

Mitigation of Collapse Risk in Older Concrete Buildings

Grand Challenge Research

Pacific Earthquake Engineering Research Center & Network for Earthquake Engineering Simulation



Shear Strength Degradation Trends for Exterior and Corner Non-Ductile Beam Column Joints

Wael Hassan

Advised By

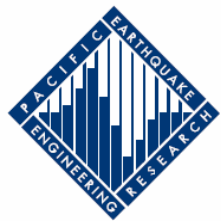
Prof. Jack Moehle



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PART 1

Exterior Non-Ductile Joints



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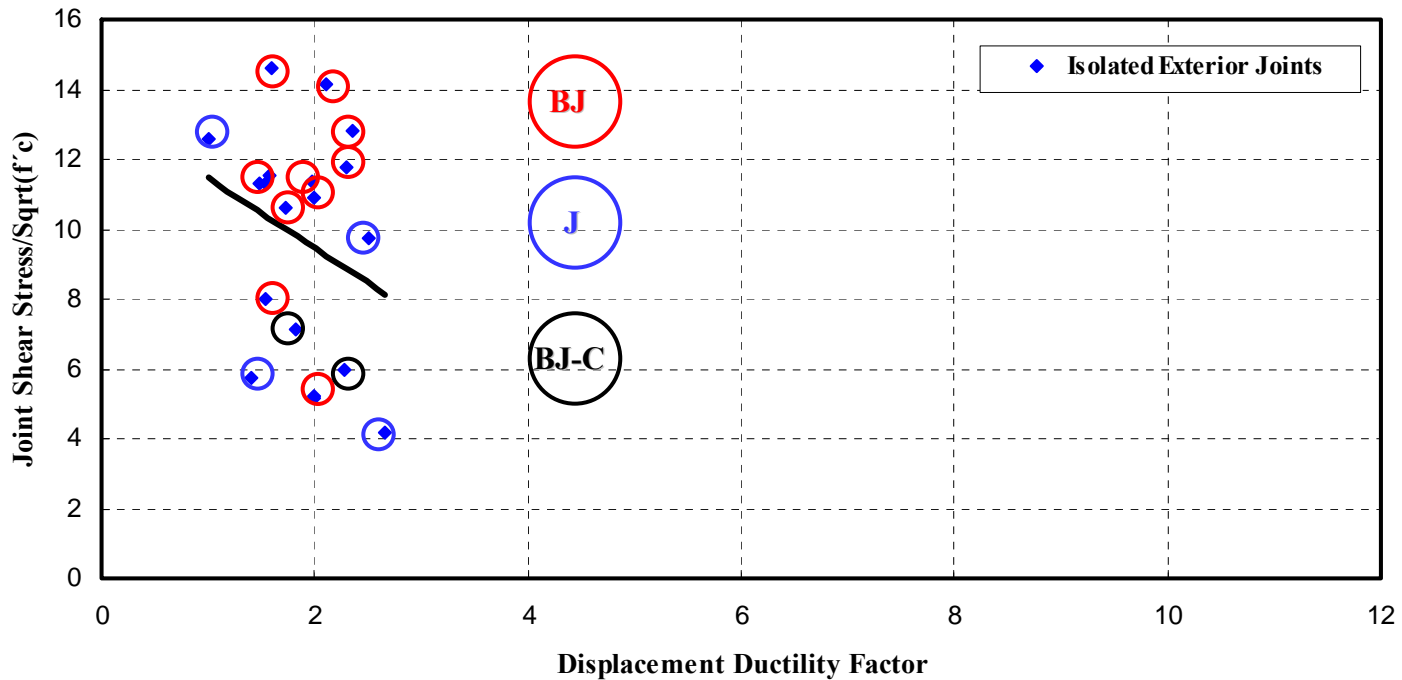
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NON-DUCTILE ISOLATED EXTERIOR JOINTS

Joint Shear Stress-Displacement Ductility Relationship (Isolated Exterior Joints)



Suggested $\gamma = 11.75$

Suggested $\mu = 2.7$



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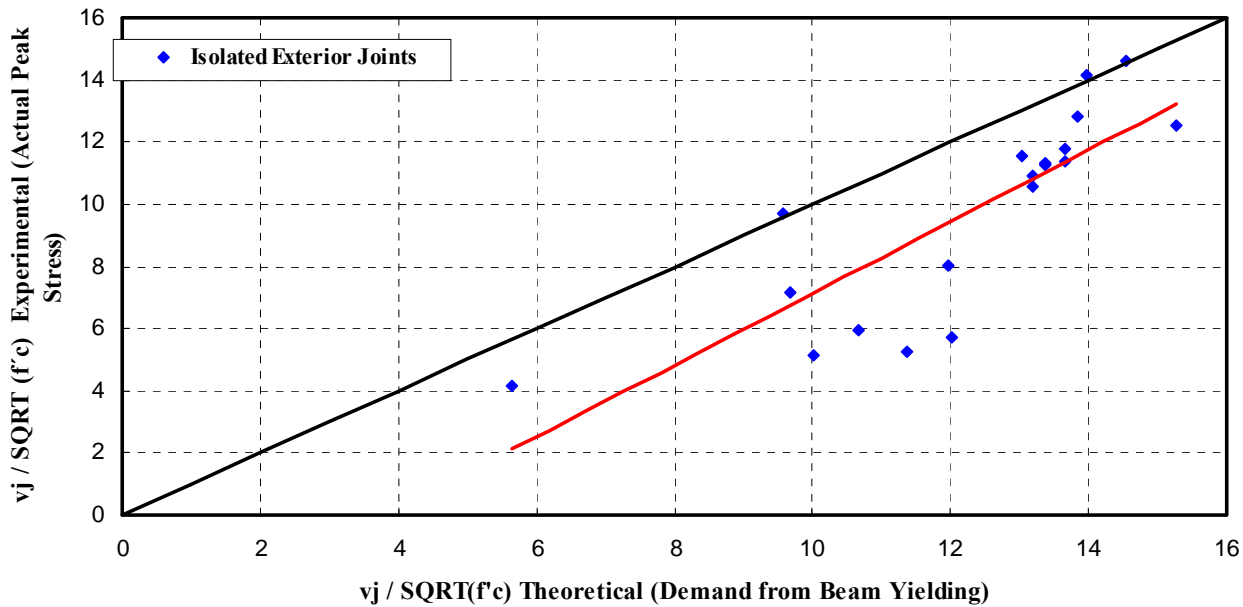
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NON-DUCTILE ISOLATED EXTERIOR JOINTS

Theoretical vs Experimental Joint Shear Stress (Isolated Exterior Joints)



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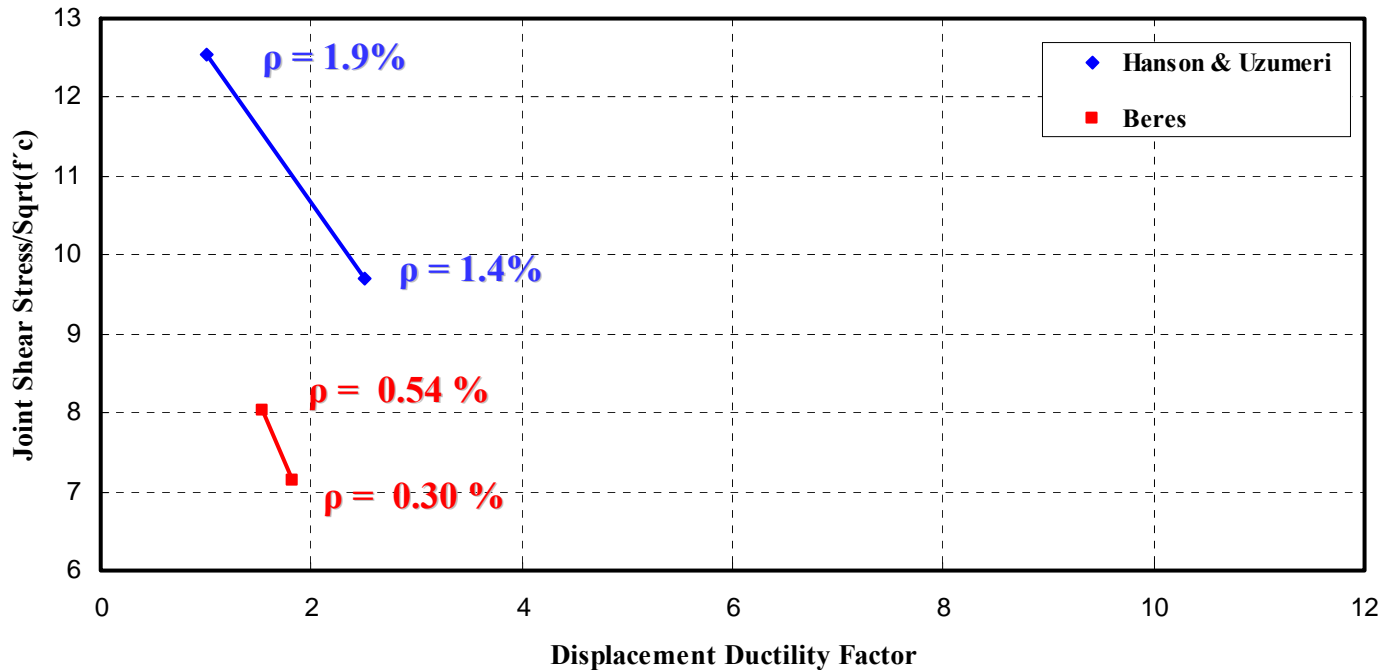
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NON-DUCTILE ISOLATED EXTERIOR JOINTS

Effect of Beam Longitudinal Reinforcement Ratio (Isolated Exterior Joints with Same Dimension Beams)



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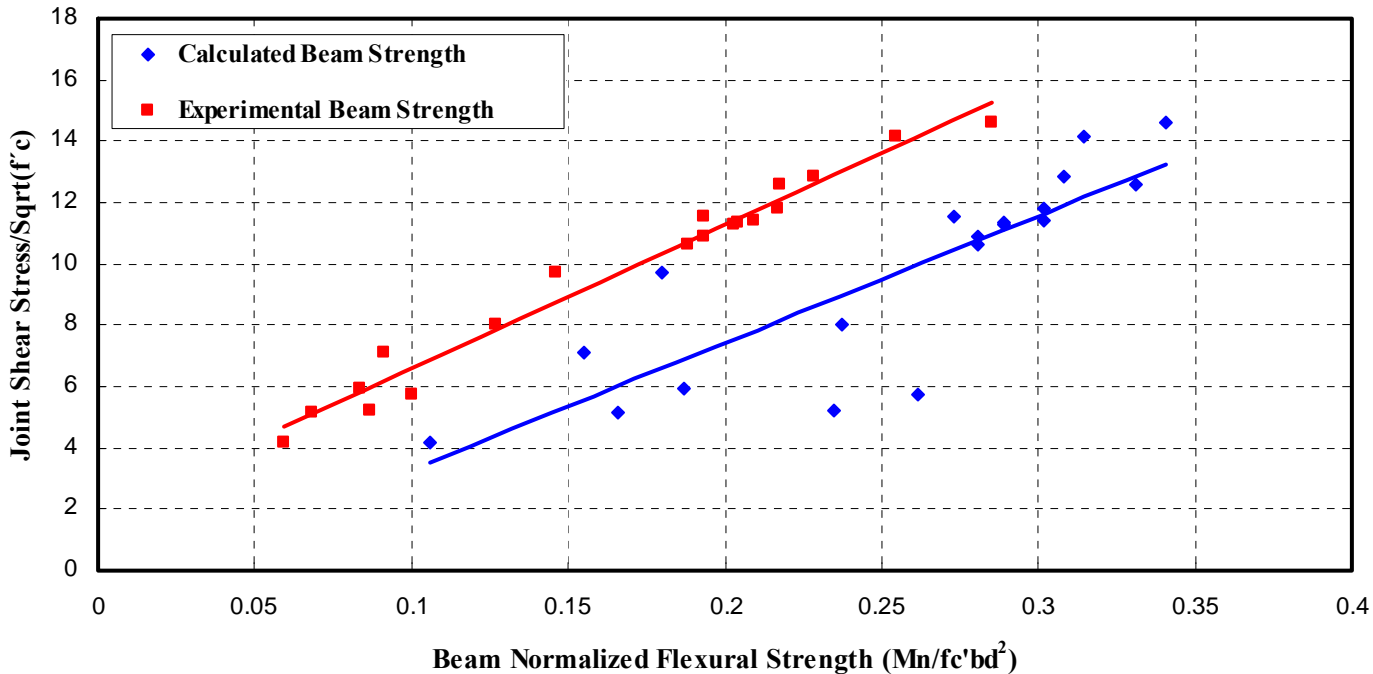
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NON-DUCTILE ISOLATED EXTERIOR JOINTS

Joint Shear Stress-Beam Flexural Capacity Relationship (Isolated Exterior Joints)



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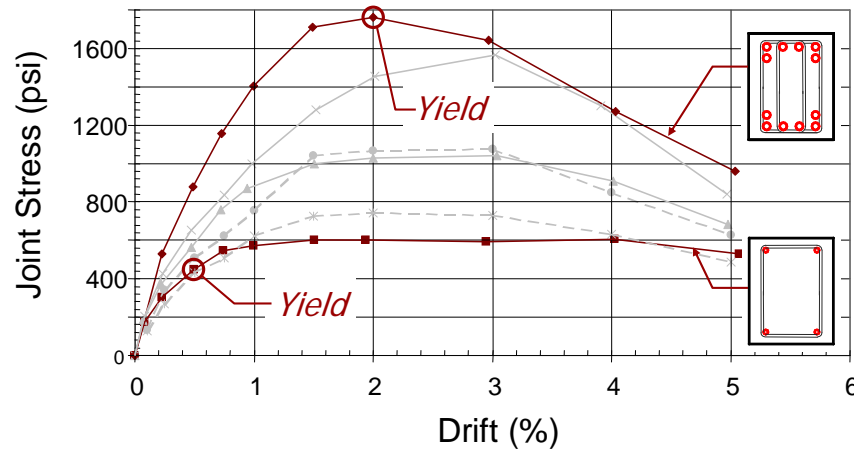
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Effect of Beam Yielding



• Joint strength closely linked to beam flexural strength

Lehman

Prof. Moehle, Joints Presentation



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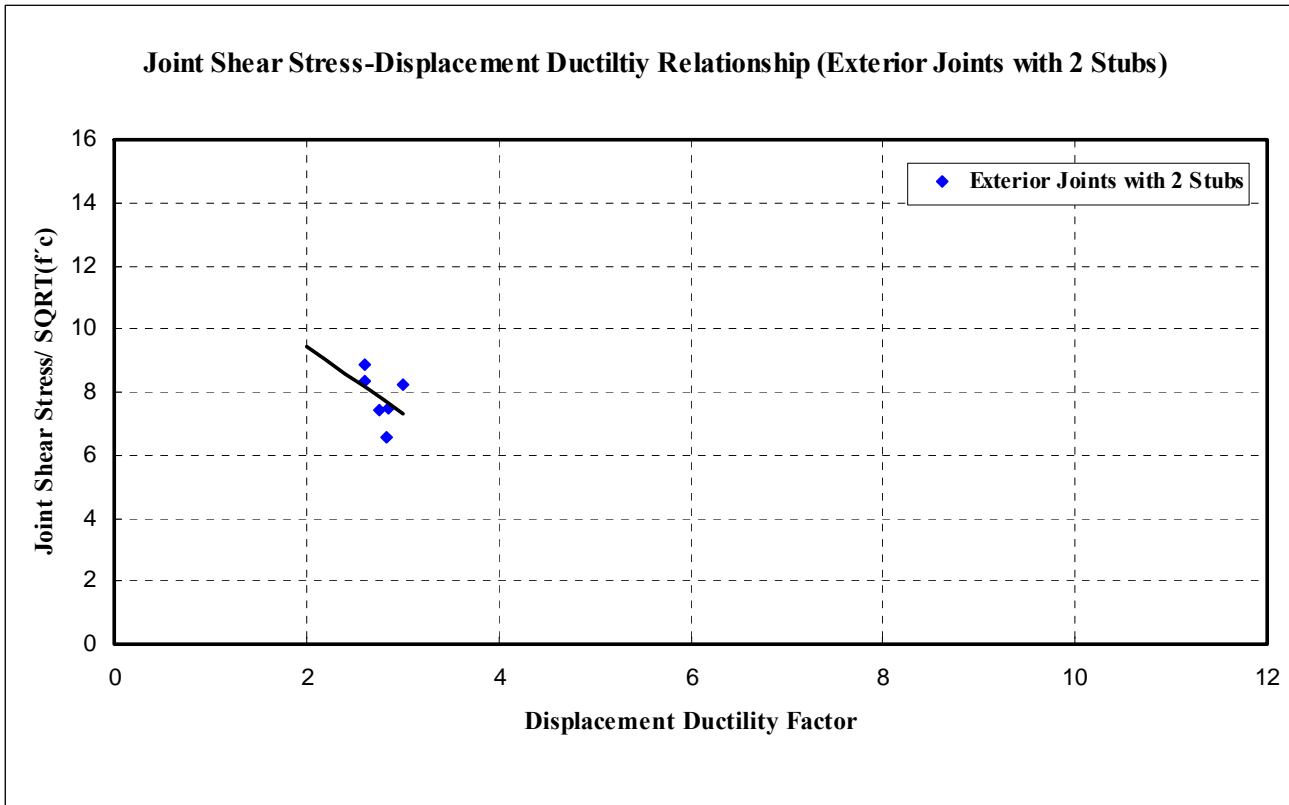
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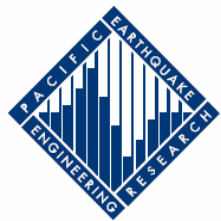
NON-DUCTILE EXTERIOR JOINT with TWO SPANDRELS



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PART 2

Corner Non-Ductile Joints



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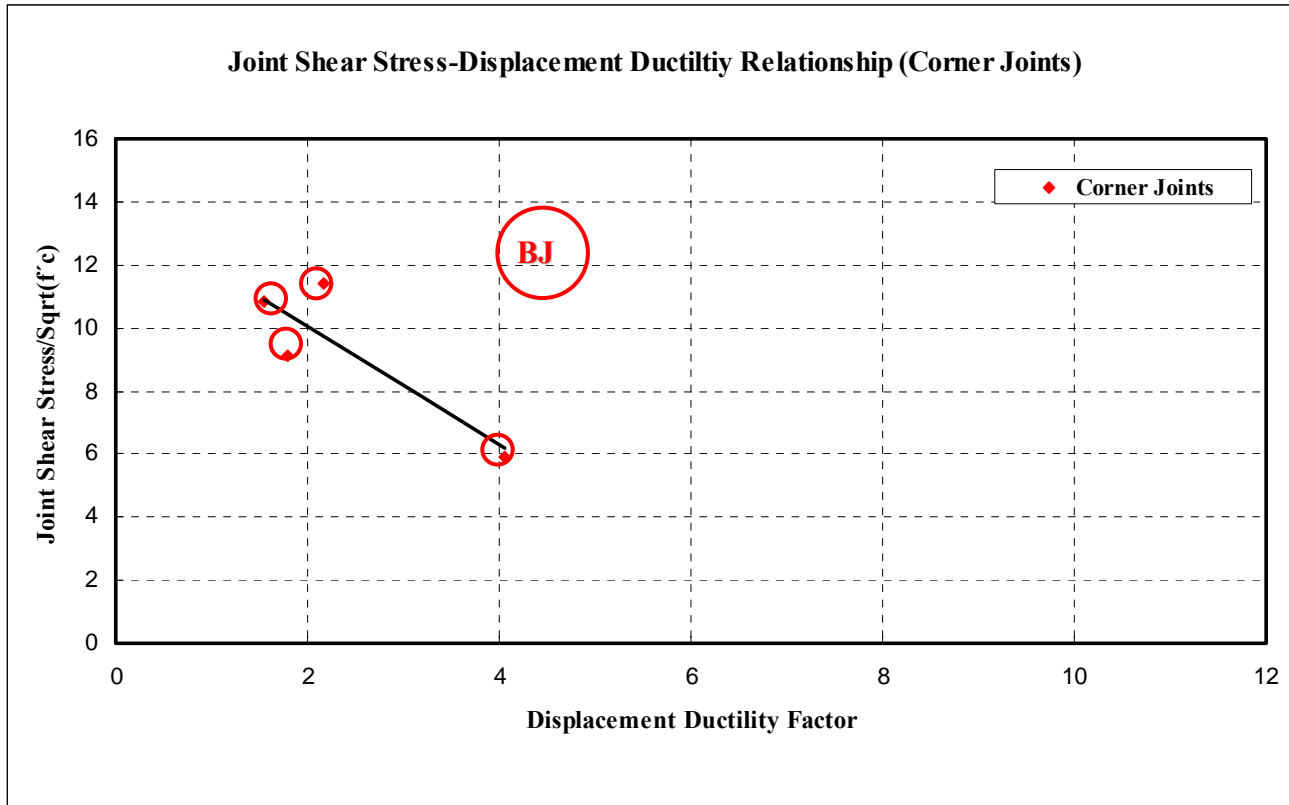
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CORNER NON-DUCTILE JOINTS



Suggested $\gamma = 11.50$

Suggested $\mu = 3.5$



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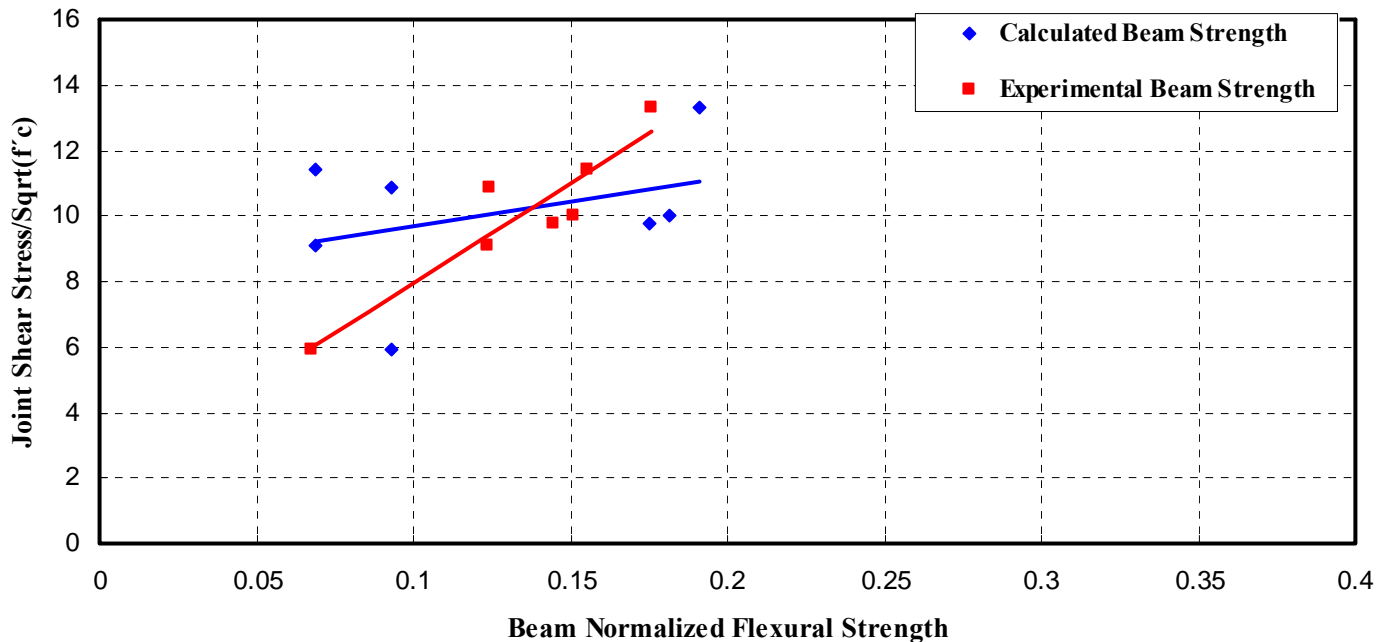
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CORNER NON-DUCTILE JOINTS

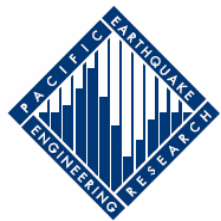
Joint Shear Stress-Beam Flexural Capacity Relationship (Corner & Corner Simulated Joints)



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PART 3

TENTATIVE FULL SCALE CORNER BEAM COLUMN JOINT TEST Biaxial Loading Suggestion



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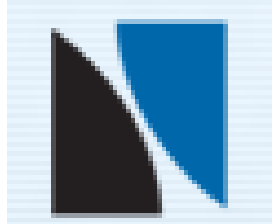




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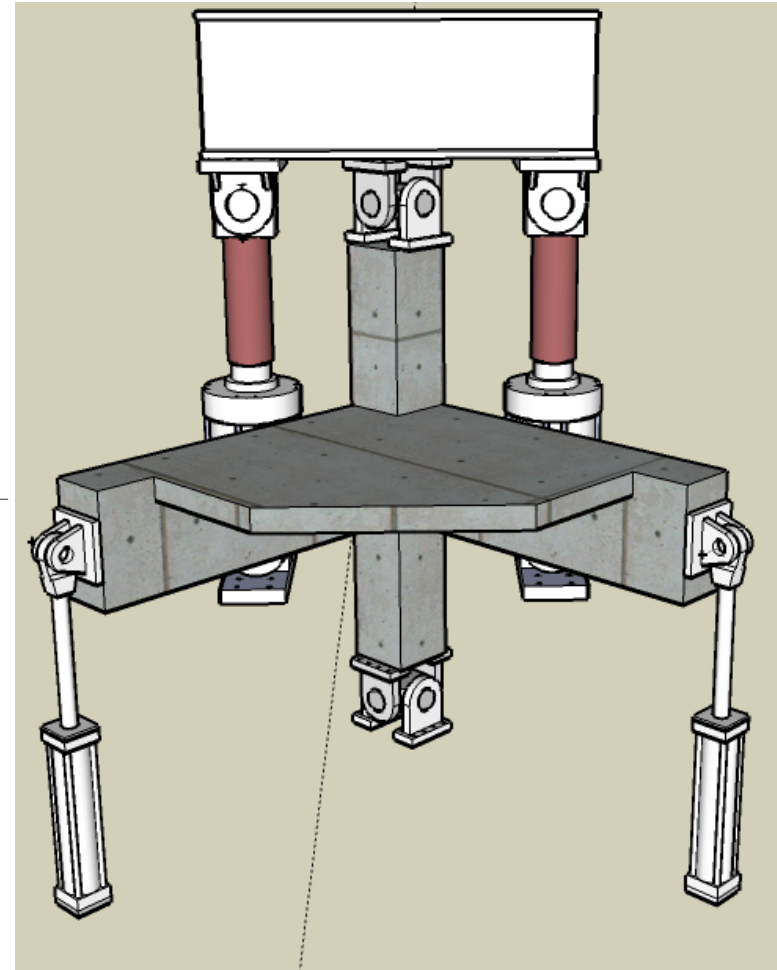
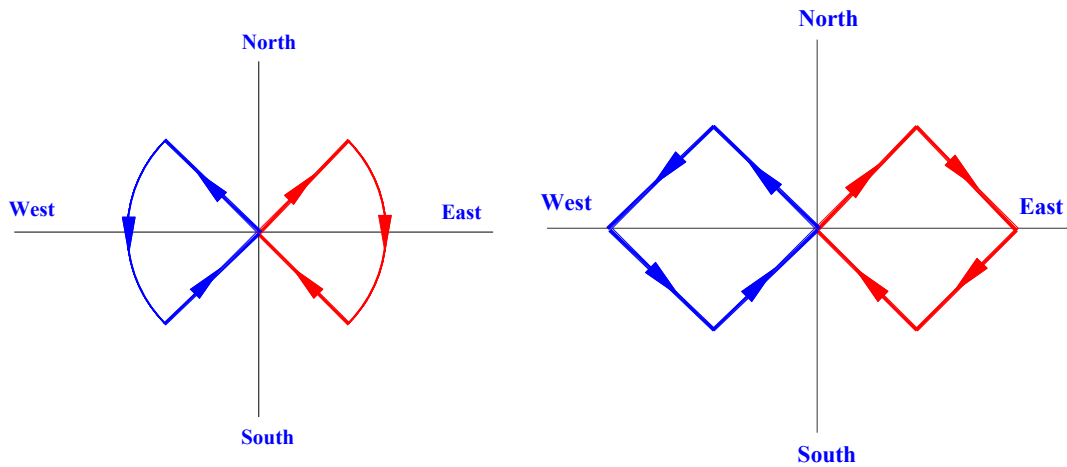
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-Lateral Load

-Two 120 Kips Beam Act.

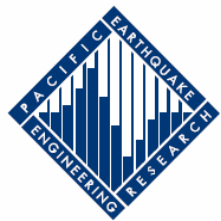
-Realistic Bidirectional Loading



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Thank You



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