Delivering Efficient Engineered Wood and Hybrid Structures

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Presentation outline

- Outline opportunities as well as the challenges in the construction of modern timber structures; Show how combining materials and systems may allow cost effective approaches and use materials to their best advantage.
- Discuss the impact on schedule when design and constructability is well thought out collaboratively…..Discuss expectations and realities of the market in B.C. and across Canada.

PRESENTATION
PART 1

Reference Projects

“Four projects made from prefabricated components”

1. **Group Practice Medical Centre, Brüggen, Germany (2013-2014)**
2. **Van Kam Freight Ways, Transport Terminal, Kelowna, British Columbia (2013)**
3. **Earl Grey Elementary School, Temporary Gymnasium, Calgary, Alberta (2014)**
4. **Martensville Athletic Pavilion , Martensville, Saskatchewan (2013-2014)**

DESIGN PROCESS FOR STARTING A PROJECT

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- **Project Team Collaboration , Lessons learned from Europe**

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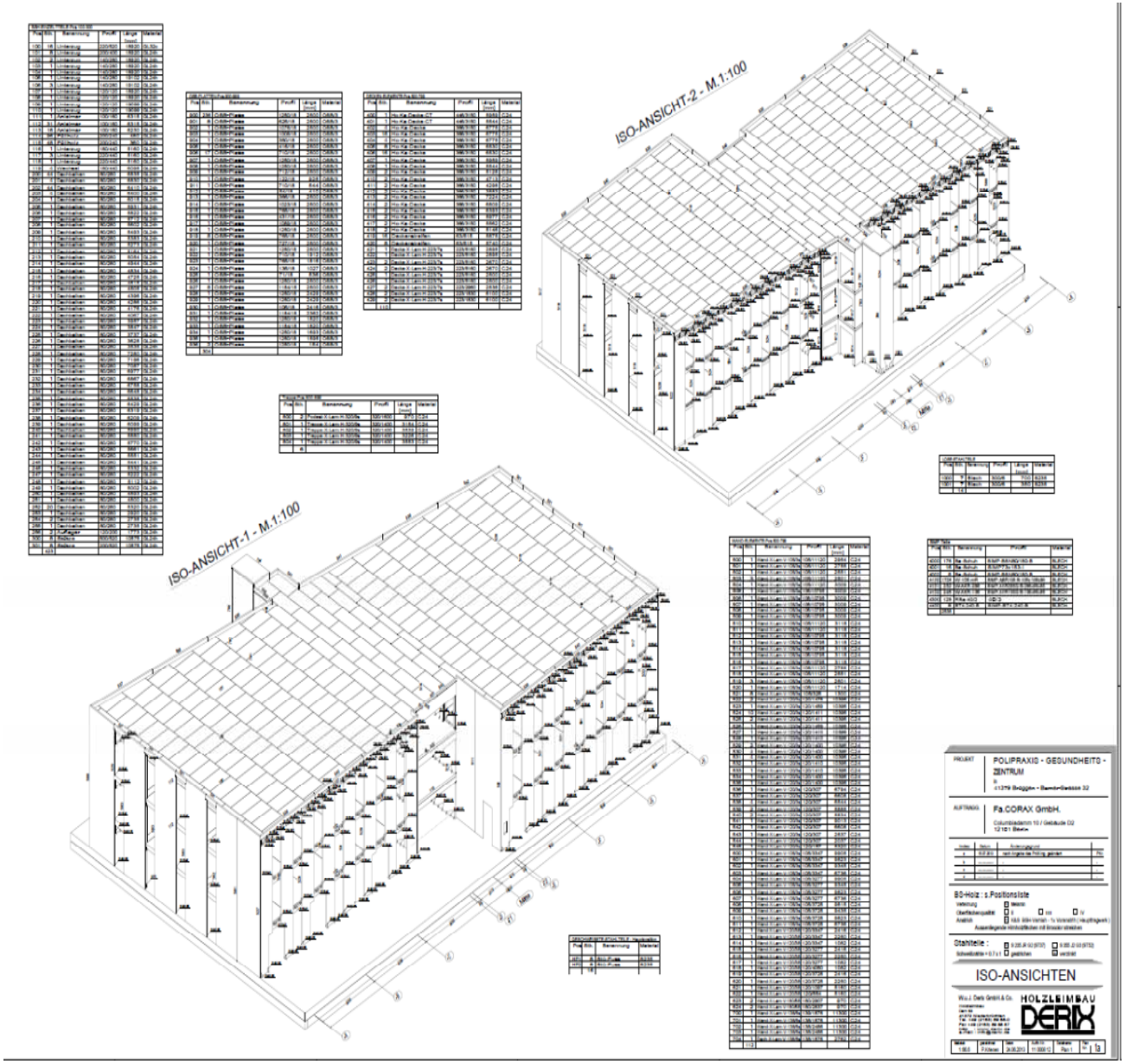
- Things to consider when choosing the best system

- Budget, Completion Date, Location & Workforce, Functionality, Climate, Soils, Structural and Sustainable materials

Group Practice Medical Centre, Brüggen, Germany (2013-2014)



Project Stats

Useable surface:

3 levels each 765 m² = 2.295 m²

Staircase each 123 m² = 369 m²

2,664 m²

28,675

Sq.ft

Wood volumes:

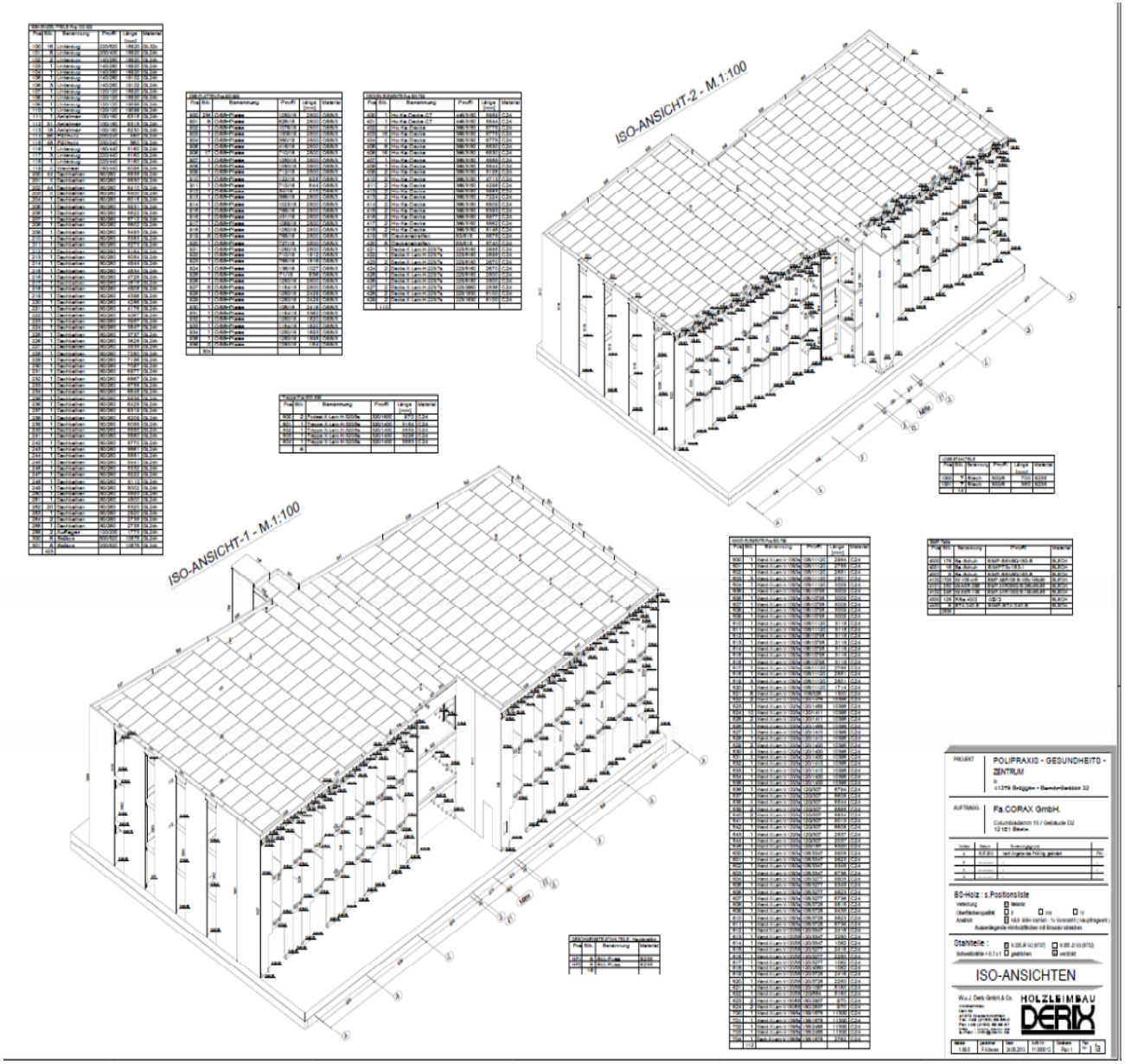
Glulam: 120 m³

X-lam walls: 230 m³

X-Lam floors: 240 m³

Total 590 m³

Group Practice Medical Centre, Brüggen, Germany (2013-2014)



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Reasons for choice of building systems.

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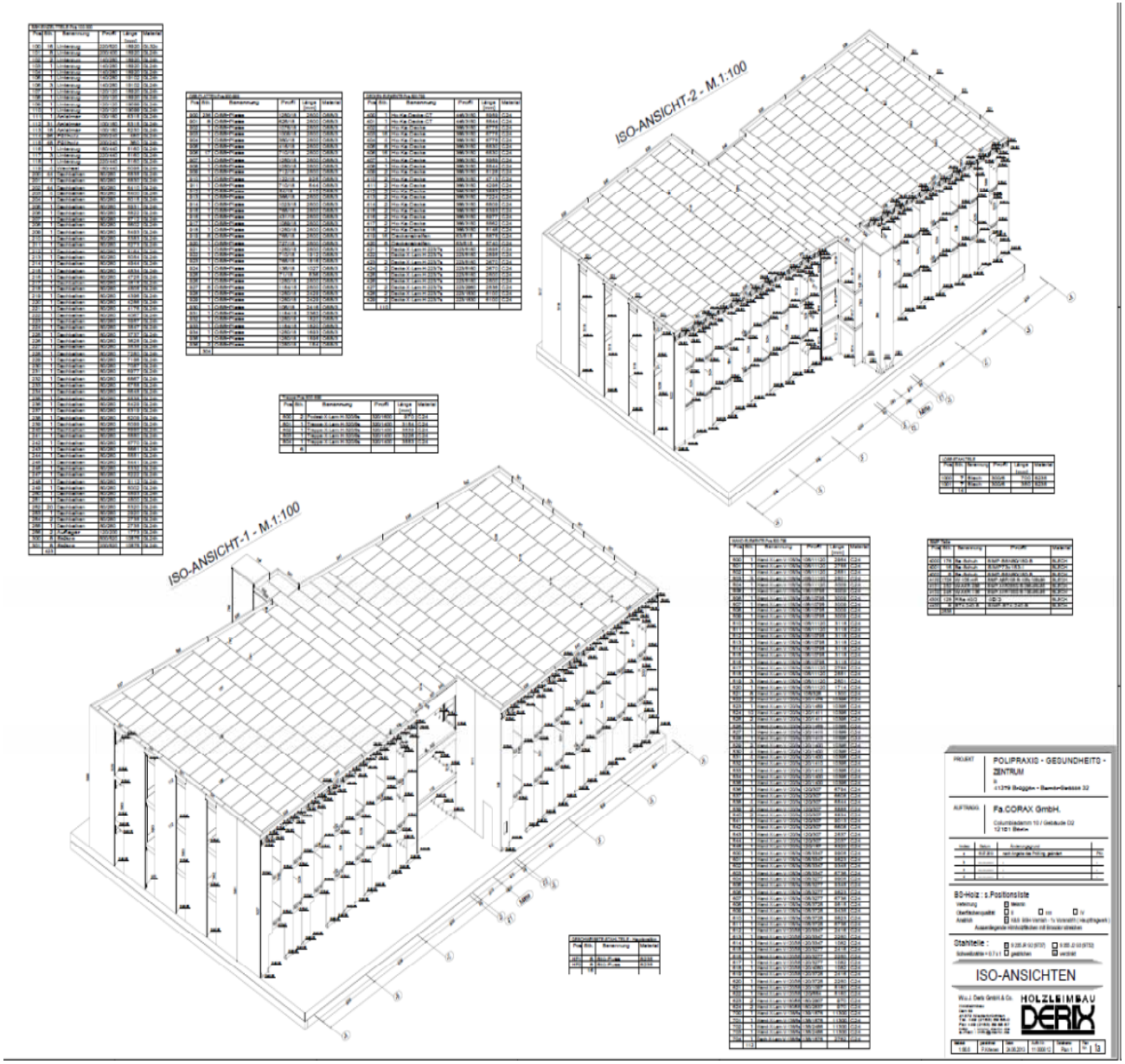

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Reasons for choice of building systems.

- Wood, for sustainability
- Prefab for speed of construction
- 12 weeks from time of order to delivered to site

Construction time for Shell, 4 weeks, 5 Men

Innovative Wood Component's

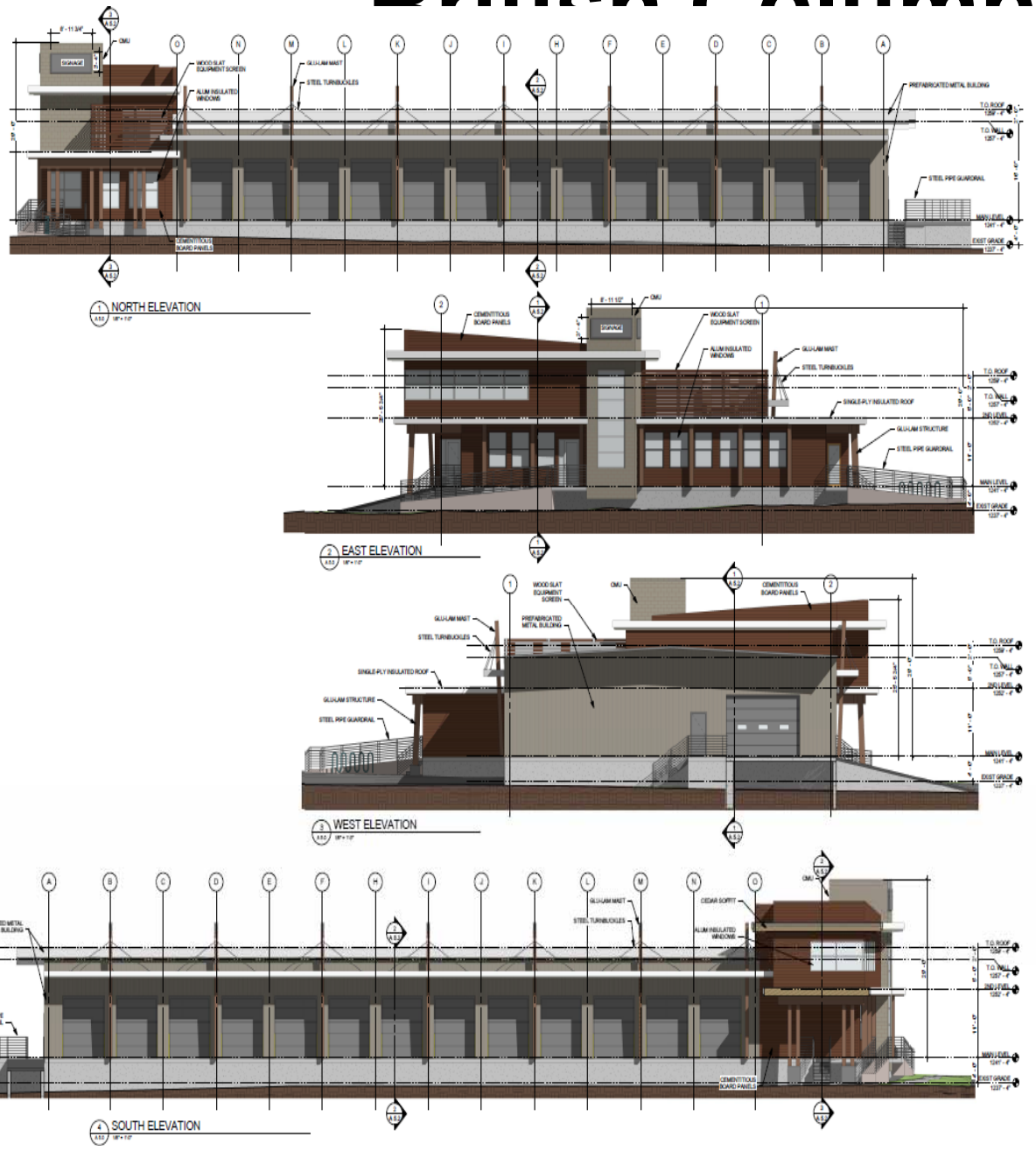
3 Level Post and Beam interior frame

3 Level X-Lam walls 10.795m tall. Assembled on sawhorses then tilted into place

Hollow Box floor system 7.5m span, 40cm thick

Prefabbed elements for faster installation

Van Kam Freight Ways, Kelowna, British Columbia



Project Stats

Useable surface:

Warehouse 9 55 m²

Two level office 319 m²

1, 274 m²

13,713 Sq.ft

Solid Wood volumes:

Glulam: 45.9 m³

X-Lam floors & Walls: 58.2 m³

Total 104.1 m³

S.I.Ps Volume 686.0m²

Building Component's

Glulam Columns, Beams and wood soffits.
Architectural for Development permit.

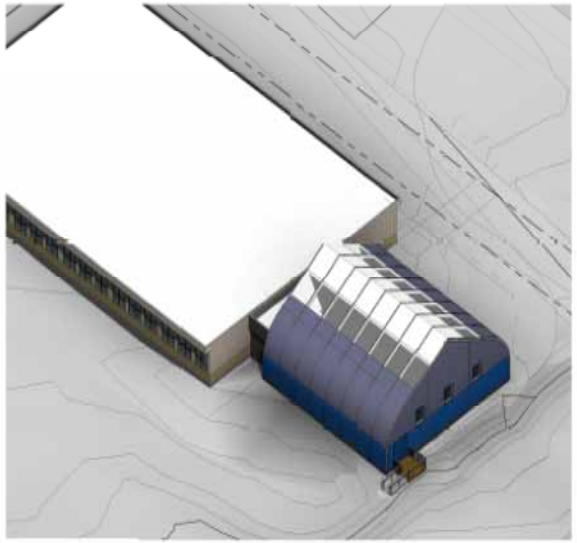
S.I.P.s (Structural Insulated Panels)
for high R-Value and speed of construction

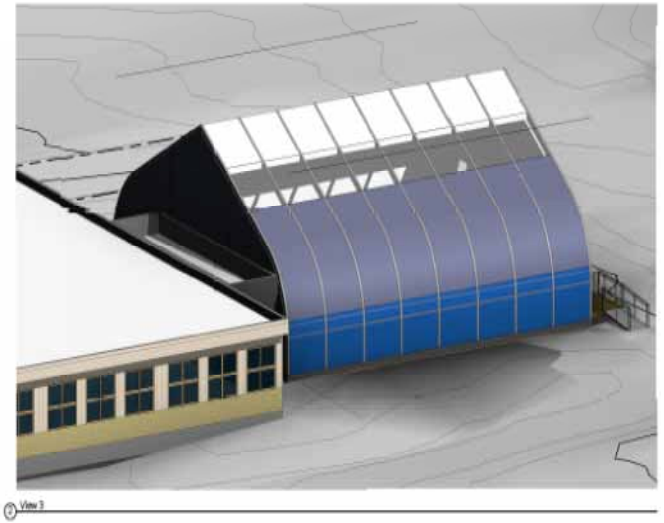
Pre Engineer Steel Building for clear span and budget

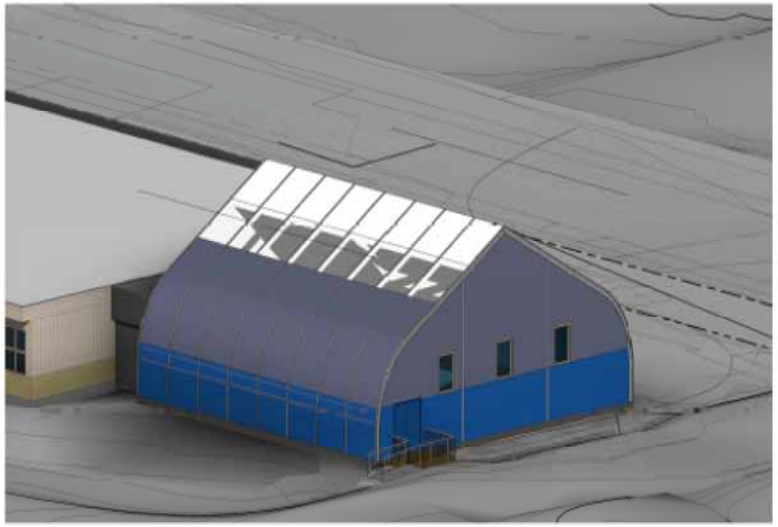
CLT (Cross Laminated Timber)
for Shear walls and speed of construction. Used for floor/ceilings in office area save time and money

Construction time for Shell, 4.5 weeks

Earl Grey Elementary School, Temporary Gymnasium, Calgary, Alberta







Project Stats

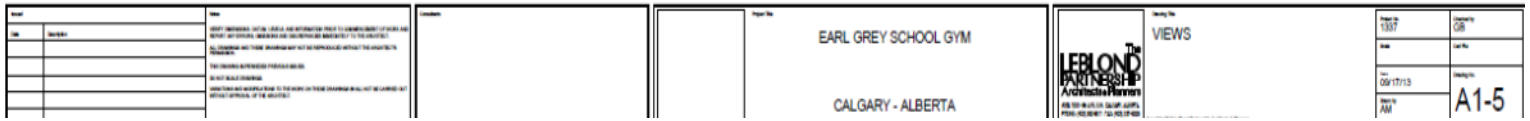
Useable surface:
Gymnasium and Connecting corridor
396.3m²

4,266 Sq.ft

Wood volumes:
LVL Beams 20.0 m³

S.I.Ps Volume
492.5m²

Screw piles 69 - 1.83m long



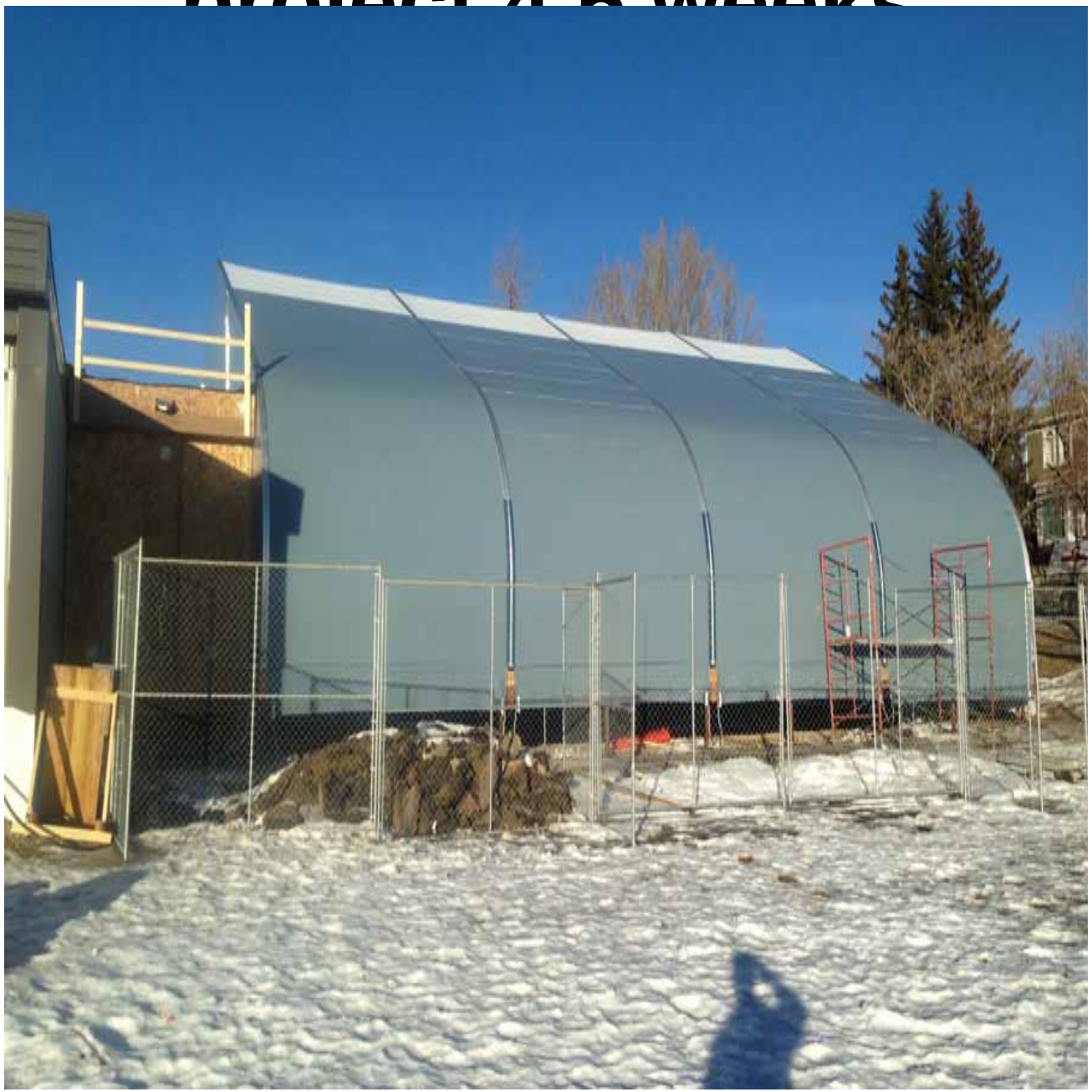
Building Component's

Screw Piles and LVL beams
Piles temporary foundation that can be easily removed. LVL to support SIPs floor. All pre cut for quick installation.

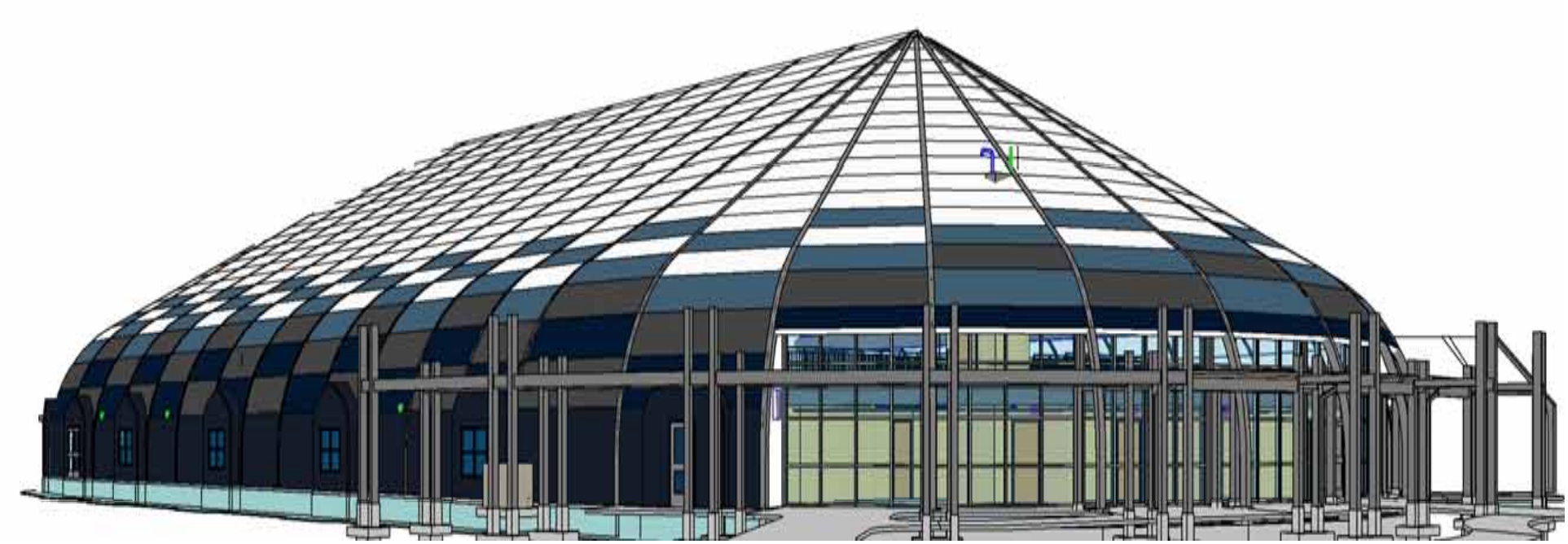
SIPs floor and walls
Elevated floor needed to be insulated SIPs best speed and cost option.

Sprung, Stressed Membrane Structure
Light weight, reusable, very high R-Value
Quick installation

Construction time for entire project 4.5 weeks

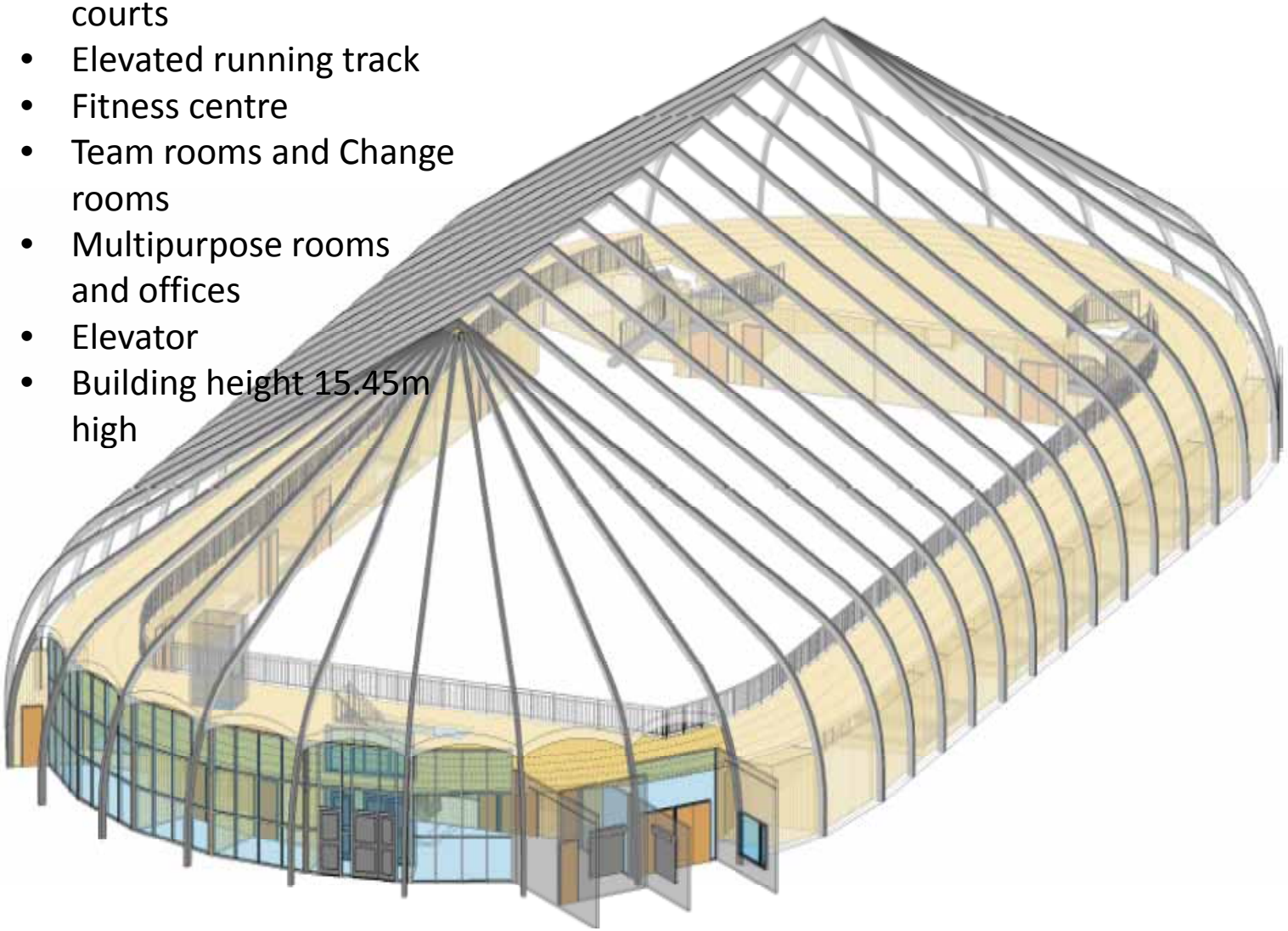


Martensville Athletic Pavilion , Martensville, Saskatchewan



Project Description

- Two level sports complex
- Three full size basketball courts
- Elevated running track
- Fitness centre
- Team rooms and Change rooms
- Multipurpose rooms and offices
- Elevator
- Building height 15.45m high



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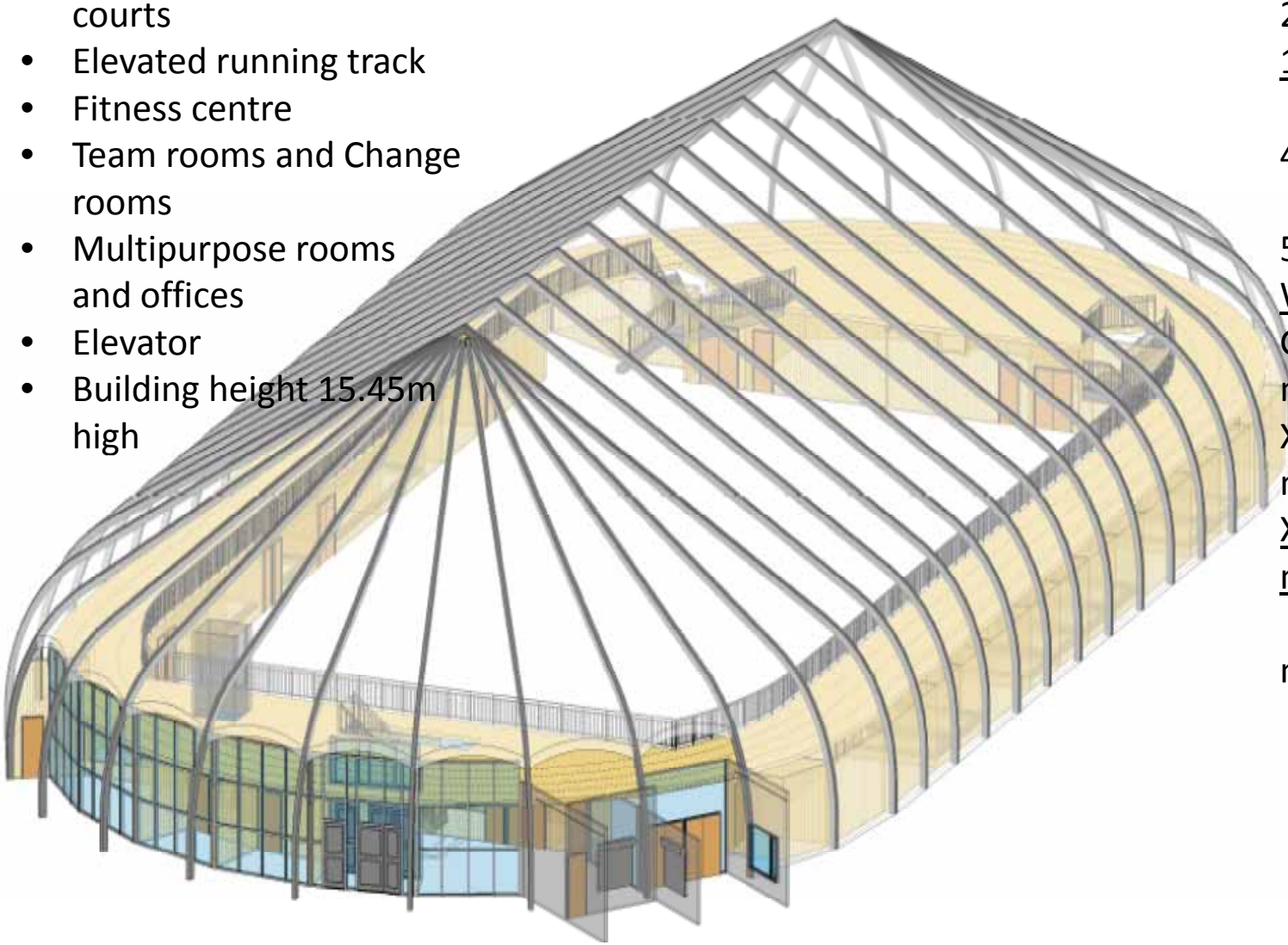


Project Stats

Useable surface:
Main floor = 3,342.0 m²
2nd floor = 1,366.3 m²
Total area 4,708.3 m²

50,679 Sq.ft
Wood volumes:
Glulam: 39.1 m³
X-lam walls: 234.4 m³
X-Lam floors: 232.4 m³
Total 505.9 m³

Building Component's

Sprung, Stressed Membrane Structure for building shell

- Light weight clear span building
- High R-Value up to 60% more efficient than conventional building
- Quick install

X-Lam panels for entire interior structure

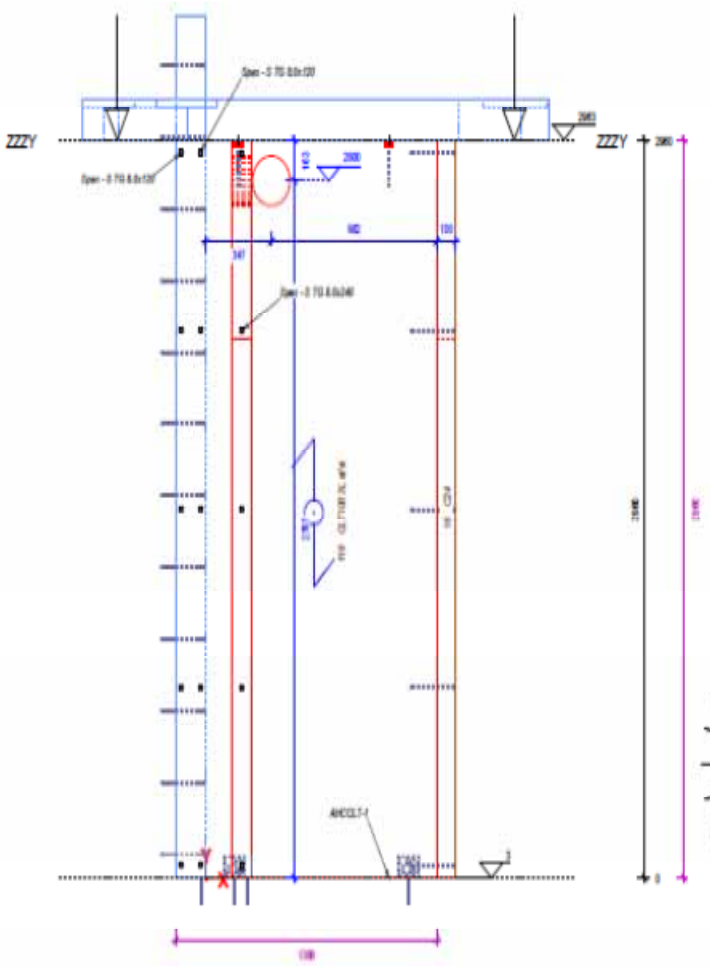
- Light weight and strong compared to other options
- Combined with the Sprung structure we eliminated several hundred concrete piles due to light weight and flexibility
- Everything Pre cut, fixings attached and all

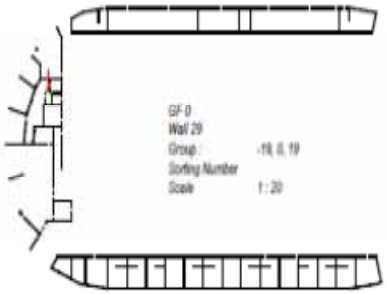
Building Component's

X-Lam panels ready to assemble

- Packaged in order for installation
- Lifting pins installed
- With 3D modeling even the smaller openings can be pre cut

Install drawings with 3D modeling assist with the installation X-Lam parts





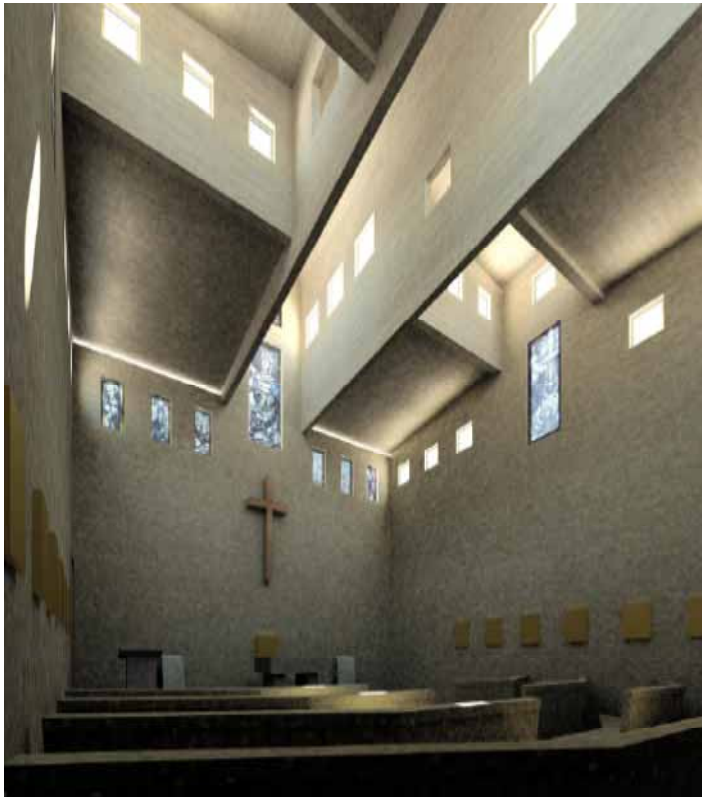
Project: 00913 City of Martensville Field House

Drawing nr.: 143

Layout name: GF Wall 29

Changes / Aenderung / Cambiamento | Date | Name | Date | Drawn

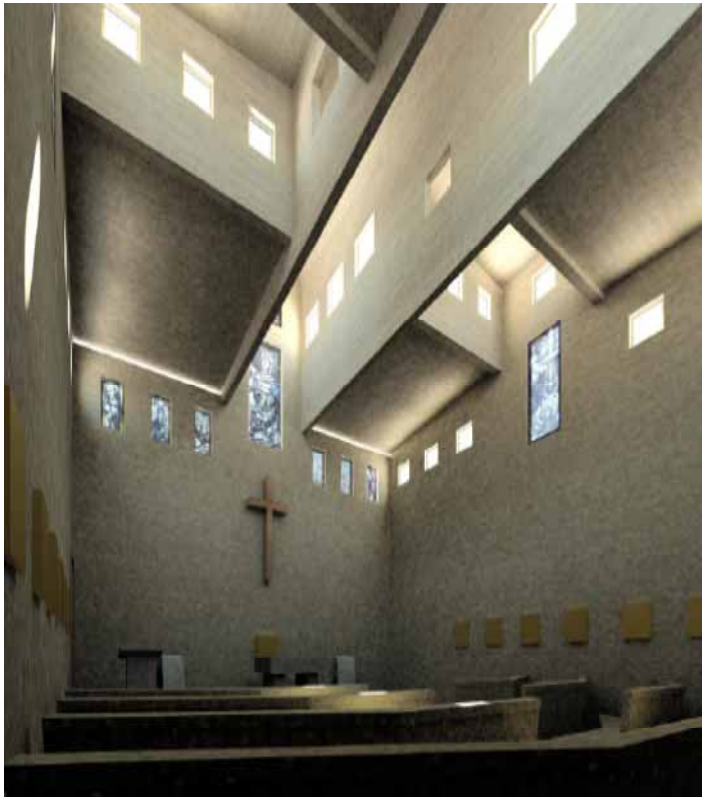
“Sneak peek of several Hybrid Timber projects planned for this year”



Conclusion

Prefabricated hybrid buildings are the future for:

- Speed of construction
- Building in challenging weather conditions across Canada
- Remote locations and challenges around materials and skilled workforce
- Quality control



PRESENTATION
PART 2

PROJE
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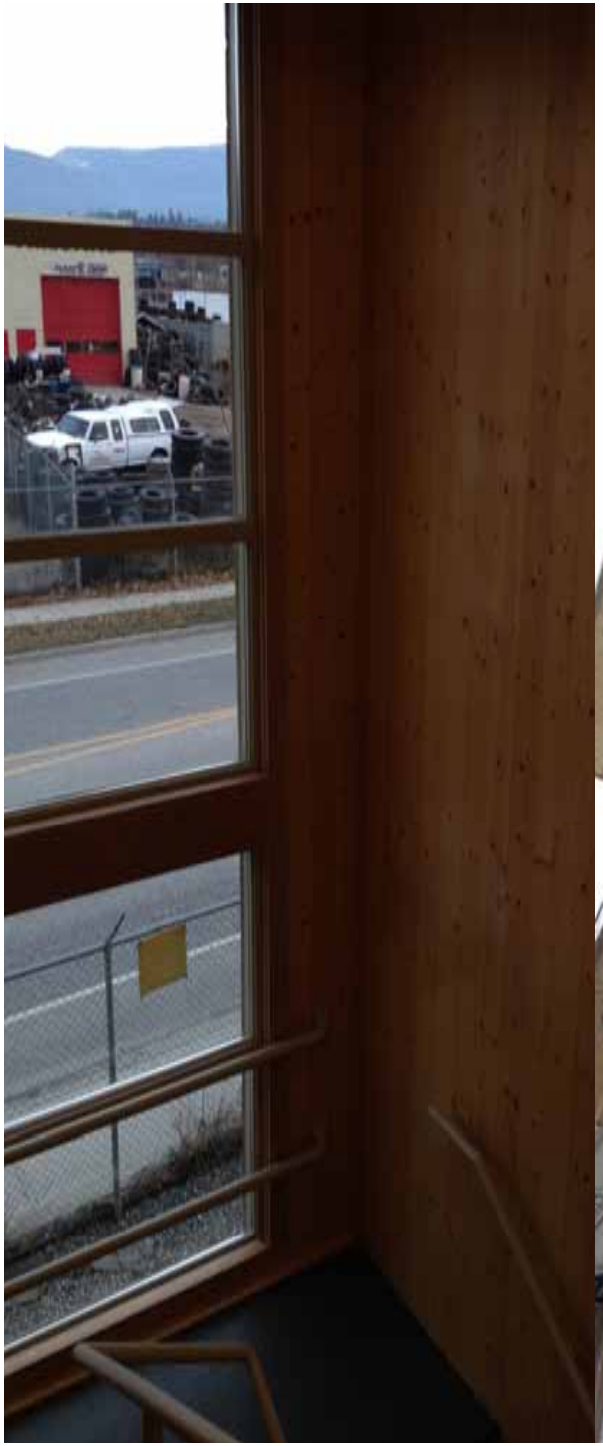
Material Choice | Construction Method | Cost

Site Location | Facility Function


Wood Innovation Design


Elkford Community Centr

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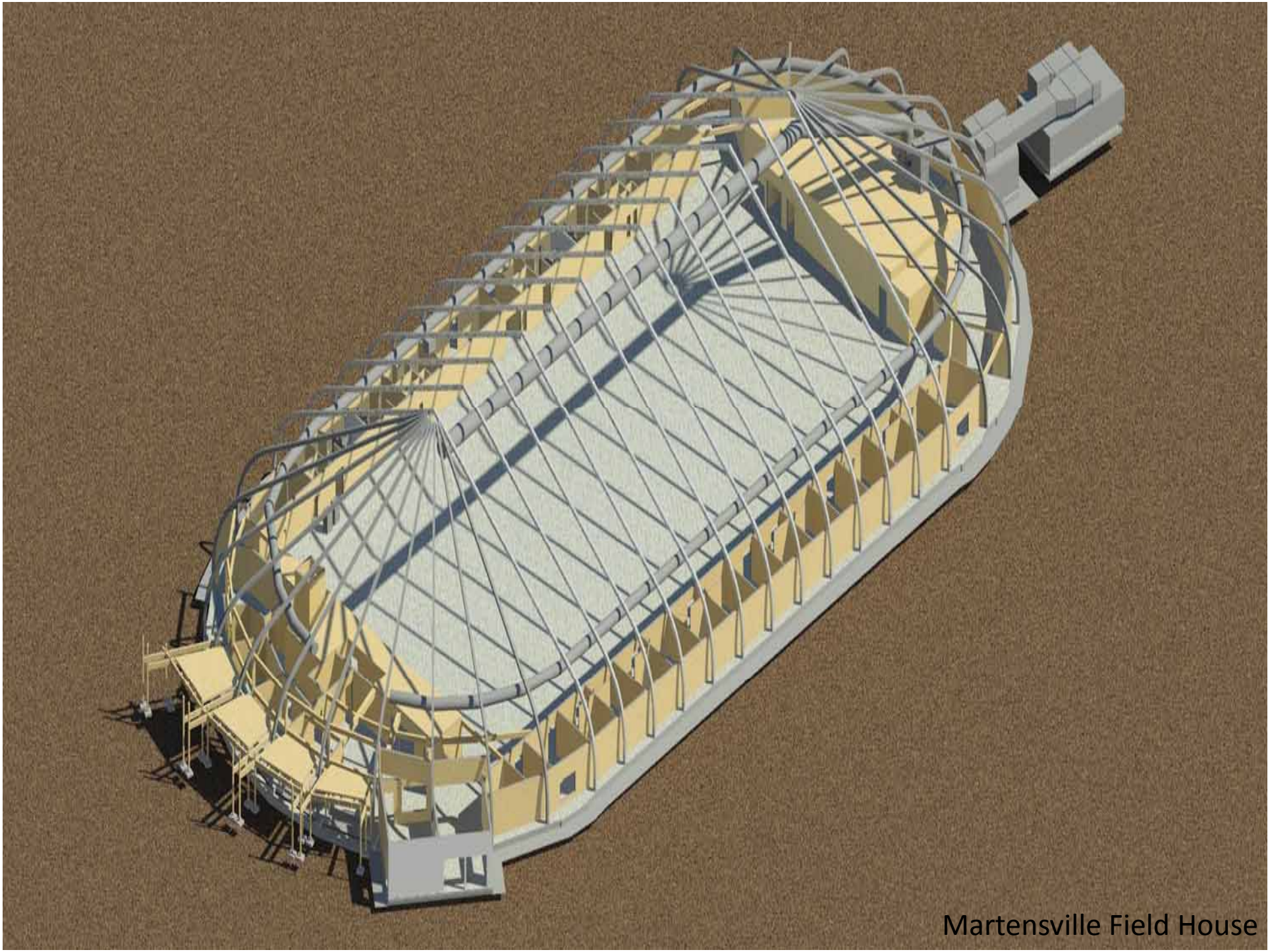
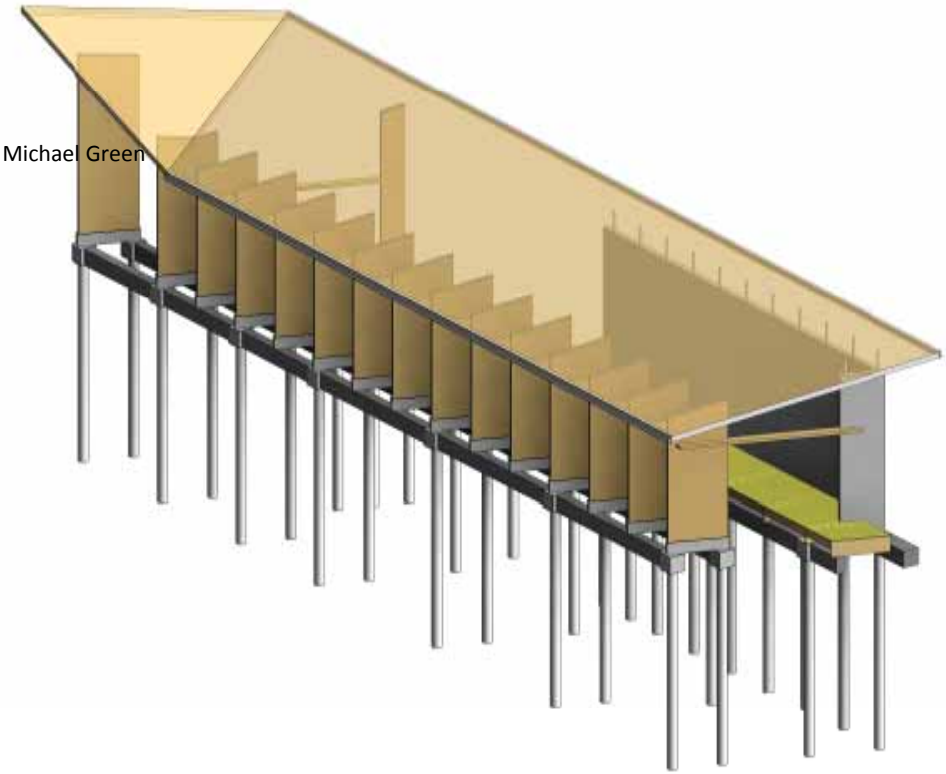


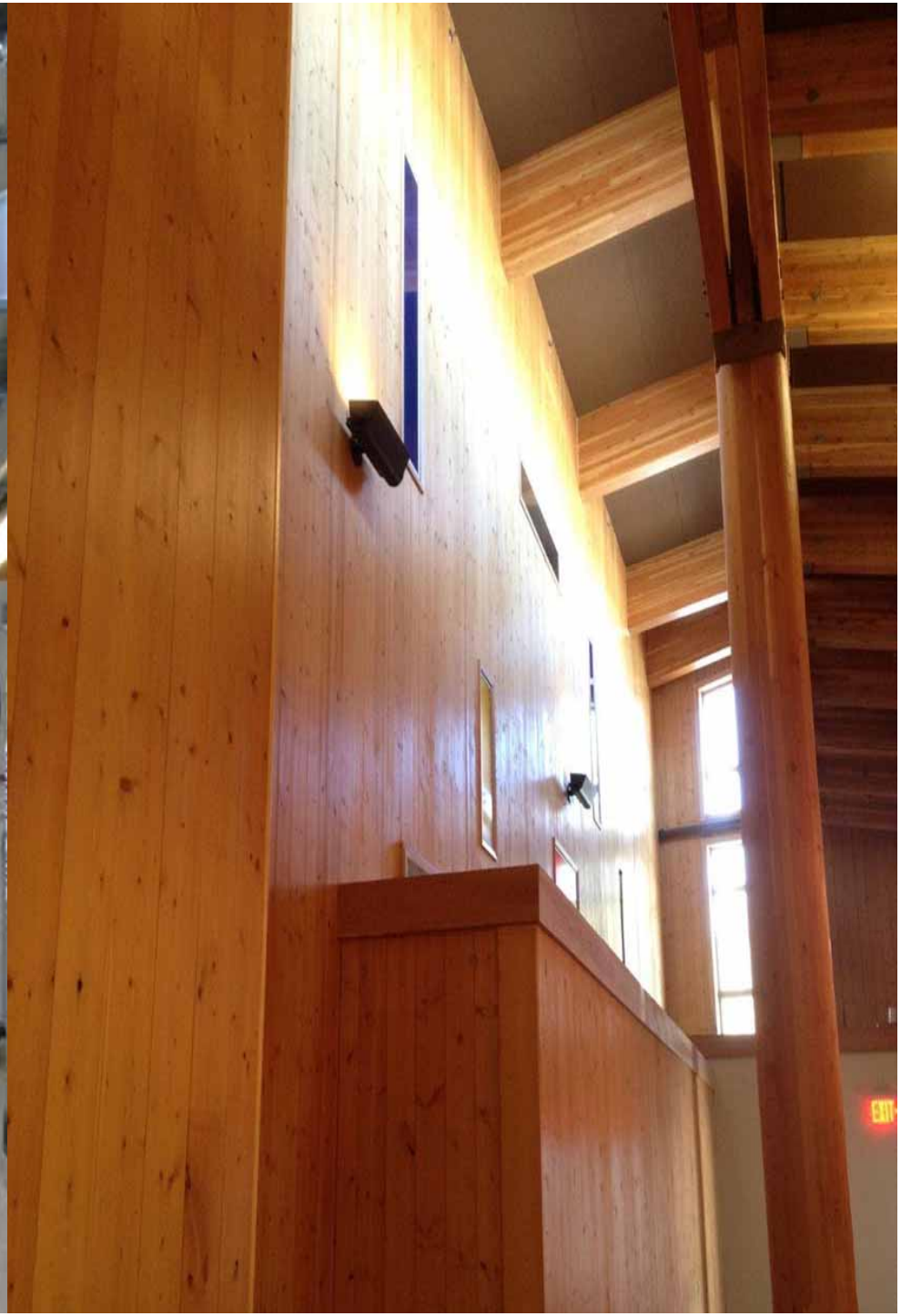
Martensville Field House

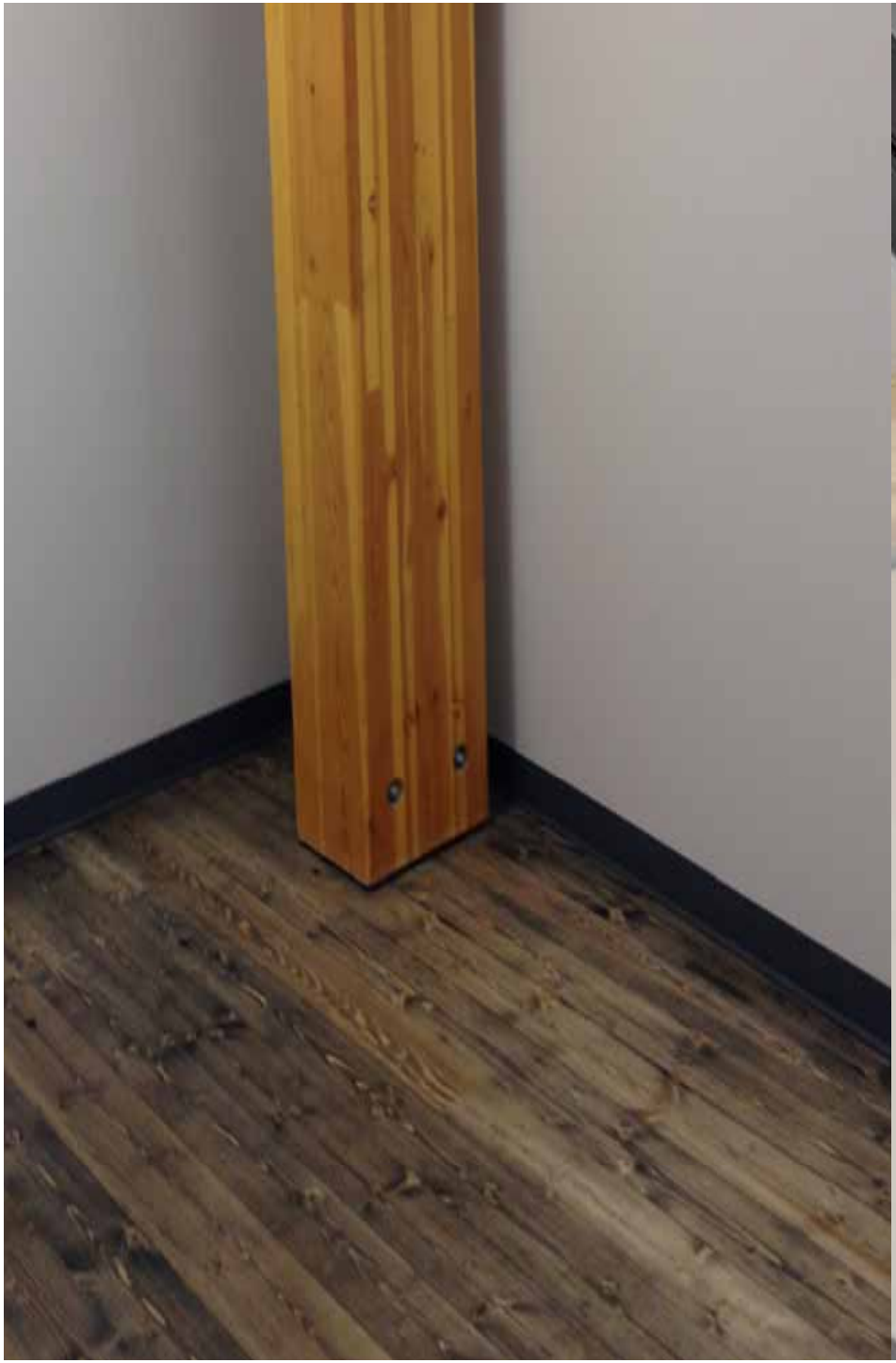
WIDC – Image courtesy of Michael Green

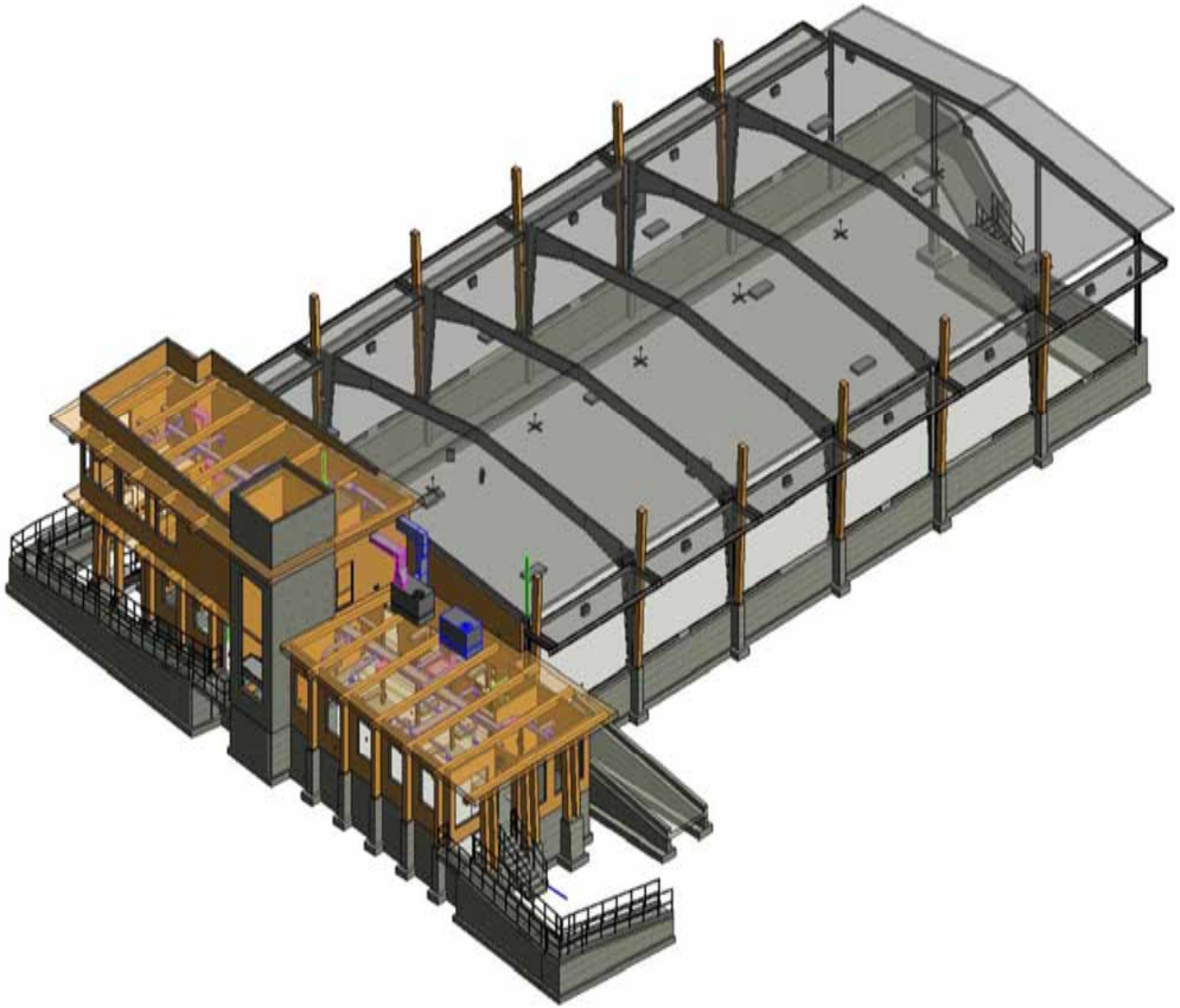


Kinsmen Park Station


SUPPLY
EXHAUST AIR
EXHAUST AIR







Van Kam Freightways

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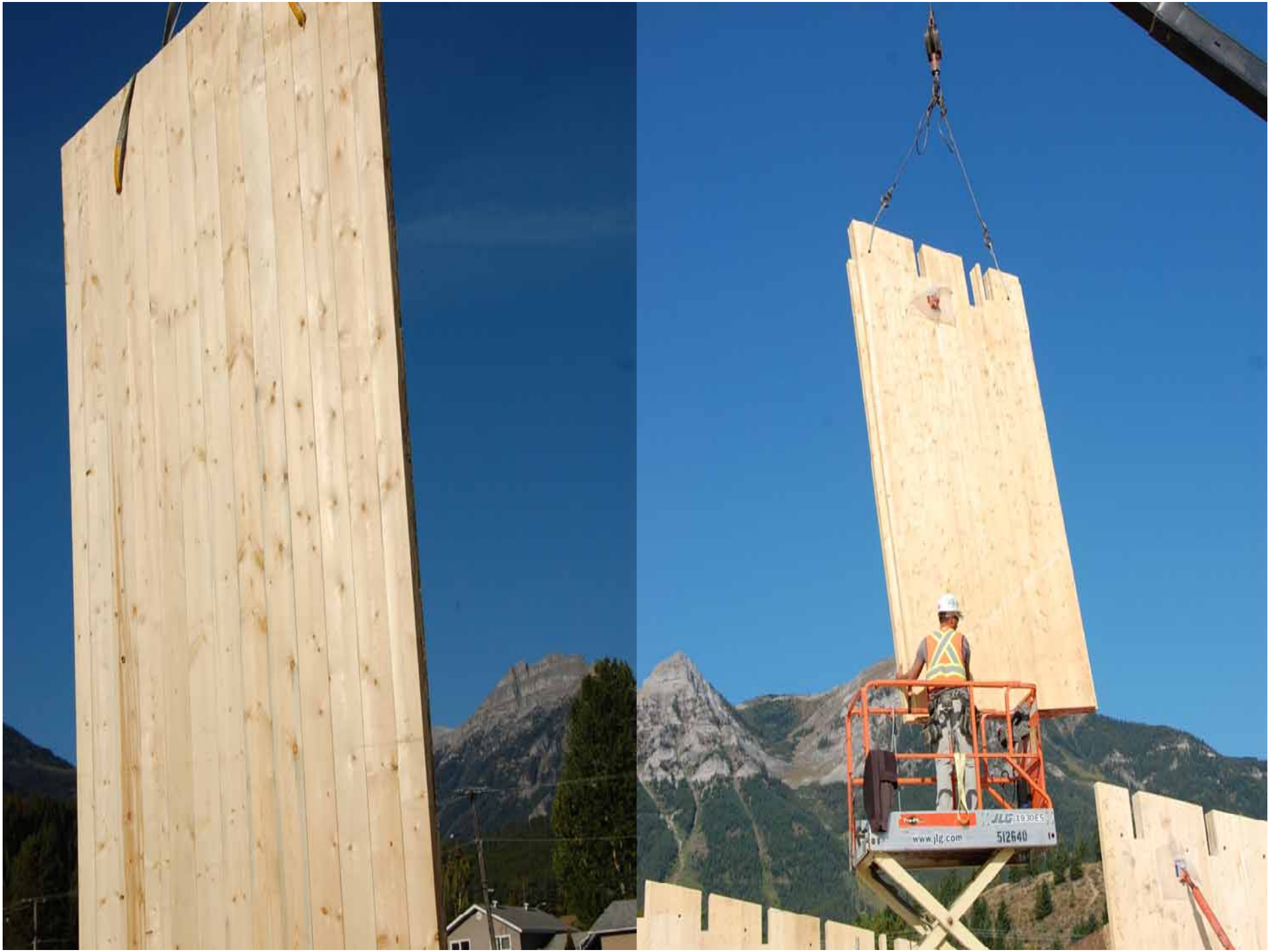
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Wood Innovation Design Ce

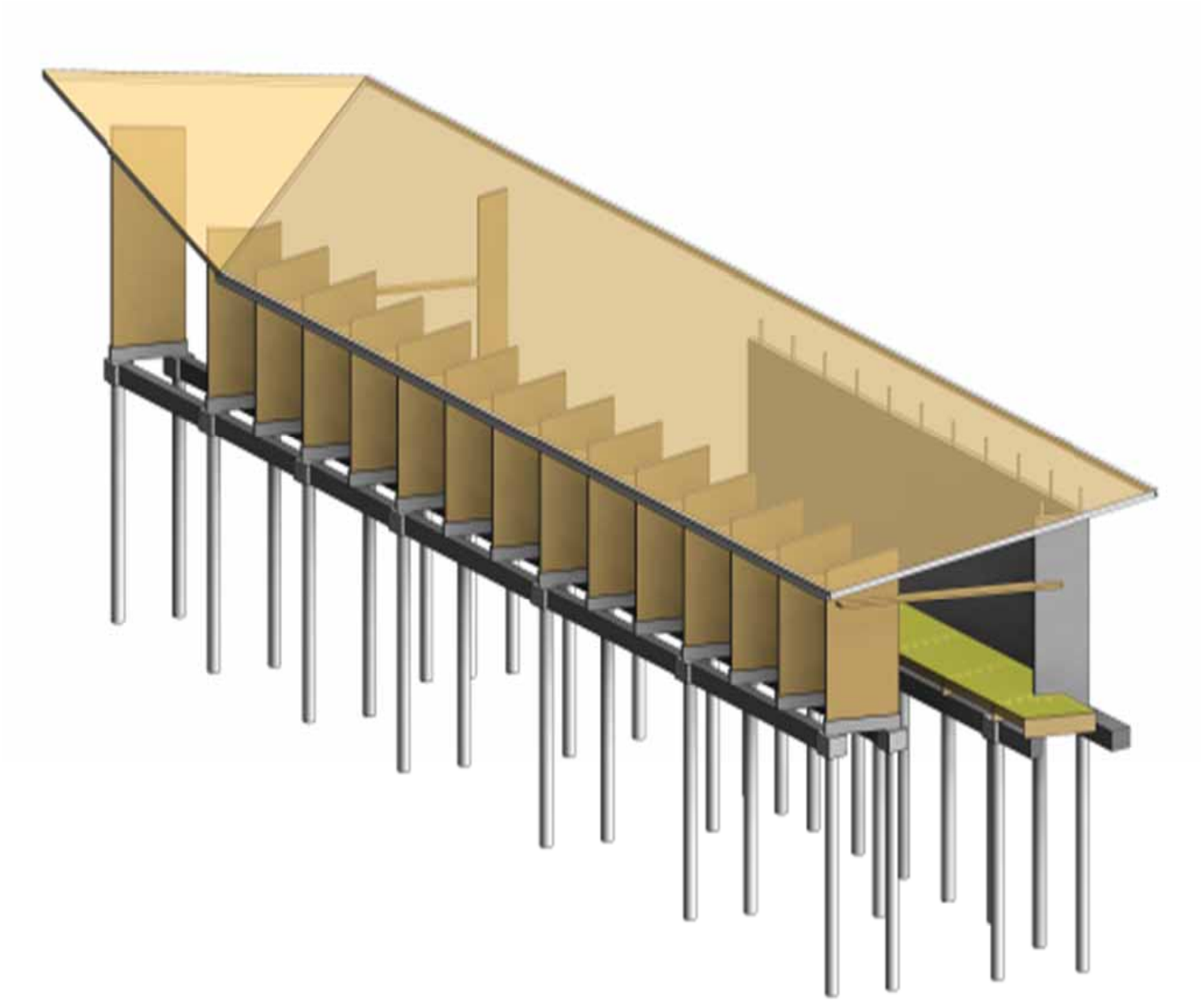
Elkford Community Centre

Elkford Community Centre

Martensville Field House

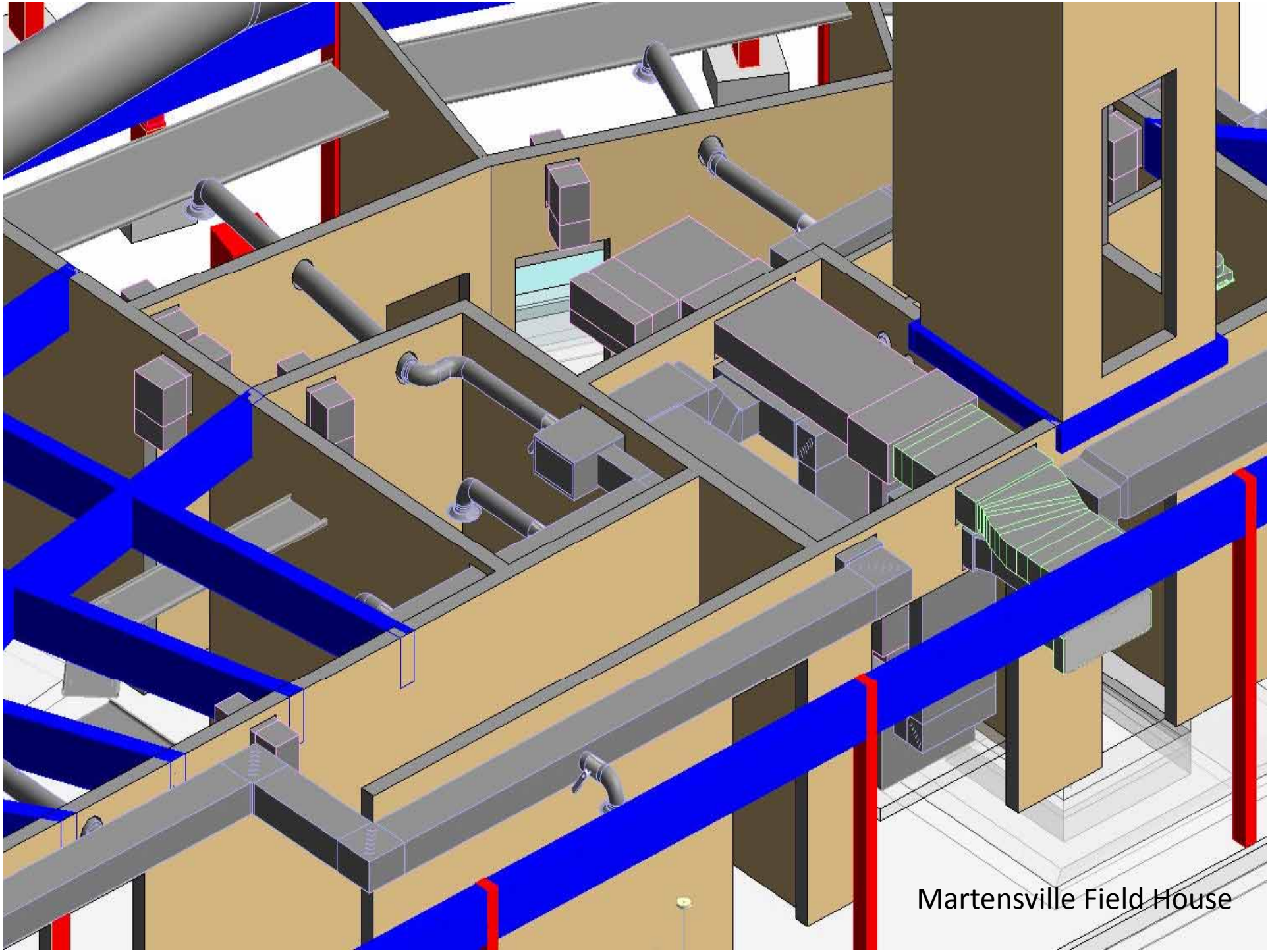
Martensville Field House

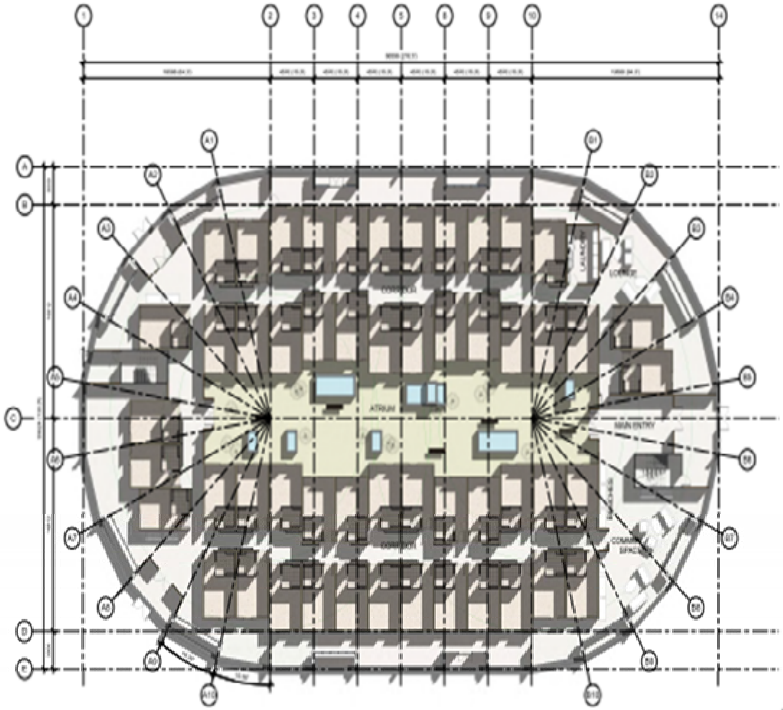
Elkford Community Centre

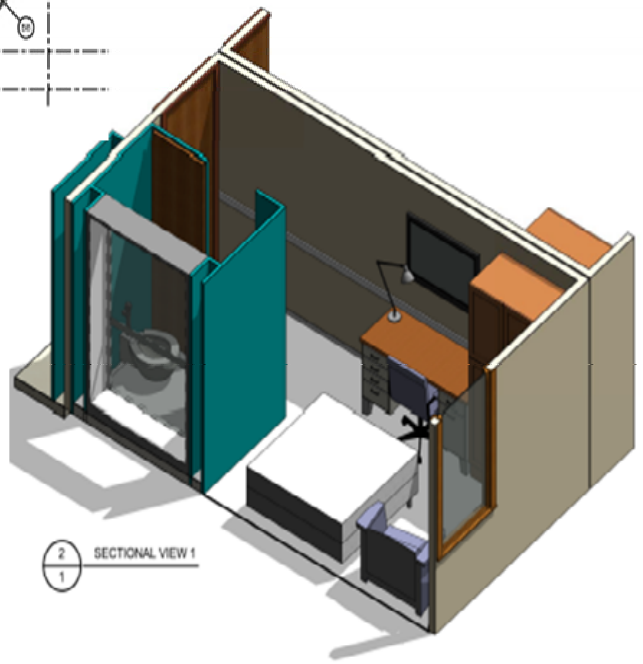


Kinsmen Park Train Station


Wood Innovation Design Ce


Martensville Field House





2
1 SECTIONAL VIEW 1

Floor Plate

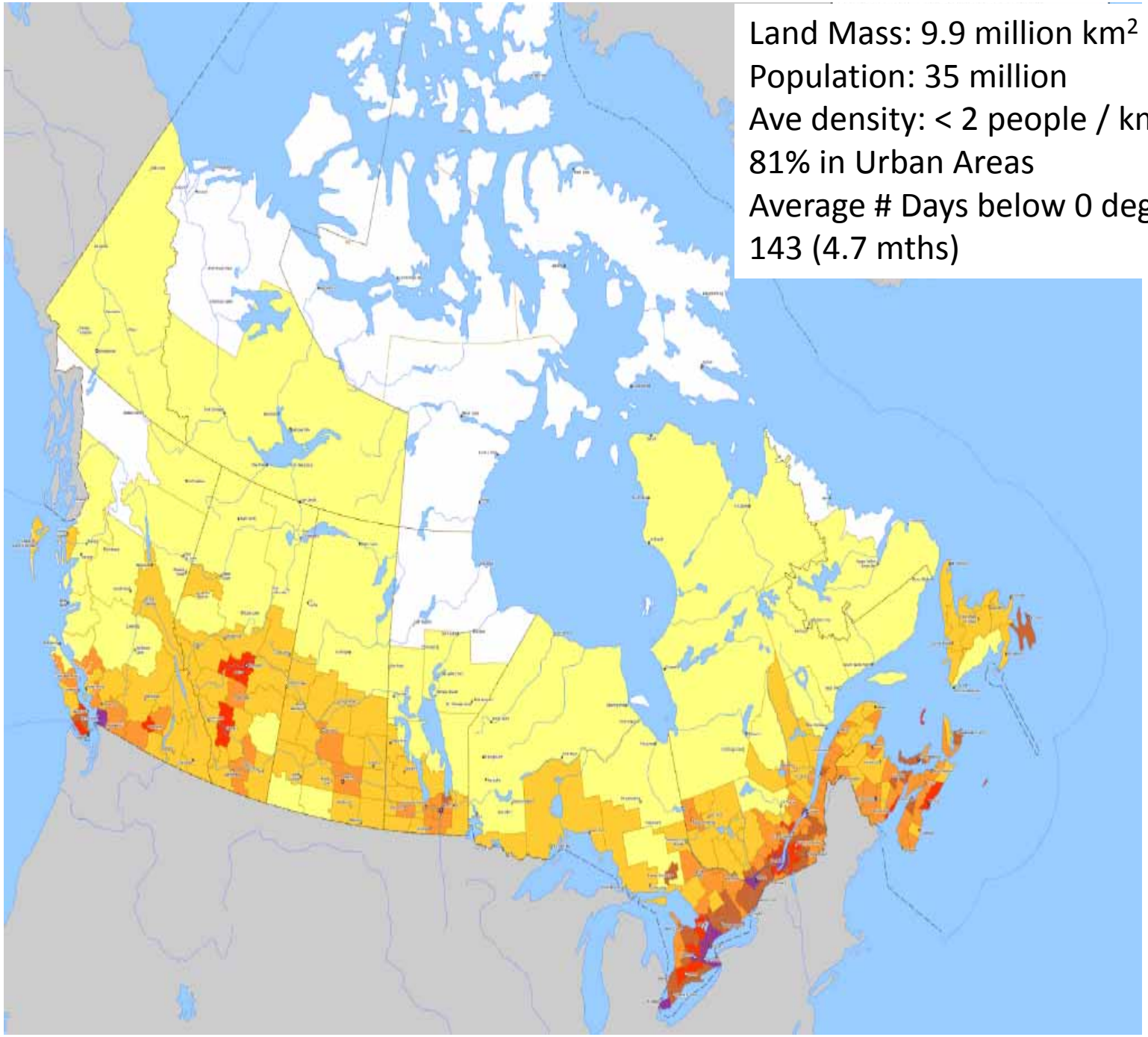
Core

Shear Wall

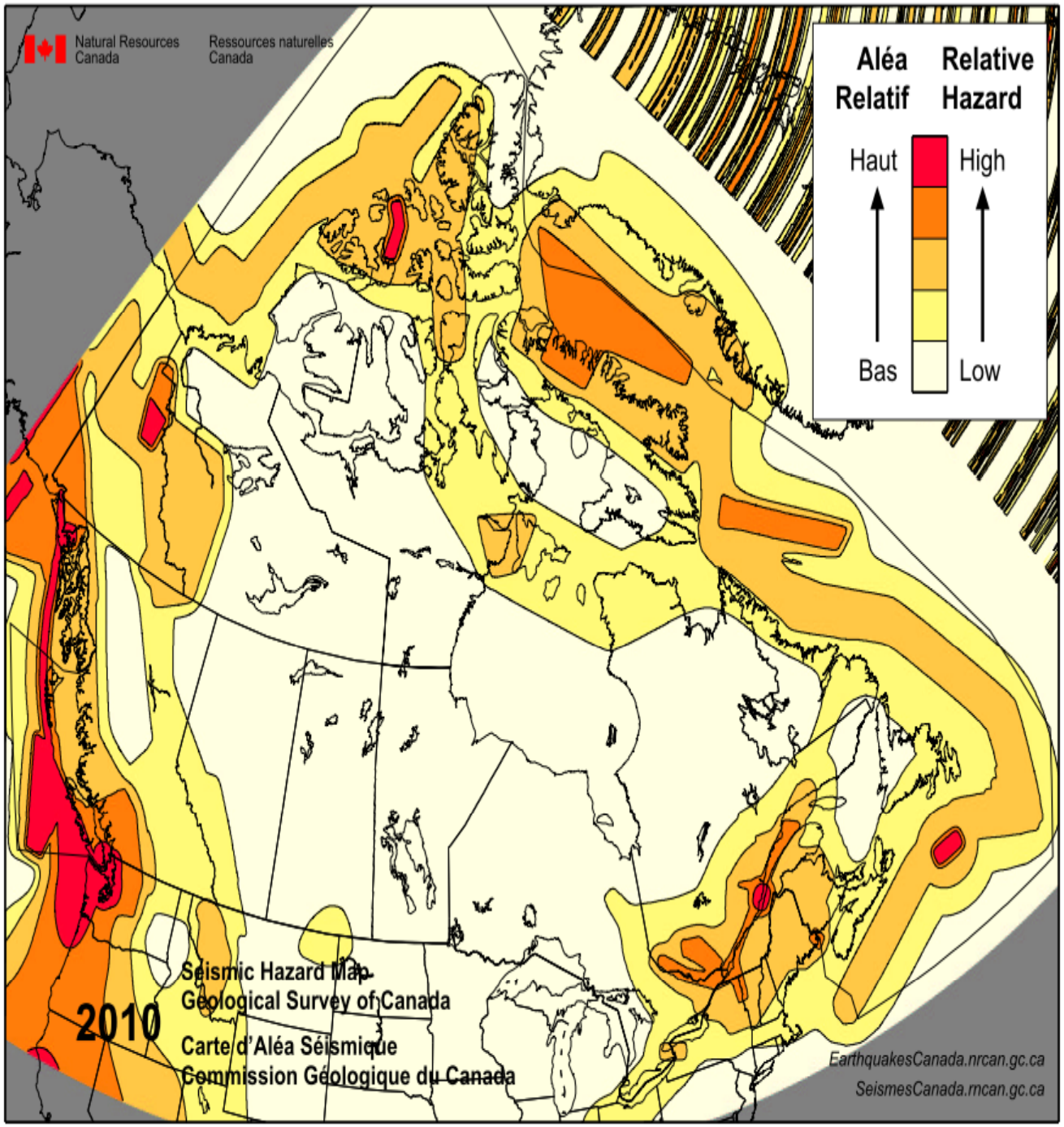
Base Ductility

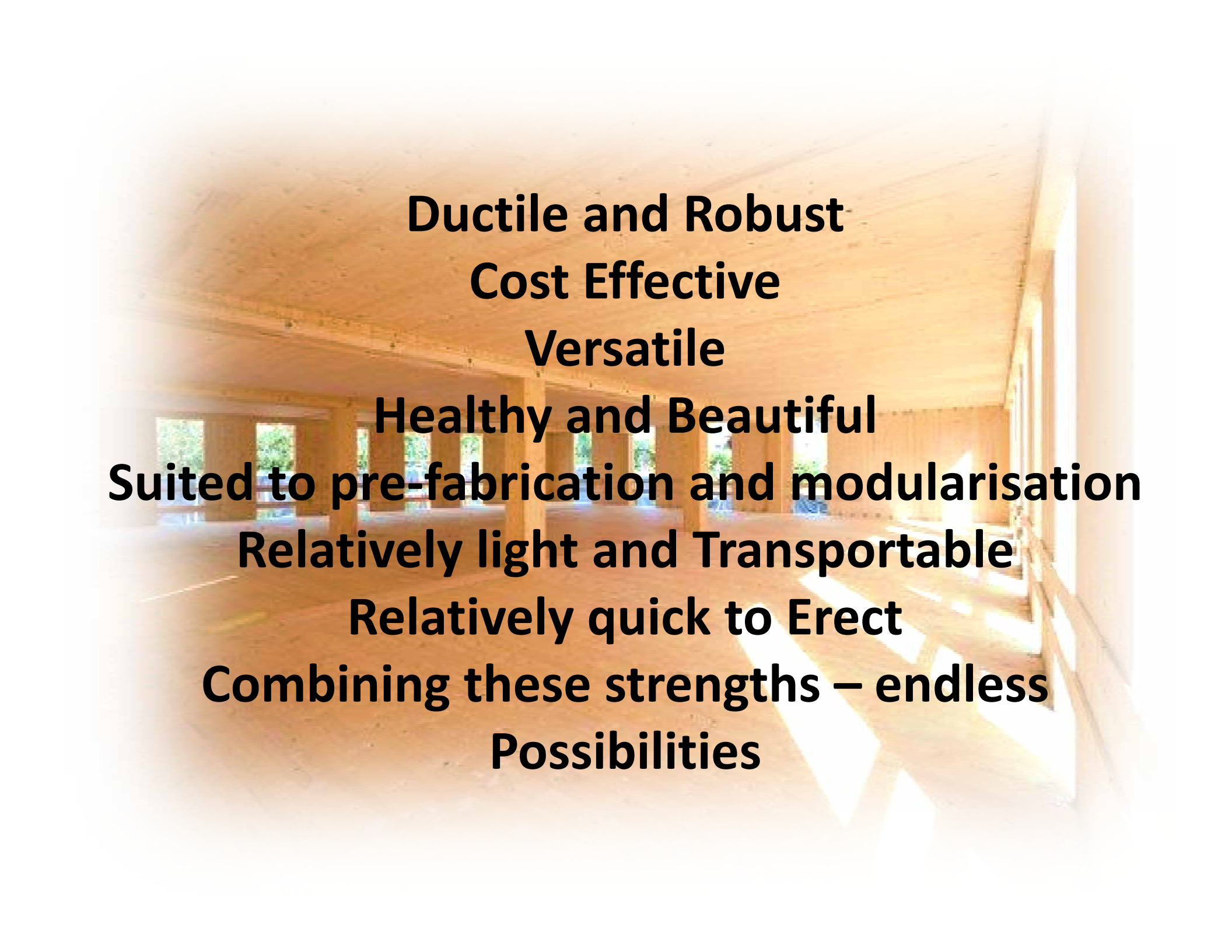
Fire Performance

Noise & Vibration



Land Mass: 9.9 million km^2
Population: 35 million
Ave density: < 2 people / km^2
81% in Urban Areas
Average # Days below 0 degrees:
143 (4.7 mths)


Natural Resources Canada
Ressources naturelles Canada
Aléa Relatif
Relative Hazard
Haut
High
Bas
Low
Seismic Hazard Map
Geological Survey of Canada
2010
Carte d'Aléa Séismique
Commission Géologique du Canada
EarthquakesCanada.nrcan.gc.ca
SeismesCanada.rncan.gc.ca



Ductile and Robust

Cost Effective

Versatile

Healthy and Beautiful

Suited to pre-fabrication and modularisation

Relatively light and Transportable

Relatively quick to Erect

Combining these strengths – endless Possibilities

Questions

John Paone, Director/ Senior Vice
ALFRED HORIE CONSTRUCTION CO
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