Seattle's Tallest Residential Tower

815 Pine

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815 Pine
Seattle, Washington
815 Pine

- 42-story residential tower with 386 units
- Four levels of parking above grade, five levels below
- 440 foot structure
- 490,000 square feet
- Expected to open in November 2014
- Targeting LEED Silver certification
815 Pine

- 7 1/2” post-tensioned flat plates
- Highly efficient core-wall seismic system
- Column sizes are constant from ground to top
- Formwork productivity was maximized
- Poured 51 floors in 53 weeks
Buildings Above 240' in High Seismic Regions

• Seismic restrictions triggered at 240'
• Ductile frames or dual systems (ductile frames/shear walls) are mandated by code above 240'
• Alternatively, shear walls can be used if ductile behavior is proven through performance based analysis — peer review required
15,000 PSI Column Concrete

- Believed to be the strongest concrete ever specified in Seattle.
- Allows building’s shear walls and columns to be smaller than typical towers this size
- Smaller shear walls and columns mean larger floor plates and more real estate inside the building
COLUMN CONCRETE PLACEMENT AT SLAB

PT SLAB

“STAYFORM” TIED TO COLUMN TIES

CONC COLUMN
**Post-Tensioning Advantages**

- Thinner slabs & Shallower beams
- Longer spans & Fewer columns
- Reduced floor to floor height
- Better control of deflection & cracking
- Smaller columns & foundations
- Reduced seismic loads
TOWER SLABS - SERVICE DEFLECTION
PT SHRINKAGE

- Drying Shrinkage: 73%
- Thermal: 15%
- PT Creep: 8%
- PT Elastic Shortening: 4%
PT SHRINKAGE

ASSUME 100’ LONG SLAB AS FOLLOWS:

- POST-TENSIONING: 175 PSI
- CONCRETE STRENGTH: 4000 PSI
- TEMPERATURE CHANGE: 30° F
- DRYING SHRINKAGE @ 28 DAYS: 0.042%

ELASTIC SHORTENING

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PL = \frac{175 \times 100 \times 12}{3,605,000} = 0.06”
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CREEP

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2 \times 0.06 = 0.12”
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THERMAL

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\left(0.0000055 \times 30 \times 100 \times 12\right) = 0.20”
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DRYING SHRINKAGE LONG TERM

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\left(0.00084 \times 100 \times 12\right) = 1.01”
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TOTAL

1.39”