UNIVERSITY OF CALIFORNIA,
SAN DIEGO

2021 EERI Undergraduate Seismic Design Competition

STALACTITE SEATTLE HOSPITAL

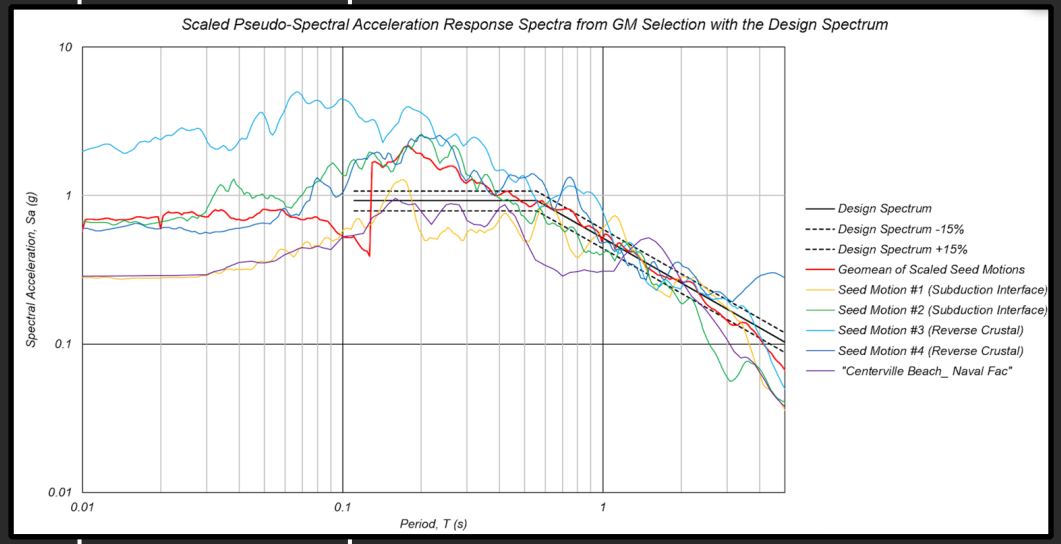
ARCHITECTURAL INSPIRATION

Glass facade inspired by the modern look of other buildings in the Seattle, WA area

- Reflective windows, structural steel members
- Allows for natural light
- Can be purchased in bulk
- Recycled materials

SOLIDWORKS
STRUCTURAL ENGINEERING
EHM ARCHITECTURE
ETC BUILDING & DESIGN
COFFMAN ENGINEERS
SOLID Professor
TIPPING STRUCTURAL ENGINEERS
&
GEOCON

GEOTECHNICAL / SEISMICITY



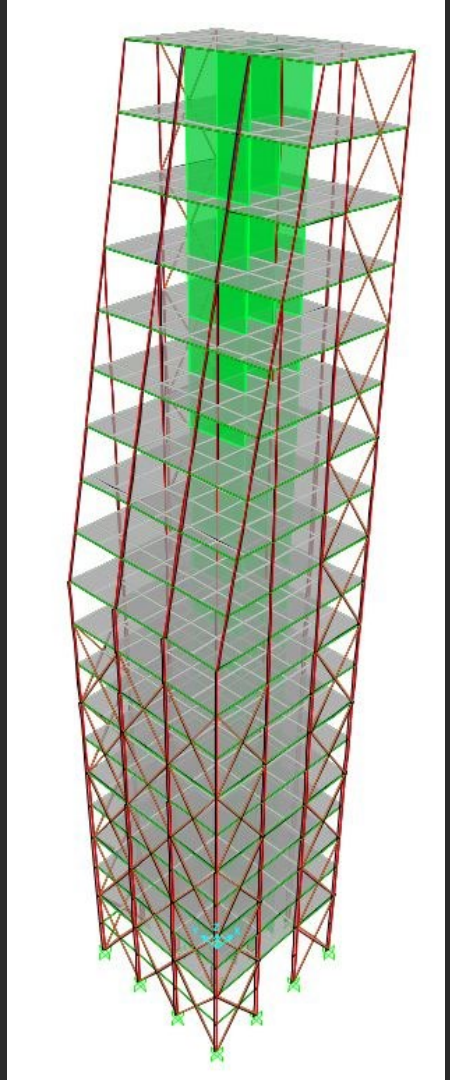
Contributing Sources	T = 1.0 sec			T = 2.0 sec		
	m	r (km)	%	m	r (km)	%
Nearby Faults (< 15 km)	6.297	6.720	28.360	6.949	6.540	27.050
Cascadia Subduction Zone (CSZ) Interface	9.030	103.790	30.530	9.020	105.702	42.310
Other	---	---	34.230	---	---	22.330

Greater Seattle Area

Stalactite Seattle Hospital

S_{M1}	0.873
S_{D1}	0.517
T_0	0.111
T_S	0.557
T_L	6.000

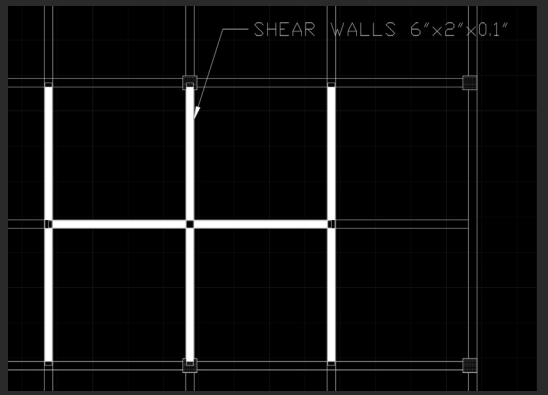
Mean Magnitude: 7.98
Mean Rupture Displacement: 56.121 km



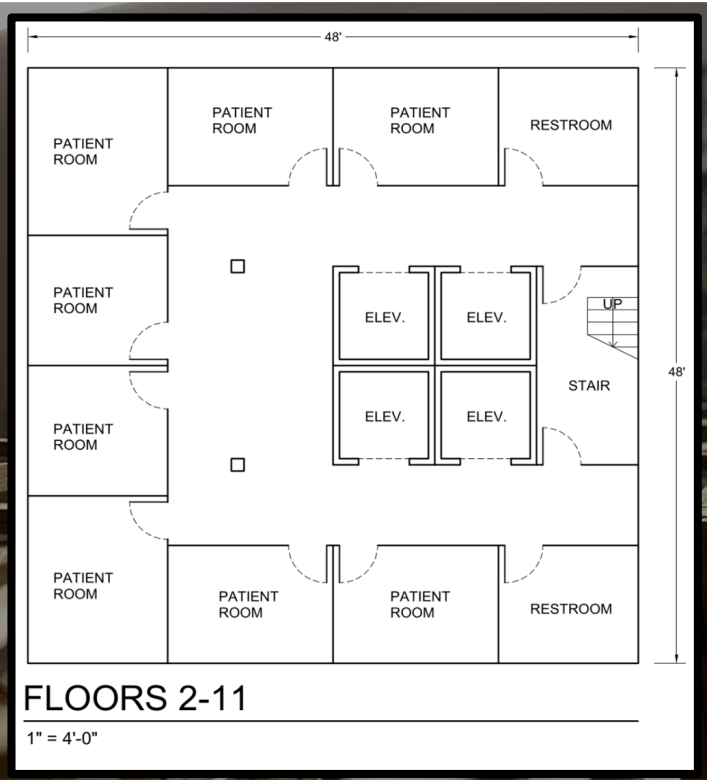
STRUCTURAL DESIGN

- Addition was added to hospital in Greater Seattle Area
- Tower takes up maximum floor space allowed, resulting in an asymmetrical building
  - Results in torsion
- Double -H Shear Walls and Braced -Frames were used for the Lateral Force Resisting System
- Structural systems chosen in order to
  - Decrease member forces
  - Reduce inter -story drift
  - Increase structural capacity and FOS
- Time histories were applied to both E/W and N/S directions in SAP2000

Time History	Direction	Maximum Inter-story Drift Ratio (%)	Two Floors Between Which Maximum Drift Ratio Occurs
TH1	N/S	0.22	10-11
	E/W	1.23	11-12
TH2	N/S	0.47	10-11
	E/W	0.75	11-12
TH3	N/S	0.22	10-11
	E/W	1.23	11-12
TH4	N/S	0.61	10-11
	E/W	0.74	11-12

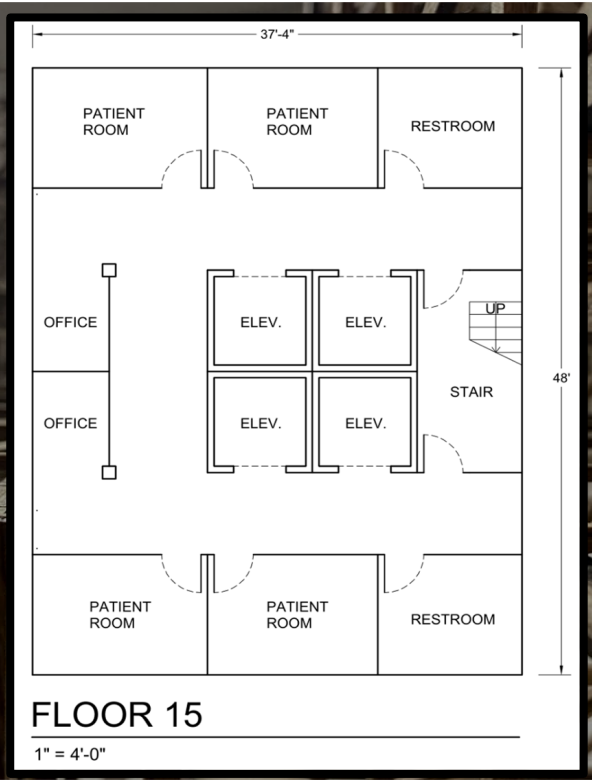


TYPICAL ADDITION FLOOR PLAN



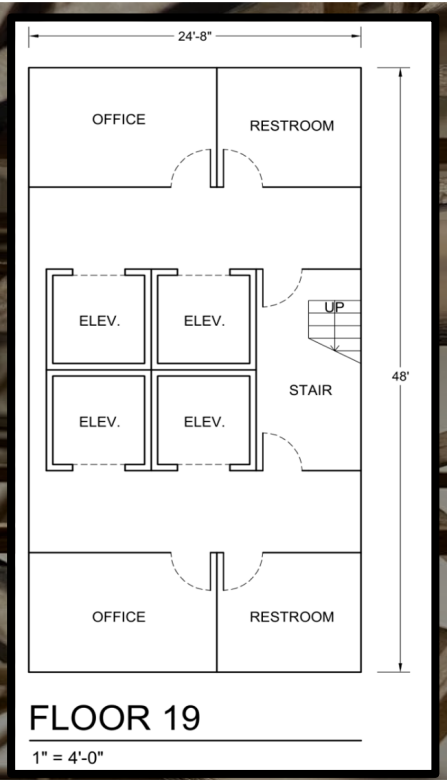
FLOORS 2-11

1" = 4'-0"



FLOOR 15

1" = 4'-0"



FLOOR 19

1" = 4'-0"

LEED CONSIDERATIONS

Healthcare sectors within the US is responsible for 10% of nationwide greenhouse gas emissions

- Hospitals are responsible for a third of this percentage

Looked towards using sustainable materials that also had low volatile organic compounds emissions

- Low VOC emissions can reduce the carbon footprint of the building overall

Implemented water efficient measures to recycle rainwater to be used throughout the building

Used renewable energy alternatives to power the hospital and optimize energy performance

- Installed solar panels on the exterior of the building
- Large windows used to reduce lighting costs and provide natural light
- Wood powered boiler that can replace natural gas emissions