The Economics of Low-Carbon Structures

Emily Dawson, Kaiser + Path
Partner, Principal Architect
Kaiser + Path
Developers
+ Architects
+ Contractors
Designing a low-carbon building

1. Reduce or eliminate automobile parking
2. Only develop urban and brownfield sites
3. Design for structural efficiency
4. Design in modules
5. Design for reuse & disassembly
6. Use less concrete
7. Specify low-carbon concrete mixes or lower-strength concrete where feasible
8. Use less steel
9. Limit use of aluminum
10. Limit use of plastics
11. Limit use of foam insulation
12. Choose renewable, bio-based, carbon-sequestering materials like wood, grasses, hemp, etc
13. Reuse/reclaim materials
14. Prefer recycled content materials
15. Use less of EVERYTHING
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CIRCULAR ECONOMY

WOOD

BIOECONOMY

CIRCULAR CARBON ECONOMY
The result is that the North American building industry will store more carbon than it emits by the year 2034.
The Radiator | 5 stories, 38,000 sf | Glulam & Timber Decking | Type IIA
Carbon 12    |    8 stories, 40,000 sf    |    CLT & Steel Braced Frame    |    Type IIIA+
buildingCarbon12.com
BUILDING COST

- Material Costs
- Labor Costs
- Overhead
- Contingency
- Escalation

BUILDING VALUE

- Cost Estimate
- Construction Duration
- Loan Rates
- Leasability
- Leasing Rates
- Market Value at Sale
- Market Differentiation
The Canyons | 6 stories, 110,000 sf | CLT/Light Framing | Type IIIA
Base Design

➔ 5-ply 139V CLT panels at 10’ spans
➔ 5-ply 175E CLT panels at 20’ spans
➔ Drywall soffits where required
Total Change to Light Framing

- Delete CLT ($1,194,500)
- Savings in plumbing ($49,600)
- I-joist framing throughout $440,500
- Add for drywall soffits, paint $344,000
- 5 weeks add General Conditions $81,000

($378,600) Savings
Total Change to Light Framing

➔ Delete CLT ($1,194,500)
➔ Savings in plumbing ($49,600)
➔ I-joist framing throughout $440,500
➔ Add for drywall soffits, paint $344,000
➔ 5 weeks add General Conditions $81,000 ($378,600) Savings
➔ 5 weeks increased carrying costs $100,000 ($278,600) Savings
Value Lost

- Ceiling height reduced 6” or building height increase 30”
- Potential to lose a floor, tight height limit
- $0.12/sf apartment lease reduction (3.5%)
- -$7,668 monthly return reduction
- -$92,255 annual return reduction
  = 3.02 year pay-back period
- -$1,752,843 value at sale impact (5.0% cap rate, year 0)
Economic Value

➔ 8’-10” ceilings
➔ Premium building with quick pay-back
➔ Higher lease rates
➔ Faster lease-up, lower turnover
➔ Market differentiation
➔ Precision & predictability in construction

Social & Environmental Value

➔ Carbon Sequestration
➔ Biophilia and Sense of Place
CONCRETE vs. CLT
(a drag race)
L2 Post-Tension Concrete Slab
Day 12

L4 Cross-Laminated Timber Panels & Light Frame Walls
Day 10

The Canyons
Portland, OR
Radiator | 40,000 sf of Mass Timber
Carbon 12 | 40,000 sf of CLT + Glulam
The Canyons | 90,000 sf of CLT + Light Framing

CARBON SEQUESTERED ~ 800 TONS
(equal to about 8 acres of PNW forest)
Figure 2—Carbon storage in U.S. forest ecosystems by forest ecosystem component (in billion tons). Total storage in the United States is 57.8 billion tons—about 4 percent of all the carbon stored in the world’s forests.
PLANTING TREES IN FOREST PARK, PORTLAND

Proposal Prepared for Kaiser+Path
February 2020
Next Frontier: Affordability
COME BUILD WITH US
K A I S E R  +  P A T H
emily@kaiserpath.com

RESOURCES
BuildingCarbon12.com
MassTimberReport.com
corrim.org
woodworks.org