BERGMANN HOTEL STRUCTURAL ASSESSMENT

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1.0 INTRODUCTION

RESPEC conducted a structural condition assessment of the historic Bergmann Hotel in downtown Juneau, Alaska on July 18, 2024. Janice Wells, PE, Zach Miller, EIT, and Dave D'Amato were present during the inspection.

The hotel was built in 1913 to cater to local miners. The building became a recognized historic structure in 1978. The building is 48 ft by 73 ft, four-stories, wood framed, and located at the corner of 3rd Street and Harris Street. For the purposes of this report, 3rd Street is on the south side of the building. The four-story structure had the upper three levels dedicated to housing and the lowest level was a restaurant and bar. The current owner is in the process of renovating the building. The intention is to convert the upper three levels into apartments and the lowest level back to a restaurant.

Drawings available for review include:

- Alterations to the Bergmann Hotel, Richard W. Peters, AIA, dated 1968
- As-built drawings, MRV Architects, dated 2021

Most of the architectural finishes had been removed prior to the inspection, exposing the structural elements.

2.0 BUILDING ASSESSMENT

2.1 HISTORIC BUILDING

The International Existing Building Code (IEBC), as adopted by the City and Borough of Juneau permitting department, provides guidance on altering historic buildings. With the current renovation, the finishes are being replaced and the walls on the upper levels are going to be moved to convert the spaces into apartments. This falls under a Level 3 alteration, where the work area exceeds 50% of the aggregate area of the building. The use of the structure from a hotel to apartments does not trigger an occupancy change. The live loading remains the same.

The diagonal bracing on some of the interior walls was likely intended for the lateral force resisting system. These walls are being reconfigured, so the new lateral load resisting system will need to satisfy the requirements of the current building code. Loading will be determined based on the current International Building Code (IBC) for wind and reduced IBC-level seismic forces.

The repairs to the historic building are permitted to be with like materials and original methods of construction. The CBJ Community Development Department and the Juneau Historic Resources Advisory Committee have requirements for preserving historic buildings, especially the facade. For properties located in the Downtown Historic District, they must comply with the Downtown Historic District Design Standards and Guidelines.

2.2 CURRENT DESIGN LOADS

The following loads apply to new structures in this location, generally in accordance with International Building Code (IBC) 2012 edition, which is the current adopted code by the City and Borough of Juneau (CBJ). Snow loads are based on the current code, as amended by CBJ Title 19. In the early 1990's, CBJ increased their requirements of minimum roof snow load from 40 psf to 50 psf.

Our evaluation of existing conditions is based on the following load criteria:

Floor Live Loads	Roof	20 psf
	Apartments (Level 2-4)	40 psf
	Restaurant (Level 1)	100 psf
	Stairs and Exit Ways	100 psf
Snow Loads	Ground	70 psf
	Roof	50 psf
	I_s	1.0
	C_e	1.0 I
Wind Loads	Design Wind Speed	130 mph (3 second gust)
	Exposure	C
	I_w	1.0
Seismic Loads	S_s	0.53g
	S_1	0.36g
	S_{DS}	0.49g
	S_{D1}	0.40g
	Occupancy Category	II
	Seismic Design Category	D
	I_E	1.0
	Site Class	Assume Site Class D

2.3 LATERAL FORCE RESISTING SYSTEM

It is assumed that the building's lateral system is composed of exterior shear walls and interior walls with diagonal bracing. The diaphragm is constructed of 2 in x 6 in diagonal tongue and groove deck boards.

The exterior walls have window penetrations uniformly spaced on all sides. Some of the interior walls have diagonal bracing. Some of the walls were covered with finishes, so they were unable to be verified. The diagonally braced walls did not always align with the diagonally braced walls below, due to the modification or removal of certain walls. The walls on the lowest level are in a different configuration than the levels above. No connections or holdowns were observed, which is consistent with construction of this era. In a significant seismic event, the lack of connections can cause elements to shift or loads to not transfer as intended.

The roof diaphragm has a penetration above the stairway for a skylight. The diaphragm at the other levels has large penetrations for the stairway.

The foundation consists of a concrete stem wall and footing, the wall is approximately 6" thick and the footing was not visible during inspection. Dimensions were not able to be verified. A rebar scanner was used on the foundation stem wall, which determined the use of #5 rebar spaced at approximately 16" OC. The bar was roughly centered in the foundation wall. Reinforcement was not determined because the footings were below grade.

Since the planned renovation involves moving the interior walls, it is recommended that the interior shear walls stack so they transfer forces to the foundation. Plywood sheathing and straps will be used to resist the lateral forces and transfer the loads. In some locations, the slab may need to be cut for the addition of isolated footings.

For the diaphragm, tongue and groove boards do not transfer lateral forces as well as plywood. This will have to be checked to determine if the diaphragm requires plywood or strapping to transfer the forces around the diaphragm openings. The planned renovation includes an elevator, which adds an additional opening in the floor level diaphragms.

2.3.1 INTERIOR

The roof trusses do not have diagonal bracing from the roof diaphragm to the shear wall (Figure 2). Diagonal bracing or sheathing can be installed up to the bottom of the roof diaphragm to transfer the loads to the interior shear wall.

It is assumed the diagonal bracing in the walls is intended to transfer shear forces. Some of the walls had been removed during previous renovations, so the braced walls do not always stack. The walls were covered with lath and plaster, which is not as strong for transferring shear as plywood (Figure 3-Figure 6). The shear walls would be most effective if they stack, have connections between them, and are sheathed with plywood.

The joists have a splice on an interior bearing wall but are not blocked between joists. In a seismic event, these joists have the potential to rotate (Figure 7). Blocking should be added.

At the stairs, there is a column supporting a landing, but there is no mechanical connector from the beam to the column. If this column were to shift, the stairs could collapse (Figure 8). Install connectors, so the column cannot shift from under the stair landing.

The beam adjacent to the stair opening is very long and is critical, since the stairs are a main path of egress. Where the beam terminates, there is a built-up beam below. No mechanical connectors are present at this location (Figure 9). Connectors should be installed to prevent the shifting of the beam on the column in a seismic or wind event.

On the ground floor, there is a row of columns that have knee braces to transfer lateral forces. No visible connectors were observed from the beam to the column or the column to the floor (Figure 10). This should be analyzed for the anticipated lateral loads and connectors should be added.

In the crawl space, one of the isolated footings has a corner that is undermined (Figure 11). This should be repaired to avoid the footing rotating or settling.

2.3.2 EXTERIOR

The emergency stair landing had been installed with welds due to the misalignment of bolt holes (Figure 12). Slag from the welds has not been removed and the welds underneath have excessive porosity and inclusions. In a seismic event, this can cause the landing to shift off the support. Stair stringers need to be ground off and redone by a certified welder.

The building has openings spaced uniformly around (Figure 13). As the hotel is protected as a historic building any alterations made to the exterior walls need to be altered in the interior to preserve the façade. It is recommended analysis be performed to determine the capacity of the available exterior shear walls; the existing lap-siding will not be sufficient to act as sheathing and will need to be sheathed from the inside. Alternatively, interior shear walls may serve as the lateral system with the reconfiguration of the interior layout; in combination with plywood sheathing installed over the diagonal decking.

The main entrance awning does not appear to have lateral resisting elements (Figure 14). Inclusion of knee braces at the corners of the columns, parallel to the main building wall, may be installed to resist inertial forces from earthquake motions. Alternatively, holdown tie back connections from the awning diaphragm to the second-floor diaphragm may be able to be installed to resist earthquake forces and attempt to preserve the outward appearance of the historic building.

The sheathing at the north side of the building appears to be new T1-11, where the building addition was constructed (Figure 15). The sheathing at the east side near the side entrance to the restaurant has T1-11 that is rotting and in poor condition (Figure 16). In all areas, the nail pattern on T1-11 is insufficient to resist lateral loads. A layer of structural sheathing needs to be installed behind the new T1-11 to resist earthquake loads and transfer forces to the foundation.

2.4 GRAVITY SYSTEM

The building's roof is comprised of wood trusses. The trusses span the entire width of the building and bear on the exterior perpendicular walls. On the other levels, 2x10 joists run east-west and bear on perpendicular walls. The first-floor framing has portions of framing that span in the north-south direction.

The wall framing transfers load between floors through embedded wall columns from the upper floors directly to the foundation. In the northernmost hallway, there is a noticeable slope in the floor. Each of the levels has this issue in the same location. Along the north side of the floor at each level the walls is not supporting the floor in the hallway and transferring the loads to the foundation; The discontinuity is causing the levels above to be unsupported and sag causing the floor to slope.

2.4.1 INTERIOR

In the north hallway on the 3rd, 2nd, and 1st levels, the floor slopes down toward the north. It is suspected the combination of interior wall framing and beams is not supporting the end of each floor's joists between floors through to the foundation (Figure 17). Further load analysis is required to determine support locations to remove this deflection.

See below for specific items found during inspection:

1. Near the stairs, there is a beam adjacent to the opening. The beam terminates on a stud wall. On the first level, the top plate is crushed and the stud is cracked, and there is blocking in place to prevent bowing (Figure 18-Figure 19). There should be a column placed here to transfer the loads. This condition occurs at each level.

2. On the first level, there was a larger room, where it appears a wall may have been removed. The beam supporting floor joists does not have any support (Figure 20). Support should be placed under each end of the beam.

3. On the first level, the large beam adjacent to the stair opening rests on a wall, which has an opening in it (Figure 21). This requires a larger header, or additional support, to bear the load.

4. On the first level, there is a doorway through an interior wall, where the king studs are not continuous (Figure 22). The studs on either side of the door need to be continuous up to the top plate.

5. There were a couple of locations observed where studs were cut for piping. This reduces the capacity of the wall (Figure 23). Replace the stud or add a stud on either side of the damaged stud.

6. The 2nd level floor joists connect to a beam, which is broken. Because of this damage, the joists have an incomplete load path. This may contribute to the sloping hallway on the level above (Figure 24). Replace this beam and connect it to each wall.

7. The framing around the stair opening span exceeds the member strength, without any intermediate support (Figure 25). Analysis is recommended to ensure the beams can handle the design live loads at the stairs (path of egress).

8. Under the stairs on the ground floor, there is a beam resting on its wide face supporting floor framing. This appears to be undersized for this member size and does not have an adequate load path (Figure 26). This should be analyzed, and the structural elements sized and replaced.

9. One location of the 1st floor framing has a joist that is cracked and deflected. It is assumed the load path loads this joist instead of the adjacent wall (Figure 27). The load path should be field verified and the damaged joist replaced or repaired and supported.

10. On the ground floor there is some floor framing spanning across the top of a header. The header has a noticeable deflection (Figure 28). The header needs to be analyzed and sized for the design loads.

11. At the 1st floor framing, where the framing direction changes, it bears on a column. However, the column is discontinuous and is not supported on the floor (Figure 29-Figure 30).

12. The steel beams located on the east side of the building have multiple penetrations in the web which alter the structural integrity of the member (Figure 40). Recommend an analysis of the steel beam with reduced strength be conducted to ensure the beams are adequate.

13. New foundation elements along the east side of the building are supporting the floor (Figure 38). The new foundation consists of wood 6x6 posts and beams on concrete pier blocks supporting the floor joists at mid-span. It appears some of the existing floor joists around the hatch, at the middle of the wall, are rotting and likely the cause of the new foundation post-and-beam construction under the floor (Figure 39).

2.4.2 EXTERIOR

The foundation was intermittently spalled at the visible portions of the exterior but was free of traverse cracks associated with settlement and shear failure (Figure 35). The concrete stem wall has occasionally spaced crawl space vents on the East side of the building and the finish of the concrete appears to be imprinted by rough-sawn form boards (Figure 36). The overall condition of the foundation appears to be sound and does not require modification.

The exterior walls along all sides, excluding the east side, appear to be in decent condition, with the exception of the window trim and surrounding siding showing evidence of rot and black mold (Figure 37). The siding and trim should be removed, and the condition of materials be assessed and/or replaced to match the historic condition of the building. Modifications to the building envelope to prevent future water intrusion, which may include flashing, is recommended to mitigate water damage to the framing and exterior finishes around openings. Consult a licensed architect for potential solutions to prevent future water damage.

There are several failure points along the roof membrane that exposed the roof OSB sheathing. The roof sheathing along the south side appears to have been exposed due an envelope failure (Figure 63). Gouging in the roof appears intermittently along the south side of the building (Figure 62). The roof service hatch sheathing was not patched and shows signs of water damage where the EPDM was cut and installed (Figure 61). While the structural inspectors were on-site, a roof contractor was also performing an inspection of a roof leak to provide a quote for a re-roof to the owner.

There is an exterior shed roof that appears to be caving in (Figure 34). The building was not accessible at the time of the site visit and the framing type and spacing could not be determined. Recommend complete demolition of the structure.

3.0 RECOMMENDATIONS

The building appears to be in good condition for its age. For the building to be utilized as an apartment building, modifications to the building's interior framing and lateral systems will need to be made to conform to the current building code. Any modifications to the roof assembly need to be coordinated with the engineer designing the future modifications to the building structure. See list below for a summary of recommendations:

- Diagonal blocking or bracing is needed between the roof and interior shear walls to transfer lateral loads from the roof diaphragm into the shear walls. The shear walls at the 3rd floor need to be braced between levels to transfer lateral loads through the building.
- All framing with notches or penetrations needs to be analyzed and repairs considered where necessary.
- A full structural analysis of the building is needed to determine adequacy of the building framing to support occupancy loads with the new floorplan layout.
- Load bearing elements need to be installed at all framing discontinuities as shown in the report above and field verified.
- All deteriorating exterior finishes must be removed and replaced, and the building envelope be designed and detailed by a licensed architect to prevent future deterioration.
- The sloped floor needs to be leveled by a contractor and columns and support framing installed at the framing discontinuities causing the slope in the floor.
- New holdowns and sheathing installed at the interior side of the exterior walls or modification to the interior walls to act as shear walls for earthquake and wind loading. If interior walls are used as lateral resistance the inclusion of isolated footings may be required to transfer loads through the building.
- The design of an elevator shaft and foundation will need to be completed by a licensed structural or civil engineer.

4.0 PHOTOS

Figure 1 - Google Aerial Image of the Bergmann Hotel

4.1 LATERAL

Figure 2 - Roof trusses do not have diagonal bracing from the roof diaphragm to the shearwall.

Figure 3 - Typical diagonally braced interior wall.

Figure 4 - Wall was removed, so diagonally braced walls do not stack.

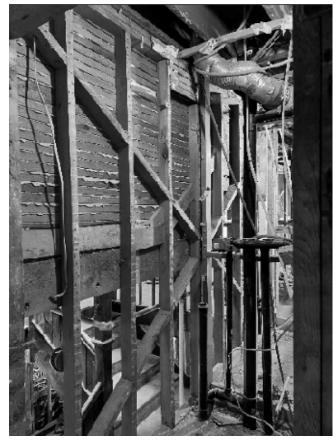

Figure 5 - Lath and plaster is on both sides of diagonally braced wall.

Figure 6 - Diagonally blocked exterior wall.

Figure 7 - Joist splice on wall is not blocked.

Figure 8 - No connections from column to stair landing.

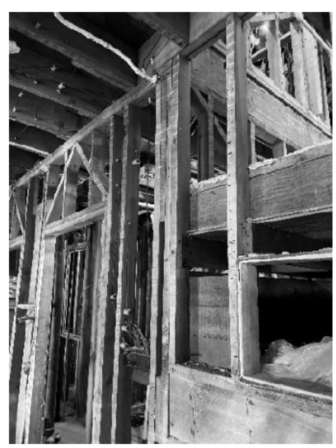

Figure 9 - No connection between beam and column.

Figure 10 - Knee braces to transfer lateral loads.

Figure 11 - One of the isolated footings has a corner that is undermined. Unknown if or how columns are connected to concrete footing.

Figure 12 - There is a bolt missing from an emergency exit stair landing.

Figure 13 - Building envelope has openings uniformly spaced around.

Figure 14 - The main entrance awning does not have lateral bracing.

Figure 15 - New siding at the building addition warped and not fastened with enough nails.

Figure 16 - Rotting T1-11 on the east side of the ground floor.

4.2 GRAVITY

Figure 17 - Sloping hallway, similar on all levels.

Figure 18 - Beam adjacent to stairway bears on stud wall, similar on all levels.

Figure 19 - Beam adjacent to stair opening bears on stud wall.

Figure 20 - Support for beam appears to be missing.

Figure 21 - Beam adjacent to stairway is bearing on a header.

Figure 22 - King studs are discontinuous on either side of the door opening.

Figure 23 - Stud was cut for piping.

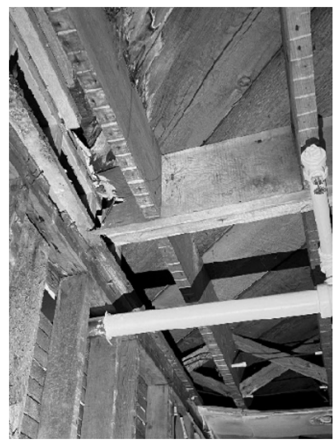

Figure 24 - Beam is broken.

Figure 25 - Framing is long around stair opening with no intermediary support.

Figure 26 - Under the stairs, there is some framing with inadequate support.

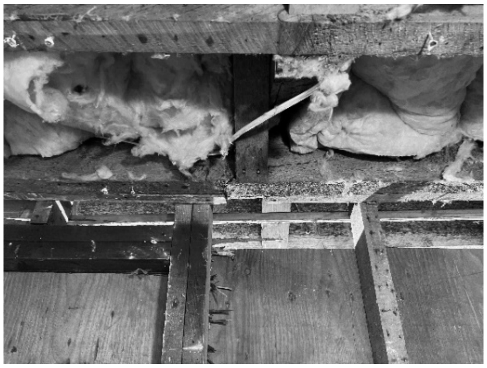

Figure 27 - A joist on the 1st level floor framing has a lot of deflection and is cracked.

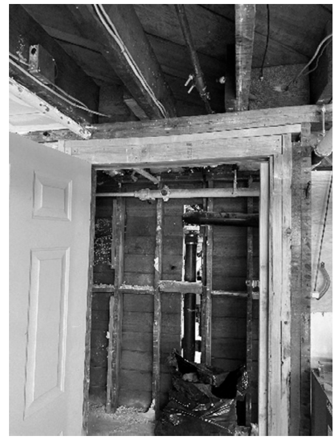

Figure 28 - The header has a lot of deflection and appears to be overloaded.

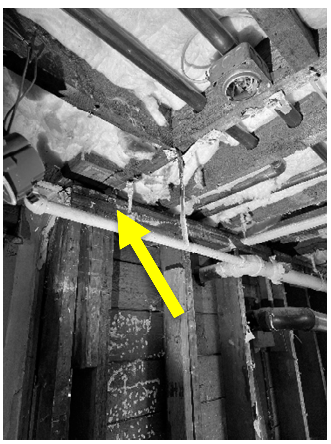

Figure 29 - Floor framing bears on a column, which is not supported.

Figure 30 - The column is not supported. There is an incomplete load path.

Figure 31 - The 1st level floor framing has a location where the diagonal boards are broken and appear to have been exposed to moisture.

Figure 32 - Floor joist is notched in the crawl space.

Figure 33 - There are a few cracks visible in the stem wall of the foundation.

Figure 34 – Lower Shed Roof Failing

Figure 35 - Worst case of spauling found at the perimeter stem wall.

Figure 36 – Typical condition of concrete stem wall finish. Occasional crawl space vent penetration.

Figure 37 - Typical condition of exterior walls. There is potential rot at the window trim and siding where black mold is present.

Figure 38 - New post-and-beam foundation for floor framing along West side of ground floor.

Figure 39 - Rotting joists along West side of the building near crawl space access hatch.

Figure 40 - Perforated steel beams supporting first-floor.

4.3 OTHER

Figure 41 - Black mold and signs of water damage.

Figure 42 - There are no connections between post and beam.

Figure 43 - There are no visible connections from the concrete pedestal to the column.

Figure 44 - The slab was cracked, and the floor was sloped.

Figure 45 - There are signs of past leaks.

Figure 46 - There is no seismic strap on this tank.

Figure 47- There is a support board, holding up piping, that is rotten.

Figure 48 - There is mold at the interface between the wood framing and concrete stairs.

Figure 49 - In the kitchen add-on, there is black mold on the ceiling.

Figure 50 - Chimney penetration

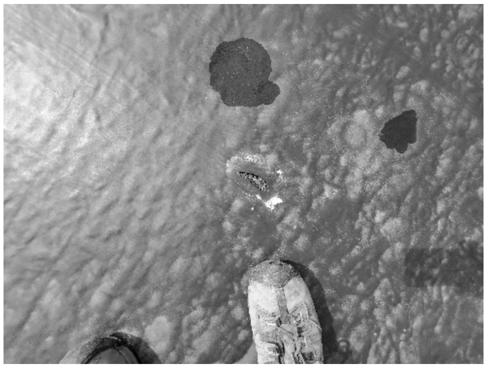

Figure 51 - There are a few small holes in the roof, which allow water to infiltrate.

Figure 52 - There is significant moss on the entryway roof.

Figure 53 - There is significant moss in an emergency exit way.

Figure 54 - There is moss on the exterior siding.

Figure 55 - Some of the exterior siding has black mold.

Figure 56 - This window does not have trim around the perimeter to prevent water infiltration.

Figure 57 - In many locations, the paint is flaking.

Figure 58 - Some of the siding panels have warped.

Figure 59 - Many windowsills have moss growing on them. Some windows are broken.

Figure 60 - The small shed on the back has significant moss on the roof, appears to have a roof leak, and is pulling away from the main building.

Figure 61 - Roof access hatch sheathing with water damage and shows signs of rot.

Figure 62 - Gouging in the roof membrane along the South side of the building.

Figure 63 - Leading edge of EPDM membrane exposed roof assembly.