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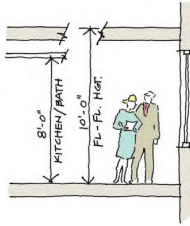
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## Residential Interior



Typical Section




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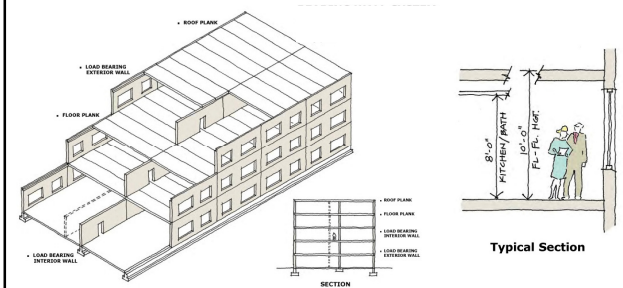
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## Typical Layout



Typical Section

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## System Selection

- Conventional framing systems
  - Types
  - When to use: Can use for some low and mid-rise, but most economical for 8 stories and above
  - Benefits – open floor plan – flexibility – lowest floor to floor heights – fire resistance – sound resistance
- Bearing wall systems
  - Types
  - When to use: Best for low- to mid-rise, but examples of up to 20+ stories
  - Benefits
- Advantages over stick framing
  - Open floor plates – flexibility for renovation, etc.
  - Interior non-load bearing
  - others

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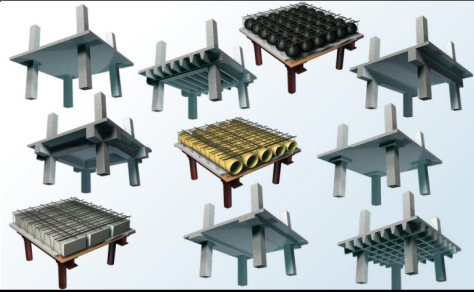
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### Cast-in-place Frame



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### Bearing Wall Solutions

- Removable Forms
- Tilt-up
- ICF

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### Concrete Systems: Removable Forms

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## Panelized Aluminum Forms



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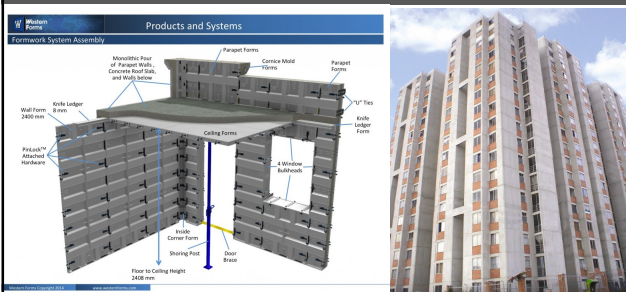
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## Wall Innovation: Aluminum Forms



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## Integral Insulation Systems



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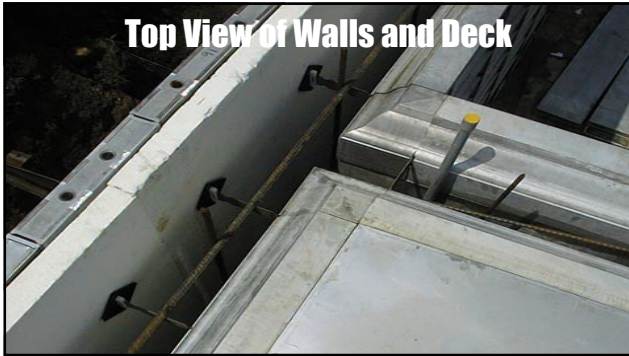
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## Wall Innovation: Aluminum Forms



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## Arnold Development Group

275 unit  
Passive Haus certified (90% less energy)  
Kansas City, MO  
Cost: \$50M  
24% Lower Life Cycle Costs



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## Concrete Systems: Tilt Up

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## What is Tilt-Up?



*A construction method which eliminates the cumbersome practice of constructing two wooden walls to get one concrete wall.* - Thomas A. Edison, 1909

The process of casting walls or other concrete elements on site, lifting and placing them in their final location in a structure.

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## Myth: Aesthetics



Apple Storage Warehouse, Wanatchee, WA

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## Myth: Limited Openings

Beacon Pointe, Weston, FL



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# Tilt Up Process

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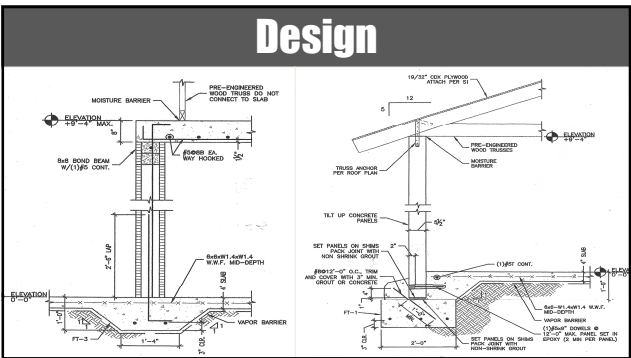
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# Design



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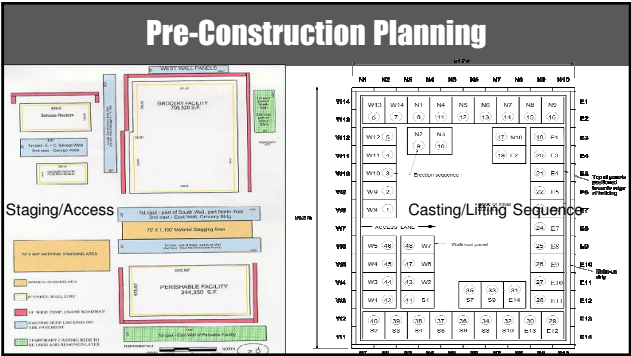
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# Pre-Construction Planning



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## Floor Slab/Casting Surface



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## Casting Beds



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## Forming



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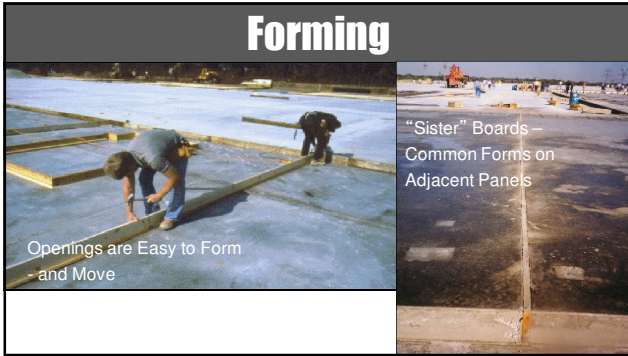
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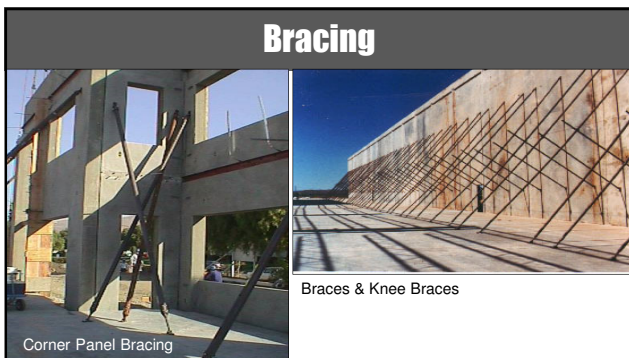
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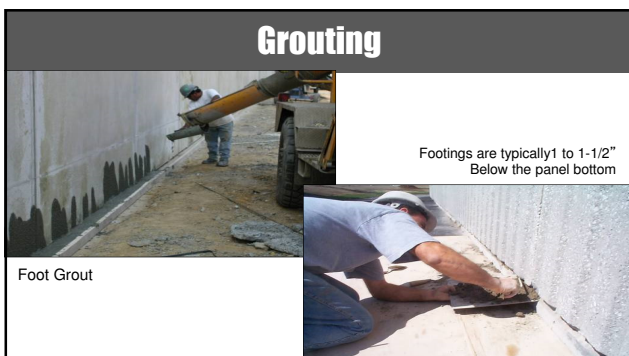
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## Tilt-Up Resources

- PCA Publications
- Suppliers & Manufacturers
- Web Site ([www.tilt-up.org](http://www.tilt-up.org))
- TCA Reference Publications
  - Tilt-Up Construction & Engineering Manual (English & Spanish)
  - Supervisor and Technician Reference Guide
  - The Architecture of Tilt-Up (2005)

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## Questions?

Economical Design of Concrete Systems

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