



**City of
Portland, Oregon**
Bureau of Development Services
FROM CONCEPT TO CONSTRUCTION

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Structural Advisory Board Meeting January 13, 2017

Meeting Resolution

Attendees:

Board Members:

Brandon Erickson – Erickson Structural Consulting Engineers
David Nilles – JHI Engineering
Blake Patsy – KPFF Consulting Engineers

City Staff:

Amit Kumar – Bureau of Development Services, City of Portland
Eric Thomas – Bureau of Development Services, City of Portland
Greg Wilken – Bureau of Development Services, City of Portland

Applicant:

Tim Schweitzer – Mackenzie
Sohaila Starks – Mackenzie

Background and Proposal:

The proposed structure is a six story, 94,000 square foot self-storage building with overall dimensions of 175ft x 95ft and a roof height of approximately 60ft. The building consists of 3 levels of light gauge bearing/shear walls (sheathed with corrugated metal panels) supported by 3 levels of post-tensioned concrete slabs supported by concrete columns and non-bearing special reinforced CMU shear walls.

The proposed structure plans to utilize the two-stage analysis procedure of ASCE 7-10 section 12.2.3.2 with the flexible upper 3 levels consisting of corrugated metal sheathed and strap braced light frame shear walls and the rigid lower portion consisting of special reinforced CMU shear walls.

The Issue the applicant is asking the Structural Advisory Board to consider:

Item #1:

Although light framed shear walls sheathed with corrugated metal panels is not a pre-approved seismic force resisting system in accordance with ASCE 7-10, limited use has been allowed within the City of Portland on a case-by-case basis where the design adheres to the limitations set forth in the structural advisory decision from August 2011.

Item #2:

The two-stage analysis procedure of ASCE 7-10 section 12.2.3.2 is used to justify that the light gauge framing meets the structural system height limitations set forth by the 2011 Structural Advisory Board decision regarding light framed shear walls sheathed with corrugated metal panels. Historically, the City of Portland has only allowed two levels of podium construction when utilizing the two-stage analysis procedure.

Structural Advisory Board Resolution:

Item #1:

- The structural advisory board rules that it is **not appropriate** to extrapolate the 2011 structural advisory decision regarding corrugated metal shear walls to structures more complex than was originally evaluated at the time of the previous decision.
- The requirements of the 2011 decision are modified as follows (modifications in **bold**):
 - 1) The proposed lateral system using metal stud with corrugated steel sheathing as vertical elements of the lateral load resisting system is a viable lateral system.
 - 2) It is not appropriate to consider this system as a pre-approved lateral system covered under the preapproved system of “Light framed walls sheathed with wood structural panels rated for shear resistance or steel sheets” ASCE 7-05 with seismic coefficients $R= 6.5$, $C_d= 4$, and $\Omega=3$.
 - 3) It would be appropriate to use the following seismic coefficients : $R= 4.0$, $C_d= 3.5$, and $\Omega=2.0$
 - 4) This system can be used only in structures less than or equal to 35 ft in height. **Structural height shall be measured from the base as defined in ASCE 7 to the overall mean roof height. It is not permitted to measure the structural height from the top of a podium structure where a two-stage analysis procedure is used for lateral design.**
 - 5) The decking material shall be a **22 gauge to 26 gauge**.
 - 6) The thickness of the metal stud backing shall be greater than or equal to the thickness of the metal deck. **The maximum stud spacing shall be no greater than 24 inches on center.**
 - 7) The lateral capacity of the system may be based on testing or calculated using principles of mechanics, using values of fastener strength and sheathing shear resistance per procedures of AISI standard, S100 “North American Specification for the design of Cold formed Steel”, and AISI S213, “North American Standard for the design of Cold formed Steel Framing- Lateral Design”
 - 8) The thickness of the metal studs shall be such that the governing failure mode for the fasteners is “ Shear limited by Tilting and Bearing”, section E4.3.1 of AISI S100
- Use of corrugated metal shear walls as a lateral system that do not meet the modified 2011 decision requirements above shall adhere to the provisions of the performance based design procedures per ASCE 7-10 section 1.3.

Item #2:

The structural advisory board rules that the two-stage analysis procedure of ASCE 7-10 section 12.2.3.2 is appropriate for any number of podium levels supporting any number of flexible upper levels, provided all of the provisions of 12.2.3.2 have been satisfied and the structural height limitations as noted in Item #1 are met.

Summary:

The proposed 6-story 60 feet tall structure that utilizes 3 stories of corrugated metal shear wall over a 3 story podium would not be allowed since the proposed structure is beyond the 2011/2017 Structural Advisory Board decisions for a building that uses corrugated metal shear walls as part of the lateral force resisting system. A different lateral system that is defined in ASCE 7-10 that meets the specified allowable height limit would be permissible for this project. The use of the two-stage procedure would be permissible provided the requirements of ASCE 7-10 are met.