

BROCK COMMONS TALL WOOD BUILDING **STRUCTURAL CONNECTIONS**



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The hybrid structure of Brock Commons includes multiple connection types: between the mass timber structure and the concrete podium and cores, within the mass timber structure, and between the mass timber structure and the roof.

Considerations for the connections include:

- Effective transfer of vertical (gravity) loads as well as panel shear loads.
- Function of floor panels as diaphragms and transfer lateral loads to the cores.
- Minimizing transmission of vibrations throughout the building.
- Accounting for building settlement as well as movement between the wood and concrete elements.
- Settlement and shrinkage of the wood elements due to moisture content and loading.
- Tolerance for fabrication and installation, and variances of the wood products.



FLOOR TO COLUMN CONNECTION

4 DRAG STRAPS

- Constructability of assemblies, and ease and speed of installation.
- Mitigation of water infiltration as well as any potential damage.
- Long-term monitoring of connection performance.

COLUMN TO ROOF CONNECTION

COLUMN TO STEEL ROOF

- The column to roof structure connection is similar to the column to column connection, roof beams will be supported on a welded steel assembly that will be bolted to the top of the glulam columns.
- The assembly will be adjusted for the sloping of the steel roof structure.





COLUMN TO CLT PANEL

- The column to column/CLT panel connection consists of round steel hollow structural sections (HSS) fastened to steel plates connected at the top and the bottom of each column using threaded rods epoxied into the column.
- The smaller HSS at the column base fits into the larger one at the top of the column below.
- The CLT panels are supported on top of the lower columns, and are bolted to the steel plates by four threaded rods.
- The connections transfer vertical loads directly through the columns only. GLULAM COLUMN



COLUMN TO CONCRETE SLAB

• The drag straps are steel plates (100 mm wide) screwed to the tops of the CLT panels and bolted to steel tabs which are welded to embed plates on the cores.

CORE TO SLAB CONNECTION

- The drag straps transfer lateral loads from the floors to the core.
- Strap length, thickness and spacing varies depending on position within the structure to accommodate different loads (larger and closer spacing on higher levels).

STEEL LEDGERS 5

- CLT is supported at the concrete core by steel ledger angle (L2O3 x 152 x 13 thick LLH) welded to an embedded plate (300 mm wide) cast into the core walls.
- Connection accommodates vertical and horizontal shear transfer at the connection point.







• The concrete slab to column connection is similar to the column to column connection except that the bottom plate is bolted to the concrete transfer slab.





Images courtesy of Acton Ostry Architects Inc., CadMakers Inc., and UBC Research Team



