UVIC SEISMIC

University of Victoria

Ansel Tower

HOSPITAL ADDITION AND RETROFIT

THE WIZINSKY FOUNDATION

rjc Engineers

GLOTMAN · SIMPSON CONSULTING ENGINEERS

KNAPPETT PROJECTS INC.

HATCH

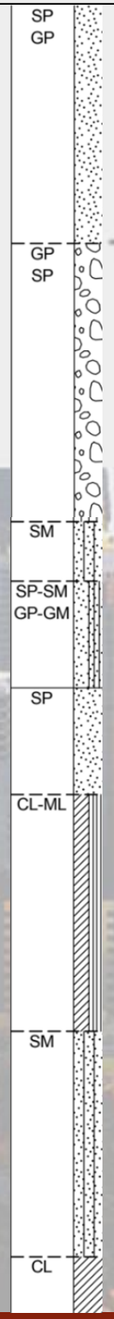
HEROLD ENGINEERING

25TH ANNIVERSARY

EERI Student Leadership Council

EERI

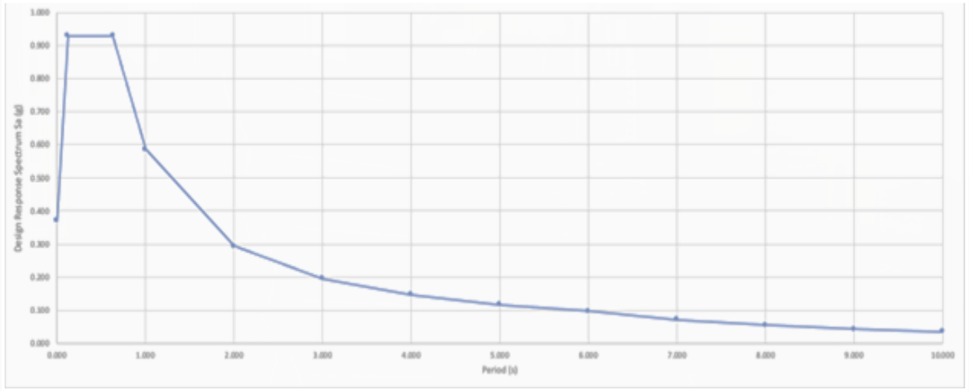
GEOTECHNICAL & SEISMICITY



The Seattle region in the North-Central Puget Sound Lowland lies within the Cascadia subduction zone, at the convergent boundary between the Juan de Fuca and North American plates. Seismic hazard in the region is due to three primary mechanisms: deep-focus oceanic-continental plate interface earthquakes, megathrust events at the subduction zone, and shallow crustal earthquakes of the continental plate [1]. This region typically produces soil profiles containing fine-grained unconsolidated deposits, which aligns with the findings of the boring log [6].

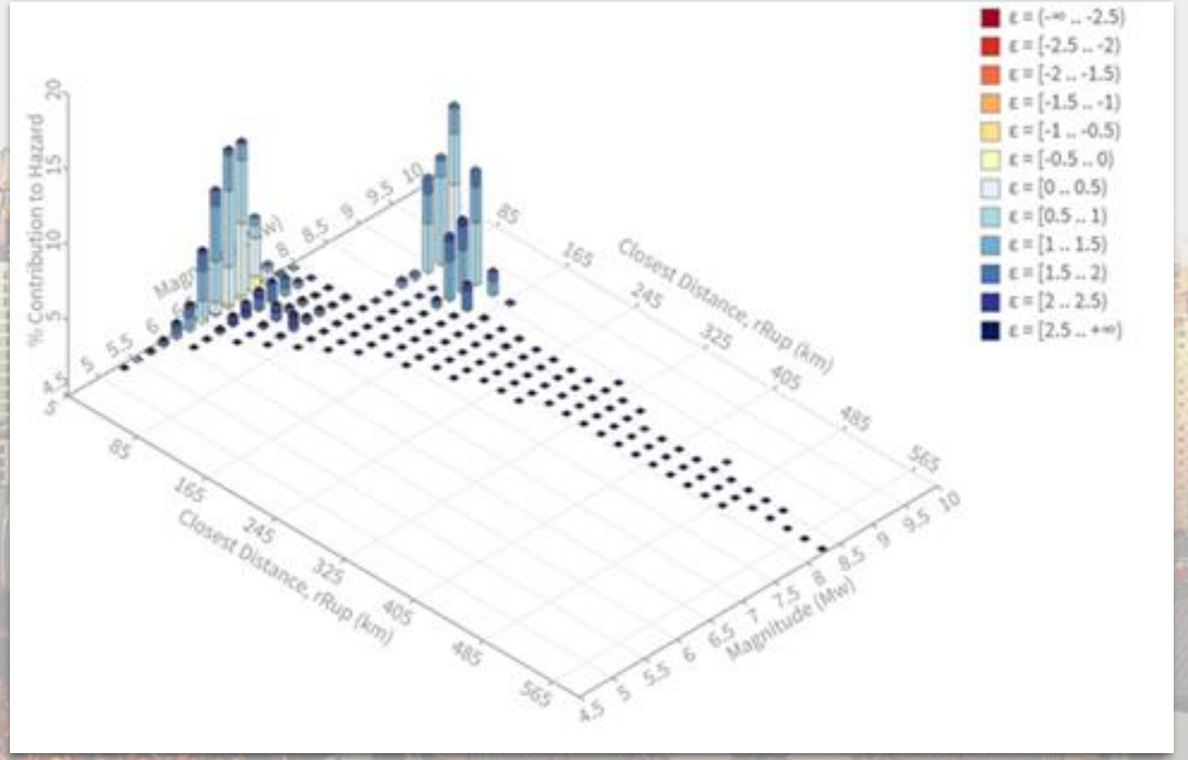
SITE CLASS	E - Soft Clay Soil
RISK CATEGORY	IV - High Risk
SEISMIC DESIGN CATEGORY	D - Extensive Seismic Design Required

Design Response Spectrum



Recommended Ground Improvement Techniques

I. Compaction grouting
II. Permeation grouting
III. Jet grouting
IV. Earthquake drains



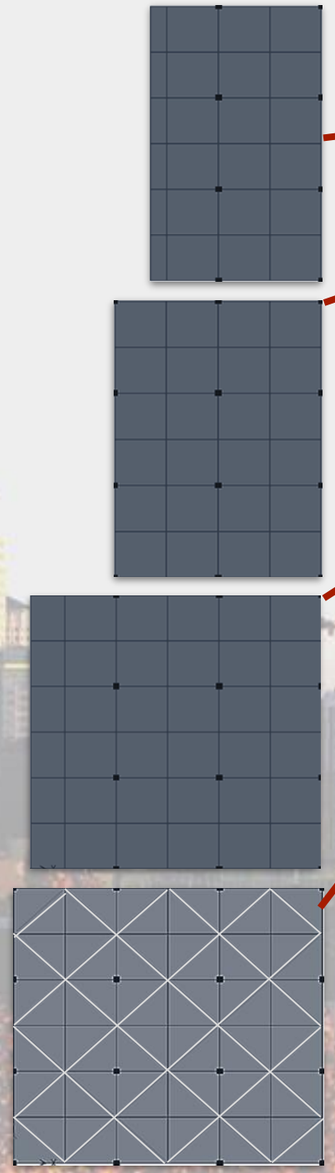
ADDITION DESIGN & ANALYSIS

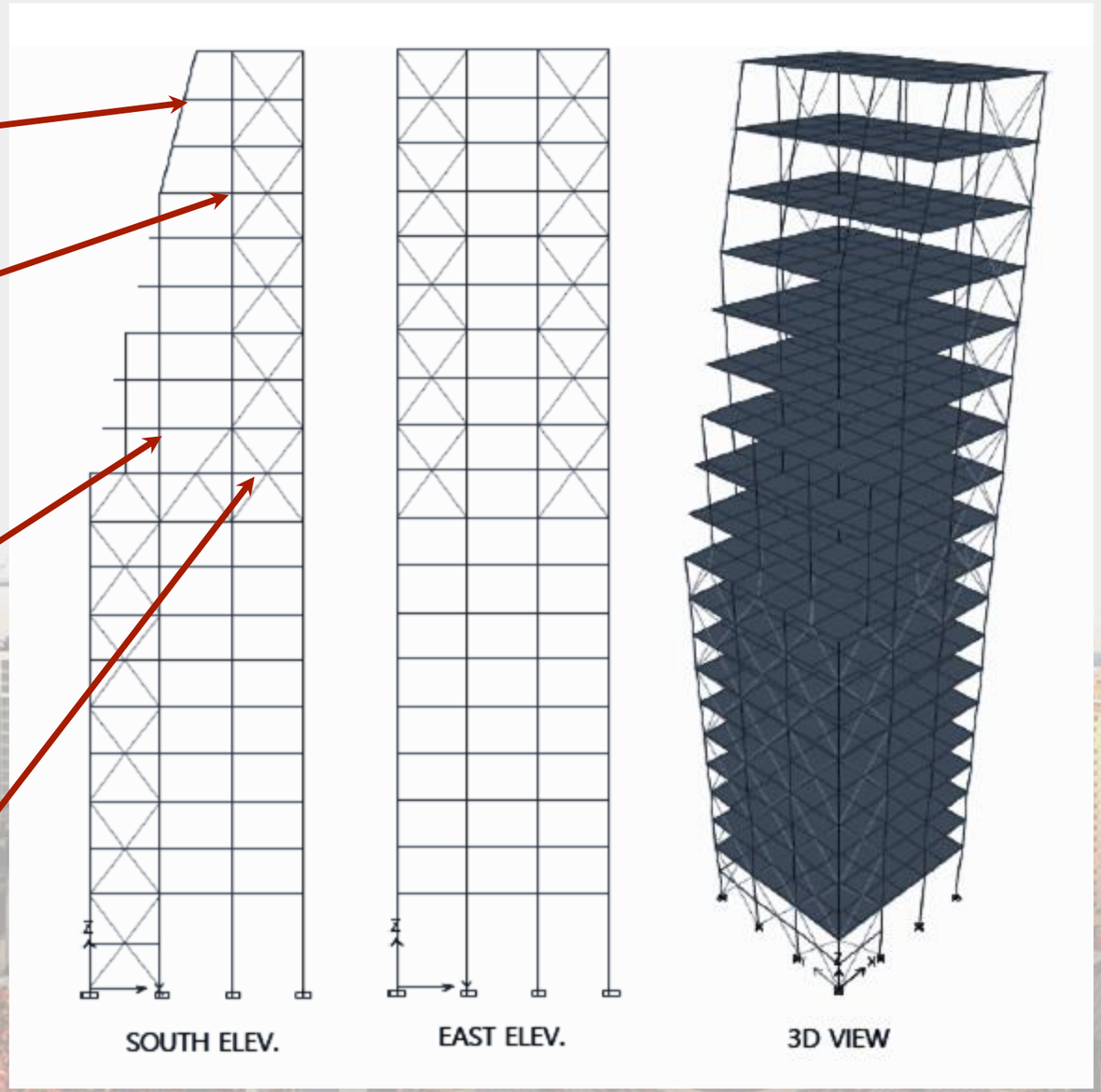
Floor	Gross Area (in^2)	Architectural Access Area (in^2)	Height Constrained Area (in^2)	Total rentable area (in^2)
19	80.04	9.975	6.672	63.393
18	87.96	9.975	6.672	71.312
17	96.00	9.975	6.672	79.353
16	104.04	9.975	N/A	94.065
15	111.96	12.741	N/A	99.219
14	120.00	12.741	N/A	107.259
13	128.04	12.741	N/A	115.299
12	135.96	12.741	N/A	123.219
11-1	144.00	12.741	N/A	131.259 x 11
			Total	**2065.712**

Total Weight of Addition: 0.258 lbs

Mode	Period	SumUX	SumUY	SumUZ
1	0.018s	0	0.4804	0
2	0.011s	0.7141	0.4804	0
3 ...	0.008s	0.7141	0.5867	0
23 ...	0.002s	0.8916	0.9027	0
34 ...	0.002s	0.9491	0.925	0

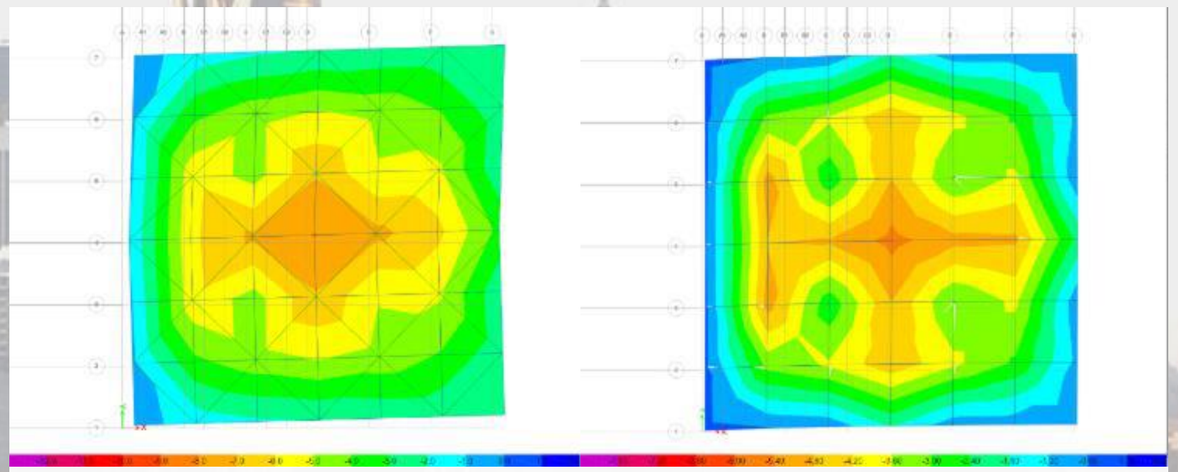
Total Rentable Floor Area of Addition: 884.378 in^2





RETROFIT DESIGN & ANALYSIS

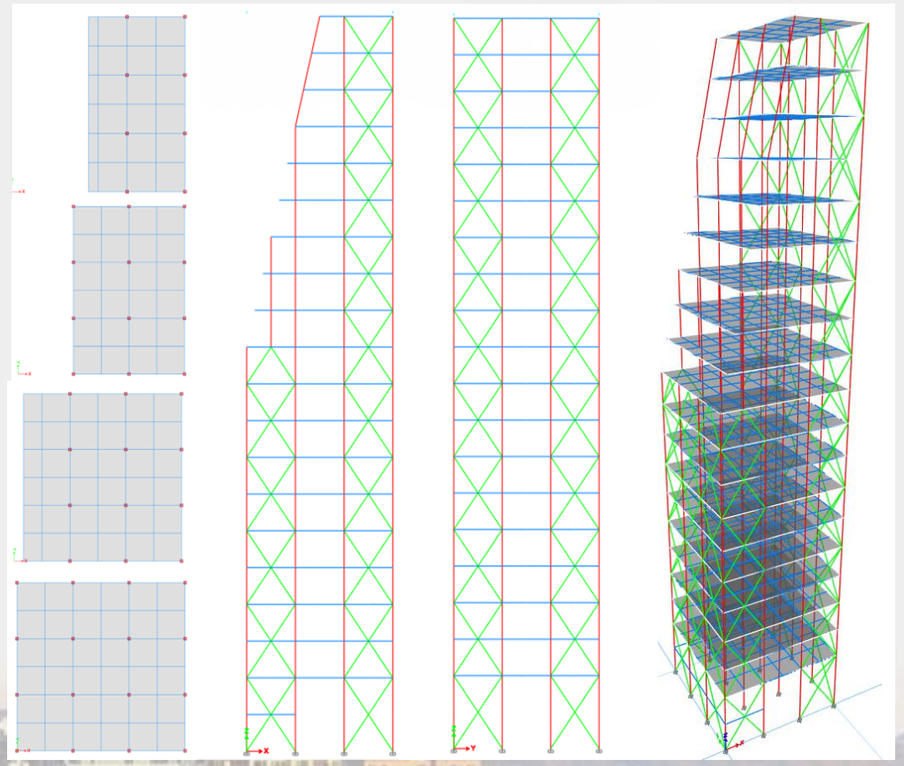
Concentric Braced Frames extended down the east face are a favorable solution in resisting lateral forces as they provide high strength and stiffness while also allowing natural light infiltration. Stacked multi-storey X-bracing was utilized to maintain continuity as well as balance the lateral resistance in the system design for ground motions in both directions.



Torsional irregularity improvements following the retrofit design.

Collapse Risk

With the annualized collapse risk, the 50-year collapse risk was determined to be 1.95869%, which does not meet code requirements. The retrofit will need to achieve a minimum reduction factor of 1.96822 to achieve the minimum code requirements.

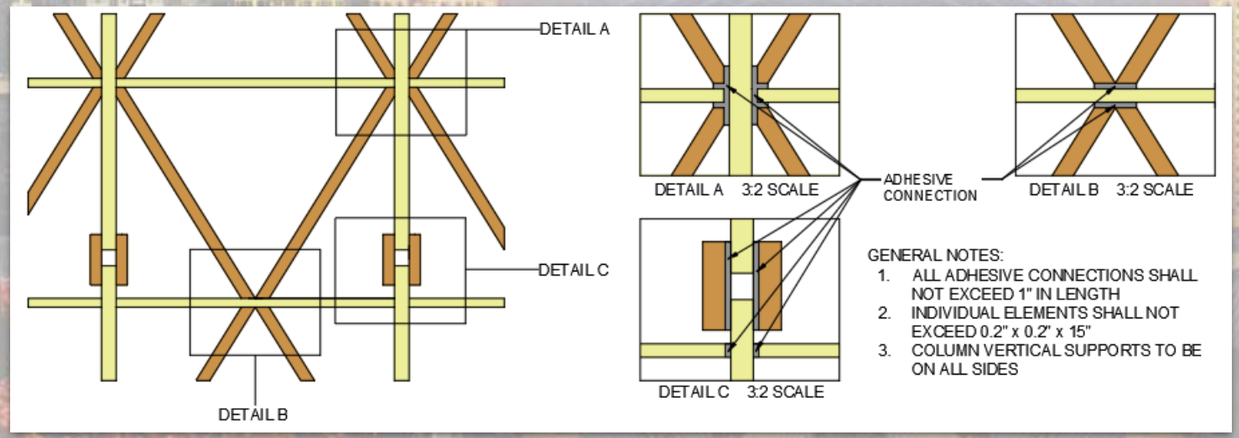


Total Rentable Floor Area After Retrofit

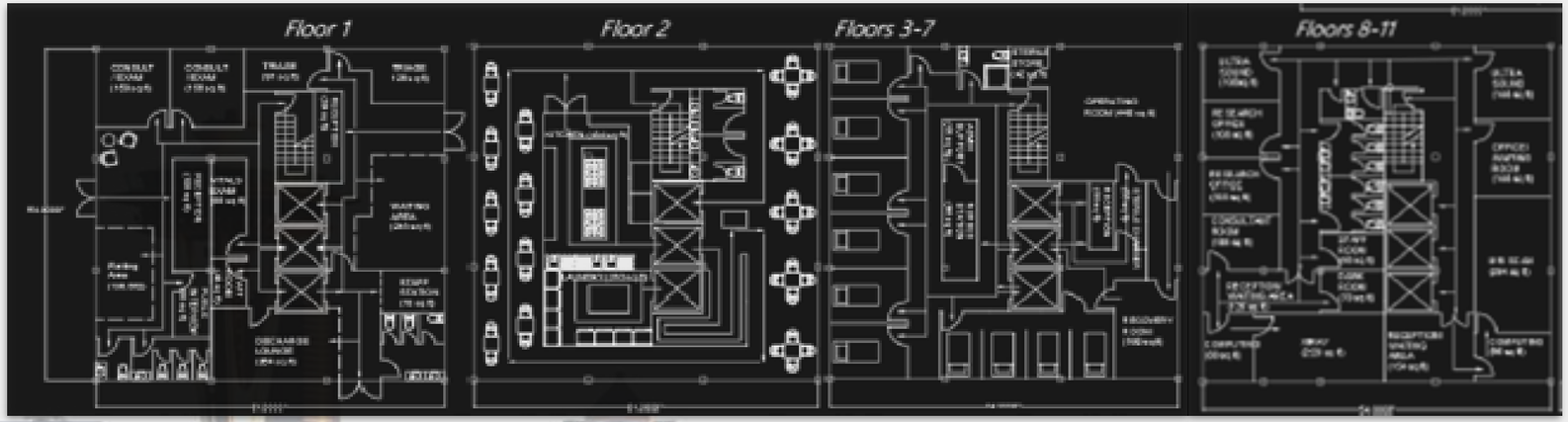
= 2065.712 in^2

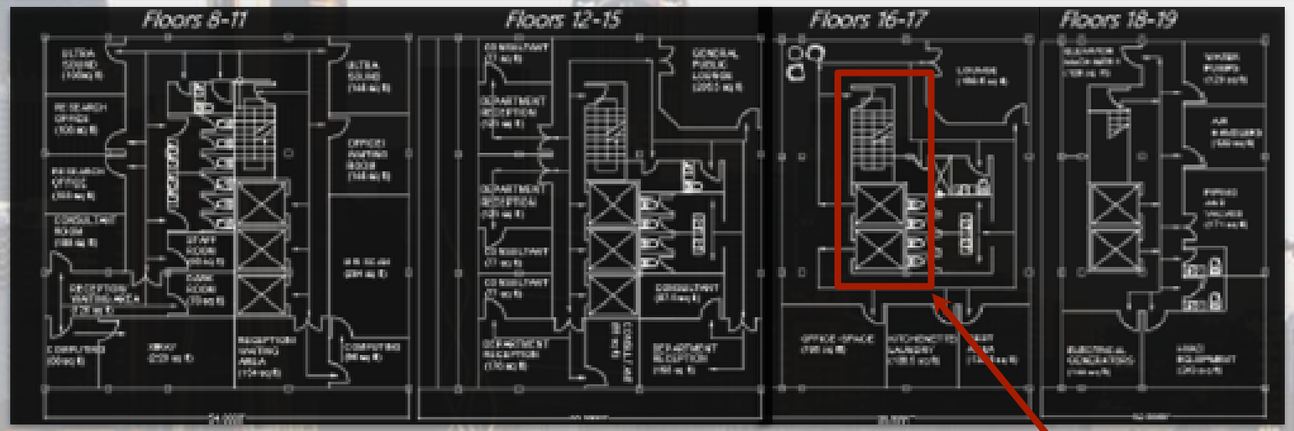
Total Building Self-Weight After Retrofit

= 0.508 lbs

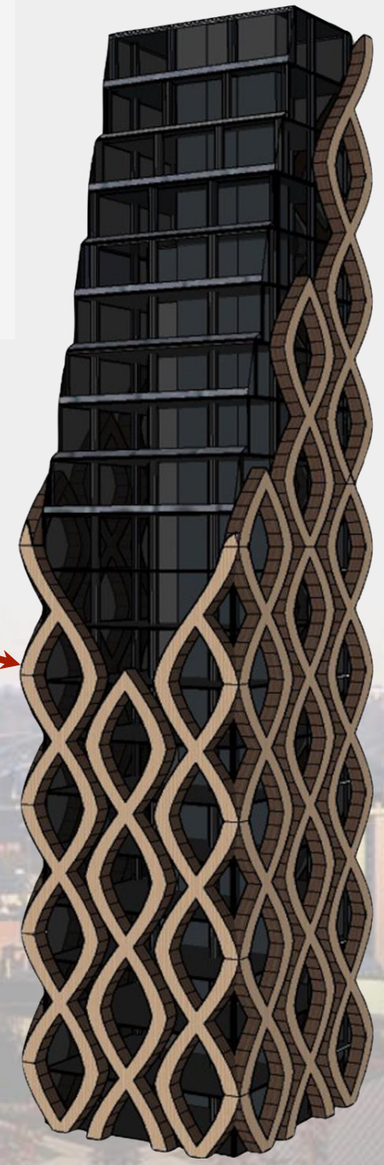


Architectural and Environmental





Exterior design inspiration pulled elements from iconic Seattle buildings, such as the Rainier Square designed by Minoru Yamasaki.



The facade utilizes non-uniform elements to highlight the cascading design of floors eleven through nineteen, inspired by the nearby Cascadia mountain range.

Patient and staff movements are shown on the floor plans, of which an integral part is the three elevators and emergency stairs located at the centre of the building.

LEED Targets

LEED Category	Points
Water Efficiency & Energy & Atmosphere	20
Indoor Environmental Quality	10
Sustainable Sites	4
Materials and Resources	11