GRIND CITY

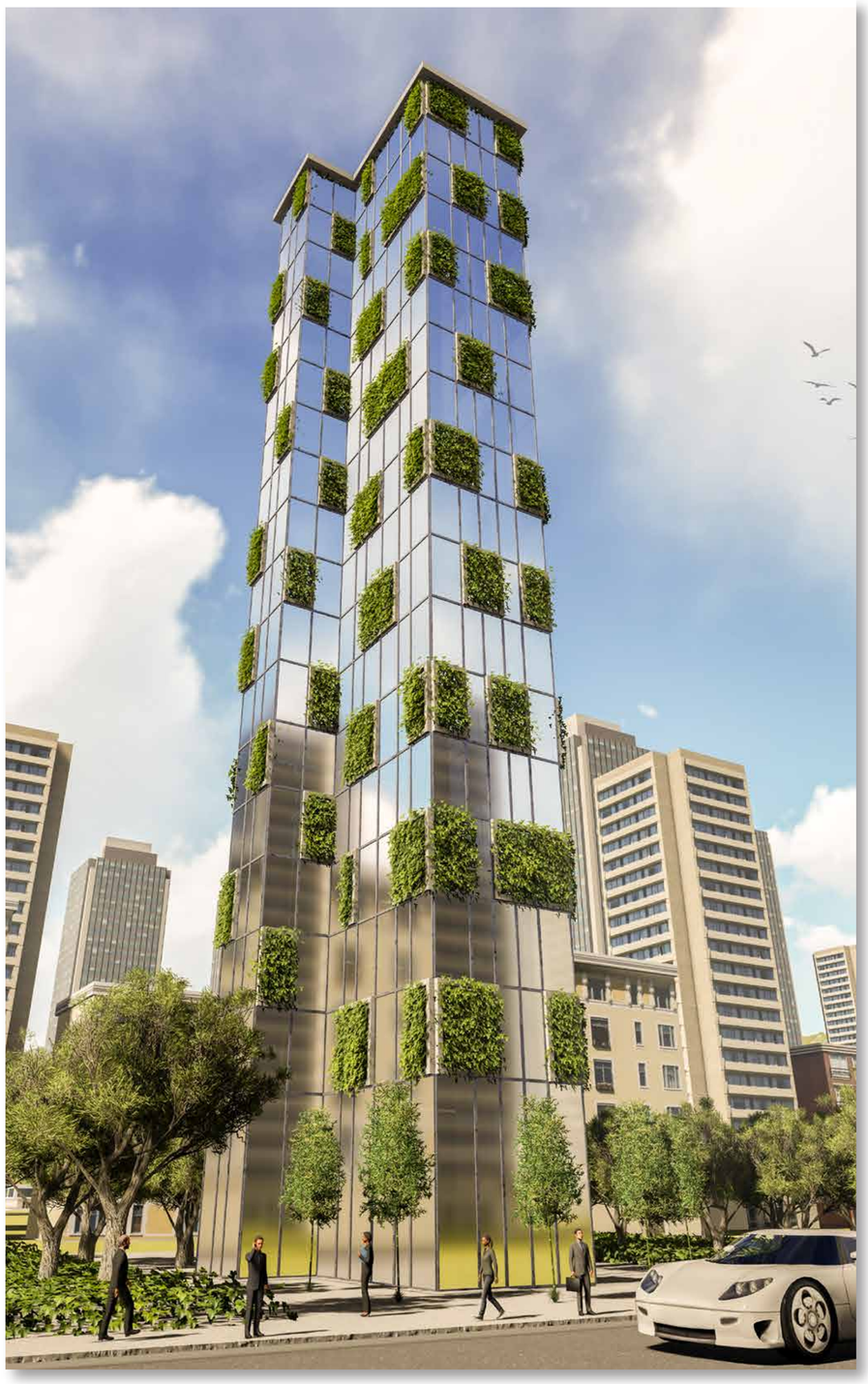


Figure 1. 3D Rendering of the structure

ARCHITECTURAL DESIGN

Grind City incorporates a very intricate design, with a sleek and bold manner of showing. The super bracing not only provides a key structural property but provides the structure a burst of character. Since this structures shape is so unique, we brainstormed to create an innovative design that has never been seen before.

The exterior skeleton of our structure will incorporate some environmentally friendly green plants. These are ideal for the eco-friendly environmental design, in a city that prides itself on urban sustainability.

Grind City will fit well into Greenest City Action Plan for Vancouver, because of its character, eco-friendly features, expensive taste, and adaptation to the surrounding environment and healthy atmosphere.

Building Features

- **17** stories high totaling up to **51** inches tall
- Provides **1600** square inches of rentable floor area
- Aesthetically pleasing design of outer bracing system
- Lobby floor height doubled for retail space

Figure 2. 3D Rendering of the structure base

STRUCTURAL DESIGN

Seismic Load Mechanism
Earthquake forces originate from the ficticious force due to the ground accleration and the mass source of the building.

It acts as a lateral load and the building behaves much like a cantilever beam.

In order to resist this lateral load, BRAVADO has incorporated two main innovations:

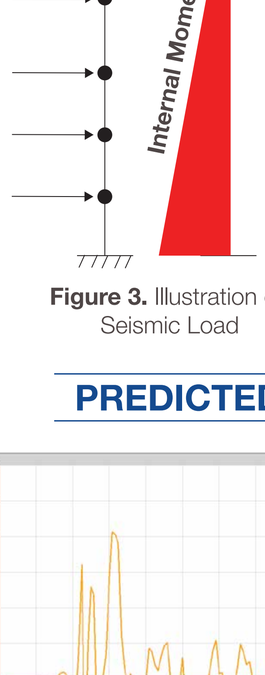
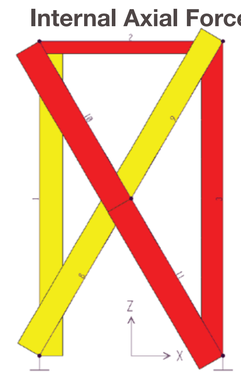


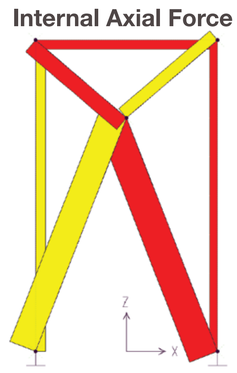
Figure 3. Illustration of Seismic Load

1. Vertical Bracing Design Using Topology Optimization
Unlike the conventional X bracing design, GRIND CITY utilizes the Super Braces which yield a better strength-to-weight ratio (SWR).

Compared to the X bracing, Super Braces put less compression force on the outer column which is the most critical one due to its longer length.



SWR = 156
Figure 4.a. X Bracing



SWR = 337
Figure 4.b. Super Bracing

2. Horizontal In-plan Bracing due to Structural Irregularity
The T-shape of the floor plan can be systematic because of its structural irregularity. If we consider a line in Y-Y direction in the middle of the structure, the center of diaphargm does not lie in the middle of that line.

Due to the earthquake, the floor behaves like a cross section of the beam under torsion and the corners are exposed to more risk.

GRIND CITY features an in-plan bracing at the corners to reinforces these weaknesses.

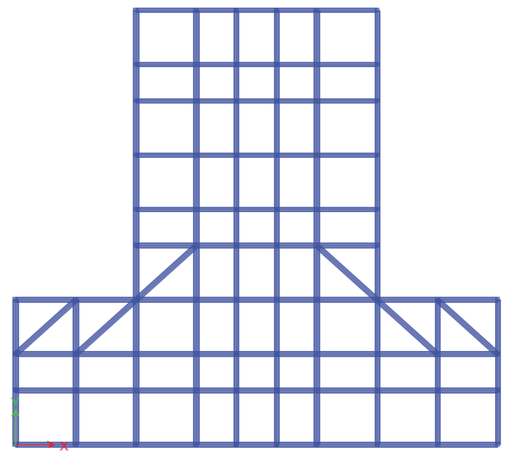
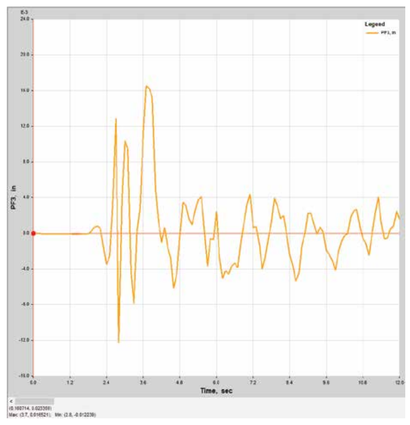
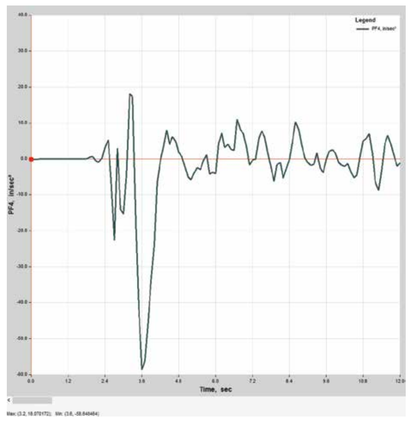


Figure 5. Typical Floor Plan

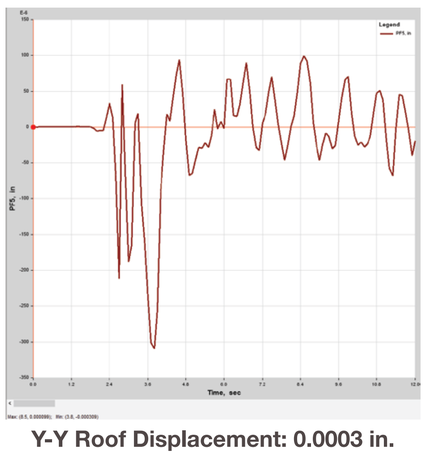
PREDICTED STRUCTURAL BEHAVIOR



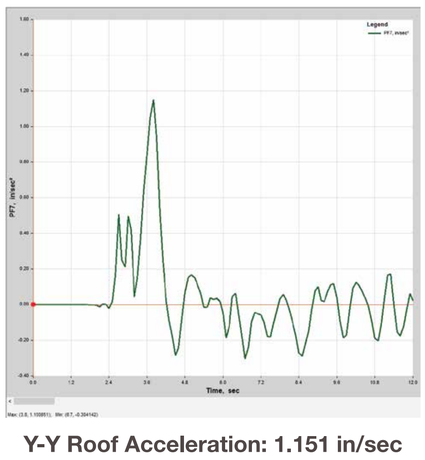
X-X Peak Roof Displacement: 0.0165 in.



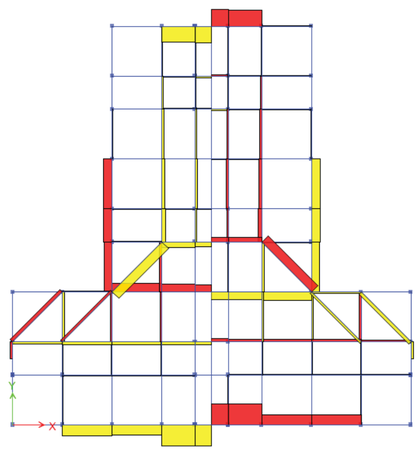
X-X Roof Acceleration: 58.65 in/sec ^{2}

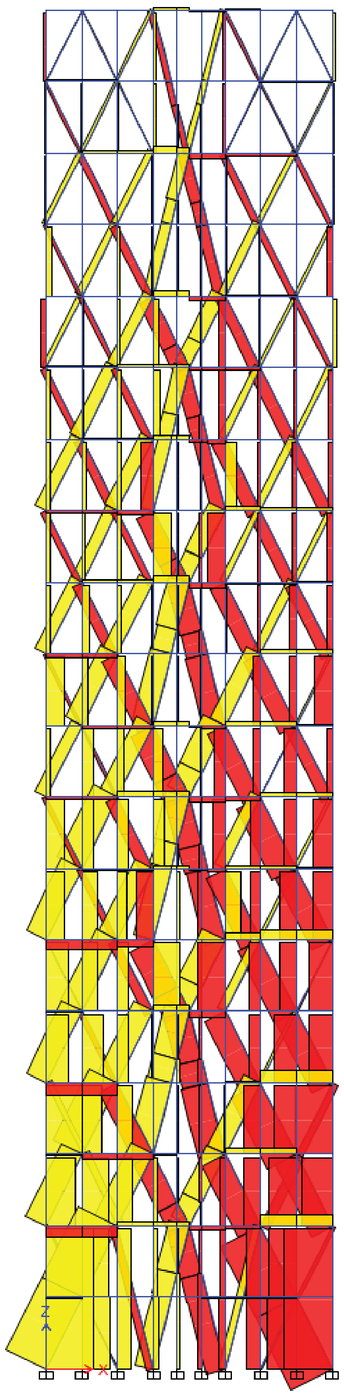


Y-Y Roof Displacement: 0.0003 in.

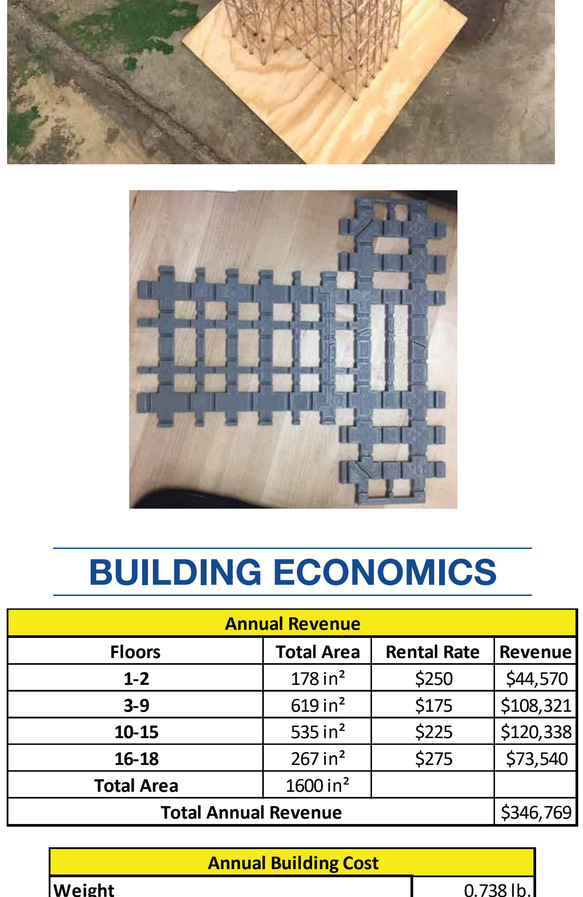


Y-Y Roof Acceleration: 1.151 in/sec





BALSA WOOD FABRICATIONS



BUILDING ECONOMICS

Annual Revenue			
Floors	**Total Area**	**Rental Rate**	**Revenue**
1-2	178 in²	$250	$44,570
3-9	619 in²	$175	$108,321
10-15	535 in²	$225	$120,338
16-18	267 in²	$275	$73,540
Total Area	1600 in²		
Total Annual Revenue			$346,769

Annual Building Cost		
Weight		0.738 lb.
Construction Cost		$ 7,360,503
Land Cost		$3,119,878
Annual Building Cost		$104,804
Annual Seismic Cost	North-South	$7,133
	East-West	$ 3,769
Final Annual Building Income	North-South	**$234,832**
	East-West	**$238,196**