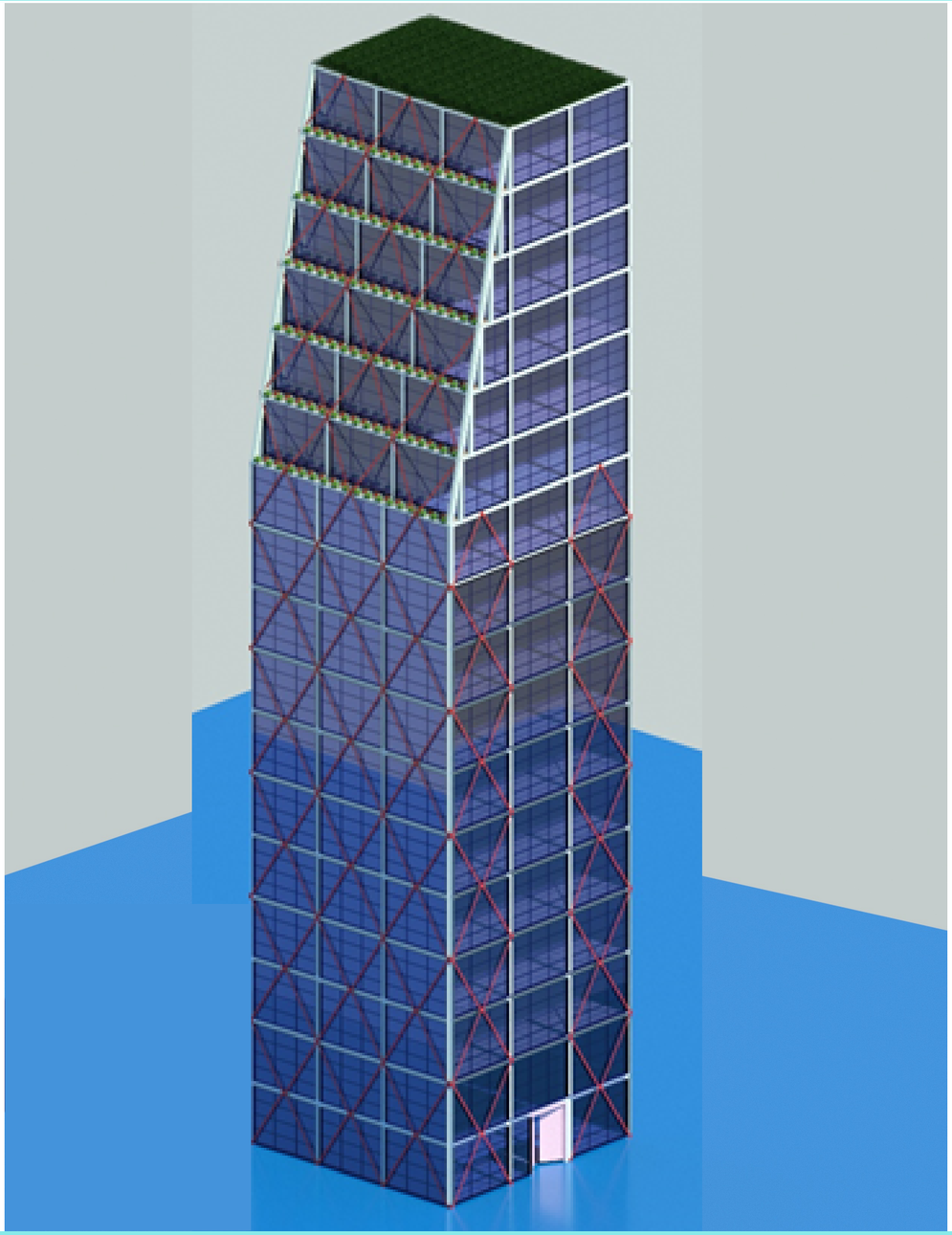


NIGHTINGALE HOSPITAL-SEATTLE

G Geotechnical

S Structural

R Retrofitting

A Architectural

Earthquake Resistant Building for COVID-19 Patients

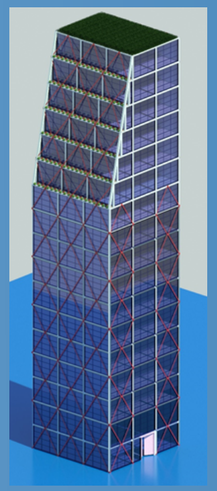
EERI Student Leadership Council

EERI IIT BOMBAY

A
Architectural

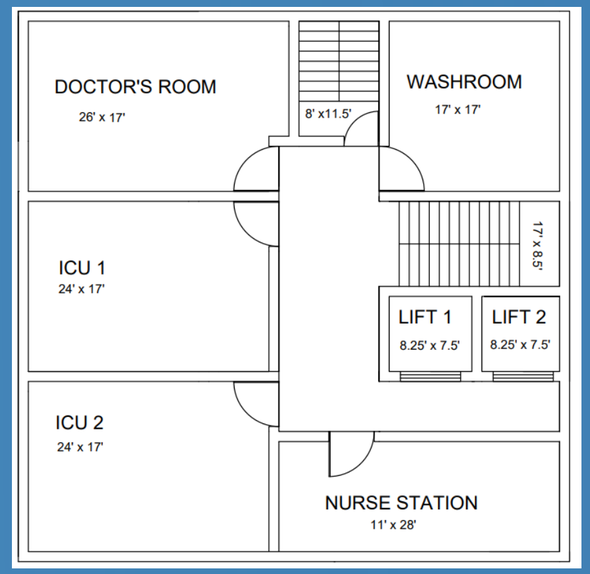
TYPICAL FLOOR PLANS OF THE ADDITION PART

- Hospital Building in Seattle, USA
- Floor - 10 , Floor area : 55x55 sqft.
- Addition: 6 Floors due to COVID-19

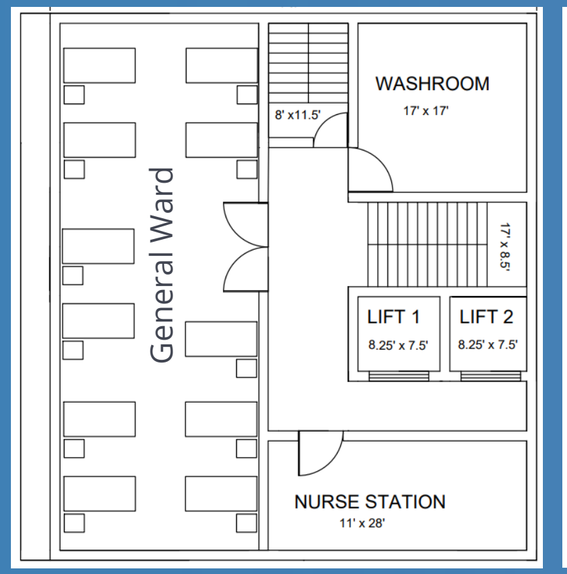


Building Façade with Seattle Skyline

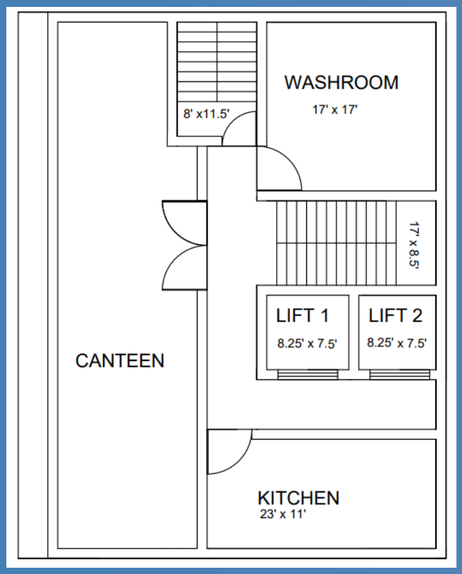
- Maximum exposure to the outside
- Accomodate bracing system
- Matching with regional trends
- Eco-Sense glass facade



Layout of Floor 11-12



Layout of Floor 13-15



Layout of Floor 16

- Floor wise dedicated facility
- Separation of horizontal and vertical circulation
- Large size patient wards with enough ventilation and proper sanitation facilities
- COVID-19 consideration

LEED BD+C CERTIFICATION

We are aiming to achieve LEED Silver Certification for the Hospital

Following are some of the technologies and techniques adapted for better sustainability of the Building and achieving LEED Certification :

INDOOR ENVIRONMENTAL QUALITY

- CO2 Monitors
- Particle Filters
- Lighting controls
- Thermal Comfort Controls
- Glare Controls

MATERIALS AND RESOURCES

- Demountable walls
- Movable casework
- Interstitial spaces

ENERGY AND ATMOSPHERE

- Green Roof
- Eco-Friendly Refrigerants
- Solar Panels

WATER EFFICIENCY

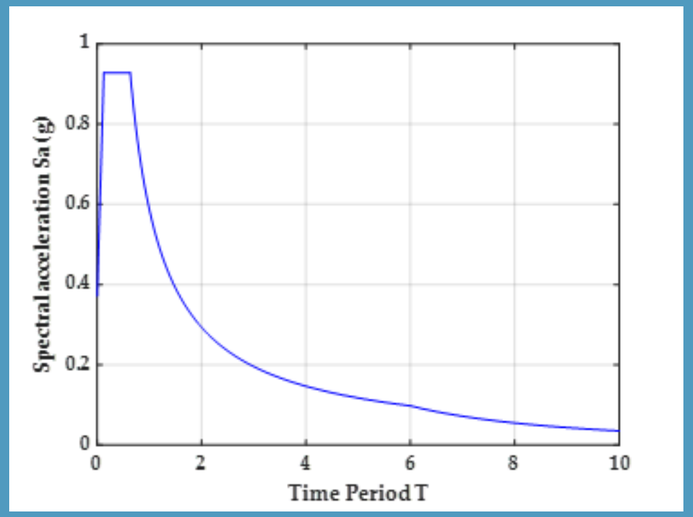
- Gutters
- Efficient Plumbing Fixtures

SUSTAINABLE SITES

- All Gender Facility Restrooms
- Open Grid Pavers with vegetation

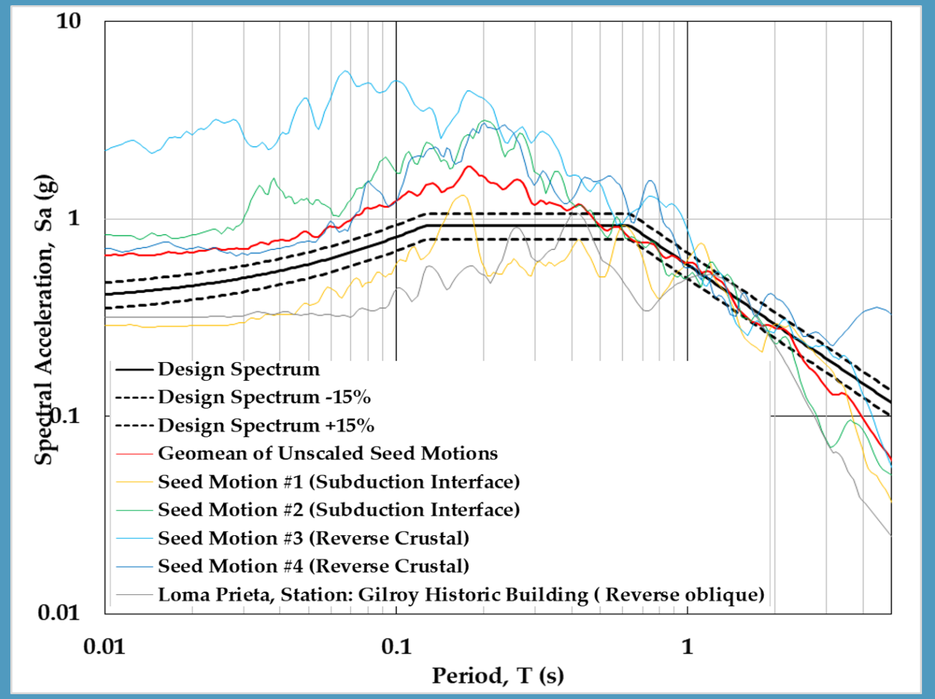
G GEOTECHNICAL

- The whole Seattle area is exposed to earthquakes
- Site Class E
- Soil is wet , loosely to medium dense
- Site improvement is done

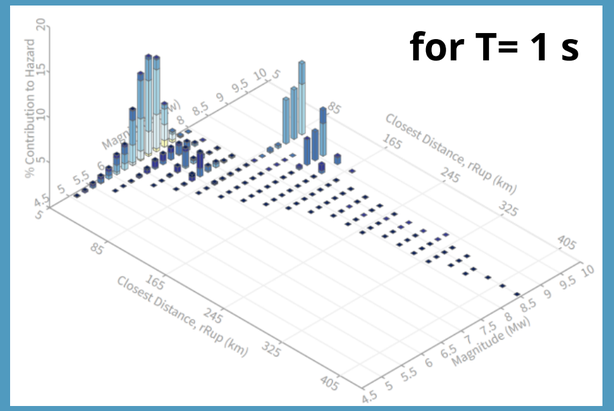


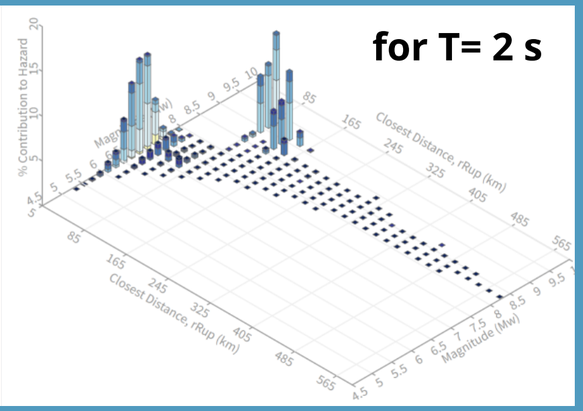
Design Response Spectra as per ASCE 7-16 for risk category IV

Major Faults



Ground Motion Selection





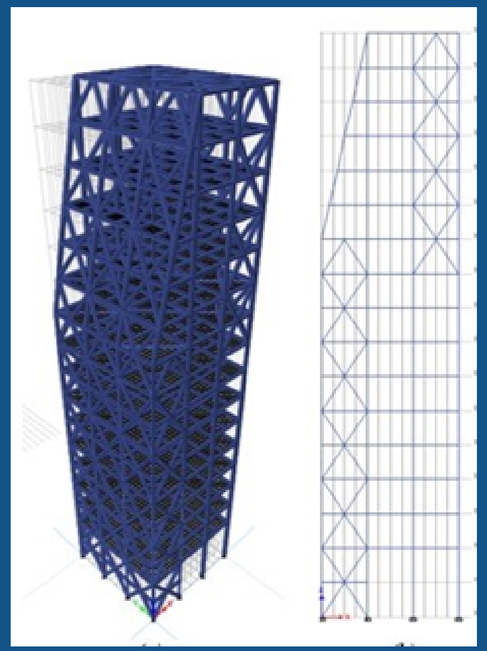
Deaggregation plots

- For existing structure i.e., Sa(T=1s) = 0.59g, with the proposed addition i.e., Sa(T=2s) = 0.29g

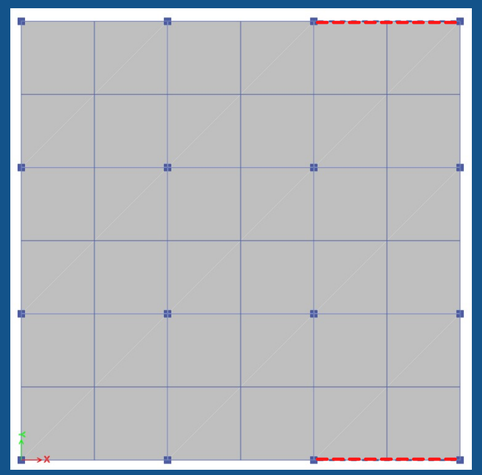
S STRUCTURAL

RETROFITTING TECHNIQUE R

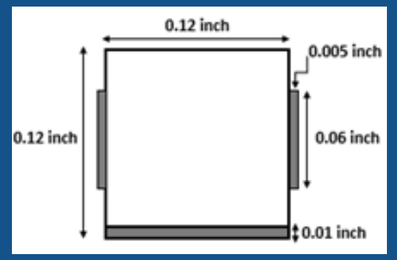
- Moment resisting frame with bracings
- Time history analysis
- Allowable stress design as per NDS(2018) methodology
- Torsional contribution in first mode
- Members are not satisfying demand/capacity checks for existing building and building with addition which indicates need for retrofitting



Building with Extension (Without Retrofit)

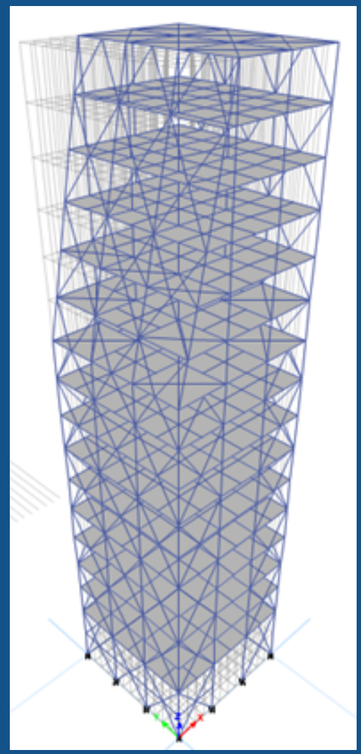


First Floor Plan with Critical Members

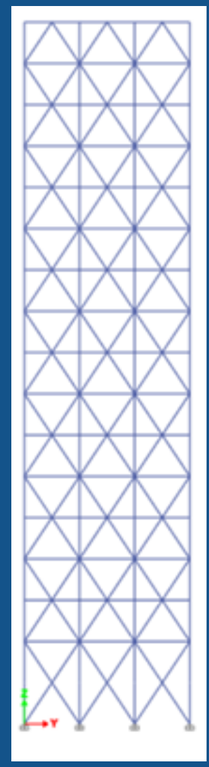


Retroffited Composite Section

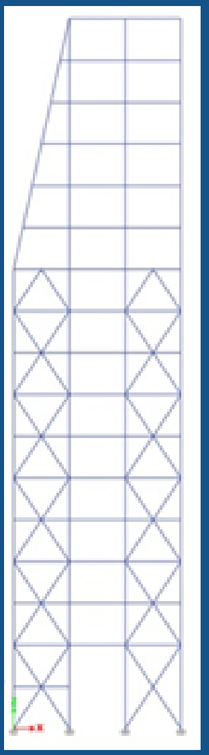
AFTER RETROFIT



Balsa wood Structure



East Elevation



South Elevation

Additional bracings
Additional plates