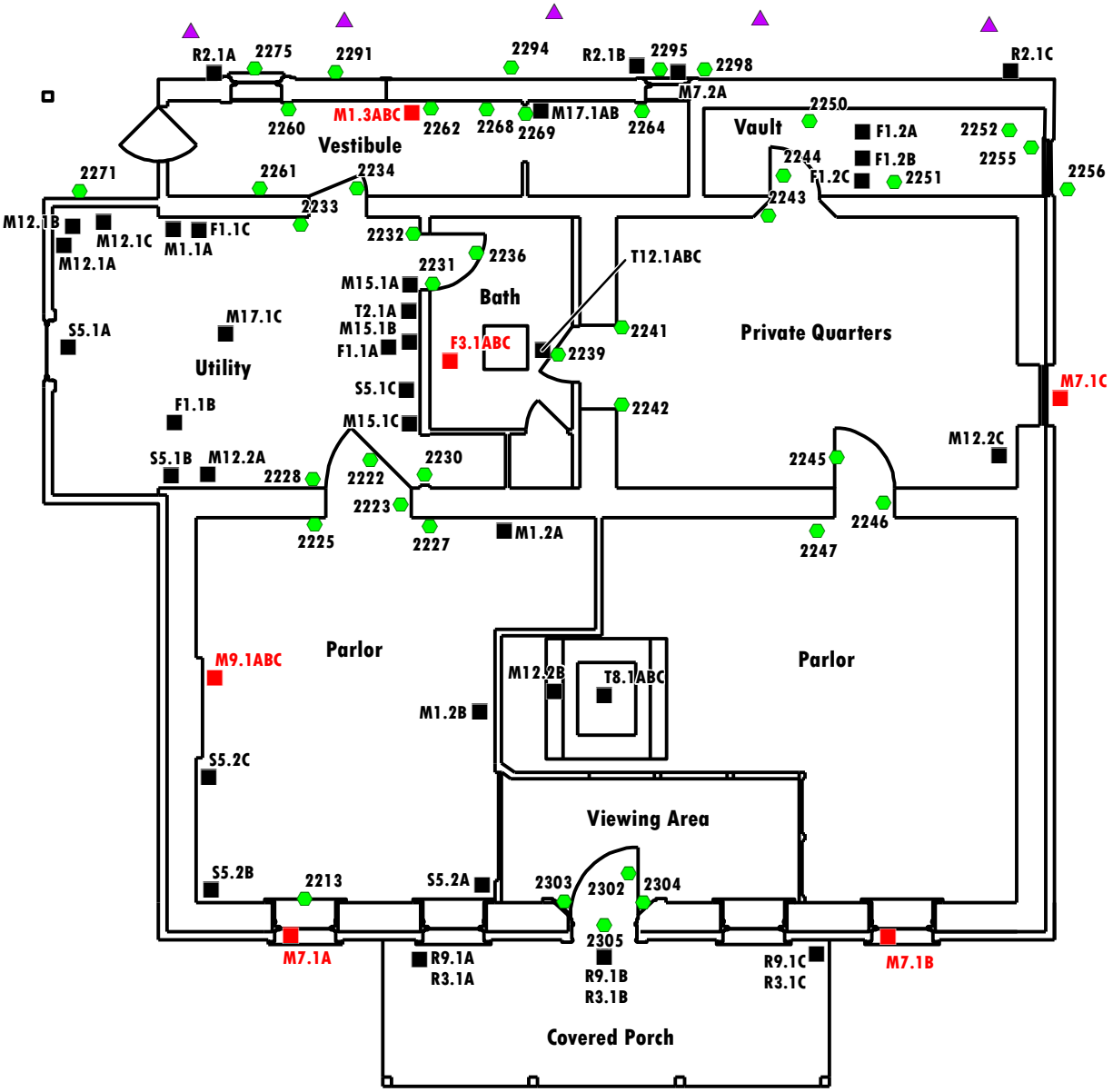
N

0 100
Feet

Approximate Property Boundary

NewFields

Site Map
Baker House
1608 Front Street
Fort Benton, MT
FIGURE 2



Z:\Projects\BROWNFIELDS\350.0044.005 BearPaw 2018 Assessment Grant\03 GIS & GRAPHICS\Bakers House\Projects\Sample Locations.mxd

N

0 Feet 8

- Asbestos Sample Location (Non Detect)
- Asbestos Sample Location (>1% Asbestos)
- Positive Lead Based Paint Result
- Composite Soil Sample Subsample Location

NewFields

Sample Locations
Baker House
1608 Front Street
Fort Benton, MT
FIGURE 3

TABLE

Table 1
XRF Measurements
Baker House, Fort Benton, MT

XRF Reading No.	Date, Time	Type	Side	Component	Substrate	Condition	Color	Room	Floor	Site	Pb Measurement	PbC Error	Results
XRF Action Level											1.0		
2204	5/22/2019 14:28	Calibration	Calibration								5.82	0	
2205	5/22/2019 15:34	PAINT	Calibration								0.9	0.1	Negative
2206	5/22/2019 15:38	PAINT	Calibration								0.9	0.1	Negative
2207	5/22/2019 15:40	PAINT	Calibration								0.9	0.1	Negative
2208	5/22/2019 15:43	PAINT	B	Wall	Plaster	Intact	White	Room 1	First	Baker House	< LOD	0.04	Null
2209	5/22/2019 15:43	PAINT	B	Wall	Plaster	Intact	White	Room 1	First	Baker House	< LOD	0.03	Null
2210	5/22/2019 15:44	PAINT	B	Wall	Plaster	Intact	White	Room 1	First	Baker House	< LOD	0.03	Negative
2211	5/22/2019 15:46	PAINT	C	Wall	Plaster	Intact	White	Room 1	First	Baker House	< LOD	0.03	Negative
2212	5/22/2019 15:48	PAINT	D	Wall	Plaster	Intact	White	Room 1	First	Baker House	< LOD	0.03	Negative
2213	5/22/2019 16:05	PAINT	B	Window	Wood	Intact	White	Room 1	First	Baker House	1.8	0.6	Positive
2214	5/22/2019 16:06	PAINT	B	Wall Casing	Wood	Intact	White	Room 1	First	Baker House	< LOD	0.03	Negative
2215	5/22/2019 16:10	PAINT	B	Window Casing	Wood	Intact	White	Room 1	First	Baker House	< LOD	0.03	Negative
2216	5/22/2019 16:11	PAINT	B	Window Casing	Wood	Intact	White	Room 1	First	Baker House	< LOD	0.03	Negative
2217	5/22/2019 16:11	PAINT	B	Window	Wood	Intact	White	Room 1	First	Baker House	< LOD	1.65	Null
2218	5/22/2019 16:12	PAINT	B	Window	Wood	Intact	White	Room 1	First	Baker House	0.5	0.3	Negative
2219	5/22/2019 16:13	PAINT	B	Window Trough	Wood	Intact	White	Room 1	First	Baker House	< LOD	0.03	Negative
2220	5/22/2019 16:17	PAINT	B	Window Casing	Wood	Intact	White	Room 1	First	Baker House	< LOD	0.82	Null
2221	5/22/2019 16:18	PAINT	B	Window Casing	Wood	Intact	White	Room 1	First	Baker House	< LOD	0.03	Negative
2222	5/22/2019 16:18	PAINT	A	Door	Wood	Intact	White	Room 1	First	Baker House	< LOD	27.15	Positive
2223	5/22/2019 16:19	PAINT	A	Door Casing	Wood	Intact	White	Room 1	First	Baker House	< LOD	18.3	Positive
2224	5/22/2019 16:21	PAINT	A	Door Stop	Wood	Intact	White	Room 1	First	Baker House	< LOD	0.03	Negative
2225	5/22/2019 16:22	PAINT	A	Door Casing	Wood	Intact	White	Room 1	First	Baker House	< LOD	19.2	Positive
2226	5/22/2019 16:22	PAINT	A	Door Casing	Wood	Intact	White	Room 1	First	Baker House	< LOD	0.03	Negative
2227	5/22/2019 16:26	PAINT	A	Door Casing	Wood	Intact	White	Room 1	First	Baker House	< LOD	29.4	Positive
2228	5/22/2019 16:26	PAINT	C	Door Casing	Wood	Intact	White	Room 1	First	Baker House	< LOD	10.65	Positive
2229	5/22/2019 16:28	PAINT	C	Wall	Wood	Intact	White	Room 1	First	Baker House	< LOD	0.06	Negative
2230	5/22/2019 16:29	PAINT	C	Closet Stop	Wood	Intact	White	Room 1	First	Baker House	< LOD	7.2	Positive
2231	5/22/2019 16:30	PAINT	B	Door Casing	Wood	Intact	White	Room 1	First	Baker House	< LOD	10.2	Positive
2232	5/22/2019 16:30	PAINT	B	Door Casing	Wood	Intact	White	Room 1	First	Baker House	< LOD	9	Positive
2233	5/22/2019 16:32	PAINT	A	Door Casing	Wood	Intact	White	Room 2	First	Baker House	< LOD	36.6	Positive
2234	5/22/2019 16:32	PAINT	A	Door	Wood	Intact	White	Room 2	First	Baker House	< LOD	36.75	Positive
2235	5/22/2019 16:34	PAINT	Upper	Access Panel	Wood	Intact	White	Room 2	First	Baker House	< LOD	0.29	Negative
2236	5/22/2019 16:36	PAINT	B	Door	Wood	Intact	White	Room 2	First	Baker House	1.3	0.2	Positive
2237	5/22/2019 16:43	PAINT	C	Trim	Wood	Intact	Black	Room 3	First	Baker House	< LOD	0.33	Negative
2238	5/22/2019 16:46	PAINT	C	Wall	Wood	Intact	Black	Room 3	First	Baker House	0.7	0.2	Negative
2239	5/22/2019 16:48	PAINT	C	Door Casing	Wood	Intact	Black	Room 3	First	Baker House	1.6	0.6	Positive
2240	5/22/2019 16:50	PAINT	D	Door Casing	Wood	Intact	Black	Room 3	First	Baker House	0.8	0.2	Negative
2241	5/22/2019 16:50	PAINT	A	Door Casing	Wood	Intact	Black	Room 4	First	Baker House	< LOD	23.55	Positive

XRF Reading No.	Date, Time	Type	Side	Component	Substrate	Condition	Color	Room	Floor	Site	Pb Measurement	PbC Error	Results
XRF Action Level											1.0		
2242	5/22/2019 16:51	PAINT	A	Door Casing	Wood	Intact	Black	Room 4	First	Baker House	2	1	Positive
2243	5/22/2019 16:52	PAINT	B	Door Casing	Wood	Intact	Black	Room 4	First	Baker House	< LOD	16.95	Positive
2244	5/22/2019 16:52	PAINT	B	Door	Wood	Intact	Black	Room 4	First	Baker House	< LOD	7.5	Positive
2245	5/22/2019 16:53	PAINT	D	Door	Wood	Intact	Black	Room 4	First	Baker House	< LOD	34.5	Positive
2246	5/22/2019 17:02	PAINT	D	Door Casing	Wood	Intact	Black	Room 4	First	Baker House	< LOD	41.25	Positive
2247	5/22/2019 17:03	PAINT	A	Door Casing	Wood	Intact	White	Room 5	First	Baker House	< LOD	37.5	Positive
2248	5/22/2019 17:04	PAINT	A	Wall	Brick	Intact	White	Room 5	First	Baker House	< LOD	0.03	Negative
2249	5/22/2019 17:06	PAINT	D	Wall	Brick	Intact	White	Room 5	First	Baker House	< LOD	0.03	Negative
2250	5/22/2019 17:08	PAINT	C	Wall	Brick	Intact	Yellow	Room 6	First	Baker House	< LOD	2	Positive
2251	5/22/2019 17:09	PAINT	A	Wall	Brick	Intact	Yellow	Room 6	First	Baker House	< LOD	3.75	Positive
2252	5/22/2019 17:10	PAINT	A	Ceiling	Wood	Intact	White	Room 6	First	Baker House	< LOD	6	Positive
2253	5/22/2019 17:11	PAINT	C	Door Casing	Metal	Intact	White	Room 6	First	Baker House	< LOD	0.03	Negative
2254	5/22/2019 17:12	PAINT	C	Door Casing	Wood	Intact	White	Room 6	First	Baker House	< LOD	3	Null
2255	5/22/2019 17:13	PAINT	C	Door Casing	Wood	Intact	White	Room 6	First	Baker House	< LOD	5.1	Positive
2256	5/22/2019 17:14	PAINT	C	Trim	Wood	Intact	White	Room 6	First	Baker House	< LOD	4.2	Positive
2257	5/22/2019 17:17	PAINT	C	Floor	Wood	Intact	Gray	Room 4	First	Baker House	< LOD	0.33	Negative
2258	5/22/2019 17:19	PAINT	C	Floor	Wood	Intact	Gray	Room 5	First	Baker House	0.7	0.3	Negative
2259	5/22/2019 17:21	PAINT	Lower	Floor	Concrete	Intact	Green	Room 7	First	Baker House	0.18	0.12	Negative
2260	5/22/2019 17:22	PAINT	A	Trim	Wood	Intact	Green	Room 7	First	Baker House	< LOD	18.6	Positive
2261	5/22/2019 17:23	PAINT	A	Wall	Wood	Intact	White	Room 7	First	Baker House	< LOD	26.1	Positive
2262	5/22/2019 17:26	PAINT	C	Wall	Wood	Intact	Beige	Room 7	First	Baker House	< LOD	12.9	Positive
2263	5/22/2019 17:28	PAINT	C	Wall	Wood	Intact	White	Room 7	First	Baker House	< LOD	0.26	Negative
2264	5/22/2019 17:30	PAINT	C	Window Casing	Wood	Intact	White	Room 7	First	Baker House	2	0.7	Positive
2265	5/22/2019 17:30	PAINT	B	Door	Wood	Intact	White	Room 7	First	Baker House	< LOD	3.9	Null
2266	5/22/2019 17:31	PAINT	B	Door	Wood	Intact	White	Room 7	First	Baker House	0.7	0.3	Negative
2267	5/22/2019 17:32	PAINT	B	Door Casing	Wood	Intact	White	Room 7	First	Baker House	0.7	0.3	Negative
2268	5/22/2019 17:33	PAINT	C	Wall	Wood	Intact	White	Room 7	First	Baker House	< LOD	28.5	Positive
2269	5/22/2019 17:33	PAINT	C	Wall	Wood	Intact	White	Room 7	First	Baker House	< LOD	23.25	Positive
2270	5/22/2019 17:37	PAINT	C	Door	Wood	Intact	White	Room 7	First	Baker House	0.7	0.3	Negative
2271	5/22/2019 17:39	PAINT	Mid.	Wall	Concrete	Intact	White	Outside	First	Baker House	< LOD	3.6	Positive
2272	5/22/2019 17:40	PAINT	Mid.	Trim	Concrete	Intact	White	Outside	First	Baker House	< LOD	0.04	Null
2273	5/22/2019 17:41	PAINT	Mid.	Trim	Wood	Intact	White	Outside	First	Baker House	< LOD	0.03	Negative
2274	5/22/2019 17:42	PAINT	Mid.	Window Casing	Wood	Intact	White	Outside	First	Baker House	< LOD	0.06	Negative
2275	5/22/2019 17:42	PAINT	Mid.	Window	Wood	Intact	White	Outside	First	Baker House	< LOD	28.05	Positive
2276	5/22/2019 17:43	PAINT	Mid.	Window Stool	Wood	Intact	White	Outside	First	Baker House	< LOD	0.03	Negative
2277	5/22/2019 17:44	PAINT	Mid.	Wall	Wood	Intact	White	Outside	First	Baker House	< LOD	0.04	Negative
2278	5/22/2019 17:45	PAINT	Mid.	Wall	Wood	Intact	White	Outside	First	Baker House	< LOD	0.13	Negative
2279	5/22/2019 17:46	PAINT	Mid.	Wall	Wood	Intact	White	Outside	First	Baker House	< LOD	0.05	Negative
2280	5/22/2019 17:47	PAINT	Mid.	Wall	Wood	Intact	White	Outside	First	Baker House	< LOD	0.04	Negative
2281	5/22/2019 17:47	PAINT	Mid.	Wall	Wood	Intact	White	Outside	First	Baker House	< LOD	0.04	Negative
2282	5/22/2019 17:48	PAINT	Mid.	Wall	Wood	Intact	White	Outside	First	Baker House	< LOD	0.14	Negative

XRF Reading No.	Date, Time	Type	Side	Component	Substrate	Condition	Color	Room	Floor	Site	Pb Measurement	PbC Error	Results
XRF Action Level											1.0		
2283	5/22/2019 17:49	PAINT	Mid.	Wall	Wood	Intact	White	Outside	First	Baker House	< LOD	0.03	Negative
2284	5/22/2019 17:52	PAINT	Mid.	Soffit	Wood	Intact	White	Outside	First	Baker House	< LOD	0.29	Negative
2285	5/22/2019 17:53	PAINT	Mid.	Soffit	Wood	Intact	White	Outside	First	Baker House	< LOD	0.31	Negative
2286	5/22/2019 17:54	PAINT	Mid.	Fascia	Wood	Intact	White	Outside	First	Baker House	< LOD	0.27	Negative
2287	5/22/2019 17:55	PAINT	Mid.	Fascia	Wood	Intact	White	Outside	First	Baker House	< LOD	0.03	Negative
2288	5/22/2019 17:55	PAINT	Mid.	Fascia	Wood	Intact	White	Outside	First	Baker House	< LOD	0.05	Null
2289	5/22/2019 17:55	PAINT	Mid.	Fascia	Wood	Intact	White	Outside	First	Baker House	< LOD	0.94	Null
2290	5/22/2019 17:56	PAINT	Mid.	Fascia	Wood	Intact	White	Outside	First	Baker House	< LOD	0.03	Negative
2291	5/22/2019 17:57	PAINT	Mid.	Wall	Wood	Poor	White	Outside	First	Baker House	< LOD	20.1	Positive
2292	5/22/2019 17:57	PAINT	Mid.	Wall	Wood	Poor	White	Outside	First	Baker House	< LOD	0.55	Negative
2293	5/22/2019 17:58	PAINT	Mid.	Wall	Wood	Poor	White	Outside	First	Baker House	< LOD	0.31	Negative
2294	5/22/2019 17:59	PAINT	Mid.	Wall	Wood	Poor	White	Outside	First	Baker House	< LOD	27	Positive
2295	5/22/2019 17:59	PAINT	Mid.	Window Casing	Wood	Poor	White	Outside	First	Baker House	< LOD	36	Positive
2296	5/22/2019 18:01	PAINT	Mid.	Window	Wood	Poor	White	Outside	First	Baker House	< LOD	0.05	Negative
2297	5/22/2019 18:01	PAINT	Mid.	Window	Wood	Poor	White	Outside	First	Baker House	< LOD	0.06	Negative
2298	5/22/2019 18:03	PAINT	Mid.	Window	Wood	Poor	White	Outside	First	Baker House	< LOD	4.95	Positive
2299	5/22/2019 18:04	PAINT	Mid.	Window	Wood	Poor	White	Outside	First	Baker House	1.4	0.5	Null
2300	5/22/2019 18:05	PAINT	Mid.	Window	Wood	Poor	White	Outside	First	Baker House	1.3	0.6	Null
2301	5/22/2019 18:06	PAINT	Mid.	Window	Wood	Poor	White	Outside	First	Baker House	1.3	0.4	Null
2302	5/22/2019 18:06	PAINT	Mid.	Door	Wood	Poor	White	Outside	First	Baker House	< LOD	50.25	Positive
2303	5/22/2019 18:07	PAINT	Mid.	Door Casing	Wood	Poor	White	Outside	First	Baker House	< LOD	47.4	Positive
2304	5/22/2019 18:07	PAINT	Mid.	Door Casing	Wood	Poor	White	Outside	First	Baker House	< LOD	31.65	Positive
2305	5/22/2019 18:07	PAINT	Mid.	Door Casing	Wood	Poor	White	Outside	First	Baker House	< LOD	29.4	Positive
2306	5/22/2019 18:10	PAINT	Mid.	Deck	Wood	Poor	Gray	Outside	First	Baker House	< LOD	0.03	Negative
2307	5/22/2019 18:11	PAINT	Lower	Column	Wood	Intact	White	Outside	First	Baker House	< LOD	0.03	Negative
2308	5/22/2019 18:12	PAINT	Lower	Ceiling	Wood	Intact	White	Outside	First	Baker House	< LOD	0.06	Negative
2309	5/22/2019 18:15	PAINT	Lower	Foundation	Concrete	Intact	White	Outside	First	Baker House	< LOD	0.04	Negative
2310	5/22/2019 18:18	PAINT	Calib.	Window Stool	Cinder block	Intact	White	Outside	First	Baker House	0.9	0.1	Negative
2311	5/22/2019 18:19	PAINT	Calib.	Window Stool	Cinder block	Intact	White	Outside	First	Baker House	0.8	0.2	Negative
2312	5/22/2019 18:21	PAINT	Calib.	Window Stool	Cinder block	Intact	White	Outside	First	Baker House	0.8	0.2	Negative

Notes:

The "Side" column corresponds to the location of the exterior or interior surface that was measured. For this project, Side "A" is East "B" is South "C" is West and "D" is North.

Readings that are greater than the upper boundary of the "inconclusive" range (determined by the XRF Performance Characteristic Sheet) are considered positive by the XRF.

All measurements reported in mg/cm^2

LOD - Limit of Detection

Null - Measurement inconclusive, therefore, requiring an additional measurement

Site Access Agreement

APPENDIX A

PROPERTY ACCESS AGREEMENT
NEWFIELDS COMPANIES, LLC
AND PROPERTY OWNER

BACKGROUND

NewFields Companies LLC (NewFields) has been retained by Bear Paw Development Corporation (Bear Paw) to complete a Phase I Environmental Site Assessment (ESA) and an asbestos abatement assessment on properties participating in Bear Paw's USEPA Brownfields Program. To complete the Phase I ESA, NewFields personnel will require access to the facility for the purpose of visually inspecting the property for recognized environmental conditions (RECs), as defined by ASTM 1527-13. Should RECs be identified, NewFields may require additional access to the facility for the purpose of sampling soil, groundwater, air, or building materials to determine the severity and extent of the REC. Upon completion of the Phase I ESA, a Phase I ESA report will be provided to the Property Owner outlining recommendations for Phase II assessment, as appropriate. If a Phase II assessment is deemed necessary by the Property Owner, the Property Owner will be provided a copy of a Sampling & Analysis Plan (SAP), which shall identify the location and purpose of proposed samples on the property. In addition, upon completion of the Phase II ESA, if required, the Property Owner will be provided a copy of the Report of Findings.

REQUEST

Property Owner, City of Fort Benton at 1608 Front St., Ft. Benton Montana, hereby grants NEWFIELDS, its consultants and subcontractors (collectively "NEWFIELDS") permission to enter upon the property to engage in **environmental assessment and testing services (the "WORK").**

PURPOSE

NEWFIELDS and the Property Owner are entering into this Agreement so that NEWFIELDS may enter upon the Site to perform the WORK. Without waiver of any protections pursuant to the laws of the State of Montana, NEWFIELDS agrees to act in accordance with all applicable statutes and regulations in conducting the WORK.

NEWFIELDS COMMITMENTS

In return for the Property Owner granting NEWFIELDS access to the property to perform the WORK, NEWFIELDS agrees to the following:

a. NEWFIELDS will give the Property Owner reasonable notice before commencing any on-site activities.
b. NEWFIELDS will, to the greatest extent possible, perform the WORK in a way that minimizes interference with any ongoing operations. If NEWFIELDS determines that any on-site activity may interfere with the Property Owner's operations, NEWFIELDS will first notify, and consult with, the Property Owner before commencing the activity.
c. The Property Owner will have the opportunity to be present for any on-site activity.
d. NEWFIELDS agrees, as practicable, to return the property to the general condition that existed before NEWFIELDS work activities.

INDEMNIFICATION & INSURANCE

NEWFIELDS and its consultants and subcontractors, agree to indemnify the Property Owner, its heirs, successors and assigns, from any and all liability, claims, damages and actions that may result from the negligent use or occupancy of the Property by NEWFIELDS and its consultants and subcontractors, subject to the following exceptions: 1) NEWFIELDS and its consultants and subcontractors shall have no obligation to indemnify or hold harmless the Property Owner, its heirs, successors or assigns, or any of them, for any claims or damages for which NEWFIELDS and/or its consultants and subcontractors would have no liability under the laws of the State of Montana; 2) The agreement of NEWFIELDS and its consultants and subcontractors to indemnify, as set forth in this paragraph, shall not apply to any claims, actions or damages that may arise out of, be occasioned by or result from any condition existing on, or which did exist on, the Property at the time of the execution of this agreement, or at any time prior to the execution of this Agreement or that was caused by the Property Owner.

GENERAL CONDITIONS

This Agreement represents the entire agreement between the parties concerning site access for NEWFIELDS and its consultants and subcontractors, and supersedes all prior access negotiations, representations, or agreements, either written or oral between the parties unless otherwise expressly stated.

This Agreement may be terminated by the written notice of either the Party. Further, any modification to this Agreement shall be in writing unless NEWFIELDS determines circumstances allow otherwise. Where any agreed-upon modification is verbal, NEWFIELDS will document the modification, in writing, as soon as practicable.

This Agreement applies to and is binding upon NEWFIELDS and its consultants and subcontractors, and the Property Owner.

TERM

This Agreement shall take effect as of the date both parties have signed and dated it. Unless terminated sooner by mutual written agreement of the parties, this Agreement shall expire upon NEWFIELDS and the Property Owner agreeing that site assessment or cleanup activities are completed.

Property Owner

Richard D. Morris

Signature

Richard D. Morris Mayor

Name (Print)

PO Box 8, Fort Benton, MT

Address

Dated: 1/23/19

NEWFIELDS COMPANIES, LLC

Christin Hileman

Signature

Christin Hileman, Project Manager

Name (Print)

700 SW Higgins, Suite 15, Missoula, MT

Address

Dated: 1/23/19

Inspector Credentials

APPENDIX B

RYAN D MCGEE
has met the requirements of Montana Administrative Rule 17.74.362 and/or 17.74.363 for accreditation in the following asbestos occupation(s) through the specified expiration date(s).

MTA-1705

Asbestos Inspector	03/28/2020
Project Contractor/Supervisor	10/19/2019
Project Designer	05/02/2019

MT DEQ Asbestos Control Program

CERTIFICATE OF COMPLETION

RYAN D McGEE

104 E Broadway Street, Suite G1, Helena, MT 59601

successfully completed course training and satisfactorily passed the course examination meeting the accreditation requirements for the

Montana 4-Hour Asbestos Inspector Refresher Course

in accordance with Administrative Rules of Montana 17.74.362 and/or 17.74.363

Certificate Number: ACM 03282019-11

Examination Date: 03/28/2019 **Course Date:** 03/28/2019 **Expiration Date:** 03/28/2020

Course Instructor:

Brian Betts
Abatement Contractors of Montana, LLC
208 Commerce Street
Missoula, MT 59808
406-549-8489

Instructor Signature:

Course Approving Agency:

Asbestos Control Program
Montana Department of Environmental Quality
PO Box 200901
Helena, MT 59620-0901

United States Environmental Protection Agency

This is to certify that

Ryan D McGee

has fulfilled the requirements of the Toxic Substances Control Act (TSCA) Section 402, and has received certification to conduct lead-based paint activities pursuant to 40 CFR Part 745.226 as:

Risk Assessor

In the Jurisdiction of:

All EPA Administered Lead-based Paint Activities Program States, Tribes and Territories

This certification is valid from the date of issuance and expires March 21, 2022

LBP-R-I198901-1

Certification #

March 07, 2019

Issued On

Adrienne Priselac, Manager, Toxics Office

Land Division

Project Photo Log

APPENDIX C

Photo 1

Location:
South Side of Property

Description:
Baker House looking North

Photo 2

Location:
North Side of Property

Description:
Baker House looking South. LBP Exterior Siding

Photo 3

Location:
West Side of Property

Description:
Baker House looking East

Photo 4

Location:
Roof Systems

Description:
Non-Asbestos Cedar Shake Roof/Underlayment (R9.1)

Non-Asbestos Rolled Asphalt Roof/Underlayment (R3.1)

Photo 5

Location:
Roof Systems

Description:
Non-Asbestos Cedar Shake Roof/Underlayment (R9.1)

Non-Asbestos 3-Tab Asphalt Shingle Roof/Underlayment (R2.1)

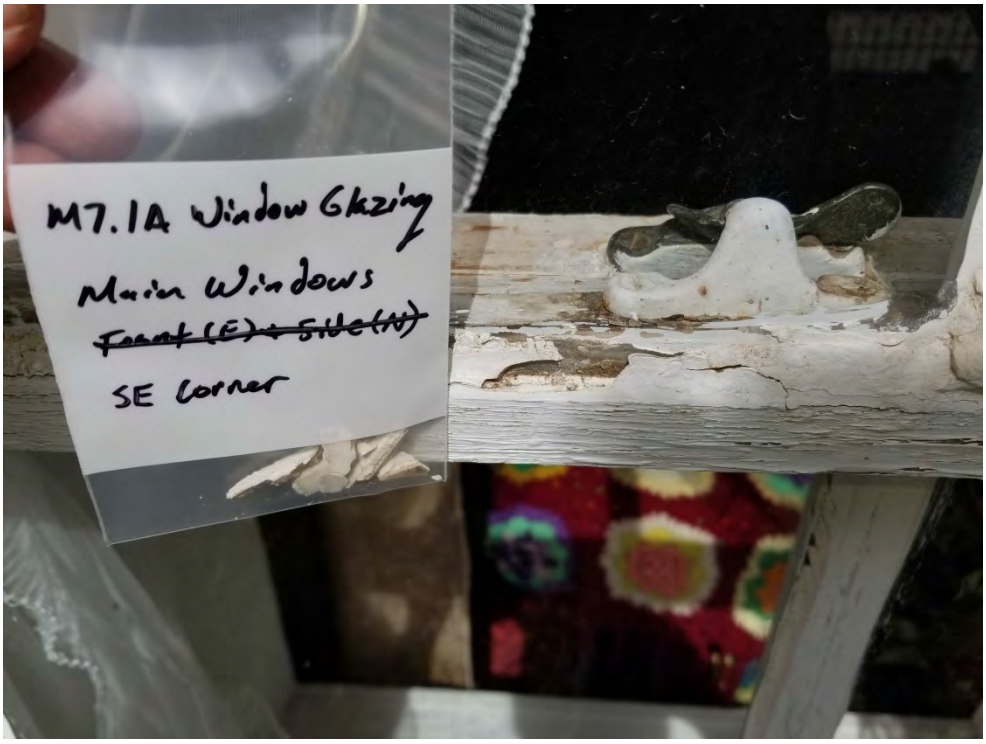


Photo 6

Location:
Southeast Corner Window

Description:
Asbestos-Containing Window Glazing (M7.1)

Photo 7

Location:
Kitchen

Description:
Non-Asbestos Interior Plaster Wall System (S5.1)

Photo 8

Location:
Vestibule (Back Porch)

Description:
Exterior LBP Wall and Door Casing

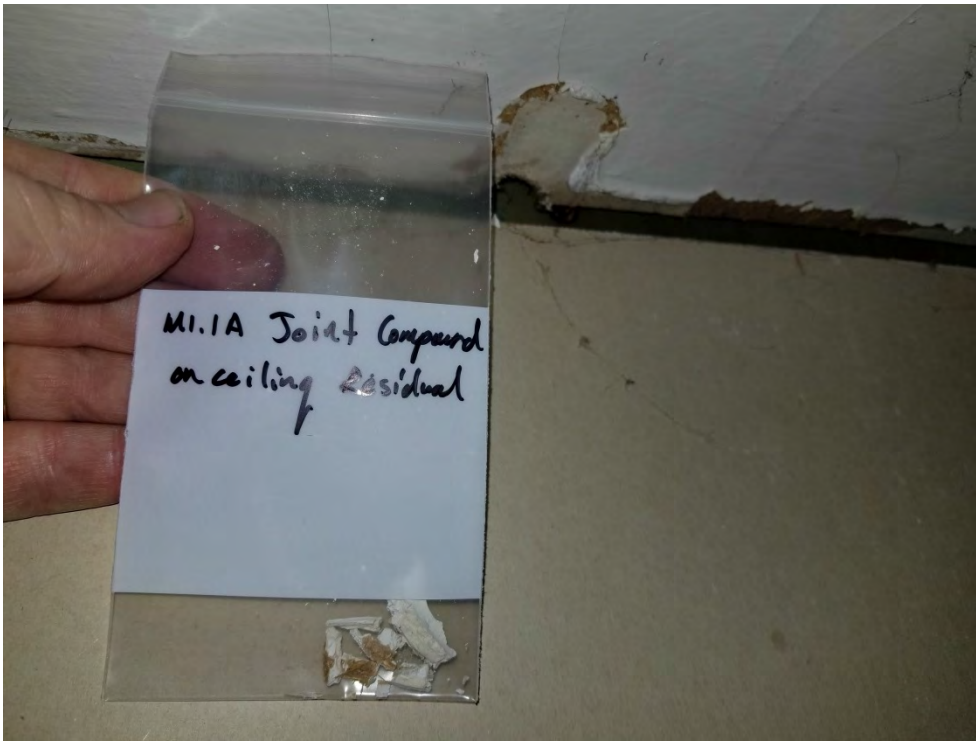


Photo 9

Location:
Kitchen Ceiling

Description:
Non-Asbestos Joint Compound Patch (<6 sq. ft.) Material (M1.1)

Photo 10

Location:
Kitchen Ceiling

Description:
Pipe Joint Insulation Patch Material (<6 sq ft)

Photo 11

Location:
Bathroom

Description:
9-inch Vinyl Floor Tile and Asbestos-Containing Mastic (F3.1)

Photo 12

Location:
Vestibule (Back Porch)

Description:
Asbestos-Containing Joint Compound on Wood (M1.3)

Photo 13

Location:
Vestibule (Back Porch)

Description:
Non-Asbestos Electrical Wiring (M17.1)

Photo 14

Location:
Northwest Corner Porch

Description:
Non-Asbestos Vinyl Sheet Flooring (F1.2) and Yellow LBP on Walls/Ceiling

Photo 15

Location:
Attic Space above Bathroom/Kitchen

Description:
Non-Asbestos Blown-in Insulation (T12.1)

Photo 16

Location:
Vestibule (Back Porch)

Description:
Stored Window Systems and LBP Walls/Ceiling

Analytical Laboratory Reports

APPENDIX D

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June 7, 2019

NewFields
1120 Cedar Street
Missoula, MT 59802

CLIENT PROJECT: Baker House, 350.0044.005-003A-H
CEI LAB CODE: B192536

Dear Customer:

Enclosed are asbestos analysis results for PLM Bulk samples received at our laboratory on May 28, 2019. The samples were analyzed for asbestos using polarizing light microscopy (PLM) per the EPA 600 Method.

Sample results containing >1% asbestos are considered asbestos-containing materials (ACMs) per EPA regulatory requirements. The detection limit for the EPA 600 Method is <1% asbestos by weight as determined by visual estimation.

Thank you for your business and we look forward to continuing good relations.

Kind Regards,

Tianbao Bai, Ph.D., CIH
Laboratory Director

NVLAP TESTING
NVLAP LAB CODE 101768-0

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ASBESTOS ANALYTICAL REPORT
By: Polarized Light Microscopy

Prepared for

NewFields

CLIENT PROJECT: Baker House, 350.0044.005-003A-H

LAB CODE: B192536

TEST METHOD: EPA 600 / R93 / 116 and EPA 600 / M4-82 / 020

REPORT DATE: 06/07/19

TOTAL SAMPLES ANALYZED: 55

SAMPLES >1% ASBESTOS: 4

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Asbestos Report Summary

By: POLARIZING LIGHT MICROSCOPY

PROJECT: Baker House, 350.0044.005-003A-H **LAB CODE:** B192536

METHOD: EPA 600 / R93 / 116 and EPA 600 / M4-82 / 020

Client ID	Layer	Lab ID	Color	Sample Description	ASBESTOS %
R9.1A		B43339	Brown	Roof Underlayment	None Detected
R9.1B		B43340	Brown	Roof Underlayment	None Detected
R9.1C		B43341	Brown	Roof Underlayment	None Detected
R2.1A	Layer 1	B43342A	Black,Variously	Asphalt Shingle	None Detected
	Layer 2	B43342A	Black,Variously	Underlayment	None Detected
		B43342B	Black,Off-white	Asphalt Shingle	None Detected
R2.1B	Layer 1	B43343A	Black,Variously	Asphalt Shingle	None Detected
	Layer 2	B43343A	Brown	Underlayment	None Detected
		B43343B	Black,Off-white	Asphalt Shingle	None Detected
R2.1C	Layer 1	B43344A	Black,Variously	Asphalt Shingle	None Detected
	Layer 2	B43344A	Brown	Underlayment	None Detected
		B43344B	Black,Off-white	Asphalt Shingle	None Detected
R3.1A	Layer 1	B43345	Black,Off-white	Roof Shingle	None Detected
	Layer 2	B43345	Brown	Underlayment	None Detected
R3.1B	Layer 1	B43346	Black,Off-white	Roof Shingle	None Detected
	Layer 2	B43346	Brown	Underlayment	None Detected
R3.1C	Layer 1	B43347	Black,Off-white	Roof Shingle	None Detected
	Layer 2	B43347	Brown	Underlayment	None Detected
S5.2A	Layer 1	B43348	White	Plaster Skim Coat	None Detected
	Layer 2	B43348	Gray	Plaster Base Coat	None Detected
S5.2B	Layer 1	B43349	White	Plaster Skim Coat	None Detected
	Layer 2	B43349	Gray	Plaster Base Coat	None Detected
S5.2C	Layer 1	B43350	White	Plaster Skim Coat	None Detected
	Layer 2	B43350	Gray	Plaster Base Coat	None Detected
M9.1A		B43351A	Beige	Ceramic Tile	None Detected
		B43351B	Beige	Adhesive	Chrysotile 10%
M9.1B		B43352A	Beige	Ceramic Tile	None Detected
		B43352B		Sample Not Analyzed per COC	
M9.1C		B43353A	Beige	Ceramic Tile	None Detected
		B43353B		Sample Not Analyzed per COC	
M1.2A		B43354	White	Sheetrock , Joint, And Tape	None Detected

Asbestos Report Summary

By: POLARIZING LIGHT MICROSCOPY

PROJECT: Baker House, 350.0044.005-003A-H **LAB CODE:** B192536

METHOD: EPA 600 / R93 / 116 and EPA 600 / M4-82 / 020

Client ID	Layer	Lab ID	Color	Sample Description	ASBESTOS %
M1.2B		B43355	White	Sheetrock , Joint, And Tape	None Detected
M1.2C		B43356	White	Sheetrock , Joint, And Tape	None Detected
M12.2A		B43357	Brown,Gray	Adobe Stone/grout	None Detected
M12.2B		B43358	Brown,Gray	Adobe Stone/grout	None Detected
M12.2C		B43359	Brown,Gray	Adobe Stone/grout	None Detected
T8.1A		B43360	Brown	Fire Brick And Grout	None Detected
T8.1B		B43361	Brown	Fire Brick And Grout	None Detected
T8.1C		B43362	Brown	Fire Brick And Grout	None Detected
F1.1A		B43363	Creme,Red and Black Streaks	Vinyl Sheet Flooring	None Detected
F1.1B		B43364	Creme,Red and Black Streaks	Vinyl Sheet Flooring	None Detected
F1.1C		B43365	Creme,Red and Black Streaks	Vinyl Sheet Flooring	None Detected
S5.1A		B43366	Gray	Plaster Walls	None Detected
S5.1B		B43367	Gray	Plaster Walls	None Detected
S5.1C		B43368	Gray	Plaster Walls	None Detected
M12.1A	Layer 1	B43369	Brown	Brick	None Detected
	Layer 2	B43369	Gray	Grout	None Detected
M12.1B	Layer 1	B43370	Brown	Brick	None Detected
	Layer 2	B43370	Gray	Grout	None Detected
M12.1C	Layer 1	B43371	Brown	Brick	None Detected
	Layer 2	B43371	Gray	Grout	None Detected
M15.1A		B43372	Yellow	Panel Adhesive	None Detected
M15.1B		B43373	Yellow	Panel Adhesive	None Detected
M15.1C		B43374	Yellow	Panel Adhesive	None Detected
M1.1A		B43375	White	Joint Compound	None Detected
T2.1A		B43376	Green	Pipe Insulation Joint	None Detected
F3.1A		B43377A	Yellow	Vinyl Floor Tile	None Detected
	Layer 1	B43377B	Yellow	Mastic	Chrysotile 5%
	Layer 2	B43377B	Black	Mastic	None Detected
F3.1B		B43378A	Yellow	Vinyl Floor Tile	None Detected

Asbestos Report Summary

By: POLARIZING LIGHT MICROSCOPY

PROJECT: Baker House, 350.0044.005-003A-H **LAB CODE:** B192536

METHOD: EPA 600 / R93 / 116 and EPA 600 / M4-82 / 020

Client ID	Layer	Lab ID	Color	Sample Description	ASBESTOS %
		B43378B		Sample Not Analyzed per COC	
F3.1C		B43379A	Yellow	Vinyl Floor Tile	None Detected
		B43379B		Sample Not Analyzed per COC	
F1.2A		B43380	Black	Vinyl Sheet Flooring	None Detected
F1.2B		B43381	Black	Vinyl Sheet Flooring	None Detected
F1.2C		B43382	Black	Vinyl Sheet Flooring	None Detected
M17.1A		B43383	Brown	Electrical Wiring	None Detected
M17.1B		B43384	Brown	Electrical Wiring	None Detected
M17.1C		B43385	Brown	Electrical Wiring	None Detected
M1.3A		B43386	White	Joint Compound	Chrysotile 3%
M1.3B		B43387		Sample Not Analyzed per COC	
M1.3C		B43388		Sample Not Analyzed per COC	
M7.1A		B43389	White	Window Glazing	None Detected
M7.1B		B43390	White	Window Glazing	Chrysotile 2%
M7.1C		B43391		Sample Not Analyzed per COC	
M7.2A		B43392	White	Window Glazing	None Detected
M7.3A		B43393	White	Window Glazing	None Detected
T12.1A		B43394	White,Brown	Blown-in Insulation	None Detected
T12.1B		B43395	White,Brown	Blown-in Insulation	None Detected
T12.1C		B43396	White,Brown	Blown-in Insulation	None Detected

ASBESTOS BULK ANALYSIS

By: POLARIZING LIGHT MICROSCOPY

Client: NewFields
1120 Cedar Street
Missoula, MT 59802

Lab Code: B192536
Date Received: 05-28-19
Date Analyzed: 05-29-19
Date Reported: 06-07-19

Project: Baker House, 350.0044.005-003A-H

ASBESTOS BULK PLM, EPA 600 METHOD

Client ID / Lab ID	Lab Description	Lab Attributes	NON-ASBESTOS COMPONENTS Fibrous		Non-Fibrous		ASBESTOS %
R9.1A B43339	Roof Underlayment	Homogeneous Brown Fibrous Bound	80%	Cellulose	20%	Tar	None Detected
R9.1B B43340	Roof Underlayment	Homogeneous Brown Fibrous Bound	80%	Cellulose	20%	Tar	None Detected
R9.1C B43341	Roof Underlayment	Homogeneous Brown Fibrous Bound	80%	Cellulose	20%	Tar	None Detected
R2.1A Layer 1 B43342A	Asphalt Shingle	Heterogeneous Black,Variously Fibrous Bound	40%	Cellulose	50% 10%	Tar Gravel	None Detected
Layer 2 B43342A	Underlayment	Homogeneous Black,Variously Fibrous Bound	80%	Cellulose	20%	Tar	None Detected
B43342B	Asphalt Shingle	Heterogeneous Black,Off-white Fibrous Bound	20% 10%	Cellulose Fiberglass	50% 20%	Tar Gravel	None Detected
R2.1B Layer 1 B43343A	Asphalt Shingle	Heterogeneous Black,Variously Fibrous Bound	30%	Cellulose	55% 10% 5%	Tar Gravel Organic Material	None Detected

ASBESTOS BULK ANALYSIS

By: POLARIZING LIGHT MICROSCOPY

Client: NewFields
1120 Cedar Street
Missoula, MT 59802

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Date Analyzed: 05-29-19
Date Reported: 06-07-19

Project: Baker House, 350.0044.005-003A-H

ASBESTOS BULK PLM, EPA 600 METHOD

Client ID Lab ID	Lab Description	Lab Attributes	NON-ASBESTOS COMPONENTS Fibrous		 Non-Fibrous		ASBESTOS %
Layer 2 B43343A	Underlayment	Homogeneous Brown Fibrous Bound	80%	Cellulose	20%	Tar	None Detected
B43343B	Asphalt Shingle	Heterogeneous Black,Off-white Fibrous Bound	20% 10%	Cellulose Fiberglass	50% 20%	Tar Gravel	None Detected
R2.1C Layer 1 B43344A	Asphalt Shingle	Heterogeneous Black,Variously Fibrous Bound	40%	Cellulose	50% 10%	Tar Gravel	None Detected
Layer 2 B43344A	Underlayment	Homogeneous Brown Fibrous Bound	80%	Cellulose	20%	Tar	None Detected
B43344B	Asphalt Shingle	Heterogeneous Black,Off-white Fibrous Bound	20% 10%	Cellulose Fiberglass	50% 20%	Tar Gravel	None Detected
R3.1A Layer 1 B43345	Roof Shingle	Heterogeneous Black,Off-white Fibrous Bound	20% 10%	Cellulose Fiberglass	50% 20%	Tar Gravel	None Detected
Layer 2 B43345	Underlayment	Homogeneous Brown Fibrous Bound	80%	Cellulose	20%	Tar	None Detected

ASBESTOS BULK ANALYSIS

By: POLARIZING LIGHT MICROSCOPY

Client: NewFields
1120 Cedar Street
Missoula, MT 59802

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Project: Baker House, 350.0044.005-003A-H

ASBESTOS BULK PLM, EPA 600 METHOD

Client ID / Lab ID	Lab Description	Lab Attributes	NON-ASBESTOS COMPONENTS Fibrous		Non-Fibrous		ASBESTOS %
R3.1B	Roof Shingle	Heterogeneous	20%	Cellulose	50%	Tar	None Detected
Layer 1		Black,Off-white	10%	Fiberglass	20%	Gravel	
B43346		Fibrous					
		Bound					
Layer 2	Underlayment	Homogeneous	80%	Cellulose	20%	Tar	None Detected
B43346		Brown					
		Fibrous					
		Bound					
R3.1C	Roof Shingle	Heterogeneous	20%	Cellulose	50%	Tar	None Detected
Layer 1		Black,Off-white	10%	Fiberglass	20%	Gravel	
B43347		Fibrous					
		Bound					
Layer 2	Underlayment	Homogeneous	80%	Cellulose	20%	Tar	None Detected
B43347		Brown					
		Fibrous					
		Bound					
S5.2A	Plaster Skim Coat	Homogeneous	5%	Cellulose	25%	Silicates	None Detected
Layer 1		White			65%	Binder	
B43348		Fibrous			5%	Paint	
		Tightly Bound					
Layer 2	Plaster Base Coat	Homogeneous	20%	Cellulose	55%	Silicates	None Detected
B43348		Gray			20%	Binder	
		Fibrous			5%	Paint	
		Tightly Bound					
S5.2B	Plaster Skim Coat	Homogeneous	5%	Cellulose	25%	Silicates	None Detected
Layer 1		White			65%	Binder	
B43349		Fibrous			5%	Paint	
		Tightly Bound					

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ASBESTOS BULK PLM, EPA 600 METHOD

Client ID / Lab ID	Lab Description	Lab Attributes	NON-ASBESTOS COMPONENTS Fibrous		Non-Fibrous		ASBESTOS %
Layer 2 B43349	Plaster Base Coat	Homogeneous Gray Fibrous Tightly Bound	20%	Cellulose	55% 20% 5%	Silicates Binder Paint	None Detected
S5.2C Layer 1 B43350	Plaster Skim Coat	Homogeneous White Fibrous Tightly Bound	5%	Cellulose	25% 65% 5%	Silicates Binder Paint	None Detected
Layer 2 B43350	Plaster Base Coat	Homogeneous Gray Fibrous Tightly Bound	20%	Cellulose	55% 20% 5%	Silicates Binder Paint	None Detected
M9.1A B43351A	Ceramic Tile	Homogeneous Beige Fibrous Tightly Bound	15%	Cellulose	65% 20%	Vinyl Silicates	None Detected
B43351B	Adhesive	Homogeneous Beige Fibrous Tightly Bound	15%	Cellulose	70% 5%	Mastic Calc Carb	**10% Chrysotile**
M9.1B B43352A	Ceramic Tile	Homogeneous Beige Fibrous Tightly Bound	15%	Cellulose	65% 20%	Vinyl Silicates	None Detected
B43352B	Sample Not Analyzed per COC						
M9.1C B43353A	Ceramic Tile	Homogeneous Beige Fibrous Tightly Bound	15%	Cellulose	65% 20%	Vinyl Silicates	None Detected

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ASBESTOS BULK PLM, EPA 600 METHOD

Client ID / Lab ID	Lab Description	Lab Attributes	NON-ASBESTOS COMPONENTS Fibrous		NON-ASBESTOS COMPONENTS Non-Fibrous		ASBESTOS %
B43353B	Sample Not Analyzed per COC						
M1.2A B43354	Sheetrock , Joint, And Tape	Homogeneous White Fibrous Loose	20%	Cellulose	55% 20% 5%	Gypsum Silicates Paint	None Detected
M1.2B B43355	Sheetrock , Joint, And Tape	Homogeneous White Fibrous Loose	20%	Cellulose	55% 20% 5%	Gypsum Silicates Paint	None Detected
M1.2C B43356	Sheetrock , Joint, And Tape	Homogeneous White Fibrous Loose	20%	Cellulose	55% 20% 5%	Gypsum Silicates Paint	None Detected
M12.2A B43357	Adobe Stone/grout	Heterogeneous Brown,Gray Fibrous Bound	15%	Cellulose	50% 20% 15%	Silicates Binder Calc Carb	None Detected
M12.2B B43358	Adobe Stone/grout	Heterogeneous Brown,Gray Fibrous Bound	15%	Cellulose	50% 20% 15%	Silicates Binder Calc Carb	None Detected
M12.2C B43359	Adobe Stone/grout	Heterogeneous Brown,Gray Fibrous Bound	15%	Cellulose	50% 20% 15%	Silicates Binder Calc Carb	None Detected
T8.1A B43360	Fire Brick And Grout	Heterogeneous Brown Fibrous Bound	15%	Cellulose	65% 20%	Silicates Binder	None Detected

ASBESTOS BULK ANALYSIS

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ASBESTOS BULK PLM, EPA 600 METHOD

Client ID / Lab ID	Lab Description	Lab Attributes	NON-ASBESTOS COMPONENTS Fibrous		Non-Fibrous		ASBESTOS %
T8.1B B43361	Fire Brick And Grout	Heterogeneous Brown Fibrous Bound	15% 	Cellulose 	65% 20%	Silicates Binder	None Detected
T8.1C B43362	Fire Brick And Grout	Heterogeneous Brown Fibrous Bound	15% 	Cellulose 	65% 20%	Silicates Binder	None Detected
F1.1A B43363	Vinyl Sheet Flooring	Heterogeneous Creme,Red and Black Streaks Fibrous Bound	40% 	Cellulose 	40% 20%	Vinyl Tar	None Detected
F1.1B B43364	Vinyl Sheet Flooring	Heterogeneous Creme,Red and Black Streaks Fibrous Bound	40% 	Cellulose 	40% 20%	Vinyl Tar	None Detected
F1.1C B43365	Vinyl Sheet Flooring	Heterogeneous Creme,Red and Black Streaks Fibrous Bound	40% 	Cellulose 	40% 20%	Vinyl Tar	None Detected
S5.1A B43366	Plaster Walls	Heterogeneous Gray Fibrous Tightly Bound	15% 5%	Cellulose Hair	50% 20% 10%	Silicates Calc Carb Paint	None Detected
S5.1B B43367	Plaster Walls	Heterogeneous Gray Fibrous Tightly Bound	15% 5%	Cellulose Hair	50% 20% 10%	Silicates Calc Carb Paint	None Detected

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ASBESTOS BULK PLM, EPA 600 METHOD

Client ID / Lab ID	Lab Description	Lab Attributes	NON-ASBESTOS COMPONENTS Fibrous		Non-Fibrous		ASBESTOS %
S5.1C B43368	Plaster Walls	Heterogeneous Gray Fibrous Tightly Bound	15% 5%	Cellulose Hair	50% 20% 10%	Silicates Calc Carb Paint	None Detected
M12.1A Layer 1 B43369	Brick	Homogeneous Brown Fibrous Bound	15%	Cellulose	50% 35%	Silicates Binder	None Detected
Layer 2 B43369	Grout	Homogeneous Gray Non-fibrous Bound			65% 35%	Silicates Binder	None Detected
M12.1B Layer 1 B43370	Brick	Homogeneous Brown Fibrous Bound	15%	Cellulose	50% 35%	Silicates Binder	None Detected
Layer 2 B43370	Grout	Homogeneous Gray Non-fibrous Bound			65% 35%	Silicates Binder	None Detected
M12.1C Layer 1 B43371	Brick	Homogeneous Brown Fibrous Bound	15%	Cellulose	50% 35%	Silicates Binder	None Detected
Layer 2 B43371	Grout	Homogeneous Gray Non-fibrous Bound			65% 35%	Silicates Binder	None Detected

ASBESTOS BULK ANALYSIS

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ASBESTOS BULK PLM, EPA 600 METHOD

Client ID / Lab ID	Lab Description	Lab Attributes	NON-ASBESTOS COMPONENTS Fibrous		Non-Fibrous		ASBESTOS %
M15.1A B43372	Panel Adhesive	Homogeneous Yellow Fibrous Bound	20%	Cellulose	80%	Mastic	None Detected
M15.1B B43373	Panel Adhesive	Homogeneous Yellow Fibrous Bound	20%	Cellulose	80%	Mastic	None Detected
M15.1C B43374	Panel Adhesive	Homogeneous Yellow Fibrous Bound	20%	Cellulose	80%	Mastic	None Detected
M1.1A B43375	Joint Compound	Heterogeneous White Fibrous Bound	10%	Cellulose	30% 40% 20%	Silicates Binder Calc Carb	None Detected
T2.1A B43376	Pipe Insulation Joint	Heterogeneous Green Fibrous Bound	10%	Cellulose	30% 40% 20%	Silicates Binder Calc Carb	None Detected
F3.1A B43377A	Vinyl Floor Tile	Heterogeneous Yellow Fibrous Bound	10%	Cellulose	90%	Vinyl	None Detected
Layer 1 B43377B	Mastic	Heterogeneous Yellow Fibrous Bound	10%	Cellulose	85%	Mastic	**5% Chrysotile**

ASBESTOS BULK ANALYSIS

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ASBESTOS BULK PLM, EPA 600 METHOD

Client ID / Lab ID	Lab Description	Lab Attributes	NON-ASBESTOS COMPONENTS Fibrous		Non-Fibrous		ASBESTOS %
Layer 2 B43377B	Mastic	Heterogeneous Black Fibrous Bound	10%	Cellulose	90%	Mastic	None Detected
F3.1B B43378A	Vinyl Floor Tile	Heterogeneous Yellow Fibrous Bound	10%	Cellulose	90%	Vinyl	None Detected
B43378B	Sample Not Analyzed per COC						
F3.1C B43379A	Vinyl Floor Tile	Heterogeneous Yellow Fibrous Bound	10%	Cellulose	90%	Vinyl	None Detected
B43379B	Sample Not Analyzed per COC						
F1.2A B43380	Vinyl Sheet Flooring	Heterogeneous Black Fibrous Bound	60%	Cellulose	20% 5% 15%	Vinyl Calc Carb Tar	None Detected
F1.2B B43381	Vinyl Sheet Flooring	Heterogeneous Black Fibrous Bound	60%	Cellulose	20% 5% 15%	Vinyl Calc Carb Tar	None Detected
F1.2C B43382	Vinyl Sheet Flooring	Heterogeneous Black Fibrous Bound	60%	Cellulose	20% 5% 15%	Vinyl Calc Carb Tar	None Detected

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ASBESTOS BULK PLM, EPA 600 METHOD

Client ID / Lab ID	Lab Description	Lab Attributes	NON-ASBESTOS COMPONENTS Fibrous		Non-Fibrous		ASBESTOS %
M17.1A B43383	Electrical Wiring	Heterogeneous Brown Fibrous Loosely Bound	80%	Cellulose	20%	Tar	None Detected
M17.1B B43384	Electrical Wiring	Heterogeneous Brown Fibrous Loosely Bound	80%	Cellulose	20%	Tar	None Detected
M17.1C B43385	Electrical Wiring	Heterogeneous Brown Fibrous Loosely Bound	80%	Cellulose	20%	Tar	None Detected
M1.3A B43386	Joint Compound	Heterogeneous White Fibrous Loosely Bound	20%	Cellulose	25% 30% 22%	Binder Silicates Calc Carb	**3% Chrysotile**
M1.3B B43387	Sample Not Analyzed per COC						
M1.3C B43388	Sample Not Analyzed per COC						
M7.1A B43389	Window Glazing	Heterogeneous White Fibrous Bound	20% 5%	Cellulose Talc	25% 30% 20%	Binder Silicates Calc Carb	None Detected
M7.1B B43390	Window Glazing	Heterogeneous White Fibrous Bound	30%	Cellulose	45% 5% 18%	Binder Paint Calc Carb	**2% Chrysotile**
M7.1C B43391	Sample Not Analyzed per COC						

ASBESTOS BULK ANALYSIS

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ASBESTOS BULK PLM, EPA 600 METHOD

Client ID / Lab ID	Lab Description	Lab Attributes	NON-ASBESTOS COMPONENTS Fibrous		Non-Fibrous		ASBESTOS %
M7.2A B43392	Window Glazing	Heterogeneous White Fibrous Bound	20% 	Cellulose	25% 30% 25%	Binder Silicates Calc Carb	None Detected
M7.3A B43393	Window Glazing	Heterogeneous White Fibrous Bound	10% 	Cellulose	50% 10% 30%	Binder Silicates Calc Carb	None Detected
T12.1A B43394	Blown-in Insulation	Heterogeneous White,Brown Fibrous Loosely Bound	50% 40%	Cellulose Fiberglass	10%	Perlite	None Detected
T12.1B B43395	Blown-in Insulation	Heterogeneous White,Brown Fibrous Loosely Bound	50% 40%	Cellulose Fiberglass	10%	Perlite	None Detected
T12.1C B43396	Blown-in Insulation	Heterogeneous White,Brown Fibrous Loosely Bound	50% 40%	Cellulose Fiberglass	10%	Perlite	None Detected

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LEGEND:
Non-Anth = Non-Asbestiform Anthophyllite
Non-Trem = Non-Asbestiform Tremolite
Calc Carb = Calcium Carbonate

METHOD: EPA 600 / R93 / 116 and EPA 600 / M4-82 / 020

REPORTING LIMIT: <1% by visual estimation

REPORTING LIMIT FOR POINT COUNTS: 0.25% by 400 Points or 0.1% by 1,000 Points

REGULATORY LIMIT: >1% by weight

Due to the limitations of the EPA 600 method, nonfriable organically bound materials (NOBs) such as vinyl floor tiles can be difficult to analyze via polarized light microscopy (PLM). EPA recommends that all NOBs analyzed by PLM, and found not to contain asbestos, be further analyzed by Transmission Electron Microscopy (TEM). Please note that PLM analysis of dust and soil samples for asbestos is not covered under NVLAP accreditation. *Estimated measurement of uncertainty is available on request.*

This report relates only to the samples tested or analyzed and may not be reproduced, except in full, without written approval by Eurofins CEI. Eurofins CEI makes no warranty representation regarding the accuracy of client submitted information in preparing and presenting analytical results. Interpretation of the analytical results is the sole responsibility of the client. Samples were received in acceptable condition unless otherwise noted. This report may not be used by the client to claim product endorsement by NVLAP or any other agency of the U.S. Government.

Information provided by customer includes customer sample ID, location, volume and area as well as date and time of sampling.

ANALYST: Gannon Griffin

APPROVED BY: Tianbao Bai, Ph.D., CIH
Laboratory Director

Gary A. Swanson

NVLAP TESTING
NVLAP LAB CODE 101768-0

B192536

CEI LABS

SAMPLING FORM

COMPANY CONTACT INFORMATION	
Company: NewFields	Job Contact: Ryan McGee
Project Name: Baker House	Sample Date: 5/22/19
Project ID #: 350.0044.005-003A-H	Tel: (406)461-4037

SAMPLE ID#	DESCRIPTION / LOCATION	VOLUME/ AREA	COMMENTS
R9.1A	Roof Underlayment Under Wood Shingles		SE Corner
B	↓		East Middle
C	↓		NE Corner
R2.1A	3-Tab Asphalt Shingle/Underlayment		NW Corner
B	↓		West Middle
C	↓		SW Corner
R3.1A	Rolled Asphalt Roofing/Underlayment		SE Corner - Porch Roof
B	↓		Middle ↓
C	↓		NE Corner ↓
S5.2A	Plaster/Skim Coat - Original Const.		Remodel - SE Corner
B	↓ ↓		↓ - NW Corner
C	↓ ↓		↓ - West Wall
M9.1A	Ceramic Tile/Adhesive - Decorative Fire Place		Remodel of Original Bldg
B	↓		↓
C	↓		
M1.2A	Sheetrock, Joint + Tape - Original Bldg.		Remodel - NW Corner
B	↓		- Above Fire Place
C	↓		- East Wall/Ceiling
M12.2A	Adobe Stone/Grout - Original Const.		SW Wall - Middle
B	↓ ↓		Fireplace Flue
C	↓ ↓		NW Corner
T8.1A	Fire Brick/Original Fireplace + Grout		Inside Fireplace
B	↓		↓
C	↓		
F1.1A	Vinyl Sheet Flooring - Kitchen		East - Middle
B	↓ Cream w/ Black/Red Streaks		South - Middle
C	↓		North - Middle
S5.1A	Plaster Walls - Kitchen		West Wall - Middle
B			South Wall - Middle
C			East Wall - Middle

10 HA's - 30 samples

B1925536

CEI LABS

SAMPLING FORM

COMPANY CONTACT INFORMATION	
Company: NewFields	Job Contact: Ryan McGee
Project Name: Baker House	Sample Date: 5/22/19
Project ID #: 350.0044.005 - 003A - H	Tel: (406)461-4037

SAMPLE ID#	DESCRIPTION / LOCATION	VOLUME/ AREA	COMMENTS
M12.1A	brick Chimney / Grout - Kitchen		SW Corner of Kitchen
B	↓		↓
C	↓		↓
M15.1A	Panel Adhesive - N. Wall Kitchen		West End
B	↓		Middle
C	↓		East End
M1.1A	~~Sheetrock~~ DM Joint Compound - Kitchen		West Ceiling
T2.1A	Pipe Insulation - Kitchen Pipe		North Ceiling
F3.1A	9" VCT - Green - Restroom		N. Floor
B	↓ ↓		Middle
C	↓ ↓		S. Floor
F1.2A	Vinyl Sheet Flooring - NW corner		NW Corner
B	↓ Storage/Porch		Middle
C	↓		SW corner
M17.1A	Electrical Wiring - Porch		
B	↓ Porch		
C	↓ Kitchen		
M1.3A	Joint Compound on Wood - Porch		
B	↓ ↓		
C	↓ ↓		
M7.1A	← Main Window Systems - SE Corner		East Side - white
B	Window Glazing - NE Corner		East Side ↓
C	- N- Middle		North Side ↓
M7.2A	← West Side Small Window		
	Window Glazing SW corner		Yellow/Gold - Glazing
M7.3A	Window Glazing - Stored Windows		White Glazing
T12.1A	Blown-in Insulation - Above Restroom		East
B	↓ & Kitchen Area		Middle
C	↓		West

12 HA's - 28 Samples

eurofins | CEI
Eurofins CEI
730 SE Maynard Road, Cary, NC 27511
Phone: (919) 481-1413 Fax: (919) 481-1442

LABORATORY REPORT
LEAD IN SOIL

Client: NewFields
1120 Cedar Street
Missoula, MT 59802

Lab Code: C190485
Received: 05-28-19
Analyzed: 05-31-19
Reported:

Project: Baker House, 350.0044.005-003A-H

METHOD: EPA 7000B

CLIENT ID	LAB ID	CONCENTRATION LEAD PPM (mg/Kg)
LIS-01	CA2740	710

Reviewed By:

Tianbao Bai, Ph.D.
Laboratory Director

Minimum reporting limit is 10 µg total lead. Sample results denoted with a "less than" (<) sign contain less than 10.0 µg total lead, based on a 50ml sample volume.

Lead samples are not analyzed by Eurofins CEI Lead samples are submitted to an AIHA ELLAP accredited laboratory for lead analysis of soil, dust, paint, and TCLP samples.

Laboratory results represent the analysis of samples as submitted by the client. Information regarding sample location, description, area, volume, etc., was provided by the client. Unless notified in writing to return samples, Eurofins CEI discards client samples after 30 days. This report shall not be reproduced, except in full, without the written consent of Eurofins CEI.

Information provided by customer includes customer sample ID, location, volume and area as well as date and time of sampling.

REGULATORY LIMITS Federal Lead Standard / HUD: 5000 ppm abatement criteria for bare residential soil; 1200 ppm for building perimeters and yards; 400 ppm for play areas and high contact areas for children.

LEGEND µg = microgram; ml = milliliter; ppm = parts per million; Pb = lead; $\mu g/ft^2$ = micrograms per square foot

End of Report

METALS
CHAIN OF CUSTODY

730 SE Maynard Road, Cary, NC 27511
Tel: 866-481-1412; Fax: 919-481-1442

LAB USE ONLY:	
CEI Lab Code:	CA90485
CEI Lab I.D. Range:	CA2746

COMPANY INFORMATION	PROJECT INFORMATION
CEI CLIENT #:	Job Contact: R. McGee
Company: NewFields	Email / Tel: rmcgee@newfields.com
Address: 104 E. Broadway Helena, MT. 59601	Project Name: Baker House
	Project ID# 350.0044.005-003A-H
Email: rmcgee@newfields.com	PO #:
Tel: Fax:	STATE SAMPLES COLLECTED IN:

IF TAT IS NOT MARKED STANDARD 3 DAY TAT APPLIES.

ASBESTOS	METHOD	TURN AROUND TIME					
		4 HR**	8 HR**	24 HR**	2 DAY	3 DAY	5 DAY
LEAD PAINT	EPA SW846 7000B				☐	☐	☐
LEAD WIPE	EPA SW846 7000B				☐	☐	☐
LEAD SOIL	EPA SW846 7000B				☐	☐	☒
LEAD AIR	NIOSH 7082				☐	☐	☐
LEAD TCLP	EPA SW846 7000B				☐	☐	☐
RCRA 8 METALS	EPA SW846 7000B				☐	☐	☐
RCRA 8 TCLP	EPA SW846 7000B				☐	☐	☐
OTHER:					☐	☐	☐

***TAT IS NOT AVAILABLE. LEAD SAMPLES ARE SUBCONTRACTED FOR ANALYSIS TO AN ELLAP ACCREDITED LAB.*

REMARKS:	☑ Accept Samples ☐ Reject Samples

Relinquished By:	Date/Time	Received By:	Date/Time
[signature]	5/25/19 11 am	FedEx Carrier	5/25/19 11am
		JA	5/28/19 8:50

Samples will be disposed of 30 days after analysis

C190485

METALS SAMPLING FORM

CEI LABS

COMPANY CONTACT INFORMATION	
Company: NewFields	Job Contact: R. McGee
Project Name: Baker House	Sample Date 5/22/19
Project ID #: 350.0044.005-003A-H	Tel: 406-461-4037

SAMPLE ID#	DESCRIPTION / LOCATION	VOLUME/AREA	COMMENTS
LIS-01	Soil Sample - West Side		5-PT Composite
			along drip line of
			residence

METALS SAMPLING FORM

COMPANY CONTACT INFORMATION	
Company: [illegible]	Job Contact: [illegible]
Project Name: [illegible]	[illegible]
Project ID #: [illegible]	Tel: [illegible]

SAMPLE ID#	DESCRIPTION / LOCATION	VOLUME/AREA	COMMENTS
[illegible]	[illegible]		[illegible]
			[illegible]
			[illegible]

Abatement Cost Estimate

APPENDIX E

NewFields

ASBESTOS AND LBP ABATEMENT COST ESTIMATE

Baker House

Fort Benton, Montana

Item Number	Description	Quantity	Unit	Unit Cost[1]	Total
Asbestos Abatement					
1	Abatement Contractor Mobilization[1]	1	ls	$3,500.00	$3,500
2	(F3.1) Yellow Mastic beneath 9-inch Vinyl Floor Tile	70	sf	$15.00	$1,050
3	(M1.3) Wallboard, Tape and Joint Material	160	sf	$15.00	$2,400
4	(M7.1) Window Glazing - including LBP removal	7	ea	$1,500.00	$10,500
5	(M9.1) Ceramic Tile Adhesive	1	ls	$500.00	$500
6	Asbestos Abatement Permit	1	ls	10%	$345
	Total Asbestos Abatement Cost Estimate				$18,295
Lead-Based Paint Abatement[2]					
7	Doors, Door Casing, and Door Trim	6	ea	$1,500.00	$9,000
8	Lead Waste Collection, Transport and Disposal	1	ls	$2,500.00	$2,500
	Total Lead-Based Paint Abatement Cost Estimate				$11,500
Asbestos Abatement Consulting and Oversight[3]					
9	Bid Document Production, Contract Administration, Air Clearance Testing, and Reporting	1	ls	$26,198.00	$26,198
Abatement Contingency[4]					
10	Abatement Contingency	1	ls	10%	$1,445
	Total Asbestos Abatement Cost Estimate w/Contingency				**$57,438**

Notes/Assumptions:

[1]Abatement Contractor Mobilization includes travel, lodging, site prep, labor to complete asbestos abatement permit, and incidentals (e.g. equipment, plastic sheeting, asbestos bags, Tyvek suits, respirators, etc.…). Although the abatement work may take 2-3 weeks, this cost estimate assumes all work will be completed during one mobilization.

[2]The estimate assumes lead abatement, waste collection, and transport and disposal considerations will be completed by 40-hour EPA trained lead abatement contractors. 8-hour EPA trained personnel are not trained or equipped to complete these services. Costs associated with the lead abatement of door and window systems includes estimated costs for sampling and characterization, and transport and disposal of waste generated from the abatement. Abatement costs do not include removal, containerization and transport and disposal of contaminated soils. Additional soil sampling during the design phase will assist in determining the overall scope for cleanup of the soils.

[3]The estimate for engineering oversight assumes oversight firm would be hired to develop bid specifications, contract administration, abatement oversight (including final clearance and TCLP sampling) and reporting. The estimate for development of the bid specification includes one round trip to Fort Benton to complete additional soil sampling for potential lead. Abatement oversight will include a minimum of two round trips to Fort Benton to oversee asbestos and lead abatement operations and perform required clearance sampling following abatement activities.

[4]The abatement contingency is estimated at 10%, which reflects additions to the project that may be realized during the abatement.

*This estimate should be considered preliminary based on the findings of the site investigation. Unit costs are estimated based on experience overseeing similar projects and may be higher or lower when bid by an abatement contractor.

NewFields

COST ESTIMATE

Soil Lead Assessment

Baker House Renovation Project

Fort Benton, Montana

7/8/2019

TASK / ITEM	QTY	UNIT	RATE	AMOUNT
Task A - Sampling & Analysis Plan				
Labor				
Principal Review	3	hrs	$155	$465
Project Scientist	18	hrs	$115	$2,070
Administrative	3	hrs	$65	$195
			Labor Subtotal	$2,730
Direct Costs				
Document Production	2	ea	$45	$90
			Direct Cost Subtotal	$90
			Task A Subtotal	**$2,820**
Task B - Soil Sampling				
Staff Scientist (including prep., mobilization, sampling, and sample shipment)	16	hrs	$85	$1,360
			Labor Subtotal	$1,360
Direct Costs				
Lead Analysis	10	ea	$35	$350
Vehicle, including fuel	1	day	$125	$125
Per diem	1	day	$35	$35
			Direct Cost Subtotal	$510
			Task B Subtotal	**$1,870**
Task C - Reporting				
Labor				
Principal - Review	3	hrs	$155	$465
Senior Scientist (UCL calculation)	4	hrs	$125	$500
Staff Scientist (UCL Calcs, report preparation)	20	hrs	$95	$1,900
Graphics	4	hrs	$85	$340
Administrative	2	hrs	$65	$130
			Labor Subtotal	$3,335
Direct Costs				
Document Production	2	ea.	$55	$110
			Direct Cost Subtotal	$110
			Task C Subtotal	**$3,445**
			Subtotal (all tasks)	**$8,135**
			Project Management	**$814**
			Total Estimate	**$8,949**