BCIT Student Residence, Burnaby, Canada: Large-Format Point-Supported CLT Optimization

Ian Boyle
Principal, Fast + Epp
BCIT Student Residence

Large-Format Point-Supported CLT Optimization

Ian Boyle
Principal P.E., S.E., P.Eng., Struct.Eng

Fast + Epp
Introduction

- Client: British Columbia Institute of Technology
- 469 Bed Student Housing
- 12 Stories plus 1 Basement
- 16,000sf per Floor
  250,000sf Building Area
- 9’-3” Floor to Floor, 120’ Ht.
- Architect: Perkins & Will
Project Goals

+ Simple, practical, economical
+ Optimize layout for mass timber panels
+ Reduce construction time
+ Optimize Point-Supported CLT design
Structural System

- PS-CLT Deck w/Conc. Topping
- Steel HSS Columns
- Steel Cores w/Concrete Deck
- Concrete Transfer Podium at L2
- Concrete Basement
PS-CLT Advantages

+ Efficient beamless system
+ Fewer crane picks (incl. hand erected columns)
+ Reduced schedule
+ Reduced floor-to-floor (env. savings)
+ Cost competitive
Point-Supported CLT
Point-Supported CLT

PURE

$\tau_{xz}$

$\tau_{yx}$

PURE

$\tau_{xy}$

LONGITUDINAL

$\tau_{xy}$

$\tau_{zx}$

ROLLING

$\tau_{yz}$

$\tau_{zy}$

LONGITUDINAL

Mmax x: 164.65, Min x: -106.89 kN/m

1/2

V1

V2

V3

45°
Panel Testing

+ 18 Panels Tested

+ Multiple Suppliers
Methodology

Fast + Epp Point Supported CLT: Proposed Punching Shear Design Method
Mass Timber Layout

+ Structure and Architect in Tandem
+ Utilize Large Format Panels
+ Reduced Columns
+ Steel Columns Fit Within Walls
Mass Timber Layout

- Structure and Architect in Tandem
- Utilize Large Format Panels
- Reduced Columns
- Steel Columns Fit Within Walls
Panel Layout - Stresses

+ **Vx strong**

+ **Vy weak**

+ **Mx strong**

+ **My weak**

Max v-x: 100.94, Min v-x: -100.80 kN/m

Max m-x: 15.12, Min m-x: -30.55 kN/m

Max v-y: 64.60, Min v-y: -64.62 kN/m

Max m-y: 11.24, Min m-y: -4.37 kN/m
Lateral System

- Self-stable cores (w/stairs)
- Concentrically Braced Frame w/HSS brace and WF Column
- Full-height towers erected prior to timber arrival on site
- Concrete podium
Braced Frames
Construction Highlights

+ 40 Days for Cores
+ 3 Days for CLT deck
+ 4 Days for columns
+ 8 Days for envelope
+ In sequence, approx. 16 weeks for steel and timber
+ 22 months from mobilization to completion
Thank You