Facility Condition Survey

Willow, Alaska

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BCA Project No. 1821

Prepared by:

Burkhart Croft
ARCHITECTS LLC
880 N Street Suite 302 | Anchorage Alaska 99501
T: 907.929.9334 | www.burkhart-croft.com

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1. INTRODUCTION

Description of the Condition Survey

Burkhart Croft Architects, LLC (BCA) conducted a facility condition survey inspection on site in Willow, for the recently acquired log cabin that's located on the Willow Community Center Parcel for the Matanuska-Susitna Borough (MSB) The inspection team consisted of:

Burkhart Croft Architects:	Dave Dreher, AIA - Architect
PND Engineers, Inc.:	Chuck Kenley, PE – Structural Engineer
HZA Engineering	Tim Hickman, PE – Mechanical Engineer
HZA Engineering	Brett Bingham, PE – Electrical Engineer

The team was companied by Jeff Walden, MSB Project Manager.

The facility condition survey was conducted to examine the existing condition of the existing log cabin and make recommendations on any corrective work required to occupy the facility. The on-site survey was conducted based on visual inspections of the buildings. No destructive testing was performed to verify concealed construction. The facility is not currently being occupied.

Code Analysis

Any major renovations, or remediation work would be required to comply to the 2012 International Building Code (IBC). Given the fact that the facility is roughly 2,400 SF there would be no area limitations due to either building size or construction type. Without knowing how the MSB intends to use the facility, it is difficult to perform a full code analysis. But to offer some direction regarding occupancy, the facility could support either a Business or Retail function given the construction type and the overall area.

2. SUMMARY OF FINDINGS

In general, the building has substantial deficiencies and given the current condition could not be occupied without addressing major deficiencies. Recommendations are being provided as part of this report, that could inform future projects within the facility, but the MSB would first have to identify what the use of the facility will be. Knowing how the facility will be used in the future would ultimately be the driver for the remediation efforts.

Building System Deficiencies

The original building is of an unknow timeframe. It has been relocated from another site but does currently rest on a permanent concrete foundation. It is however a shallow foundation with no frost protection.

All the buildings mechanical and electrical systems are from the original construction, or during the relocation and have reached the end of their useful life, and in some cases removed in their entirety. The heating system was not operational, and no plumbing systems are present. There is no fire protection system, and though one would not be required to occupy the facility, it will depend on the eventual re-use the MSB envisions for the facility. Given the floor area, the only use that would trigger fire protection would be an E Occupancy, or Educational use.

The building envelope is in serious disrepair. The roofing is damaged and there is active degradation of the building due to moisture migration from the roof. The wood logs walls are rotted in areas, and temporary steel bracing has been added, to potentially thwart against catastrophic failure. The roof trusses were site constructed, and their structural capacity is unknown. The floor system does appear to be in serviceable condition, no major rotting or decay was noted.

While the major structural and system deficiencies are the most pressing issues, it should be noted that all entrances and vertical circulation is either non-operational, exhibits major deficiencies, or is missing altogether.

A stage is currently constructed in a portion of the interior of the facility. While there are no major deficiencies with the framing, the current stairs into the stage area do not meet ADA requirements. The recommendation would be to remove the stage area in its entirety.

3. ARCHITECTURAL NARRATIVE

Exterior Envelope

Roof Assemblies:

The roof assembly is a composition asphalt shingle over 1x6 nailers. There is no insulation present in the roof assembly. Noted in greater depth in Structural below, neither the roof sheathing nor the trusses themselves were designed or can be verified to resist the current snow loads. The recommendation would be to replace the existing truss and roof system in their entirety.

Exterior Walls:

The exterior walls are log three-sided D-Logs. In general, the logs are in acceptable condition. There are areas that the logs have either rotted or are decaying. This is largely confined to the areas that have exposed ends, and along the rim joist area. The recommendation would be to cut off exposed ends as required, and to replace portions of the existing, rotted log system as required. A transparent finish should be applied to resist further decay.

Floor & Underfloor: The flooring throughout the building is in relatively good condition. The floor assembly consists of painted 3/4-inch plywood over 2X wood decking. While there are areas of water damage, the flooring appears to be in serviceable condition and could be incorporated into the remediations dependent on what the use of the facility is. Per the Structural narrative below, floor loads would need to be closely watched to ensure adequate structural support. There is a crawlspace under the facility and was dry during the time of inspection. The crawlspace is properly vented. The deficiency noted here was the lack to insect screens over the vents. Recommendation is to add screening.

Windows & Doors

Windows: Windows are wood framed, single paned windows and are fixed. The recommendation would be to replace the windows. Given their age they do warrant replacement, but more importantly, if they were replaced with operable windows the need for mechanical ventilation would be eliminated, discussed in greater detail in the Mechanical narrative below.

Doors: There are currently two exterior door openings within the facility. Both are hollow metal doors, and both exhibit deficiencies in both hardware, function and general appearance to warrant replacement.

Entries and Stairs

There is currently one functional, entrance into the building, located at the front door. At the front entrance both a stair and a ramp are present. However, the code issues and construction with both warrant replacement. There is no a handrail on both sides of either the stair or the ramp, the stairs have open risers and the handrail returns that are present do not meet the current wall return requirements. That couple with a rather temporary wood construction, the recommendation would be to replace both the star and ramp in their entirety. No landing is provided at the second exterior entrance, the recommendation would be to provide a landing and stair only at this exit door. The new ramp at the main entrance would comply for ADA accessibility.

Interior Finishes

Walls: The wall finish consist of an engineered wood faux panel. No destructive testing was performed, but it is assumed that this panel is fastened to wood trimmers, fastened directly to the wood logs. While the paneling itself appears to be is serviceable condition, per the structural recommendations for occupation, this paneling should be removed prior to erection of a new, interior load bearing wall.

Ceilings: The ceilings consist of plywood fastened directly to the bottom cord of the existing trusses. There are areas of significant rot and decay in the areas of major roof leaks. This sheathing is not required, and given the structural repair required, and could either be omitted in the remediation work, and new roof trusses left exposed, or a new ceiling installed.

Plumbing Fixtures: No toilet fixtures are present in the current facility. The proximity of the Community Center is too great a distance to for any of the exceptions in the current code. Again, depending on the MSB's intent for the building's re-use, toilet fixtures could be added. This would be at substantial cost given there is neither a well system nor a septic system present. Also, give the current envelope's condition, little to no thaw protection is present. As part of the remediation work, options could be explored by a mechanical engineer. Holding tanks for both potable water and black water could be explored. Unless freeze protection is provided this would be considered a seasonal building. Final direction will be dependent on the MSB's intent for re-use.

4. STRUCTURAL SYSTEMS & DESIGN

General

The building is a log wall structure with a crawl space and wood-framed floor. The roof framing consists of site-built trusses which clear span the entire width of the building. It is evident that the building has been moved in the past and placed on a new foundation which consists of a concrete stem wall and strip footing. It is important to note that this building was never engineered to meet any standard or code. The community deems it an historic building, although the date of its construction is unknown. No plans or drawings were available for review.

Roof Framing

Snow loads in Willow are roughly double those found in Palmer or Wasilla. The homemade wood roof trusses spaced at 3-ft oc with nailed 1x4 diagonals are insufficient for the snow loads and most likely a structural hazard. Rehabilitation and strengthening of the trusses would not be economically feasible as new roof trusses are relatively inexpensive. Roof sheathing consists of 1x6 boards that have no structural value as a structural diaphragm. The recommend repair for the roof would be to replace all roof trusses with new metal-plate-connected trusses designed for the Willow area snow loads. Also replace all roof sheathing with new plywood to form a structural diaphragm.

Log Walls

The exterior log walls are three-sided D logs. The bottom log in areas is rotted out. It is not known whether the logs are spiked together or at what spacing. Logs as a structural element span from side to side rather than vertically like a stud. Usually, logs span from wall corner to wall corner. In this case the walls are too long for the log to span corner to corner. Logs are randomly butt spliced along their length. This renders the log walls incapable of meeting wind load requirements perpendicular to the wall. In some locations, vertical stiffener logs have been bolted to the outside of the wall to stiffen and prevent buckling of the wall. These, however are too few and of questionable value.

Log walls also have no tested shear wall capacity recognized by the code. Hence, there is no code-approved lateral resistance system for log buildings.

Log walls could be retrofitted to carry the vertical loads from the roof, but the seismic loads would be more difficult. The recommended repair for the walls would be to construct a 2x6 stud wall inside of the log walls, spanning vertically from floor to roof. This stud wall would strengthen the log wall and share vertical loads. The stud wall could also be sheathed with plywood to provide a lateral shear-resisting wall.

Floor Framing

Floor framing consists of rough-sawn 2x10 joists of unknown species. Joists are supported by nail-laminated, multi-ply 2x beams of the same rough-sawn material spanning between interior wood posts. Flooring is also rough-sawn planks with a plywood overlay. No connections or clips exist on the joists, beams or posts.

Depending upon the occupancy and the required floor loading, the floor framing could be upgraded and strengthened to allow continued use. The mostly likely element to require upgrade are the built-up floor beams supporting the joists. Current floor framing is unlikely to be able to support assembly loadings of 100 psf. Floor capacity is likely in the 30-40 psf range.

Foundations

Foundations are the newest of the elements in the building. Concrete stem walls and footings appear to be in good condition. The amount of concrete reinforcing is not known.

Codes

The buildings can be analyzed under the Existing Building Code which offers some relief from present-day code requirements. However, building officials usually draws a distinction between a renovation and new construction when the total cost of the renovation exceeds one half of the value of the building.

5. MECHANICAL SYSTEMS & DESIGN

General

The facility is a log type cabin that currently does not contain any ventilation or plumbing systems but does currently have a means to produce heat, however a fuel source for the heating device is not present. The facility has minor wall and roof insulation and it is expected that if the existing heating device was operational it would lack sufficient capacity to adequately heat the facility in winter months. Due to a lack of ventilation/plumbing systems and an insufficient heat source, the building is probably only seldomly used and not intended for year-round occupation.

Fire Protection & Water Storage

The existing facility is not equipped with a fire protection system or a means for onsite water storage to accommodate a fire sprinkler protection system. Should a fire suppression system be deemed necessary for this structure, as determined by others, extensive efforts would be needed to provide on site water storage, water distribution capabilities, and a means to prevent the water source and distribution from freezing during the winter season.

Plumbing

The existing facility does not have any existing plumbing utility connections as there was no visible water service or waste connection to the building. There are also no existing design drawings for this building and it is unknown if these utility services were ever roughed-in for to be provided at a later date. Efforts to provide the facility with potable water service and waste water management through well and septic systems would be significant and likely not feasible for this building due to the extensive cost.

Since there is no water service to the building, the facility in turn does not contain any cold/hot water distribution piping, hot water generation capability, waste/vent distribution piping, or plumbing fixtures. Unless determined necessary by an architectural code study based on occupancy usage, it would not be recommended to provide plumbing infrastructure within this facility since there is no existing service and the existing heat source is unable to prevent piping from freezing during winter months. However, if deemed necessary to provide restrooms within the building, the facility would need to be re-insulated or provided with a large enough heat source to maintain the building above freezing during winter months. A space for utility connections and water heating equipment would also need to be provided within the building, which currently does not have a space designated for such equipment. Pipe routing would be problematic as well since the facility utilizes an unheated attic and an unheated crawlspace, so any new water piping would have to be routed exposed within the building with any new waste piping below the building provided with arctic insulation and electrical heat trace.

There is no rain leader or scupper system as the building roof is sloped and simply drains water off of the roof to the ground below. Based on water damage at ceiling, roof leaks are likely present.

Heating

An existing gas fired furnace is present within the facility, capable of 125,000 Btuh input and 100,000 Btuh output per the unit's nameplate. It utilizes sub-floor ductwork to distribute air to the larger room within

the building, with the back rooms not provided with ducted air. There is gas piping between the furnace and back of building, routed sub-floor within the crawlspace. The exterior piping terminates with a gas regulator, which is not connected to any gas source. There is also another regulator located roughly twelve feet off the building which is connected to a flexible tubing routed underground, yet it is not clear where this tubing is routed to. It was not determinable if a buried tank was present at the building, however it does not appear that a buried tank exists based on site observations. Since there is no natural gas available in the area, it is assumed the existing furnace utilized propane. Attempts to turn on the furnace were unsuccessful, and it is unknown if the existing furnace is functional.

Looking from the exterior of the building, an old chimney vent can be seen attached to the roof. Inside the facility though, there is no equipment connected to this vent. The chimney appears to have been capped at the ceiling within the building and likely served an older wood fired heating device. The chimney construction and its proximity to combustibles is not compliant with local building codes and re-use of this chimney would not be possible. It would be recommended to remove this chimney vent and patch and seal the ceiling and roof per architectural recommendation.

Due to the age and deterioration of the furnace, re-use or refurbishment of the device is not recommended and it should be removed. As it is assumed this facility is not intended for year-round use, but merely summer time usage during tourism season, it would be recommended to provide electric baseboard around the perimeter for occupant comfort on colder summer days and then allow the building to be winterized and not heated during winter months. This approach would eliminate the need for a fuel fired heat source within the building and the need for an exterior propane or fuel oil tank.

Ventilation

The existing facility does not currently house any ventilation equipment, with exception of the minor ductwork associated with the existing furnace. There were not any combustion air openings provided for the furnace as it appeared to pull combustion air through a grille from the larger room within the building. The larger room within the building contained windows and exterior doors, but the windows did not appear operable. Crawlspace ventilation was provided via openings knocked out in the foundation wall and did not have any grilles or coverings to deter rodent entrance.

Due to the assumed seasonal use of the building, and lack of space to route ductwork within the thermal envelope of the building, it is recommended to ventilate this facility via natural ventilation and not mechanical ventilation. Per local mechanical codes, natural ventilation can be provided through operable doors or windows to the outside. Operable opening size would only need to equal four percent of the floor area being ventilated, which appears possible to do by simply replacing the existing windows.

The addition of exhaust systems would not be necessary as no current spaces require exhaust per code.

Controls

The existing furnace is controlled via a single thermostat located in the larger room of the facility. Control of the recommended electric baseboard would be a thermostat, with exact number of thermostats as deemed necessary for zoning the building spaces. As there are no other mechanical systems being recommended, additional controls would not be needed beyond thermostats.

6. ELECTRICAL SYSTEMS & DESIGN

Power Distribution System

Electrical Service: The existing building is served by an overhead service lateral terminated at a combination meter disconnect located on the exterior of the building. The service is 120/240 volt single phase and there is a 100 amp 2 pole main circuit breaker disconnect. The service equipment appears to be operational, however the enclosure is extremely rusty and does not include proper labeling.

Branch Panel: There is a single 125 amp 120/240 volt panelboard located inside, serving the facility. The panel is manufactured by Square D (QO loadcenter) and has capacity for 20 circuits. There are no spare circuit breakers, however there are spare spaces for breakers to be added in the future. This panel is still manufactured and compatible circuit breakers are still available. The panel has a circuit directory and appears to be in operational condition, however Code required labeling, such as available fault current, arc-flash warnings, etc. are missing from the panel. Although an equipment grounding conductor was run with the feeder, the panel did not have a ground bar and branch circuit wiring did not have equipment grounding conductors. We didn't see any evidence that periodic maintenance or testing has occurred. It is very likely that many of these breakers have been in the closed position for years with no maintenance. Typical breaker maintenance indicates that breakers should be exercised 1-2 times a year.

Power Receptacles: The majority of receptacles in the facility are installed surface mount inside along the exterior perimeter walls. The receptacles appear to be in adequate and usable condition, however the age of the receptacles is unknown and we noted an occasional broken receptacle or missing cover plate. The receptacles are not properly grounded as equipment grounding conductors were not installed with any of the branch circuitry from the panels. No receptacles were noticed on the exterior of the building.

Lighting Systems: Exterior & Interior

Interior Lighting: The majority of the interior lighting is comprised of linear 8' surface mounted fluorescent fixtures with T12 lamps. Additional track light fixtures were located in the front corners of the facility. There were entire rooms in the facility, including the front entry vestibule and two back rooms, without any lighting at all. All of the fluorescent fixtures are pretty old and have T12 style lamps and ballasts, which are less efficient, both in illumination and in energy usage than newer LED or even T8 or T5 fluorescent fixtures with electronic ballasts. Fluorescent lamps although more energy efficient than incandescent lamps are less efficient in energy and require more maintenance than new LED fixtures. there were a number of fixtures that did not turn on, most likely due to bad lamps and/or ballasts.

Lighting Controls: Lighting is controlled by on/off toggle switches. The use of single manual on/off switches does not allow for multi-level illumination levels for comfort or comply with current energy codes and allows for lights to be left on longer than needed, requiring the owner to pay for unneeded and wasted energy usage.

Emergency Lights: Existing emergency illumination in the building generally consisted of self-contained combination battery/lighting units. Lighting units seen varied in age and style, with some appearing to have been replaced somewhat recently with newer LED style emergency lighting units. Fire and life safety codes require emergency illumination lasting a minimum of 90 minutes to be provided in all paths of egress. Some of the units that were tested were operable, but we are uncertain if they will provide a minimum of 90 minutes of illumination during an outage as required by the International Building Code (IBC). Other units tested did not illuminate as the batteries will no longer hold a charge. The quantity and locations of emergency lights that are present, will not provide the required illumination levels at all paths of egress and there is no emergency egress illumination at the exterior landings as is currently required by the IBC for new construction or lighting remodels. Emergency lighting units manufactured today have a typical battery life of 5-7 years for Lead-acid batteries.

Exit Signs: Existing exit signs were of the electrically operated/self-contained battery unit type and were located at each of the egress doors leading outside. The units appeared to be in decent condition, however it is unknown if the batteries will operate for 90 minutes as required by codes. Exit signs manufactured today have a typical LED life anywhere from 10 to 25 years and battery life of 3-5 years for Lead-acid batteries and 7-9 years for Nickel cadmium batteries. It was noted that one of the exit signs was not firmly attached to the junction box.

Exterior Lighting: Other than one residential style motion detection flood light on the front of the building, there was no exterior lighting. The fixture utilizes inefficient halogen type bulbs and does not provide adequate exterior illumination.

Fire Detection and Alarm System

Fire Alarm: The facility does not have a central building fire alarm system but has been equipped with battery powered smoke detectors in the open space. When the test buttons were pressed, only one device made an alerting sound.

Telecommunication System

Although it appeared as though telecommunication service was brought to the building, we did not note any telecom devices in the building.

Front Elevation

Quartering Front Elevation

Side Elevation

Partial Quartering Side Elevation

Quartering Rear Elevation

Partial Rear Elevation

Quartering Side Elevation

Partial Quartering Side Elevation

Corner at Eave/Rake

Corner at Foundation

Front Entrance Stairs/Ramp

Entrance Ramp

Interior Toward Front Entrance

Interior Toward Front Entrance

Interior Toward Stage Left

Interior Toward Stage Right

Interior Toward Rear

Interior Side Right of Entrance

Interior Toward Front

Interior Side Left of Entrance

Existing Trusses

Existing Trusses

Existing Crawlspace

Existing Crawlspace