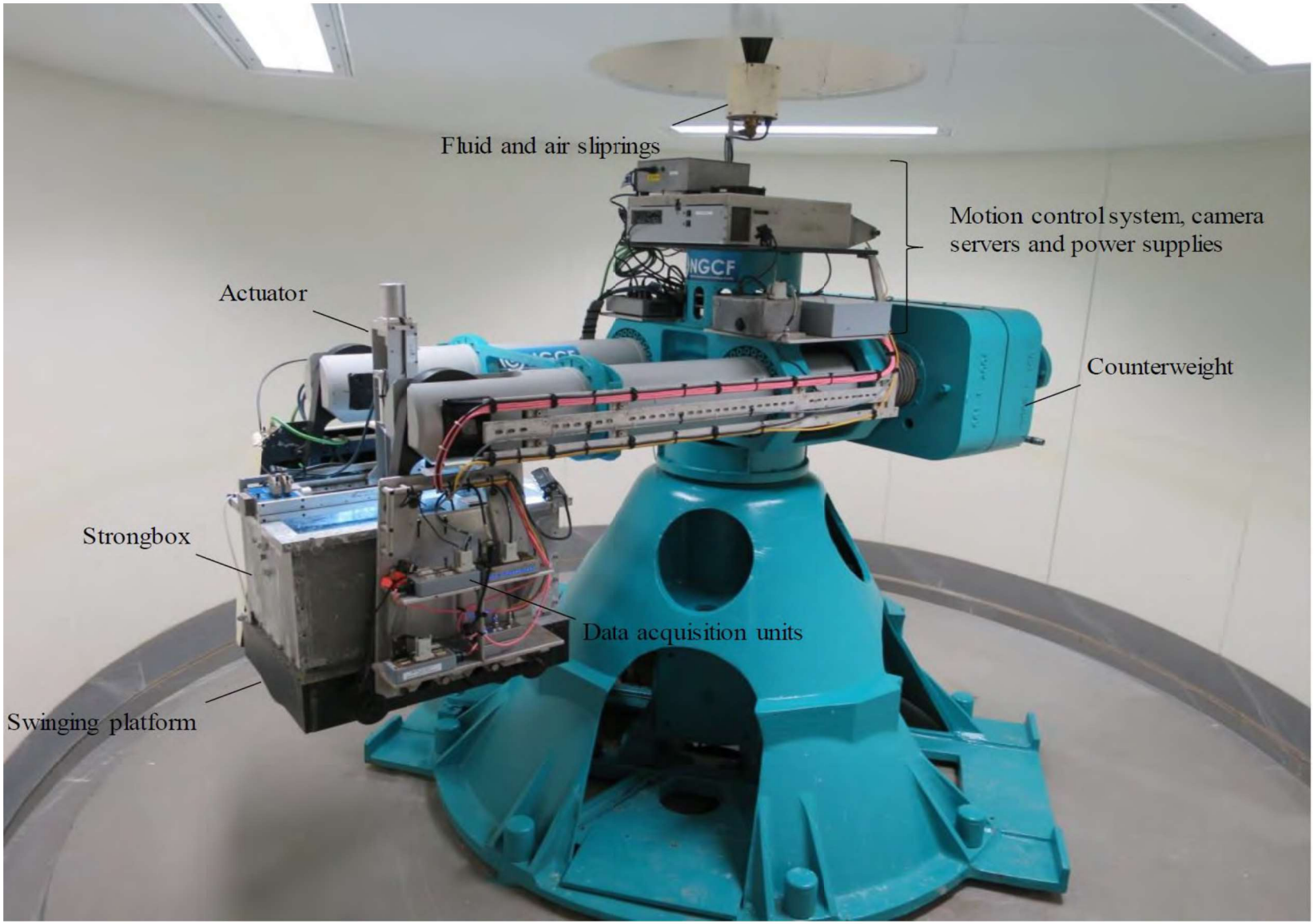
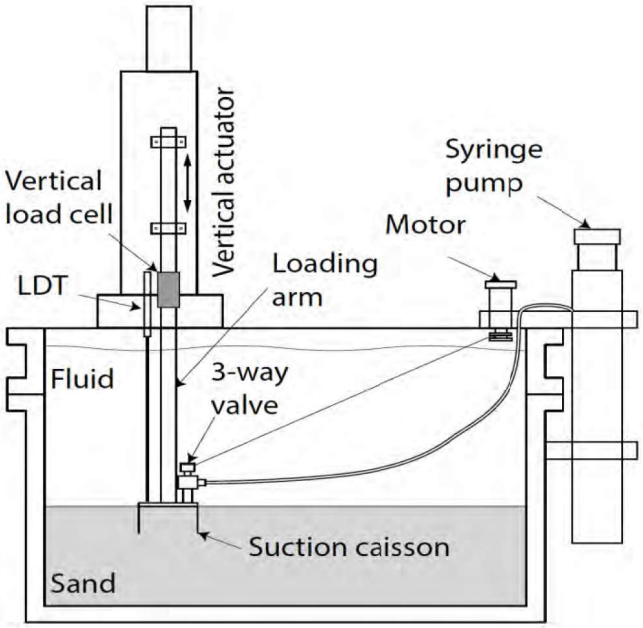
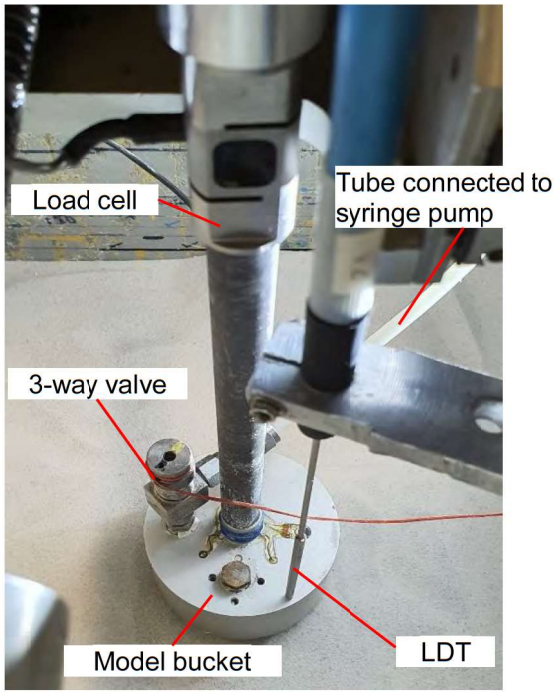
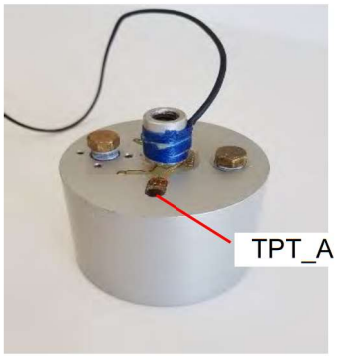


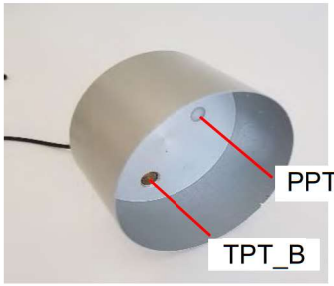
Plate 1: UWA Beam Centrifuge





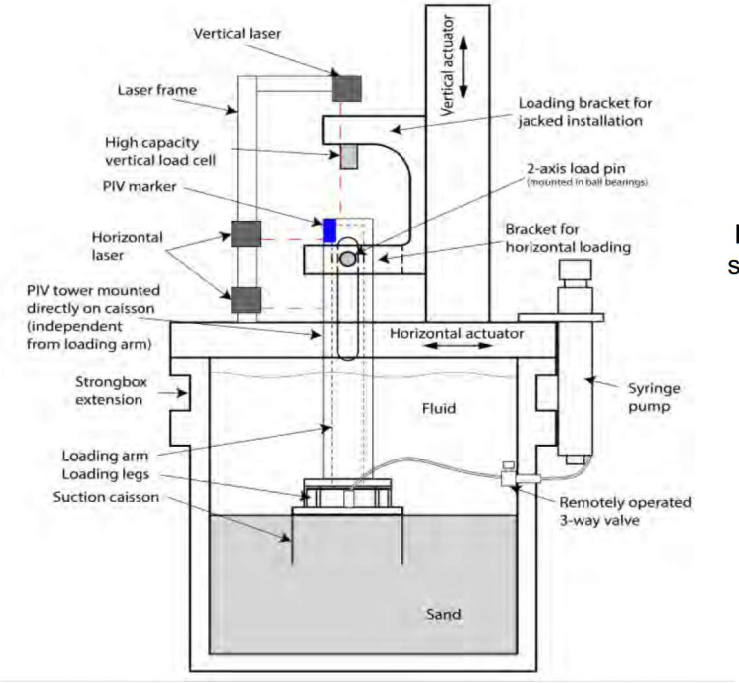
Model bucket with 80 mm diameter and 40 mm skirt

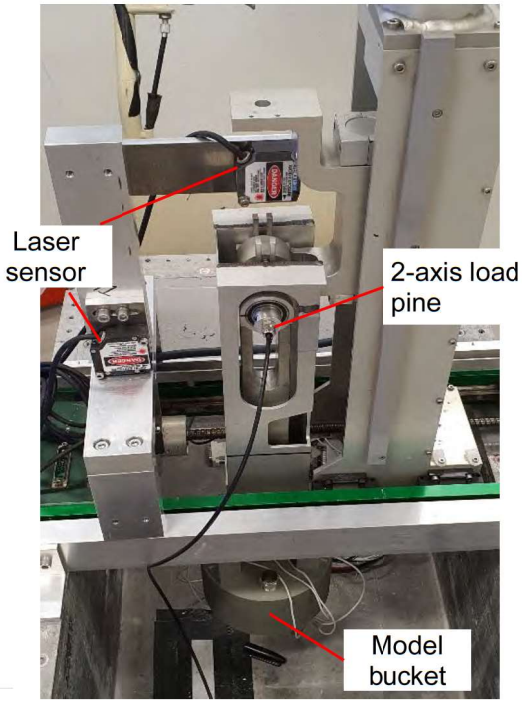




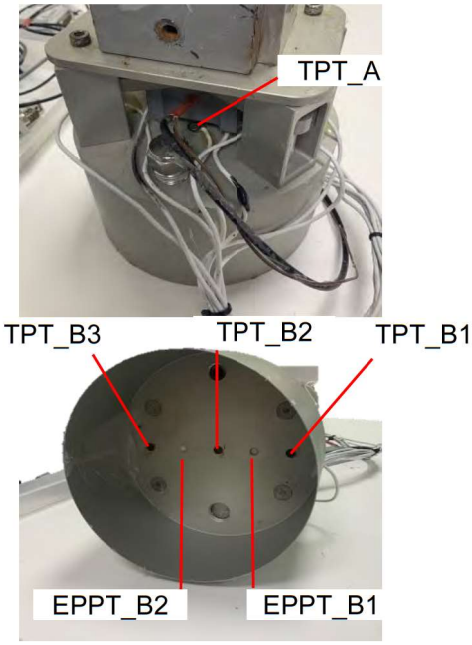
TPT_A = Total pressure transducer above bucket lid
TPT_B = Total pressure transducer beneath bucket lid
PPT_B = Pore pressure transducer beneath bucket lid
LDT = Linear displacement transducer

Plate 2: Experimental Arrangement (Multi-bucket Test)





Model bucket with 140 mm diameter and 70 mm skirt



TPT_A = Total pressure transducer above bucket lid
TPT_B1 = Total pressure transducer at the 1st location beneath bucket lid
TPT_B2 = Total pressure transducer at the 2nd location beneath bucket lid
TPT_B3 = Total pressure transducer at the 3rd location beneath bucket lid
EPPT_B1 = Excess pore pressure transducer at the 1st location beneath bucket lid
EPPT_B1 = Excess pore pressure transducer at the 2nd location beneath bucket lid

Plate 3: Experimental Arrangement (Mono-bucket Test)

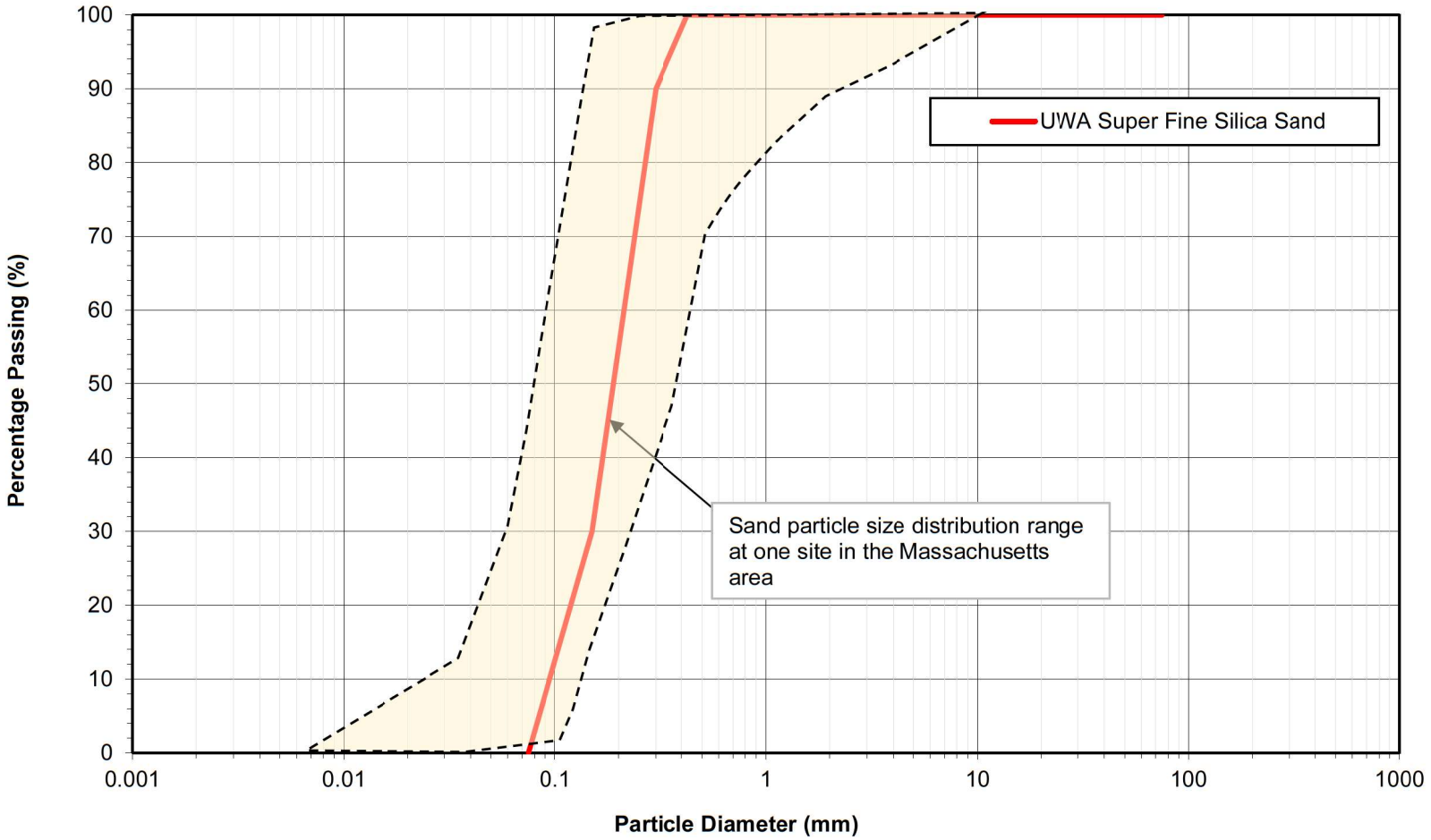
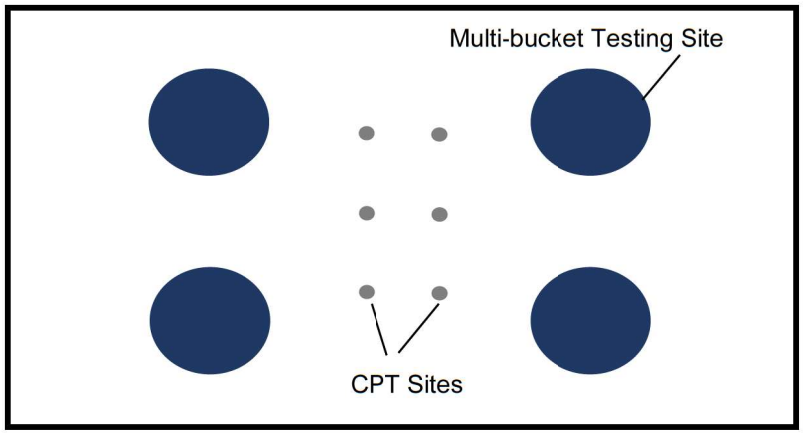


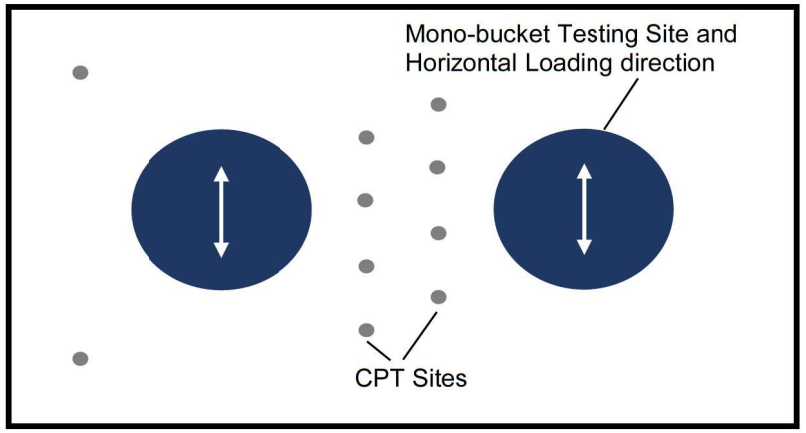
Plate 4: Particle Size Distribution Range for Sands at One of the OWF Sites in the Massachusetts Area

Multi-bucket Test Layout



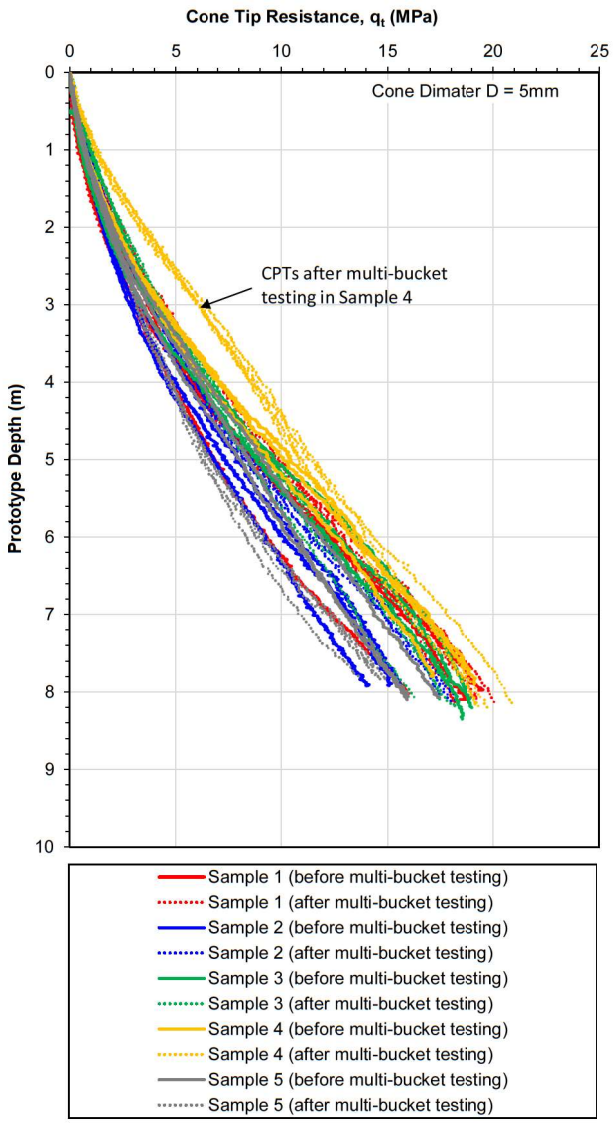
Strongbox dimension:
650 mm x 390 mm x 325 mm

Mono-bucket Test Layout

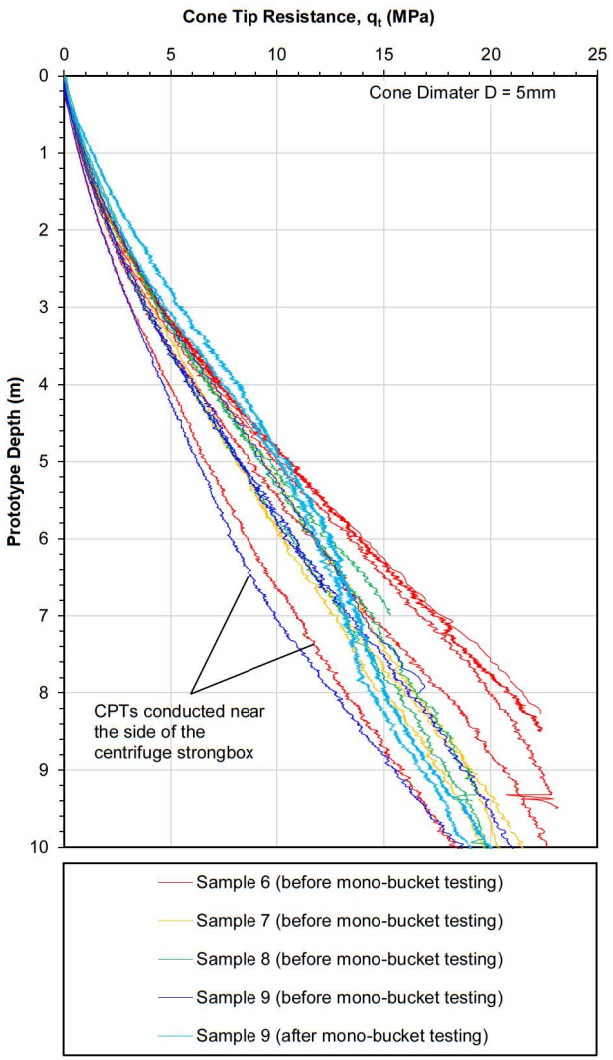


Strongbox dimension:
650 mm x 390 mm x 325 mm

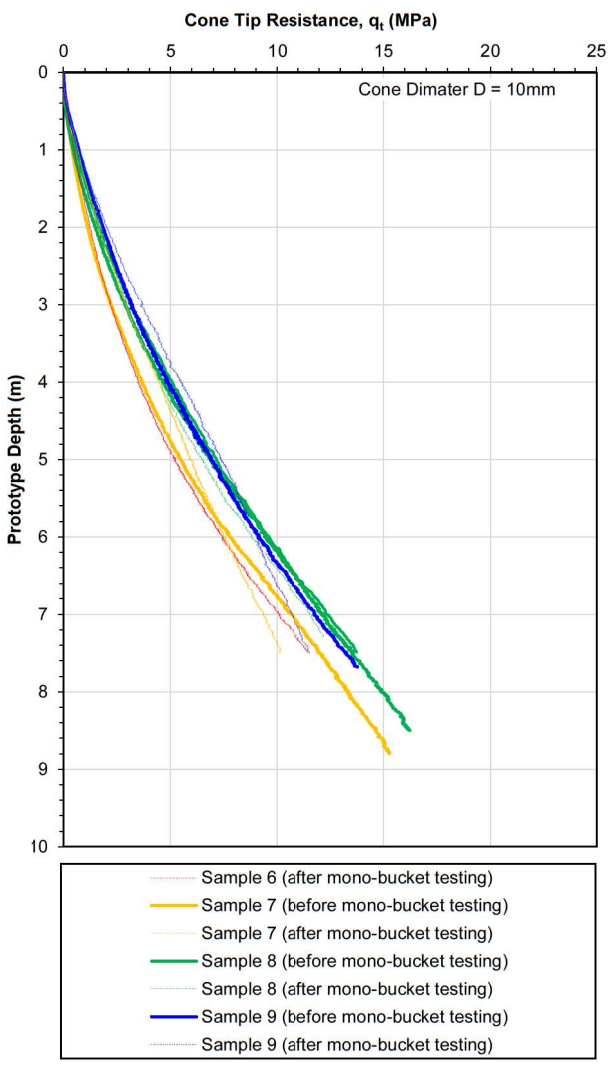
Plate 5: Test Layout for Multi-Bucket and Mono-Bucket Tests



(a) Samples 1 to 5 for Multi-Bucket Testing (Cone Diameter: 5mm)



(b) Samples 6 to 9 for Mono-Bucket Testing (Cone Diameter: 5mm)



(c) Samples 6 to 9 for Mono-Bucket Testing (Cone Diameter: 10mm)

Plate 6: CPT Profiles Measured in Centrifuge Soil Samples Used for Multi-Bucket and Mono-Bucket Tests

V: vertical load
H: horizontal load
M: moment at reference point
e: eccentricity of horizontal load relative to reference point

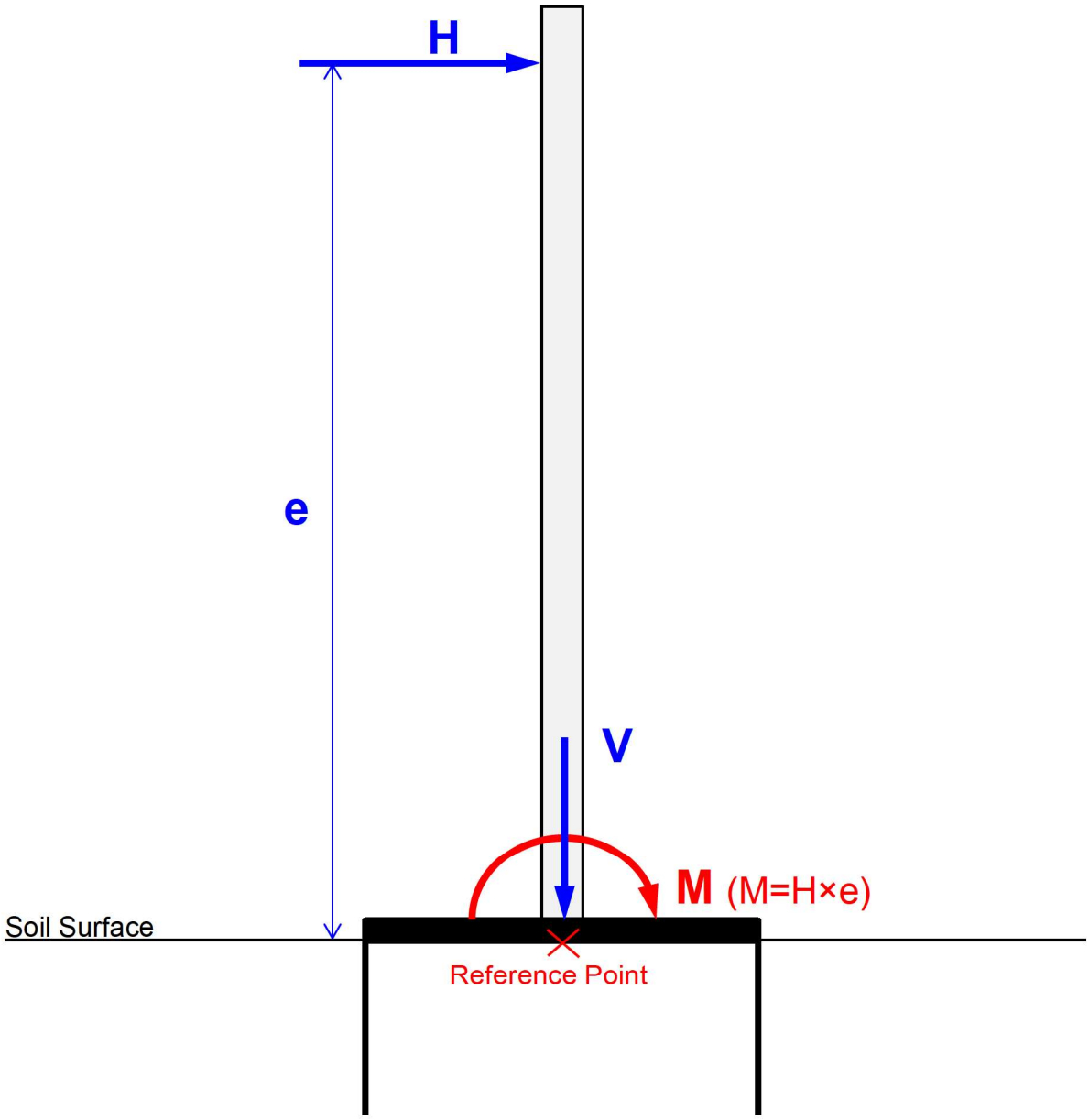
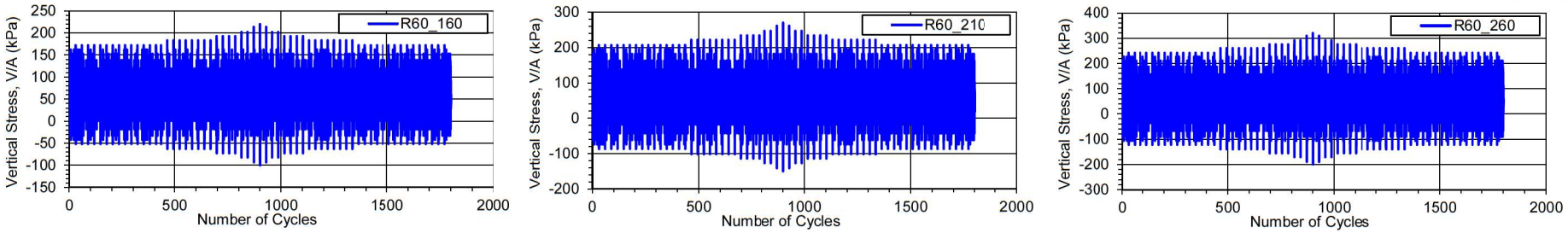
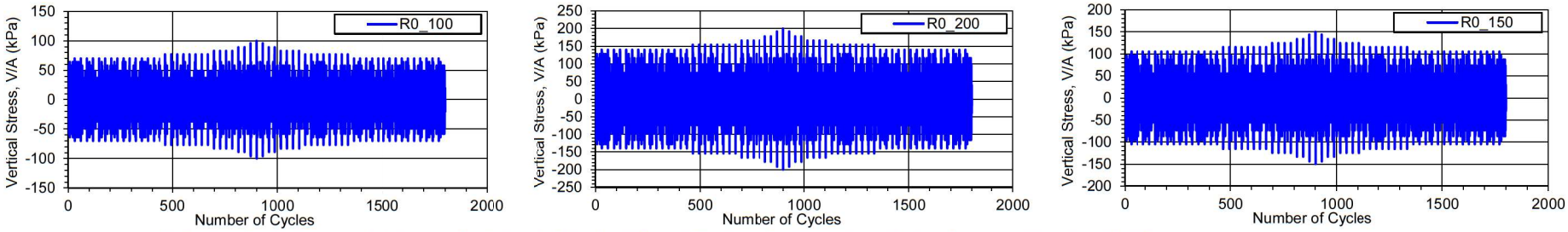


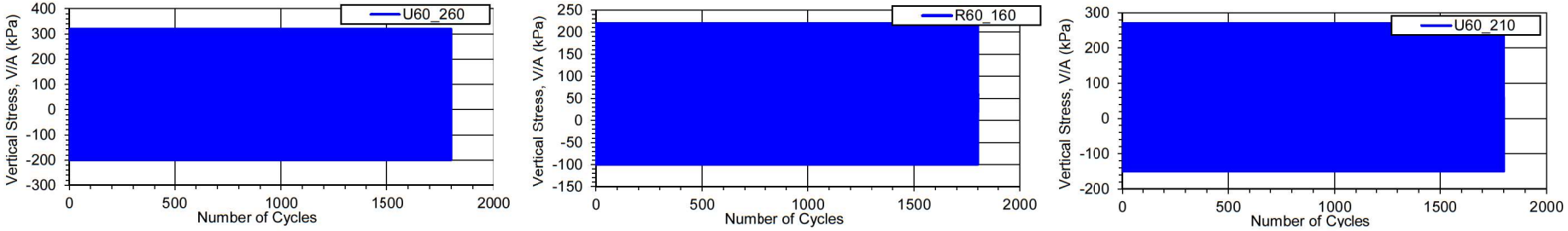
Plate 7: Definition of Loads in Mono-bucket Test



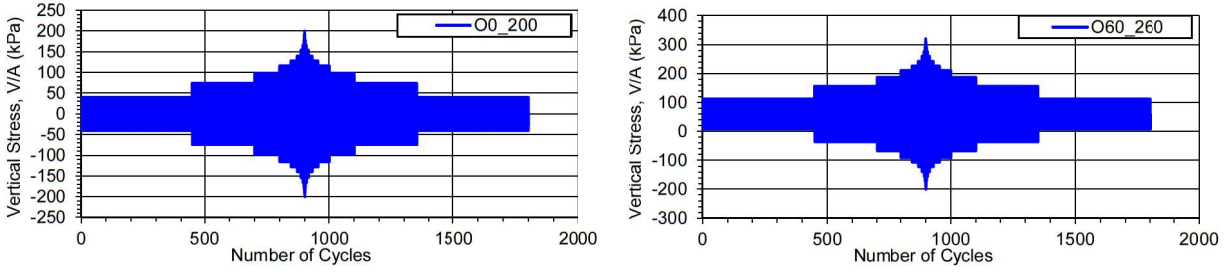
(a) Random Cyclic Loading with Average Cyclic load of V_{ave}/A = 60kPa and Maximum Cyclic Load Amplitude of V_{amp}/A = 160, 200 and 260kPa



(b) Random Cyclic Loading with Average Cyclic Load of V_{ave}/A = 0kPa and Maximum Cyclic Load Amplitude of V_{amp}/A = 100, 150 and 210kPa



(c) Uniform Cyclic Loading with Average Cyclic Load of V_{ave}/A = 60kPa and Maximum Cyclic Load Amplitude of V_{amp}/A = 160, 200 and 260kPa



(d) Ordered Cyclic Loading with Average Cyclic Loads of V_{ave}/A = 60kPa or 0kPa and Maximum Cyclic Load Amplitude of V_{amp}/A = 200kPa or 260kPa

Plate 8: Cyclic Load Packets (Multi-Bucket Test)

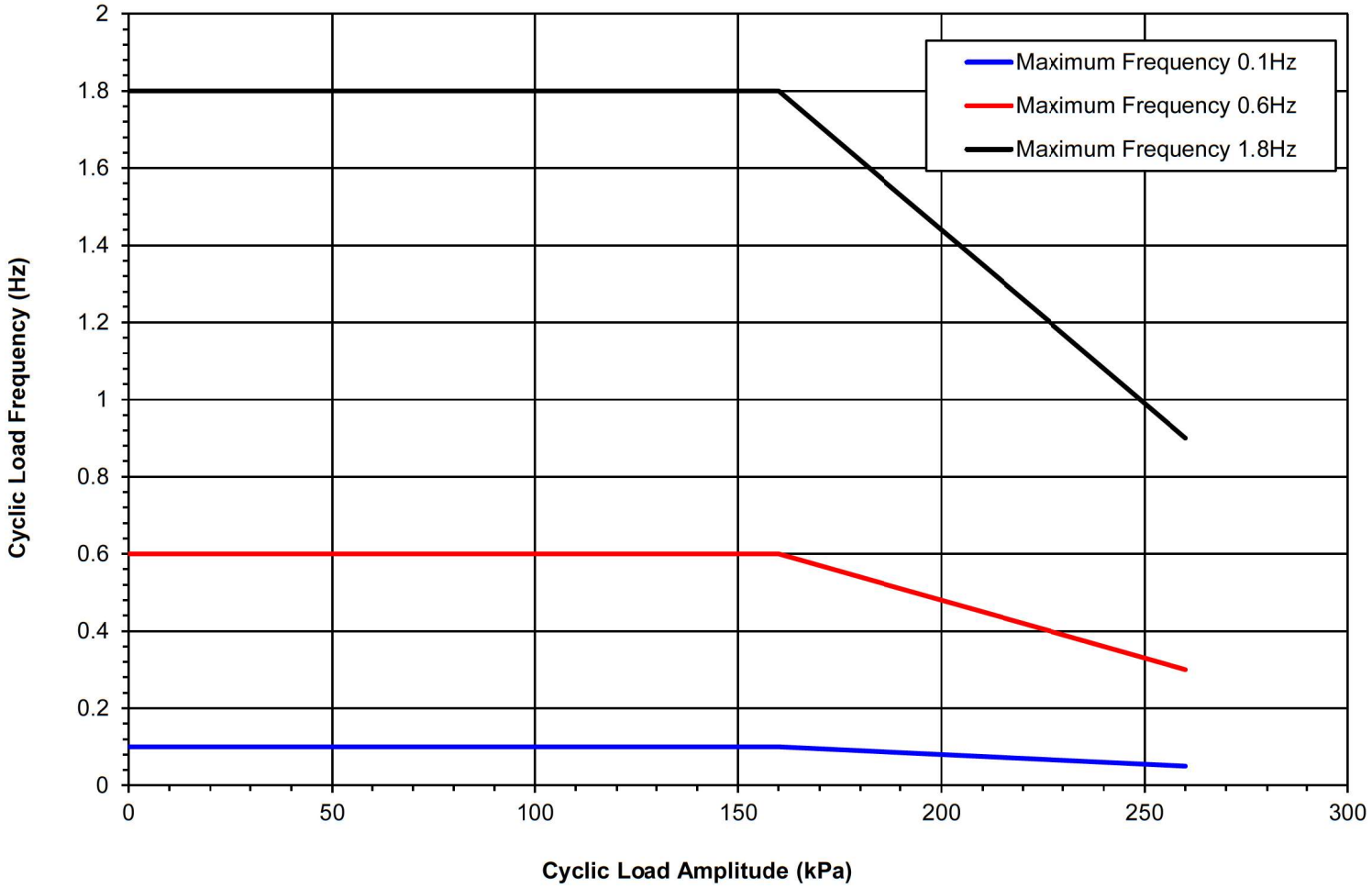
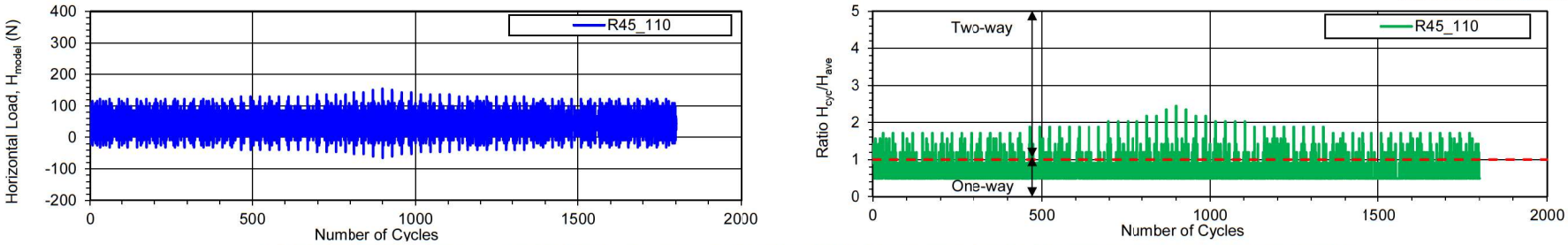
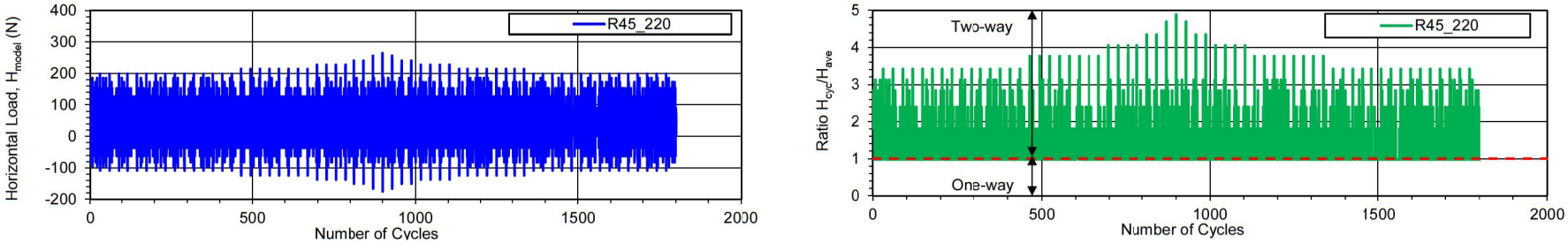


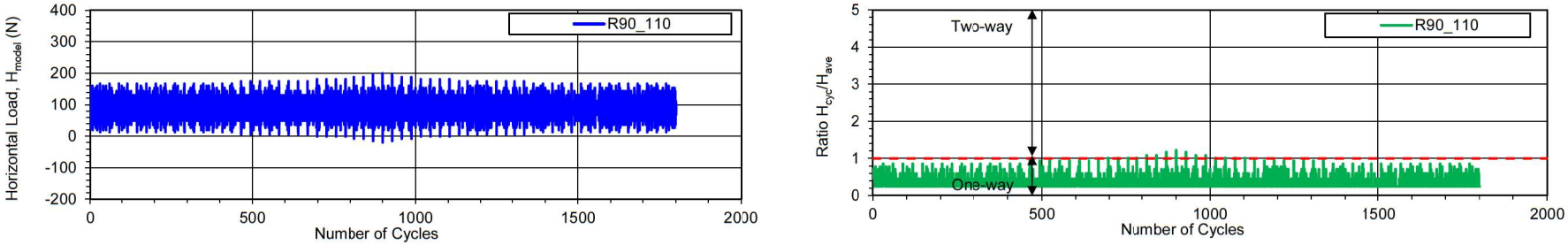
Plate 9: Relationships Between Cyclic Load Frequency and Cyclic Load Amplitude



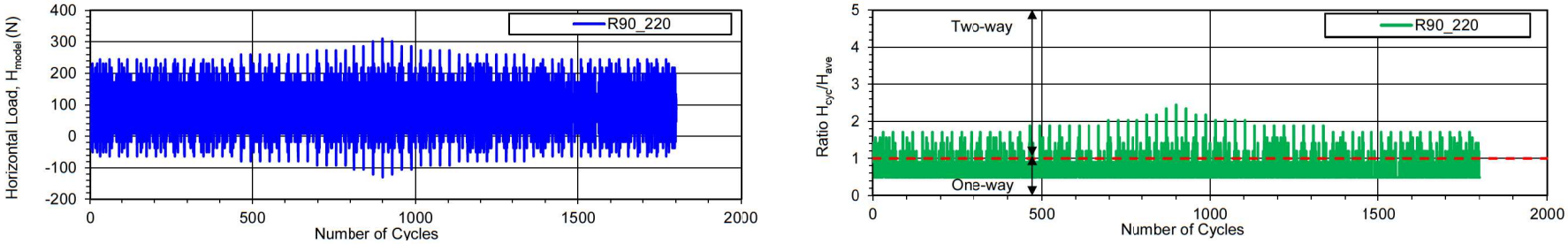
(a) Random Cyclic Loading with Average Cyclic Load of H_{ave} = 45N (model scale) and Maximum Cyclic Load Amplitude of H_{amp} = 110N (model scale)



(b) Random Cyclic Loading with Average Cyclic Load of H_{ave} = 45N (model scale) and Maximum Cyclic Load Amplitude of H_{amp} = 220N (model scale)



(c) Random Cyclic Loading with Average Cyclic Load of H_{ave} = 90N (model scale) and Maximum Cyclic Load Amplitude of H_{amp} = 110N (model scale)



(d) Random Cyclic Loading with Average Cyclic Load of H_{ave} = 90N (model scale) and Maximum Cyclic Load Amplitude of H_{amp} = 220N (model scale)

Plate 10: Cyclic Load Packets (Mono-Bucket Test)

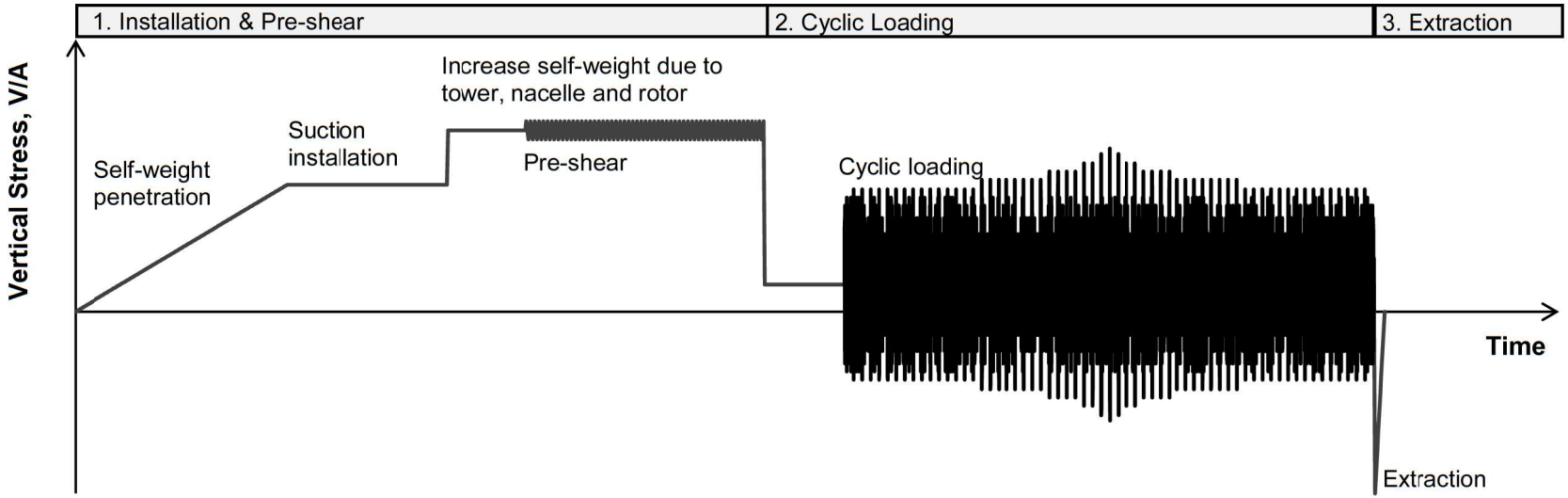


Plate 11: Centrifuge Testing Sequence (Multi-Bucket Test)

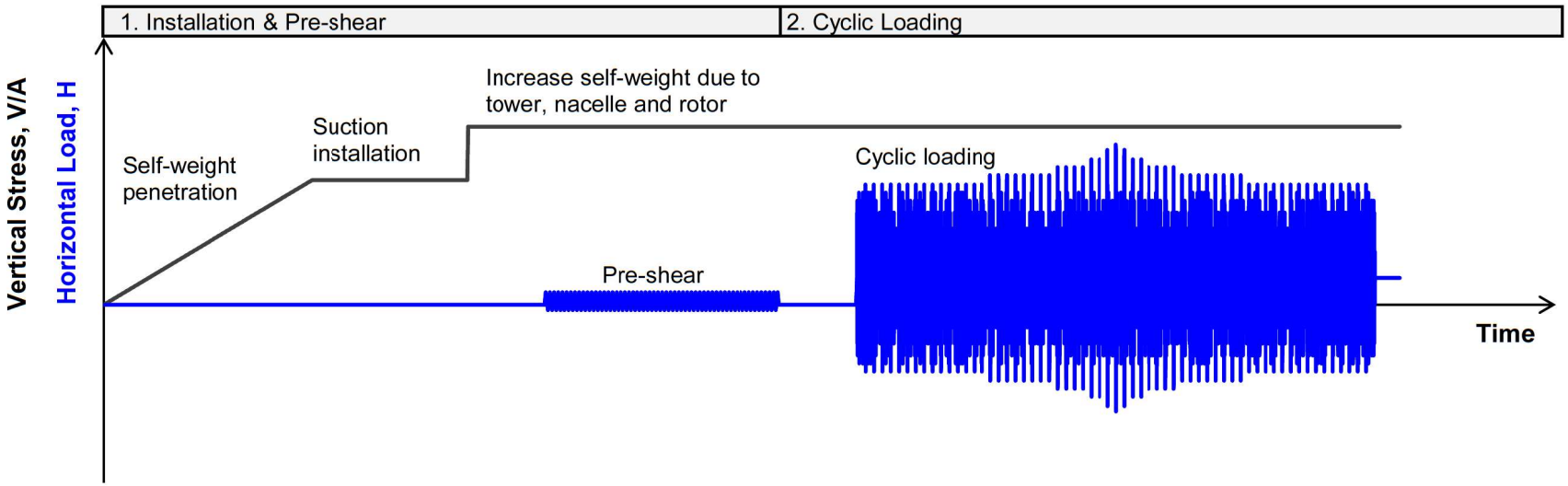
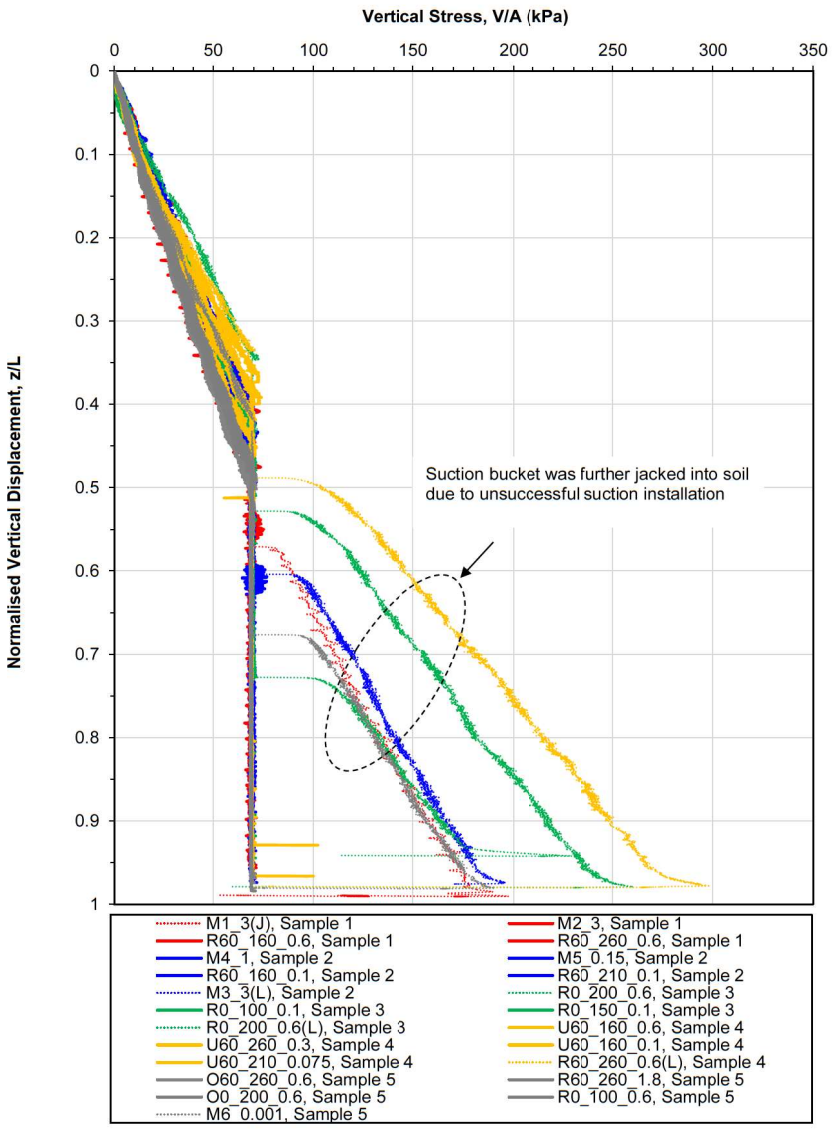
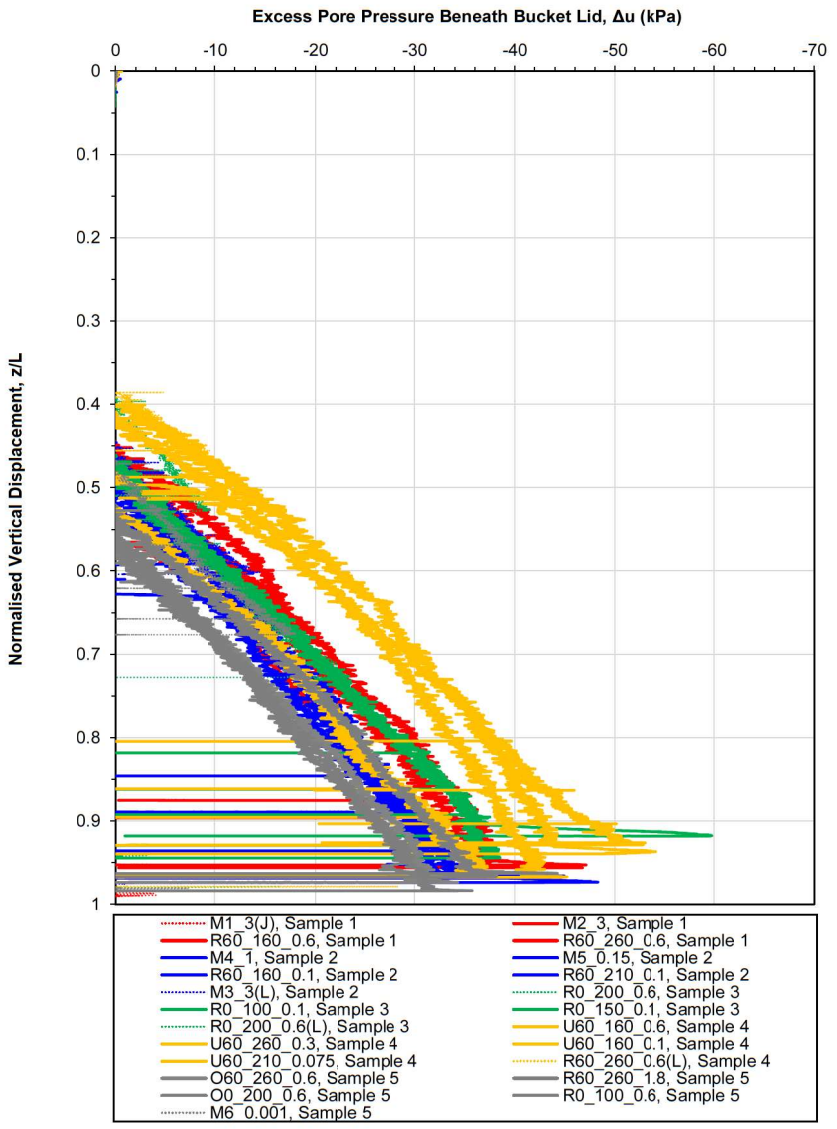


Plate 12: Centrifuge Testing Sequence (Mono-Bucket Test)

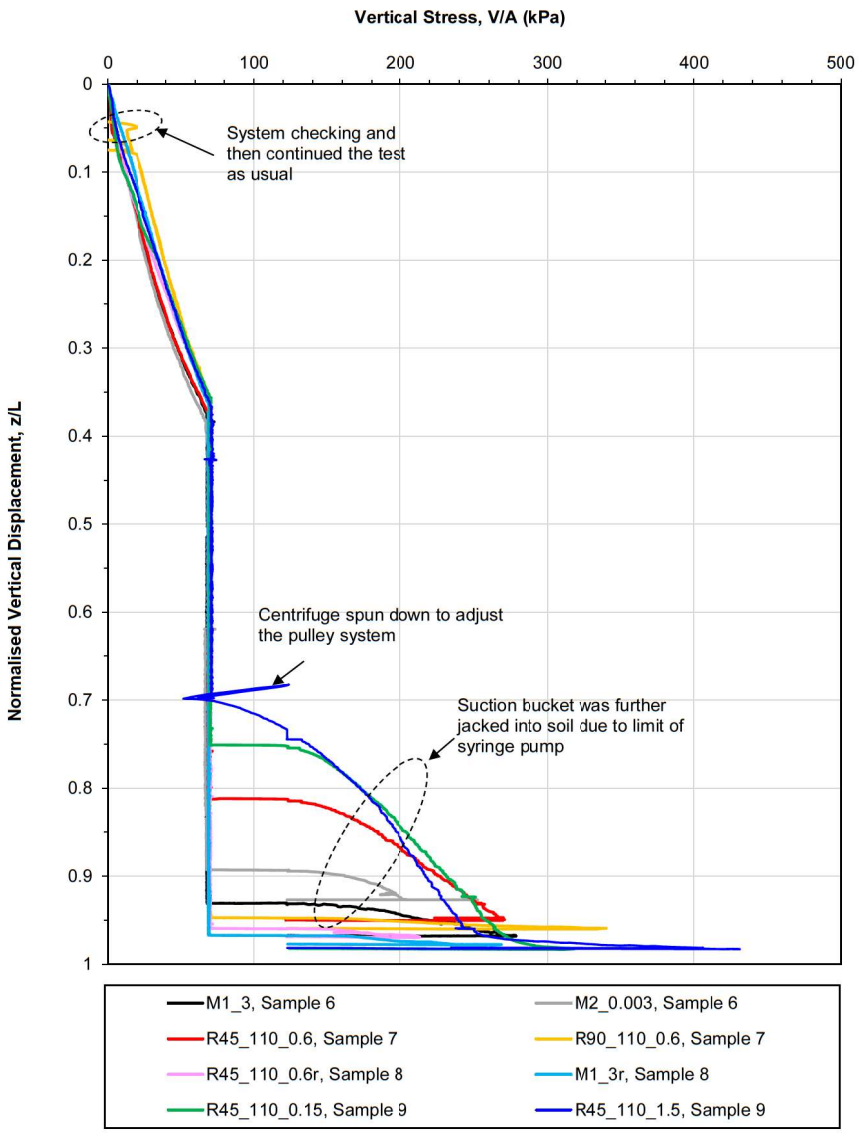


(a) Vertical Stress

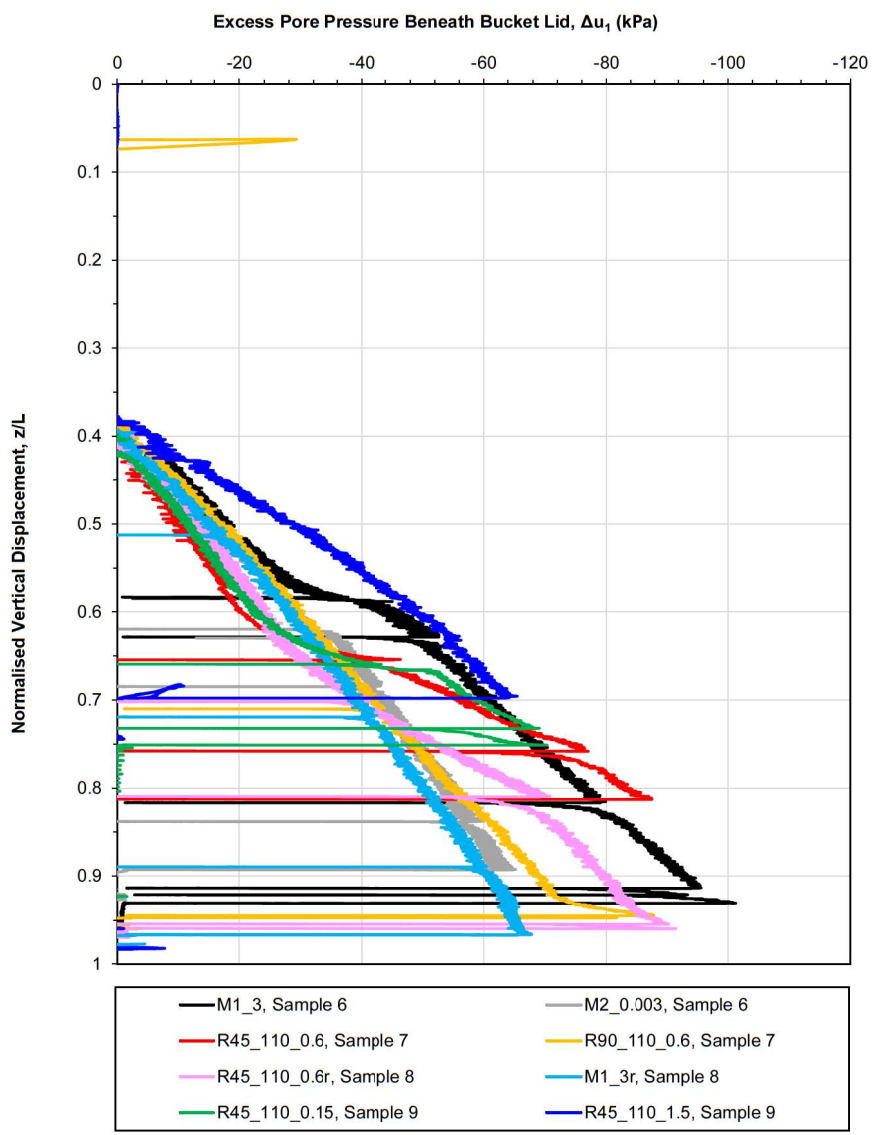


(b) Excess Pore Pressure Beneath Bucket Lid

Plate 13: Installation Responses (Multi-Bucket Test)

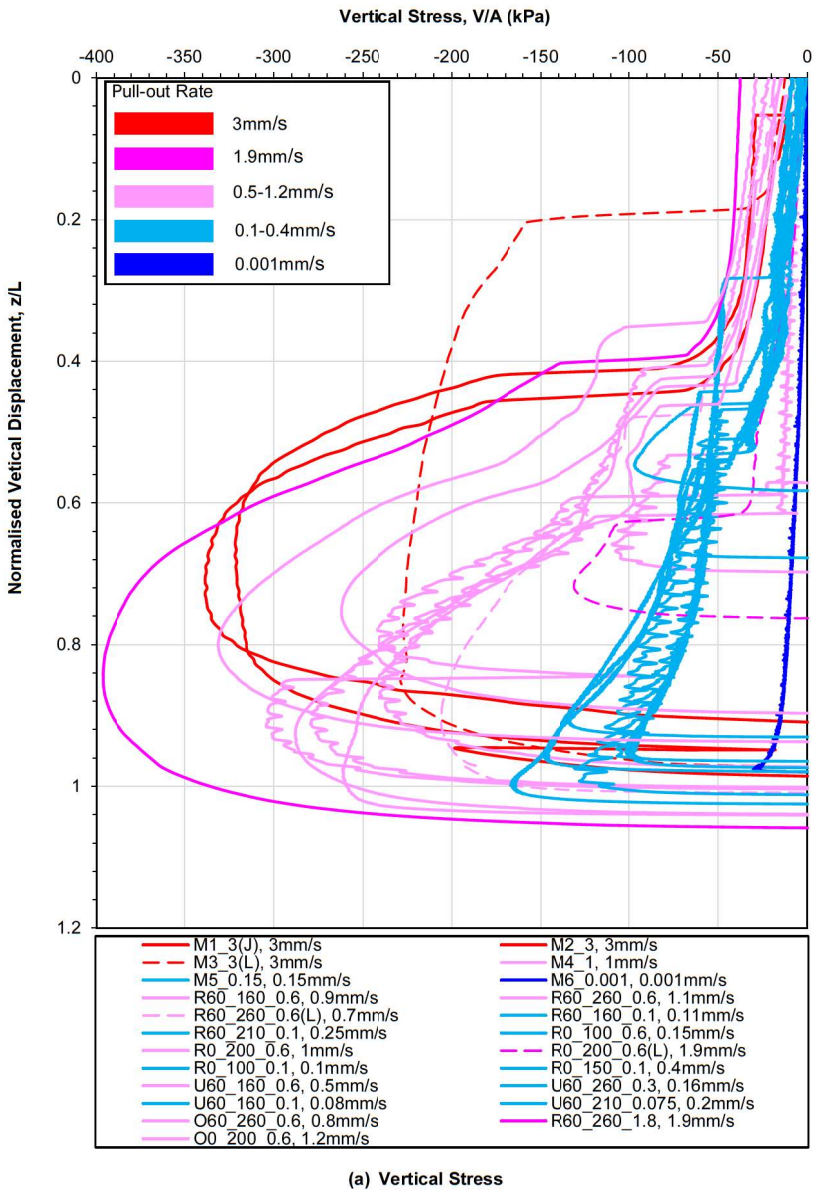


(a) Vertical Stress

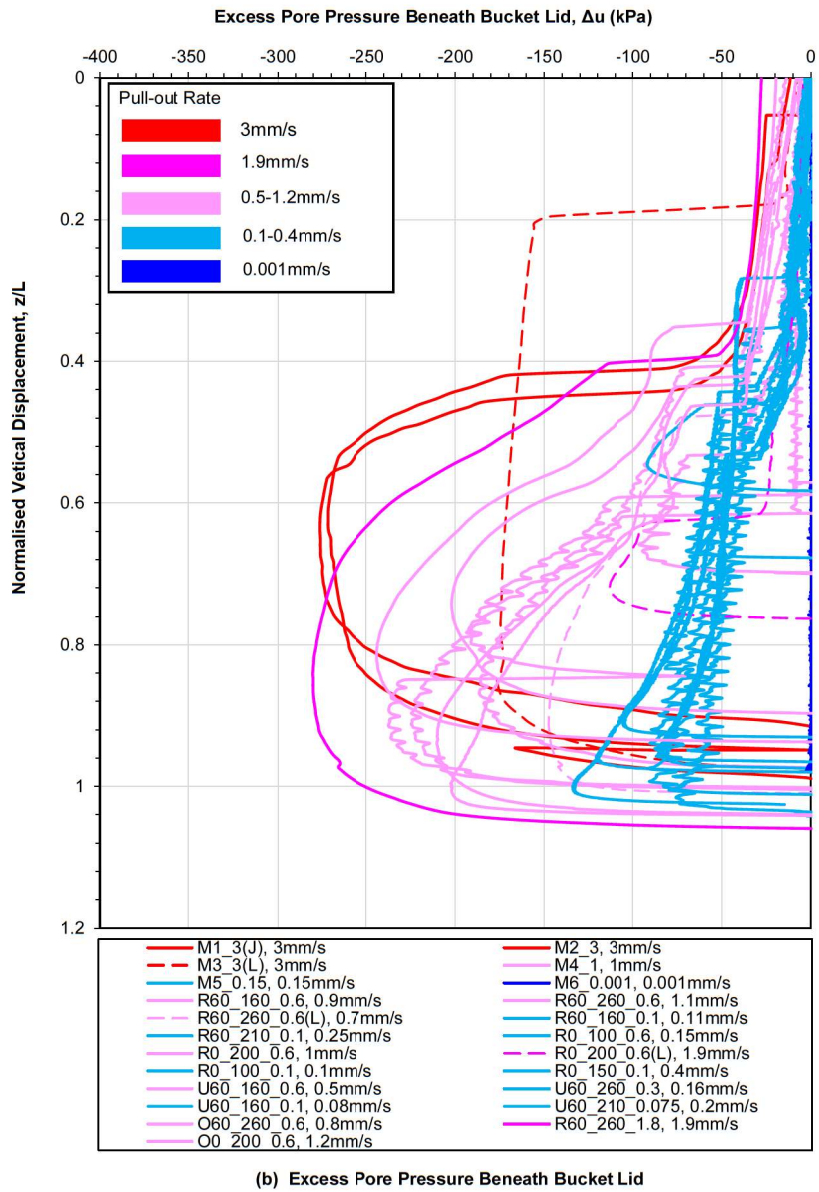


(b) Excess Pore Pressure Beneath Bucket Lid

Plate 14: Installation Responses (Mono-Bucket Test)

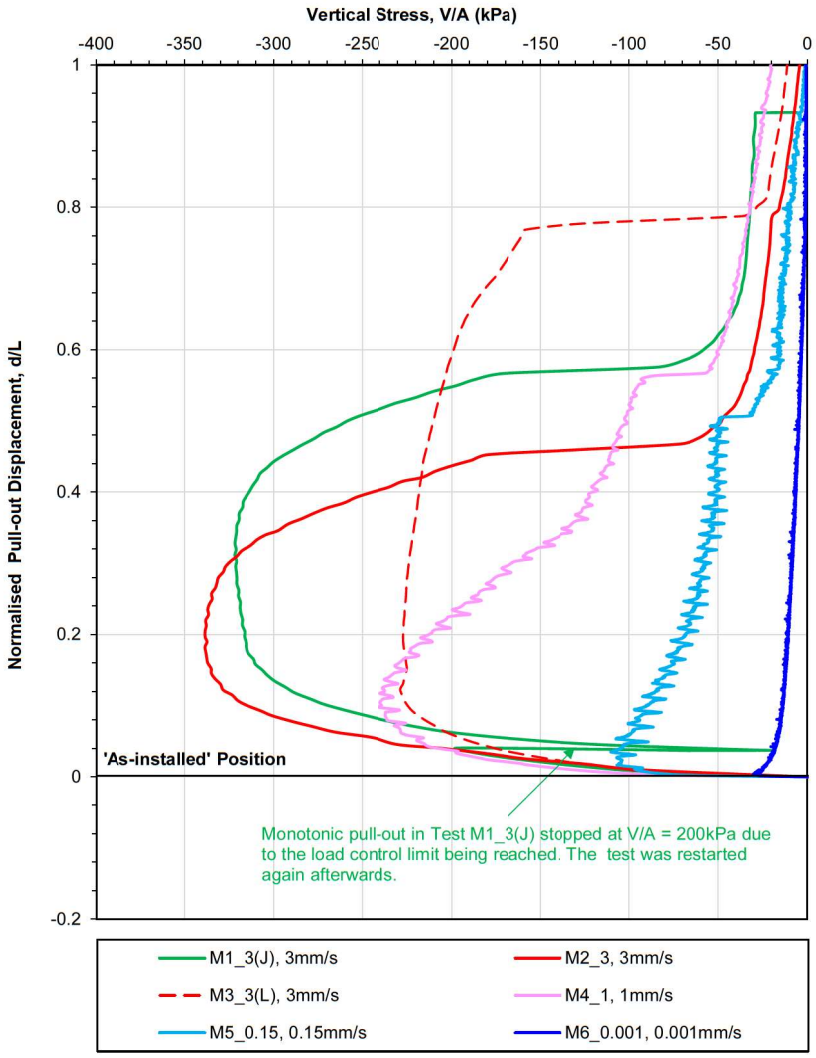


(a) Vertical Stress

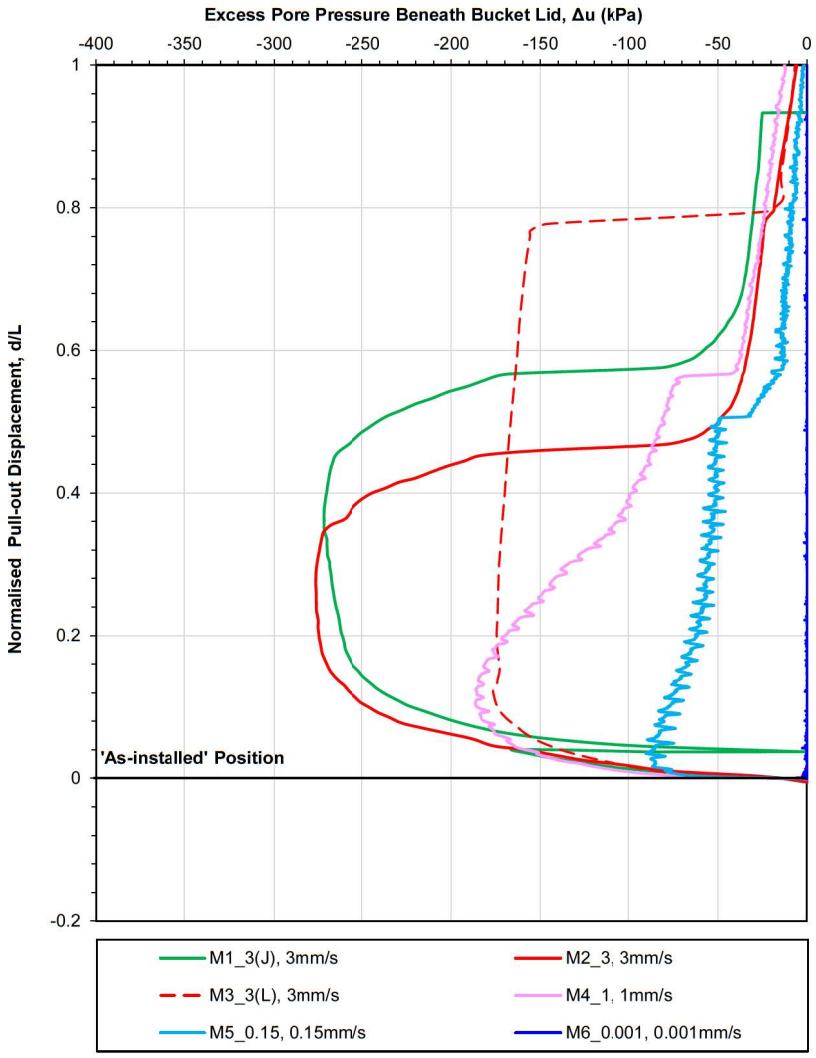


(b) Excess Pore Pressure Beneath Bucket Lid

Plate 15: Monotonic and Post-cyclic Monotonic Pull-out Responses (Multi-Bucket Tests)



(a) Vertical Stress



(b) Excess Pore Pressure Beneath Bucket Lid

Plate 16: Monotonic Pull-out Responses (Multi-Bucket Test)

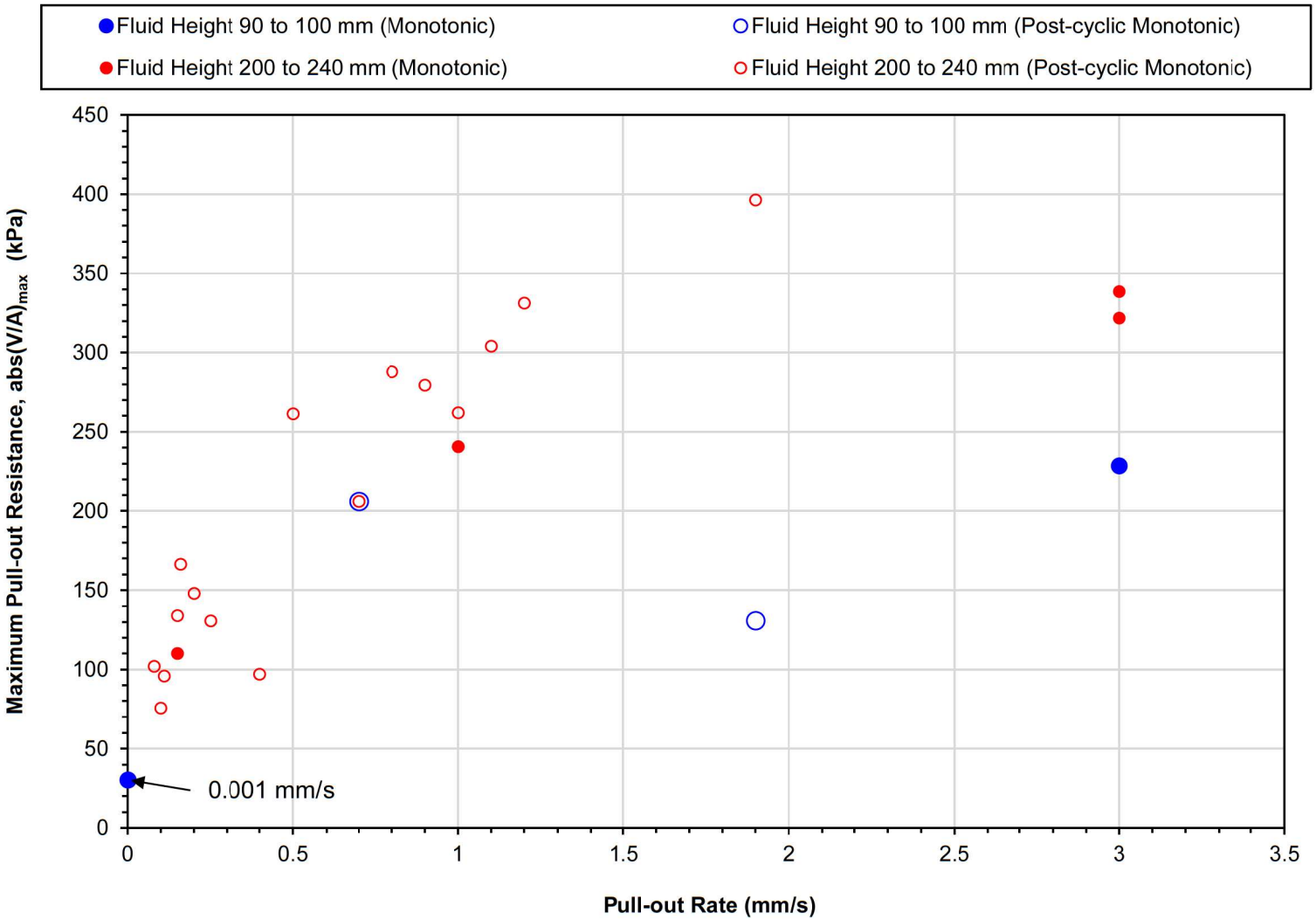
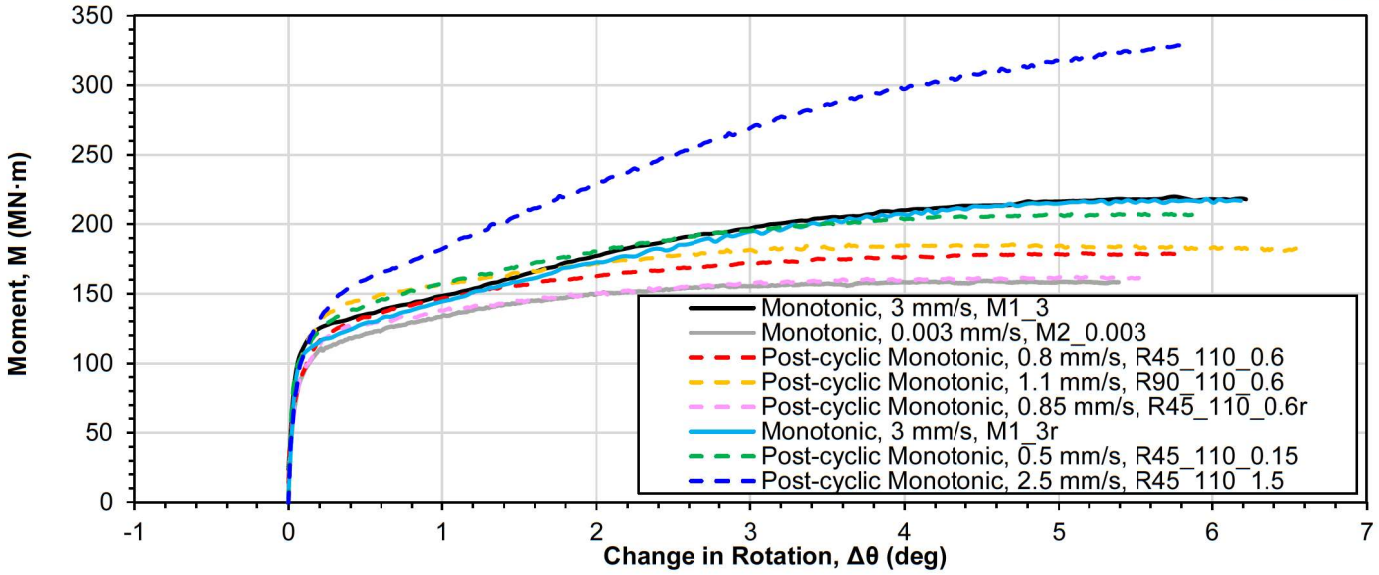
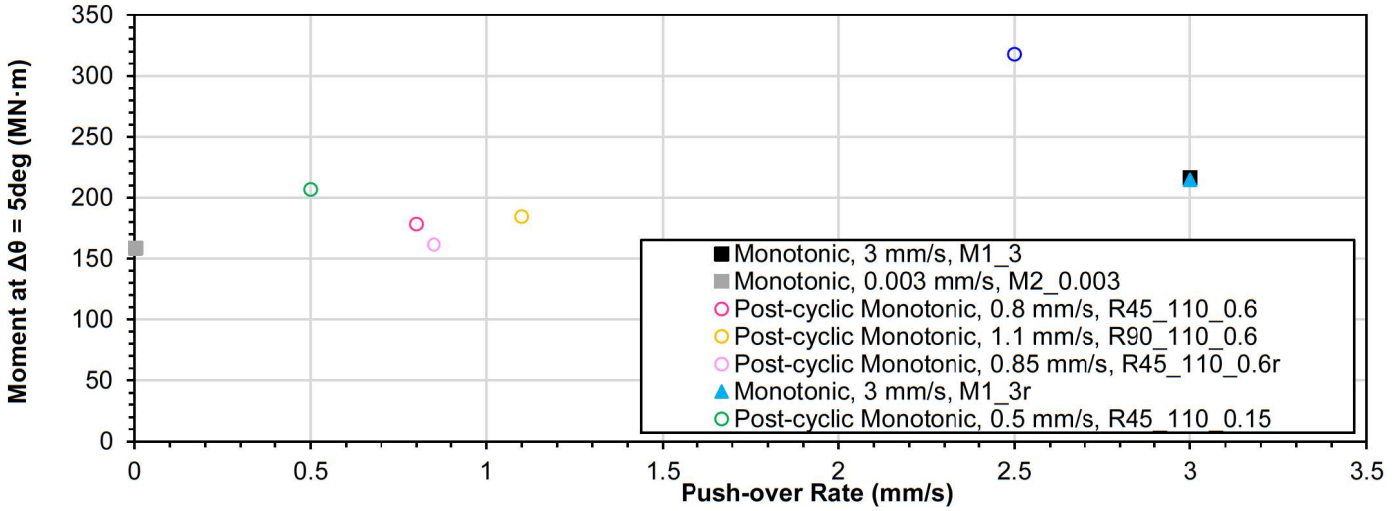


Plate 17: Variation of Maximum Pull-out Resistance with Pull-out Rate (Multi-Bucket Tests)

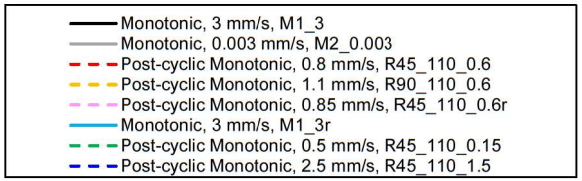


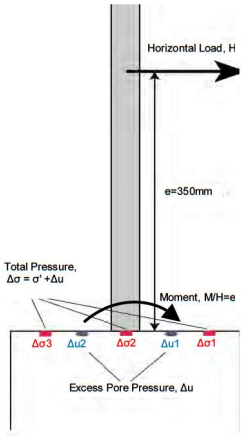
(a) Moment-rotation Responses

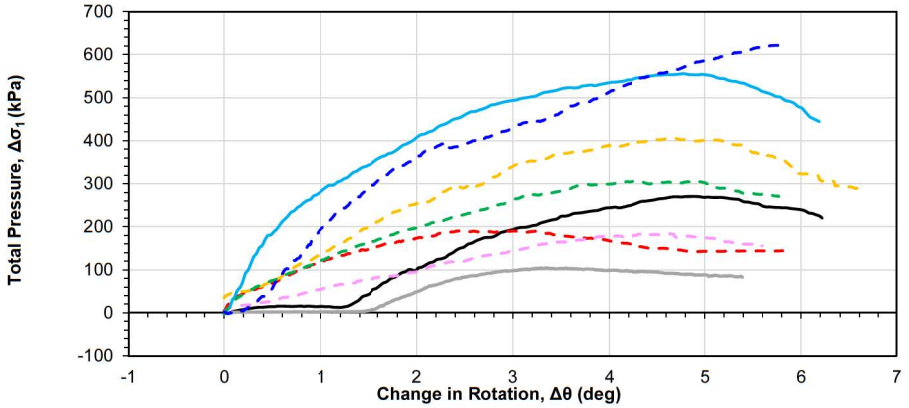


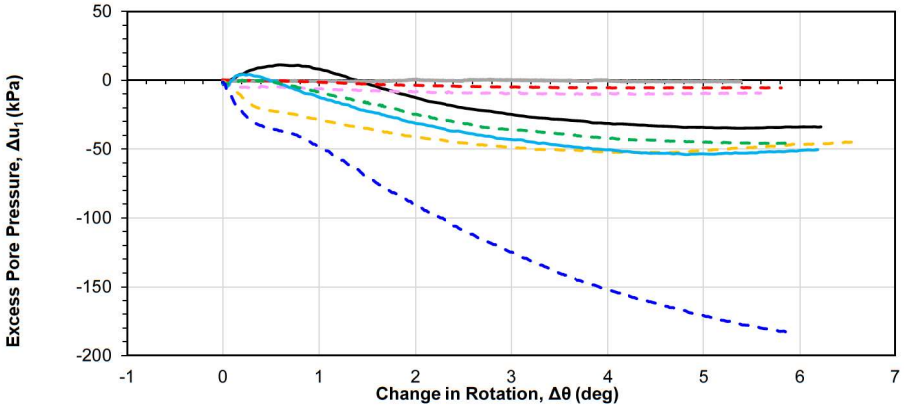
(b) Variation of Moment at Δθ = 5deg with Push-over Rate

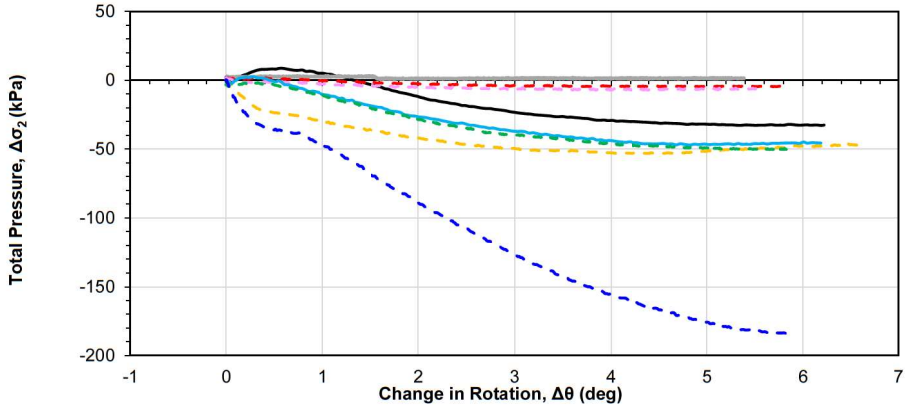
Plate 18: Moment-rotation Responses during Monotonic and Post-cyclic Monotonic Push-over (Mono-bucket Test)

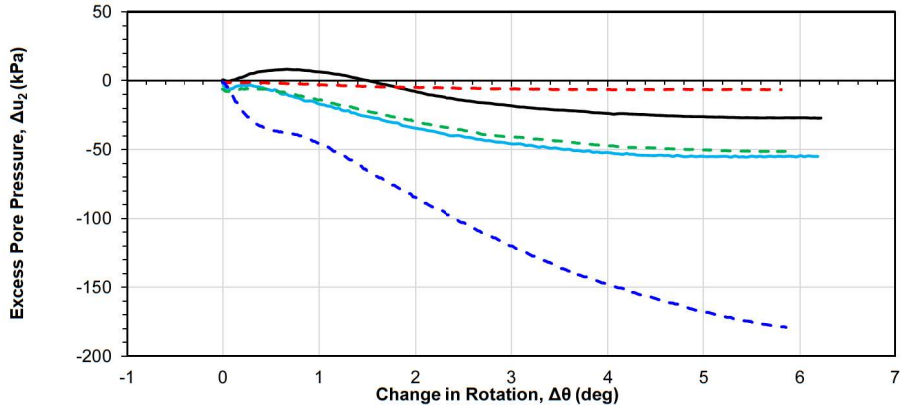












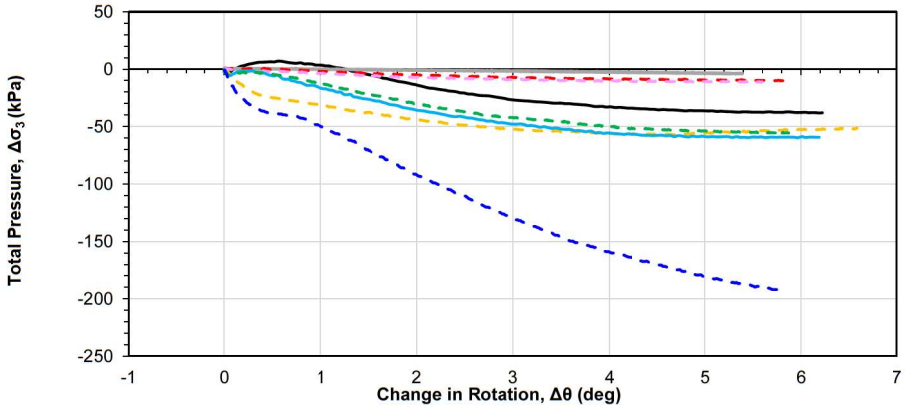


Plate 19: Pressure-rotation Responses during Monotonic and Post-cyclic Monotonic Push-over (Mono-bucket Test)

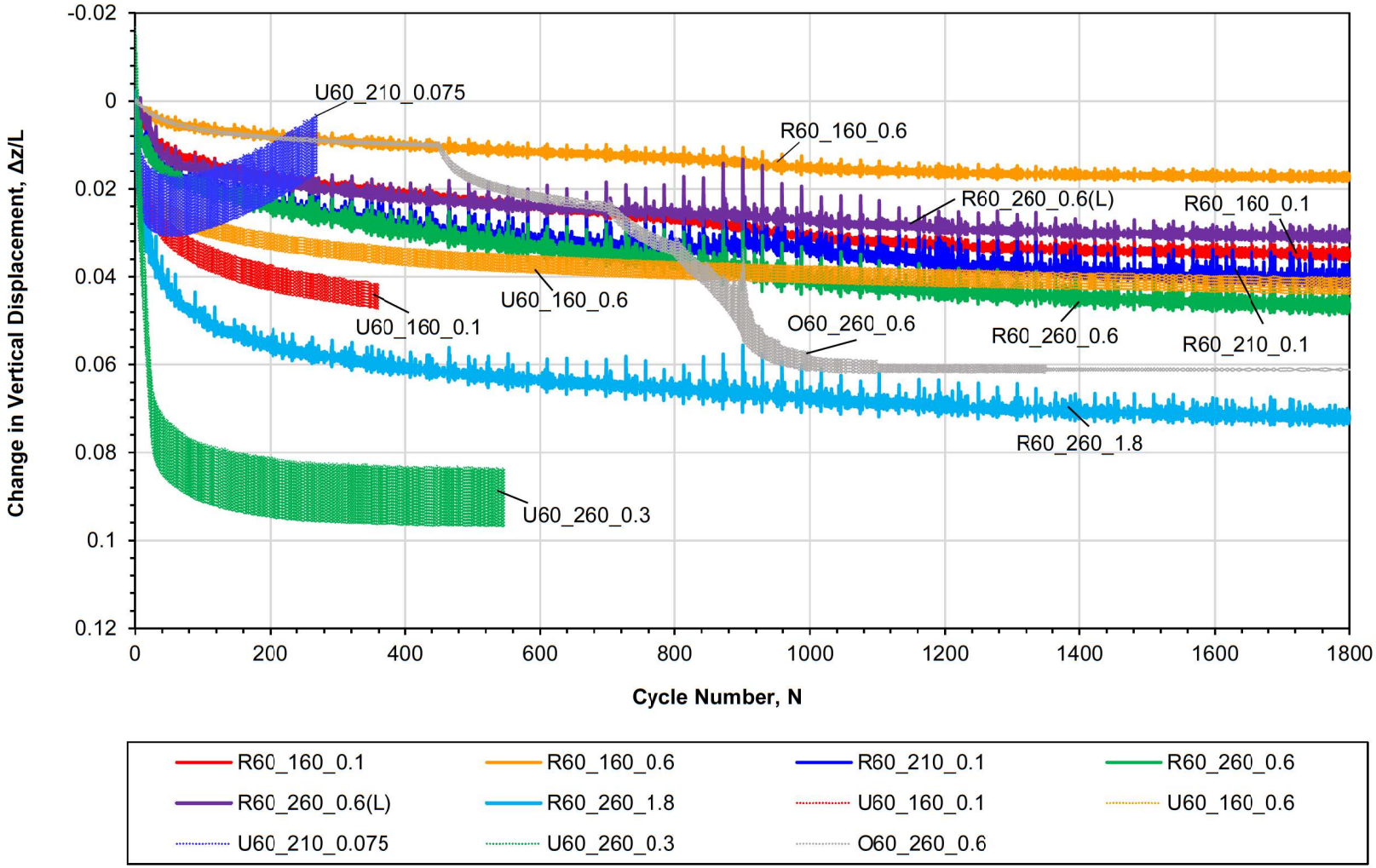


Plate 20: Comparison of Displacement for Multi-bucket Tests with Average Vertical Stress of 60 kPa (Packet 1)

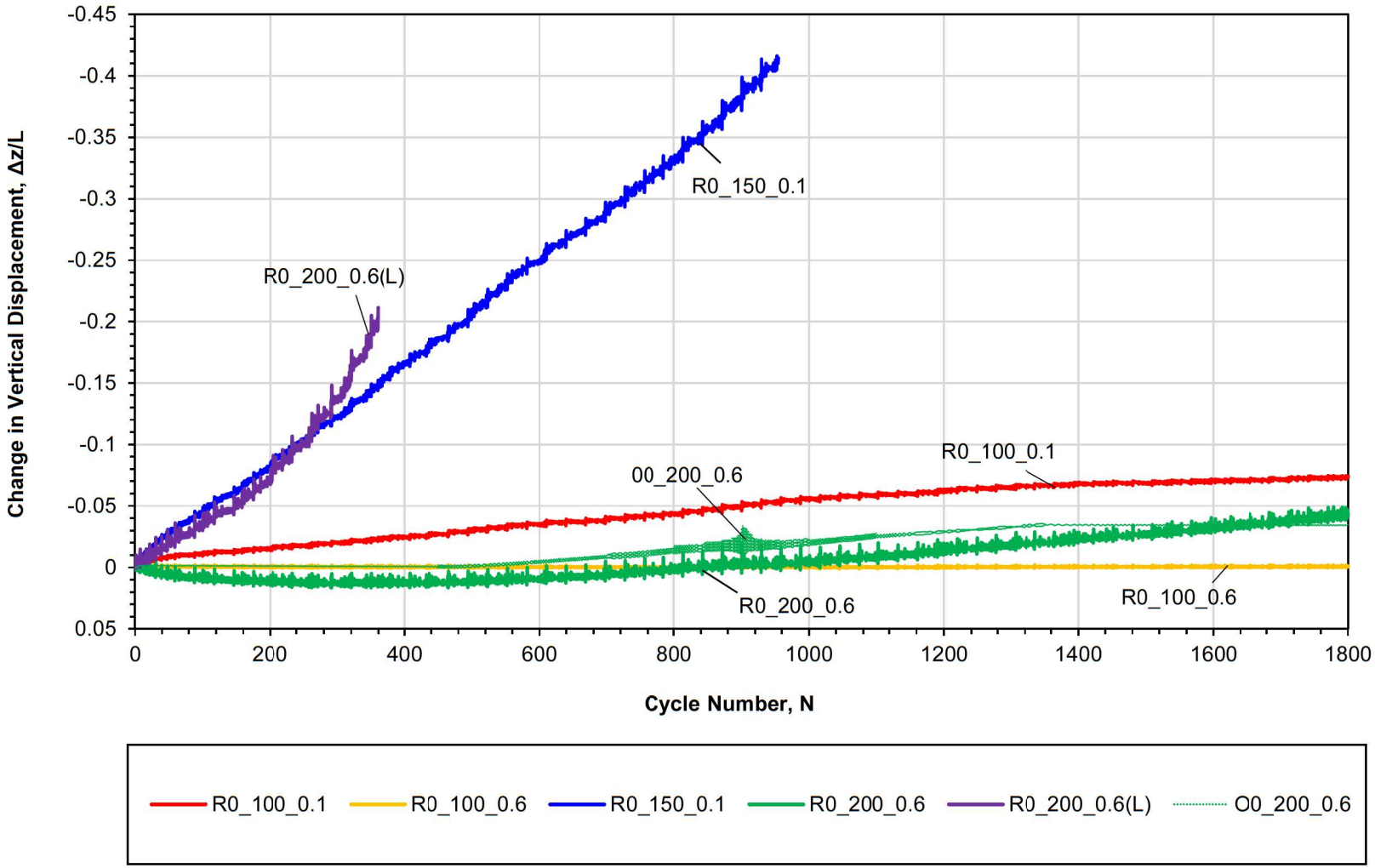


Plate 21: Comparison of Displacement for Multi-bucket Tests with Average Vertical Stress of 0 kPa (Packet 1)

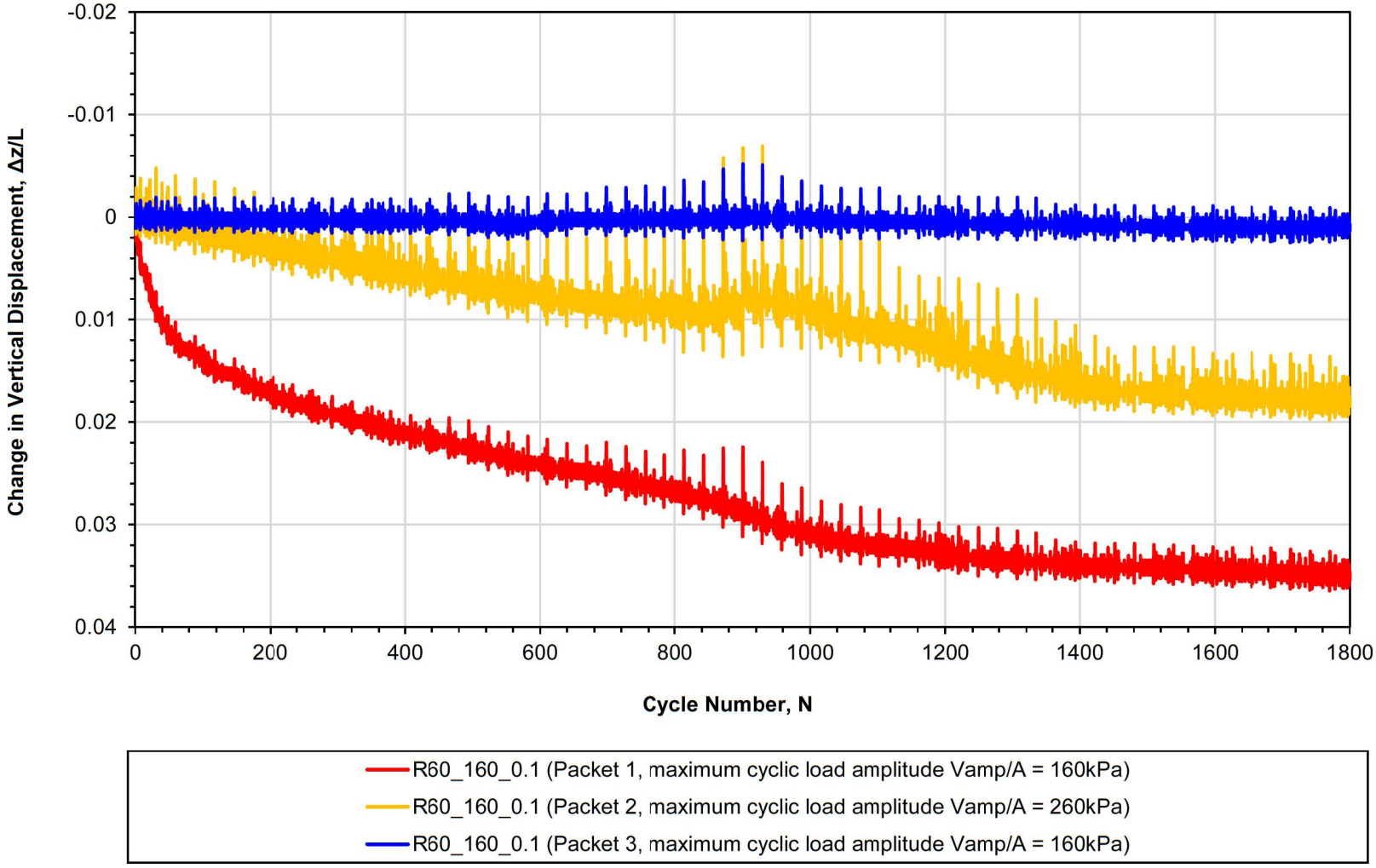


Plate 22: Comparison of Displacement for Cyclic Load Packets 1, 2 and 3 (Multi-bucket Test R60_160_0.1)

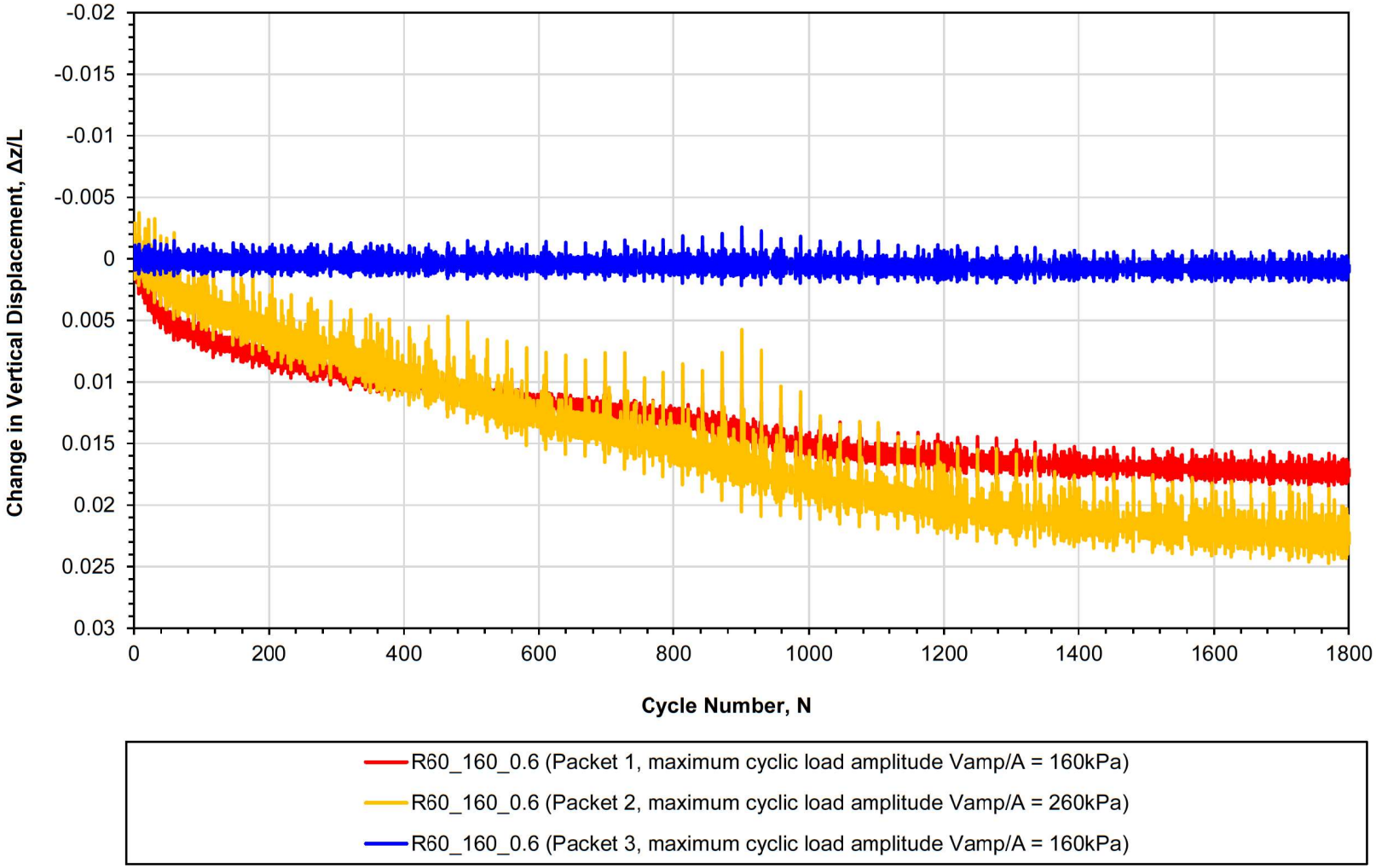


Plate 23: Comparison of Displacement for Cyclic Load Packets 1, 2 and 3 (Multi-bucket Test R60_160_0.6)

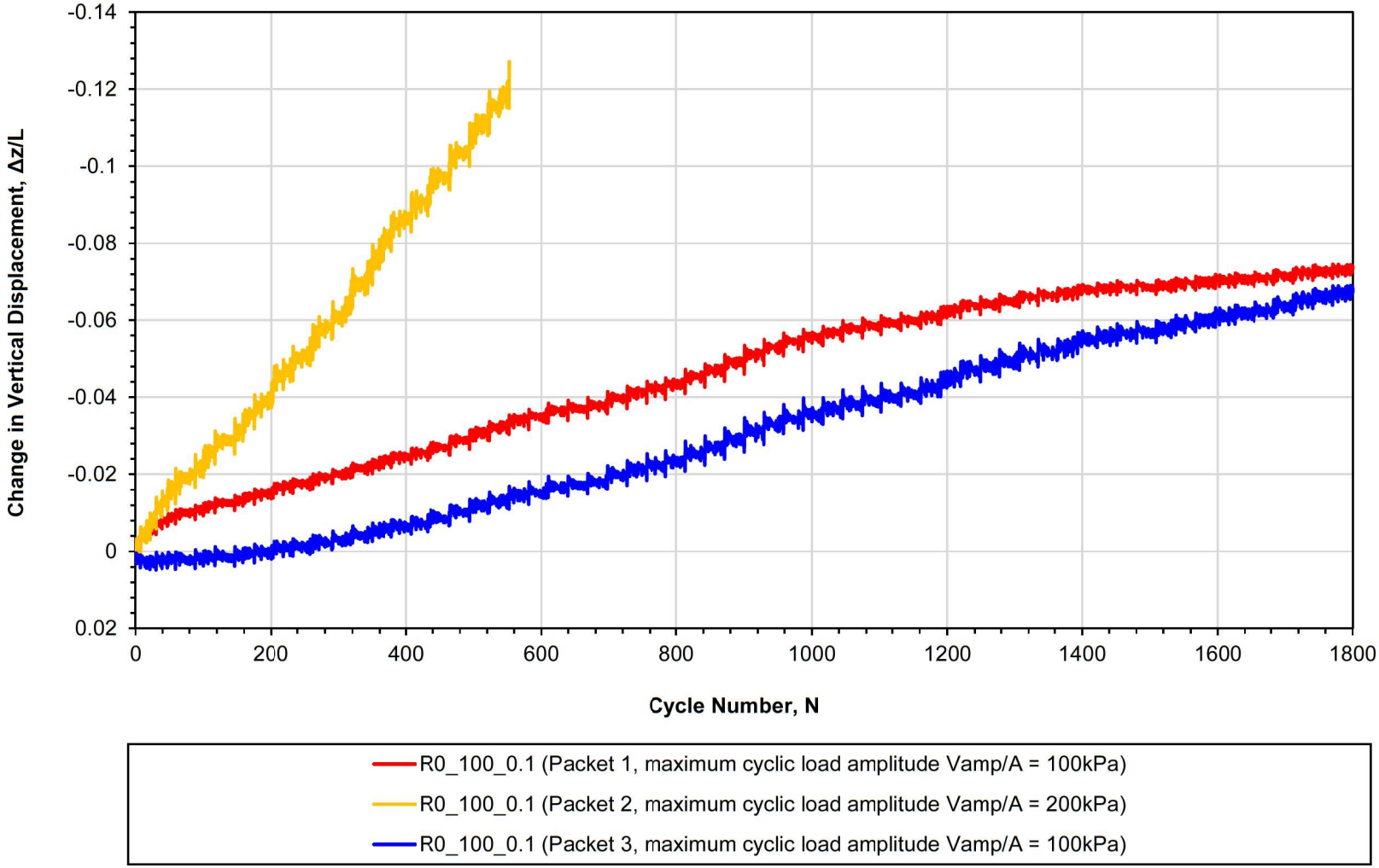


Plate 24: Comparison of Displacement for Cyclic Load Packets 1, 2 and 3 (Multi-bucket Test R0_100_0.1)

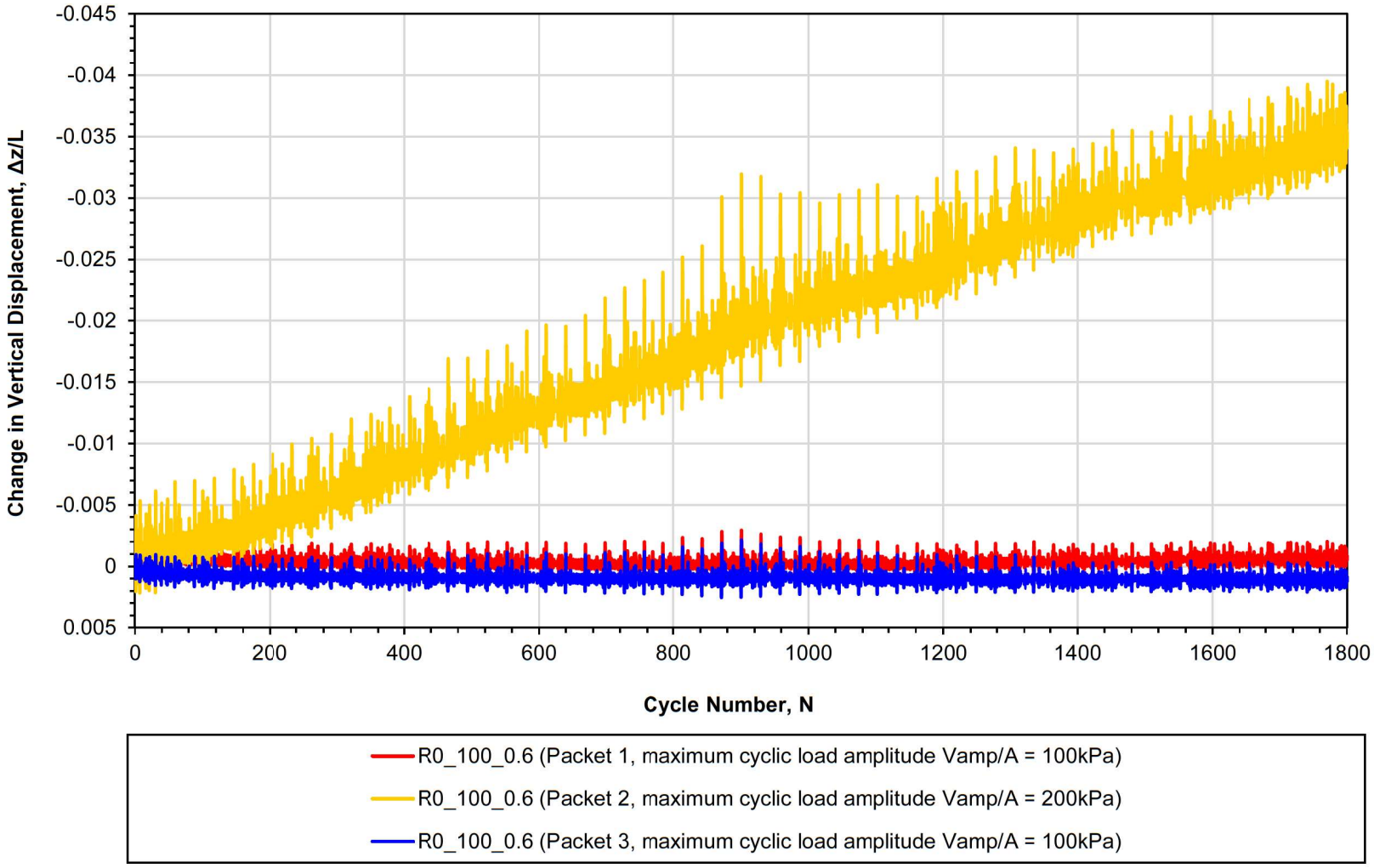


Plate 25: Comparison of Displacement for Cyclic Load Packets 1, 2 and 3 (Multi-bucket Test R0_100_0.6)

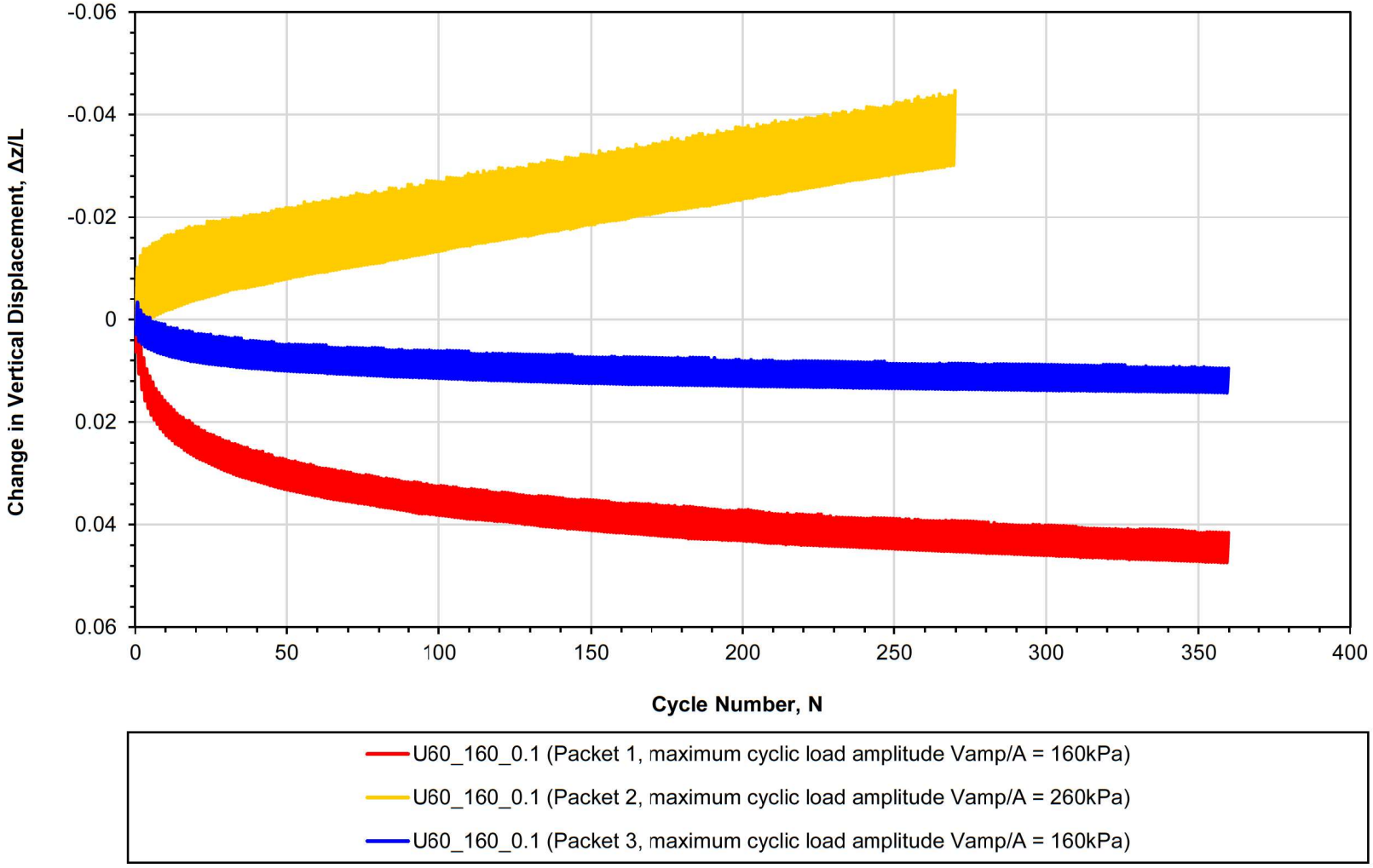


Plate 26: Comparison of Displacement for Cyclic Load Packets 1, 2 and 3 (Multi-bucket Test U60_160_0.1)

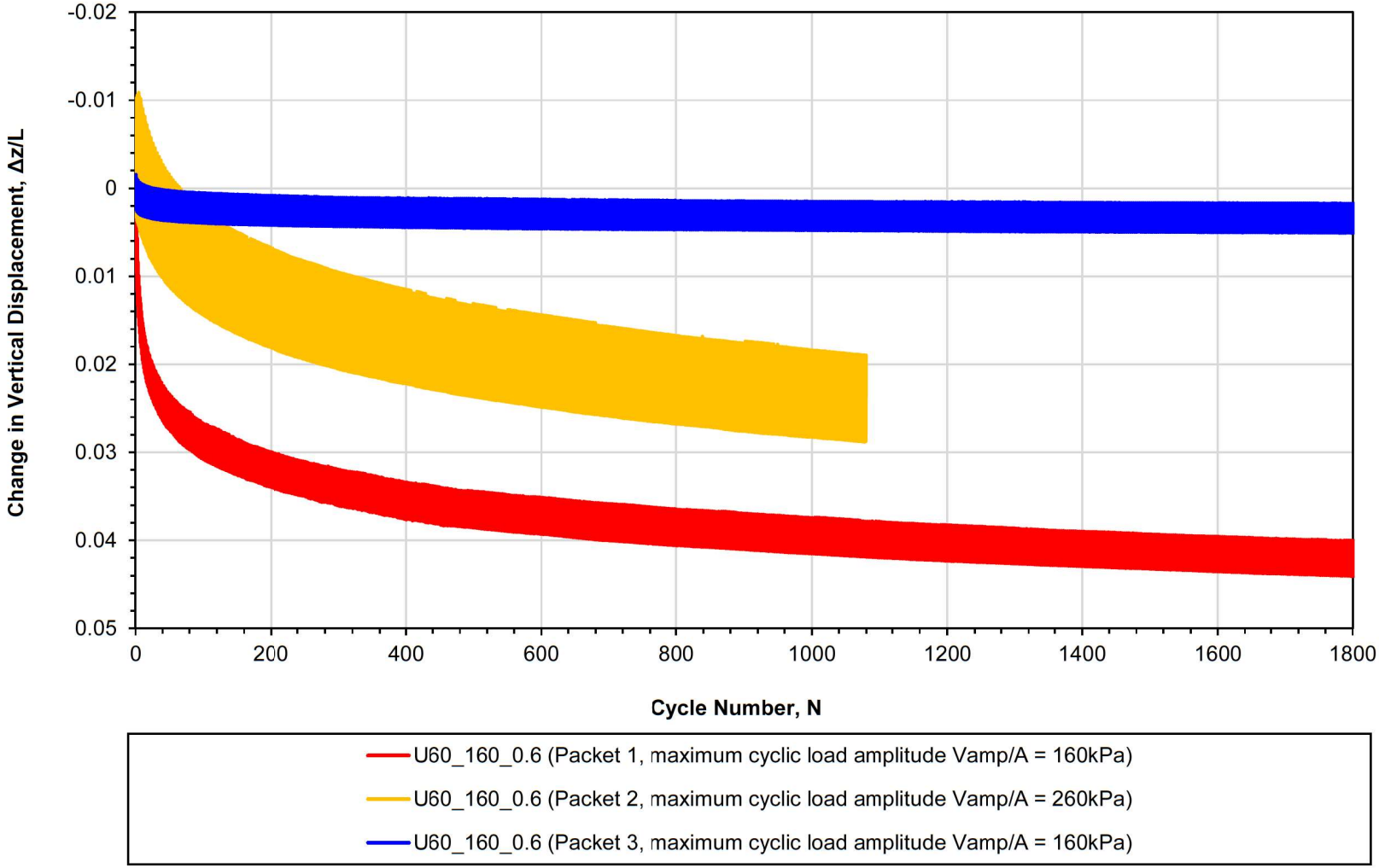
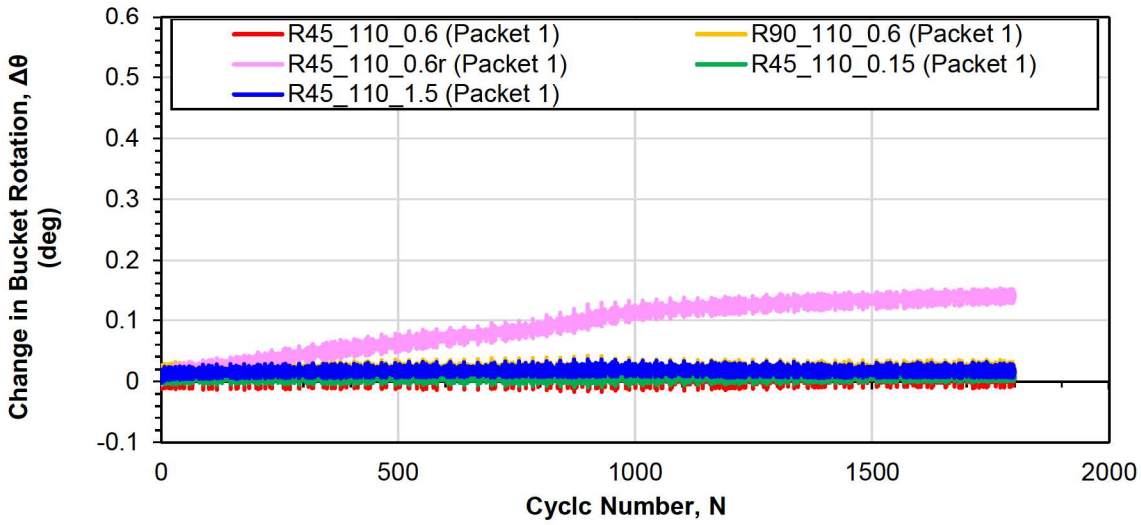
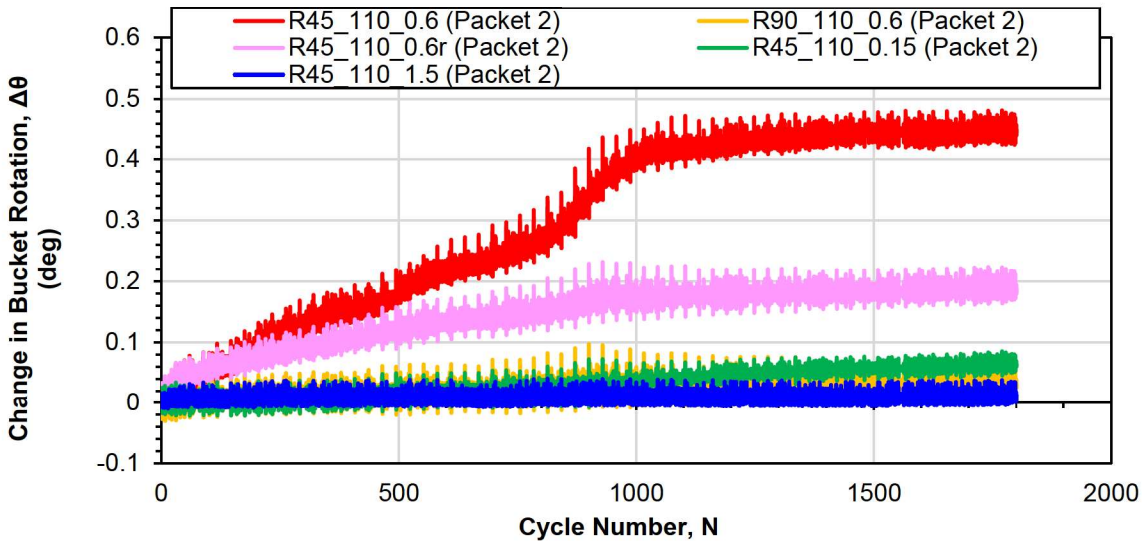


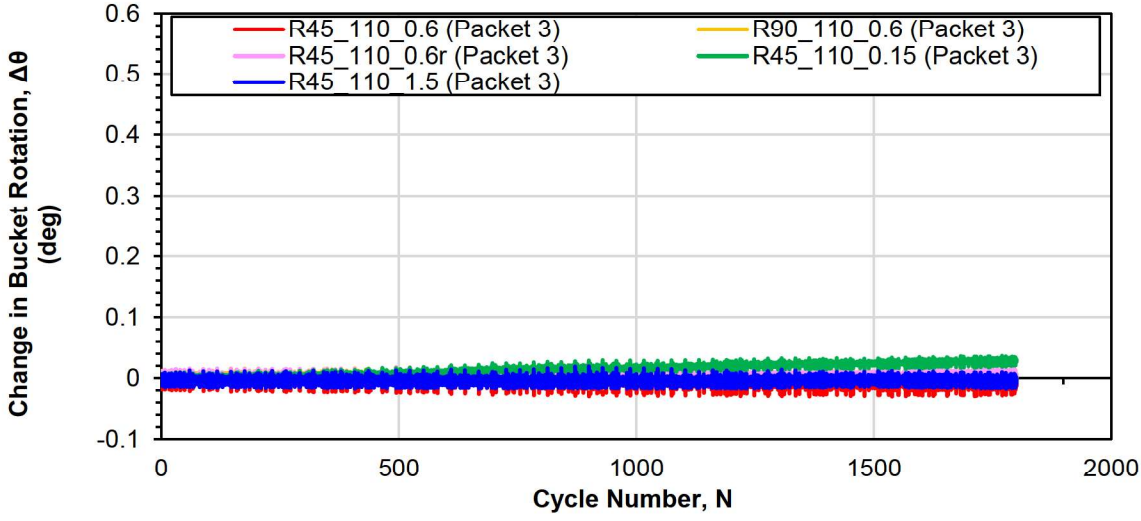
Plate 27: Comparison of Displacement for Cyclic Load Packets 1, 2 and 3 (Multi-bucket Test U60_160_0.6)



(a) Packet 1, Maximum Cyclic Load Amplitude H_{amp} = 110N (model scale)

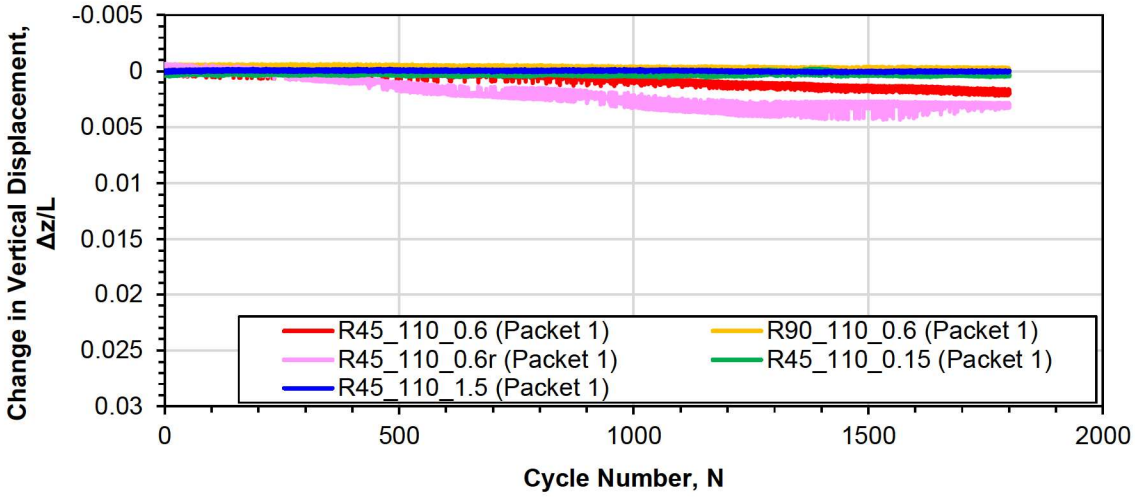


(b) Packet 2, Maximum Cyclic Load Amplitude H_{amp} = 220N (model scale)

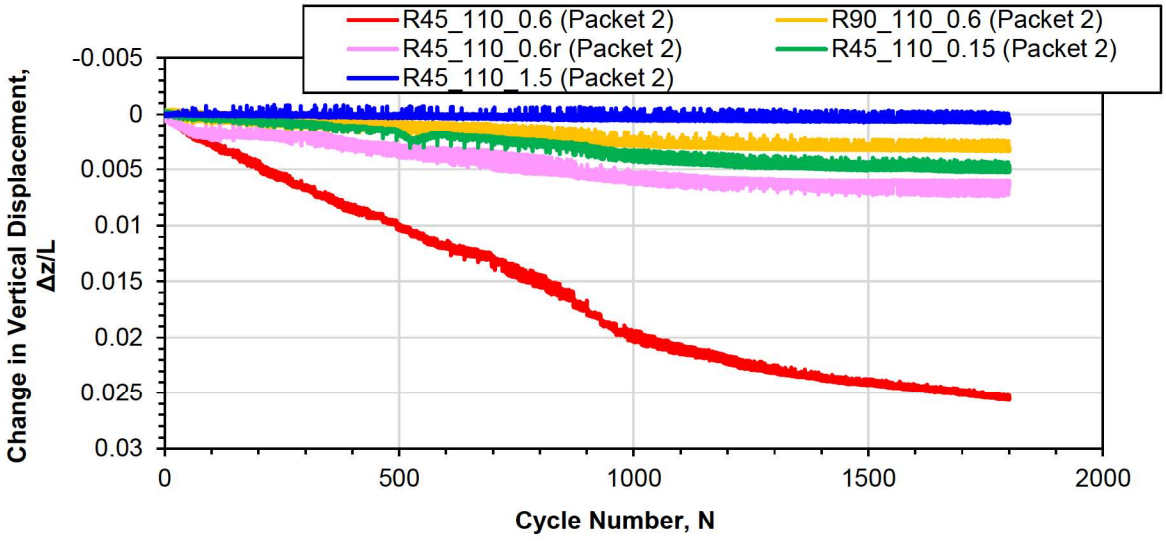


(c) Packet 3, Maximum Cyclic Load Amplitude H_{amp} = 110N (model scale)

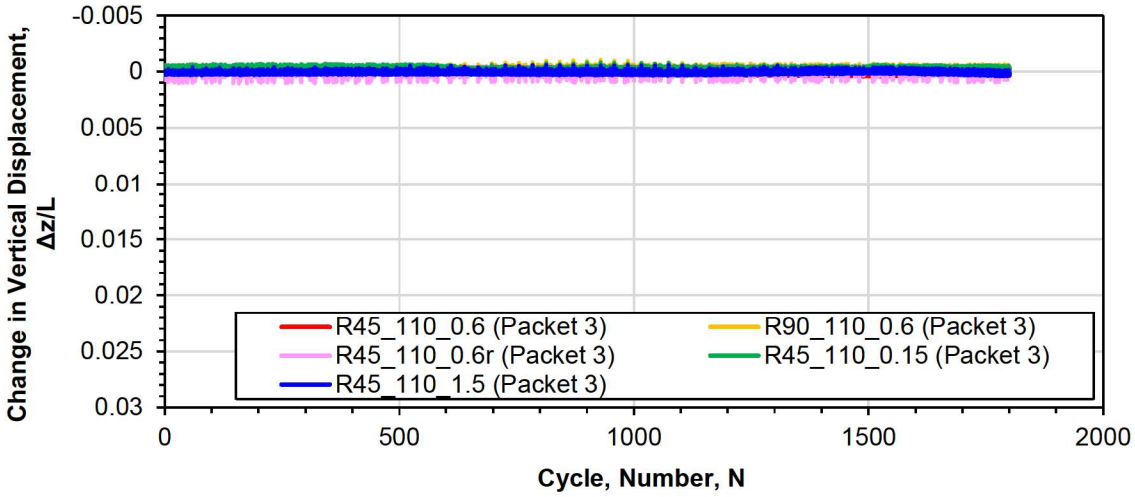
Plate 28: Variation of Bucket Rotation with Cycle Number (Mono-bucket Test)



(a) Packet 1, Maximum Cyclic Load Amplitude H_{amp} = 110N (model scale)



(b) Packet 2, Maximum Cyclic Load Amplitude H_{amp} = 220N (model scale)



(c) Packet 3, Maximum Cyclic Load Amplitude H_{amp} = 110N (model scale)

Plate 29: Variation of Vertical Disp. with Cycle Number (Mono-bucket Test)