

Hebville Mechanical Branch

Project Background

CBCL Limited retained Dalhousie's group 12 to design the new Mechanical Branch building located in Hebville, Nova Scotia.



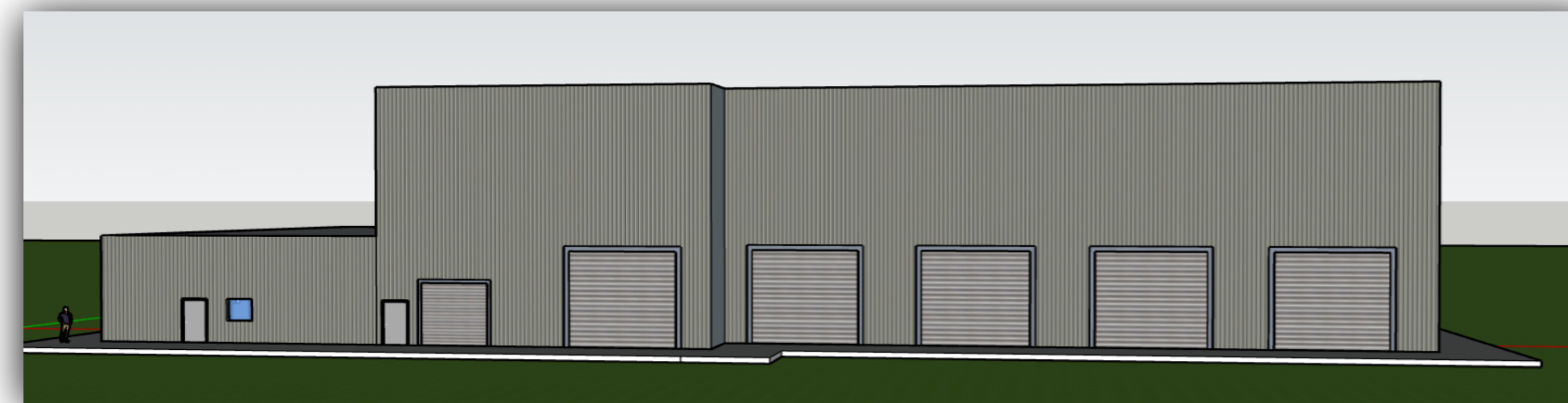
The new mechanical branch is required by the Department of Transportation and Infrastructure Renewal (NSTIR) to service a fleet of large vehicles such as snowplows and buses. The building consists of 10 garage bays which opens to a large open maintenance area, as well as an administrative office space in the building.

Design Process

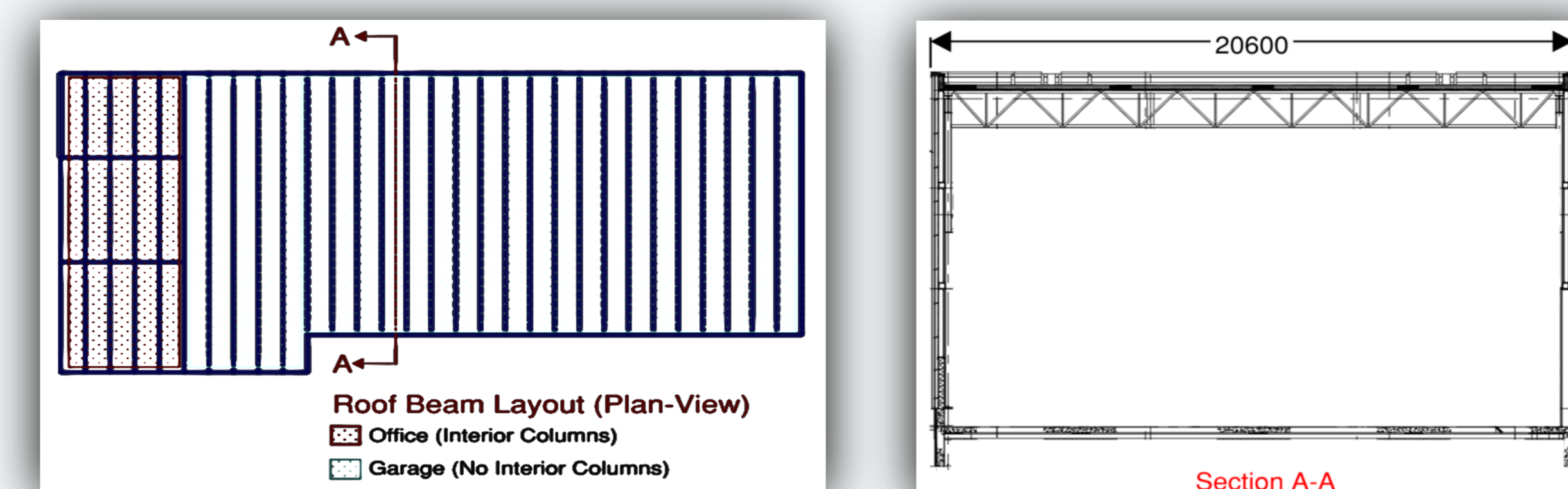
The basis of the design process was to design the structure from the top-down, as follows:

- 1 **Site Inspection**
 - Design load Analysis
 - Geotechnical Review
- 2 **Architectural Considerations**
 - Material selection
 - layout of structural components
 - Building Façade
- 3 **Structural Analysis**
 - Finite Element Modeling
 - Model Verification
 - Roof System
 - Steel deck diaphragm
 - Steel Trusses
 - Gravity and lateral load resisting system
 - Shear Walls
 - Moment Frames
 - Braced Frames
 - Foundation
- 4 **Cost Estimate**
 - Class A

Details of Design

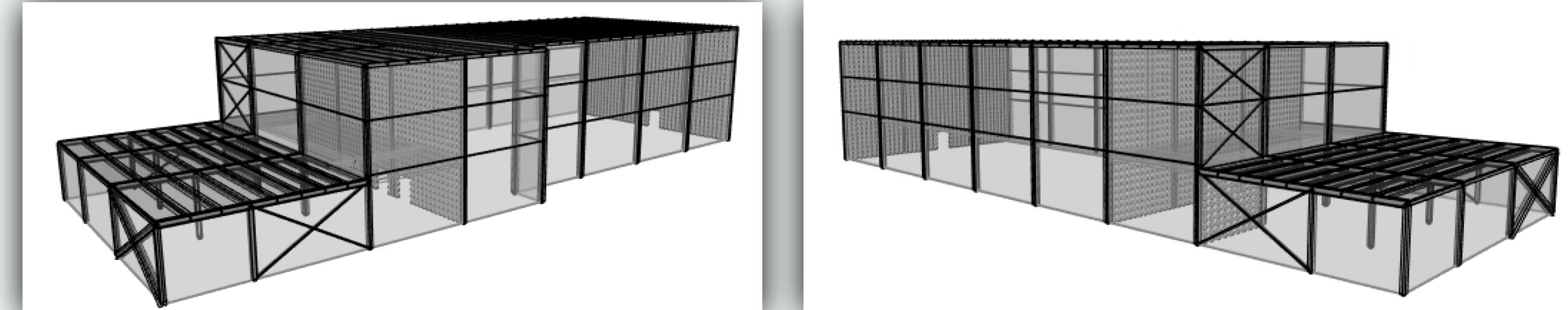


Gravity Load Resisting System

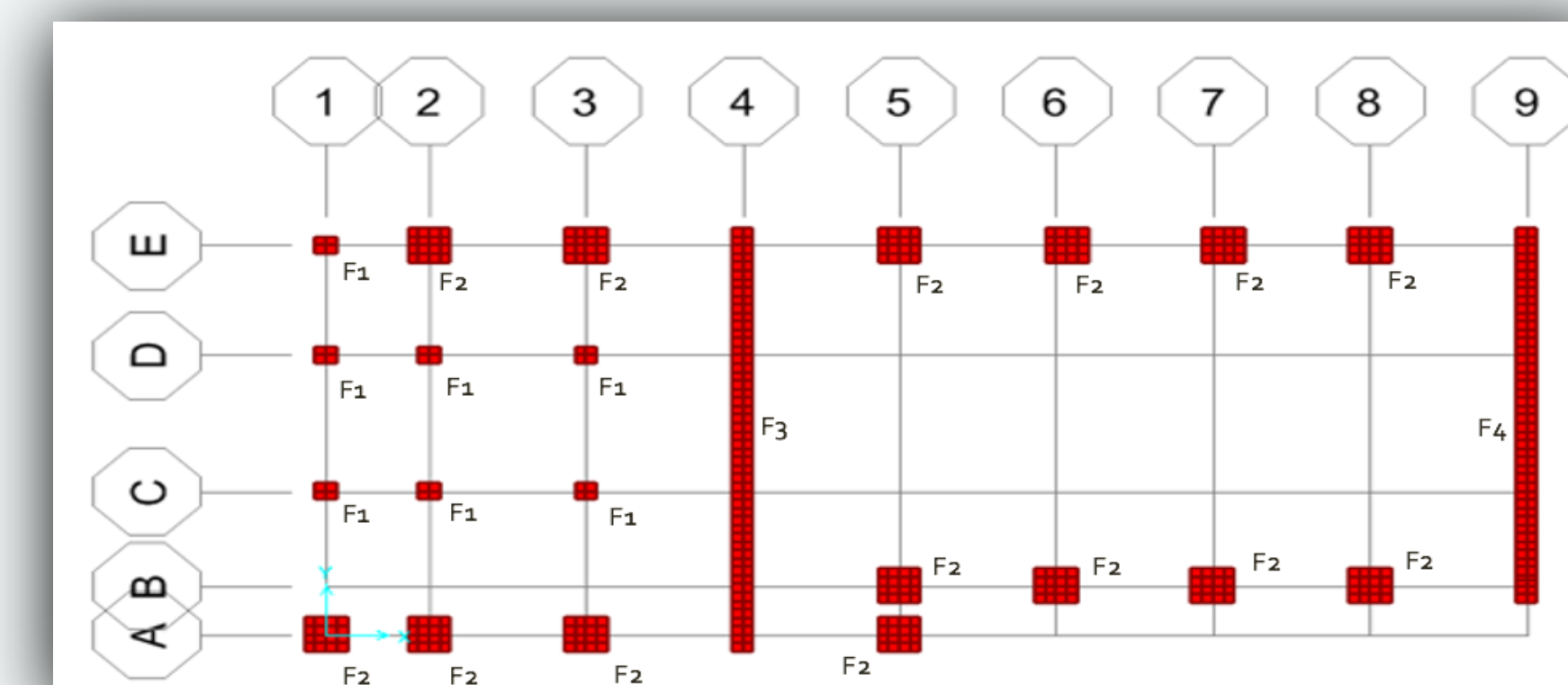


The steel deck was designed as a semi-rigid system. Supporting trusses were designed using 3 m spanning 20 m using Canam selection tables for the garage area and 1 m for the office area.

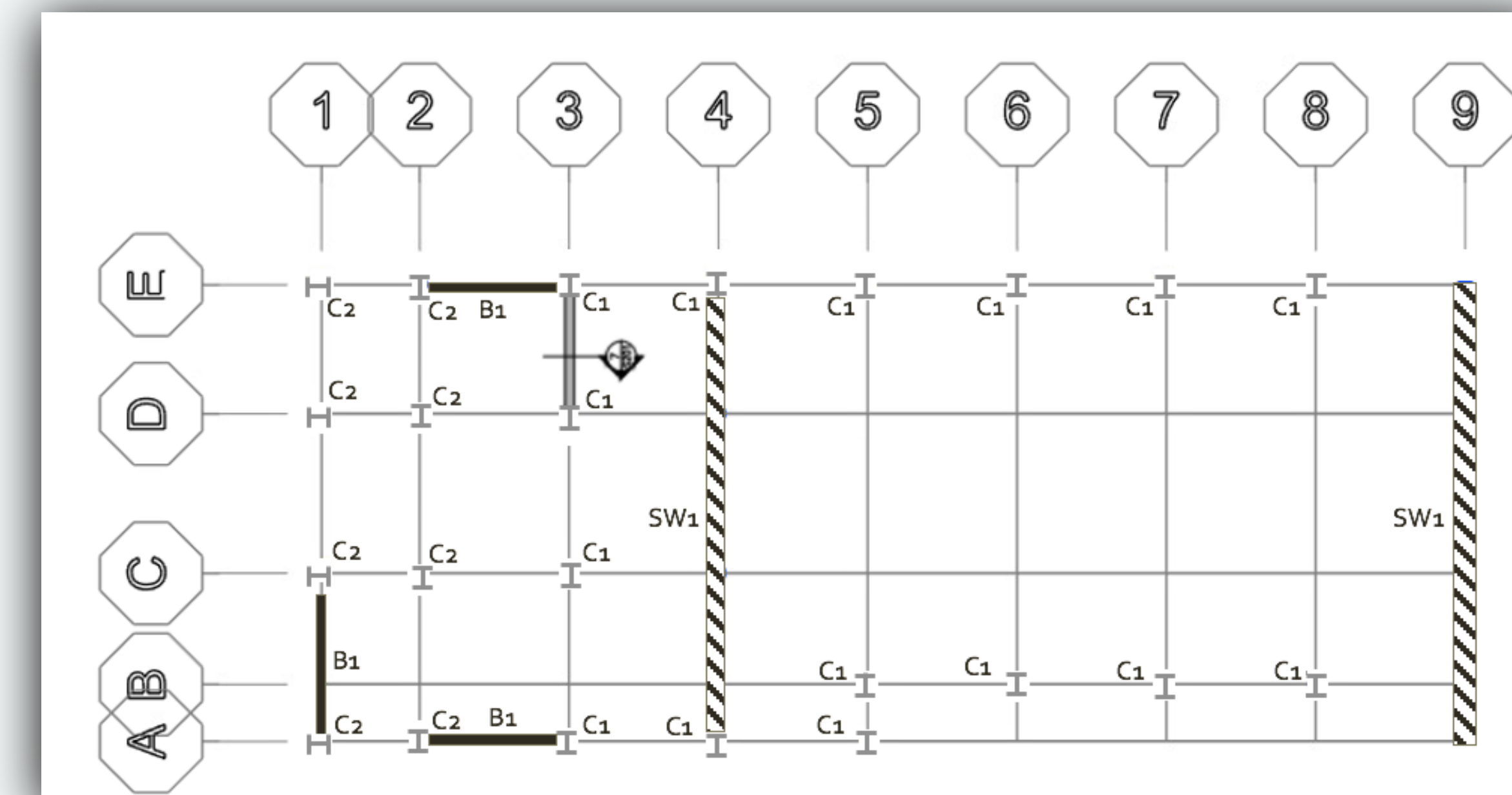
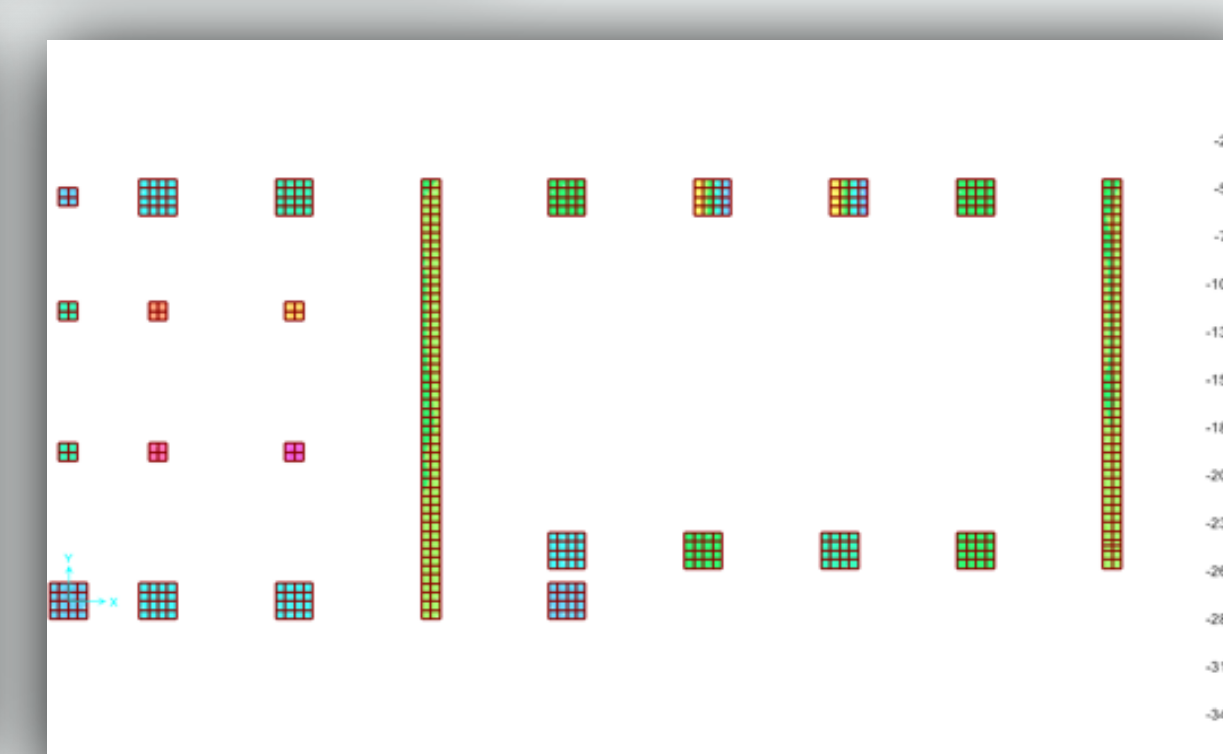
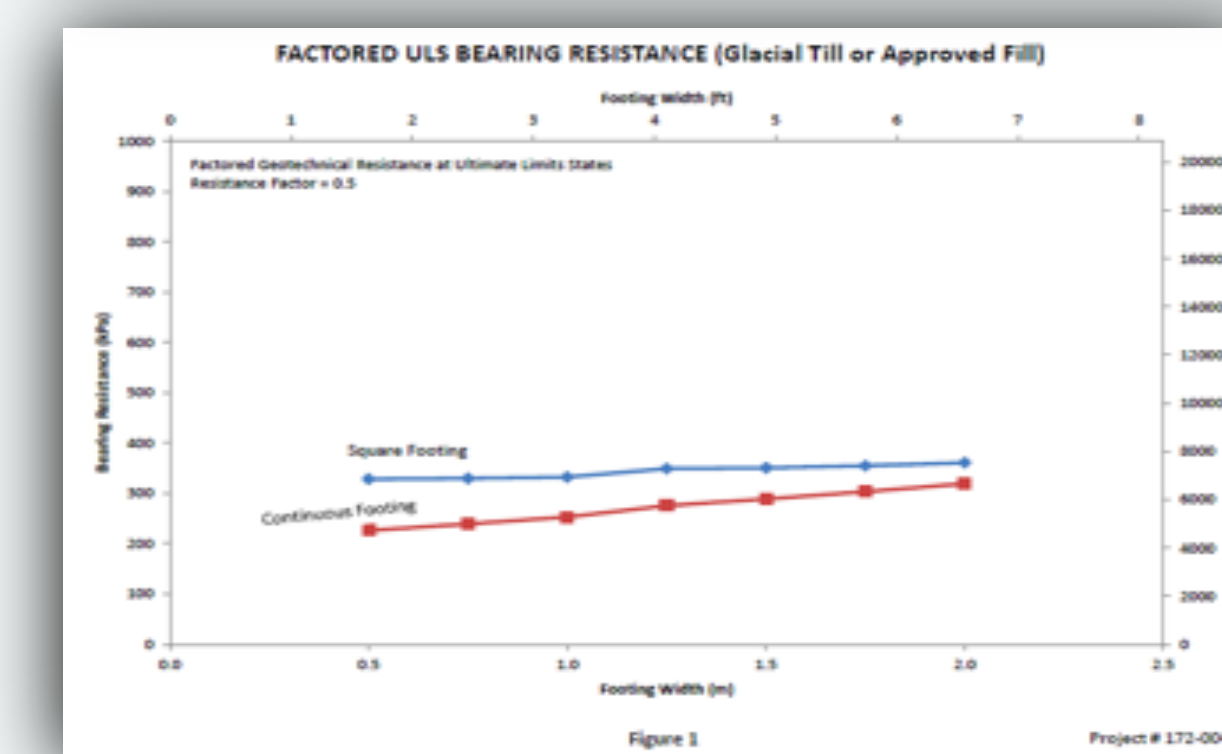
Lateral Load Resisting System



Foundation



Footing Schedule
F1: 1m x 1m
F2: 2m x 2m
F3: 1m x 24 m
F4: 1m x 21 m

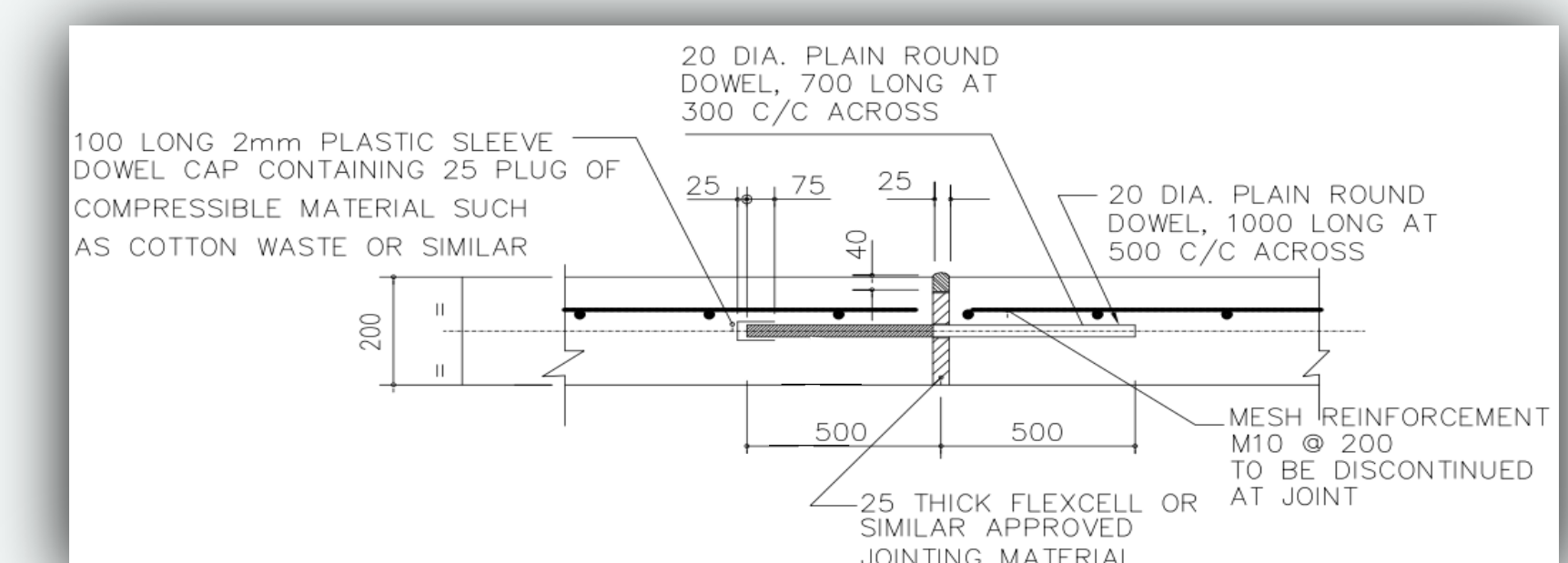


Braced Frame Schedule
B1: HSS 178x9.5

Shear wall Schedule
SW1: 190mm thick, reinforced
SW2: 190mm thick, unreinforced

Column Schedule
C1: W410x149
C2: W250x89

Slab-on-grade



Cost Estimate

Class A Cost Estimation	Cost
Earthwork (Excavation/Fill)	\$5000
Concrete (Material/Formwork/Finish)	\$17200
Structural Steel (Beams/Columns/Joists, etc.)	\$1785799
Reinforced Steel (Deck/Abutment)	\$28824
Other (Design, management, etc.)	\$500000
Total	\$2336820
Contingency (10%)	\$233682
Mobilization (10%)	\$233682
Inflation (5%)	\$116841
Final Estimation	\$2920000

Conclusion and Recommendations

The design of the Hebville Mechanical Branch was presented to meet all client considerations while maintaining the approved budget. In addition to having a structure that is suitable in resisting all forces, considerations to sustainability and environmental impacts was also considered. The team researched various methods that could be implemented such as material selection, managing the site for improved environment, energy efficient light sources, photovoltaic solar panels and computerized controls.

References

- CANAM Cladding products, CANAM Murox®, 2012
- CANAM Joist and Joist Girders, A division of Canam Group
- CANAM Steel Deck, A division of Canam Group