Hotel in the Mountains – S3
Mohammed Bersy, Nicholas Doiron, Abed Fazli, Matthew Latruwe and Mehar Sandhu

Objective
Complete the primary structural design for a new six-storey 2,200m² destination hotel in Golden, British Columbia to bring the client and architects vision to life.

The architect’s design was primarily influenced by the surrounding landscape. Emphasis was placed on continuing that beauty throughout the building using organic forms and natural elements. Our challenge was to complete the structural design without compromising the architectural vision.

Scope
• Load Considerations:
  I. Environmental: Wind, Snow, and Seismic loads
  II. Occupancy: Live load
  III. Earth pressures
  IV. Additional: Hot tub, mechanical equipment, finishes and self-weight
• Ultimate Limit State Design (ULS)
  I. Checks for load-bearing capacity, overturning, sliding, and fracture
• Serviceability Limit State Design (SLS)
  I. Checks for deflection, vibration, deformation and structural damage

Design Methodology
• Structural design and analysis of primary structural elements:
  I. Gravity Load Resisting System (Beams, Columns and Foundations)
  II. Lateral Load Resisting System (Diaphragm and Shear Walls)
• Structural Drawings (primary structural elements only)
• Cost Analysis
• Embodied Carbon Impact

Material Cost
Material cost assessment estimates hybrid wood design to cost $11,718,390.
Preliminary reinforced concrete design cost assessment estimated $13,078,765.

Structural Material | Estimated Price
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Concrete | $1,925,583.80
Wood | $4,094,519.60
Steel | $4,169,799.20
Sub-Total | $10,189,902.60

15% Contingency | $1,528,485.39
Total | $11,718,390

References:

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Raafat El-Hacha – Academic Advisor
Ryan Willmer – Industry Advisor
Martin Jasso and Jacob Lamb – Course Coordinators

Sustainability
• Local attraction
• More accommodation for events
• Designed main floor for multi-use
• Selected sustainable and locally sourced materials

Economic

Social

Environmental

Lateral Load Resisting System (LLRS)
• Horizontal members:
  I. Combination of rigid light frame diaphragm and cross-laminated timber (CLT) floor systems
  II. Glulam beams and columns
• Vertical members:
  I. Combination of light frame and concrete shear walls

Lateral Seismic Unfactored Loads

Main Floor Framing
Open Concept: Structural framing, including glulam beams and columns, are exposed in large open spaces to meet the architects biophilic design.

Roof designed with extra capacity for potential future solar installation – in line with BC Climate goals to reach net-zero carbon pollution by 2050.

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