Design Strategies for Podium and Wrapper Buildings

Presented by Brian Gobell, AIA / Principal

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

1- Understanding the Context of the Building Code
2- Applying Code Limitations to Podium and Wrapper Designs
3- Design Challenges with Type III Construction
4- Cost and Density Summary
5- Case Studies
Podium and Wrapper Buildings

GENERAL CONTEXT:
- Code References from 2021 International Building Code (for new construction)
- Multi-family (IBC Use Group R-2); multi-level

MIXED-USE BUILDING COMPONENTS/ USES INCLUDE:
- RESIDENTIAL (R-2) and PARKING (S-2)
- Can also include RETAIL (M), RESTAURANT (A-2) and/or OFFICE (B)
Podium and Wrapper Buildings

**TYPOLOGY DEFINITIONS:**

- **“Wrapper”** typically refers to a parking garage “wrapped” by wood-framed residential; aka “donut” or “Texas donut”

- **“Podium”** typically refers to wood-framed, residential construction above a concrete (or steel-framed) base or “podium”; aka “pedestal”

- Neither of these terms are found in IBC

- Both are cost effective strategies for moderate density, mid-rise, multi-family design (5 – 8 stories)
CONSTRUCTION TYPES:

- **Types I and II**: non-combustible (NC); concrete, steel, metal stud

- **Type III**: non-combustible exterior + combustible interior; FRT allowed for Type III [602.3]

- **Type IV**: combustible; heavy timber (HT) and cross-laminated timber (CLT); 2021 IBC updates to expand limitations

- **Type V**: combustible; standard wood
### Table 504.3
**Allowable Building Height in Feet Above Grade Plane**

<table>
<thead>
<tr>
<th>Occupancy Classification</th>
<th>See Footnotes</th>
<th>Type I</th>
<th>Type II</th>
<th>Type III</th>
<th>Type IV</th>
<th>Type V</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>A</td>
<td>B</td>
<td>A</td>
<td>B</td>
<td>A</td>
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<tr>
<td>S, U</td>
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</tbody>
</table>

### Table 504.4
**Allowable Number of Stories Above Grade Plane**

<table>
<thead>
<tr>
<th>Occupancy Classification</th>
<th>See Footnotes</th>
<th>Type I</th>
<th>Type II</th>
<th>Type III</th>
<th>Type IV</th>
<th>Type V</th>
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</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>A</td>
<td>B</td>
<td>A</td>
<td>B</td>
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<tr>
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<td>B</td>
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<td>11</td>
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</table>

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Building Code
# Building Code Considerations for Typical Podium & Wrapper Buildings

<table>
<thead>
<tr>
<th>Construction Type (IBC)</th>
<th>2021 IBC Ref.</th>
<th>R-2 (Residential) and Fully Sprinklered (NFPA 13)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Chapter 6</td>
<td>Type IA (NC)</td>
</tr>
<tr>
<td>Number of Stories (max)</td>
<td>T504.4</td>
<td>Unlimited</td>
</tr>
<tr>
<td>Building Height (max)</td>
<td>T504.3</td>
<td>Unlimited</td>
</tr>
<tr>
<td>Allowable Area (SF) *</td>
<td>T506.2</td>
<td>Unlimited</td>
</tr>
<tr>
<td>Exterior Materials</td>
<td>(NC) Metal Stud, Concrete, Steel</td>
<td>(NC) FRT wood [602.3]</td>
</tr>
<tr>
<td>Interior Materials</td>
<td>(NC) Metal Stud, Concrete, Steel</td>
<td>(C) Standard Wood</td>
</tr>
</tbody>
</table>

(NC) = Non-combustible; (C) = Combustible
* not including frontage increase [506.3]
CONSIDERATIONS:

- Cost effective design employing structured parking garages
- “Open” garages [406.5] do not require mechanical ventilation or sprinklers
- For open garages, a minimum separation distance of 10 feet is required [406.5.6]
- “Enclosed” garages [406.6] require both mechanical ventilation [406.6.2] and sprinklers [406.6.3]
CONSIDERATIONS:

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CONSIDERATIONS and CHALLENGES:

- Lot size, garage connection, construction phasing and inefficiency
CONSIDERATIONS:

- Allows for construction of additional stories by separating a building by a 3-hour horizontal separation [510.2.1]
- Non-combustible, Type IA is required below the podium [510.2.2]
- Limited by the allowable height and stories by the lesser construction (Type III or Type V)
- Height is measured from the Average Grade Plane rather than from the top of the podium
Podium Buildings

CONSIDERATIONS (con’t):

- Podiums typically also serve as structural transfer slab
- Fire walls (if incorporated) are allowed to terminate at the podium
- Both allow open floor plan to benefit non-residential uses (parking, retail, office) but also dramatic amenity spaces and unique apartment design
CONSIDERATIONS (con’t):

- 2015 IBC was revised to not limit the number of stories allowed below the podium
- Prevalence of many more Type IIIA podium structures
- High rise classification becomes a significant consideration
Podium Buildings

**DESIGN OPPORTUNITIES:**

- Tall and open ground level spaces for retail, restaurants, office or residential amenity
Podium Buildings
Podium Buildings

- Multiple buildings of differing construction types above a podium [510.9]
- S-2 parking garage below
Variou strategies to combine mixed use podium with centralized parking
Combination Podium & Wrapper Building

- Separated mixed-use buildings employing fire walls [706]
Combination Podium & Wrapper Building

- Non-separated mixed-use employing fire barriers
Combination Podium & Wrapper Building
**CHALLENGES:**

- Load-bearing exterior walls are required to be 2-hours (Type IIIA) [T601]
- Continuity of 2-hour (NC) walls with 1-hour (C) floor assemblies
- Structural ‘gymnastics’ vs additional layer of GWB becomes a cost consideration
- NFPA 285

Detail courtesy of Structura, Inc.
TYPICAL ASSEMBLIES:

- Exterior walls/ 2HR for Type IIIA: UL Design W408
  - Non-combustible vs Fire-rated

- Floors/ 1HR: UL Designs L521 & L528
  - Interstitial sprinkler elimination (NFPA 13) if filled with insulation

- Roofs/ 1HR: UL Design P522
Cost and Density Summary

**Typology Comparison**

<table>
<thead>
<tr>
<th></th>
<th>Podium</th>
<th>Wrapper</th>
</tr>
</thead>
<tbody>
<tr>
<td>Site Area</td>
<td>requires less</td>
<td>requires more</td>
</tr>
<tr>
<td>Site Density / Yield</td>
<td>higher (130 - 170 units / acre)</td>
<td>lower (70 - 100 units / acre)</td>
</tr>
<tr>
<td>Overall Cost *</td>
<td>more costly ($125 - 150 / SF)</td>
<td>less costly ($105 - 120 / SF)</td>
</tr>
<tr>
<td>Parking Garage</td>
<td>cast-in-place / sprinklers required</td>
<td>precast / sprinklers may not be required</td>
</tr>
<tr>
<td>Efficiency</td>
<td>higher / double-loaded corridors</td>
<td>lower / single-loaded corridors</td>
</tr>
<tr>
<td>Concrete construction</td>
<td>yes below podium</td>
<td>at garage only</td>
</tr>
</tbody>
</table>

* *blended* cost including all building components (residential, parking & shell retail/office); pre-pandemic pricing
Case Studies

Union Wharf / Baltimore, MD

combination podium and wrapper
Case Studies

**Novel Deep Ellum / Dallas, TX**

5-over-2 podium with rooftop amenity terrace
Case Studies

Glasshouse / Pittsburgh, PA

5-over-2 podium
Case Studies

Bainbridge Federal Hill / Baltimore, MD

5-over-2 plus ground level loft
This concludes The American Institute of Architects Continuing Education Systems Course

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