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March 8, 2005

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Principal

Mr. Jeff Ryan, AIA
Ryan Architecture
3017 13th Street
Tacoma, Washington 98406

Subject: **Tacoma Elks Lodge**
2005 Structural Evaluation Update
Tacoma, Washington

Re: Structural Evaluation Update Summary Letter

Dear Jeff:

Magnusson Klemencic Associates (MKA) is pleased to provide the following summary of the 2005 structural evaluation for the existing Tacoma Elks Lodge building located at 565 Broadway Street in Tacoma, Washington. This structural evaluation is an update to our previous Structural Condition Assessment dated March 2002, provided when we were then known as Skilling Ward Magnusson Barkshire. This is a re-assessment based on the current general structural condition, and it reconfirms and/or revises our past recommendations accordingly as well as in regard to current code considerations. Structural commentary regarding a possible residential adaptive reuse is also provided.

This update evaluation is based on MKA's site observation provided on February 25, 2005, a review of the March 2002 Structural Condition Assessment report, a review of the original design drawings and historical documentation, and a review of a recently discovered historical construction-phase photograph dated May 9, 1915. Accordingly, in this summary letter we address the issue of a revised building description and commentary on the existing primary structural system, leading to recommendation for further selective demolition to confirm the existing basic framing.

GENERAL BUILDING DESCRIPTION

The existing building is composed of the original 1915 main building as well as 1937 and 1948 additions to the north. The main building, constructed in 1914–1915, is approximately six stories in height and is situated on a sloping site with the first level (first floor) at the street level of Commerce Street and the fourth level (third floor) at the Broadway Street level. Please refer to our March 2002 Structural Assessment for a more detailed building description.

EXISTING STRUCTURAL FRAMING CONSIDERATIONS

From a review of the original main building design drawing details (Purdy & Hendersen Engineers, Frere Champney Architects, November 13, 1914), we note some discrepancy between the original design drawings and the existing structural framing as previously and currently observed. The discrepant framing systems are likely a result of undocumented original cost-based value-engineering alternatives

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that were implemented during construction. From our past assessment and with current confirmation of revisions, we note the following existing structural building-frame considerations:

- The existing floor framing of the main building consists of a pan-joist system rather than the cast-in-place concrete beams and slabs as shown in the original design drawings. This pan-joist type system is considered an early 20th century "tin-pan" composite concrete and permanent steel form framing floor system, briefly described in a historic reference from the Kidder-Parker *Architect's and Builder's Handbook* (1931, page 1168).

- The roof of the main building is wood framed on edge side-by-side (2x), which spans to deep trusses and some steel beams. There are mainly timber framed trusses, and one north-south steel truss was observed. The original design drawings show a concrete roof slab on steel trusses. The original design drawings also show a large central skylight that appears to have been omitted.

- The existing perimeter ornamental rooftop fenestration consists of metal composition rather than terra-cotta as shown in the original design drawings.

- Further selective demolition is recommended to ascertain the existing exterior wall framing composition:

  — The terra-cotta exterior finish shown in original design drawings certainly was not built, having been replaced with a cement-based applied finish possibly as an originally less-expensive alternative used to emulate a terra-cotta and block-stone look. The backing wall framing of this exterior perimeter wall is uncertain.

  From the previous assessment, the interior hollow clay tile (HCT) that was observed at that time led to a belief that HCT could have been the backing of this exterior frame. However, a lack of observed earthquake damage at the exterior wall, together with our recent observation made possible due to the presence of vandal-type damage, leads us to another possibility.

  HCT may have been used to line the interior and create a void space between the exterior framing wall and the HCT wall. We believe that either brick masonry wall infill or cast-in-place concrete may have been used as a backing to the exterior finish and main exterior structural wall framing.

  — From the attic space a HCT interior wall liner was observed, which was vertically discontinuous at the attic, with concrete exposed behind the HCT and the concrete "wall" continuing up to the roof line. A portion of the building's upper south-side exterior is also visible, appearing to be an exterior concrete "wall." This could be an indication of a possibly more extensive exterior concrete framing; however, it is more likely that these observations represent the 5-foot-deep concrete perimeter beam at this location as shown in the original design drawings.

  — A historical construction-phase photograph in poor condition, dated May 9, 1915, shows exterior formwork in place up to the third floor. This would indicate cast-in-place concrete at least up to that level, and this is also consistent with major portions of the original design drawings. Above this level, perimeter concrete beams and columns are shown and brick masonry infill is indicated in the original design drawings.

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— The extent and possibility of a more extensive concrete and/or brick exterior wall framing greatly affects the seismic considerations both for the scope of upgrades and the potential construction upgrade cost efficiency. We therefore recommend further selective demolition in several locations around the exterior of the building—more specifically, selective demolition approached from inside the building in order to expose areas of the back of the exterior framing to visual observation.

STRUCTURAL CONDITION ASSESSMENT AND RECOMMENDATIONS

The existing building continues to be vacant, and it appears to have suffered further maintenance neglect and vandal damage. The concrete framed 1936 and 1948 additions appear to be in generally good structural condition. Water intrusion in the main building has caused structural degradation and molding of the ceiling, wall, and floor finishes. The source of water intrusion is uncertain; however, constant dripping and puddling was observed, and at a time when rainfall has been very scarce. A broken waterline was reported in 2002; however, this should have been shut down at that time, and we understand that no utilities are currently active within the vacated building. It is possible that a compromised roofing system composed of some type of foam insulation above the wood deck could act to absorb water which slowly discharges (like a sponge reservoir).

Based on this structural re-evaluation and limited observation, we have determined that the main building is structurally in fair condition, with some areas of wood rot, pan-joist corrosion, and localized areas, such as long-term water puddle locations, that may require extensive repair. The following is a current summary of the general structural condition, with accompanying recommendations:

CONCRETE FLOOR SLABS

- **Assessment**: A metal pan-joist floor framing system was observed on the third floor of the main building. This floor framing system was used extensively within the main building. The metal pan appears to be severely corroded.

- **Recommendation**: Load testing and/or local selective demolition is recommended, and/or repair. Selective demolition can serve to determine if reinforcing was placed and embedded within the concrete, allowing for a calculated load capacity. Load testing can be used to determine if the compromised system can achieve adequate load capacity. Repair may consist of local cleaning and painting/corrosion protection/fireproofing of the exposed metal pan.

ATTIC ROOF TRUSSES

- **Assessment**: Localized areas of rot were observed in the wood truss seat connections.

- **Recommendation**: Repair is recommended, with possible added steel seat extensions and/or seats from the concrete support.

ROOF DECK FRAMING

- **Assessment:** Within the attic, limited localized areas of potential rot (water staining) in the 2x wood roof decking were observed from below. The roof membrane likely is compromised, and therefore further rot to the tops of the 2x framing is possible.

- **Recommendation:** Patching, repair, and replacement are most likely necessary. The extent of damage is undeterminable without removal of the existing roof insulation topping and membrane for further evaluation.

INTERIOR NON-BEARING HOLLOW CLAY TILE

- **Assessment:** Many HCT walls were observed to have been damaged, with small and large openings apparently broken by vandal and/or scavenging acts.

- **Recommendation:** We recommend removing the HCT interior walls and replacing where necessary with light gage steel stud wall construction. Where HCT is to be retained due to preservation of historic finishes, we recommend that these walls be secured with strong-backing or other means (refer to "Seismic Considerations," below).

EXTERIOR WALL

- **Assessment:** The exterior appears to be generally intact; however, a significant portion of the exterior finish suffers from crack and spall damage. Most of the damage is concentrated at the window openings/lintels and at protruding ornamental features.

- **Recommendation:** We recommend first addressing further selective demolition (as noted above) to better determine the backing infill wall framing construction, prior to any upgrades or repairs. As a non-structural recommendation, we also recommend extensive cleaning and repair of the exterior finish.

FOUNDATION BASEMENT WALL

- **Assessment:** The basement wall is fairly extensive up to the third floor, and it appears to be in fairly good condition. However, some concrete wall cracks were observed.

- **Recommendation:** We recommend epoxy-injection repair of the concrete wall cracks.

DROPPED PLASTER CEILINGS AND WALL FINISHES

- **Assessment:** The plaster ceilings and wall finishes are considered to be compromised from water damage and inadequate for self-sufficient support. The water-caused mold on the plaster not only diminishes the plaster's integrity but also can create an unhealthy environment.

- **Recommendation:** While they are considered as being non-structural elements in regard to the primary building, we recommend that the plaster ceilings and wall finishes be removed and replaced.

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SOUTH GRAND EXTERIOR STAIR

- **Assessment:** The reinforced concrete grand stair is separate from the building but is associated with the building site. The stair is in poor condition both from weathering and vandal damage. Portions of the balustrade are missing, and much of the stair and balustrade is cracked and spalled.
- **Recommendation:** We recommend replacement, spall repair, and possibly epoxy-injection repair of concrete cracks.

FLOOR CAPACITY AND RESIDENTIAL ADAPTIVE REUSE CONSIDERATION

As indicated in our past assessment, the floors and columns of the main building generally have a vertical load-carrying capability commensurate to a code-defined office or residential use, albeit with repairs for floors where existing damage dictates. Localized damage repair will be required; however, further vertical load-carrying capacity upgrade modifications will not be necessary. Unusually heavy local areas of loading (i.e., libraries, mechanical support, etc.) for any proposed re-occupancy scenario of the building will need to be reviewed on a case-by-case basis. The concrete framed 1936 and 1948 additions generally are in good structural condition and can also accommodate a code-defined vertical load capacity rating for office or residential use.

SEISMIC CONSIDERATIONS

The basis of the seismic evaluation and upgrade rehabilitation recommendations previously provided in our March 2002 assessment remains valid. The ASCE 31 evaluation draft, which was used in 2002, is now an accepted standard. The seismic rehabilitation remains valid within the current guideline version of FEMA 356. The seismic performance objective remains as Life Safety for a design-level earthquake. As such, please refer to our March 2002 assessment for a more in-depth discussion of the general seismic considerations and methodology.

The Life Safety requirements of ASCE 31/FEMA 356 for the design-level seismic hazard as previously defined are considered the minimum standard for a substantial alteration of this building. The intent is to provide a degree of protection against life-threatening injury resulting from a major earthquake similar to that of a building conforming to the current building code, though with somewhat less reliability. Moreover, the main building, like most buildings of this vintage, lacks the detailing practices that would serve to reduce the expected level of damage in smaller, more frequent earthquakes. Therefore, even if the building achieves a Life Safety performance level, it would be expected to provide less protection against economic loss (both direct and indirect as resulting from temporary loss of use) than a new building. The main building is a reinforced concrete frame, with the extent of the concrete perimeter walls indeterminate at this time. Four general areas of concern remain valid with respect to the seismic performance of the existing main building: lack of adequate stiffness of the frame, inadequate detailing of reinforcing, lack of adequate frame-to-roof connectivity and diaphragm strength, and stiffness. As such, the recommended primary seismic upgrades, listed in priority as relating to the Life Safety objective, include the following:

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- **Global Seismic Upgrade:** The existing exterior frame lacks sufficient strength and stiffness. We recommend that additional concrete shear walls approximately 12 inches thick by 30 feet in length be placed one each on all four sides of the exterior perimeter. Ideally, since they are placed to engage the existing columns in order to resist overturning, these walls would be connected to the basement walls below and rise up the full height of the building. Some foundation modification local to these walls may be required. These added walls, where they occur, can possibly be reduced in thickness or length if a more extensive perimeter concrete wall framing is verified. Where concrete or brick masonry occurs, a more cost effective one-sided shotcrete placement of the new walls can be made.

- **Roof Upgrade:** We recommend the addition of a plywood overlay of the roof and sloping roof sidewall. Connection and/or collectors of this wood overlay down to the added perimeter concrete shear walls is also recommended.

The deficiencies and the recommended upgrades above are defined as essential primary structural Life Safety upgrades for this building. Other "nonstructural" issues remain, however, as important items when addressing a basic Life Safety objective. This objective, as defined for nonstructural items, is the post-earthquake damage state in which potentially significant and costly damage has occurred to nonstructural components, but they have not dislodged and fallen, threatening life safety either within or outside the building. Furthermore, egress routes within the building are not to be extensively blocked but may be impaired by lightweight debris. Heating/ventilating/air-conditioning, plumbing, and fire-suppression systems may be damaged, resulting in local flooding as well as loss of function. While injuries may occur during the earthquake from the failure of nonstructural components, it is expected that, overall, the risk of life-threatening injury is very low. Restoration of the nonstructural components may take extensive effort. In consideration of the nonstructural Life Safety upgrades, in order of priority, we recommend the following:

- **Exterior Walls:** Strongbacking for the out-of-plane support or removal of exterior HCT walls is recommended. This is of primary importance for locations of egress and also where limiting the damage to historically sensitive ornaments is desired.

- **HCT Walls:** In general, removal of HTC walls and/or new studwall-and-sheathing containment of existing HTC walls is recommended. This is especially critical at the high story of the fourth floor and should be verified with selective demolition.

SUMMARY

We believe that the existing gravity floor framing, columns, and footings, albeit with some localized floor damage repair, can support an office or residential occupancy with minor to no upgrade modification. We believe that the extent of damage due to neglect maintenance and vandal/scavenge acts, however, has increased significantly over the three years that have elapsed from our previous review. The existing pan-joist floor framing system should be investigated further in regard to its capacity with consideration given to its corroded condition. Existing ponded areas in the building may require repair and/or partial replacement. The roof decking may require extensive repair. The water-damaged plaster ceilings and wall finishes are likely a total loss and will require replacement or replication where and if historically important or desired. We recommend that any proposal for this building also consider a Life Safety

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seismic objective as typically required for substantial alteration, as applicable in this case to the re-occupancy of this existing building, and as addressed above.

Sincerely,

Magnusson Klemencic Associates, Inc.

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