# APPENDIX 2

## LOAD TEST RESULTS AT LONG ISLAND SITE (SITE 2)

**Hollow Bar Soil Nail Testing Research**
**Long Island Site, New York**
**Schnabel Reference 07150064**

**FOR**

## ADSC

**14180 Dallas Parkway, Pacific Center I, Dallas, TX 75254**

**February 3, 2009**

**PREPARED BY**

Schnabel Engineering

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Schnabel Engineering, LLC

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February 3, 2009

Mr. Scot Litke
ADSC
14180 Dallas Parkway
Pacific Center I
Dallas, TX 75254

**Subject:** **Project 07150064, Hollow Bar Soil Nail Testing Research – Load Test Results at Long Island Site (Site 2)**

Dear Mr. Litke:

Schnabel Engineering, LLC (Schnabel), is pleased to present the data from pullout load tests performed at the site in Long Island, New York.

Peterson Geotechnical Construction, LLC (PGC) in collaboration with Posillico Group (Posillico) installed and tested nine soil nails as part of the load test matrix for the research program. The nail installation process was in general accordance with the installation methods indicated in the research test protocol. Personnel from Schnabel generally observed the installation of the soil nails and the load testing. PGC installed Soil Nail A3 following the protocol procedures; however, this soil nail could not be tested. When PGC attempted to test Soil Nail A3, the nail pulled out with low resistance. Apparently, the grout was lost after installation. Schnabel did not observe the installation of Soil Nail B3.

Schnabel measured the axial movement of the test nail during loading and unloading using two dial gauges. Loads from a hydraulic jacking system were applied to the test nail through a steel plate. PGC monitored the loads using a calibrated jack-pressure dial gauge.

Table 1 in Appendix A summarizes the results from the load tests. Appendix B includes the load-movement and movement-time diagrams based on the test data. Appendix C includes the nail installation logs. Appendix D includes the results from grout compressive strength tests. Jack calibrations are included in Appendix E.

Boring B-1 was drilled within ten feet of the soil nails. Field personnel from Schnabel took bulk soil samples during the excavation of Test Pit TP-1. Appendix F includes a boring log and soil test results.

Posillico exhumed Soil Nails B3 and C3. Schnabel observed the physical condition of the nails and presents photographs in Appendix G.

Sincerely,

SCHNABEL ENGINEERING, LLC

Javier Rodríguez, P.E.
Senior Engineer

Allen W. Cadden, P.E.
Principal

CJR:JEG:AWC:jlm

Appendix A: Summary of Load Test Results
Appendix B: Load-Movement and Movement-Time Diagrams
Appendix C: Soil Nail Installation Logs
Appendix D: Grout Compressive Strength
Appendix E: Jack Calibrations
Appendix F: Boring Log and Laboratory Test Results
Appendix G: Observation of Exhumed Nails

Distribution:
ADSC (3)
Attn: Mr. Scot Litke

# APPENDIX A

## Summary of Load Test Results

**SCHNABEL ENGINEERING**

By Javier Rodríguez Date 10/28/2008 Sheet _____ of _____
Checked _____ Date _____ Job No 7150064
Subject Hollow Bar Soil Nail Research - Load Test Data Summary - Long Island, New York - Site 2

**TABLE 1: LOAD TEST DATA SUMMARY**

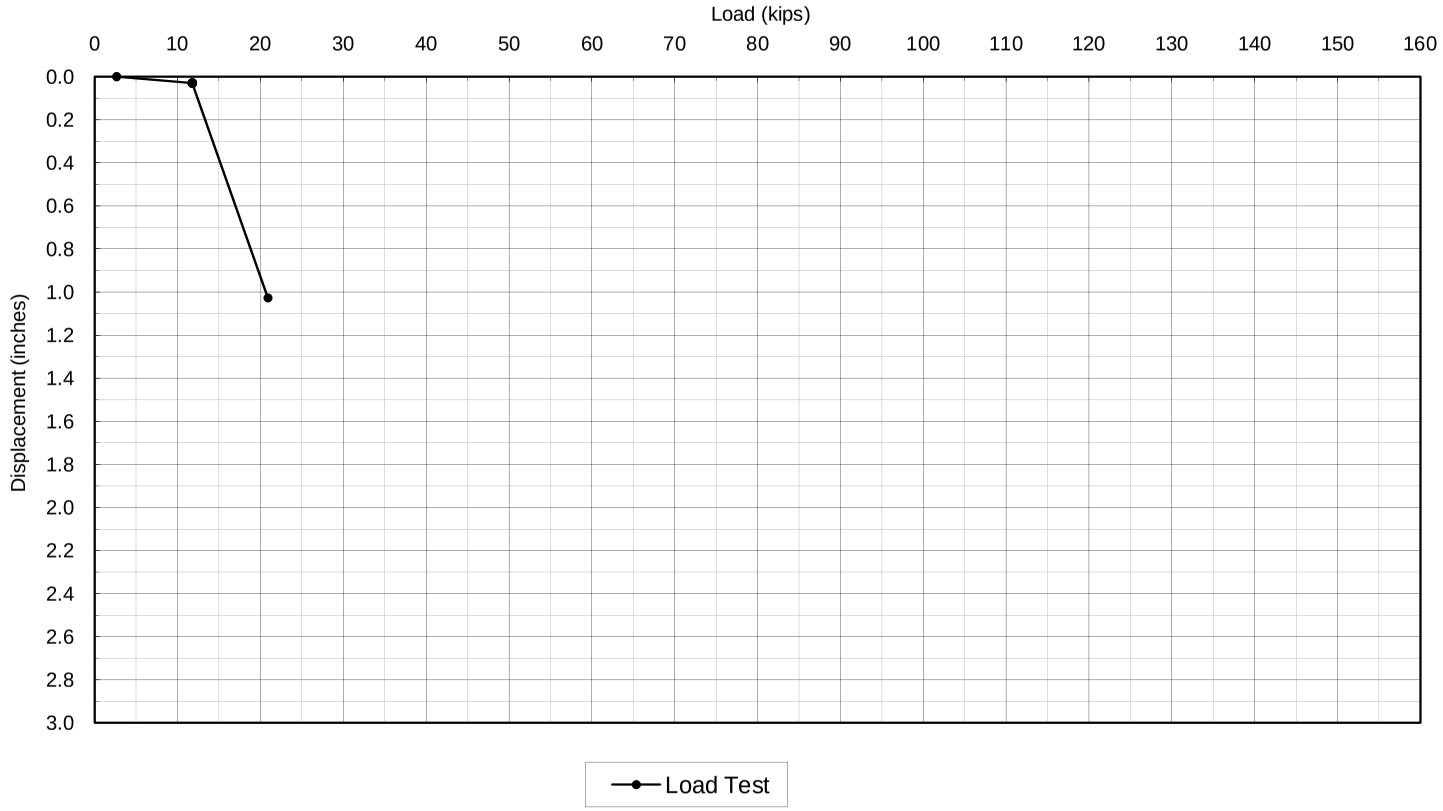
| Nail ID | Installation Method | Design Test Load (kip) | Maximum Test Load (kip) | Maximum Movement (in) | Residual Movement (in) | Failure | Max Creep Rate (1) | Load at Creep Test (kip) | Unbonded Length (2) (ft) | Bond Length (ft) | Drill Bit / Casing Diameter (in) | Average Drilling Rate (3) (ft/min) | Estimated Average Bond Strength (psi) (5) | Soil Type Along Bond Zone |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| A1 | A | 45 | 20.9 | 1.027 | NA | Yes | NA | NA | 12.91 | 6.0 | 7.0 | 0.6 | 13.2 | Poorly graded sand |
| A2 | A | 12 | 20.9 | 1.804 | NA | Yes | 0.5260 | 18.2 | 11.54 | 6.0 | 7.0 | 1.0 | 13.2 | Poorly graded sand |
| B1 | B | 45 | 78.4 | 0.868 | NA | Yes | 0.003 | 67.6 | 13.29 | 6.0 | 5.1 | 1.7 | 68.0 | Poorly graded sand |
| B2 | B | 45 | 91.8 | 2.953 | NA | Yes | 0.032 | 67.6 | 12.48 | 6.0 | 5.1 | 3.6 | 79.6 | Poorly graded sand |
| B3 | B | 45 | 71.4 | 1.604 | NA | Yes | 0.043 | 67.6 | 12.77 | 6.0 | 5.1 | - | 61.9 | Poorly graded sand |
| C1 | C | 45 | 151.9 | 1.577 | 0.963 | Yes | 0.006 | 67.6 | 13.43 | 6.0 | 5.1 | 0.4 | 131.7 | Poorly graded sand |
| C2 | C | 45 | 116.5 | 2.007 | NA | Yes | 0.026 | 67.6 | 13.29 | 6.0 | 5.1 | 0.8 | 101.0 | Poorly graded sand |
| C3(4) | C | 45 | 73.5 | 0.836 | NA | NA | 0.064 | 67.6 | 13.93 | 6.0 | 5.1 | 1.0 | 63.7 | Poorly graded sand |

Notes:
(1) Creep rate measured at the 6 to 60 minute interval.
(2) Unbonded length as measured to the top of jack at time of load test. The unbonded length reported in the installation logs refers to the total unbonded length at completion of drilling.
(3) Drilling rate along bond zone.
(4) A wedge of soil failed behind the cribbing at a load of 73.5 kip.
(5) Bond strength based on nominal drill bit diameter and bonded length.
(6) Soil nail A3 was installed but could not be tested due to grout loss after installation.

# APPENDIX B

## Load-Movement and Movement-Time Diagrams

VERIFICATION SOIL NAIL LOAD TEST
Hollow Core Bar Research - Long Island, New York




| | | | | | |
|---|---|---|---|---|---|
| Type of Test: Verification | Bond: 6 ft<br>Unbonded 12.91 ft | Diameter: 7 in (nominal) | Test Nail: A1 | **SCHNABEL ENGINEERING, LLC** | |
| | | | | Verification Soil Nail Load Test | |
| Design Test Load (P) : 45 kip | Comments: Nail pulled out at approximately 20.9 kip. | | | Hollow Core Bar Soil Nail Research | |
| | | | | Long Island, NY | |
| Maximum Test Load: 300% P = 135 kip | | | | Date: 10/30/08 | 07150064 |

# Soil Nail Verification Load Test Data

Schnabel Engineering

**Project:** Hollow Core Bar Soil Nail Research
**Location:** Long Island, NY
**Client:** ADSC

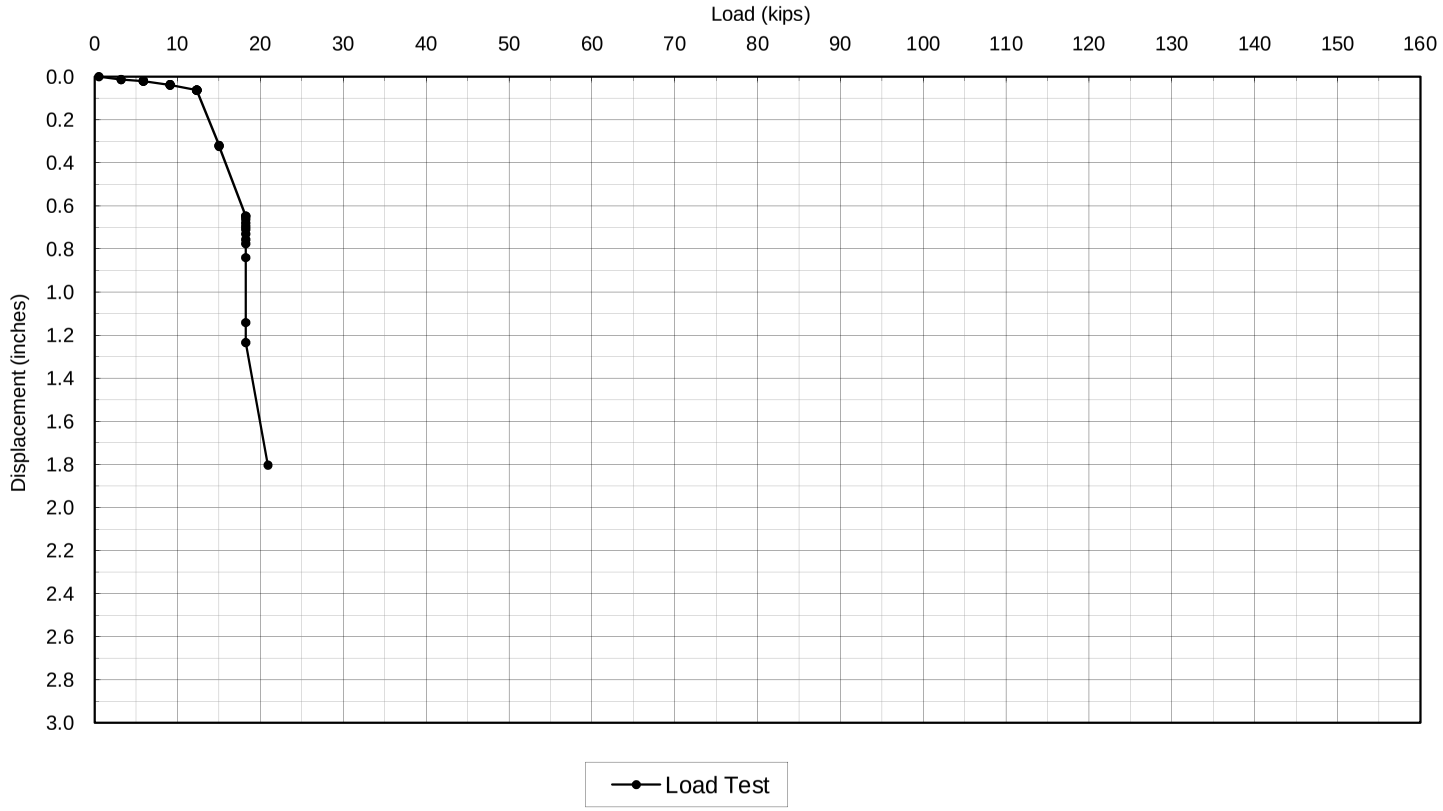
**Performed:** Nolan Kealy
**Observed:** M. Dirdal
**Data by:** M. Dirdal

**Soil Nail:** A-1
**Date:** 10/30/2008

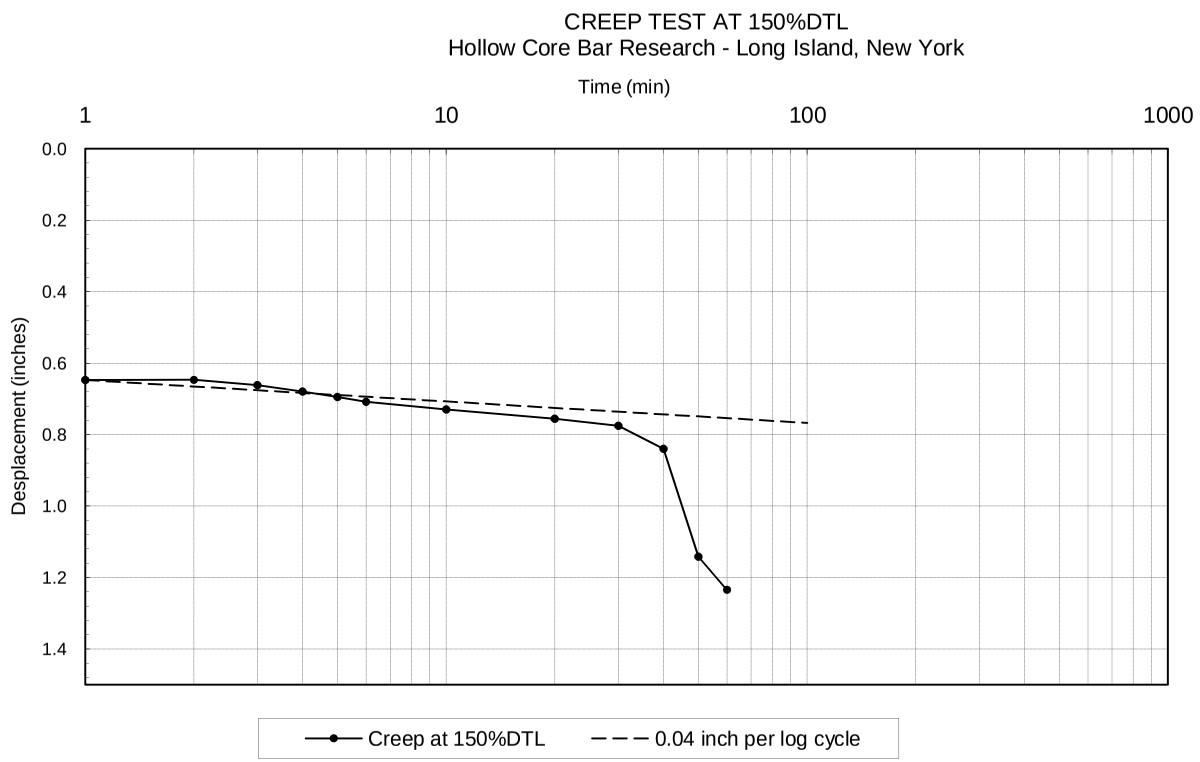
**Design Test Load (P):** 45 kips **# Dials:** 2 **Jack Calibration:** Pressure = 46.557 X reading (kip) + 76.141 (psi)

| Sequence of Loading | Estimated Load [kip] | Dial Load [psi] | Applied Pressure [psi] | Applied Load [kip] | Time [min] | Time of Test | Dial 1 Deformation [in.] | Dial 2 Deformation [in.] | Dial 3 Deformation [in.] | Dial 4 Deformation [in.] | Average Deformation [in.] | Comments: |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| AL | 2.3 | 180.9 | 200.0 | 2.7 | 1 | 7:51 AM | 0.100 | 0.100 | | | 0.000 | tail length = 14.25" |
| 25% | 11.3 | 599.9 | 625.0 | 11.8 | 1 | 7:52 AM | 0.124 | 0.134 | | | 0.029 | |
| | 11.3 | 599.9 | 625.0 | 11.8 | 2 | 7:53 AM | 0.124 | 0.133 | | | 0.029 | |
| | 11.3 | 599.9 | 625.0 | 11.8 | 3 | 7:54 AM | 0.124 | 0.133 | | | 0.029 | |
| | 11.3 | 599.9 | 625.0 | 11.8 | 4 | 7:55 AM | 0.125 | 0.135 | | | 0.030 | adj |
| | 11.3 | 599.9 | 625.0 | 11.8 | 5 | 7:56 AM | 0.126 | 0.137 | | | 0.032 | adj |
| | 11.3 | 599.9 | 625.0 | 11.8 | 6 | 7:57 AM | 0.126 | 0.136 | | | 0.031 | |
| | 11.3 | 599.9 | 625.0 | 11.8 | 10 | 8:01 AM | 0.126 | 0.136 | | | 0.031 | |
| 50% | 22.5 | 1123.7 | 1050.0 | 20.9 | 1 | 8:02 AM | 1.120 | 1.134 | | | 1.027 | popping sound. nail pulled out |
| | 22.5 | 1123.7 | 1150.0 | | 2 | | | | | | | |
| | 22.5 | 1123.7 | 1150.0 | | 3 | | | | | | | |
| | 22.5 | 1123.7 | 1150.0 | | 4 | | | | | | | |
| | 22.5 | 1123.7 | 1150.0 | | 5 | | | | | | | |
| | 22.5 | 1123.7 | 1150.0 | | 6 | | | | | | | |
| | 22.5 | 1123.7 | 1150.0 | | 10 | | | | | | | |

VERIFICATION SOIL NAIL LOAD TEST
Hollow Core Bar Research - Long Island, New York




| | | | | | |
|---|---|---|---|---|---|
| Type of Test: Verification | Bond: 6 ft<br>Unbonded 11.54 ft | Diameter: 7 in (nominal) | Test Nail: A2 | **SCHNABEL ENGINEERING, LLC** | |
| | | | | Verification Soil Nail Load Test | |
| Design Test Load (P) : 12 kip | Comments: Nail pulled out at approximately 20.9 kip. | | | Hollow Core Bar Soil Nail Research | |
| | | | | Long Island, NY | |
| Maximum Test Load: 300% P = 36 kip | | | | Date: 10/30/08 | 07150064 |




| | | | | | |
|---|---|---|---|---|---|
| Type of Test: Verification | Bond: 6 ft<br>Unbonded 11.54 ft | Diameter: 7 in (nominal) | Test Nail: A2 | **SCHNABEL ENGINEERING, LLC** | |
| | | | | Verification Soil Nail Load Test | |
| Design Test Load (P) : 12 kip | Comments: Nail pulled out at approximately 20.9 kip. | | | Hollow Core Bar Soil Nail Research | |
| | | | | Long Island, NY | |
| Maximum Test Load: 300% P = 36 kip | | | | Date: 10/30/08 | 07150064 |

# Soil Nail Verification Load Test Data

Schnabel Engineering

**Project:** Hollow Core Bar Soil Nail Research
**Location:** Long Island, NY
**Client:** ADSC

**Performed:** Nolan Kealy
**Observed:** M. Dirdal
**Data by:** M. Dirdal

**Soil Nail:** A-2
**Date:** 10/30/2008

**Design Test Load (P):** 12 kips **# Dials:** 2 **Jack Calibration:** Pressure = 46.557 X reading (kip) + 76.141 (psi)

| Sequence of Loading | Estimated Load [kip] | Dial Load [psi] | Applied Pressure [psi] | Applied Load [kip] | Time [min] | Time of Test | Dial 1 Deformation [in.] | Dial 2 Deformation [in.] | Dial 3 Deformation [in.] | Dial 4 Deformation [in.] | Average Deformation [in.] | Comments: |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| AL | 0.6 | 104.1 | 100.0 | 0.5 | 1 | 9:39 AM | 0.100 | 0.100 | | | 0.000 | tail length = 30.75" |
| 25% | 3.0 | 215.8 | 225.0 | 3.2 | 1 | 9:40 AM | 0.115 | 0.112 | | | 0.014 | |
| | 3.0 | 215.8 | 225.0 | 3.2 | 2 | 9:41 AM | 0.115 | 0.112 | | | 0.014 | |
| | 3.0 | 215.8 | 225.0 | 3.2 | 3 | 9:42 AM | 0.115 | 0.112 | | | 0.014 | |
| | 3.0 | 215.8 | 225.0 | 3.2 | 4 | 9:43 AM | 0.115 | 0.113 | | | 0.014 | |
| | 3.0 | 215.8 | 225.0 | 3.2 | 5 | 9:44 AM | 0.115 | 0.113 | | | 0.014 | |
| | 3.0 | 215.8 | 225.0 | 3.2 | 6 | 9:45 AM | 0.115 | 0.113 | | | 0.014 | |
| | 3.0 | 215.8 | 225.0 | 3.2 | 10 | 9:49 AM | 0.115 | 0.113 | | | 0.014 | |
| 50% | 6.0 | 355.5 | 350.0 | 5.9 | 1 | 9:50 AM | 0.126 | 0.115 | | | 0.021 | |
| | 6.0 | 355.5 | 350.0 | 5.9 | 2 | 9:51 AM | 0.125 | 0.114 | | | 0.020 | |
| | 6.0 | 355.5 | 350.0 | 5.9 | 3 | 9:52 AM | 0.125 | 0.114 | | | 0.020 | |
| | 6.0 | 355.5 | 350.0 | 5.9 | 4 | 9:53 AM | 0.125 | 0.114 | | | 0.020 | |
| | 6.0 | 355.5 | 350.0 | 5.9 | 5 | 9:54 AM | 0.125 | 0.115 | | | 0.020 | |
| | 6.0 | 355.5 | 350.0 | 5.9 | 6 | 9:55 AM | 0.125 | 0.115 | | | 0.020 | |
| | 6.0 | 355.5 | 350.0 | 5.9 | 10 | 9:59 AM | 0.126 | 0.115 | | | 0.021 | |

# Soil Nail Verification Load Test Data

Schnabel Engineering

**Project:** Hollow Core Bar Soil Nail Research
**Location:** Long Island, NY
**Client:** ADSC

**Performed:** Nolan Kealy
**Observed:** M. Dirdal
**Data by:** M. Dirdal

**Soil Nail:** A-2
**Date:** 10/30/2008

**Design Test Load (P):** 12 kips **# Dials:** 2 **Jack Calibration:** Pressure = 46.557 X reading (kip) + 76.141 (psi)

| Sequence of Loading | Estimated Load [kip] | Dial Load [psi] | Applied Pressure [psi] | Applied Load [kip] | Time [min] | Time of Test | Dial 1 Deformation [in.] | Dial 2 Deformation [in.] | Dial 3 Deformation [in.] | Dial 4 Deformation [in.] | Average Deformation [in.] | Comments: |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 75% | 9.0 | 495.2 | 500.0 | 9.1 | 1 | 10:00 AM | 0.146 | 0.132 | | | 0.039 | |
| | 9.0 | 495.2 | 500.0 | 9.1 | 2 | 10:01 AM | 0.145 | 0.131 | | | 0.038 | |
| | 9.0 | 495.2 | 500.0 | 9.1 | 3 | 10:02 AM | 0.144 | 0.131 | | | 0.038 | |
| | 9.0 | 495.2 | 500.0 | 9.1 | 4 | 10:03 AM | 0.143 | 0.130 | | | 0.037 | |
| | 9.0 | 495.2 | 500.0 | 9.1 | 5 | 10:04 AM | 0.145 | 0.133 | | | 0.039 | adj |
| | 9.0 | 495.2 | 500.0 | 9.1 | 6 | 10:05 AM | 0.145 | 0.133 | | | 0.039 | |
| | 9.0 | 495.2 | 500.0 | 9.1 | 10 | 10:09 AM | 0.145 | 0.132 | | | 0.039 | |
| 100% | 12.0 | 634.8 | 650.0 | 12.3 | 1 | 10:10 AM | 0.170 | 0.156 | | | 0.063 | |
| | 12.0 | 634.8 | 650.0 | 12.3 | 2 | 10:11 AM | 0.169 | 0.154 | | | 0.062 | |
| | 12.0 | 634.8 | 650.0 | 12.3 | 3 | 10:12 AM | 0.170 | 0.157 | | | 0.064 | adj |
| | 12.0 | 634.8 | 650.0 | 12.3 | 4 | 10:13 AM | 0.170 | 0.155 | | | 0.063 | |
| | 12.0 | 634.8 | 650.0 | 12.3 | 5 | 10:14 AM | 0.169 | 0.155 | | | 0.062 | |
| | 12.0 | 634.8 | 650.0 | 12.3 | 6 | 10:15 AM | 0.169 | 0.155 | | | 0.062 | |
| | 12.0 | 634.8 | 650.0 | 12.3 | 10 | 10:19 AM | 0.171 | 0.157 | | | 0.064 | adj |

# Soil Nail Verification Load Test Data

Schnabel Engineering

**Project:** Hollow Core Bar Soil Nail Research
**Location:** Long Island, NY
**Client:** ADSC

**Performed:** Nolan Kealy
**Observed:** M. Dirdal
**Data by:** M. Dirdal

**Soil Nail:** A-2
**Date:** 10/30/2008

**Design Test Load (P):** 12 kips **# Dials:** 2 **Jack Calibration:** Pressure = 46.557 X reading (kip) + 76.141 (psi)

| Sequence of Loading | Estimated Load [kip] | Dial Load [psi] | Applied Pressure [psi] | Applied Load [kip] | Time [min] | Time of Test | Dial 1 Deformation [in.] | Dial 2 Deformation [in.] | Dial 3 Deformation [in.] | Dial 4 Deformation [in.] | Average Deformation [in.] | Comments: |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 125% | 15.0 | 774.5 | 775.0 | 15.0 | 1 | 10:20 AM | 0.426 | 0.412 | | | 0.319 | popping sound. Pressure held |
| | 15.0 | 774.5 | 775.0 | 15.0 | 2 | 10:21 AM | 0.428 | 0.414 | | | 0.321 | |
| | 15.0 | 774.5 | 775.0 | 15.0 | 3 | 10:22 AM | 0.428 | 0.414 | | | 0.321 | |
| | 15.0 | 774.5 | 775.0 | 15.0 | 4 | 10:23 AM | 0.428 | 0.413 | | | 0.321 | |
| | 15.0 | 774.5 | 775.0 | 15.0 | 5 | 10:24 AM | 0.428 | 0.413 | | | 0.321 | |
| | 15.0 | 774.5 | 775.0 | 15.0 | 6 | 10:25 AM | 0.431 | 0.416 | | | 0.324 | adj |
| | 15.0 | 774.5 | 775.0 | 15.0 | 10 | 10:29 AM | 0.431 | 0.416 | | | 0.324 | |
| 150% | 18.0 | 914.2 | 925.0 | 18.2 | 1 | 10:31 AM | 0.755 | 0.740 | | | 0.648 | |
| | 18.0 | 914.2 | 925.0 | 18.2 | 2 | 10:32 AM | 0.755 | 0.739 | | | 0.647 | |
| | 18.0 | 914.2 | 925.0 | 18.2 | 3 | 10:33 AM | 0.770 | 0.754 | | | 0.662 | adj |
| | 18.0 | 914.2 | 925.0 | 18.2 | 4 | 10:34 AM | 0.788 | 0.772 | | | 0.680 | adj |
| | 18.0 | 914.2 | 925.0 | 18.2 | 5 | 10:35 AM | 0.803 | 0.787 | | | 0.695 | adj |
| | 18.0 | 914.2 | 925.0 | 18.2 | 6 | 10:36 AM | 0.830 | 0.787 | | | 0.709 | |
| | 18.0 | 914.2 | 925.0 | 18.2 | 10 | 10:40 AM | 0.839 | 0.821 | | | 0.730 | adj |
| | 18.0 | 914.2 | 925.0 | 18.2 | 20 | 10:50 AM | 0.864 | 0.848 | | | 0.756 | adj |
| | 18.0 | 914.2 | 925.0 | 18.2 | 30 | 11:00 AM | 0.884 | 0.867 | | | 0.776 | adj |
| | 18.0 | 914.2 | 925.0 | 18.2 | 40 | 11:10 AM | 0.949 | 0.931 | | | 0.840 | adj |
| | 18.0 | 914.2 | 925.0 | 18.2 | 50 | 11:20 AM | 1.250 | 1.233 | | | 1.142 | adj |
| | 18.0 | 914.2 | 925.0 | 18.2 | 60 | 11:30 AM | 1.346 | 1.323 | | | 1.235 | adj |

# Soil Nail Verification Load Test Data

Schnabel Engineering

**Project:** Hollow Core Bar Soil Nail Research
**Location:** Long Island, NY
**Client:** ADSC

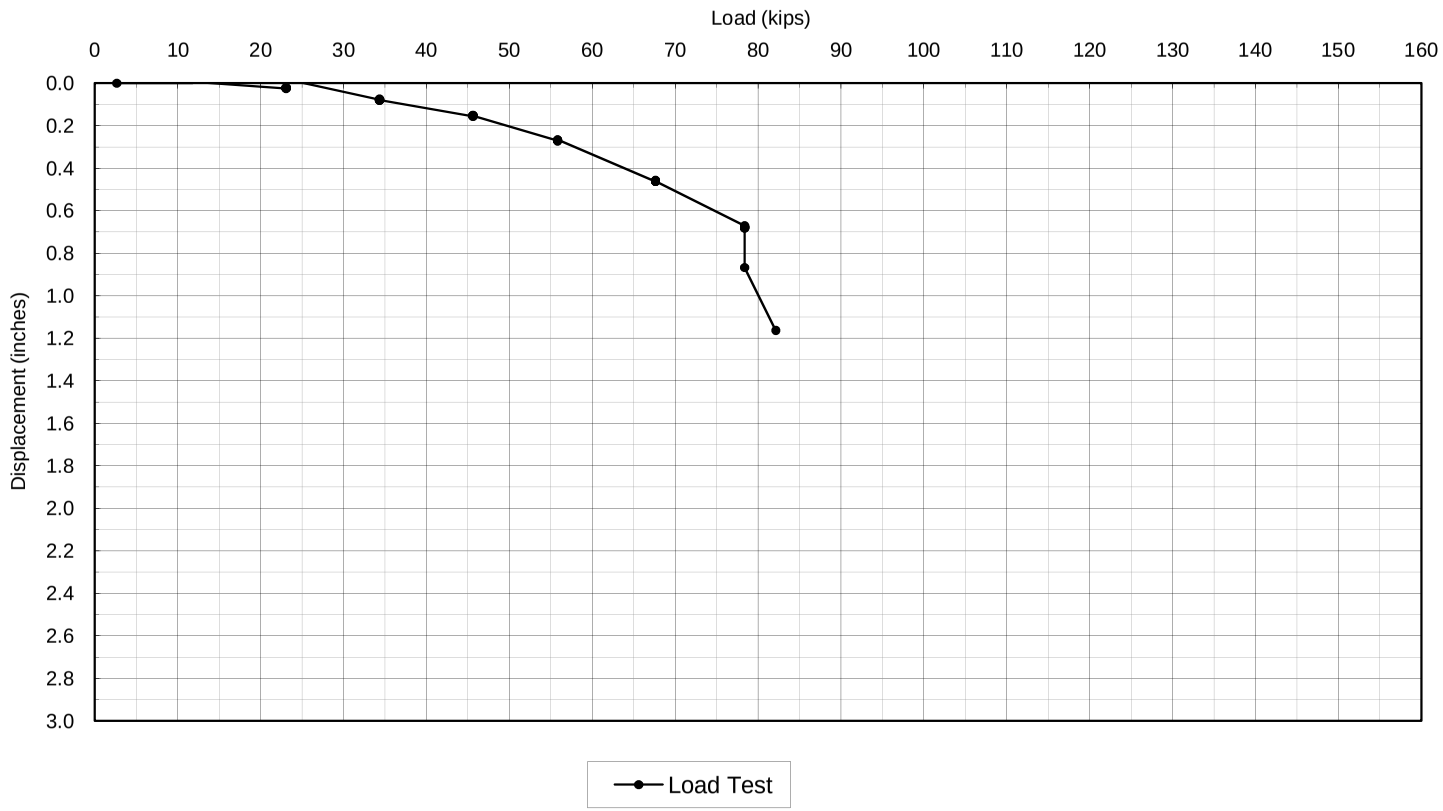
**Performed:** Nolan Kealy
**Observed:** M. Dirdal
**Data by:** M. Dirdal

**Soil Nail:** A-2
**Date:** 10/30/2008

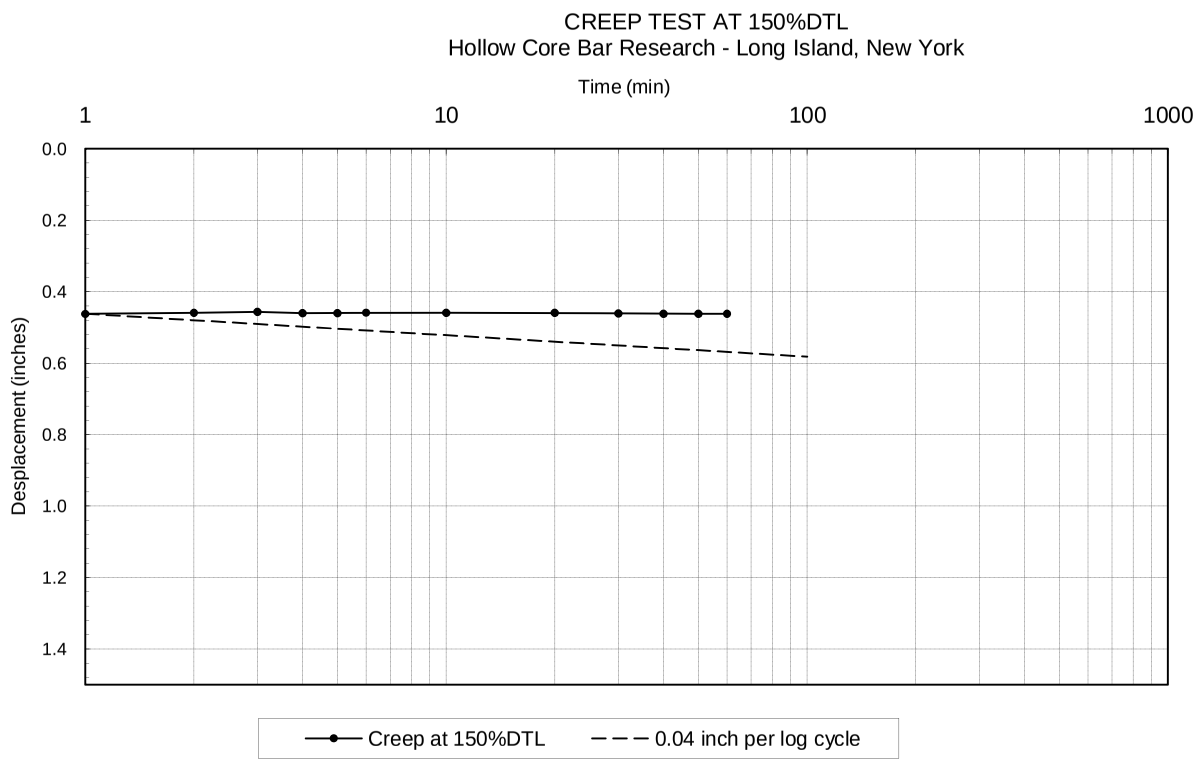
**Design Test Load (P):** 12 kips **# Dials:** 2 **Jack Calibration:** Pressure = 46.557 X reading (kip) + 76.141 (psi)

| Sequence of Loading | Estimated Load [kip] | Dial Load [psi] | Applied Pressure [psi] | Applied Load [kip] | Time [min] | Time of Test | Dial 1 Deformation [in.] | Dial 2 Deformation [in.] | Dial 3 Deformation [in.] | Dial 4 Deformation [in.] | Average Deformation [in.] | Comments: |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 175% | 21.0 | 1053.8 | 1050.0 | 20.9 | 1 | 11:33 AM | 1.912 | 1.895 | | | 1.804 | load not holding. Max pressure 1050 psi |
| | 21.0 | 1053.8 | | | 2 | | | | | | | |
| | 21.0 | 1053.8 | | | 3 | | | | | | | |
| | 21.0 | 1053.8 | | | 4 | | | | | | | |
| | 21.0 | 1053.8 | | | 5 | | | | | | | |
| | 21.0 | 1053.8 | | | 6 | | | | | | | |
| | 21.0 | 1053.8 | | | 10 | | | | | | | |

VERIFICATION SOIL NAIL LOAD TEST
Hollow Core Bar Research - Long Island, New York




| | | | | | |
|---|---|---|---|---|---|
| Type of Test: Verification | Bond: 6 ft<br>Unbonded 13.29 ft | Diameter: 5.1 in (130 mm) (nominal) | Test Nail: B1 | **SCHNABEL ENGINEERING, LLC** | |
| | | | | Verification Soil Nail Load Test | |
| Design Test Load (P) : 45 kip | Comments:Nail pulled out at approximately 78.4 kip. | | | Hollow Core Bar Soil Nail Research | |
| | | | | Long Island, NY | |
| Maximum Test Load: 300% P = 135 kip | | | | Date: 10/29/08 | 07150064 |




| | | | | |
|---|---|---|---|---|
| Type of Test: Verification | Bond: Unbonded 6 ft 13.29 ft | Diameter: 5.1 in (130 mm) (nominal) | Test Nail: B1 | **SCHNABEL ENGINEERING, LLC** |
| | | | | Verification Soil Nail Load Test |
| Design Test Load (P) : 45 kip | Comments:Nail pulled out at approximately 78.4 kip. | | | Hollow Core Bar Soil Nail Research |
| | | | | Long Island, NY |
| Maximum Test Load: 300% P = 135 kip | | | | Date: 10/29/08 — 07150064 |

# Soil Nail Verification Load Test Data

Schnabel Engineering

**Project:** Hollow Core Bar Soil Nail Research
**Location:** Long Island, NY
**Client:** ADSC

**Performed:** Nolan Kealy
**Observed:** M. Dirdal
**Data by:** M. Dirdal

**Soil Nail:** B-1
**Date:** 10/29/2008

**Design Test Load (P):** 45 kips **# Dials:** 2 **Jack Calibration:** Pressure = 46.557 X reading (kip) + 76.141 (psi)

| Sequence of Loading | Estimated Load [kip] | Dial Load [psi] | Applied Pressure [psi] | Applied Load [kip] | Time [min] | Time of Test | Dial 1 Deformation [in.] | Dial 2 Deformation [in.] | Dial 3 Deformation [in.] | Dial 4 Deformation [in.] | Average Deformation [in.] | Comments: |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| AL | 2.3 | 180.9 | 200.0 | 2.7 | 1 | 9:05 AM | 0.100 | 0.100 | | | 0.000 | tail length = 9.75 |
| 25% | 11.3 | 599.9 | 625.0 | 11.8 | 1 | 9:06 AM | 0.071 | 0.127 | | | -0.001 | |
| | 11.3 | 599.9 | 625.0 | 11.8 | 2 | 9:07 AM | 0.070 | 0.126 | | | -0.002 | |
| | 11.3 | 599.9 | 625.0 | 11.8 | 3 | 9:08 AM | 0.069 | 0.125 | | | -0.003 | |
| | 11.3 | 599.9 | 625.0 | 11.8 | 4 | 9:09 AM | 0.069 | 0.125 | | | -0.003 | |
| | 11.3 | 599.9 | 625.0 | 11.8 | 5 | 9:10 AM | 0.068 | 0.125 | | | -0.004 | |
| | 11.3 | 599.9 | 625.0 | 11.8 | 6 | 9:11 AM | 0.068 | 0.125 | | | -0.004 | |
| | 11.3 | 599.9 | 625.0 | 11.8 | 10 | 9:15 AM | 0.066 | 0.122 | | | -0.006 | adj |
| 50% | 22.5 | 1123.7 | 1150.0 | 23.1 | 1 | 9:16 AM | 0.080 | 0.170 | | | 0.025 | |
| | 22.5 | 1123.7 | 1150.0 | 23.1 | 2 | 9:17 AM | 0.078 | 0.168 | | | 0.023 | |
| | 22.5 | 1123.7 | 1150.0 | 23.1 | 3 | 9:18 AM | 0.077 | 0.167 | | | 0.022 | |
| | 22.5 | 1123.7 | 1150.0 | 23.1 | 4 | 9:19 AM | 0.076 | 0.166 | | | 0.021 | |
| | 22.5 | 1123.7 | 1150.0 | 23.1 | 5 | 9:20 AM | 0.077 | 0.168 | | | 0.023 | adj |
| | 22.5 | 1123.7 | 1150.0 | 23.1 | 6 | 9:21 AM | 0.076 | 0.167 | | | 0.022 | |
| | 22.5 | 1123.7 | 1150.0 | 23.1 | 10 | 9:25 AM | 0.068 | 0.094 | | | -0.019 | |

# Soil Nail Verification Load Test Data

Schnabel Engineering

**Project:** Hollow Core Bar Soil Nail Research
**Location:** Long Island, NY
**Client:** ADSC

**Performed:** Nolan Kealy
**Observed:** M. Dirdal
**Data by:** M. Dirdal

**Soil Nail:** B-1
**Date:** 10/29/2008

**Design Test Load (P):** 45 kips **# Dials:** 2 **Jack Calibration:** Pressure = 46.557 X reading (kip) + 76.141 (psi)

| Sequence of Loading | Estimated Load [kip] | Dial Load [psi] | Applied Pressure [psi] | Applied Load [kip] | Time [min] | Time of Test | Dial 1 Deformation [in.] | Dial 2 Deformation [in.] | Dial 3 Deformation [in.] | Dial 4 Deformation [in.] | Average Deformation [in.] | Comments: |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 75% | 33.8 | 1647.4 | 1675.0 | 34.3 | 1 | 9:28 AM | 0.123 | 0.232 | | | 0.078 | |
| | 33.8 | 1647.4 | 1675.0 | 34.3 | 2 | 9:29 AM | 0.121 | 0.229 | | | 0.075 | |
| | 33.8 | 1647.4 | 1675.0 | 34.3 | 3 | 9:30 AM | 0.124 | 0.235 | | | 0.080 | adj |
| | 33.8 | 1647.4 | 1675.0 | 34.3 | 4 | 9:31 AM | 0.125 | 0.236 | | | 0.081 | adj |
| | 33.8 | 1647.4 | 1675.0 | 34.3 | 5 | 9:32 AM | 0.123 | 0.232 | | | 0.078 | |
| | 33.8 | 1647.4 | 1675.0 | 34.3 | 6 | 9:33 AM | 0.122 | 0.232 | | | 0.077 | |
| | 33.8 | 1647.4 | 1675.0 | 34.3 | 10 | 9:37 AM | 0.124 | 0.234 | | | 0.079 | adj |
| 100% | 45.0 | 2171.2 | 2200.0 | 45.6 | 1 | 9:38 AM | 0.180 | 0.333 | | | 0.157 | |
| | 45.0 | 2171.2 | 2200.0 | 45.6 | 2 | 9:39 AM | 0.176 | 0.330 | | | 0.153 | |
| | 45.0 | 2171.2 | 2200.0 | 45.6 | 3 | 9:40 AM | 0.175 | 0.328 | | | 0.152 | |
| | 45.0 | 2171.2 | 2200.0 | 45.6 | 4 | 9:41 AM | 0.177 | 0.331 | | | 0.154 | adj |
| | 45.0 | 2171.2 | 2200.0 | 45.6 | 5 | 9:42 AM | 0.176 | 0.330 | | | 0.153 | |
| | 45.0 | 2171.2 | 2200.0 | 45.6 | 6 | 9:43 AM | 0.175 | 0.329 | | | 0.152 | |
| | 45.0 | 2171.2 | 2200.0 | 45.6 | 10 | 9:47 AM | 0.175 | 0.330 | | | 0.153 | adj |

# Soil Nail Verification Load Test Data

Schnabel Engineering

**Project:** Hollow Core Bar Soil Nail Research
**Location:** Long Island, NY
**Client:** ADSC

**Performed:** Nolan Kealy
**Observed:** M. Dirdal
**Data by:** M. Dirdal

**Soil Nail:** B-1
**Date:** 10/29/2008

**Design Test Load (P):** 45 kips **# Dials:** 2 **Jack Calibration:** Pressure = 46.557 X reading (kip) + 76.141 (psi)

| Sequence of Loading | Estimated Load [kip] | Dial Load [psi] | Applied Pressure [psi] | Applied Load [kip] | Time [min] | Time of Test | Dial 1 Deformation [in.] | Dial 2 Deformation [in.] | Dial 3 Deformation [in.] | Dial 4 Deformation [in.] | Average Deformation [in.] | Comments: |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 125% | 56.3 | 2695.0 | 2675.0 | 55.8 | 1 | 9:49 AM | 0.275 | 0.465 | | | 0.270 | |
| | 56.3 | 2695.0 | 2675.0 | 55.8 | 2 | 9:50 AM | 0.276 | 0.468 | | | 0.272 | adj |
| | 56.3 | 2695.0 | 2675.0 | 55.8 | 3 | 9:51 AM | 0.275 | 0.466 | | | 0.271 | adj |
| | 56.3 | 2695.0 | 2675.0 | 55.8 | 4 | 9:52 AM | 0.274 | 0.465 | | | 0.270 | |
| | 56.3 | 2695.0 | 2675.0 | 55.8 | 5 | 9:53 AM | 0.273 | 0.464 | | | 0.269 | |
| | 56.3 | 2695.0 | 2675.0 | 55.8 | 6 | 9:54 AM | 0.269 | 0.466 | | | 0.268 | |
| | 56.3 | 2695.0 | 2675.0 | 55.8 | 10 | 9:58 AM | 0.268 | 0.465 | | | 0.267 | adj |
| 150% | 67.5 | 3218.7 | 3225.0 | 67.6 | 1 | 9:59 AM | 0.447 | 0.678 | | | 0.463 | |
| | 67.5 | 3218.7 | 3225.0 | 67.6 | 2 | 10:00 AM | 0.445 | 0.674 | | | 0.460 | |
| | 67.5 | 3218.7 | 3225.0 | 67.6 | 3 | 10:01 AM | 0.443 | 0.671 | | | 0.457 | |
| | 67.5 | 3218.7 | 3225.0 | 67.6 | 4 | 10:02 AM | 0.446 | 0.675 | | | 0.461 | adj |
| | 67.5 | 3218.7 | 3225.0 | 67.6 | 5 | 10:03 AM | 0.446 | 0.675 | | | 0.461 | |
| | 67.5 | 3218.7 | 3225.0 | 67.6 | 6 | 10:04 AM | 0.444 | 0.674 | | | 0.459 | |
| | 67.5 | 3218.7 | 3225.0 | 67.6 | 10 | 10:08 AM | 0.445 | 0.674 | | | 0.460 | adj |
| | 67.5 | 3218.7 | 3225.0 | 67.6 | 20 | 10:18 AM | 0.445 | 0.674 | | | 0.460 | adj |
| | 67.5 | 3218.7 | 3225.0 | 67.6 | 30 | 10:28 AM | 0.447 | 0.676 | | | 0.462 | adj |
| | 67.5 | 3218.7 | 3225.0 | 67.6 | 40 | 10:38 AM | 0.447 | 0.677 | | | 0.462 | adj |
| | 67.5 | 3218.7 | 3225.0 | 67.6 | 50 | 10:48 AM | 0.447 | 0.677 | | | 0.462 | adj |
| | 67.5 | 3218.7 | 3225.0 | 67.6 | 60 | 10:58 AM | 0.447 | 0.677 | | | 0.462 | adj |

# Soil Nail Verification Load Test Data

Schnabel Engineering

**Project:** Hollow Core Bar Soil Nail Research
**Location:** Long Island, NY
**Client:** ADSC

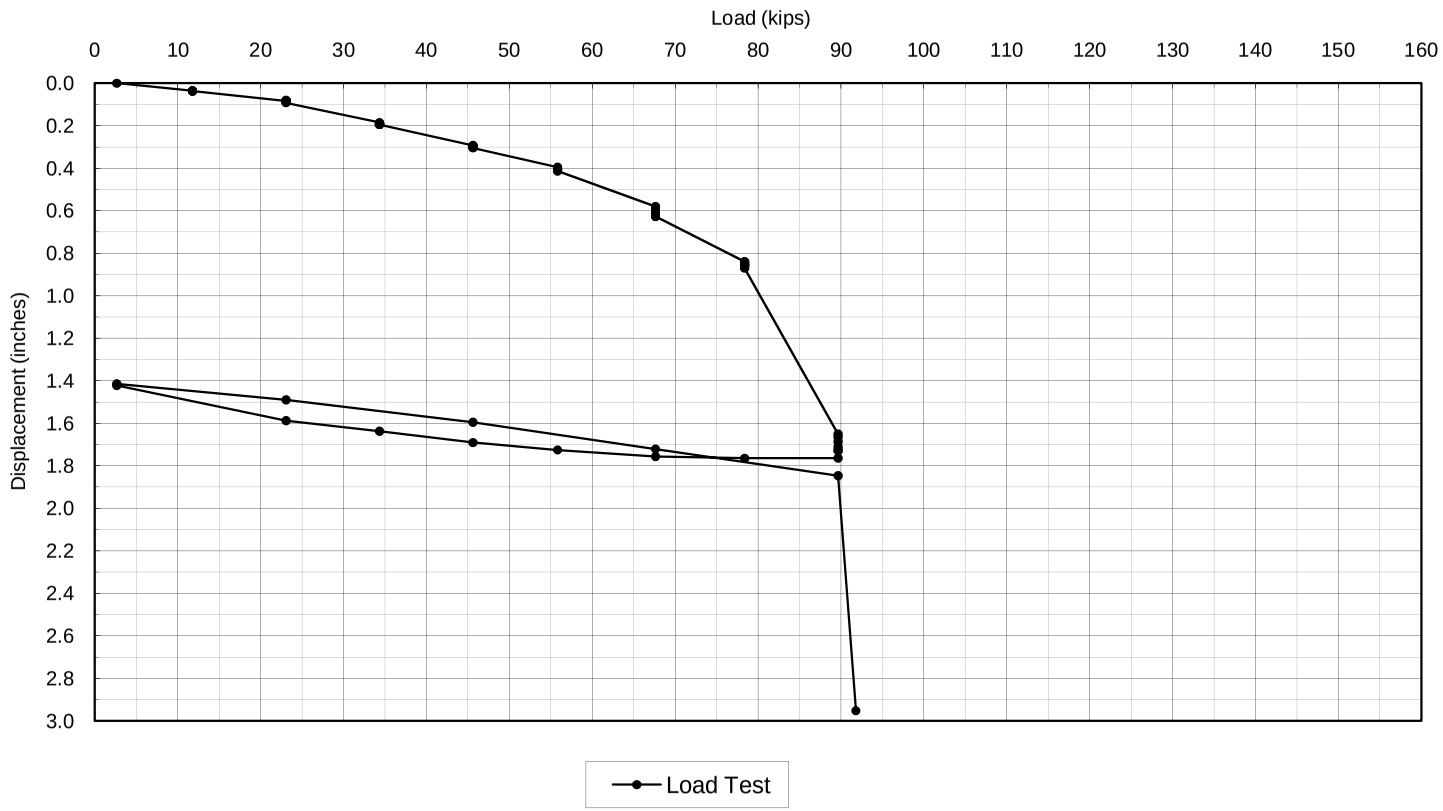
**Performed:** Nolan Kealy
**Observed:** M. Dirdal
**Data by:** M. Dirdal

**Soil Nail:** B-1
**Date:** 10/29/2008

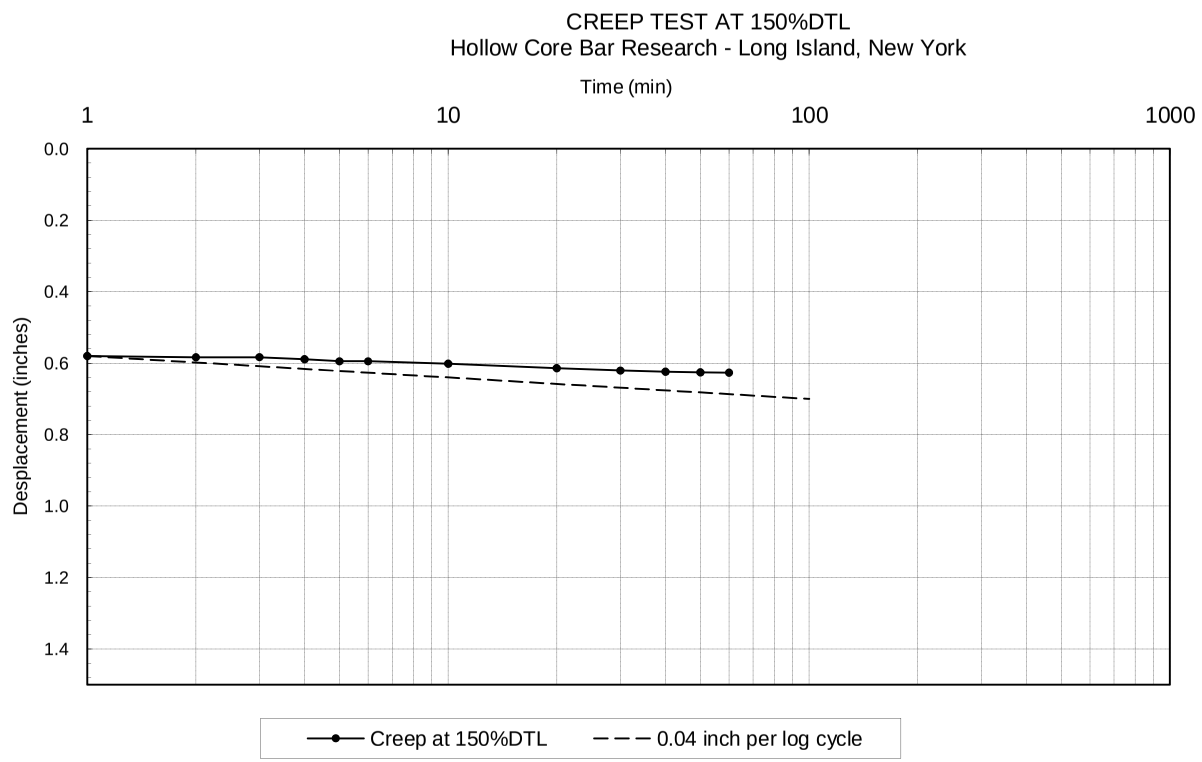
**Design Test Load (P):** 45 kips **# Dials:** 2 **Jack Calibration:** Pressure = 46.557 X reading (kip) + 76.141 (psi)

| Sequence of Loading | Estimated Load [kip] | Dial Load [psi] | Applied Pressure [psi] | Applied Load [kip] | Time [min] | Time of Test | Dial 1 Deformation [in.] | Dial 2 Deformation [in.] | Dial 3 Deformation [in.] | Dial 4 Deformation [in.] | Average Deformation [in.] | Comments: |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 175% | 78.8 | 3742.5 | 3725.0 | 78.4 | 1 | 10:59 AM | 0.639 | 0.902 | | | 0.671 | |
| | 78.8 | 3742.5 | 3725.0 | 78.4 | 2 | 11:00 AM | 0.642 | 0.907 | | | 0.675 | adj |
| | 78.8 | 3742.5 | 3725.0 | 78.4 | 3 | 11:01 AM | 0.648 | 0.912 | | | 0.680 | adj |
| | 78.8 | 3742.5 | 3725.0 | 78.4 | 4 | 11:02 AM | 0.645 | 0.910 | | | 0.678 | |
| | 78.8 | 3742.5 | 3725.0 | 78.4 | 5 | 11:03 AM | 0.649 | 0.913 | | | 0.681 | adj |
| | 78.8 | 3742.5 | 3725.0 | 78.4 | 6 | 11:04 AM | 0.649 | 0.914 | | | 0.682 | |
| | 78.8 | 3742.5 | 3725.0 | 78.4 | 10 | 11:08 AM | 0.874 | 1.061 | | | 0.868 | adj. Jack having trouble holding load. |
| 200% | 90.0 | 4266.3 | 3900.0 | 82.1 | 1 | 11:11 AM | 1.057 | 1.469 | | | 1.163 | nail failed |
| | 90.0 | 4266.3 | | | 2 | | | | | | | |
| | 90.0 | 4266.3 | | | 3 | | | | | | | |
| | 90.0 | 4266.3 | | | 4 | | | | | | | |
| | 90.0 | 4266.3 | | | 5 | | | | | | | |
| | 90.0 | 4266.3 | | | 6 | | | | | | | |
| | 90.0 | 4266.3 | | | 10 | | | | | | | |

VERIFICATION SOIL NAIL LOAD TEST
Hollow Core Bar Research - Long Island, New York




| | | | | | |
|---|---|---|---|---|---|
| Type of Test: Verification | Bond: 6 ft<br>Unbonded 12.48 ft | Diameter: 5.1 in (130 mm) (nominal) | Test Nail: B2 | **SCHNABEL ENGINEERING, LLC** | |
| | | | | Verification Soil Nail Load Test | |
| Design Test Load (P) : 45 kip | Comments: Soil nail pulled out at approximately 91.8 kip. | | | Hollow Core Bar Soil Nail Research | |
| | | | | Long Island, NY | |
| Maximum Test Load: 300% P = 135 kip | | | | Date: 10/29/08 | 07150064 |




| | | | | | |
|---|---|---|---|---|---|
| Type of Test: Verification | Bond: Unbonded 6 ft 12.48 ft | Diameter: 5.1 in (130 mm) (nominal) | Test Nail: B2 | **SCHNABEL ENGINEERING, LLC** | |
| | | | | Verification Soil Nail Load Test | |
| Design Test Load (P) : 45 kip | Comments: Soil nail pulled out at approximately 91.8 kip. | | | Hollow Core Bar Soil Nail Research | |
| | | | | Long Island, NY | |
| Maximum Test Load: 300% P = 135 kip | | | | Date: 10/29/08 | 07150064 |

# Soil Nail Verification Load Test Data

Schnabel Engineering

**Project:** Hollow Core Bar Soil Nail Research
**Location:** Long Island, NY
**Client:** ADSC

**Performed:** Nolan Kealy
**Observed:** M. Dirdal
**Data by:** M. Dirdal

**Soil Nail:** B-2
**Date:** 10/29/2008

**Design Test Load (P):** 45 kips **# Dials:** 2 **Jack Calibration:** Pressure = 46.557 X reading (kip) + 76.141 (psi)

| Sequence of Loading | Estimated Load [kip] | Dial Load [psi] | Applied Pressure [psi] | Applied Load [kip] | Time [min] | Time of Test | Dial 1 Deformation [in.] | Dial 2 Deformation [in.] | Dial 3 Deformation [in.] | Dial 4 Deformation [in.] | Average Deformation [in.] | Comments: |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| AL | 2.3 | 180.9 | 200.0 | 2.7 | 1 | 12:10 PM | 0.100 | 0.200 | | | 0.000 | tail length = 19.5" |
| 25% | 11.3 | 599.9 | 625.0 | 11.8 | 1 | 12:11 PM | 0.120 | 0.252 | | | 0.036 | |
| | 11.3 | 599.9 | 625.0 | 11.8 | 2 | 12:12 PM | 0.120 | 0.250 | | | 0.035 | |
| | 11.3 | 599.9 | 625.0 | 11.8 | 3 | 12:13 PM | 0.121 | 0.252 | | | 0.037 | adj |
| | 11.3 | 599.9 | 625.0 | 11.8 | 4 | 12:14 PM | 0.121 | 0.251 | | | 0.036 | |
| | 11.3 | 599.9 | 625.0 | 11.8 | 5 | 12:15 PM | 0.122 | 0.252 | | | 0.037 | adj |
| | 11.3 | 599.9 | 625.0 | 11.8 | 6 | 12:16 PM | 0.122 | 0.252 | | | 0.037 | |
| | 11.3 | 599.9 | 625.0 | 11.8 | 10 | 12:20 PM | 0.123 | 0.252 | | | 0.038 | adj |
| 50% | 22.5 | 1123.7 | 1150.0 | 23.1 | 1 | 12:21 PM | 0.161 | 0.305 | | | 0.083 | |
| | 22.5 | 1123.7 | 1150.0 | 23.1 | 2 | 12:22 PM | 0.159 | 0.304 | | | 0.082 | |
| | 22.5 | 1123.7 | 1150.0 | 23.1 | 3 | 12:23 PM | 0.159 | 0.303 | | | 0.081 | |
| | 22.5 | 1123.7 | 1150.0 | 23.1 | 4 | 12:24 PM | 0.164 | 0.310 | | | 0.087 | adj |
| | 22.5 | 1123.7 | 1150.0 | 23.1 | 5 | 12:25 PM | 0.163 | 0.309 | | | 0.086 | |
| | 22.5 | 1123.7 | 1150.0 | 23.1 | 6 | 12:26 PM | 0.165 | 0.310 | | | 0.088 | adj |
| | 22.5 | 1123.7 | 1150.0 | 23.1 | 10 | 12:30 PM | 0.169 | 0.315 | | | 0.092 | adj |

# Soil Nail Verification Load Test Data

Schnabel Engineering

**Project:** Hollow Core Bar Soil Nail Research
**Location:** Long Island, NY
**Client:** ADSC

**Performed:** Nolan Kealy
**Observed:** M. Dirdal
**Data by:** M. Dirdal

**Soil Nail:** B-2
**Date:** 10/29/2008

**Design Test Load (P):** 45 kips **# Dials:** 2 **Jack Calibration:** Pressure = 46.557 X reading (kip) + 76.141 (psi)

| Sequence of Loading | Estimated Load [kip] | Dial Load [psi] | Applied Pressure [psi] | Applied Load [kip] | Time [min] | Time of Test | Dial 1 Deformation [in.] | Dial 2 Deformation [in.] | Dial 3 Deformation [in.] | Dial 4 Deformation [in.] | Average Deformation [in.] | Comments: |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 75% | 33.8 | 1647.4 | 1675.0 | 34.3 | 1 | 12:31 PM | 0.249 | 0.421 | | | 0.185 | |
| | 33.8 | 1647.4 | 1675.0 | 34.3 | 2 | 12:32 PM | 0.252 | 0.424 | | | 0.188 | adj |
| | 33.8 | 1647.4 | 1675.0 | 34.3 | 3 | 12:33 PM | 0.256 | 0.428 | | | 0.192 | adj |
| | 33.8 | 1647.4 | 1675.0 | 34.3 | 4 | 12:34 PM | 0.258 | 0.430 | | | 0.194 | adj |
| | 33.8 | 1647.4 | 1675.0 | 34.3 | 5 | 12:35 PM | 0.256 | 0.428 | | | 0.192 | |
| | 33.8 | 1647.4 | 1675.0 | 34.3 | 6 | 12:36 PM | 0.258 | 0.429 | | | 0.194 | adj |
| | 33.8 | 1647.4 | 1675.0 | 34.3 | 10 | 12:40 PM | 0.259 | 0.430 | | | 0.195 | adj |
| 100% | 45.0 | 2171.2 | 2200.0 | 45.6 | 1 | 12:41 PM | 0.343 | 0.543 | | | 0.293 | |
| | 45.0 | 2171.2 | 2200.0 | 45.6 | 2 | 12:42 PM | 0.345 | 0.545 | | | 0.295 | adj |
| | 45.0 | 2171.2 | 2200.0 | 45.6 | 3 | 12:43 PM | 0.346 | 0.546 | | | 0.296 | adj |
| | 45.0 | 2171.2 | 2200.0 | 45.6 | 4 | 12:44 PM | 0.348 | 0.548 | | | 0.298 | adj |
| | 45.0 | 2171.2 | 2200.0 | 45.6 | 5 | 12:45 PM | 0.350 | 0.551 | | | 0.301 | adj |
| | 45.0 | 2171.2 | 2200.0 | 45.6 | 6 | 12:46 PM | 0.351 | 0.551 | | | 0.301 | adj |
| | 45.0 | 2171.2 | 2200.0 | 45.6 | 10 | 12:50 PM | 0.354 | 0.555 | | | 0.305 | adj |

# Soil Nail Verification Load Test Data

Schnabel Engineering

**Project:** Hollow Core Bar Soil Nail Research
**Location:** Long Island, NY
**Client:** ADSC

**Performed:** Nolan Kealy
**Observed:** M. Dirdal
**Data by:** M. Dirdal

**Soil Nail:** B-2
**Date:** 10/29/2008

**Design Test Load (P):** 45 kips **# Dials:** 2 **Jack Calibration:** Pressure = 46.557 X reading (kip) + 76.141 (psi)

| Sequence of Loading | Estimated Load [kip] | Dial Load [psi] | Applied Pressure [psi] | Applied Load [kip] | Time [min] | Time of Test | Dial 1 Deformation [in.] | Dial 2 Deformation [in.] | Dial 3 Deformation [in.] | Dial 4 Deformation [in.] | Average Deformation [in.] | Comments: |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 125% | 56.3 | 2695.0 | 2675.0 | 55.8 | 1 | 12:51 PM | 0.436 | 0.655 | | | 0.396 | |
| | 56.3 | 2695.0 | 2675.0 | 55.8 | 2 | 12:52 PM | 0.439 | 0.658 | | | 0.399 | adj |
| | 56.3 | 2695.0 | 2675.0 | 55.8 | 3 | 12:53 PM | 0.446 | 0.667 | | | 0.407 | adj |
| | 56.3 | 2695.0 | 2675.0 | 55.8 | 4 | 12:54 PM | 0.445 | 0.666 | | | 0.406 | |
| | 56.3 | 2695.0 | 2675.0 | 55.8 | 5 | 12:55 PM | 0.447 | 0.668 | | | 0.408 | adj |
| | 56.3 | 2695.0 | 2675.0 | 55.8 | 6 | 12:56 PM | 0.449 | 0.670 | | | 0.410 | adj |
| | 56.3 | 2695.0 | 2675.0 | 55.8 | 10 | 1:00 PM | 0.453 | 0.675 | | | 0.414 | adj |
| 150% | 67.5 | 3218.7 | 3225.0 | 67.6 | 1 | 1:01 PM | 0.605 | 0.856 | | | 0.581 | |
| | 67.5 | 3218.7 | 3225.0 | 67.6 | 2 | 1:02 PM | 0.609 | 0.859 | | | 0.584 | adj |
| | 67.5 | 3218.7 | 3225.0 | 67.6 | 3 | 1:03 PM | 0.609 | 0.858 | | | 0.584 | |
| | 67.5 | 3218.7 | 3225.0 | 67.6 | 4 | 1:04 PM | 0.615 | 0.864 | | | 0.590 | adj |
| | 67.5 | 3218.7 | 3225.0 | 67.6 | 5 | 1:05 PM | 0.620 | 0.870 | | | 0.595 | adj |
| | 67.5 | 3218.7 | 3225.0 | 67.6 | 6 | 1:06 PM | 0.620 | 0.870 | | | 0.595 | |
| | 67.5 | 3218.7 | 3225.0 | 67.6 | 10 | 1:10 PM | 0.627 | 0.876 | | | 0.602 | adj |
| | 67.5 | 3218.7 | 3225.0 | 67.6 | 20 | 1:20 PM | 0.639 | 0.890 | | | 0.615 | adj |
| | 67.5 | 3218.7 | 3225.0 | 67.6 | 30 | 1:30 PM | 0.645 | 0.897 | | | 0.621 | adj |
| | 67.5 | 3218.7 | 3225.0 | 67.6 | 40 | 1:40 PM | 0.647 | 0.901 | | | 0.624 | adj |
| | 67.5 | 3218.7 | 3225.0 | 67.6 | 50 | 1:50 PM | 0.649 | 0.903 | | | 0.626 | adj |
| | 67.5 | 3218.7 | 3225.0 | 67.6 | 60 | 2:00 PM | 0.649 | 0.905 | | | 0.627 | |

# Soil Nail Verification Load Test Data

Schnabel Engineering

**Project:** Hollow Core Bar Soil Nail Research
**Location:** Long Island, NY
**Client:** ADSC

**Performed:** Nolan Kealy
**Observed:** M. Dirdal
**Data by:** M. Dirdal

**Soil Nail:** B-2
**Date:** 10/29/2008

**Design Test Load (P):** 45 kips **# Dials:** 2 **Jack Calibration:** Pressure = 46.557 X reading (kip) + 76.141 (psi)

| Sequence of Loading | Estimated Load [kip] | Dial Load [psi] | Applied Pressure [psi] | Applied Load [kip] | Time [min] | Time of Test | Dial 1 Deformation [in.] | Dial 2 Deformation [in.] | Dial 3 Deformation [in.] | Dial 4 Deformation [in.] | Average Deformation [in.] | Comments: |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 175% | 78.8 | 3742.5 | 3725.0 | 78.4 | 1 | 2:03 PM | 0.852 | 1.127 | | | 0.840 | |
| | 78.8 | 3742.5 | 3725.0 | 78.4 | 2 | 2:04 PM | 0.858 | 1.133 | | | 0.846 | adj |
| | 78.8 | 3742.5 | 3725.0 | 78.4 | 3 | 2:05 PM | 0.863 | 1.141 | | | 0.852 | |
| | 78.8 | 3742.5 | 3725.0 | 78.4 | 4 | 2:06 PM | 0.869 | 1.146 | | | 0.858 | adj |
| | 78.8 | 3742.5 | 3725.0 | 78.4 | 5 | 2:07 PM | 0.869 | 1.147 | | | 0.858 | |
| | 78.8 | 3742.5 | 3725.0 | 78.4 | 6 | 2:08 PM | 0.869 | 1.147 | | | 0.858 | adj |
| | 78.8 | 3742.5 | 3725.0 | 78.4 | 10 | 2:12 PM | 0.881 | 1.160 | | | 0.871 | adj |
| 200% | 90.0 | 4266.3 | 4250.0 | 89.7 | 1 | 2:15 PM | 1.648 | 1.954 | | | 1.651 | |
| | 90.0 | 4266.3 | 4250.0 | 89.7 | 2 | 2:16 PM | 1.662 | 1.968 | | | 1.665 | adj |
| | 90.0 | 4266.3 | 4250.0 | 89.7 | 3 | 2:17 PM | 1.683 | 1.990 | | | 1.687 | adj |
| | 90.0 | 4266.3 | 4250.0 | 89.7 | 4 | 2:18 PM | 1.707 | 2.015 | | | 1.711 | adj |
| | 90.0 | 4266.3 | 4250.0 | 89.7 | 5 | 2:19 PM | 1.724 | 2.030 | | | 1.727 | adj |
| | 90.0 | 4266.3 | 4250.0 | 89.7 | 6 | 2:20 PM | 1.726 | 2.032 | | | 1.729 | |
| | 90.0 | 4266.3 | 4250.0 | 89.7 | 10 | 2:24 PM | 1.759 | 2.068 | | | 1.764 | adj |
| 175% | 78.8 | 3742.5 | 3725.0 | 78.4 | 1 | 2:25 PM | 1.760 | 2.069 | | | 1.765 | |
| 150% | 67.5 | 3218.7 | 3225.0 | 67.6 | 1 | 2:26 PM | 1.752 | 2.060 | | | 1.756 | |
| 125% | 56.3 | 2695.0 | 2675.0 | 55.8 | 1 | 2:27 PM | 1.723 | 2.028 | | | 1.726 | |
| 100% | 45.0 | 2171.2 | 2200.0 | 45.6 | 1 | 2:29 PM | 1.691 | 1.990 | | | 1.691 | |
| 75% | 33.8 | 1647.4 | 1675.0 | 34.3 | 1 | 2:31 PM | 1.645 | 1.930 | | | 1.638 | |
| 50% | 22.5 | 1123.7 | 1150.0 | 23.1 | 1 | 2:32 PM | 1.595 | 1.881 | | | 1.588 | |
| AL | 2.3 | 180.9 | 200.0 | 2.7 | 1 | 2:33 PM | 1.472 | 1.672 | | | 1.422 | |

# Soil Nail Verification Load Test Data

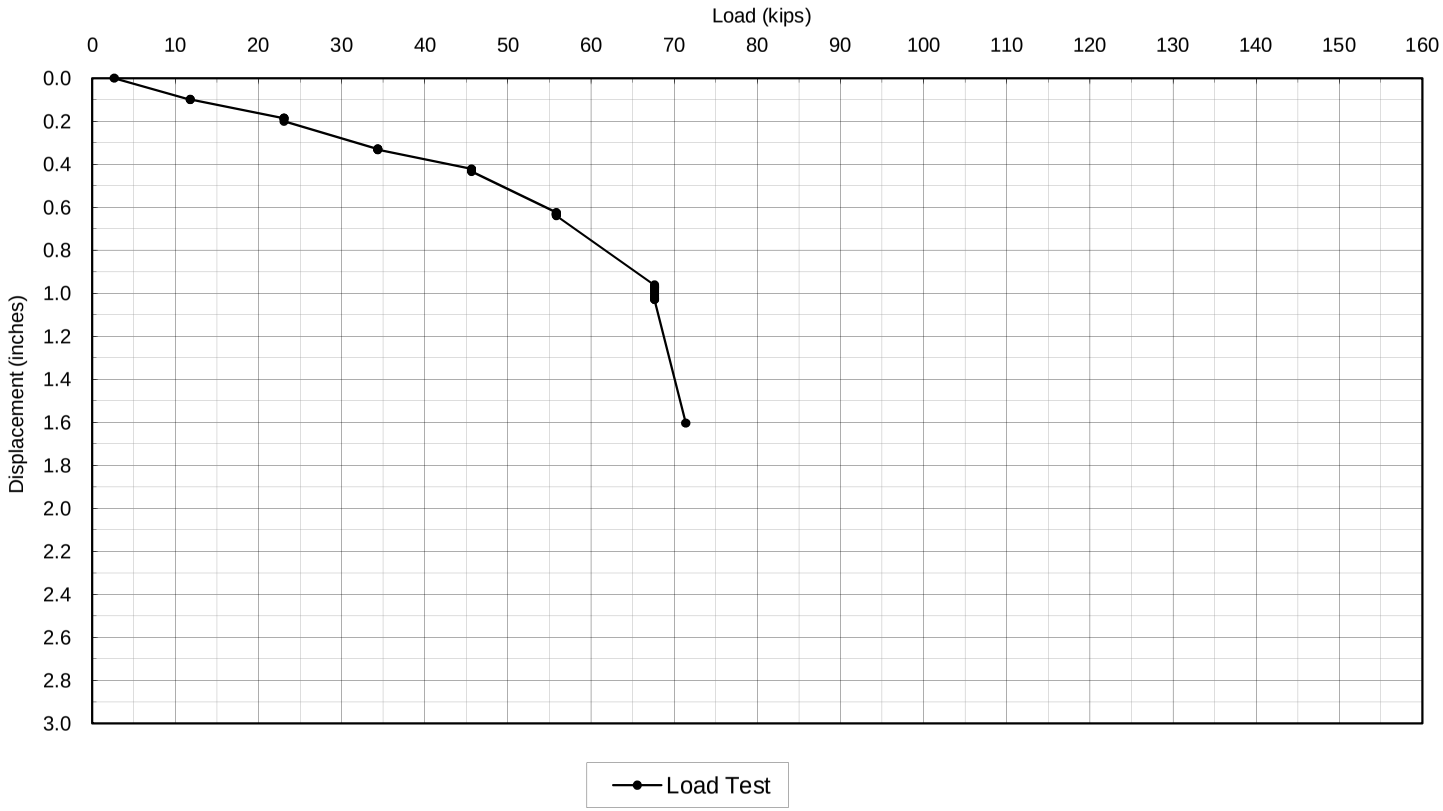
Schnabel Engineering

| | | | | | |
|---|---|---|---|---|---|
| **Project:** | Hollow Core Bar Soil Nail Research | **Performed:** | Nolan Kealy | **Soil Nail:** | B-2 |
| **Location:** | Long Island, NY | **Observed:** | M. Dirdal | | |
| **Client:** | ADSC | **Data by:** | M. Dirdal | **Date:** | 10/29/2008 |

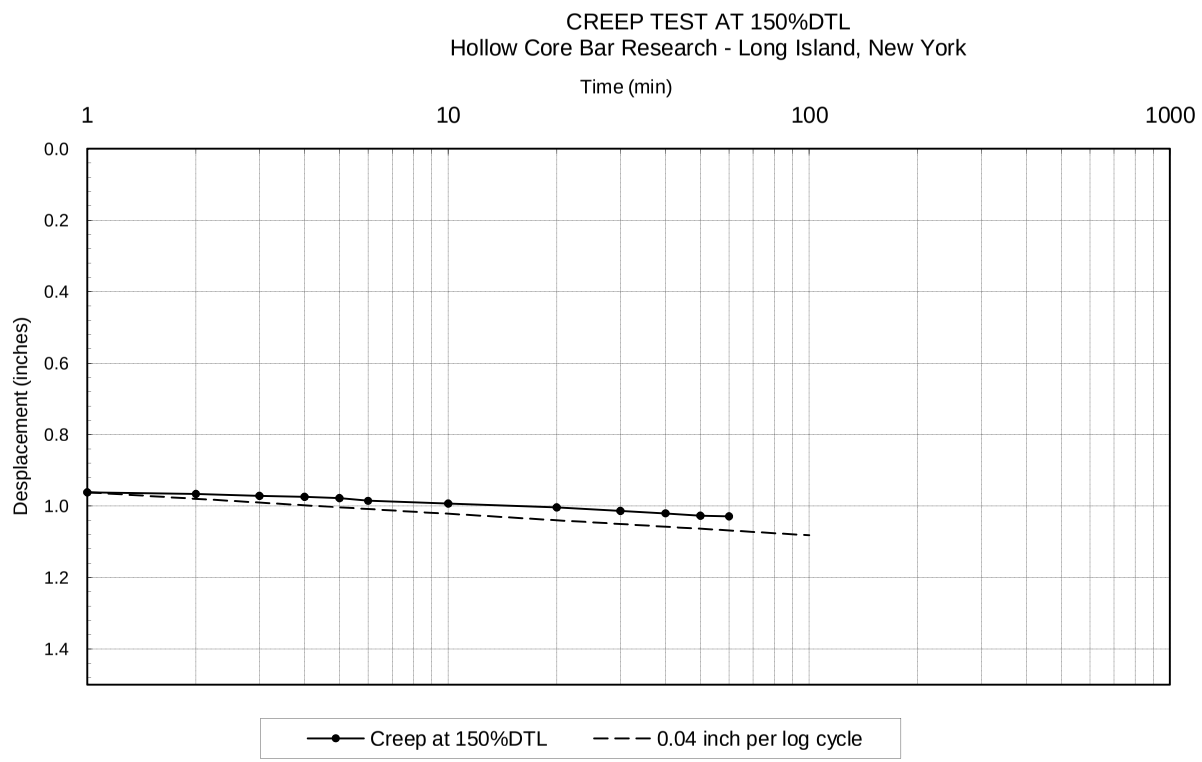
**Design Test Load (P):** 45 kips **# Dials:** 2 **Jack Calibration:** Pressure = 46.557 X reading (kip) + 76.141 (psi)

| Sequence of Loading | Estimated Load [kip] | Dial Load [psi] | Applied Pressure [psi] | Applied Load [kip] | Time [min] | Time of Test | Dial 1 Deformation [in.] | Dial 2 Deformation [in.] | Dial 3 Deformation [in.] | Dial 4 Deformation [in.] | Average Deformation [in.] | Comments: |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2.3 | 180.9 | 200.0 | 2.7 | 10 | 2:43 PM | 1.466 | 1.663 | | | 1.415 | |
| 50% | 22.5 | 1123.7 | 1150.0 | 23.1 | 1 | 2:44 PM | 1.519 | 1.761 | | | 1.490 | |
| 100% | 45.0 | 2171.2 | 2200.0 | 45.6 | 1 | 2:45 PM | 1.610 | 1.881 | | | 1.596 | |
| 150% | 67.5 | 3218.7 | 3225.0 | 67.6 | 1 | 2:46 PM | 1.724 | 2.018 | | | 1.721 | dial gages ran out of stroke. re-set |
| 200% | 90.0 | 4266.3 | 4250.0 | 89.7 | 1 | 2:52 PM | 1.848 | 2.146 | | | 1.847 | |
| 225% | 101.3 | 4790.0 | 4350.0 | 91.8 | 1 | 2:54 PM | 2.765 | 3.440 | | | 2.953 | nail failed |
| | 101.3 | 4790.0 | | | 2 | | | | | | | |
| | 101.3 | 4790.0 | | | 3 | | | | | | | |
| | 101.3 | 4790.0 | | | 4 | | | | | | | |
| | 101.3 | 4790.0 | | | 5 | | | | | | | |
| | 101.3 | 4790.0 | | | 6 | | | | | | | |
| | 101.3 | 4790.0 | | | 10 | | | | | | | |

VERIFICATION SOIL NAIL LOAD TEST
Hollow Core Bar Research - Long Island, New York




| | | | | | |
|---|---|---|---|---|---|
| Type of Test: Verification | Bond: Unbonded 6 ft 12.77 ft | Diameter: 5.1 in (130 mm) (nominal) | Test Nail: B3 | **SCHNABEL ENGINEERING, LLC** | |
| | | | | Verification Soil Nail Load Test | |
| Design Test Load (P) : 45 kip | Comments: Soil nail pulled out at approximately 71.4 kip. | | | Hollow Core Bar Soil Nail Research | |
| | | | | Long Island, NY | |
| Maximum Test Load: 300% P = 135 kip | | | | Date: 10/23/08 | 07150064 |




| | | | | |
|---|---|---|---|---|
| Type of Test: Verification | Bond: 6 ft<br>Unbonded 12.77 ft | Diameter: 5.1 in (130 mm) (nominal) | Test Nail: B3 | **SCHNABEL ENGINEERING, LLC**<br>Verification Soil Nail Load Test |
| Design Test Load (P) : 45 kip | Comments: Soil nail pulled out at approximately 71.4 kip. | | | Hollow Core Bar Soil Nail Research<br>Long Island, NY |
| Maximum Test Load: 300% P = 135 kip | | | | Date: 10/23/08 — 07150064 |

# Soil Nail Verification Load Test Data

Schnabel Engineering

**Project:** Hollow Core Bar Soil Nail Research
**Location:** Long Island, NY
**Client:** ADSC

**Performed:** Nolan Kealy
**Observed:** Johanna Mikitka
**Data by:** Johanna Mikitka

**Soil Nail:** B-3
**Date:** 10/23/2008

**Design Test Load (P):** 45 kips **# Dials:** 2 **Jack Calibration:** Pressure = 46.557 X reading (kip) + 76.141 (psi)

| Sequence of Loading | Estimated Load [kip] | Dial Load [psi] | Applied Pressure [psi] | Applied Load [kip] | Time [min] | Time of Test | Dial 1 Deformation [in.] | Dial 2 Deformation [in.] | Dial 3 Deformation [in.] | Dial 4 Deformation [in.] | Average Deformation [in.] | Comments: |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| AL | 2.3 | 180.9 | 200.0 | 2.7 | 1 | 8:52 AM | 0.100 | 0.100 | | | 0.000 | |
| 25% | 11.3 | 599.9 | 625.0 | 11.8 | 1 | 8:53 AM | 0.040 | 0.359 | | | 0.100 | |
| | 11.3 | 599.9 | 625.0 | 11.8 | 2 | 8:54 AM | 0.040 | 0.358 | | | 0.099 | |
| | 11.3 | 599.9 | 625.0 | 11.8 | 3 | 8:55 AM | 0.040 | 0.358 | | | 0.099 | |
| | 11.3 | 599.9 | 625.0 | 11.8 | 4 | 8:56 AM | 0.040 | 0.358 | | | 0.099 | |
| | 11.3 | 599.9 | 625.0 | 11.8 | 5 | 8:57 AM | 0.040 | 0.358 | | | 0.099 | |
| | 11.3 | 599.9 | 625.0 | 11.8 | 6 | 8:58 AM | 0.040 | 0.358 | | | 0.099 | |
| | 11.3 | 599.9 | 625.0 | 11.8 | 10 | 9:02 AM | 0.040 | 0.358 | | | 0.099 | |
| 50% | 22.5 | 1123.7 | 1150.0 | 23.1 | 1 | 9:03 AM | 0.101 | 0.471 | | | 0.186 | |
| | 22.5 | 1123.7 | 1150.0 | 23.1 | 2 | 9:04 AM | 0.101 | 0.471 | | | 0.186 | |
| | 22.5 | 1123.7 | 1150.0 | 23.1 | 3 | 9:05 AM | 0.101 | 0.471 | | | 0.186 | |
| | 22.5 | 1123.7 | 1150.0 | 23.1 | 4 | 9:06 AM | 0.101 | 0.471 | | | 0.186 | |
| | 22.5 | 1123.7 | 1150.0 | 23.1 | 5 | 9:07 AM | 0.102 | 0.471 | | | 0.187 | |
| | 22.5 | 1123.7 | 1150.0 | 23.1 | 6 | 9:08 AM | 0.103 | 0.472 | | | 0.188 | |
| | 22.5 | 1123.7 | 1150.0 | 23.1 | 10 | 9:12 AM | 0.115 | 0.486 | | | 0.201 | |

# Soil Nail Verification Load Test Data

Schnabel Engineering

**Project:** Hollow Core Bar Soil Nail Research
**Location:** Long Island, NY
**Client:** ADSC

**Performed:** Nolan Kealy
**Observed:** Johanna Mikitka
**Data by:** Johanna Mikitka

**Soil Nail:** B-3
**Date:** 10/23/2008

**Design Test Load (P):** 45 kips **# Dials:** 2 **Jack Calibration:** Pressure = 46.557 X reading (kip) + 76.141 (psi)

| Sequence of Loading | Estimated Load [kip] | Dial Load [psi] | Applied Pressure [psi] | Applied Load [kip] | Time [min] | Time of Test | Dial 1 Deformation [in.] | Dial 2 Deformation [in.] | Dial 3 Deformation [in.] | Dial 4 Deformation [in.] | Average Deformation [in.] | Comments: |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 75% | 33.8 | 1647.4 | 1675.0 | 34.3 | 1 | 9:13 AM | 0.211 | 0.647 | | | 0.329 | |
| | 33.8 | 1647.4 | 1675.0 | 34.3 | 2 | 9:14 AM | 0.211 | 0.647 | | | 0.329 | |
| | 33.8 | 1647.4 | 1675.0 | 34.3 | 3 | 9:15 AM | 0.211 | 0.648 | | | 0.330 | |
| | 33.8 | 1647.4 | 1675.0 | 34.3 | 4 | 9:16 AM | 0.211 | 0.648 | | | 0.330 | |
| | 33.8 | 1647.4 | 1675.0 | 34.3 | 5 | 9:17 AM | 0.212 | 0.648 | | | 0.330 | |
| | 33.8 | 1647.4 | 1675.0 | 34.3 | 6 | 9:18 AM | 0.212 | 0.649 | | | 0.331 | |
| | 33.8 | 1647.4 | 1675.0 | 34.3 | 10 | 9:22 AM | 0.214 | 0.650 | | | 0.332 | |
| 100% | 45.0 | 2171.2 | 2200.0 | 45.6 | 1 | 9:23 AM | 0.339 | 0.705 | | | 0.422 | |
| | 45.0 | 2171.2 | 2200.0 | 45.6 | 2 | 9:24 AM | 0.343 | 0.705 | | | 0.424 | |
| | 45.0 | 2171.2 | 2200.0 | 45.6 | 3 | 9:25 AM | 0.346 | 0.708 | | | 0.427 | |
| | 45.0 | 2171.2 | 2200.0 | 45.6 | 4 | 9:26 AM | 0.347 | 0.708 | | | 0.428 | |
| | 45.0 | 2171.2 | 2200.0 | 45.6 | 5 | 9:27 AM | 0.347 | 0.708 | | | 0.428 | |
| | 45.0 | 2171.2 | 2200.0 | 45.6 | 6 | 9:28 AM | 0.350 | 0.710 | | | 0.430 | |
| | 45.0 | 2171.2 | 2200.0 | 45.6 | 10 | 9:32 AM | 0.353 | 0.714 | | | 0.434 | |

# Soil Nail Verification Load Test Data

Schnabel Engineering

**Project:** Hollow Core Bar Soil Nail Research
**Location:** Long Island, NY
**Client:** ADSC

**Performed:** Nolan Kealy
**Observed:** Johanna Mikitka
**Data by:** Johanna Mikitka

**Soil Nail:** B-3
**Date:** 10/23/2008

**Design Test Load (P):** 45 kips **# Dials:** 2 **Jack Calibration:** Pressure = 46.557 X reading (kip) + 76.141 (psi)

| Sequence of Loading | Estimated Load [kip] | Dial Load [psi] | Applied Pressure [psi] | Applied Load [kip] | Time [min] | Time of Test | Dial 1 Deformation [in.] | Dial 2 Deformation [in.] | Dial 3 Deformation [in.] | Dial 4 Deformation [in.] | Average Deformation [in.] | Comments: |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 125% | 56.3 | 2695.0 | 2675.0 | 55.8 | 1 | 9:34 AM | 0.522 | 0.927 | | | 0.625 | |
| | 56.3 | 2695.0 | 2675.0 | 55.8 | 2 | 9:35 AM | 0.525 | 0.930 | | | 0.628 | |
| | 56.3 | 2695.0 | 2675.0 | 55.8 | 3 | 9:36 AM | 0.527 | 0.935 | | | 0.631 | |
| | 56.3 | 2695.0 | 2675.0 | 55.8 | 4 | 9:37 AM | 0.528 | 0.936 | | | 0.632 | |
| | 56.3 | 2695.0 | 2675.0 | 55.8 | 5 | 9:38 AM | 0.530 | 0.937 | | | 0.634 | |
| | 56.3 | 2695.0 | 2675.0 | 55.8 | 6 | 9:39 AM | 0.533 | 0.940 | | | 0.637 | |
| | 56.3 | 2695.0 | 2675.0 | 55.8 | 10 | 9:43 AM | 0.535 | 0.942 | | | 0.639 | |
| 150% | 67.5 | 3218.7 | 3225.0 | 67.6 | 1 | 9:45 AM | 0.835 | 1.288 | | | 0.962 | |
| | 67.5 | 3218.7 | 3225.0 | 67.6 | 2 | 9:46 AM | 0.840 | 1.293 | | | 0.967 | |
| | 67.5 | 3218.7 | 3225.0 | 67.6 | 3 | 9:47 AM | 0.845 | 1.298 | | | 0.972 | |
| | 67.5 | 3218.7 | 3225.0 | 67.6 | 4 | 9:48 AM | 0.848 | 1.300 | | | 0.974 | |
| | 67.5 | 3218.7 | 3225.0 | 67.6 | 5 | 9:49 AM | 0.852 | 1.304 | | | 0.978 | |
| | 67.5 | 3218.7 | 3225.0 | 67.6 | 6 | 9:50 AM | 0.859 | 1.312 | | | 0.986 | |
| | 67.5 | 3218.7 | 3225.0 | 67.6 | 10 | 9:54 AM | 0.866 | 1.320 | | | 0.993 | |
| | 67.5 | 3218.7 | 3225.0 | 67.6 | 20 | 10:04 AM | 0.876 | 1.332 | | | 1.004 | |
| | 67.5 | 3218.7 | 3225.0 | 67.6 | 30 | 10:14 AM | 0.886 | 1.341 | | | 1.014 | |
| | 67.5 | 3218.7 | 3225.0 | 67.6 | 40 | 10:24 AM | 0.893 | 1.348 | | | 1.021 | |
| | 67.5 | 3218.7 | 3225.0 | 67.6 | 50 | 10:34 AM | 0.899 | 1.355 | | | 1.027 | |
| | 67.5 | 3218.7 | 3225.0 | 67.6 | 60 | 10:44 AM | 0.901 | 1.357 | | | 1.029 | |

# Soil Nail Verification Load Test Data

Schnabel Engineering

**Project:** Hollow Core Bar Soil Nail Research
**Location:** Long Island, NY
**Client:** ADSC

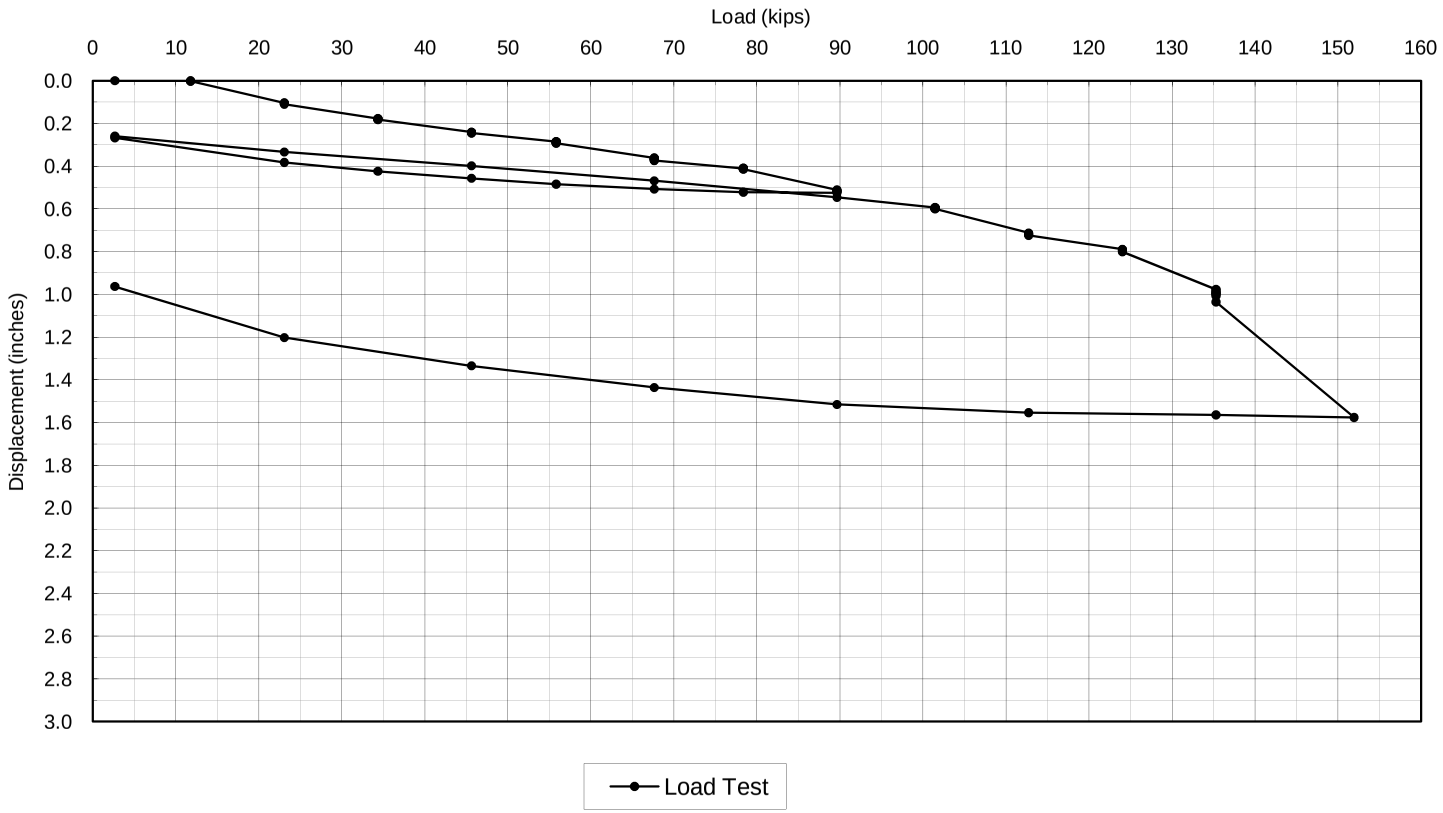
**Performed:** Nolan Kealy
**Observed:** Johanna Mikitka
**Data by:** Johanna Mikitka

**Soil Nail:** B-3
**Date:** 10/23/2008

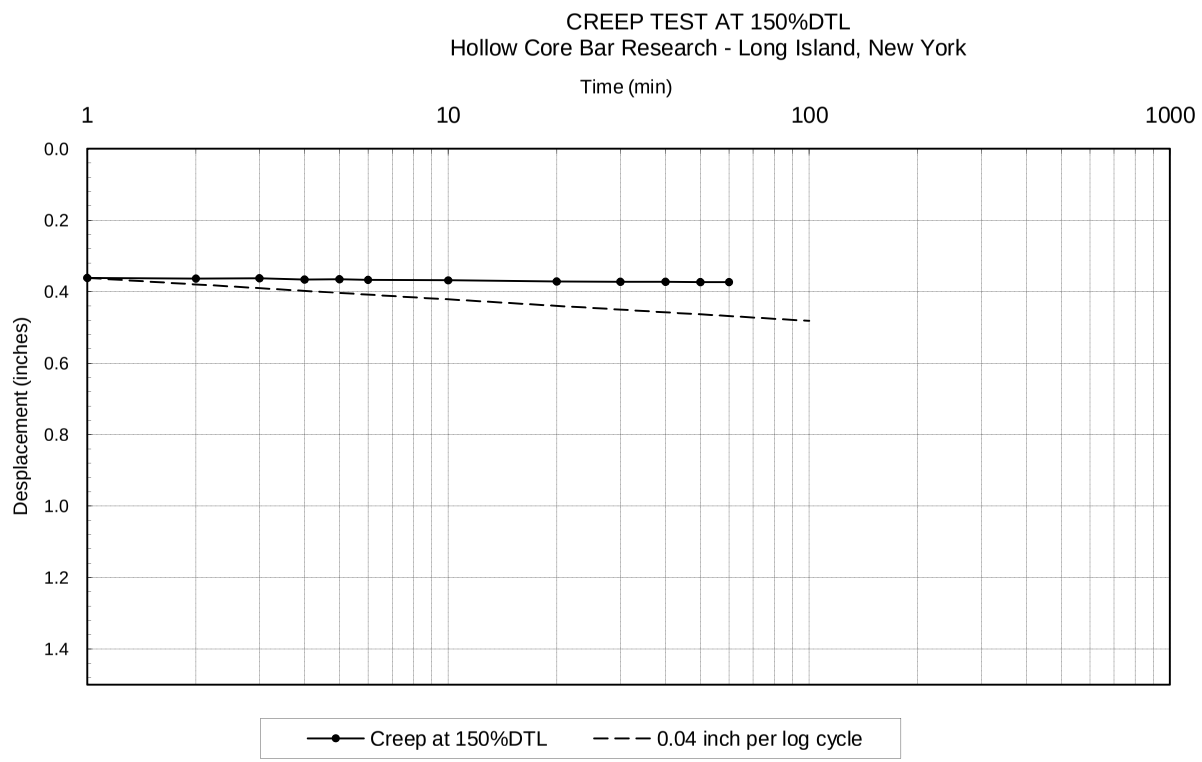
**Design Test Load (P):** 45 kips **# Dials:** 2 **Jack Calibration:** Pressure = 46.557 X reading (kip) + 76.141 (psi)

| Sequence of Loading | Estimated Load [kip] | Dial Load [psi] | Applied Pressure [psi] | Applied Load [kip] | Time [min] | Time of Test | Dial 1 Deformation [in.] | Dial 2 Deformation [in.] | Dial 3 Deformation [in.] | Dial 4 Deformation [in.] | Average Deformation [in.] | Comments: |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 175% | 78.8 | 3742.5 | 3400.0 | 71.4 | 1 | | 1.431 | 1.976 | | | 1.604 | max load reached = 3600 - could not hold to take readings |
| | 78.8 | 3742.5 | | | 2 | | | | | | | |
| | 78.8 | 3742.5 | | | 3 | | | | | | | |
| | 78.8 | 3742.5 | | | 4 | | | | | | | |
| | 78.8 | 3742.5 | | | 5 | | | | | | | |
| | 78.8 | 3742.5 | | | 6 | | | | | | | |
| | 78.8 | 3742.5 | | | 10 | | | | | | | |

VERIFICATION SOIL NAIL LOAD TEST
Hollow Core Bar Research - Long Island, New York




| | | | | | |
|---|---|---|---|---|---|
| Type of Test: Verification | Bond: Unbonded 6 ft 13.43 ft | Diameter: 5.1 in (130 mm) (nominal) | Test Nail: C1 | **SCHNABEL ENGINEERING, LLC** | |
| | | | | Verification Soil Nail Load Test | |
| Design Test Load (P) : 45 kip | Comments: Maximum test load approximately 151.9 kip. | | | Hollow Core Bar Soil Nail Research | |
| | | | | Long Island, NY | |
| Maximum Test Load: 338% P = 151.9 kip | | | | Date: 10/27/08 | 07150064 |




| | | | | |
|---|---|---|---|---|
| Type of Test: Verification | Bond: Unbonded 6 ft 13.43 ft | Diameter: 5.1 in (130 mm) (nominal) | Test Nail: C1 | **SCHNABEL ENGINEERING, LLC** |
| | | | | Verification Soil Nail Load Test |
| Design Test Load (P) : 45 kip | Comments: Maximum test load approximately 151.9 kip. | | | Hollow Core Bar Soil Nail Research |
| | | | | Long Island, NY |
| Maximum Test Load: 338% P = 151.9 kip | | | | Date: 10/27/08 — 07150064 |

# Soil Nail Verification Load Test Data

Schnabel Engineering

**Project:** Hollow Core Bar Soil Nail Research
**Location:** Long Island, NY
**Client:** ADSC

**Performed:** Nolan Kealy
**Observed:** M. Dirdal
**Data by:** M. Dirdal

**Soil Nail:** C-1
**Date:** 10/27/2008

**Design Test Load (P):** 45 kips **# Dials:** 2 **Jack Calibration:** Pressure = 46.557 X reading (kip) + 76.141 (psi)

| Sequence of Loading | Estimated Load [kip] | Dial Load [psi] | Applied Pressure [psi] | Applied Load [kip] | Time [min] | Time of Test | Dial 1 Deformation [in.] | Dial 2 Deformation [in.] | Dial 3 Deformation [in.] | Dial 4 Deformation [in.] | Average Deformation [in.] | Comments: |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| AL | 2.3 | 180.9 | 200.0 | 2.7 | 1 | 9:27 AM | 0.200 | 0.200 | | | 0.000 | tail length = 8 in |
| 25% | 11.3 | 599.9 | 625.0 | 11.8 | 1 | 9:28 AM | 0.218 | 0.183 | | | 0.000 | |
| | 11.3 | 599.9 | 625.0 | 11.8 | 2 | 9:29 AM | 0.218 | 0.184 | | | 0.001 | adj |
| | 11.3 | 599.9 | 625.0 | 11.8 | 3 | 9:30 AM | 0.218 | 0.184 | | | 0.001 | |
| | 11.3 | 599.9 | 625.0 | 11.8 | 4 | 9:31 AM | 0.219 | 0.184 | | | 0.001 | adj |
| | 11.3 | 599.9 | 625.0 | 11.8 | 5 | 9:32 AM | 0.219 | 0.184 | | | 0.001 | |
| | 11.3 | 599.9 | 625.0 | 11.8 | 6 | 9:33 AM | 0.219 | 0.184 | | | 0.001 | |
| | 11.3 | 599.9 | 625.0 | 11.8 | 10 | 9:37 AM | 0.220 | 0.185 | | | 0.002 | adj |
| 50% | 22.5 | 1123.7 | 1150.0 | 23.1 | 1 | 9:38 AM | 0.384 | 0.224 | | | 0.104 | |
| | 22.5 | 1123.7 | 1150.0 | 23.1 | 2 | 9:39 AM | 0.385 | 0.226 | | | 0.106 | adj |
| | 22.5 | 1123.7 | 1150.0 | 23.1 | 3 | 9:40 AM | 0.385 | 0.226 | | | 0.106 | |
| | 22.5 | 1123.7 | 1150.0 | 23.1 | 4 | 9:41 AM | 0.385 | 0.226 | | | 0.106 | adj |
| | 22.5 | 1123.7 | 1150.0 | 23.1 | 5 | 9:42 AM | 0.386 | 0.227 | | | 0.107 | |
| | 22.5 | 1123.7 | 1150.0 | 23.1 | 6 | 9:43 AM | 0.388 | 0.228 | | | 0.108 | |
| | 22.5 | 1123.7 | 1150.0 | 23.1 | 10 | 9:47 AM | 0.390 | 0.230 | | | 0.110 | adj |

# Soil Nail Verification Load Test Data

Schnabel Engineering

**Project:** Hollow Core Bar Soil Nail Research
**Location:** Long Island, NY
**Client:** ADSC

**Performed:** Nolan Kealy
**Observed:** M. Dirdal
**Data by:** M. Dirdal

**Soil Nail:** C-1
**Date:** 10/27/2008

**Design Test Load (P):** 45 kips **# Dials:** 2 **Jack Calibration:** Pressure = 46.557 X reading (kip) + 76.141 (psi)

| Sequence of Loading | Estimated Load [kip] | Dial Load [psi] | Applied Pressure [psi] | Applied Load [kip] | Time [min] | Time of Test | Dial 1 Deformation [in.] | Dial 2 Deformation [in.] | Dial 3 Deformation [in.] | Dial 4 Deformation [in.] | Average Deformation [in.] | Comments: |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 75% | 33.8 | 1647.4 | 1675.0 | 34.3 | 1 | 9:48 AM | 0.472 | 0.282 | | | 0.177 | |
| | 33.8 | 1647.4 | 1675.0 | 34.3 | 2 | 9:49 AM | 0.475 | 0.284 | | | 0.180 | adj |
| | 33.8 | 1647.4 | 1675.0 | 34.3 | 3 | 9:50 AM | 0.475 | 0.284 | | | 0.180 | |
| | 33.8 | 1647.4 | 1675.0 | 34.3 | 4 | 9:51 AM | 0.475 | 0.284 | | | 0.180 | adj |
| | 33.8 | 1647.4 | 1675.0 | 34.3 | 5 | 9:52 AM | 0.476 | 0.284 | | | 0.180 | |
| | 33.8 | 1647.4 | 1675.0 | 34.3 | 6 | 9:53 AM | 0.476 | 0.284 | | | 0.180 | |
| | 33.8 | 1647.4 | 1675.0 | 34.3 | 10 | 9:57 AM | 0.478 | 0.286 | | | 0.182 | |
| 100% | 45.0 | 2171.2 | 2200.0 | 45.6 | 1 | 9:59 AM | 0.547 | 0.335 | | | 0.241 | |
| | 45.0 | 2171.2 | 2200.0 | 45.6 | 2 | 10:00 AM | 0.547 | 0.336 | | | 0.242 | |
| | 45.0 | 2171.2 | 2200.0 | 45.6 | 3 | 10:01 AM | 0.549 | 0.338 | | | 0.244 | |
| | 45.0 | 2171.2 | 2200.0 | 45.6 | 4 | 10:02 AM | 0.549 | 0.337 | | | 0.243 | |
| | 45.0 | 2171.2 | 2200.0 | 45.6 | 5 | 10:03 AM | 0.549 | 0.339 | | | 0.244 | |
| | 45.0 | 2171.2 | 2200.0 | 45.6 | 6 | 10:04 AM | 0.549 | 0.339 | | | 0.244 | adj |
| | 45.0 | 2171.2 | 2200.0 | 45.6 | 10 | 10:08 AM | 0.550 | 0.339 | | | 0.245 | adj |

# Soil Nail Verification Load Test Data

Schnabel Engineering

**Project:** Hollow Core Bar Soil Nail Research
**Location:** Long Island, NY
**Client:** ADSC

**Performed:** Nolan Kealy
**Observed:** M. Dirdal
**Data by:** M. Dirdal

**Soil Nail:** C-1
**Date:** 10/27/2008

**Design Test Load (P):** 45 kips **# Dials:** 2 **Jack Calibration:** Pressure = 46.557 X reading (kip) + 76.141 (psi)

| Sequence of Loading | Estimated Load [kip] | Dial Load [psi] | Applied Pressure [psi] | Applied Load [kip] | Time [min] | Time of Test | Dial 1 Deformation [in.] | Dial 2 Deformation [in.] | Dial 3 Deformation [in.] | Dial 4 Deformation [in.] | Average Deformation [in.] | Comments: |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 125% | 56.3 | 2695.0 | 2675.0 | 55.8 | 1 | 10:13 AM | 0.592 | 0.377 | | | 0.285 | |
| | 56.3 | 2695.0 | 2675.0 | 55.8 | 2 | 10:14 AM | 0.596 | 0.380 | | | 0.288 | adj |
| | 56.3 | 2695.0 | 2675.0 | 55.8 | 3 | 10:15 AM | 0.595 | 0.379 | | | 0.287 | |
| | 56.3 | 2695.0 | 2675.0 | 55.8 | 4 | 10:16 AM | 0.595 | 0.379 | | | 0.287 | |
| | 56.3 | 2695.0 | 2675.0 | 55.8 | 5 | 10:17 AM | 0.598 | 0.382 | | | 0.290 | adj |
| | 56.3 | 2695.0 | 2675.0 | 55.8 | 6 | 10:18 AM | 0.598 | 0.382 | | | 0.290 | |
| | 56.3 | 2695.0 | 2675.0 | 55.8 | 10 | 10:22 AM | 0.602 | 0.384 | | | 0.293 | adj |
| 150% | 67.5 | 3218.7 | 3225.0 | 67.6 | 1 | 10:23 AM | 0.681 | 0.442 | | | 0.362 | |
| | 67.5 | 3218.7 | 3225.0 | 67.6 | 2 | 10:24 AM | 0.683 | 0.444 | | | 0.364 | adj |
| | 67.5 | 3218.7 | 3225.0 | 67.6 | 3 | 10:25 AM | 0.683 | 0.442 | | | 0.363 | |
| | 67.5 | 3218.7 | 3225.0 | 67.6 | 4 | 10:26 AM | 0.686 | 0.446 | | | 0.366 | |
| | 67.5 | 3218.7 | 3225.0 | 67.6 | 5 | 10:27 AM | 0.686 | 0.445 | | | 0.366 | |
| | 67.5 | 3218.7 | 3225.0 | 67.6 | 6 | 10:28 AM | 0.688 | 0.446 | | | 0.367 | |
| | 67.5 | 3218.7 | 3225.0 | 67.6 | 10 | 10:32 AM | 0.689 | 0.448 | | | 0.369 | |
| | 67.5 | 3218.7 | 3225.0 | 67.6 | 20 | 10:42 AM | 0.693 | 0.450 | | | 0.372 | adj |
| | 67.5 | 3218.7 | 3225.0 | 67.6 | 30 | 10:52 AM | 0.694 | 0.451 | | | 0.373 | adj |
| | 67.5 | 3218.7 | 3225.0 | 67.6 | 40 | 11:02 AM | 0.694 | 0.451 | | | 0.373 | |
| | 67.5 | 3218.7 | 3225.0 | 67.6 | 50 | 11:12 AM | 0.695 | 0.452 | | | 0.374 | adj |
| | 67.5 | 3218.7 | 3225.0 | 67.6 | 60 | 11:22 AM | 0.695 | 0.452 | | | 0.374 | |

# Soil Nail Verification Load Test Data

Schnabel Engineering

**Project:** Hollow Core Bar Soil Nail Research
**Location:** Long Island, NY
**Client:** ADSC

**Performed:** Nolan Kealy
**Observed:** M. Dirdal
**Data by:** M. Dirdal

**Soil Nail:** C-1
**Date:** 10/27/2008

**Design Test Load (P):** 45 kips **# Dials:** 2 **Jack Calibration:** Pressure = 46.557 X reading (kip) + 76.141 (psi)

| Sequence of Loading | Estimated Load [kip] | Dial Load [psi] | Applied Pressure [psi] | Applied Load [kip] | Time [min] | Time of Test | Dial 1 Deformation [in.] | Dial 2 Deformation [in.] | Dial 3 Deformation [in.] | Dial 4 Deformation [in.] | Average Deformation [in.] | Comments: |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 175% | 78.8 | 3742.5 | 3725.0 | 78.4 | 1 | 11:23 AM | 0.734 | 0.487 | | | 0.411 | |
| | 78.8 | 3742.5 | 3725.0 | 78.4 | 2 | 11:24 AM | 0.734 | 0.487 | | | 0.411 | adj |
| | 78.8 | 3742.5 | 3725.0 | 78.4 | 3 | 11:25 AM | 0.733 | 0.486 | | | 0.410 | |
| | 78.8 | 3742.5 | 3725.0 | 78.4 | 4 | 11:26 AM | 0.735 | 0.488 | | | 0.412 | adj |
| | 78.8 | 3742.5 | 3725.0 | 78.4 | 5 | 11:27 AM | 0.735 | 0.488 | | | 0.412 | |
| | 78.8 | 3742.5 | 3725.0 | 78.4 | 6 | 11:28 AM | 0.735 | 0.487 | | | 0.411 | |
| | 78.8 | 3742.5 | 3725.0 | 78.4 | 10 | 11:32 AM | 0.738 | 0.490 | | | 0.414 | adj |
| 200% | 90.0 | 4266.3 | 4250.0 | 89.7 | 1 | 11:34 AM | 0.840 | 0.583 | | | 0.512 | |
| | 90.0 | 4266.3 | 4250.0 | 89.7 | 2 | 11:35 AM | 0.843 | 0.584 | | | 0.514 | adj |
| | 90.0 | 4266.3 | 4250.0 | 89.7 | 3 | 11:36 AM | 0.845 | 0.586 | | | 0.516 | adj |
| | 90.0 | 4266.3 | 4250.0 | 89.7 | 4 | 11:37 AM | 0.848 | 0.589 | | | 0.519 | adj |
| | 90.0 | 4266.3 | 4250.0 | 89.7 | 5 | 11:38 AM | 0.849 | 0.590 | | | 0.520 | adj |
| | 90.0 | 4266.3 | 4250.0 | 89.7 | 6 | 11:39 AM | 0.849 | 0.590 | | | 0.520 | |
| | 90.0 | 4266.3 | 4250.0 | 89.7 | 10 | 11:43 AM | 0.855 | 0.595 | | | 0.525 | |
| 175% | 78.8 | 3742.5 | 3725.0 | 78.4 | 1 | 11:44 AM | 0.852 | 0.592 | | | 0.522 | |
| 150% | 67.5 | 3218.7 | 3225.0 | 67.6 | 1 | 11:45 AM | 0.838 | 0.577 | | | 0.508 | |
| 125% | 56.3 | 2695.0 | 2675.0 | 55.8 | 1 | 11:46 AM | 0.814 | 0.555 | | | 0.485 | |
| 100% | 45.0 | 2171.2 | 2200.0 | 45.6 | 1 | 11:47 AM | 0.787 | 0.527 | | | 0.457 | |
| 75% | 33.8 | 1647.4 | 1675.0 | 34.3 | 1 | 11:48 AM | 0.752 | 0.496 | | | 0.424 | |
| 50% | 22.5 | 1123.7 | 1150.0 | 23.1 | 1 | 11:49 AM | 0.708 | 0.457 | | | 0.383 | |

# Soil Nail Verification Load Test Data

Schnabel Engineering

**Project:** Hollow Core Bar Soil Nail Research
**Location:** Long Island, NY
**Client:** ADSC

**Performed:** Nolan Kealy
**Observed:** M. Dirdal
**Data by:** M. Dirdal

**Soil Nail:** C-1
**Date:** 10/27/2008

**Design Test Load (P):** 45 kips **# Dials:** 2 **Jack Calibration:** Pressure = 46.557 X reading (kip) + 76.141 (psi)

| Sequence of Loading | Estimated Load [kip] | Dial Load [psi] | Applied Pressure [psi] | Applied Load [kip] | Time [min] | Time of Test | Dial 1 Deformation [in.] | Dial 2 Deformation [in.] | Dial 3 Deformation [in.] | Dial 4 Deformation [in.] | Average Deformation [in.] | Comments: |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| AL | 2.3 | 180.9 | 200.0 | 2.7 | 1 | 11:50 AM | 0.541 | 0.394 | | | 0.268 | |
| | 2.3 | 180.9 | 200.0 | 2.7 | 10 | 12:00 | 0.529 | 0.391 | | | 0.260 | |
| 50% | 22.5 | 1123.7 | 1150.0 | 23.1 | 1 | 12:00 PM | 0.650 | 0.417 | | | 0.334 | |
| 100% | 45.0 | 2171.2 | 2200.0 | 45.6 | 1 | 12:01 PM | 0.722 | 0.475 | | | 0.399 | |
| 150% | 67.5 | 3218.7 | 3225.0 | 67.6 | 1 | 12:02 PM | 0.797 | 0.540 | | | 0.469 | |
| 200% | 90.0 | 4266.3 | 4250.0 | 89.7 | 1 | 12:04 PM | 0.881 | 0.612 | | | 0.547 | |
| 225% | 101.3 | 4790.0 | 4800.0 | 101.5 | 1 | 12:06 PM | 0.930 | 0.658 | | | 0.594 | |
| | 101.3 | 4790.0 | 4800.0 | 101.5 | 2 | 12:07 PM | 0.931 | 0.659 | | | 0.595 | |
| | 101.3 | 4790.0 | 4800.0 | 101.5 | 3 | 12:08 PM | 0.932 | 0.660 | | | 0.596 | adj |
| | 101.3 | 4790.0 | 4800.0 | 101.5 | 4 | 12:09 PM | 0.932 | 0.661 | | | 0.597 | adj |
| | 101.3 | 4790.0 | 4800.0 | 101.5 | 5 | 12:10 PM | 0.933 | 0.662 | | | 0.598 | adj |
| | 101.3 | 4790.0 | 4800.0 | 101.5 | 6 | 12:11 PM | 0.933 | 0.662 | | | 0.598 | |
| | 101.3 | 4790.0 | 4800.0 | 101.5 | 10 | 12:15 PM | 0.936 | 0.664 | | | 0.600 | |
| 250% | 112.5 | 5313.8 | 5325.0 | 112.7 | 1 | 12:19 PM | 1.052 | 0.773 | | | 0.713 | |
| | 112.5 | 5313.8 | 5325.0 | 112.7 | 2 | 12:20 PM | 1.052 | 0.773 | | | 0.713 | adj |
| | 112.5 | 5313.8 | 5325.0 | 112.7 | 3 | 12:21 PM | 1.056 | 0.777 | | | 0.717 | adj |
| | 112.5 | 5313.8 | 5325.0 | 112.7 | 4 | 12:22 PM | 1.058 | 0.778 | | | 0.718 | adj |
| | 112.5 | 5313.8 | 5325.0 | 112.7 | 5 | 12:23 PM | 1.060 | 0.780 | | | 0.720 | |
| | 112.5 | 5313.8 | 5325.0 | 112.7 | 6 | 12:24 PM | 1.060 | 0.780 | | | 0.720 | |
| | 112.5 | 5313.8 | 5325.0 | 112.7 | 10 | 12:28 PM | 1.064 | 0.784 | | | 0.724 | adj |

# Soil Nail Verification Load Test Data

Schnabel Engineering

**Project:** Hollow Core Bar Soil Nail Research
**Location:** Long Island, NY
**Client:** ADSC

**Performed:** Nolan Kealy
**Observed:** M. Dirdal
**Data by:** M. Dirdal

**Soil Nail:** C-1
**Date:** 10/27/2008

**Design Test Load (P):** 45 kips **# Dials:** 2 **Jack Calibration:** Pressure = 46.557 X reading (kip) + 76.141 (psi)

| Sequence of Loading | Estimated Load [kip] | Dial Load [psi] | Applied Pressure [psi] | Applied Load [kip] | Time [min] | Time of Test | Dial 1 Deformation [in.] | Dial 2 Deformation [in.] | Dial 3 Deformation [in.] | Dial 4 Deformation [in.] | Average Deformation [in.] | Comments: |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 275% | 123.8 | 5837.6 | 5850.0 | 124.0 | 1 | 12:29 PM | 1.130 | 0.848 | | | 0.789 | |
| | 123.8 | 5837.6 | 5850.0 | 124.0 | 2 | 12:30 PM | 1.132 | 0.850 | | | 0.791 | |
| | 123.8 | 5837.6 | 5850.0 | 124.0 | 3 | 12:31 PM | 1.136 | 0.855 | | | 0.796 | adj |
| | 123.8 | 5837.6 | 5850.0 | 124.0 | 4 | 12:32 PM | 1.136 | 0.855 | | | 0.796 | |
| | 123.8 | 5837.6 | 5850.0 | 124.0 | 5 | 12:33 PM | 1.138 | 0.858 | | | 0.798 | |
| | 123.8 | 5837.6 | 5850.0 | 124.0 | 6 | 12:34 PM | 1.139 | 0.858 | | | 0.799 | |
| | 123.8 | 5837.6 | 5850.0 | 124.0 | 10 | 12:38 PM | 1.141 | 0.860 | | | 0.801 | adj |
| 300% | 135.0 | 6361.3 | 6375.0 | 135.3 | 1 | 12:40 PM | 1.323 | 1.030 | | | 0.977 | |
| | 135.0 | 6361.3 | 6375.0 | 135.3 | 2 | 12:41 PM | 1.330 | 1.033 | | | 0.982 | |
| | 135.0 | 6361.3 | 6375.0 | 135.3 | 3 | 12:42 PM | 1.340 | 1.044 | | | 0.992 | adj |
| | 135.0 | 6361.3 | 6375.0 | 135.3 | 4 | 12:43 PM | 1.343 | 1.046 | | | 0.995 | adj |
| | 135.0 | 6361.3 | 6375.0 | 135.3 | 5 | 12:44 PM | 1.347 | 1.050 | | | 0.999 | adj |
| | 135.0 | 6361.3 | 6375.0 | 135.3 | 6 | 12:45 PM | 1.356 | 1.059 | | | 1.008 | |
| | 135.0 | 6361.3 | 6375.0 | 135.3 | 10 | 12:49 PM | 1.386 | 1.085 | | | 1.036 | |
| 338% | 152.1 | 7157.5 | 7150.0 | 151.9 | 1 | 1:30 PM | 1.925 | 1.628 | | | 1.577 | reset dial gages |
| 300% | 135.0 | 6361.3 | 6375.0 | 135.3 | 1 | 2:04 PM | 1.911 | 1.618 | | | 1.565 | |
| 250% | 112.5 | 5313.8 | 5325.0 | 112.7 | 1 | 2:05 PM | 1.901 | 1.607 | | | 1.554 | |
| 200% | 90.0 | 4266.3 | 4250.0 | 89.7 | 1 | 2:06 PM | 1.865 | 1.566 | | | 1.516 | |
| 150% | 67.5 | 3218.7 | 3225.0 | 67.6 | 1 | 2:07 PM | 1.786 | 1.486 | | | 1.436 | |
| 100% | 45.0 | 2171.2 | 2200.0 | 45.6 | 1 | 2:08 PM | 1.685 | 1.384 | | | 1.335 | |

# Soil Nail Verification Load Test Data

Schnabel Engineering

**Project:** Hollow Core Bar Soil Nail Research
**Location:** Long Island, NY
**Client:** ADSC

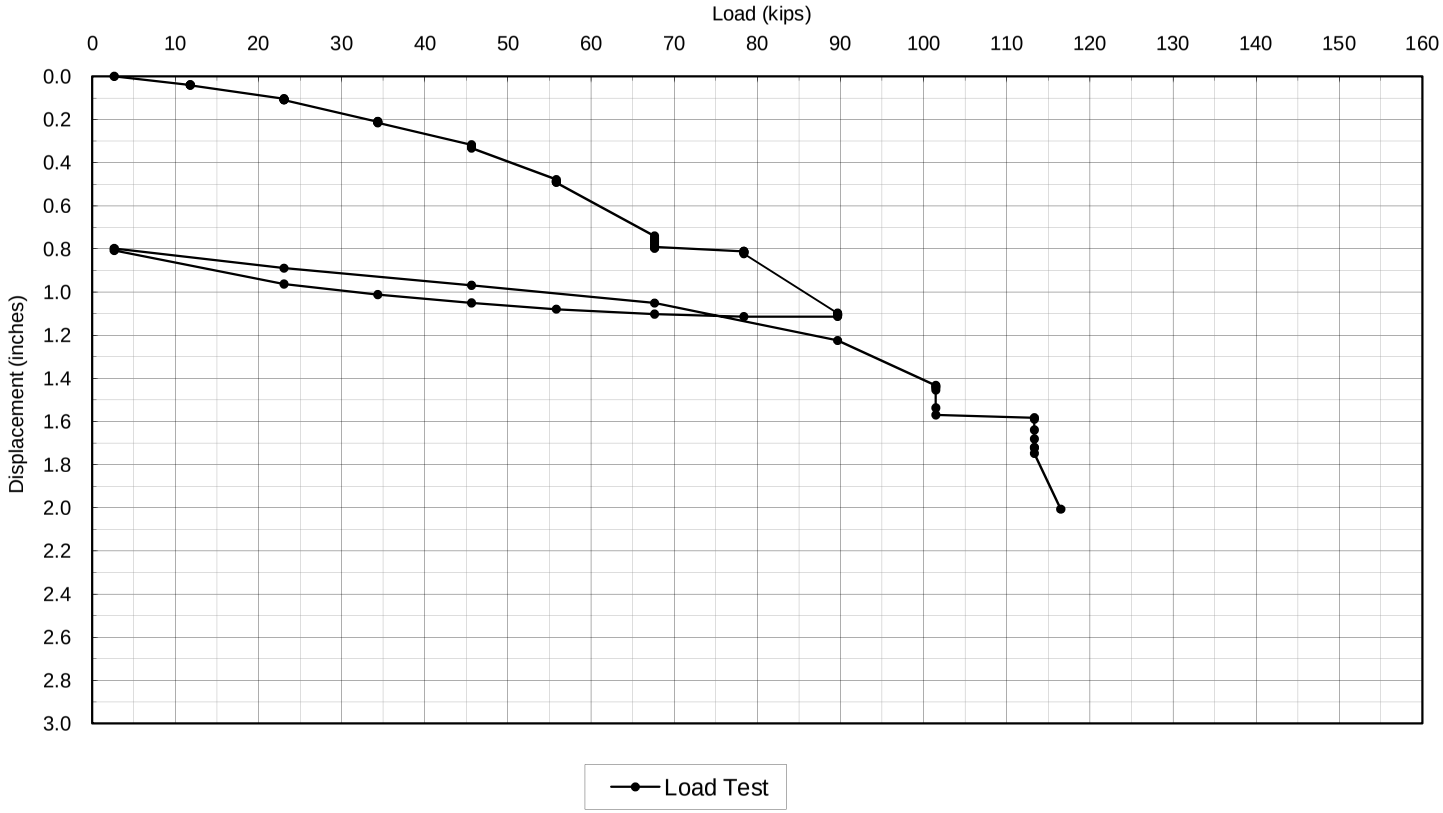
**Performed:** Nolan Kealy
**Observed:** M. Dirdal
**Data by:** M. Dirdal

**Soil Nail:** C-1
**Date:** 10/27/2008

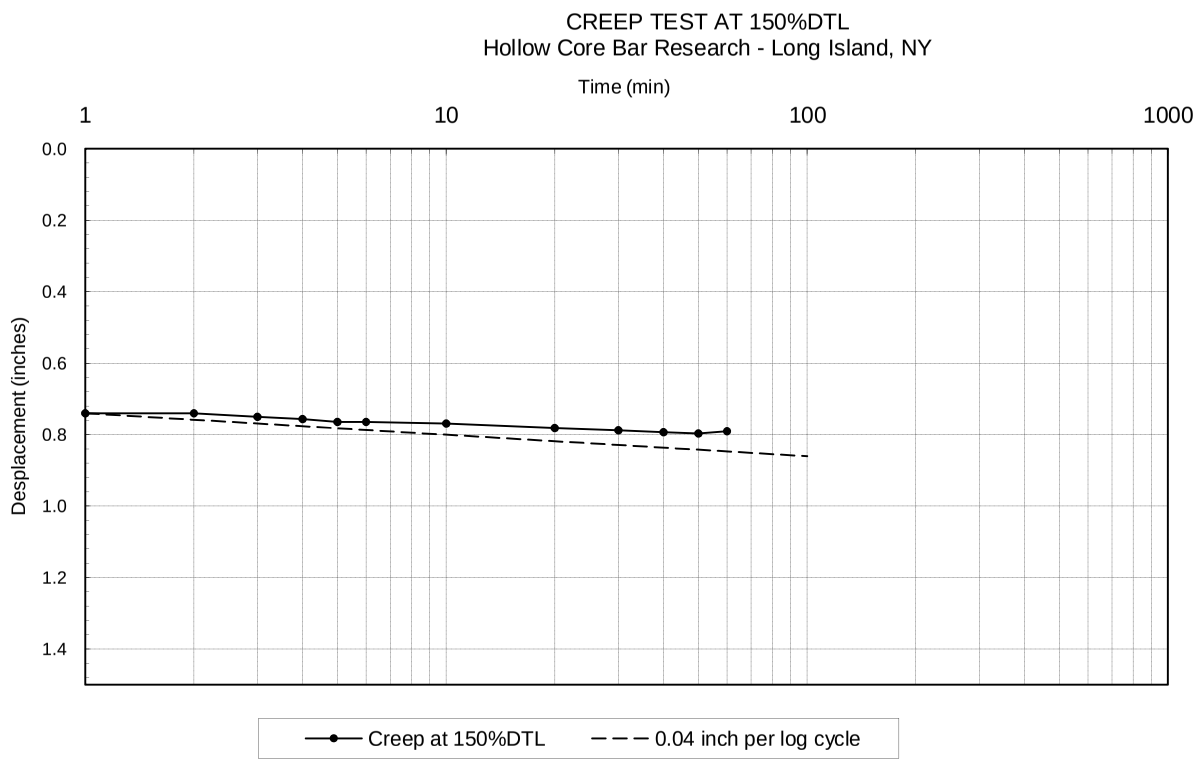
**Design Test Load (P):** 45 kips **# Dials:** 2 **Jack Calibration:** Pressure = 46.557 X reading (kip) + 76.141 (psi)

| Sequence of Loading | Estimated Load [kip] | Dial Load [psi] | Applied Pressure [psi] | Applied Load [kip] | Time [min] | Time of Test | Dial 1 Deformation [in.] | Dial 2 Deformation [in.] | Dial 3 Deformation [in.] | Dial 4 Deformation [in.] | Average Deformation [in.] | Comments: |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 50% | 22.5 | 1123.7 | 1150.0 | 23.1 | 1 | 2:10 PM | 1.555 | 1.250 | | | 1.203 | |
| AL | 2.3 | 180.9 | 200.0 | 2.7 | 1 | 2:14 PM | 1.326 | 1.000 | | | 0.963 | |
| | 2.3 | 180.9 | 200.0 | 2.7 | 2 | 2:15 PM | 1.325 | 1.000 | | | 0.963 | |
| | 2.3 | 180.9 | 200.0 | 2.7 | 3 | 2:16 PM | 1.325 | 1.000 | | | 0.963 | |
| | 2.3 | 180.9 | 200.0 | 2.7 | 4 | 2:17 PM | 1.325 | 1.000 | | | 0.963 | |
| | 2.3 | 180.9 | 200.0 | 2.7 | 5 | 2:18 PM | 1.325 | 1.000 | | | 0.963 | |
| | 2.3 | 180.9 | 200.0 | 2.7 | 6 | 2:19 PM | 1.325 | 1.000 | | | 0.963 | |
| | 2.3 | 180.9 | 200.0 | 2.7 | 10 | 2:23 PM | 1.325 | 1.000 | | | 0.963 | |

VERIFICATION SOIL NAIL LOAD TEST
Hollow Core Bar Research - Long Island, NY




| | | | | | |
|---|---|---|---|---|---|
| Type of Test: Verification | Bond: 6 ft<br>Unbonded 13.29 ft | Diameter: 5.1 in (130 mm) (nominal) | Test Nail: C2 | **SCHNABEL ENGINEERING, LLC** | |
| | | | | Verification Soil Nail Load Test | |
| Design Test Load (P) : 45 kip | Comments: Nail pulled out at approximately 116.5 kip. | | | Hollow Core Bar Soil Nail Research | |
| | | | | Long Island, NY | |
| Maximum Test Load: 300% P = 135 kip | | | | Date: 10/27/08 | 07150064 |




| | | | | |
|---|---|---|---|---|
| Type of Test: Verification | Bond: Unbonded 6 ft 13.29 ft | Diameter: 5.1 in (130 mm) (nominal) | Test Nail: C2 | **SCHNABEL ENGINEERING, LLC** |
| | | | | Verification Soil Nail Load Test |
| Design Test Load (P) : 45 kip | Comments: Nail pulled out at approximately 116.5 kip. | | | Hollow Core Bar Soil Nail Research |
| | | | | Long Island, NY |
| Maximum Test Load: 300% P = 135 kip | | | | Date: 10/27/08 — 07150064 |

# Soil Nail Verification Load Test Data

Schnabel Engineering

**Project:** Hollow Core Bar Soil Nail Research
**Location:** Long Island, NY
**Client:** ADSC

**Performed:** Nolan Kealy
**Observed:** M. Dirdal
**Data by:** M. Dirdal

**Soil Nail:** C-2
**Date:** 10/27/2008

**Design Test Load (P):** 45 kips **# Dials:** 2 **Jack Calibration:** Pressure = 46.557 X reading (kip) + 76.141 (psi)

| Sequence of Loading | Estimated Load [kip] | Dial Load [psi] | Applied Pressure [psi] | Applied Load [kip] | Time [min] | Time of Test | Dial 1 Deformation [in.] | Dial 2 Deformation [in.] | Dial 3 Deformation [in.] | Dial 4 Deformation [in.] | Average Deformation [in.] | Comments: |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| AL | 2.3 | 180.9 | 200.0 | 2.7 | 1 | 3:04 PM | 0.100 | 0.100 | | | 0.000 | tail length = |
| 25% | 11.3 | 599.9 | 625.0 | 11.8 | 1 | 3:06 PM | 0.145 | 0.134 | | | 0.040 | |
| | 11.3 | 599.9 | 625.0 | 11.8 | 2 | 3:07 PM | 0.146 | 0.134 | | | 0.040 | adj |
| | 11.3 | 599.9 | 625.0 | 11.8 | 3 | 3:08 PM | 0.145 | 0.134 | | | 0.040 | |
| | 11.3 | 599.9 | 625.0 | 11.8 | 4 | 3:09 PM | 0.144 | 0.134 | | | 0.039 | |
| | 11.3 | 599.9 | 625.0 | 11.8 | 5 | 3:10 PM | 0.145 | 0.134 | | | 0.040 | adj |
| | 11.3 | 599.9 | 625.0 | 11.8 | 6 | 3:11 PM | 0.145 | 0.134 | | | 0.040 | |
| | 11.3 | 599.9 | 625.0 | 11.8 | 10 | 3:15 PM | 0.147 | 0.135 | | | 0.041 | |
| 50% | 22.5 | 1123.7 | 1150.0 | 23.1 | 1 | 3:16 PM | 0.215 | 0.192 | | | 0.104 | |
| | 22.5 | 1123.7 | 1150.0 | 23.1 | 2 | 3:17 PM | 0.216 | 0.194 | | | 0.105 | adj |
| | 22.5 | 1123.7 | 1150.0 | 23.1 | 3 | 3:18 PM | 0.218 | 0.194 | | | 0.106 | adj |
| | 22.5 | 1123.7 | 1150.0 | 23.1 | 4 | 3:19 PM | 0.220 | 0.196 | | | 0.108 | |
| | 22.5 | 1123.7 | 1150.0 | 23.1 | 5 | 3:20 PM | 0.219 | 0.196 | | | 0.108 | |
| | 22.5 | 1123.7 | 1150.0 | 23.1 | 6 | 3:21 PM | 0.219 | 0.196 | | | 0.108 | |
| | 22.5 | 1123.7 | 1150.0 | 23.1 | 10 | 3:25 PM | 0.220 | 0.198 | | | 0.109 | adj |

# Soil Nail Verification Load Test Data

Schnabel Engineering

**Project:** Hollow Core Bar Soil Nail Research
**Location:** Long Island, NY
**Client:** ADSC

**Performed:** Nolan Kealy
**Observed:** M. Dirdal
**Data by:** M. Dirdal

**Soil Nail:** C-2
**Date:** 10/27/2008

**Design Test Load (P):** 45 kips **# Dials:** 2 **Jack Calibration:** Pressure = 46.557 X reading (kip) + 76.141 (psi)

| Sequence of Loading | Estimated Load [kip] | Dial Load [psi] | Applied Pressure [psi] | Applied Load [kip] | Time [min] | Time of Test | Dial 1 Deformation [in.] | Dial 2 Deformation [in.] | Dial 3 Deformation [in.] | Dial 4 Deformation [in.] | Average Deformation [in.] | Comments: |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 75% | 33.8 | 1647.4 | 1675.0 | 34.3 | 1 | 3:28 PM | 0.326 | 0.295 | | | 0.211 | |
| | 33.8 | 1647.4 | 1675.0 | 34.3 | 2 | 3:29 PM | 0.324 | 0.294 | | | 0.209 | |
| | 33.8 | 1647.4 | 1675.0 | 34.3 | 3 | 3:30 PM | 0.326 | 0.296 | | | 0.211 | adj |
| | 33.8 | 1647.4 | 1675.0 | 34.3 | 4 | 3:31 PM | 0.326 | 0.296 | | | 0.211 | |
| | 33.8 | 1647.4 | 1675.0 | 34.3 | 5 | 3:32 PM | 0.329 | 0.297 | | | 0.213 | adj |
| | 33.8 | 1647.4 | 1675.0 | 34.3 | 6 | 3:33 PM | 0.329 | 0.297 | | | 0.213 | |
| | 33.8 | 1647.4 | 1675.0 | 34.3 | 10 | 3:37 PM | 0.330 | 0.300 | | | 0.215 | |
| 100% | 45.0 | 2171.2 | 2200.0 | 45.6 | 1 | 3:38 PM | 0.435 | 0.399 | | | 0.317 | |
| | 45.0 | 2171.2 | 2200.0 | 45.6 | 2 | 3:39 PM | 0.440 | 0.406 | | | 0.323 | adj |
| | 45.0 | 2171.2 | 2200.0 | 45.6 | 3 | 3:40 PM | 0.445 | 0.409 | | | 0.327 | |
| | 45.0 | 2171.2 | 2200.0 | 45.6 | 4 | 3:41 PM | 0.445 | 0.408 | | | 0.327 | |
| | 45.0 | 2171.2 | 2200.0 | 45.6 | 5 | 3:42 PM | 0.443 | 0.408 | | | 0.326 | |
| | 45.0 | 2171.2 | 2200.0 | 45.6 | 6 | 3:43 PM | 0.447 | 0.410 | | | 0.329 | adj |
| | 45.0 | 2171.2 | 2200.0 | 45.6 | 10 | 3:47 PM | 0.450 | 0.415 | | | 0.333 | |

# Soil Nail Verification Load Test Data

Schnabel Engineering

**Project:** Hollow Core Bar Soil Nail Research
**Location:** Long Island, NY
**Client:** ADSC

**Performed:** Nolan Kealy
**Observed:** M. Dirdal
**Data by:** M. Dirdal

**Soil Nail:** C-2
**Date:** 10/27/2008

**Design Test Load (P):** 45 kips **# Dials:** 2 **Jack Calibration:** Pressure = 46.557 X reading (kip) + 76.141 (psi)

| Sequence of Loading | Estimated Load [kip] | Dial Load [psi] | Applied Pressure [psi] | Applied Load [kip] | Time [min] | Time of Test | Dial 1 Deformation [in.] | Dial 2 Deformation [in.] | Dial 3 Deformation [in.] | Dial 4 Deformation [in.] | Average Deformation [in.] | Comments: |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 125% | 56.3 | 2695.0 | 2675.0 | 55.8 | 1 | 3:48 PM | 0.596 | 0.560 | | | 0.478 | |
| | 56.3 | 2695.0 | 2675.0 | 55.8 | 2 | 3:49 PM | 0.603 | 0.568 | | | 0.486 | adj |
| | 56.3 | 2695.0 | 2675.0 | 55.8 | 3 | 3:50 PM | 0.603 | 0.568 | | | 0.486 | |
| | 56.3 | 2695.0 | 2675.0 | 55.8 | 4 | 3:51 PM | 0.606 | 0.570 | | | 0.488 | |
| | 56.3 | 2695.0 | 2675.0 | 55.8 | 5 | 3:52 PM | 0.606 | 0.572 | | | 0.489 | |
| | 56.3 | 2695.0 | 2675.0 | 55.8 | 6 | 3:53 PM | 0.606 | 0.572 | | | 0.489 | |
| | 56.3 | 2695.0 | 2675.0 | 55.8 | 10 | 3:57 PM | 0.610 | 0.574 | | | 0.492 | adj |
| 150% | 67.5 | 3218.7 | 3225.0 | 67.6 | 1 | 4:01 PM | 0.861 | 0.820 | | | 0.741 | |
| | 67.5 | 3218.7 | 3225.0 | 67.6 | 2 | 4:02 PM | 0.861 | 0.820 | | | 0.741 | |
| | 67.5 | 3218.7 | 3225.0 | 67.6 | 3 | 4:03 PM | 0.871 | 0.830 | | | 0.751 | adj |
| | 67.5 | 3218.7 | 3225.0 | 67.6 | 4 | 4:04 PM | 0.876 | 0.837 | | | 0.757 | |
| | 67.5 | 3218.7 | 3225.0 | 67.6 | 5 | 4:05 PM | 0.884 | 0.846 | | | 0.765 | adj |
| | 67.5 | 3218.7 | 3225.0 | 67.6 | 6 | 4:06 PM | 0.884 | 0.846 | | | 0.765 | |
| | 67.5 | 3218.7 | 3225.0 | 67.6 | 10 | 4:10 PM | 0.889 | 0.850 | | | 0.770 | adj |
| | 67.5 | 3218.7 | 3225.0 | 67.6 | 20 | 4:20 PM | 0.900 | 0.863 | | | 0.782 | adj |
| | 67.5 | 3218.7 | 3225.0 | 67.6 | 30 | 4:30 PM | 0.908 | 0.868 | | | 0.788 | adj |
| | 67.5 | 3218.7 | 3225.0 | 67.6 | 40 | 4:40 PM | 0.912 | 0.875 | | | 0.794 | |
| | 67.5 | 3218.7 | 3225.0 | 67.6 | 50 | 4:50 PM | 0.916 | 0.878 | | | 0.797 | adj |
| | 67.5 | 3218.7 | 3225.0 | 67.6 | 60 | 5:00 PM | 0.909 | 0.872 | | | 0.791 | |

# Soil Nail Verification Load Test Data

Schnabel Engineering

**Project:** Hollow Core Bar Soil Nail Research
**Location:** Long Island, NY
**Client:** ADSC

**Performed:** Nolan Kealy
**Observed:** M. Dirdal
**Data by:** M. Dirdal

**Soil Nail:** C-2
**Date:** 10/27/2008

**Design Test Load (P):** 45 kips **# Dials:** 2 **Jack Calibration:** Pressure = 46.557 X reading (kip) + 76.141 (psi)

| Sequence of Loading | Estimated Load [kip] | Dial Load [psi] | Applied Pressure [psi] | Applied Load [kip] | Time [min] | Time of Test | Dial 1 Deformation [in.] | Dial 2 Deformation [in.] | Dial 3 Deformation [in.] | Dial 4 Deformation [in.] | Average Deformation [in.] | Comments: |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 175% | 78.8 | 3742.5 | 3725.0 | 78.4 | 1 | 5:09 PM | 0.930 | 0.893 | | | 0.812 | |
| | 78.8 | 3742.5 | 3725.0 | 78.4 | 2 | 5:10 PM | 0.929 | 0.892 | | | 0.811 | |
| | 78.8 | 3742.5 | 3725.0 | 78.4 | 3 | 5:11 PM | 0.932 | 0.897 | | | 0.815 | adj |
| | 78.8 | 3742.5 | 3725.0 | 78.4 | 4 | 5:12 PM | 0.932 | 0.897 | | | 0.815 | |
| | 78.8 | 3742.5 | 3725.0 | 78.4 | 5 | 5:13 PM | 0.934 | 0.899 | | | 0.817 | |
| | 78.8 | 3742.5 | 3725.0 | 78.4 | 6 | 5:14 PM | 0.933 | 0.899 | | | 0.816 | |
| | 78.8 | 3742.5 | 3725.0 | 78.4 | 10 | 5:18 PM | 0.939 | 0.905 | | | 0.822 | |
| 200% | 90.0 | 4266.3 | 4250.0 | 89.7 | 1 | 5:22 PM | 1.200 | 1.196 | | | 1.098 | re-set dial gages |
| | 90.0 | 4266.3 | 4250.0 | 89.7 | 2 | 5:23 PM | 1.202 | 1.201 | | | 1.102 | |
| | 90.0 | 4266.3 | 4250.0 | 89.7 | 3 | 5:24 PM | 1.204 | 1.204 | | | 1.104 | |
| | 90.0 | 4266.3 | 4250.0 | 89.7 | 4 | 5:25 PM | 1.206 | 1.207 | | | 1.107 | |
| | 90.0 | 4266.3 | 4250.0 | 89.7 | 5 | 5:26 PM | 1.206 | 1.206 | | | 1.106 | |
| | 90.0 | 4266.3 | 4250.0 | 89.7 | 6 | 5:27 PM | 1.205 | 1.206 | | | 1.106 | adj |
| | 90.0 | 4266.3 | 4250.0 | 89.7 | 10 | 5:31 PM | 1.212 | 1.215 | | | 1.114 | adj |
| 175% | 78.8 | 3742.5 | 3725.0 | 78.4 | 1 | 5:34 PM | 1.212 | 1.216 | | | 1.114 | |
| 150% | 67.5 | 3218.7 | 3225.0 | 67.6 | 1 | 5:35 PM | 1.200 | 1.204 | | | 1.102 | |
| 125% | 56.3 | 2695.0 | 2675.0 | 55.8 | 1 | 5:37 PM | 1.178 | 1.181 | | | 1.080 | |
| 100% | 45.0 | 2171.2 | 2200.0 | 45.6 | 1 | 5:38 PM | 1.148 | 1.153 | | | 1.051 | |
| 75% | 33.8 | 1647.4 | 1675.0 | 34.3 | 1 | 5:40 PM | 1.108 | 1.115 | | | 1.012 | |
| 50% | 22.5 | 1123.7 | 1150.0 | 23.1 | 1 | 5:42 PM | 1.055 | 1.070 | | | 0.963 | |
| AL | 2.3 | 180.9 | 200.0 | 2.7 | 1 | 5:44 PM | 0.895 | 0.919 | | | 0.807 | |

# Soil Nail Verification Load Test Data

Schnabel Engineering

**Project:** Hollow Core Bar Soil Nail Research
**Location:** Long Island, NY
**Client:** ADSC

**Performed:** Nolan Kealy
**Observed:** M. Dirdal
**Data by:** M. Dirdal

**Soil Nail:** C-2
**Date:** 10/27/2008

**Design Test Load (P):** 45 kips **# Dials:** 2 **Jack Calibration:** Pressure = 46.557 X reading (kip) + 76.141 (psi)

| Sequence of Loading | Estimated Load [kip] | Dial Load [psi] | Applied Pressure [psi] | Applied Load [kip] | Time [min] | Time of Test | Dial 1 Deformation [in.] | Dial 2 Deformation [in.] | Dial 3 Deformation [in.] | Dial 4 Deformation [in.] | Average Deformation [in.] | Comments: |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2.3 | 180.9 | 200.0 | 2.7 | 10 | 5:54 PM | 0.886 | 0.909 | | | 0.798 | |
| 50% | 22.5 | 1123.7 | 1150.0 | 23.1 | 1 | 5:55 PM | 0.996 | 0.982 | | | 0.889 | |
| 100% | 45.0 | 2171.2 | 2200.0 | 45.6 | 1 | 5:56 PM | 1.066 | 1.071 | | | 0.969 | |
| 150% | 67.5 | 3218.7 | 3225.0 | 67.6 | 1 | 5:57 PM | 1.151 | 1.151 | | | 1.051 | |
| 200% | 90.0 | 4266.3 | 4250.0 | 89.7 | 1 | 5:58 PM | 1.321 | 1.328 | | | 1.225 | |
| 225% | 101.3 | 4790.0 | 4800.0 | 101.5 | 1 | 6:00 PM | 1.520 | 1.545 | | | 1.433 | |
| | 101.3 | 4790.0 | 4800.0 | 101.5 | 2 | 6:01 PM | 1.525 | 1.550 | | | 1.438 | adj |
| | 101.3 | 4790.0 | 4800.0 | 101.5 | 3 | 6:02 PM | 1.525 | 1.550 | | | 1.438 | |
| | 101.3 | 4790.0 | 4800.0 | 101.5 | 4 | 6:03 PM | 1.530 | 1.556 | | | 1.443 | |
| | 101.3 | 4790.0 | 4800.0 | 101.5 | 5 | 6:04 PM | 1.540 | 1.567 | | | 1.454 | adj |
| | 101.3 | 4790.0 | 4800.0 | 101.5 | 6 | 6:05 PM | 1.638 | 1.636 | | | 1.537 | adj |
| | 101.3 | 4790.0 | 4800.0 | 101.5 | 10 | 6:09 PM | 1.670 | 1.669 | | | 1.570 | |

# Soil Nail Verification Load Test Data

Schnabel Engineering

**Project:** Hollow Core Bar Soil Nail Research
**Location:** Long Island, NY
**Client:** ADSC

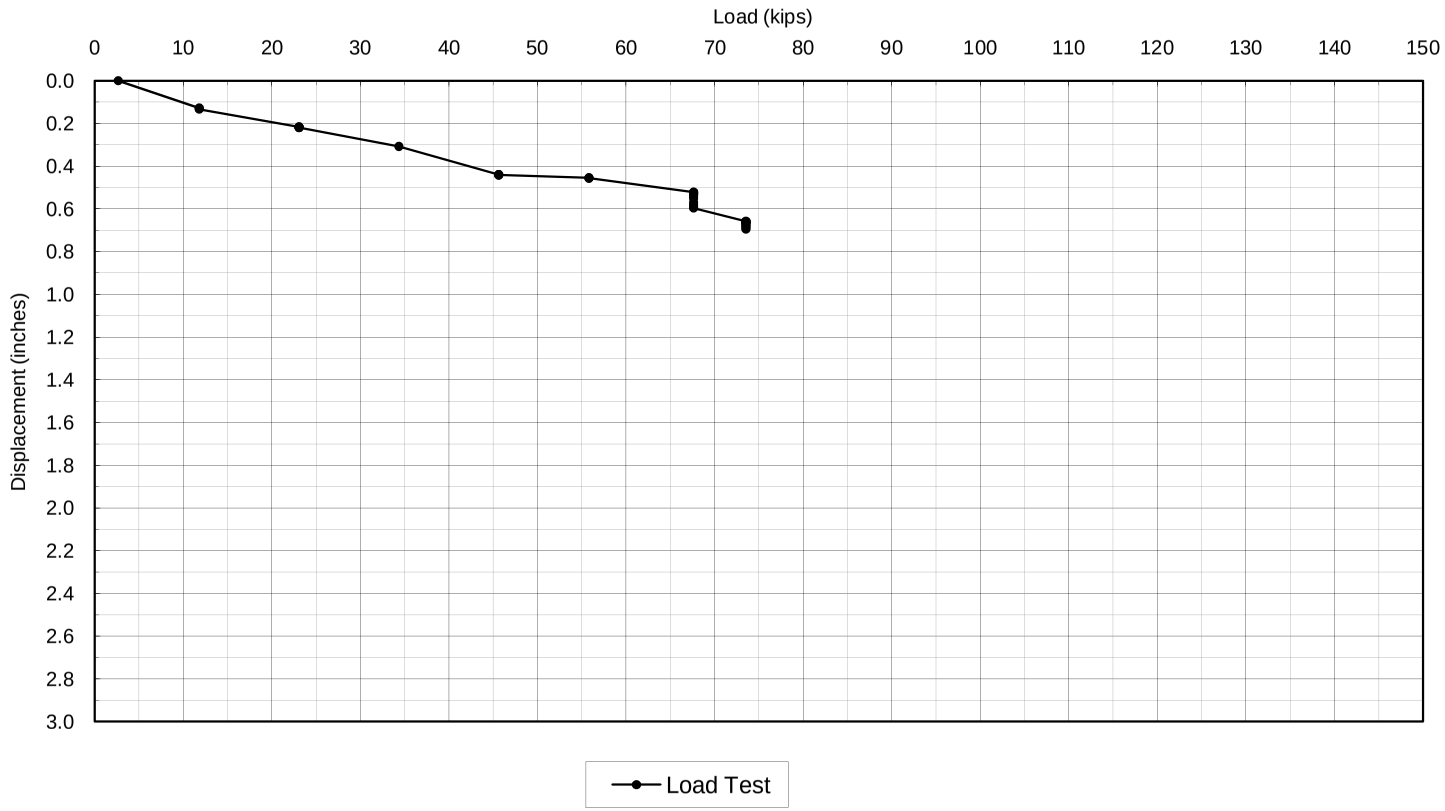
**Performed:** Nolan Kealy
**Observed:** M. Dirdal
**Data by:** M. Dirdal

**Soil Nail:** C-2
**Date:** 10/27/2008

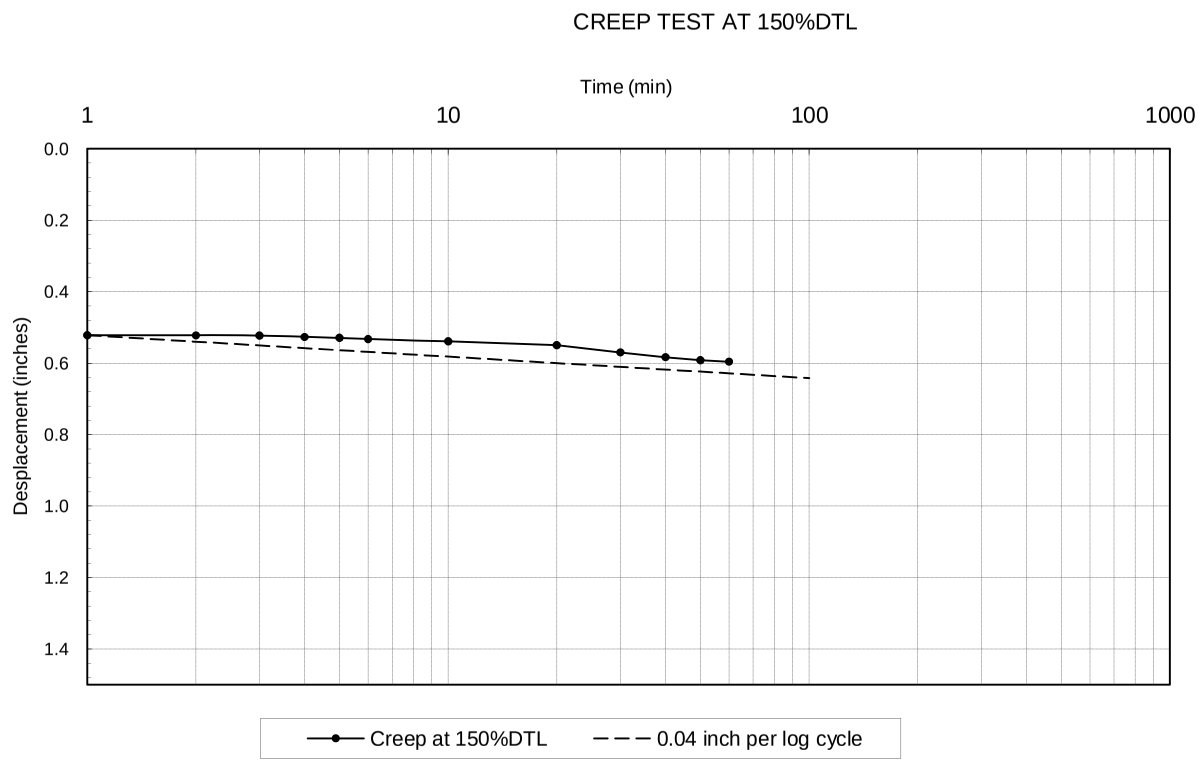
**Design Test Load (P):** 45 kips **# Dials:** 2 **Jack Calibration:** Pressure = 46.557 X reading (kip) + 76.141 (psi)

| Sequence of Loading | Estimated Load [kip] | Dial Load [psi] | Applied Pressure [psi] | Applied Load [kip] | Time [min] | Time of Test | Dial 1 Deformation [in.] | Dial 2 Deformation [in.] | Dial 3 Deformation [in.] | Dial 4 Deformation [in.] | Average Deformation [in.] | Comments: |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 250% | 112.5 | 5313.8 | 5352.0 | 113.3 | 1 | 6:15 PM | 1.683 | 1.682 | | | 1.583 | reset dial gages |
| | 112.5 | 5313.8 | 5352.0 | 113.3 | 2 | 6:16 PM | 1.690 | 1.687 | | | 1.589 | adj |
| | 112.5 | 5313.8 | 5352.0 | 113.3 | 3 | 6:17 PM | 1.740 | 1.738 | | | 1.639 | adj |
| | 112.5 | 5313.8 | 5352.0 | 113.3 | 4 | 6:18 PM | 1.783 | 1.778 | | | 1.681 | adj |
| | 112.5 | 5313.8 | 5352.0 | 113.3 | 5 | 6:19 PM | 1.824 | 1.819 | | | 1.722 | adj |
| | 112.5 | 5313.8 | 5352.0 | 113.3 | 6 | 6:20 PM | 1.823 | 1.819 | | | 1.721 | adj |
| | 112.5 | 5313.8 | 5352.0 | 113.3 | 10 | 6:24 PM | 1.849 | 1.846 | | | 1.748 | adj |
| 275% | 123.8 | 5837.6 | 5500.0 | 116.5 | 1 | 6:26 PM | 2.108 | 2.105 | | | 2.007 | |
| | 123.8 | 5837.6 | | | 2 | | | | | | | |
| | 123.8 | 5837.6 | | | 3 | | | | | | | |
| | 123.8 | 5837.6 | | | 4 | | | | | | | |
| | 123.8 | 5837.6 | | | 5 | | | | | | | |
| | 123.8 | 5837.6 | | | 6 | | | | | | | |
| | 123.8 | 5837.6 | | | 10 | | | | | | | |

VERIFICATION SOIL NAIL LOAD TEST
Hollow Core Bar Research - Long Island, New York




| | | | | | |
|---|---|---|---|---|---|
| Type of Test: Verification | Bond: 6 ft<br>Unbonded 13.93 ft | Diameter: 5.1 in (130 mm) (nominal) | Test Nail: C3 | **SCHNABEL ENGINEERING, LLC** | |
| | | | | Verification Soil Nail Load Test | |
| Design Test Load (P) : 45 kip | Comments: A wedge of soil behind the cribbing failed at a load of approximately 73.5 kip. | | | Hollow Core Bar Soil Nail Research | |
| | | | | Long Island, NY | |
| Maximum Test Load: 300% P = 135 kip | | | | Date: 10/23/08 | 07150064 |




| | | | | |
|---|---|---|---|---|
| Type of Test: Verification | Bond: Unbonded 6 ft 13.93 ft | Diameter: 5.1 in (130 mm) (nominal) | Test Nail: C3 | **SCHNABEL ENGINEERING, LLC** |
| | | | | Verification Soil Nail Load Test |
| Design Test Load (P) : 45 kip | Comments: A wedge of soil behind the cribbing failed at a load of approximately 73.5 kip. | | | Hollow Core Bar Soil Nail Research |
| | | | | Long Island, NY |
| Maximum Test Load: 300% P = 135 kip | | | | Date: 10/23/08 — 07150064 |

# Soil Nail Verification Load Test Data

Schnabel Engineering

**Project:** Hollow Core Bar Soil Nail Research
**Location:** Long Island, NY
**Client:** ADSC

**Performed:** Nolan Kealy
**Observed:** J. Mikitka
**Data by:** J. Mikitka

**Soil Nail:** C-3
**Date:** 10/23/2008

**Design Test Load (P):** 45 kips **# Dials:** 2 **Jack Calibration:** Pressure = 46.557 X reading (kip) + 76.141 (psi)

| Sequence of Loading | Estimated Load [kip] | Dial Load [psi] | Applied Pressure [psi] | Applied Load [kip] | Time [min] | Time of Test | Dial 1 Deformation [in.] | Dial 2 Deformation [in.] | Dial 3 Deformation [in.] | Dial 4 Deformation [in.] | Average Deformation [in.] | Comments: |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| AL | 2.3 | 180.9 | 200.0 | 2.7 | 1 | 11:53 AM | 0.200 | 0.100 | | | 0.000 | |
| 25% | 11.3 | 599.9 | 625.0 | 11.8 | 1 | 11:54 AM | 0.200 | 0.355 | | | 0.128 | |
| | 11.3 | 599.9 | 625.0 | 11.8 | 2 | 11:55 AM | 0.200 | 0.355 | | | 0.128 | |
| | 11.3 | 599.9 | 625.0 | 11.8 | 3 | 11:56 AM | 0.200 | 0.361 | | | 0.131 | |
| | 11.3 | 599.9 | 625.0 | 11.8 | 4 | 11:57 AM | 0.200 | 0.361 | | | 0.131 | |
| | 11.3 | 599.9 | 625.0 | 11.8 | 5 | 11:58 AM | 0.200 | 0.361 | | | 0.131 | |
| | 11.3 | 599.9 | 625.0 | 11.8 | 6 | 11:59 AM | 0.200 | 0.366 | | | 0.133 | |
| | 11.3 | 599.9 | 625.0 | 11.8 | 10 | 12:03 PM | 0.200 | 0.367 | | | 0.134 | |
| 50% | 22.5 | 1123.7 | 1150.0 | 23.1 | 1 | 12:04 PM | 0.203 | 0.530 | | | 0.217 | |
| | 22.5 | 1123.7 | 1150.0 | 23.1 | 2 | 12:05 PM | 0.203 | 0.531 | | | 0.217 | |
| | 22.5 | 1123.7 | 1150.0 | 23.1 | 3 | 12:06 PM | 0.203 | 0.532 | | | 0.218 | |
| | 22.5 | 1123.7 | 1150.0 | 23.1 | 4 | 12:07 PM | 0.203 | 0.533 | | | 0.218 | |
| | 22.5 | 1123.7 | 1150.0 | 23.1 | 5 | 12:08 PM | 0.203 | 0.534 | | | 0.219 | |
| | 22.5 | 1123.7 | 1150.0 | 23.1 | 6 | 12:09 PM | 0.203 | 0.537 | | | 0.220 | |
| | 22.5 | 1123.7 | 1150.0 | 23.1 | 10 | 12:13 PM | 0.203 | 0.537 | | | 0.220 | |

# Soil Nail Verification Load Test Data

Schnabel Engineering

**Project:** Hollow Core Bar Soil Nail Research
**Location:** Long Island, NY
**Client:** ADSC

**Performed:** Nolan Kealy
**Observed:** J. Mikitka
**Data by:** J. Mikitka

**Soil Nail:** C-3
**Date:** 10/23/2008

**Design Test Load (P):** 45 kips **# Dials:** 2 **Jack Calibration:** Pressure = 46.557 X reading (kip) + 76.141 (psi)

| Sequence of Loading | Estimated Load [kip] | Dial Load [psi] | Applied Pressure [psi] | Applied Load [kip] | Time [min] | Time of Test | Dial 1 Deformation [in.] | Dial 2 Deformation [in.] | Dial 3 Deformation [in.] | Dial 4 Deformation [in.] | Average Deformation [in.] | Comments: |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 75% | 33.8 | 1647.4 | 1675.0 | 34.3 | 1 | 12:17 PM | 0.207 | 0.709 | | | 0.308 | |
| | 33.8 | 1647.4 | 1675.0 | 34.3 | 2 | 12:18 PM | 0.207 | 0.709 | | | 0.308 | |
| | 33.8 | 1647.4 | 1675.0 | 34.3 | 3 | 12:19 PM | 0.207 | 0.709 | | | 0.308 | |
| | 33.8 | 1647.4 | 1675.0 | 34.3 | 4 | 12:20 PM | 0.207 | 0.709 | | | 0.308 | |
| | 33.8 | 1647.4 | 1675.0 | 34.3 | 5 | 12:21 PM | 0.207 | 0.709 | | | 0.308 | |
| | 33.8 | 1647.4 | 1675.0 | 34.3 | 6 | 12:22 PM | 0.207 | 0.709 | | | 0.308 | |
| | 33.8 | 1647.4 | 1675.0 | 34.3 | 10 | 12:26 PM | 0.207 | 0.709 | | | 0.308 | |
| 100% | 45.0 | 2171.2 | 2200.0 | 45.6 | 1 | 12:31 PM | 0.344 | 0.834 | | | 0.439 | |
| | 45.0 | 2171.2 | 2200.0 | 45.6 | 2 | 12:32 PM | 0.344 | 0.837 | | | 0.441 | |
| | 45.0 | 2171.2 | 2200.0 | 45.6 | 3 | 12:33 PM | 0.344 | 0.838 | | | 0.441 | |
| | 45.0 | 2171.2 | 2200.0 | 45.6 | 4 | 12:34 PM | 0.344 | 0.838 | | | 0.441 | |
| | 45.0 | 2171.2 | 2200.0 | 45.6 | 5 | 12:35 PM | 0.344 | 0.838 | | | 0.441 | |
| | 45.0 | 2171.2 | 2200.0 | 45.6 | 6 | 12:36 PM | 0.344 | 0.838 | | | 0.441 | |
| | 45.0 | 2171.2 | 2200.0 | 45.6 | 10 | 12:41 PM | 0.344 | 0.839 | | | 0.442 | |

# Soil Nail Verification Load Test Data

Schnabel Engineering

**Project:** Hollow Core Bar Soil Nail Research
**Location:** Long Island, NY
**Client:** ADSC

**Performed:** Nolan Kealy
**Observed:** J. Mikitka
**Data by:** J. Mikitka

**Soil Nail:** C-3
**Date:** 10/23/2008

**Design Test Load (P):** 45 kips
**# Dials:** 2
**Jack Calibration:** Pressure = 46.557 X reading (kip) + 76.141 (psi)

| Sequence of Loading | Estimated Load [kip] | Dial Load [psi] | Applied Pressure [psi] | Applied Load [kip] | Time [min] | Time of Test | Dial 1 Deformation [in.] | Dial 2 Deformation [in.] | Dial 3 Deformation [in.] | Dial 4 Deformation [in.] | Average Deformation [in.] | Comments: |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 125% | 56.3 | 2695.0 | 2675.0 | 55.8 | 1 | 12:51 PM | 0.352 | 0.857 | | | 0.455 | pumped pressure, lost gauge, backed off to 2200 psi, readings at 2200: 0.396 and 1.071 |
| | 56.3 | 2695.0 | 2675.0 | 55.8 | 2 | 12:52 PM | 0.352 | 0.858 | | | 0.455 | |
| | 56.3 | 2695.0 | 2675.0 | 55.8 | 3 | 12:53 PM | 0.353 | 0.860 | | | 0.457 | |
| | 56.3 | 2695.0 | 2675.0 | 55.8 | 4 | 12:54 PM | 0.353 | 0.860 | | | 0.457 | |
| | 56.3 | 2695.0 | 2675.0 | 55.8 | 5 | 12:55 PM | 0.353 | 0.860 | | | 0.457 | |
| | 56.3 | 2695.0 | 2675.0 | 55.8 | 6 | 12:56 PM | 0.353 | 0.860 | | | 0.457 | |
| | 56.3 | 2695.0 | 2675.0 | 55.8 | 10 | 1:00 PM | 0.353 | 0.860 | | | 0.457 | |
| 150% | 67.5 | 3218.7 | 3225.0 | 67.6 | 1 | 1:01 PM | 0.416 | 0.928 | | | 0.522 | |
| | 67.5 | 3218.7 | 3225.0 | 67.6 | 2 | 1:02 PM | 0.415 | 0.930 | | | 0.523 | |
| | 67.5 | 3218.7 | 3225.0 | 67.6 | 3 | 1:03 PM | 0.414 | 0.932 | | | 0.523 | |
| | 67.5 | 3218.7 | 3225.0 | 67.6 | 4 | 1:04 PM | 0.416 | 0.938 | | | 0.527 | |
| | 67.5 | 3218.7 | 3225.0 | 67.6 | 5 | 1:05 PM | 0.417 | 0.941 | | | 0.529 | |
| | 67.5 | 3218.7 | 3225.0 | 67.6 | 6 | 1:06 PM | 0.419 | 0.946 | | | 0.533 | |
| | 67.5 | 3218.7 | 3225.0 | 67.6 | 10 | 1:10 PM | 0.422 | 0.956 | | | 0.539 | |
| | 67.5 | 3218.7 | 3225.0 | 67.6 | 20 | 1:20 PM | 0.428 | 0.972 | | | 0.550 | |
| | 67.5 | 3218.7 | 3225.0 | 67.6 | 30 | 1:30 PM | 0.440 | 1.000 | | | 0.570 | |
| | 67.5 | 3218.7 | 3225.0 | 67.6 | 40 | 1:40 PM | 0.447 | 1.020 | | | 0.584 | |
| | 67.5 | 3218.7 | 3225.0 | 67.6 | 50 | 1:50 PM | 0.452 | 1.032 | | | 0.592 | |
| | 67.5 | 3218.7 | 3225.0 | 67.6 | 60 | 2:00 PM | 0.454 | 1.038 | | | 0.596 | |

# Soil Nail Verification Load Test Data

Schnabel Engineering

**Project:** Hollow Core Bar Soil Nail Research
**Location:** Long Island, NY
**Client:** ADSC

**Performed:** Nolan Kealy
**Observed:** J. Mikitka
**Data by:** J. Mikitka

**Soil Nail:** C-3
**Date:** 10/23/2008

**Design Test Load (P):** 45 kips **# Dials:** 2 **Jack Calibration:** Pressure = 46.557 X reading (kip) + 76.141 (psi)

| Sequence of Loading | Estimated Load [kip] | Dial Load [psi] | Applied Pressure [psi] | Applied Load [kip] | Time [min] | Time of Test | Dial 1 Deformation [in.] | Dial 2 Deformation [in.] | Dial 3 Deformation [in.] | Dial 4 Deformation [in.] | Average Deformation [in.] | Comments: |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 175% | 78.8 | 3742.5 | 3500.0 | 73.5 | 1 | 2:01 PM | 0.504 | 1.111 | | | 0.658 | |
| | 78.8 | 3742.5 | 3500.0 | 73.5 | 2 | 2:02 PM | 0.505 | 1.114 | | | 0.660 | |
| | 78.8 | 3742.5 | 3500.0 | 73.5 | 3 | 2:03 PM | 0.507 | 1.117 | | | 0.662 | |
| | 78.8 | 3742.5 | 3500.0 | 73.5 | 4 | 2:04 PM | 0.502 | 1.129 | | | 0.666 | |
| | 78.8 | 3742.5 | 3500.0 | 73.5 | 5 | 2:05 PM | 0.515 | 1.134 | | | 0.675 | |
| | 78.8 | 3742.5 | 3500.0 | 73.5 | 6 | 2:06 PM | 0.520 | 1.146 | | | 0.683 | |
| | 78.8 | 3742.5 | 3500.0 | 73.5 | 10 | 2:10 PM | 0.527 | 1.161 | | | 0.694 | wedge of soil failed behind cribbing. |

# APPENDIX C

# Soil Nail Installation Logs

| Sketch | Depth [feet] | Casing | Bars | Grout | Time (min:sec) Start | Time (min:sec) End | Description and Observations of Drilling | Stage | Time (hr:min) Start | Time (hr:min) End | Pressure | Gs | Observations of Grouting |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Include a description of drilling equipment | | | | | | |
| | 0 | | | | 8:05 | | YELLOWISH BROWN, FINE TO COARSE SAND | | 10:07 | | | | GROUTED WITH 3/4 in, SCHEDULE 40, RIGID PVC PIPE |
| | 5 | | | | | | DRILLED USING DUPLEX DRILLING WITH: | | | | | | GROUTED WITH 26 GALLONS OF GROUT. |
| | | | | | | | - 7 IN O.D. CASING, tw = 3/16 in | | | | | | |
| | 10 | | | | 8:28 | 8:11 | - 4 IN RODS WITH 5 in ROLLER BIT | | | | | | PULLED CASING BACK 5 FT AND LET GROUT SET |
| | | | | | | | DRILLING WITH A CASAGRANDE M9-1 | | | | | | CHECKED GROUT AT 18 FT FROM TOP OF 20-FT CASING. |
| | 18 | | | | | 8:44 | PVC PIPE | | | 10:36 | | | |
| | | | | | | | CENTRALIZER | | | | | | NOTES: |
| | | | | | | | No 14 WILLIAMS BAR | | | | | | (1) NOMINAL BOND LENGTH IS 6 FT AND UNBONDED LENGTH IS 14 FT (14 FT OF BAR COVERED WITH PVC CASING). HOWEVER THE GROUT COLUM WAS POURED TO 8 FT FROM THE TOP OF THE SOIL NAIL. |
| | | | | | | | GROUT | | | | | | |

Sketch: top and bottom of temporary casing, location of temporary casing sections and location of centralizers.

Sketch: top and bottom of bar, location of bar sections and location of centralizers.

**Schnabel**

**Schnabel Engineering**

| | | |
|---|---|---|
| **SOIL NAIL:** | A1 | |
| *Soil Boring:* | B-1 | |
| *Soil Nail Geometry:* | Perpendicular to face | |
| Soil Nail elev. | N/A | ft |
| Total casing length | 20 (TEMPORARY) | ft |
| Total hole depth | 18 | ft |
| Total grout length | 17 | ft |
| | Design / As-built | |
| Total bar length | 20 / 20 | ft |
| Bonded length | 6 / 6 (1) | ft |
| Unbonded length | 14 / 14 (1) | ft |
| Tail length | 2 / 2 | ft |
| Bit type | DUPLEX DRILLING W/7in CSG | |
| Bit diameter | 5 | in |
| Hole inclination | 15 | degrees |
| Centralizers | 2 | |
| *Reinforcing steel:* | | |
| Date of installation | 10/14/08 | |
| Supplier | WILLIAMS | |
| Casing description | | |
| Diameter | 7in | Thickn. 3/16 in |
| Nail description | | |
| | Design / As-built | |
| No. Bars | 1 / 1 | |
| Diameter | No 14 / No 14 | |
| *Primary grouting* | | |
| Date of grouting | 10/14/08 | |
| Cement typ. & supp | TYPE II / LAFARGE | |
| Dosage / Admixture | 1 BAG CEMENT / 5 GALLONS | |
| Grouting method | Through Hole | |
| Batch ID | GS / Cubes | |
| 1 | 1.89 / AT HOPPER | |
| 2 | | |
| 3 | | |
| Final | | |
| Volume | Theor. / As-built | |
| Drilling Grout | | gal |
| Final Grout | 24 / 26 | gal |

| | | | |
|---|---|---|---|
| Project: | HBSN Testing Research Program | Manager: | ALLEN CADDEN (SE) |
| Location: | LONG ISLAND, N.Y. | Engineer: | JAVIER RODRIGUEZ (SE) |
| Client: | FHWA/ ADSC | Superint.: | NOLAN KEALY (PGG) |
| Job No.: | 07150064 | Weather: | SUNNY |

Date Drilled: 10/14/08
Date Grouted: 10/14/08
Capacity: 45 Kip
Page: 1 of 1

Installer Representative (Name and Date)

JAVIER RODRIGUEZ (10/14/08)
Schnabel's Representative (Name and Date)

| Sketch | Depth [feet] | Casing | Bars | Grout | Time (min:sec) Start | Time (min:sec) End | Description and Observations of Drilling | Stage | Time (hr:min) Start | Time (hr:min) End | Pressure | Gs | Observations of Grouting |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Include a description of drilling equipment | | | | | | |
| | | | | | | | YELLOWISH BROWN, FINE TO COARSE SAND | | | | | | |
| | 0 | | | | 10:59 | | DRILLED USING DUPLEX DRILLING WITH: | | 1:58 | | | | GROUTED WITH 3/4 in, SCHEDULE 40, RIGID PVC PIPE |
| | | | | | | | - 7 IN O.D. CASING, tw= 3/16in | | | | | | |
| | 5 | | | | | 11:03 | - 4 IN RODS WITH 5in ROLLER BIT | | | | | | |
| | | | | | 11:09 | | | | | | | | |
| | | | | | | 11:10 | FIXING RODS | | | | | | |
| | | | | | 12:56 | | | | | | | | |
| | 10 | | | | | 12:57 | | | | | | | |
| | | | | | 1:24 | | | | | | | | |
| | | | | | | | DRILLED WITH A CASAGRANDE M9-1 | | | | | | |
| | 15 | | | | | | PVC PIPE | | | | | | NOTES: |
| | 18 | | | | | 1:34 | | | | 2:08 | | | (1) NOMINAL BOND LENGTH IS 6 FT AND UNBONDED LENGTH IS 14 FT (14 FT OF BAR COVERED WITH PVC CASING). HOWEVER, THE GROUT COLUMN WAS POURED TO 10 FT FROM THE TOP OF THE SOIL NAIL. |
| | | | | | | | CENTRALIZER | | | | | | |
| | | | | | | | No 14 WILLIAMS BAR | | | | | | |
| | | | | | | | GROUT | | | | | | |

Sketch: top and bottom of temporary casing, location of temporary casing sections and location of centralizers.

Sketch: top and bottom of bar, location of bar sections and location of centralizers.

30 ft

**Schnabel**

**Schnabel Engineering**

| | | | |
|---|---|---|---|
| **SOIL NAIL:** | A2 | | |
| *Soil Boring:* | B-1 | | |
| *Soil Nail Geometry:* | Perpendicular to face | | |
| Soil Nail elev. | N/A | | ft |
| Total casing length | 20 (TEMPORARY) | | ft |
| Total hole depth | 18 | | ft |
| Total grout length | 12 | | ft |
| | Design | As-built | |
| Total bar length | 20 | 20 | ft |
| Bonded length | 6 | 6 (1) | ft |
| Unbonded length | 14 | 14 (1) | ft |
| Tail length | 2 | 2 | ft |
| Bit type | ROLLER BIT | | |
| Bit diameter | 5 | | in |
| Hole inclination | 15 | | degrees |
| Centralizers | 2 | | |
| *Reinforcing steel:* | | | |
| Date of installation | 10/14/08 | | |
| Supplier | WILLIAMS | | |
| Casing description | | | |
| Diameter | 7 in | Thickn. 3/16 in | |
| Nail description | | | |
| | Design | As-built | |
| No. Bars | 1 | 1 | |
| Diameter | No 14 | No 14 | |
| *Primary grouting* | | | |
| Date of grouting | 10/14/08 | | |
| Cement typ. & supp | TYPE II / LAFARGE | | |
| Dosage / Admixture | 1 BAG CEMENT / 5 GALLONS | | |
| Grouting method | Through Hole | | |
| Batch ID | GS | Cubes | |
| 1 | | | |
| 2 | | | |
| 3 | | | |
| Final | | | |
| Volume | Theor. | As-built | |
| Drilling Grout | | | gal |
| Final Grout | | | gal |

| | | | |
|---|---|---|---|
| Project: | HBSN Testing Research Program | Manager: | ALLEN CADDEN (SE) |
| Location: | LONG ISLAND, N.Y. | Engineer: | JAVIER RODRIGUEZ (SE) |
| Client: | FHWA/ ADSC | Superint.: | NOLAN KEALY (PGC) |
| Job No.: | 07150064 | Weather: | SUNNY |

Date Drilled: 10/14/08
Date Grouted: 10/14/08
Capacity: 45 kip
Page: 1 of 1

Installer Representative (Name and Date)

JAVIER RODRIGUEZ (10/14/08)
Schnabel's Representative (Name and Date)

| Sketch | Depth [feet] | Casing | Bars | Grout | Time (min:sec) Start | Time (min:sec) End | Description and Observations of Drilling | Stage | Time (hr:min) Start | Time (hr:min) End | Pressure | Gs | Observations of Grouting |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Include a description of drilling equipment | | | | | | |
| | | | | | | | YELLOWISH BROWN, FINE TO COARSE SAND | | | | | | |
| | 0 | | | | 5:01 | | DRILLED USING DUPLEX DRILLING: | | 6:18 | | | | GROUTED WITH 3/4 IN, SCHEDULE 40, RIGID PVC PIPE |
| | | | | | | | - 7 IN O.D. CASING, tw = 3/16 IN | | | | | | |
| | | | | | | | - 4 IN RODS WITH 5 IN ROLLER BIT. | | | | | | GROUTED WITH GALLONS OF GROUT |
| | 5 | | | | | 5:06 | | | | | | | |
| | | | | | 5:13 | | DRILLED WITH CASAGRANDE M9-1 | | | | | | PULLED CASING BACK 5 FT AND LET GROUT SET |
| | | | | | | | PVC PIPE | | | | | | |
| | 10 | | | | | 5:18 | | | | | | | CHECKED GROUT AT 10' FROM TOP OF 10-FT CASING |
| | | | | | 5:30 | | | | | | | | |
| | | | | | | | GROUT | | | | | | |
| | | | | | | | CENTRALIZER | | | | | | |
| | 15 | | | | | | | | | | | | |
| | | | | | | | No 14 WILLIAMS BAR | | | | | | |
| | 18 | | | | | 5:36 | OBSTRUCTION AT END HIT HARD MATERIAL DRILLED LIKE CONCRETE STOPPED DRILLING. | | | 6:36 | | | NOTES: |
| | | | | | | | | | | | | | (1) NOMINAL BOND LENGTH IS 6 FT AND UNBONDED LENGTH IS 14 FT. (14 FT OF BAR COVERED WITH PVC). HOWEVER, THE GROUT COLUMN WAS POURED TO 10 FT FROM THE TOP OF THE SOIL NAIL. |
| | | | | | | | | | | | | | (2) SOIL NAIL A3 COULD NOT BE TESTED. GROUT WAS LOST AFTER INSTALLATION. |

Sketch: top and bottom of temporary casing, location of temporary casing sections and location of centralizers.

Sketch: top and bottom of bar, location of bar sections and location of centralizers.

10'

**Schnabel**

**Schnabel Engineering**

**SOIL NAIL:** A3

| | | |
|---|---|---|
| *Soil Boring:* | B-1 | |
| *Soil Nail Geometry:* | Perpendicular to face | |
| Soil Nail elev. | N/A | ft |
| Total casing length | 20 (TEMPORARY) | ft |
| Total hole depth | 18 FT | ft |
| Total grout length | 10 FT | ft |

| | Design | As-built | |
|---|---|---|---|
| Total bar length | 20 | 20 | ft |
| Bonded length | 6 | 6 (1) | ft |
| Unbonded length | 14 | 14 (1) | ft |
| Tail length | 2 | 2 | ft |
| Bit type | ROLLER BIT | | |
| Bit diameter | 5 | | in |
| Hole inclination | 15 | | degrees |
| Centralizers | 2 | | |

| | | |
|---|---|---|
| *Reinforcing steel:* | | |
| Date of installation | 10/14/08 | |
| Supplier | WILLIAMS | |
| Casing description | | |
| Diameter | 7 in | Thickn. 3/16 in |
| Nail description | | |

| | Design | As-built |
|---|---|---|
| No. Bars | 1 | 1 |
| Diameter | No 14 | No 14 |

| | | |
|---|---|---|
| *Primary grouting* | | |
| Date of grouting | 10/14/08 | |
| Cement typ. & supp | TYPE II / LAFARGE | |
| Dosage / Admixture | 1 BAG CEMENT / 5 GALLONS | |
| Grouting method | Through Hole | |

| Batch ID | GS | Cubes |
|---|---|---|
| 1 | 1.87 | HOPPER |
| 2 | | |
| 3 | | |
| Final | | |

| Volume | Theor. | As-built | |
|---|---|---|---|
| Drilling Grout | | | gal |
| Final Grout | | | gal |

Project: HBSN Testing Research Program
Location: LONG ISLAND, N.Y.
Client: FHWA/ ADSC
Job No.: 07150064

Manager: ALLEN CADDEN (SE)
Engineer: JAVIER RODRIGUEZ (SE)
Superint.: NOLAN KEALY (PGC)
Weather: SUNNY

Date Drilled: 10/14/08
Date Grouted: 10/14/08
Capacity: 45 Kip
Page: 1 of 1

Installer Representative (Name and Date)

JAVIER RODRIGUEZ (10/14/08)
Schnabel's Representative (Name and Date)

| Sketch | Depth [feet] | Casing | Bars | Grout | Time (min:sec) Start | Time (min:sec) End | Description and Observations of Drilling | Stage | Time (hr:min) Start | Time (hr:min) End | Pressure | Gs | Observations of Grouting |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Include a description of drilling equipment | | | | | | |
| | 0 | Sketch: top and bottom of temporary casing; location of temporary casing sections and location of centralizers. | Sketch: top and bottom of bar; location of bar sections and location of centralizers. | | 9:49 | | INSTALLED 15 FT OF CASING, DUPLEX DRILLING, CASING TAIL 2 FT. DRILLED WITH CASA GRANDE M9-1. | | | | | 1.87 | AT HOPPER |
| | 5 | | | | | | INSTALLED 52/26 TITAN BAR WITH ECM-590 | | | | | | |
| | | | | | 11:30 | 9:52 | 2 1/2 in O.D. SCH.40, PVC PIPE ALONG UNBONDED LENGTH. | | | | | | |
| | 10 | | | | 12:02 | 11:33 | → STARTED DRILLING OF BAR WITH HAMMER ACTIVATED | | | | | | |
| | 15 | | | | 1:10 | 12:06 | FLUSHING PIPE | | | | | | |
| | | | | | | | TEMPORARY CASING (REMOVED AFTER FLUSHING) | | | | | | |
| | 20 | | | | | | | | | | | | |
| | 21 | | | | | 1:14 | 52/26 CTS-IBO TITAN BAR | | | | | 1.96 | AT TOP OF NAIL. |
| | | | | | | | BOND ZONE | | | | | | AFTER INSTALLATION OF BAR, INSERTED A 3/4 in O.D. RIGID PVC ONE FOOT ABOVE THE TIP OF CASING AND FLUSHED UNTIL SEEING "CLEAN" RETURN. THE PIPE WAS PERFORATED EVERY FOOT ALONG THE ENTIRE LENGTH. |

**Schnabel**

**Schnabel Engineering**

**SOIL NAIL:** B1

| | | | |
|---|---|---|---|
| *Soil Boring:* | B-1 | | |
| *Soil Nail Geometry:* | Perpendicular to face | | |
| Soil Nail elev. | ≅ 2' BELOW G.S. | | ft |
| Total casing length | 15 (TEMPORARY) | | ft |
| Total hole depth | 18 | | ft |
| Total grout length | 6 | | ft |
| | Design | As-built | |
| Total bar length | 20 | 20 | ft |
| Bonded length | 6 | 6 | ft |
| Unbonded length | 14 | 14 | ft |
| Tail length | 2 | 2 | ft |
| Bit type | CROSS-CUT BIT | | |
| Bit diameter | 5.1 (130mm) | | in |
| Hole inclination | 15 | | degrees |
| Centralizers | 2 | | |
| *Reinforcing steel:* | | | |
| Date of installation | 10/13/08 | | |
| Supplier | CONTECH | | |
| Casing description | | | |
| Diameter | 7 in | Thickn. 7/16 in | |
| Nail description | | | |
| | Design | As-built | |
| No. Bars | 1 | 1 | |
| Diameter | 52/26 | TITAN | in |
| *Primary grouting* | | | |
| Date of grouting | 10/13/08 | | |
| Cement typ. & supp | TYPE II / LAFARGE | | |
| Dosage / Admixture | 1 BAG CEMENT / 5 GALLONS | | |
| Grouting method | Through Hole | | |
| Batch ID | GS | Cubes | |
| 1 | 1.87 | AT HOPPER | |
| 2 | 1.96 | AT TOP OF NAIL | |
| 3 | | | |
| Final | | | |
| Volume | Theor. | As-built | |
| Drilling Grout | | | gal |
| Final Grout | | | gal |

Project: HBSN Testing Research Program
Location: LONG ISLAND, N.Y.
Client: FHWA/ ADSC
Job No.: 07150064

Manager: ALLEN CADDEN (S.E.)
Engineer: JAVIER RODRIGUEZ (S.E.)
Superint.: NOLAN KEALY (PGC)
Weather: SUNNY
Capacity: 45 Kip

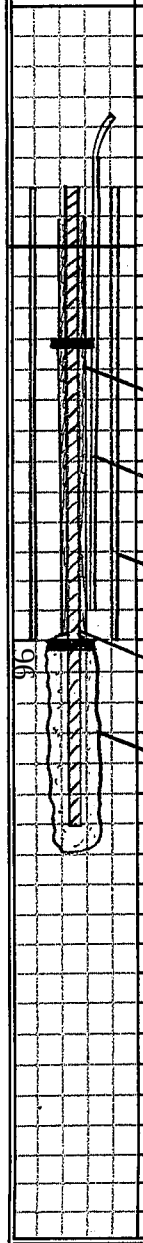
Date Drilled: 10/13/08
Date Grouted: 10/13/08

Page: 1 of 1

Installer Representative (Name and Date)

JAVIER RODRIGUEZ (10/13/08)
Schnabel's Representative (Name and Date)

| Sketch | Depth [feet] | Casing | Bars | Grout | Time (min:sec) Start | Time (min:sec) End | Description and Observations of Drilling | Stage | Time (hr:min) Start | Time (hr:min) End | Pressure | Gs | Observations of Grouting |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Include a description of drilling equipment | | | | | | |
| | | | | | | | INSTALLED 15 FT OF CASING, DUPLEX DRILLING, CASING TAIL 2 FT. DRILLED WITH CASA - GRANDE M9-1. | | | | | | |
| | 0 | | | | 3:14 | | | | | | | 1.83 | AT HOPPER |
| | | | | | | | INSTALLED 52/26 TITAN BAR WITH ECM-590 | | | | | | |
| | 5 | | | | | | | | | | | | |
| | 10 | | | | | 3:17 | 2 1/2 in O.D. SCH. 40, PVC PIPE ALONG UNBONDED LENGTH | | | | | | |
| | | | | | | | FLUSHING PIPE | | | | | | |
| | 15 | | | | | 3:29 | | | | | | | |
| | | | | | 4:25 | | TEMPORARY CASING (REMOVED AFTER FLUSHING) | | | | | | |
| | 20 | | | | | | 52/26 CTS-180 TITAN BAR | | | | | | |
| | 21 | | | | | 4:27 | | | | | | 1.87 | AT TOP ON NAIL. |
| | | | | | | | BOND ZONE | | | | | | |




**Schnabel**

**Schnabel Engineering**

**SOIL NAIL:** B2

| | | | |
|---|---|---|---|
| *Soil Boring:* | B-1 | | |
| *Soil Nail Geometry:* | Perpendicular to face | | |
| Soil Nail elev. | ≅ 2' BELOW G.S. | | ft |
| Total casing length | 15 (TEMPORARY | | ft |
| Total hole depth | 18 | | ft |
| Total grout length | 6 | | ft |
| | Design | As-built | |
| Total bar length | 20 | 20 | ft |
| Bonded length | 6 | 6 | ft |
| Unbonded length | 14 | 14 | ft |
| Tail length | 2 | 2 | ft |
| Bit type | CROSS-CUT | | |
| Bit diameter | 5.1 (130 mm) | | in |
| Hole inclination | 15 | | degrees |
| Centralizers | 2 | | |
| *Reinforcing steel:* | | | |
| Date of installation | 10/13/08 | | |
| Supplier | CONTECH | | |
| Casing description | | | |
| Diameter | 7 in | Thickn. 3/16 in | |
| Nail description | | | |
| | Design | As-built | |
| No. Bars | 1 | 1 | |
| Diameter | 52/26 | TITAN | in |
| *Primary grouting* | | | |
| Date of grouting | 10/13/08 | | |
| Cement typ. & supp | TYPE II / LAFARGE | | |
| Dosage / Admixture | 1 BAG CEMENT / 5 GALLONS | | |
| Grouting method | Through Hole | | |
| Batch ID | GS | Cubes | |
| 1 | 1.83 | AT HOPPER | |
| 2 | 1.87 | AT TOP OF NAIL | |
| 3 | | | |
| Final | | | |
| Volume | Theor. | As-built | |
| Drilling Grout | | | gal |
| Final Grout | | | gal |

Project: HBSN Testing Research Program
Location: LONG ISLAND, N.Y
Client: FHWA/ ADSC
Job No.: 07150064

Manager: ALLEN CADDEN, (SE)
Engineer: JAVIER RODRIGUEZ (SE)
Superint.: NOLAN REALY (PGC)
Weather: SUNNY
Capacity: 45 Kip
Page: 1 of 1

Date Drilled: 10/13/08
Date Grouted: 10/13/08

Installer Representative (Name and Date)

JAVIER RODRIGUEZ (10/13/08)
Schnabel's Representative (Name and Date)

| Sketch | Depth [feet] | Casing | Bars | Grout | Time (min:sec) Start | Time (min:sec) End | Description and Observations of Drilling | Stage | Time (hr:min) Start | Time (hr:min) End | Pressure | Gs | Observations of Grouting |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Include a description of drilling equipment | | | | | | |
| | | | | | | | INSTALLED 52/26 TITAN BAR WITH ECM-590 | | | | | | |
| | 0 | | | | 11:42 | | HAMMER ACTIVATED | | | | | | |
| | | | | | | 11:43 | | | | | | | |
| | | | | | 11:52 | | HAMMER ACTIVATED | | | | | | |
| | 5 | | | | | | HARD DRILLING @ 16 FT | | | | | | |
| | 10 | | | | | | | | | | | | |
| | 13 | | | | | 12:00 | 2½ IN O.D., SCHEDULE 40 PVC PIPE ALONG UNBONDED LENGTH. GREASE IN THE ANNULAR SPACE BETWEEN THE BAR AND THE PVC PIPE. | | | | | | |
| | | | | | 12:15 | | | | | | | | |
| | 15 | | | | | 12:21 | | | | | | | |
| | 17 | | | | | 12:32 | | | | | | | |
| | | | | | | | CENTRALIZER | | | | | | |
| | | | | | | | 52/26 CTS-1B0 TITAN BAR | | | | | | |
| | | | | | | | BOND ZONE: 6 FT | | | | | | |

Sketch: top and bottom of temporary casing; location of temporary casing sections and location of centralizers.

Sketch: top and bottom of bar; location of bar sections and location of centralizers.

**Schnabel**

**Schnabel Engineering**

| | | |
|---|---|---|
| **SOIL NAIL:** | C1 | |
| *Soil Boring:* | B-1 | |
| *Soil Nail Geometry:* | Perpendicular to face | |
| Soil Nail elev. | ≈ 3F' BELOW G.S. | ft |
| Total casing length | 0 | ft |
| Total hole depth | 17 | ft |
| Total grout length | 17 | ft |
| | Design / As-built | |
| Total bar length | 20 / 20 | ft |
| Bonded length | 6 / 6 | ft |
| Unbonded length | 14 / 14 | ft |
| Tail length | 3 / 3 | ft |
| Bit type | CROSS CUT | |
| Bit diameter | 5.1 (130 mm) | in |
| Hole inclination | 15 | degrees |
| Centralizers | 2 | |
| *Reinforcing steel:* | | |
| Date of installation | 10/10/08 | |
| Supplier | CONTECH | |
| Casing description | | |
| Diameter | NA | Thickn. NA |
| Nail description | | |
| | Design / As-built | |
| No. Bars | 1 / 1 | |
| Diameter | 52/26 / TITAN | in |
| *Primary grouting* | | |
| Date of grouting | 10/10/08 | |
| Cement typ. & supp | TYPE II / LAFARGE | |
| Dosage / Admixture | 1 BAG CEMENT / 5 GALLONS | |
| Grouting method | Through Hole | |
| Batch ID | GS | Cubes |
| 1 | | |
| 2 | | |
| 3 | | |
| Final | | |
| Volume | Theor. | As-built |
| Drilling Grout | | gal |
| Final Grout | | gal |

Project: HBSN Testing Research Program
Location: LONG ISLAND, N.Y.
Client: FHWA/ ADSC
Job No.: 07150064

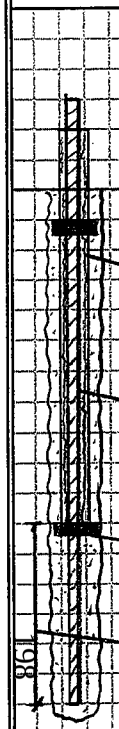
Manager: ALLEN CADDEN, (SE)
Engineer: JAVIER RODRIGUEZ (SE)
Superint.: NOLAN KEALY (PGC)
Weather: SUNNY
Capacity: 45 Kip
Page: 1 of 1

Date Drilled: 10/10/08
Date Grouted: 10/10/08

Installer Representative (Name and Date)

JAVIER RODRIGUEZ (10/10/08)
Schnabel's Representative (Name and Date)

| Sketch | Depth [feet] | Casing | Bars | Grout | Time (min:sec) Start | Time (min:sec) End | Description and Observations of Drilling | Stage | Time (hr:min) Start | Time (hr:min) End | Pressure | Gs | Observations of Grouting |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Include a description of drilling equipment | | | | | | |
| | | | | | | | INSTALLED 52/26 TITAN BAR WITH ECM-590 | | | | | | |
| | 0 | | | | 1:25 | | HAMMER ACTIVATED | | | | | | |
| | 3 | | | | | 1:26 | | | | | | | |
| | | | | | 1:40 | | | | | | | | |
| | 5 | | | | | | 2½ IN O.D., SCH.40, PVC | | | | | | |
| | 6 | | | | | 1:45 | PIPE ALONG UNBONDED LENGTH. GREASED BAR | | | | | | |
| | 10 | | | | | | 52/26 CTS-TBO TITAN BAR | | | | | | |
| | 13 | | | | | 1:50 | CONNECTING BAR | | | | | | |
| | | | | | 2:02 | | CENTRALIZER | | | | | | |
| | 15 | | | | | | | | | | | | |
| | 16 | | | | | 2:05 | | | | | | | |
| | 17 | | | | 2:07 | 2:09 | BOND LENGTH: 6 FT. | | | | | | |




**Schnabel**

**Schnabel Engineering**

**SOIL NAIL:** C2

| | | |
|---|---|---|
| *Soil Boring:* | B-1 | |
| *Soil Nail Geometry:* | Perpendicular to face | |
| Soil Nail elev. | ≅ 3' BELOW G.S. | ft |
| Total casing length | 0 | ft |
| Total hole depth | 17 | ft |
| Total grout length | 17 | ft |

| | Design | As-built | |
|---|---|---|---|
| Total bar length | 20 | 20 | ft |
| Bonded length | 6 | 6 | ft |
| Unbonded length | 14 | 14 | ft |
| Tail length | 3 | 3 | ft |

| | | |
|---|---|---|
| Bit type | CROSS-CUT | |
| Bit diameter | 5.1 (130 mm) | in |
| Hole inclination | 15 | degrees |
| Centralizers | 2 | |
| *Reinforcing steel:* | | |
| Date of installation | 10/10/08 | |
| Supplier | CONTECH | |
| Casing description | | |
| Diameter | NA | Thickn. NA |
| Nail description | | |

| | Design | As-built | |
|---|---|---|---|
| No. Bars | 1 | 1 | |
| Diameter | 52/26 | TITAN | in |

| | |
|---|---|
| *Primary grouting* | |
| Date of grouting | 10/10/08 |
| Cement typ. & supp | TYPE II / LAFARGE |
| Dosage / Admixture | 1 BAG CEMENT / 5 GALLONS |
| Grouting method | Through Hole |

| Batch ID | GS | Cubes |
|---|---|---|
| 1 | 1.78 | HOPPER |
| 2 | 1.91 | TOP OF NAIL |
| 3 | | |
| Final | | |

| Volume | Theor. | As-built | |
|---|---|---|---|
| Drilling Grout | | | gal |
| Final Grout | | | gal |

Project: HBSN Testing Research Program
Location: LONG ISLAND, N.Y.
Client: FHWA/ ADSC
Job No.: 07150064

Manager: ALLEN CADDEN (SE)
Engineer: JAVIER RODRIGUEZ (SE)
Superint.: NOLAN KEALY (PGC)
Weather: SUNNY
Capacity:

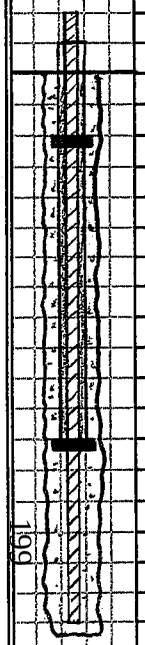
Date Drilled: 10/10/08
Date Grouted: 10/10/08

Page: 1 of 1

Installer Representative (Name and Date)

JAVIER RODRIGUEZ / 10/10/08
Schnabel's Representative (Name and Date)

| Sketch | Depth [feet] | Casing | Bars | Grout | Time (min:sec) Start | Time (min:sec) End | Description and Observations of Drilling | Stage | Time (hr:min) Start | Time (hr:min) End | Pressure | Gs | Observations of Grouting |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Include a description of drilling equipment | | | | | | |
| | | | | | | | INSTALLED 52/26 TITAN BAR WITH ECM-590 | | | | | | |
| | 0 | | | | 4:10 | | HAMMER ACTIVATED | | | | | 1.87 | AT HOPPER |
| | 5 | | | | | | | | | | | | |
| | 6 | | | | | 4:11 | | | | | | | |
| | 9 | | | | 4:12 | 4:13 | BACKED UP (CLOG) | | | | | | |
| | 10 | | | | 4:20 | | | | | | | | |
| | 13 | | | | | 4:22 | | | | | | | |
| | | | | | 4:43 | | | | | | | | |
| | 15 | | | | | | | | | | | | |
| | 16 | | | | | 4:45 | | | | | | | |
| | 18 | | | | | 4:46 | | | | | | 1.97 | TOP OF NAIL |




**Schnabel**

**Schnabel Engineering**

**SOIL NAIL:** C3

| | | | |
|---|---|---|---|
| *Soil Boring:* | B-1 | | |
| *Soil Nail Geometry:* | Perpendicular to face | | |
| Soil Nail elev. | ≅ 2 ft FROM G.S. | | ft |
| Total casing length | 0 | | ft |
| Total hole depth | 18 | | ft |
| Total grout length | 18 | | ft |
| | Design | As-built | |
| Total bar length | 20 | 20 | ft |
| Bonded length | 6 | 6 | ft |
| Unbonded length | 14 | 14 | ft |
| Tail length | 2 | 2 | ft |
| Bit type | CROSS-CUT | | |
| Bit diameter | 5.1 (130 mm) | | in |
| Hole inclination | 15 | | degrees |
| Centralizers | 2 | | |
| *Reinforcing steel:* | | | |
| Date of installation | 10/14/08 | | |
| Supplier | CONTECH | | |
| Casing description | | | |
| Diameter | NA | Thickn. NA | |
| Nail description | | | |
| | Design | As-built | |
| No. Bars | 1 | | |
| Diameter | 52/26 | TITAN | in |
| *Primary grouting* | | | |
| Date of grouting | 10/14/08 | | |
| Cement typ. & supp | TYPE II / LAFARGE | | |
| Dosage / Admixture | 1 BAG CEMENT / 5 GALLONS | | |
| Grouting method | Through Hole | | |
| Batch ID | GS | Cubes | |
| 1 | 1.87 | AT HOPPER | |
| 2 | 1.97 | AT TOP OF NAIL | |
| 3 | | 1 SET | |
| Final | | | |
| Volume | Theor. | As-built | |
| Drilling Grout | | | gal |
| Final Grout | | | gal |

Project: HBSN Testing Research Program
Location: LONG ISLAND, NY
Client: FHWA/ ADSC
Job No.: 07150064

Manager: ALLEN CADDEN (SE)
Engineer: JAVIER RODRIGUEZ (SE)
Superint.: NOLAN KEALY (PGC)
Weather:

Date Drilled: 10/14/08
Date Grouted: 10/14/08
Capacity:
Page: 1 of 1

Installer Representative (Name and Date)

JAVIER RODRIGUEZ (10/14/08)
Schnabel's Representative (Name and Date)

# APPENDIX D

# Grout Compressive Strength

Schnabel Engineering

# Grout Cube Test Report

**DATE OF REPORT: 2/2/2009**



**PROJECT:** HBSN Research
**CLIENT:** ADSC
**BLDG. PERMIT NO.:**

**PROJECT NUMBER:** 07150064
**SET NO.:** 1

## SAMPLING DATA

**DATE SAMPLED:** 10/14/2008 **TIME SAMPLED:** 16:49
**SAMPLED BY:** CJR
**NUMBER OF CUBES MOLDED:** 3
**DATE CUBES RECEIVED:** 10/20/2008
**TRANSPORTED BY:** CJR
**TRUCK NUMBER:** Mixed on site
**TICKET NUMBER:** Mixed on site
**TYPE OF OBSERVATION:** Full
**SAMPLES PLACED IN CURING BOX?:** Yes
**WEATHER CONDITIONS:** Sunny

**REQUIRED DESIGN STRENGTH (psi):** 4,000
**MIX DESIGNATION:**
**SUPPLIER:** Mixed on site by PGC
**TIME BATCHED:** 16:05
**TIME FINISHED:** Mixed on site
**SIZE OF LOAD (cy):** NA
**WATER ADDED ON SITE (gallons):** NA
**ADDITIVE QUANTITY:** none
**QUANTITY PLACED (cy):** NA
**TESTING INSTRUCTIONS:** 1@7 1@14 1@28

**LOCATION OF GROUT PLACED:** At top of HBSN C3

## PROPERTIES OF FRESH GROUT

**AIR TEMPERATURE (°F):** NA
**GROUT TEMPERATURE (ASTM C 1064) (°F):** NA
**FLOW RATE (ASTM C 939) (seconds):** NA

## MIX DATA / SPECIFICATIONS

**MIX DESIGN STRENGTH (psi):**
**GROUT TEMPERATURE (ASTM C 1064) (°F):**
**FLOW RATE (ASTM C 939) (seconds):**

## COMPRESSION TEST RESULTS

| SET NUMBER | TEST DATE | AGE (DAYS) | SIDE 1 (IN.) | SIDE 2 (IN.) | AREA (SQ.IN.) | MAXIMUM LOAD (LBS) | COMPRESSIVE STRENGTH (PSI) | CURE TYPE |
|---|---|---|---|---|---|---|---|---|
| 1 - 1 | 11/04/2008 | 21 | 1.85 | 2.02 | 3.74 | 28,810 | 7700 | L |
| 1 - 2 | 11/04/2008 | 21 | 1.83 | 2.01 | 3.68 | 31,650 | 8600 | L |
| 1 - 3 | 11/11/2008 | 28 | 2.02 | 1.75 | 3.54 | 30,150 | 8520 | L |

**REMARKS:**

**Project Distribution**

**SCHNABEL ENGINEERING**

Javier Rodriguez
Project Manager
510 East Gay Street
West Chester, Pennsylvania 19380
Phone:(610) 696-6066 Fax:(610) 696-7771

Curing Methods: L = Lab Cure; F = Field Cure; N/A = Not Applicable.
Cubes tested in accordance with ASTM C 109 or ASTM C 579. Cubes molded in accordance with ASTM C 942 or ASTM C 579 Method B when sampled by Schnabel personnel.

Schnabel Engineering

# Grout Cube Test Report

**DATE OF REPORT: 2/2/2009**



**PROJECT:** HBSN Research
**CLIENT:** ADSC
**BLDG. PERMIT NO.:**

**PROJECT NUMBER:** 07150064
**SET NO.:** 2

## SAMPLING DATA

**DATE SAMPLED:** 10/14/2008 **TIME SAMPLED:** 16:49
**SAMPLED BY:** CJR
**NUMBER OF CUBES MOLDED:** 3
**DATE CUBES RECEIVED:** 10/20/2008
**TRANSPORTED BY:** CJR
**TRUCK NUMBER:** Mixed on site
**TICKET NUMBER:** Mixed on site
**TYPE OF OBSERVATION:** Full
**SAMPLES PLACED IN CURING BOX?:** Yes
**WEATHER CONDITIONS:** Sunny

**REQUIRED DESIGN STRENGTH (psi):** 4,000
**MIX DESIGNATION:**
**SUPPLIER:** Mixed on site by PGC
**TIME BATCHED:** 16:05
**TIME FINISHED:** Mixed on site
**SIZE OF LOAD (cy):** NA
**WATER ADDED ON SITE (gallons):** NA
**ADDITIVE QUANTITY:** None
**QUANTITY PLACED (cy):** NA
**TESTING INSTRUCTIONS:** 1@7 1@14 1@28

**LOCATION OF GROUT PLACED:** At top of HBSN C3

## PROPERTIES OF FRESH GROUT

**AIR TEMPERATURE (°F):** NA
**GROUT TEMPERATURE (ASTM C 1064) (°F):** NA
**FLOW RATE (ASTM C 939) (seconds):** NA

## MIX DATA / SPECIFICATIONS

**MIX DESIGN STRENGTH (psi):**
**GROUT TEMPERATURE (ASTM C 1064) (°F):**
**FLOW RATE (ASTM C 939) (seconds):**

## COMPRESSION TEST RESULTS

| SET NUMBER | TEST DATE | AGE (DAYS) | SIDE 1 (IN.) | SIDE 2 (IN.) | AREA (SQ.IN.) | MAXIMUM LOAD (LBS) | COMPRESSIVE STRENGTH (PSI) | CURE TYPE |
|---|---|---|---|---|---|---|---|---|
| 2 - 1 | 11/04/2008 | 21 | 1.84 | 2.01 | 3.70 | 33,540 | 9060 | L |
| 2 - 2 | 11/04/2008 | 21 | 1.85 | 2.01 | 3.72 | 32,080 | 8620 | L |
| 2 - 3 | 11/11/2008 | 28 | 1.82 | 2.01 | 3.66 | 32,100 | 8770 | L |

**REMARKS:**

**Project Distribution**

**SCHNABEL ENGINEERING**

Javier Rodriguez
Project Manager
510 East Gay Street
West Chester, Pennsylvania 19380
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Cubes tested in accordance with ASTM C 109 or ASTM C 579. Cubes molded in accordance with ASTM C 942 or ASTM C 579 Method B when sampled by Schnabel personnel.

Schnabel Engineering

# Grout Cube Test Report

**DATE OF REPORT: 2/2/2009**



**PROJECT:** HBSN Research
**CLIENT:** ADSC
**BLDG. PERMIT NO.:**

**PROJECT NUMBER:** 07150064
**SET NO.:** 3

## SAMPLING DATA

**DATE SAMPLED:** 10/14/2008 **TIME SAMPLED:** 16:49
**SAMPLED BY:** CJR
**NUMBER OF CUBES MOLDED:** 3
**DATE CUBES RECEIVED:** 10/20/2008
**TRANSPORTED BY:** CJR
**TRUCK NUMBER:** Mixed on site
**TICKET NUMBER:** Mixed on site
**TYPE OF OBSERVATION:** Full
**SAMPLES PLACED IN CURING BOX?:** Yes
**WEATHER CONDITIONS:** Sunny

**REQUIRED DESIGN STRENGTH (psi):** 4,000
**MIX DESIGNATION:**
**SUPPLIER:** Mixed on site by PGC
**TIME BATCHED:** 16:05
**TIME FINISHED:** MIxed on site
**SIZE OF LOAD (cy):** NA
**WATER ADDED ON SITE (gallons):** NA
**ADDITIVE QUANTITY:** None
**QUANTITY PLACED (cy):** NA
**TESTING INSTRUCTIONS:** 1@7 1@14 1@28

**LOCATION OF GROUT PLACED:** At top of HBSN C3

## PROPERTIES OF FRESH GROUT

**AIR TEMPERATURE (°F):** NA
**GROUT TEMPERATURE (ASTM C 1064) (°F):** NA
**FLOW RATE (ASTM C 939) (seconds):** NA

## MIX DATA / SPECIFICATIONS

**MIX DESIGN STRENGTH (psi):**
**GROUT TEMPERATURE (ASTM C 1064) (°F):**
**FLOW RATE (ASTM C 939) (seconds):**

## COMPRESSION TEST RESULTS

| SET NUMBER | TEST DATE | AGE (DAYS) | SIDE 1 (IN.) | SIDE 2 (IN.) | AREA (SQ.IN.) | MAXIMUM LOAD (LBS) | COMPRESSIVE STRENGTH (PSI) | CURE TYPE |
|---|---|---|---|---|---|---|---|---|
| 3 - 1 | 11/03/2008 | 20 | 1.51 | 2.03 | 3.07 | 24,330 | 7930 | L |
| 3 - 2 | 11/03/2008 | 20 | 1.44 | 2.03 | 2.92 | 22,460 | 7690 | L |
| 3 - 3 | 11/11/2008 | 28 | 1.73 | 2.03 | 3.51 | 23,720 | 6760 | L |

**REMARKS:** Soil Nail Install

**Project Distribution**

**SCHNABEL ENGINEERING**

Javier Rodriguez
Project Manager
510 East Gay Street
West Chester, Pennsylvania 19380
Phone:(610) 696-6066 Fax:(610) 696-7771

Curing Methods: L = Lab Cure; F = Field Cure; N/A = Not Applicable.
Cubes tested in accordance with ASTM C 109 or ASTM C 579. Cubes molded in accordance with ASTM C 942 or ASTM C 579 Method B when sampled by Schnabel personnel.

# APPENDIX E

# Jack Calibrations

W. B. EQUIPMENT SERVICE CO. INC
127 OAK STREET
WOOD RIDGE, NJ 07075
TEL: 201-438-7800 FAX: 201-438-7830

Date: 10/22/08

W.B. EQUIPMENT SERVICE CO. INC NO: _____

CUSTOMER: PETERSON GEOTECH ORDER NO: _____

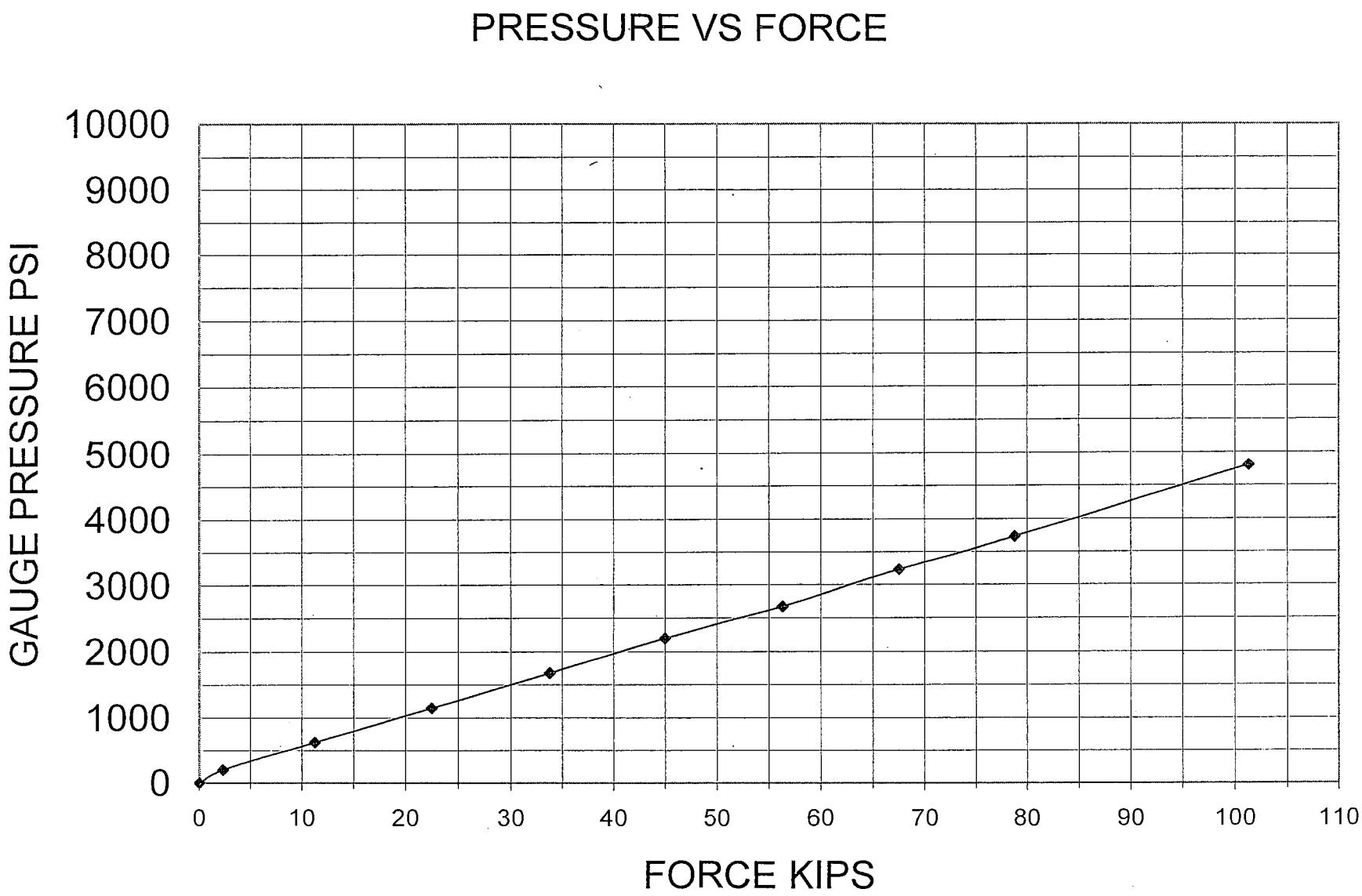
CYLINDER: 100 TONS STROKE: 12" SERIAL NO: WB610

GAUGE: 4 INCH DIAMETER: 10000 PSI SERIAL NO: WB570

| CYLINDER FORCE | GAUGE READINGS-PSI | | AVERAGE PRESSURE |
|---|---|---|---|
| KIPS | AT RAM EXTENSIONS | | PSI |
| | 2 INCHES | 4 INCHES | |
| 0 | 0 | 0 | 0 |
| 2.3 | 175 | 200 | 200 |
| 11.3 | 625 | 625 | 625 |
| 22.5 | 1150 | 1150 | 1150 |
| 33.8 | 1650 | 1675 | 1675 |
| 45 | 2175 | 2200 | 2200 |
| 56.3 | 2675 | 2675 | 2675 |
| 67.5 | 3200 | 3225 | 3225 |
| 78.8 | 3725 | 3725 | 3725 |
| 90 | 4250 | 4250 | 4250 |
| 101.3 | 4775 | 4800 | 4800 |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

TEST PERFORMED BY:DARREN CIRECO

OUTPUT MEASURED BY LOADCELLSERIAL NUMBER D WITH STRAIN INDICATOR
P3500 SERIAL NUMBER 0142585


PRESSURE VS FORCE
GAUGE PRESSURE PSI
10000
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
0
10
20
30
40
50
60
70
80
90
100
110
FORCE KIPS

W. B. EQUIPMENT SERVICE CO. INC.
127 OAK STREET
WOOD-RIDGE, NJ 07075
TEL: 201-438-7800 FAX: 201-438-7830

---

GAUGE CERTIFICATION

---

W. B. EQUIPMENT SERVICE CO NO: DATE: 10/22/08

CUSTOMER: PETERSON GEOTECH

ORDER NO:

GAUGE SERIAL NO: CAPACITY

10000 PSI

WB 570 4 INCH DIAL

WE CERTIFY THAT THE HYDRAULIC GAUGES LISTED ABOVE HAVE BEEN TESTED PRIOR TO SHIPMENT AND FOUND TO BE WITHIN STANDARD COMMERCIAL ACCURACY OF 2% PLUS-OR-MINUS OF FULL SCALE.

VERY TRULY YOURS,
W. B. EQUIPMENT SERVICE CO. INC.

DARREN CIRECO

# APPENDIX F

# Boring Log and Laboratory Test Results

| Schnabel Engineering | TEST BORING LOG | Project: Secant Pile Wall Drilling<br>Bohemia, New York | Boring Number: **B-1**<br>Contract Number: 08150002<br>Sheet: 1 of 1 |
|---|---|---|---|

**Contractor:** Universal Testing
West Babylon, New York

**Contractor Foreman:** S. Martinez

**Schnabel Representative:** J. Rodriguez

**Equipment:** Acker AD2

**Method:** 3-1/4" I.D. Hollow Stem Auger

**Hammer Type:** Safety Hammer (140 lb)

**Dates Started:** 10/8/08 **Finished:** 10/8/08

**Location:** Test Boring B-1

**Ground Surface Elevation:** 0± (ft) **Total Depth:** 22.0 ft

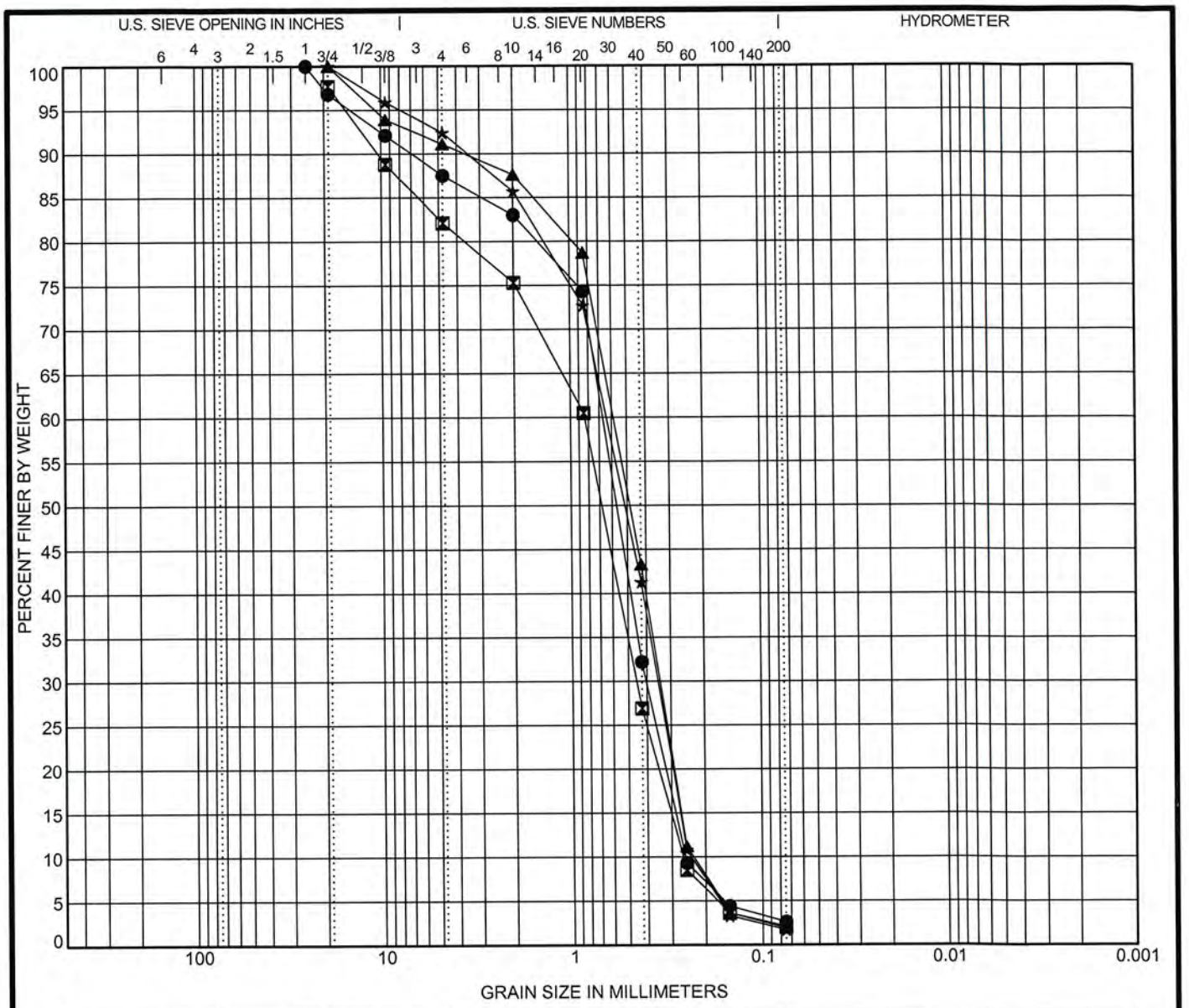
**Groundwater Observations**

| | Date | Time | Depth | Casing | Caved |
|---|---|---|---|---|---|
| Completion | 10/8 | --- | Dry | --- | --- |

| DEPTH (ft) | MATERIAL DESCRIPTION | SYMBOL | ELEV (ft) | STRATUM | SAMPLING DEPTH | SAMPLING DATA | TESTS | REMARKS |
|---|---|---|---|---|---|---|---|---|
| 5.0 | POORLY GRADED SAND, fine to coarse grained sand, moist, light yellowish brown, estimated 5 - 10% fine to coarse gravel | SP | -5.0 | | 5 | SS 10+11+15+15 | MC = 1.9%<br>% Passing #200 = 2.6 | |
| | Changes to estimated 15 - 25% fine gravel | | | | 10 | SS 5+5+8+9 | MC = 1.7%<br>% Passing #200 = 2.1 | |
| | Changes to estimated <5% fine gravel | | | | 15 | SS 5+5+7+7 | MC = 4.0%<br>% Passing #200 = 1.9 | |
| | | | | | 20 | SS 5+5+9+15 | MC = 3.4%<br>% Passing #200 = 1.7 | |
| 22.0 | | | -22.0 | | | | | |

Bottom of Boring at 22.0 ft.

TEST BORING LOG 08150002.GPJ SCHNABEL DATA TEMPLATE 2008_04_01.GDT 1/29/09




| COBBLES | GRAVEL | | SAND | | | SILT OR CLAY |
|---|---|---|---|---|---|---|
| | coarse | fine | coarse | medium | fine | |

| | Specimen | | Sample Description | LL | PL | PI | Cc | Cu |
|---|---|---|---|---|---|---|---|---|
| ● | B-1 | 5.0 ft | POORLY GRADED SAND (SP) | -- | -- | -- | 0.96 | 2.64 |
| ⊠ | B-1 | 10.0 ft | POORLY GRADED SAND (SP) | -- | -- | -- | 0.93 | 3.22 |
| ▲ | B-1 | 15.0 ft | POORLY GRADED SAND (SP) | -- | -- | -- | 0.86 | 2.56 |
| ★ | B-1 | 20.0 ft | POORLY GRADED SAND (SP) | -- | -- | -- | 0.80 | 2.71 |

| | Specimen | | Test Method | D100 | D60 | D30 | D10 | %Gravel | %Sand | %Silt | %Clay |
|---|---|---|---|---|---|---|---|---|---|---|---|
| ● | B-1 | 5.0 ft | ASTM D422 | 25 | 0.672 | 0.404 | 0.254 | 12.5 | 84.9 | 2.6 | |
| ⊠ | B-1 | 10.0 ft | ASTM D422 | 19 | 0.841 | 0.453 | 0.261 | 17.9 | 80.0 | 2.1 | |
| ▲ | B-1 | 15.0 ft | ASTM D422 | 19 | 0.589 | 0.341 | 0.231 | 8.9 | 89.2 | 1.9 | |
| ★ | B-1 | 20.0 ft | ASTM D422 | 19 | 0.642 | 0.349 | 0.237 | 7.6 | 90.7 | 1.7 | |

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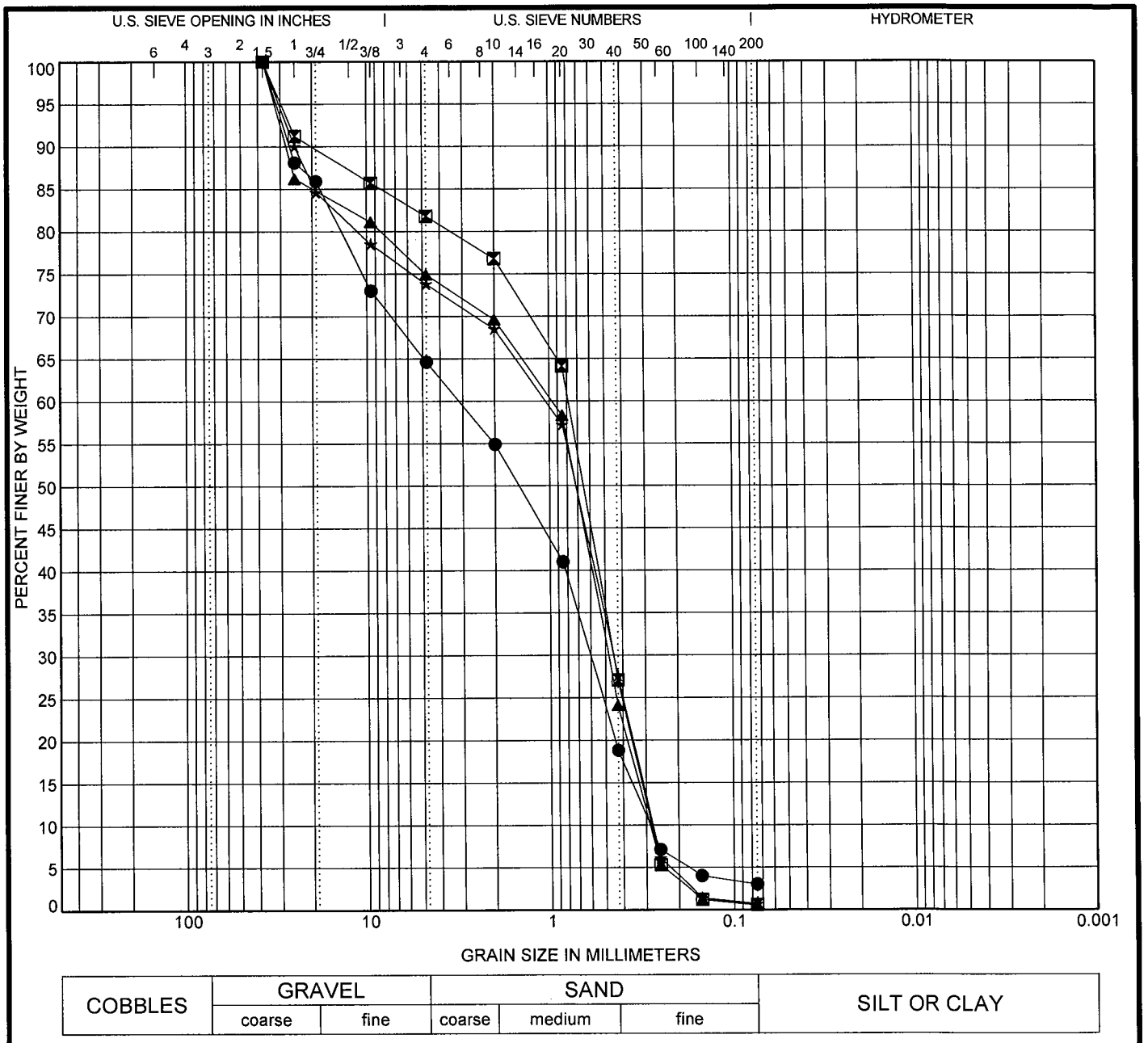
## GRADATION CURVES

**Project:** Secant Pile Wall Drilling

Bohemia, NY

**Contract:** 08150002

SIEVE 5 SHEET 08150002.GPJ SCHNABEL DATA TEMPLATE 2008_04_01.GDT 10/29/08




| COBBLES | GRAVEL | | SAND | | | SILT OR CLAY |
|---|---|---|---|---|---|---|
| | coarse | fine | coarse | medium | fine | |

| | Specimen | | Sample Description | LL | PL | PI | Cc | Cu |
|---|---|---|---|---|---|---|---|---|
| ● | TP-1 | 3.0 ft | POORLY GRADED SAND with GRAVEL (SP) | -- | -- | -- | 0.40 | 11.05 |
| ⊠ | TP-1 | 6.0 ft | POORLY GRADED SAND with GRAVEL (SP) | -- | -- | -- | 0.91 | 2.81 |
| ▲ | TP-1 | 9.0 ft | POORLY GRADED SAND with GRAVEL (SP) | -- | -- | -- | 0.83 | 3.39 |
| ★ | TP-1 | 12.0 ft | POORLY GRADED SAND with GRAVEL (SP) | -- | -- | -- | 0.70 | 3.82 |

| | Specimen | | Test Method | D100 | D60 | D30 | D10 | %Gravel | %Sand | %Silt | %Clay |
|---|---|---|---|---|---|---|---|---|---|---|---|
| ● | TP-1 | 3.0 ft | ASTM D422 | 37.5 | 3.152 | 0.603 | 0.285 | 35.4 | 61.6 | 3.0 | |
| ⊠ | TP-1 | 6.0 ft | ASTM D422 | 37.5 | 0.787 | 0.449 | 0.28 | 18.2 | 81.2 | 0.6 | |
| ▲ | TP-1 | 9.0 ft | ASTM D422 | 37.5 | 0.967 | 0.479 | 0.285 | 25.1 | 74.4 | 0.5 | |
| ★ | TP-1 | 12.0 ft | ASTM D422 | 37.5 | 1.051 | 0.45 | 0.275 | 26.2 | 73.1 | 0.7 | |

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Schnabel Engineering

## GRADATION CURVES

**Project:** Secant Pile Wall Drilling

Bohemia, NY

**Contract:** 08150002

SIEVE 5 SHEET 08150002.GPJ SCHNABEL DATA TEMPLATE 2008 04 01.GDT 1/26/09

# SUMMARY OF LABORATORY DATA

| TEST PIT | SAMPLE NUMBER | DEPTH (ft) | SOIL GROUP SYMBOL | GRAIN SIZE DISTRIBUTION | | | PLASTICITY | | | | MOISTURE CONTENT w % | VOLUMETRIC | | | | COMPACTION DATA | | | PERMEABILITY (E-6 CM/SEC) | FALLING/CONSTANT HEAD | CALIFORNIA BEARING RATIO (CBR) % | SHEAR STRENGTH | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | GRAVEL % | SAND % | SILT/CLAY % | LIQUID LIMIT $w_l$ | PLASTIC LIMIT $w_p$ | PLASTICITY INDEX $I_P$ | LIQUIDITY INDEX $I_L$ | | SPECIFIC GRAVITY (G) | DRY UNIT WEIGHT (pcf) | VOID RATIO (e) | DEGREE OF SATURATION % | MAXIMUM DRY DENSITY (psf) | OPTIMUM MOISTURE CONTENT % | STANDARD/MODIFIED | | | | UNCONFINED COMPRESSIVE STRENGTH (tsf) | COHESION (tsf) | AXIAL STRAIN (%) |
| TP-1 | S-1 | 3 | SP | 35.4 | 61.6 | 3.0 | | | | | 2.8 | | Original sample contained one $1\frac{1}{2}$" cobble not represented in test specimen | | | | | | | | | | | |
| TP-1 | S-2 | 6 | SP | 18.2 | 81.2 | 0.6 | | | | | 4.3 | | Original sample contained one 2" and three $1\frac{1}{2}$" cobbles not represented in test specimen | | | | | | | | | | | |
| TP-1 | S-3 | 9 | SP | 25.1 | 74.4 | 0.5 | | | | | 5.7 | | Original sample contained three 2" cobbles not represented in test specimen | | | | | | | | | | | |
| TP-1 | S-4 | 12 | SP | 26.2 | 73.1 | 0.7 | | | | | 12.2 | | Original sample contained three $1\frac{1}{2}$" cobbles not represented in test specimen | | | | | | | | | | | |
| B-1 | | 5-7 | SP | 12.5 | 84.9 | 2.6 | | | | | 1.9 | | | | | | | | | | | | | |
| B-1 | | 10-12 | SP | 17.9 | 80.0 | 2.1 | | | | | 1.7 | | | | | | | | | | | | | |
| B-1 | | 15-17 | SP | 8.9 | 89.2 | 1.9 | | | | | 4.0 | | | | | | | | | | | | | |
| B-1 | | 20-22 | SP | 7.6 | 90.7 | 1.7 | | | | | 3.4 | | | | | | | | | | | | | |

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Schnabel Engineering

DRAWN BY: LG DATE: 7/30/2008
CHECKED BY: MFN DATE: 7/30/2008

PROJECT: **Posillico Drilling Test Program**
LOCATION: **Bohemia, NY**

JOB No.: **08150002**

# APPENDIX G

# Observation of Exhumed Nails

Schnabel Engineering, LLC

510 East Gay Street
West Chester, PA 19380

Phone: (610) 696-6066
Fax: (610) 696-7771
www.schnabel-eng.com

# SITE VISIT REPORT

| | | | |
|---|---|---|---|
| | | PROJECT NO.: | 07150064 |
| VISITED BY: | Melinda Dirdal, E.I.T. | DATE OF SITE VISIT: | November 21, 2008 |
| PROJECT: | Hollow Core Bar Research | TIME: Arrive: | 7:00 a.m. |
| | | Leave: | 12:45 p.m. |
| LOCATION: | Bohemia, NY (Long Island) | WEATHER: | 32°F |

PURPOSE OF VISIT:

Observe excavation of Soil Nails B3 and C3.

PERSONS ON-SITE:

Angelo Occhiogrosso (Posillico Group)

DESCRIPTION OF OBSERVATIONS:

At approximately 7:00 a.m., Posillico started the excavation of Soil Nail C3.

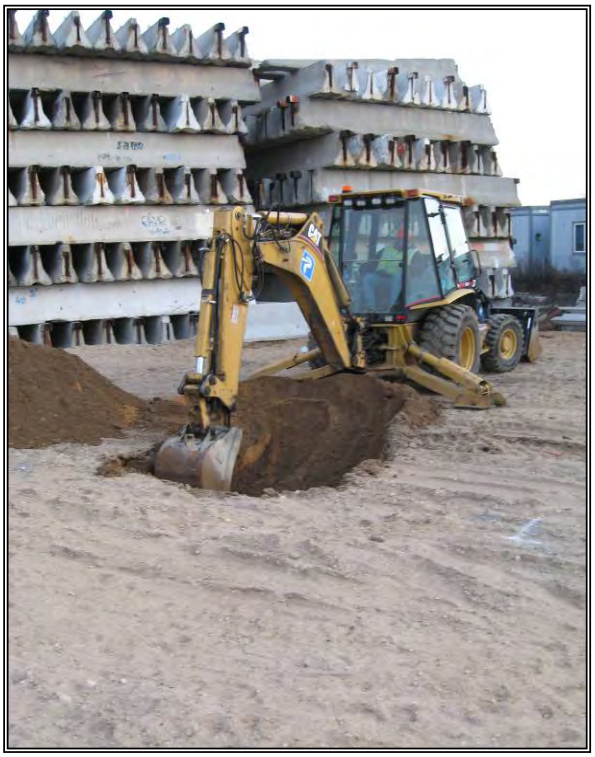


**Figure 1: Exhuming Soil Nail C3**

Posillico used a CAT Excavator to dig around the soil nails. The operator of the excavator dug with care to avoid damage to the soil nails. Personnel from Posillico directed the excavation process. Schnabel's field representative observed the excavation process.

Nail B3 was located at a higher elevation than Nail C3. During the excavation, Nail B3 was hit by the excavator. In general, we observed that Posillico dug gently around the soil nails.

Posillico tried to maintain the bucket of the excavator several inches away from the soil nails. After excavating close to the soil nails, personnel from Posillico dug or cleaned with shovels the material around the soil nails. Once the exposed material was cleaned, the nails were washed with water.

**Figure 2: Digging around Soil Nail C3**

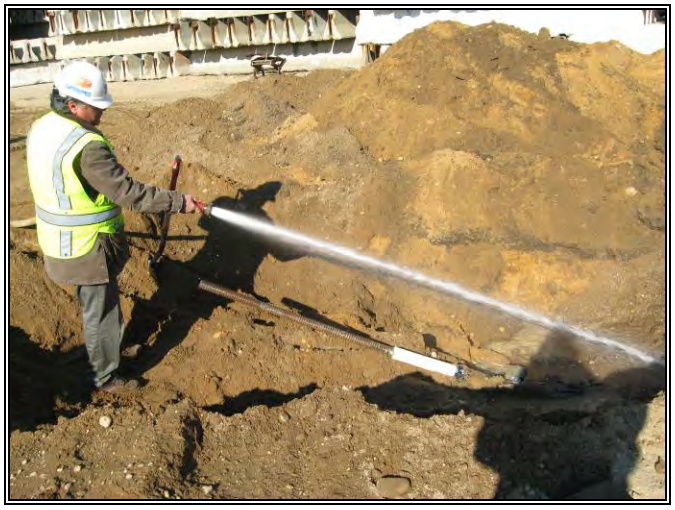


**Figure 3: Washing Soil Nail C3**

Once the excavation was completed around the soil nails, personnel from Posillico and Schnabel's field representative went inside the excavation to observe the condition of the soil nails.

Schnabel performed the following observations:

1. Pictures were taken along each foot of the soil nail. Observations along the entire length of the soil nail were recorded.

2. Soil Nail B3 was bended at approximately 6 ft from the top of the soil nail. The top of the nail was bent upwards at an approximate angle of 30 degrees from the horizontal. This bend could have been caused by the excavator.

**Figure 4: Bend on Soil Nail B3**

3. Logged the presence of bulges in Soil Nails B3 and C3.

**Figure 5: Bulge in Nail B3 from 9'-5" to 11'-10" from Bottom of Soil Nail**

**Figure 6: Bulge in Nail C3 at 6'-0" to 7'-3" from Bottom of Soil Nail**

4. Logged the presence of cracks and broken grout.

**Figure 7: Cracks in Soil Nail B3 at 12'-5" from Bottom of Nail**

**Figure 8: Broken Grout Along Soil Nail B3 Approximately 14'-6" from Bottom of Soil Nail**

**Figure 9: Broken Grout Along Soil Nail C3 at Approximately 15'-0" from Bottom of Soil Nail**

5. The grout body diameter of the soil nail was measured at five locations along the grouted portion of the soil nail. Stakes were driven into the ground on each side of the soil nail. A level was used to ensure that the distance between the stakes accurately represented the grout body diameter.

**Figure 10: Measuring Soil Nail Diameter at Soil Nail C3**

6. After observations of the intact soil nails were completed, grout was chipped away from the nail to expose the PVC underneath the grout. This was to determine the condition of the PVC and the location where the PVC terminates. The PVC was in generally good condition with no cracks observed.

**Figure 11: Exposed PVC Along Soil Nail B3 at the Point of Termination**

**Figure 12: Exposed PVC Along Soil Nail C3**

7. After Schnabel completed the observation of each soil nail, the excavations were filled with soil.

We have endeavored to prepare this report in accordance with generally accepted geotechnical engineering practice.

CJR:MD:AWC:jlm

# EXHUMING SOIL NAIL C3

Start of excavation around C3

Soil Nail C3

Carefully digging around C3

# EXHUMING SOIL NAIL C3

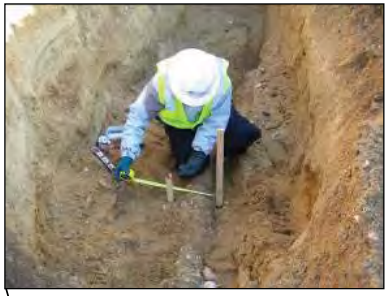
Diameter = 9½”

At bottom of nail

Diameter = 8¼”

At 4’ from bottom of nail

Stakes and a level were used to measure diameters.



Diameter = 9¼”

At 6.5’ from bottom of nail

0’-0” to 6’-0” Grout appears to be smooth. No visible signs of cracking.

6’-0” to 7’-3” Bulge in grout body. Rocks from soil adhered to the grout.

Sheet 2 of 9

| | | |
|---|---|---|
| Schnabel Engineering | Hollow Core Bar Research<br>Excavation of Soil Nails | Project Number<br>07150064 |

# EXHUMING SOIL NAIL C3

Diameter = 6½”

At 8’ from bottom of nail

Diameter increased at 8.75’ from the bottom of the nail.

Diameter = 6¾”

At 10’ from bottom of nail.

Diameter = 7½”

At 13’ from bottom of nail

7’-3” to 8’-0” Grout appears to be smooth. No visible signs of cracking.

8’-0” to 11’-0” Rocks from soil adhered to the grout. Grout body diameter increased at 8.75’.

11’-0” to 14’-0” Grout body diameter increased

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# EXHUMING SOIL NAIL C3

PVC is visible beneath cracked grout.

14'-0" to 16'-4" Grout cracked and broken.

16'-4" to 17'-0" PVC visible. No grout surrounding PVC.

17'-0" to 20'-0" Hollow core bar visible. Some surface corrosion observed.

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# EXHUMING SOIL NAIL C3

After observations were recorded, grout was chipped away from the nail. The end of the PVC was discovered at 13'-5" from top of nail (6'-7" from bottom of nail). PVC appears to be in good condition. Grout was not observed in the annular space between the hollow core bar and the PVC.

# EXHUMING SOIL NAIL B3

Washing around B3 as excavation proceeds

Carefully digging around B3

Bend at 6 ft from top of Soil Nail B3. The nail bends upward approximately 30 degrees from the horizontal





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# EXHUMING SOIL NAIL B3

Diameter = 7¾”

At 1.5’ from bottom of nail

Diameter = 6¼”

At 4’ from bottom of nail.

2” jump in grout height at 6’-9” from bottom of nail.

Diameter = 9”

At 7’ from bottom of nail.

0’-0” to 4’-6” Grout appears to be smooth. No visible signs of cracking. Some rocks from soil adhered to the grout.

4’-6” to 6’-9” Grout has a rough texture.





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# EXHUMING SOIL NAIL B3

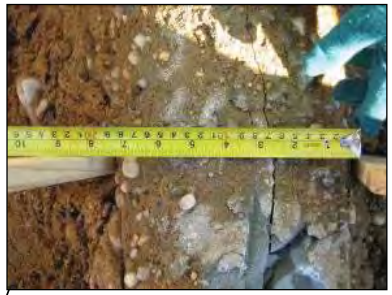
Diameter = 10¼”

At 10’ from bottom of nail

3” horizontal bulge at 10’ from bottom of nail.

2” drop in grout height at 11’-8” from bottom of nail.

Hairline crack from 12’-2” to 13’-5”. Larger cracks and breaks from 13’-5” to 16’-4”.



Diameter = 8”

At 13.5’ from bottom of nail

6’-9” to 9’-5” Grout body diameter increased.

9’-5” to 11’-10” Bulge in grout. Rocks from soil adhered to the grout.

12’-2” to 16’-4” Grout cracked and broken.





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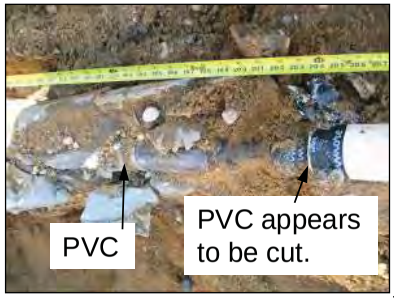
# EXHUMING SOIL NAIL B3




12” gap in PVC from 16’ to 17’ from bottom of nail.

Nail bent approximately 30 degrees from horizontal at 6 ft from top of nail

Grout exists in the annular space between the hollow core bar and the PVC in the upper PVC casing (approximately 1’-0” in length).

After observations were recorded, grout was chipped away from the nail. The end of the PVC was discovered at 15’-3.5” from top of nail (6’-10.5” from bottom of nail).

12’-2” to 16’-4” Grout cracked and broken.

16’-4” to 18’-0” PVC visible.

18’-0” to 22’-2” Hollow core bar visible. Some surface corrosion observed.

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