Universal Base Extension for LHPOST6

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Joint Academia-Industry NHERI Workshop
NHERI@UC San Diego

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University of California, San Diego
## Background

<table>
<thead>
<tr>
<th>Facility</th>
<th>LHPOST</th>
<th>SRMD</th>
<th>UCB</th>
<th>UNR</th>
<th>SUNY-Buffalo</th>
<th>E-Defense</th>
<th>NIED</th>
<th>ILEE</th>
<th>CGS</th>
<th>Pavia</th>
</tr>
</thead>
<tbody>
<tr>
<td>USA</td>
<td>USA</td>
<td>USA</td>
<td>USA</td>
<td>USA</td>
<td>USA</td>
<td>Japan</td>
<td>Japan</td>
<td>China</td>
<td>Algeria</td>
<td>Italy</td>
</tr>
<tr>
<td>Max Payload (MN)</td>
<td>20</td>
<td>4</td>
<td>0.75</td>
<td>0.45</td>
<td>1</td>
<td>12</td>
<td>5</td>
<td>0.7</td>
<td>0.6</td>
<td>0.3</td>
</tr>
<tr>
<td>DOFs</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>2</td>
<td>6</td>
<td>4</td>
</tr>
<tr>
<td>Platen Size L x W (m)$^2$</td>
<td>12.2 x 7.6</td>
<td>4 x 5</td>
<td>6.1 x 6.1</td>
<td>2.8 x 2.8</td>
<td>(2) 3.7 x 3.7</td>
<td>20 x 15</td>
<td>14.5 x 15</td>
<td>(4) 6 x 4</td>
<td>6.1 x 6.1</td>
<td>4.8 x 4.8</td>
</tr>
<tr>
<td>X-Dir Velocity (± m/s)</td>
<td>2.5</td>
<td>1.80</td>
<td>0.64</td>
<td>1.52</td>
<td>0.75</td>
<td>2.00</td>
<td>1.30</td>
<td>1.00</td>
<td>1.10</td>
<td>2.00</td>
</tr>
<tr>
<td>X-Dir Displacement (± m)</td>
<td>0.89</td>
<td>1.22</td>
<td>0.15</td>
<td>0.30</td>
<td>0.15</td>
<td>1.00</td>
<td>0.50</td>
<td>0.50</td>
<td>0.25</td>
<td>0.50</td>
</tr>
<tr>
<td>Y-Dir Velocity (± m/s)</td>
<td>2.0</td>
<td>0.80</td>
<td>0.64</td>
<td>1.52</td>
<td>0.75</td>
<td>2.00</td>
<td>0.70</td>
<td>1.00</td>
<td>1.10</td>
<td>2.00</td>
</tr>
<tr>
<td>Y-Dir Displacement (± m)</td>
<td>0.38</td>
<td>0.61</td>
<td>0.15</td>
<td>0.30</td>
<td>0.15</td>
<td>1.00</td>
<td>1.00</td>
<td>0.50</td>
<td>0.15</td>
<td>0.50</td>
</tr>
<tr>
<td>Z-Dir Velocity (± m/s)</td>
<td>0.6</td>
<td>0.25</td>
<td>0.25</td>
<td>1.40</td>
<td>0.75</td>
<td>0.70</td>
<td>0.20</td>
<td>-</td>
<td>1.00</td>
<td>0.50</td>
</tr>
<tr>
<td>Z-Dir Displacement (± m)</td>
<td>0.13</td>
<td>0.13</td>
<td>0.05</td>
<td>0.10</td>
<td>0.08</td>
<td>0.50</td>
<td>0.50</td>
<td>-</td>
<td>0.10</td>
<td>0.14</td>
</tr>
</tbody>
</table>

$^1$Performance metric that matches or exceeds that of the proposed upgraded LHPOST

$^2$(#) denotes number of tables, for multi-table facilities (note: UNR also offers (3) 4-DOF tables as well as a new 6-DOF table)
Development of a Seismic Design Methodology for Precast Building Diaphragms
PI – Prof. Robert B. Fleischman, University of Arizona
Collapse Vulnerability and Seismic Design of Metal Buildings

PI – Prof. Chia-Ming Uang, UC San Diego
Collaborative Research: A Resilience-based Seismic Design Methodology for Tall Wood Buildings
PI – Prof. Shiling Pei, Colorado School of Mines
Universal Base Extension

Potential Applications:
- Multi-bay frame buildings
- Buildings with complex geometry
  - Vertical irregularities
  - Non-orthogonal systems
  - Structures built on topographical slopes
- Interacting buildings with a common soil medium

Truss

Cellular beam
Universal Base Extension

- Input from industry as to the need

- Focused workshop to follow
  - Potential applications
  - Design Objectives
    - Functionality
    - Dynamic Characteristics

- Proposal to NSF

- Design, Fabrication, Characterization Testing