**Background**

The socket connection is a column-to-footing connection created by placing a precast column into an excavation and then casting the footing concrete around the column. The column has an intentionally roughened surface in the region that is embedded into the foundation in order to create a strong bond with the footing. However, the current means of roughening has proven to be labor intensive and can not be implemented on a column with a circular cross section. Using precast components in bridges has the potential to significantly reduce the construction time, which will mitigate issues caused by the construction process, such as increased traffic congestion and pollution.

The biggest challenge facing precast construction in seismic regions is designing a connection that can be constructed quickly and provide adequate strength under earthquake loading.

**Objectives**

- Develop novel methods of creating the roughened surface on a precast column that are constructible and allow for a column with an arbitrary section
- Conduct push through tests to determine the shear strength at the column-to-footing interface
- Determine the effectiveness of each roughening method based on strength and ease of implementation

**Methods**

- 4” x 8” precast cylinder is cast into a 12” x 6” cylindrical foundation
- Applied four methods of roughening:
  - Chemical Methods
  - Mechanical Methods
- Basis of Comparison:
  - Smooth surface (lower bound)
  - Monolithic specimen (upper bound)
- Apply axial load until push through failure occurs

**Results**

- Peak stress is less consistent than stress at post-peak displacements
- Chemical roughening is easily applied and performed better than the mechanical methods
- All roughening methods produced a shear strength that exceed the nominal shear resistance determined from AASHTO LRFD Bridge Design Specifications, section 5.8.4.

**Conclusions**

- In-form cement retarders are a viable means of roughening for the socket connection, but results should be confirmed by larger scale tests before field implementation
- Results gathered from the mechanically roughened specimens may not be valid due to scaling imperfections and needs verification before use

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