Six Over Two Podium Buildings
Analog & Moraine Tacoma Case Studies

Presented by: Paul Del Vecchio | Ethos Development
Adam Hostetler | Works Progress Architecture
Alex Davis | PCS Structural Solutions

Disclaimer: This presentation was developed by a third party and is not funded by WoodWorks or the Softwood Lumber Board.
Project Descriptions

- Analog | 115 Units | 65,000 SF
- Moraine | 171 Units | 118,000 SF
- Both Six Stories Type IIIA wood over Two Stories 1A Concrete
Cost Benefit

• Analog is amongst the first projects in Washington to be permitted with 6 stories of Type IIIA.

• The cost of one IIIA deck on Analog is $32/SF vs. 1A at $44/SF.

• This amounts to a total of $104k for the transitional deck on Analog and $175k for Moraine.

• The relative ease of routing MEP chases in wood vs concrete is relevant.

• This is primarily a cost-based choice as there is no degradation in value or resident experience.
PROJECT CONTEXT
Tacoma, WA
ANALOG PROJECT
Tacoma, WA

120’ x 75.5’ Site
17.2’ E-W Elevation Change.
4.1’ N-S Elevation Change.
115 Units
Mix of Micros, Studios, 1-Bed, 2-Bed, and 3-Bed Units
6-Stories of III-A Over 2-Story I-A Podium and a Basement
Three-Story Podium + Basement per WSBC 510.2.

All Encroachments off Concrete Decks.
Tacoma Municipal Code

2.02.140 Amendment to IBC Section 504.4 – Number of Stories – by amending subsection 504.4.1 WA State amendment to the IBC and by addition of a new Section 504.4.1.1 – Type B occupancies within R-1 and R-2 occupancies.

The following section amends Section 504.4.1 of the State Building Code amendments to IBC Section 504.4 – Number of Stories, by replacing 504.4.1 in its entirety, and by addition of a new Section 5.4.4.1.1.

504.4.1 Stair Enclosure Pressurization Increase.

For Groups R-1 and R-2 in buildings of Type VA or IIIA construction, or I-1 Condition 2 Assisted living facilities licensed per chapter 388-78A WAC and residential treatment facilities as licensed by Washington state under chapter 246-337 WAC located in buildings of Type VA construction equipped throughout with an approved automatic sprinkler system in accordance with Section 903.3.1.1, the maximum number of stories permitted in Section 504.4 may be increased by one provided the interior exit stairways and ramps are pressurized in accordance with Sections 909.11 and 909.20. Legally required standby power shall be provided for buildings constructed in compliance with this section and be connected to stairway shaft pressurization equipment, elevators and lifts used for accessible means of egress, hoistway pressurization equipment (if provided) and other life safety equipment as determined by the authority having jurisdiction. For the purposes of this section, legally required standby power shall comply with most currently adopted NEC Section 701.12, options (A), (B), (C), (D), (E), (F), or (G) or subsequent revised section number(s).

504.4.1.1 Type B Occupancies within R-1 and R-2 occupancies.

Provided the building meets the additional requirements in Section 504.4.1 as amended by the State Building Code, Type B occupancies that are considered accessory to and for the exclusive use of the R-1 and R-2 uses, including such uses as assembly areas, exercise rooms, or other amenity spaces with less than 50 occupants, may be permitted on all stories that the R-1 and R-2 uses are permitted. These spaces must also meet all the additional provisions as specified in the State Building Code amendment (WAC 51-50-0504) to IBC 504 – Building Height and Number of Stories.

Prior to Using Six Stories of III-A

- **Fire Access 75’ Podium (3-hour)**
- **Base Plane**
- **Type IIIA Height Cap**
- **All Encroachments off Concrete Decks.**
- **Fire Marshal Definition of High-Rise Taken from Lowest Access Point.**

85’ Max. Type IIIA Height per WSBC 504.3

Three-Story Podium + Basement per 510.2.

ANALOG

16.5’
Two-Story Podium + Basement.

All Encroachments off Concrete Decks.

Fire Marshal Definition of High-Rise Taken from Lowest Access Point.
Two-Story Podium + Basement.

All Encroachments off Concrete Decks.
Two-Story Podium + Basement.
All Encroachments off Concrete Decks.
Two-Story Podium + Basement.
All Encroachments off Concrete Decks.
Typical Residential Floor
ANALOG

1. Contractor to notify Architect of any discrepancies prior to start of work.

2. Reference Spec for Product Information and Installation Requirements

3. Reference Spec for Accessible Parking Stall Requirements


5. Provide Stair & Elevator Pressurization

6. Provide PTHP Unit in 2-Bedroom and 3-Bedroom units. See Elevation for Louver Location.

7. Provide Electric Cove Wall Heaters in Micro, Studio, and 1-Bedroom units.

8. See 7.00 Series for Enlarged Unit Plans.

9. All units to be Type B Accessible Unit unless labeled as Type A. See Sheet G 0.02 for Accessibility details.

10. In-Unit stacked Washer/Dryer Contractor Furnished & Installed, Laundry Room washer/dryer Owner Furnished & Installed

Non-Rated - EW-0; EW-0a; EW-0b; EW-3r
- IW-2; IW-2m; IW-3; IW-3m

1/2 Hour Rated - IW-0m

1 Hour Rated - EW-1; EW-1a; EW-1b; EW-3; EW-3a; EW-3b
- IW-1; IW-1m; IW-1s; IW-1x; IW-1b

2 Hour Rated - EW-2; EW-2a; EW-2b
- IW-4; IW-4m; IW-4s; IW-4x; IW-5; IW-6

3 Hour Rated - IW-6 (unless shown otherwise); IW-8m

Stair Pressurization Shafts

Opportunity to Eliminate Smoke Doors on the Elevator Shaft by Tying it into the Same System.
1. Contractor to notify Architect of any discrepancies prior to start of work.

2. Reference Spec for Product Information and Installation Requirements

3. Reference Spec for Accessible Parking Stall Requirements


5. Provide Stair & Elevator Pressurization

6. Provide PTHP Unit in 2-Bedroom and 3-Bedroom Units. See Elevation for Louver Location.

7. Provide Electric Cove Wall Heaters in Micro, Studio, and 1-Bedroom Units.

8. See a7.00 Series for Enlarged Unit Plans.

9. All units to be Type B Accessible Unit unless labeled as Type A. See Sheet G 0.02 for Accessibility details.

10. In-Unit stacked Washer/Dryer Contractor Furnished & Installed, Laundry Room washer/dryer Owner Furnished & Installed

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Bearing Walls Are Located Like Any Other Type III Building, with an Eye Toward Minimizing Exterior Bearing Walls.

Per Table 601
- 1-hr Wall
- 2-hr Wall

Walls and Doors in Them Need to Stack.

The AHJ Did Not Accept Asymmetric Assemblies on This Project.
MORAINE PROJECT
Tacoma, WA

130’ x 137.5’ Site
19.5’ E-W Elevation Change.
1.0’ N-S Elevation Change.
171 Units
Mix of Micros, Studios, 1-Bed, 2-Bed, and 3-Bed Units
6-Stories of III-A Over 2-Story I-A Podium and a Basement
Lessons Learned:
Considered Fire Access Height Early in the Design Process

Moraine
1402 Tacoma Avenue S
Tacoma, WA  98402
W.PA Job Number 1326
Permit Set 01.28.2021
Bearing Walls Are Located Like Any Other Type III Building, with an Eye Toward Minimizing Exterior Bearing Walls.

Walls and Doors in Them Need to Stack.

The AHJ Did Not Accept Asymmetric Assemblies on This Project.
Lessons Learned:
Set Exterior Wall Types Early and Designed with them in Mind.
Lessons Learned:
Double-sided Shear is Common on Lower Floors which Changes Acoustic Performance and Makes Trade Work Difficult.

Multi-Stud Pack is Common on Lower Floors.
Carrying Shear Down Through the Podium Proved the Most Difficult Part with This Program
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Once into the Wood, the Logics are Very Similar to Fawcett.

Per Table 601
- 1-hr Wall
- 2-hr Wall

Walls and Doors in Them Need to Stack.

Provide Stair Pressurization
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Per Table 601
- 1-hr Wall
- 2-hr Wall

Walls and Doors in Them Need to Stack.

Provide Stair Pressurization
MORAINE

GROUND FLOOR LOUNGE
MORAINE

NORTH LOUNGE DECK
Six Story Type IIAA Structural Impacts

Gravity System:

- All exterior type IIAA wood walls are required to be constructed of fire retardant treated (FRT) lumber. Reference design values for these members are reduced per manufacturer adjustment factors. IBC Table 721.1(2), note m provides some capacity reduction guidance as well.

<table>
<thead>
<tr>
<th>ADJUSTMENT FACTORS</th>
<th>Southern Pine</th>
<th>Douglas Fir</th>
<th>Spruce</th>
<th>Other Species</th>
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</thead>
<tbody>
<tr>
<td>Compression Parallel, $F_c$</td>
<td>0.99</td>
<td>0.77</td>
<td>0.92</td>
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<tr>
<td>Horizontal Shear, $F_v$</td>
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<td>0.94</td>
<td>0.84</td>
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<td>Tension Parallel, $F_t$</td>
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<td>0.85</td>
<td>0.94</td>
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<td>Bending: Modulus of Elasticity, $E$</td>
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<td>1.00</td>
<td>0.99</td>
<td>0.93</td>
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<tr>
<td>Bending: Extreme Fiber Stress, $F_b$</td>
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<tr>
<td>Fasteners/Connectors</td>
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<td>0.77</td>
<td>0.90</td>
<td>0.77</td>
</tr>
</tbody>
</table>
Gravity System:

- Joist bearing at the exterior walls was limited by framing joists parallel to the exterior walls where possible. This reduced the amount of 2-hr rated walls.

- Loads from added story result in additional studs and closer spacing especially at 2x4 walls. Compression perpendicular to grain and crushing of plates important considerations for design.
Six Story Type IIA Structural Impacts

Lateral System:

- To reduce 2 hour rated exterior walls, any exterior shear walls were eliminated. This created an open-front cantilevered diaphragm condition.
- An enveloped solution of rigid & flexible analysis was performed to meet the requirements listed in SDPWS Section 4.2.5.2.
Six Story Type IIAA Structural Impacts

Lateral System:

- With the additional story comes increased deflections and higher overturning/shear demands for shear walls. Solutions involved using more stringent holdown deflection allowances and increasing double sided walls to provide additional stiffness and capacity.

- Holdown forces should be included in localized podium slab anchorage & global slab design when over 30 kips.
Six Story Type IIA Structural Impacts

Shrinkage:

• Ensure continuous rod holdowns have shrinkage compensating take up devices capable of accommodating additional shrinkage from added story.

• Stacking of vertical and lateral elements key to avoiding continuous steel elements and prevent localized shrinkage issues.
QUESTIONS?

Paul Del Vecchio  
Ethos Development LLC  
paul@ethosdevelopmentllc.com

Adam Hostetler  
Works Progress Architecture  
adam@worksarchitecture.net

Alex Davis  
PCS Structural Solutions  
adavis@pcs-structural.com