GENERAL INFORMATION

Index Building Taxonomy String:
1. Main structural system:...........................................
2. Height range:...................................................
3. Seismic design level:.........................................
4. Diaphragm Type:............................................
5. Structural Irregularity:.....................................
6. Wall Panel Length:.......................................... 
7. Wall Openings:.............................................
8. Foundation Type and Flexibility:....................... 
9. Seismic Pounding Risk:....................................
10. Seismic Retrofitting:......................................
11. Structural Health Condition:...........................
12. Non-Structural Components:............................

INTRINSIC CHARACTERISTICS

General Geometry:
- Building Plan Area (m$^2$): ................................
- Building Total Floor Area (m$^2$): .....................
- Number of Stories: ........................................
- Story Height (m): ........................................
- Number of Spans in X Direction: ....................
- Typical Span Length in X Direction (m): ...........
- Number of Spans in Y Direction (m): ..............
- Typical Span Length in Y Direction (m): ..........
- Wall Thickness (mm): ....................................
- Wall Construction: ......................................
- Thickness: ................................................

Material Properties of Masonry:
- Unit Weight, $\gamma$ (kg/m$^3$): .........................
- Modulus of Elasticity, $E$ (MPa): ......................
- Shear Modulus, $G$ (MPa): ............................
- Compressive Strength, $f'm$ (MPa): ..............
- Cohesion, $c$ (MPa): ....................................
- Tensile Strength, $f_t$ (MPa): .........................
- Friction Coefficient, $\mu$: .............................
- Seismic Enhancement Features: ......................

SEISMIC BEHAVIOR

- Seismic Weight of IP Walls (kN): ......................
- Fundamental Time Period of IP Walls (sec): .......

Pushover Curve with Damage State Thresholds:
IO Threshold: Hairline to minor cracks (blue) of maximum width 2.5 mm developed at most of the corners of the openings, hairline cracks developed at the connection between lintel band beam and the walls.

LS Threshold: Major shear cracks (blue) developed in several of the piers with a maximum width of 10 mm. Minor cracks extended at the connection with the lintel band beam with maximum opening of 0.5 mm. OOP walls develop a full length horizontal crack at the base with a maximum opening of 1 mm. Extensive cracks (red) of 12.5 mm width started at the connection between the lintel band beam and the IP wall at right corner.

CP Threshold: Most of the IP wall piers in the front (and the left most pier in the back wall) develop extensive shear cracks (red) of width more than 12.5 mm, lintel band beam separation with the walls becomes visible with a maximum crack opening of more than 5 mm. Horizontal bottom crack in OOP walls have an opening of 3 mm.
FRAGILITY/VULNERABILITY ASSESSMENT

DRESSED STONE IN CEMENT MORTAR MASONRY INDEX BUILDING

SEISMIC PERFORMANCE ASSESSMENT

Analysis Considerations:
- Analysis Methodology: Static Analysis (N2 Method)
- Engineering Demand Parameter (EDP): Roof Drift

Seismic Ground Motions:
- Ground Motion Suite: FEMA P695 - 22 Far Field Ground Motions
- Intensity Measure (IM): PGA (g)
- Scaling Factor: 0.1
- Minimum IM: 0
- Maximum IM: 2g

Bilinear Idealization:

EDP Calculation:

FRAGILITY ASSESSMENT

Integration Methodology: Least Square Method

Fragility Functions:

Mean:
- OP: 0.23
- IO: 0.32
- LS: 0.47
- CP: 1.26

Standard Deviation:
- OP: 0.33
- IO: 0.40
- LS: 0.38
- CP: 0.40

IB8_LBM_UCM-URM6_LR_MD
**VULNERABILITY ASSESSMENT**

**Damage to Loss Function:**

<table>
<thead>
<tr>
<th>OP (%)</th>
<th>IO (%)</th>
<th>LS (%)</th>
<th>CP (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>10</td>
<td>43.5</td>
<td>100</td>
</tr>
</tbody>
</table>

**Vulnerability Function:**

[Building Vulnerability Curve Diagram]

**GLOSARY**

- IP = In Plane
- OOP = Out of Plane
- OP = Operational
- IO = Immediate Occupancy
- LS = Life Safety
- CP = Collapse Prevention
- IM = Intensity Measure
- EDP = Engineering Demand Parameter
- ADRS = Acceleration Displacement Response Spectra
- Sa = Spectral Acceleration
- Sd = Spectral Displacement
- PGA = Peak Ground Acceleration
- T (s) = Time (second)

**PRINCIPAL REFERENCES**

- Global Library of School Infrastructure - GLoSI
- GLoSI Technical Report
- FEMA P-695
- ASCE 41-17
- N2 Method (Fajfar, 2000)
- GEM Analytical Vulnerability Assessment Guideline (D’Ayala et al., 2015)
- FUNVUL (www.ecapra.org)