Uplift Resistance of Coated Driven Steel Piles

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Presentation Outline

- Reasons for Testing
- Field Investigation
- Load Testing
- Interpretation of Results
- Summary

Objective

Perform a Preliminary Field Evaluation of Surface Coating on Steel Piles Under Real Soil Conditions

Reducing Side Resistance of Driven Steel Piles?

Downdrag

Frost Heave

Expansive Soils

Field Investigation

3 Test Sites

Unsaturated Silty Sand

Saturated Sand/Clay

Saturated Stiff Clay

Driven Open Pipe Piles (2.875 in. & 4.5 in.) & H-Piles (W6 x 9)

8 ft. & 10 ft.

Plain Steel

Galvanized Steel

SlickCoat™ Coated Steel

SlickCoat™

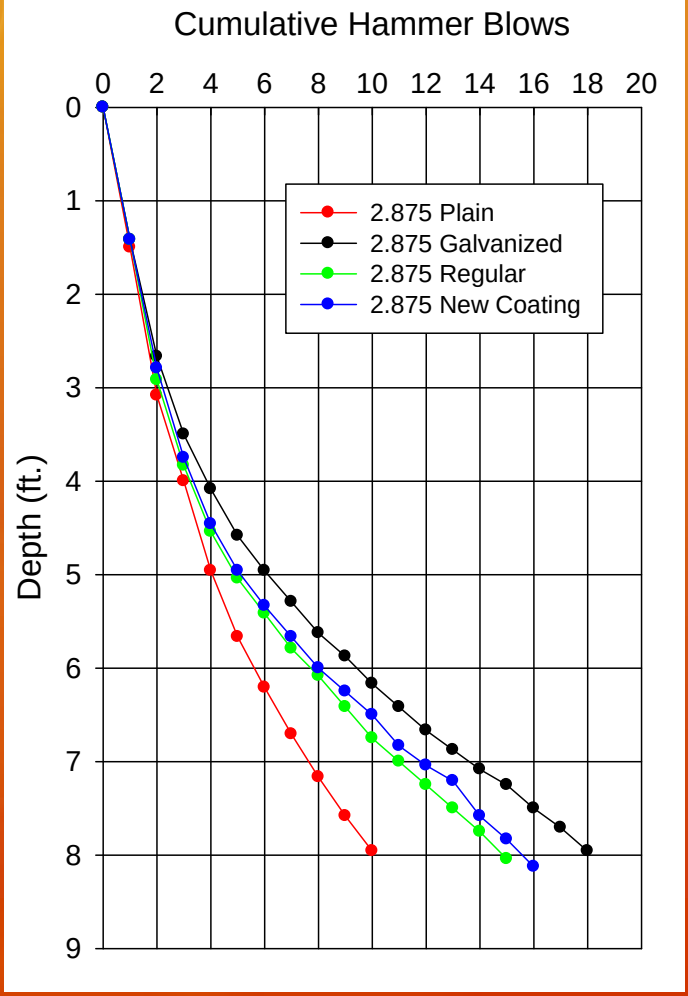
Water Based Silicone Epoxy Coating – Sprayed onto Steel Piles

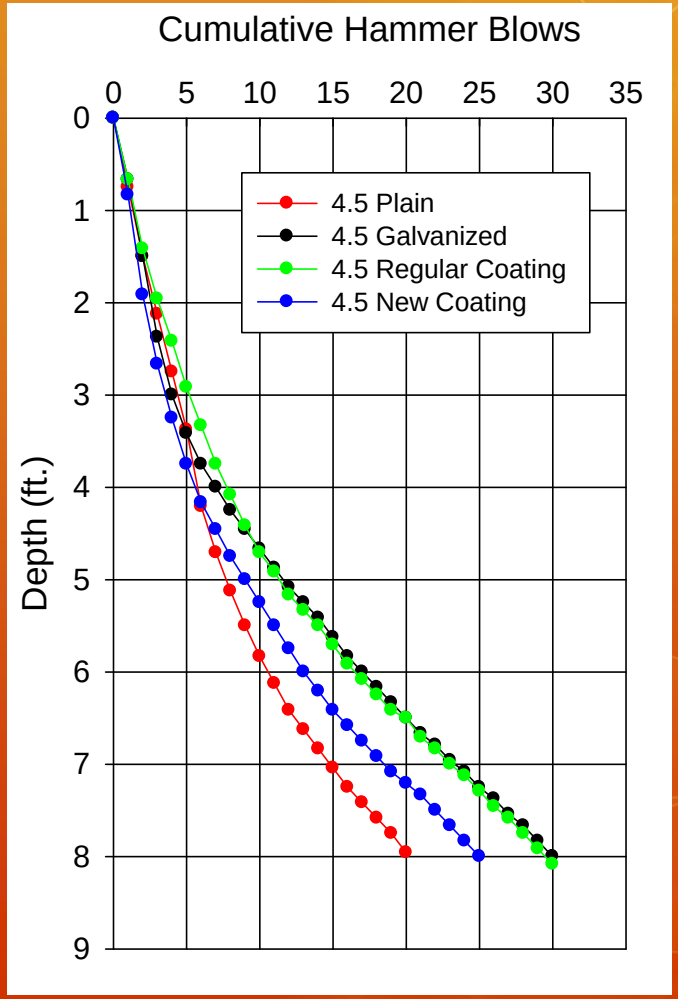
Pile Installation – 550 lb. Drop Hammer


SAFETY
FIRST
SUPERCUTS
Coca-Cola
CLIF
Comcast

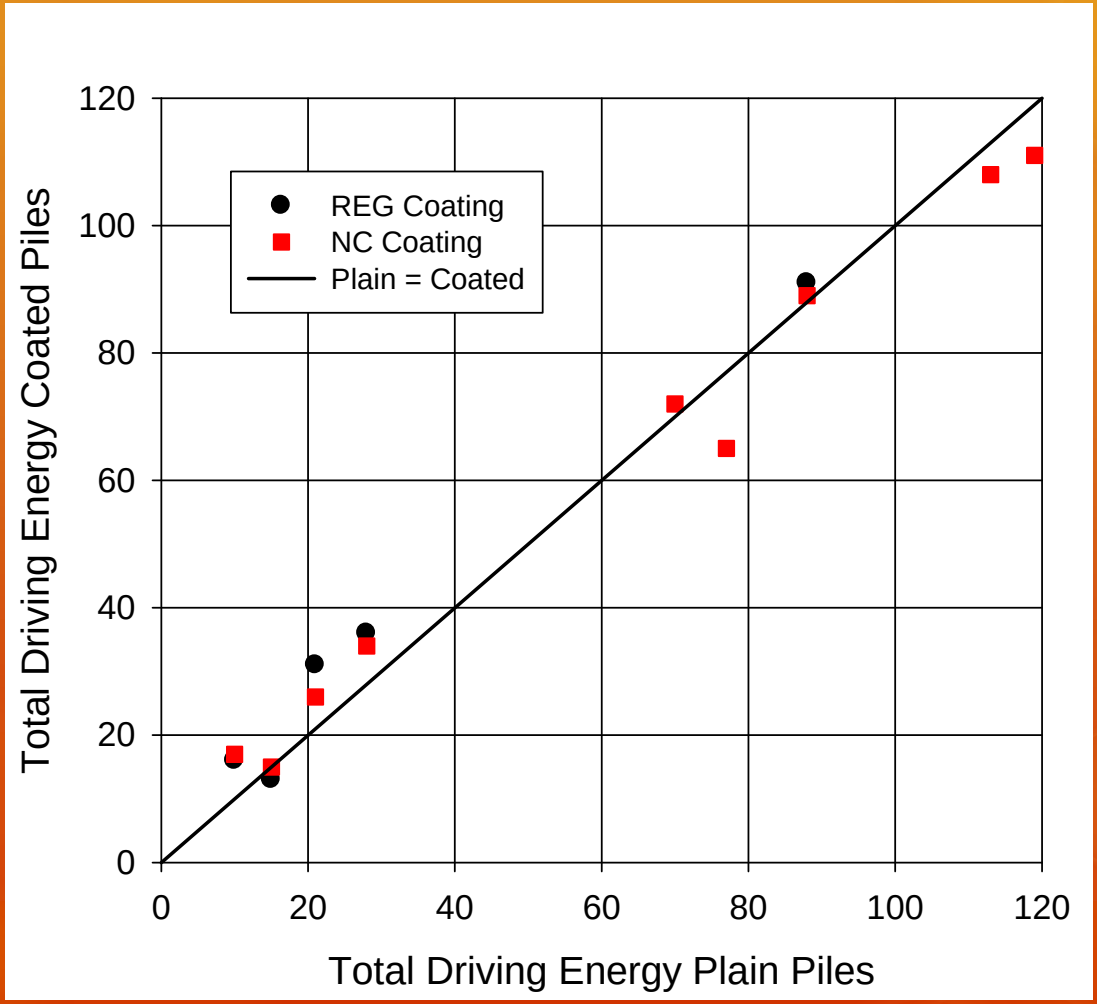

SCBP

Driving Resistance

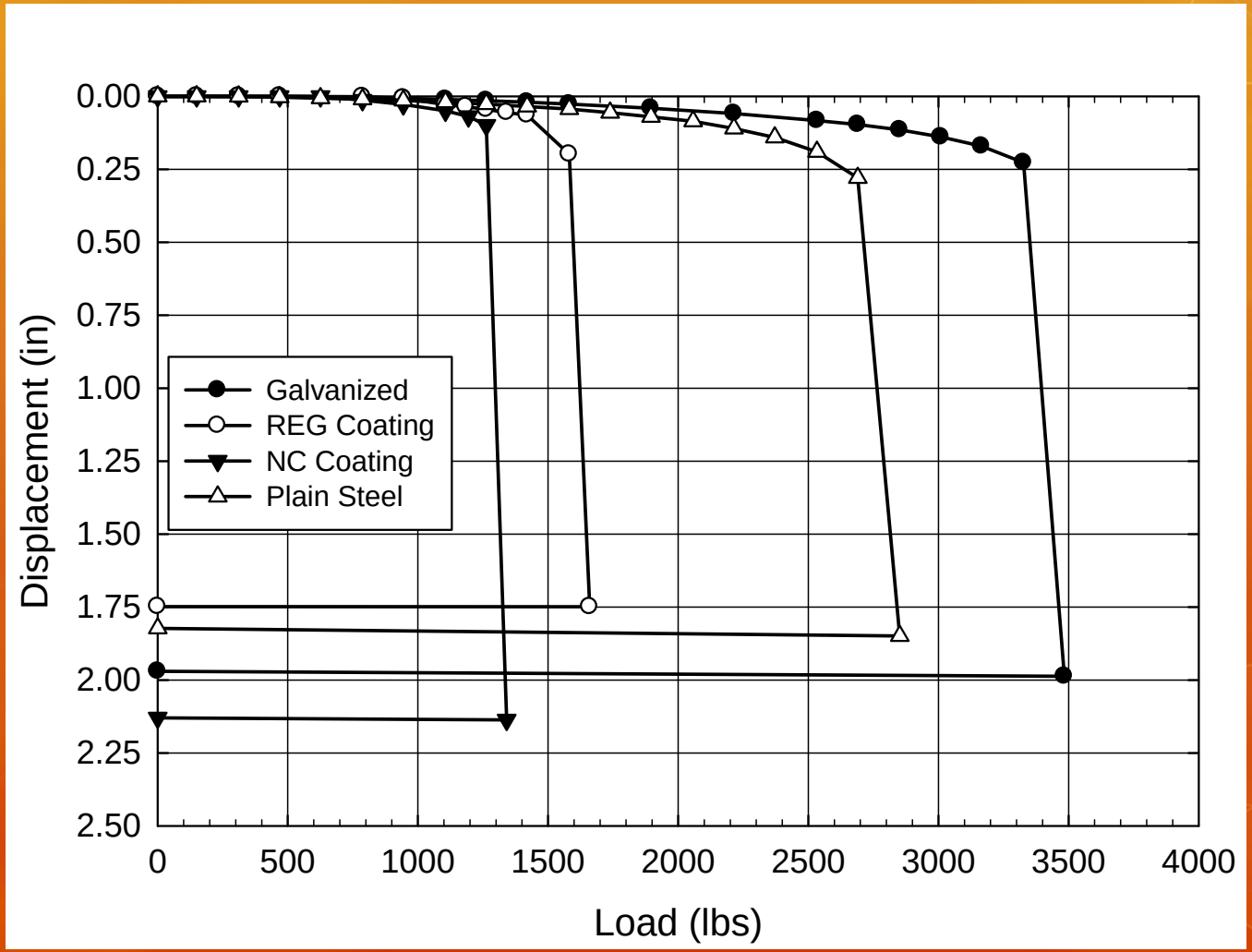




Comparison of Driving Resistance



Typical Load Tests – 4.5 in. Site-1

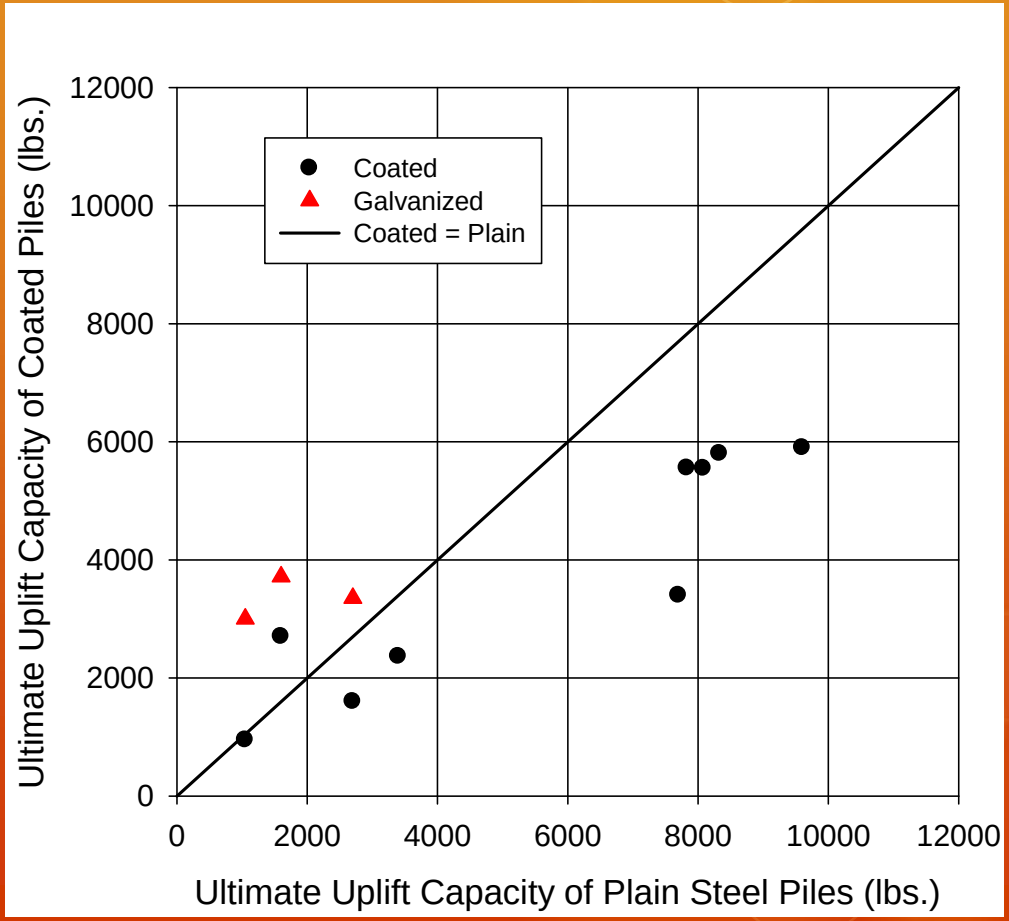


Short Term Tests (1, 7 & 10 Days)

Short Term Tests Show Scattered Results:

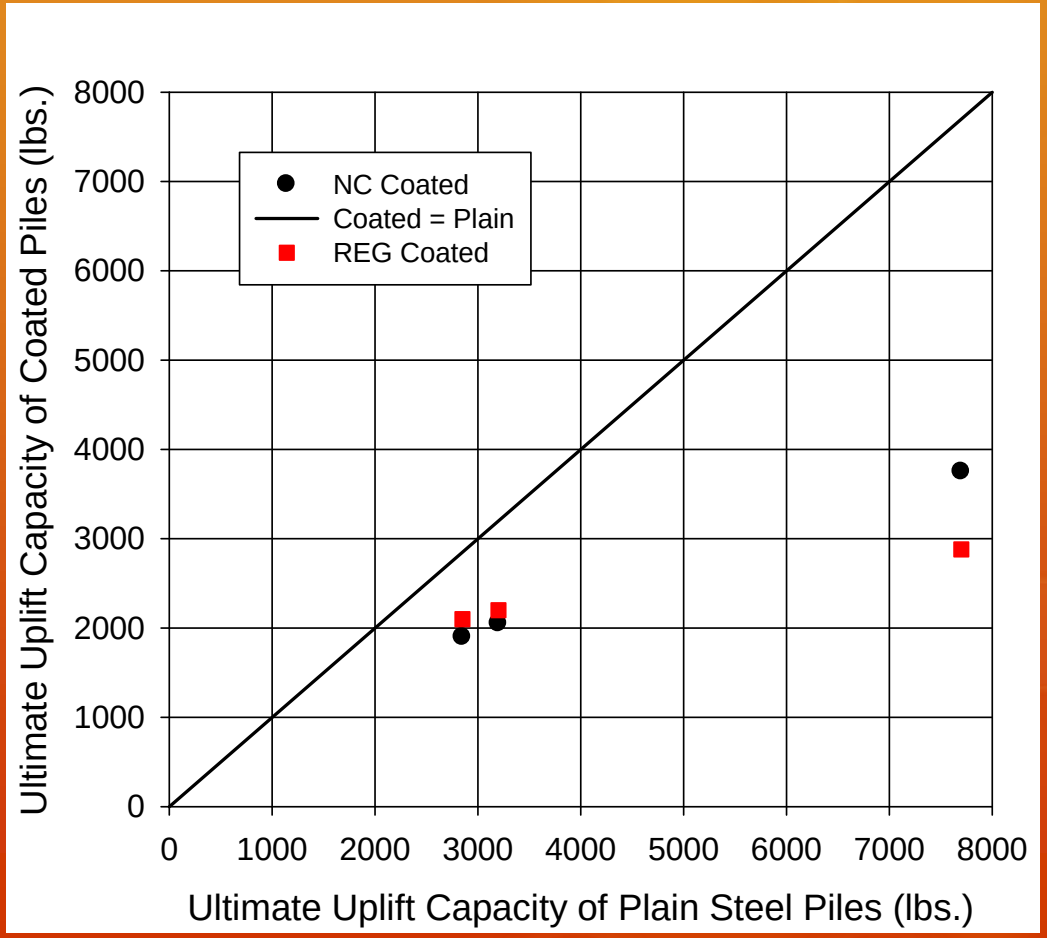
Silty Sand – Coated Generally Lower than Plain; Galvanized Higher Than Plain

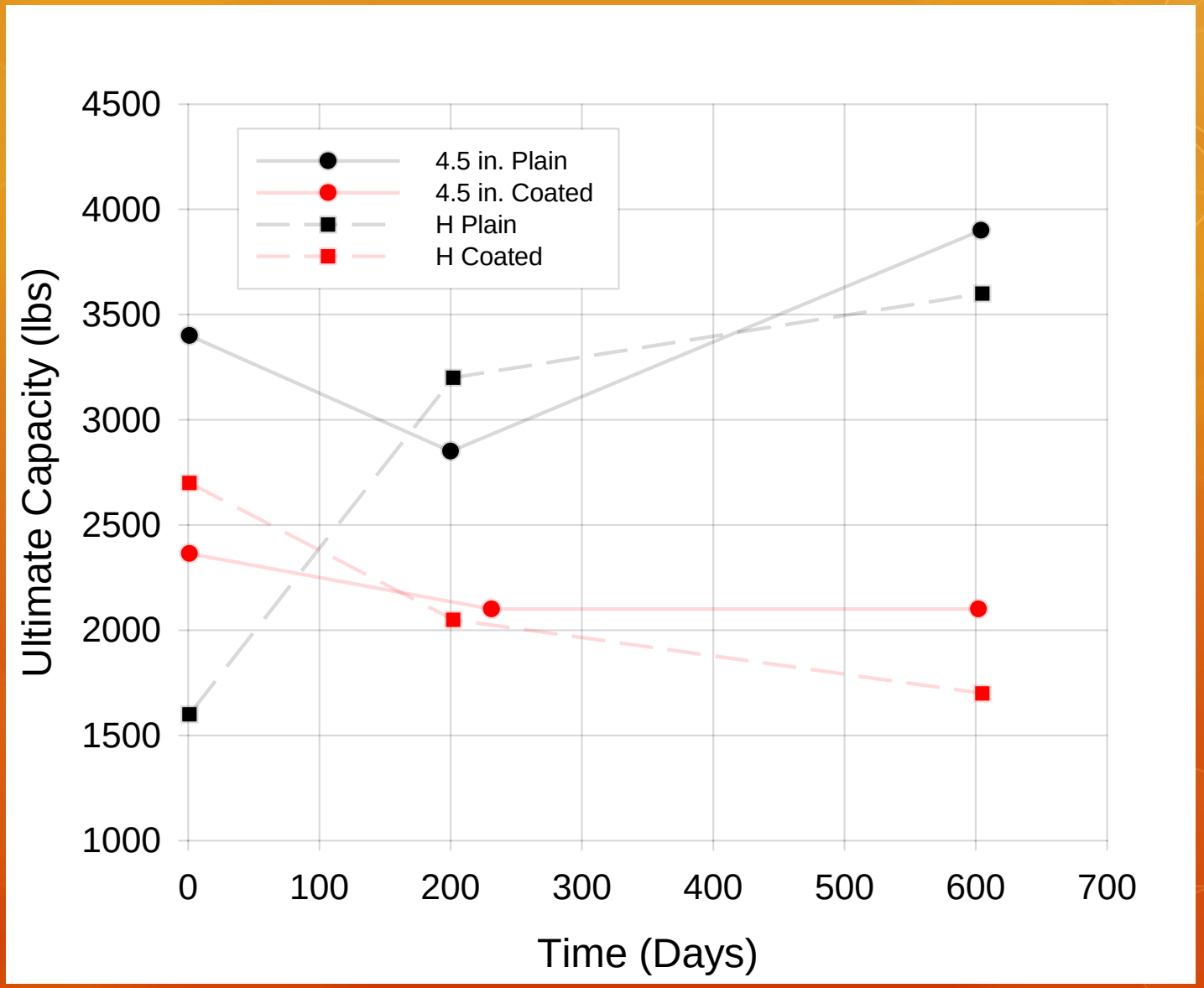
Clay – Coated About 60% Capacity of Plain



Long Term Tests (200 & 400 Days)

Long Term Tests Show Coated Piles About 50% (31% - 74%) Less Than Plain Steel Piles in Both Silty Sand and Clay




4500
4000
3500
3000
2500
2000
1500
1000
Ultimate Capacity (lbs)
0
100
200
300
400
500
600
700
Time (Days)
4.5 in. Plain
4.5 in. Coated
H Plain
H Coated

Summary

Surface Coating Did Not Significantly Influence Dynamic Driving Resistance Which is Controlled by Soil-to-Pile Interface

Short Term Static Load Tests Probably Pile-to-Soil Interface Shearing for Coated

Long Term Tests Probably Pile-to-Soil Interface Shearing for Coated Piles but Soil-to-Soil Shearing for Plain Piles Which Increases with Time

Summary

Coated Piles Showed a Substantially Lower Uplift Capacity (About 50%) as Compared with Plain Steel Piles Under Long Term Conditions