Rock and Roll Soft-Story Seismic Isolation with Cross-Laminated Timber (CLT) Load-Bearing Wall Panels

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Design Objectives:
- Mitigate Economic Impacts of Earthquakes
- Fulfill the Performance Advantages of CLT
- Qualify CLT for Seismic Isolation, in Compliance with Building Code

Conclusions:
- Digital fabrication cost-effectively realises the isolation benefits of ellipse geometry.
- Estimated practical limits of CLT rocking panel system:
  - Effective period, T ≤ 4.5 seconds, based on hysteretic isolations.
  - Lateral displacement capacity, Dr ≤ 34 inches or 0.86 meters.
- Greater ellipse centroid and connection constraint increases stiffness, but also frictional damping and reliable self-centering.
- Geometric proportions can tune of stiffness and damping across a frequency range of a few Hz.

Acknowledgements

Cited Work

Visualization of Material Behavior during lab Tests

Digital Image Correlation (DIC) using Pile Load Testing to monitor behavior of concrete pile. Visualization of stress and strain distribution in concrete pile during load testing. DIC can provide detailed information about the behavior of materials at the microscopic level, such as the deformation and strain distribution, which is crucial for understanding the failure mechanisms and improving the structural design.

Cited Work