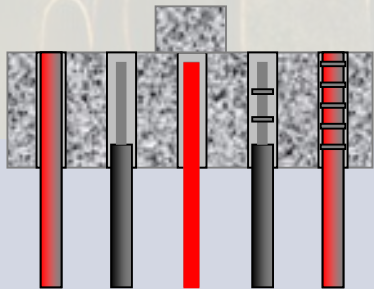



Summary of Research on Micropile to Footing Connections

Helen Robinson, P.E., D.GE
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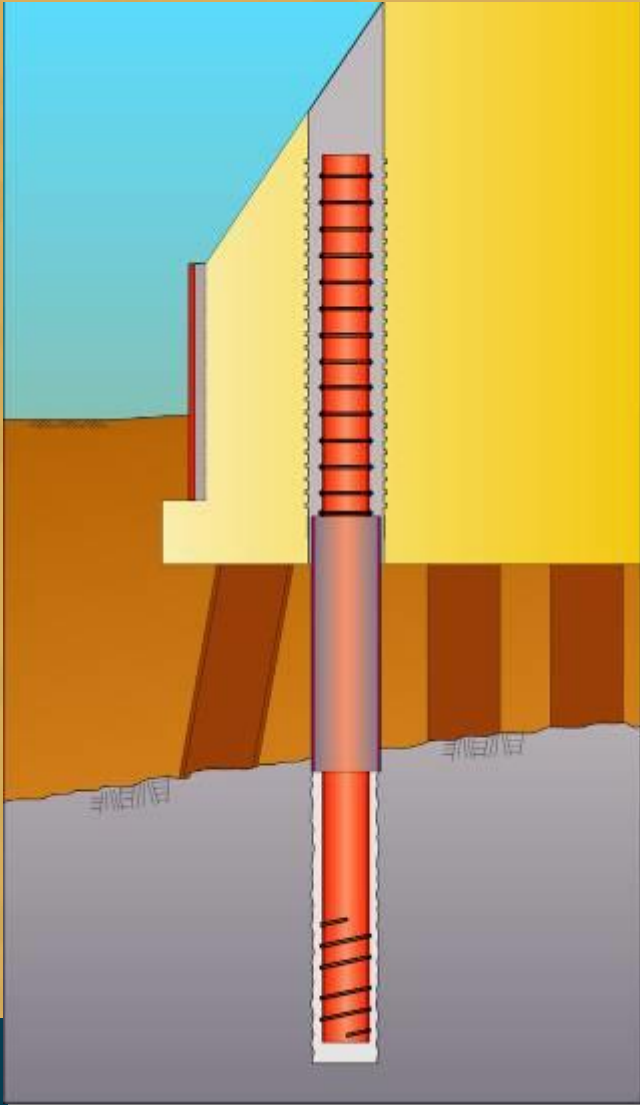


Outline



- ❑ Bonded connections
 - ❑ Previous and recent investigations
 - ❑ Findings
 - ❑ Design Implications
- 

“Bonded” connection

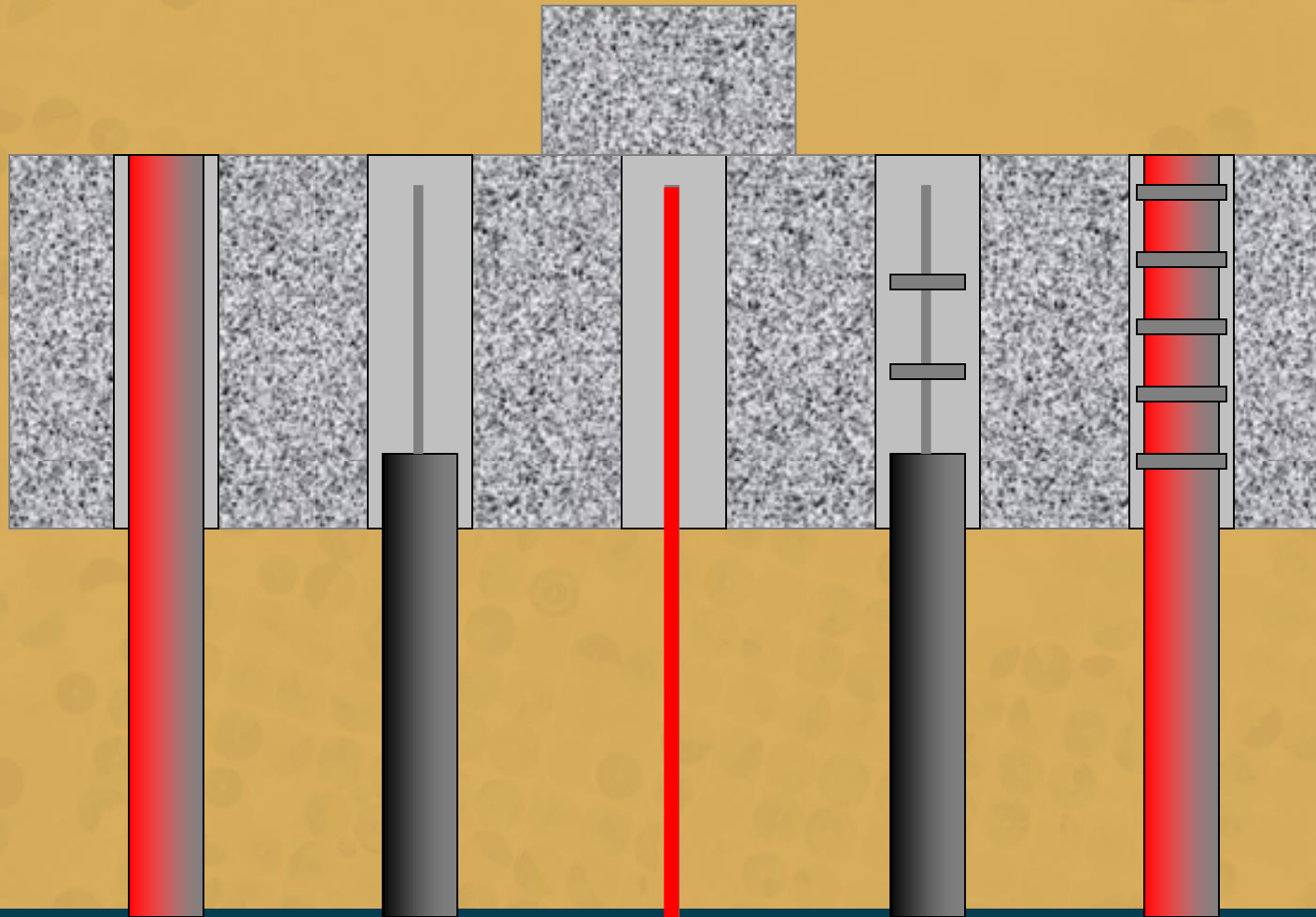


Micropile installed through footing

“Bonded” to footing

Design requires evaluation of connection “bond” strength

Bonded connection types



2005 experimental program



- 4.5" OD (114.3 mm) Casing, API N80
- 0.531" Wall thickness (13.5 mm)
- 1.75" OD (44.5 mm) thread bar
- $F_y = 75$ KSI (517 MPa)

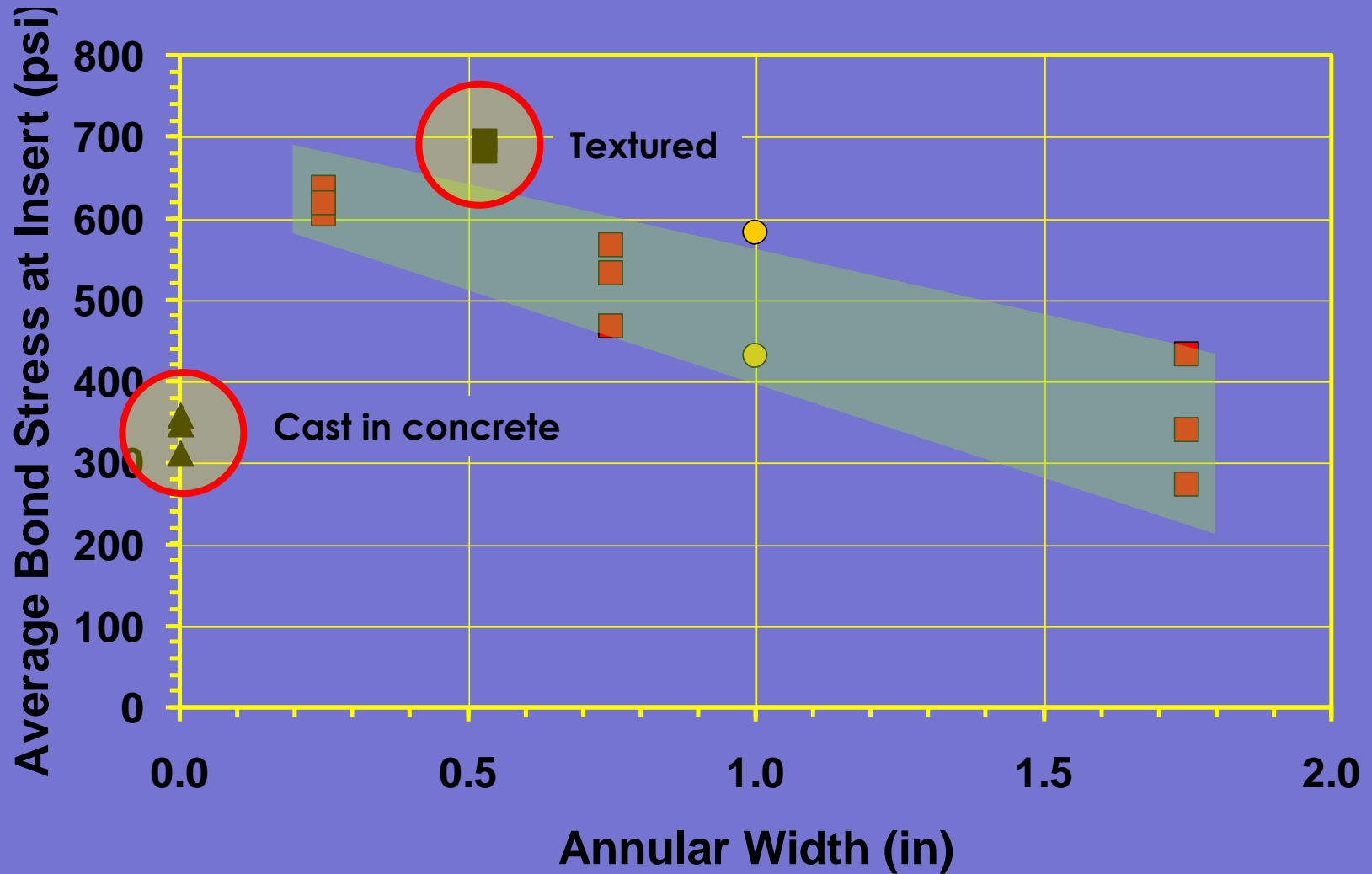
2005 experimental program



2005 experimental program



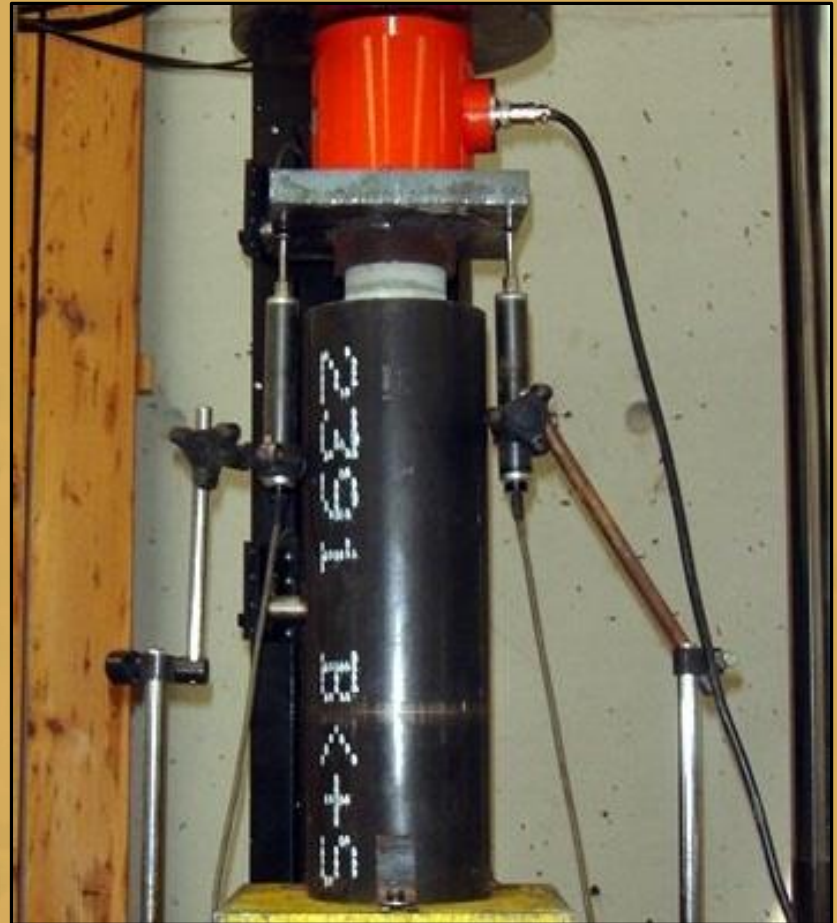
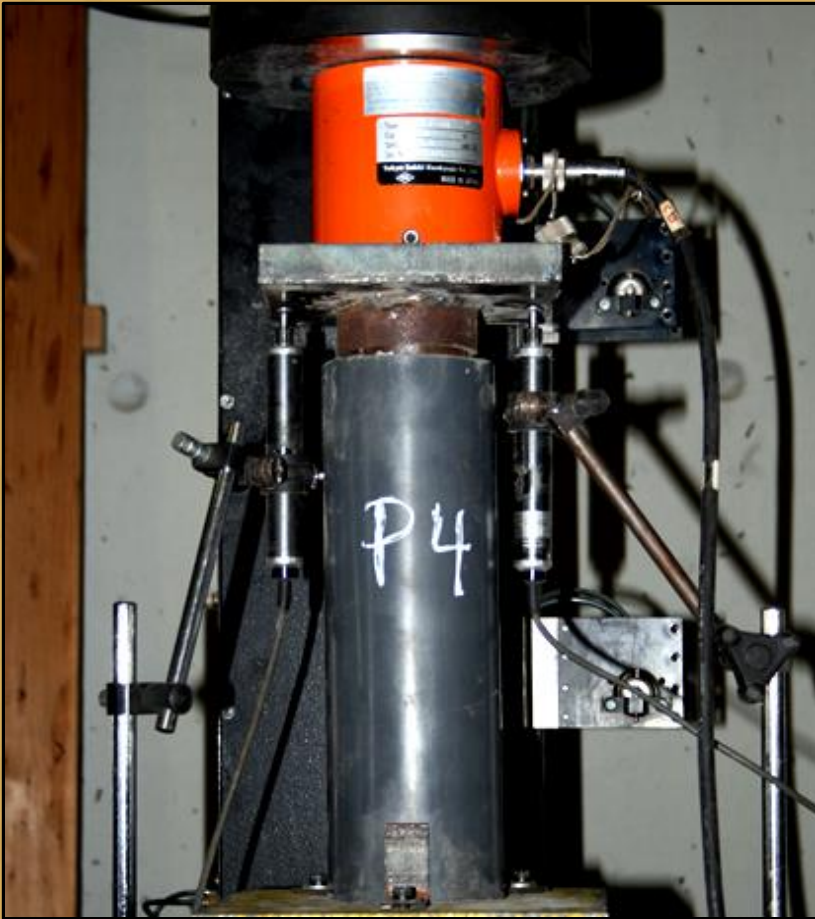
2005 experimental program



2012 experimental program



2012 experimental program



2012 experimental program



2012 experimental program



2012 experimental program



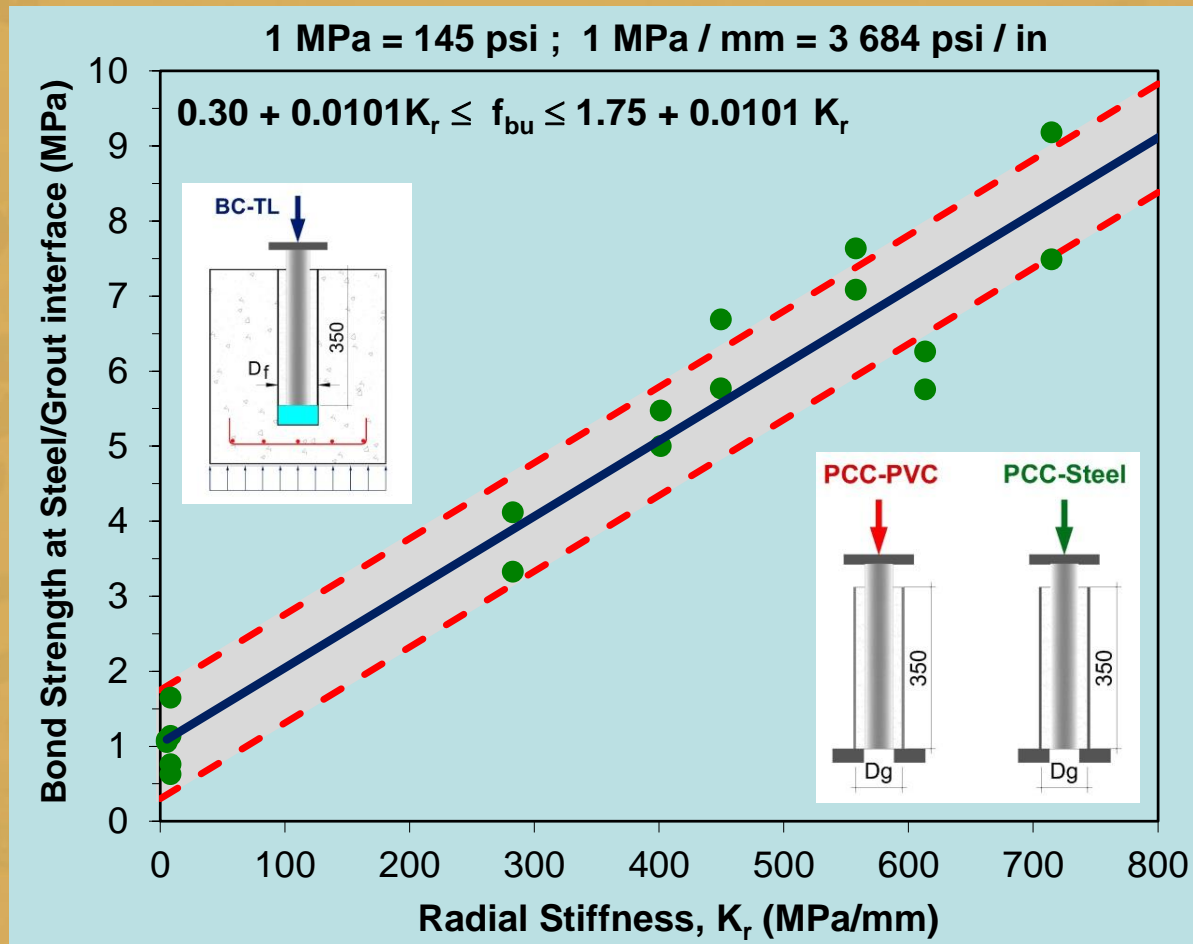
2012 experimental program



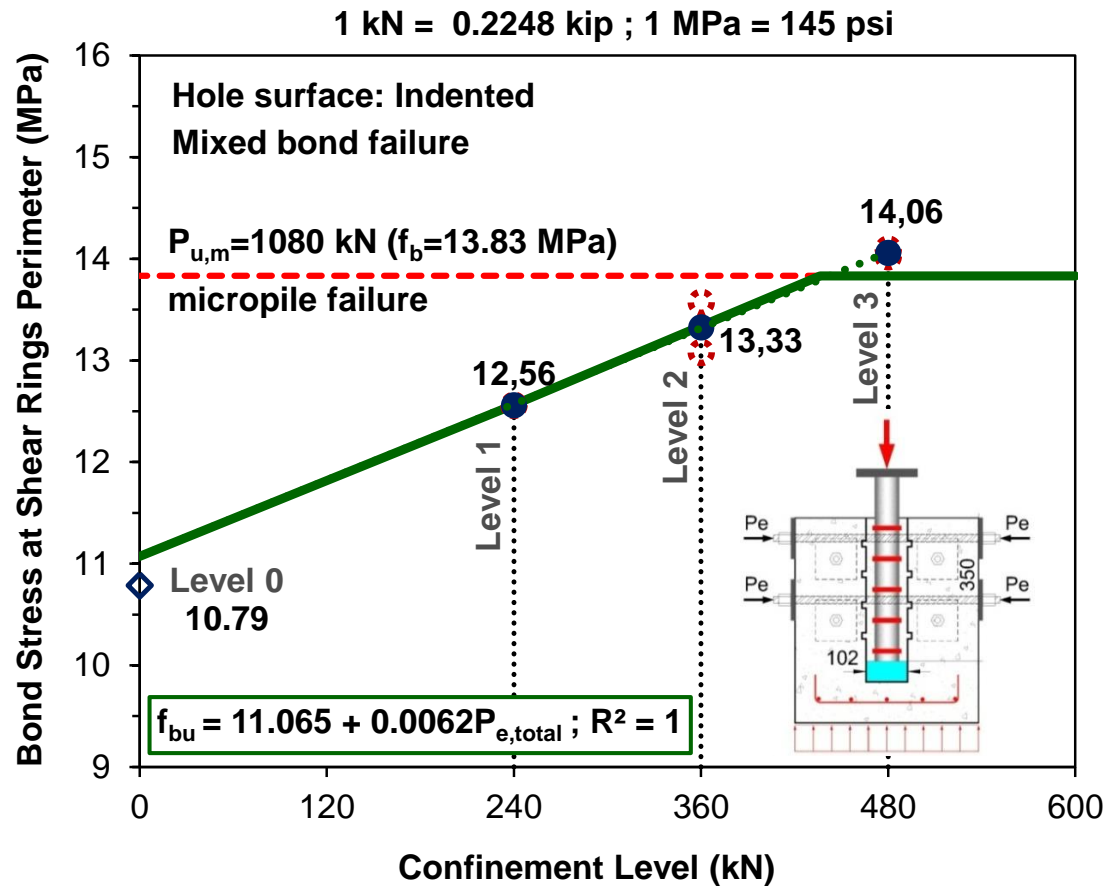
2012 experimental program



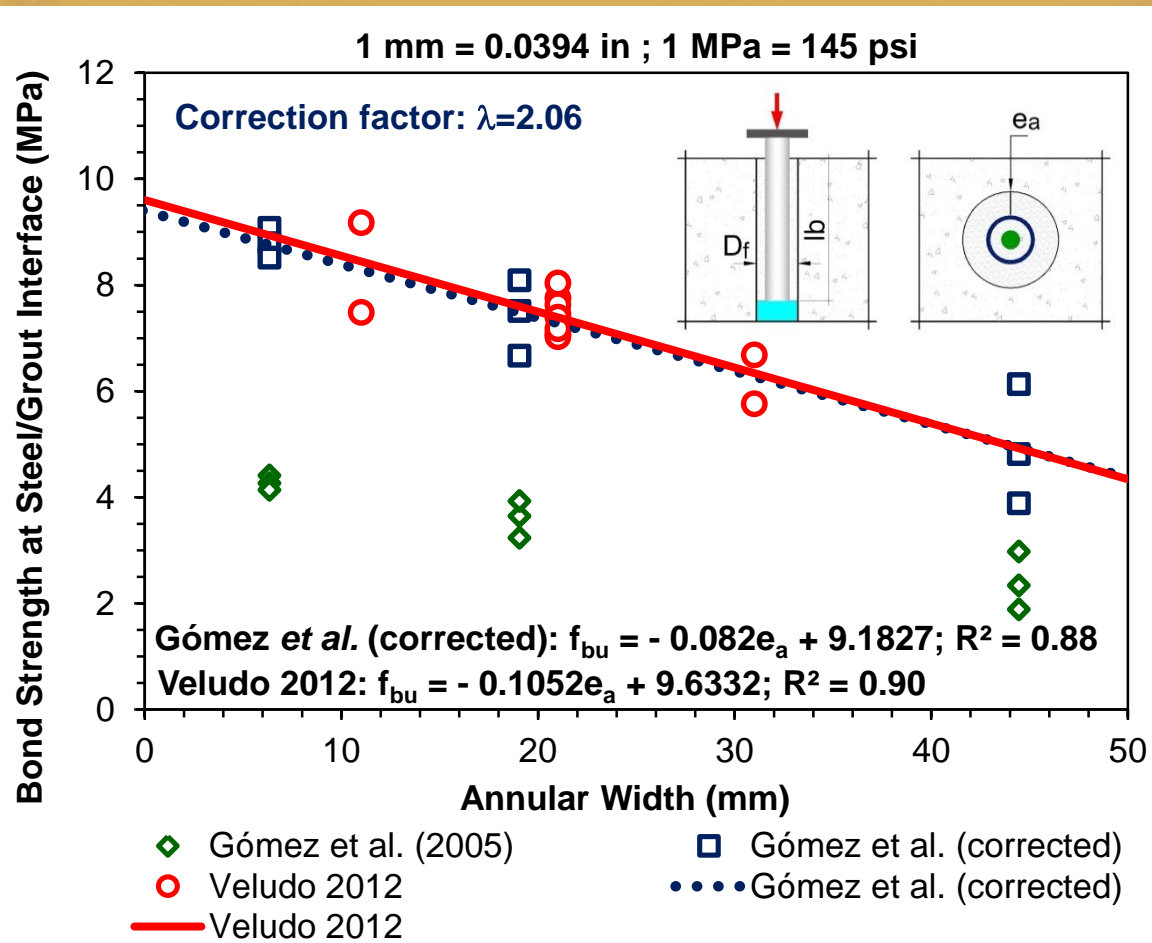
2012 experimental program



2012 experimental program



2012 experimental program



Conclusions

- q Findings are significant for practical design
- q Friction, not adhesion, is the most significant component of capacity in confined connections
- q Level and type of confinement control capacity and stiffness of connection
- q Unreinforced footing
 - Concrete provides confinement up to its tensile failure
 - Connection failure is sudden and catastrophic
 - Shear rings and grooving not very effective

Conclusions



q Reinforced footing

Rebar provides passive confinement

More rebar more capacity and more ductility

Shear rings and/or grooves increase capacity

q Data now available quantifies influence of various factors on connection capacity

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- 

Thank you



Questions?
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Connection through Bearing



New footings

Load transfer through bearing at micropile head

Design based on bearing stresses to concrete

One Noma Station, Washington, DC



Design

- q How to calculate the capacity of the connection?
- q There is currently no design procedure available for micropile-to-footing connections
- q Cannot establish one “bond” value for all situations
- q 2005 and 2012 research efforts

2005 experimental program

- q Connection capacity is controlled by friction, not bond or adhesion
- q Larger drill hole decreases connection capacity
- q Shear rings and grooves don't do as much if footing reinforcement not present
- q Can we improve connection with external reinforcement?

2012 experimental program



2012 experimental program

