

Structural Assessment: Existing & Work To Do



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Structural Review - Lakewood Theater

Date: June 28, 2010

Project Name: Lakewood Theater Review - Lakewood, Washington
FCE Project #: 10-T229

Purpose

Froelich Consulting Engineers (FCE) has been hired by Ankrom Moisan Architects to perform a review of the Lakewood Theater to identify any structural issues with the building and the potential for re-development of the site.

The goal of this structural report is to provide a brief summary of the condition of the building's structural systems and provide recommendations for seismic upgrades that may be necessary if the project is redeveloped.

General Building Description

The Lakewood Theater's structural framing appears to be in good condition compared to other buildings built in the 1930's. The primary building is the theater, which is wood-framed with heavy clear-span timber roof trusses. A restaurant and second floor banquet area was added in the 1960s. All exterior walls are 2x4/2x6 studs at 16 inch spacing with horizontal 1x8 tongue-&-groove sheathing and exterior 4-inch thick brick veneer. The ground floors are cast-in-place reinforced concrete beam/slabs with lightly reinforced concrete basement retaining walls and footings. At the second floor areas framing consists of, 2x10 joists at 16 inches on center. The various roof geometries are framed with a combination of 2x rafters and/or timber trusses with 1x8 t&g sheathing.

Structural Description

The type of construction observed and shown in the original construction drawings was common for the 1930's when the majority of the building was designed and constructed. In general, the original drawings matched actual construction.

Roof Framing: (Varies with building location)

- 1x8 T&G diagonal/straight sheathing, 2x joists and heavy timber beams and columns with timber trusses in some areas. Many of the various roof hips and eaves are stick-framed. Asphalt roofing over 1x8 sheathing – no plywood observed at roof.

Exterior Walls:

- All exterior bearing walls have 4-inch thick brick veneer, backed with horizontal 1x8 T&G sheathing on 2x4/2x6 studs at 16" on center. Overall, the brick and mortar joints are in good condition throughout the building.

2nd Floor Framing:

- 1x8 T&G diagonal sheathing, 2x joists at 16" on center and heavy timber beams and columns. Lath and plaster ceilings throughout the majority of the building. Some heavy steel beams support the banquet room that was constructed in the 1960s.

Main Floor Framing:

- Generally where there is basement below, the construction is cast-in-place reinforced concrete beam/slab system.

Seismic Resisting System:

- Perimeter wood framed walls with horizontal 1x8 T&G sheathing with 4" thick brick veneer. Interior walls will also contribute seismic resistance with the lath and plaster sheathing. Presence of veneer ties was detected. It appeared the veneer was placed directly against the 1x8 wall sheathing, possibly bonded with the grout/mortar.

Foundations:

- Cast in place, boardform concrete retaining walls. Slab on grade with typical spread footings.

Observed Structural Deterioration/Defects

Overall, the structural system of the buildings appears to be in good condition.

Roof Framing:

- No roof framing damage/deterioration detected in areas observed.

2nd Floor Framing:

- There are some areas of ceilings where sprinkler heads were exposed (chasing leaks?). No framing damage or dryrot detected.

1st Floor Framing:

- Concrete slab and beams appear to be in excellent condition.

Exterior Walls:

- Veneer in good condition throughout the exterior, no stud deterioration.

Basement Concrete Walls:

- Very few cracks or signs of efflorescence seen in basement retaining walls, good condition.

Current Seismic Resisting System

The following is brief description of the existing seismic force resisting system. National codes and standards that govern existing buildings provide guidance on estimating the capacity of historic (antiquated) lateral force systems.

Roof Diaphragms:

- The roof diaphragm consists of horizontal 1x8 T&G decking. Codes allow for a limited seismic resistance for this type assembly.

Recommendation: It appears the existing asphalt shingle roof is fairly new. Perform a full roof tear-off and add 1/2" plywood on top of the T&G throughout the entire roof at next re-roofing. This will substantially increase the diaphragm capacity of the facility.

Floor Diaphragms:

- Floor sheathing consists of horizontal 1x8 T&G sheathing in most areas.

Recommendation: If the site is remodeled, we suggest removing existing floor finishes and add 5/8" plywood over the existing T&G at all areas. This will substantially increase the floor diaphragm capacity of the facility.

Exterior Walls:

- Horizontal lateral forces are resisted by interior and exterior walls. The exterior walls have a combination of exterior horizontal 1x8 T&G sheathing and interior wood lath and plaster. Codes allow for a reasonable shear load capacity for this assembly.

Recommendation: Where possible, add 1/2" plywood to all exposed studs to increase shear capacity. A seismic analysis will show where new holddown anchors would be required. Provide epoxy anchors to connect the sill plates to the concrete walls. In some areas, it may be necessary to remove existing finishes or overlay existing finishes with plywood – depending on the level of seismic upgrade that is established by the re-development plans.

Seismic Upgrades / Trigger Scenario

The seismic resisting systems do not meet the criteria of today's code – this is to be expected. The most glaring deficiencies of the seismic resisting system are that there is no plywood at the roof or walls. The existing T&G sheathing at the roof and walls provides limited resistance to seismic forces. The seismic performance of the buildings could be dramatically improved by adding plywood to the roof and some of the walls.

The City of Lakewood follows the Washington State building Code (modified 2006 International Building Code). Chapter 34 of the IBC essentially refers to the International EXISTING building code (2006 IEBC) where modifications to existing buildings take place. The City looks at each building individually with respect to how these guidelines should best be applied. It is difficult to apply specific seismic code upgrade criteria at this early stage without a defined building use and occupancy plan; however we are going to assume the following possible re-development plan:

Theater: Re-develop theater to its original use. (No change of use or increase in occupancy).

We anticipate the exiting will be improved – possibly cutting some new openings in exterior walls.

- Adding a few new door openings in the exterior walls will not trigger major seismic work, but we recommend adding plywood and holddowns to walls that are impacted.

Restaurants, Bars & Banquet Areas: Re-develop to its original use. (No change of use or increase in occupancy).

We anticipate the exiting will be improved – possibly cutting new openings in exterior walls and modification of some interior bearing walls.

- Modifying some interior/exterior walls will not trigger major seismic work, but we recommend adding plywood and holddowns around the walls that are impacted.

Unless a large percentage of the facility is changed to a significantly higher occupancy/use, we do not anticipate the “triggering” of a major seismic upgrade. Phone conversations with the building official have confirmed this. The majority of the work would be fire/life safety upgrades.

Should the re-development plan include major structural additions or modifications, (greater than 35% of the floor area or adding additional floors, etc), then there could be significant seismic upgrade work. It is our understanding that this sort of re-development is unlikely.

Please call our office if you have any question or comments (503) 624-7005.

Regards,

Timothy T. Terich, P.E., S.E.
Principal





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Lakewood Theater
Lakewood, Washington

Photo #1: Main Front entry of Theater



Photo #2 – Brick veneer typical throughout exterior



Photo #3 – Lathe & Plaster at interior face of wall



Photo #4 – 1x8 T&G exterior sheathing with brick veneer and evidence of masonry ties



Photo #5 – cast-in-place concrete basement walls throughout



Photo #6 – 1x8 T&G roof sheathing over 2x4 roof joists/rafter



Photo #7 – Heavy timber built-up trusses at roof in some areas

