APPENDIX 1

LOAD TEST RESULTS AT SALT LAKE CITY SITE (SITE 1)

Hollow Bar Soil Nail Testing Research
Salt Lake City Site, Utah
Schnabel Reference 07150064

FOR

ADSC

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

July 23, 2008

PREPARED BY

Schnabel Engineering

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July 23, 2008

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 Salt Lake City Site (Site 1)**

Dear Mr. Litke:

Schnabel Engineering, LLC (Schnabel), is pleased to present the data from pullout load tests performed at the site in Salt Lake City, Utah.

Nicholson Construction Company 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. Senior personnel from Schnabel observed the installation of all the soil nails and the load testing of nails installed following Methods B and C.

The axial movement of the test nail during loading and unloading was measured using two dial gauges. Loads from a hydraulic jacking system were applied to the sacrificial test nail through a steel plate. The loads were monitored using a calibrated jack pressure dial gauge and a calibrated load cell readout box.

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

Sincerely,

SCHNABEL ENGINEERING, LLC

Javier Rodriguez, P.E.
Senior Engineer

Allen W. Cadden, P.E.
Principal

CJR:AWC:jlm

Appendix A: Summary of Load Test Results
Appendix B: Soil Nail Installation Logs/Load-Movement and Movement-Time Diagrams
Appendix C: Jack and Load Cell Calibrations

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

APPENDIX A

Summary of Load Test Results

TABLE 1: LOAD TEST RESULTS 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)	Bonded Length (ft)	Drill Bit Diameter (in)	Average Drilling Rate (3) (ft/min)	Estimated Average Bond Strenght (psi)	Soil Type Along Bond Zone
A1	A	45	102.5	1.346	NA	Yes	0.027	68.0	14.40	6.0	6.0	3.2	75.5	Sand (SP) / Sand with
A2	A	70	68.5	1.174	NA	Yes	N/A	N/A	13.50	6.0	6.0	1.5	50.5	Sand with Gravel (SP)
A3	A	45	111.6	1.496	NA	Yes	0.011	68.0	14.25	6.0	6.0	1.1	82.2	Sand with Gravel (SP)
B1	B	45	136.6	0.720	0.164	No	0.004	68.9	14.10	6.0	4.0	3.4	-	Gravel with Sand (GP)
B3	B	70	141.4	0.744	0.172	No	0.011	105.4	13.75	6.0	4.0	3.1	-	Gravel with Sand (GP)
B4	B	70	56.5	1.162	NA	Yes	N/A	N/A	14.00	6.0	4.0	5.6	62.4	Sand (SP)
C1	C	45	135.6	0.613	0.215	No	0.004	68.5	14.20	6.0	4.0	2.2	-	Gravel with Sand (GP)
C2	C	70	140.4	0.581	0.162	No	0.005	105.4	14.20	6.0	4.0	1.4	-	Gravel with Sand (GP)
C3	C	70	140.9	0.577	0.129	No	0.006	105.4	14.20	6.0	4.0	1.5	-	Gravel with Sand (GP)

Notes: (1) Creep rate measured at the 1 to 10 minute interval.
(2) Tail length as measured at the time of load test. The tail length reported in the installation logs refers to the tail length at completion of drilling.
(3) Drilling rate along bond zone.

APPENDIX B

Soil Nail Installation Logs
Load-Movement and Movement-Time Diagrams

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 (psi)	Gs	Observations of Grouting
	0						Include a description of drilling equipment		12:30	12:31	110	1.88	Grouted with 7.5 gal measured grout in hole (6'-4")
	1				0:00	0:09			12:45	12:46	110		
	2				0:09	0:20	F-C Poorly Graded Sand with Gravel (SP), trace silt, moist, brown						Added 7.5 gal, grout observed at top of casing.
	3				0:20	0:41							
	4				0:41	0:56							Washed out with side cut tremie tube to 2 ft above bond zone after casing removal.
	5				0:56	1:15							
	6				1:15	1:36							
	7				1:36	1:52							
	8				1:52	2:09							
	9				5:53	6:00	F-C Poorly Graded Sand (SP), trace silt, moist, brown						Washout was grout, then clear water.
	10				6:00	6:08							
	11				6:08	6:12							
	12				6:12	6:19							
	13				6:19	6:31	F-C Poorly Graded Sand with Gravel (SP), trace silt, moist, brown						Notes: After drilling full depth, the casing was withdrawn about 1 ft to check if bar would remain in hole. Bar pulled out 1 ft. Bar pushed back down hole with ease except for last 4 inches. Bar pushed last 4 inches with rig.
	14				6:31	6:48							
	15				6:48	7:10							
	16				7:10	7:40							
	17				7:40	8:04							
	18				8:04	8:35							
	19						B.O.H. 18 ft						
	20												
							Installed temporary casing to tip of soil nail. Inserted solid bar with centralizers, PVC pipe and washout pipe. Poured grout with tremie pipe. Completely extracted temporary casing. Washed out along unbonded length.						Bar grouted and casing withdrawn after grouting.

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.

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Schnabel Engineering

SOIL NAIL: A1

Soil Boring:	-		
Soil Nail Geometry:	Perpendicular to face		
Soil Nail elev.	~45		ft
Total casing length	22.33		ft
Total hole depth	18		ft
Total grout length	8		ft
	Design	As-built	
Total bar length	20 ft	20 ft	
Bonded length	6 ft	6 ft	
Unbonded length	11 ft	10.9	
Tail length	3 ft	3.1	
Bit type	Sacrificial Wing		
Bit diameter	6		in
Hole inclination	15		degrees
Centralizers	2 @ 19.5 ft and 15.4 ft		
Reinforcing steel:			
Date of installation	5/6/2008		
Supplier	Williamsform		
Casing description			
Diameter	4.5 in OD	Type	1/4 in. T
Nail description	Solid bar		
	Design	As-built	
No. Bars	1	1	
Diameter	1.75 in	1.75	in
Primary grouting			
Date of grouting	5/6/2008		
Cement typ. & supp	Type 1		
Dosage / Admixture	None		
Grouting method	gravity		
Batch ID	GS	Cubes	
1	1.88	1 set	
2	-	-	
3	-	-	
Final	-	-	
Volume	Theor.	As-built	
Drilling Grout	-	-	gal
Final Grout	14.4	15	gal

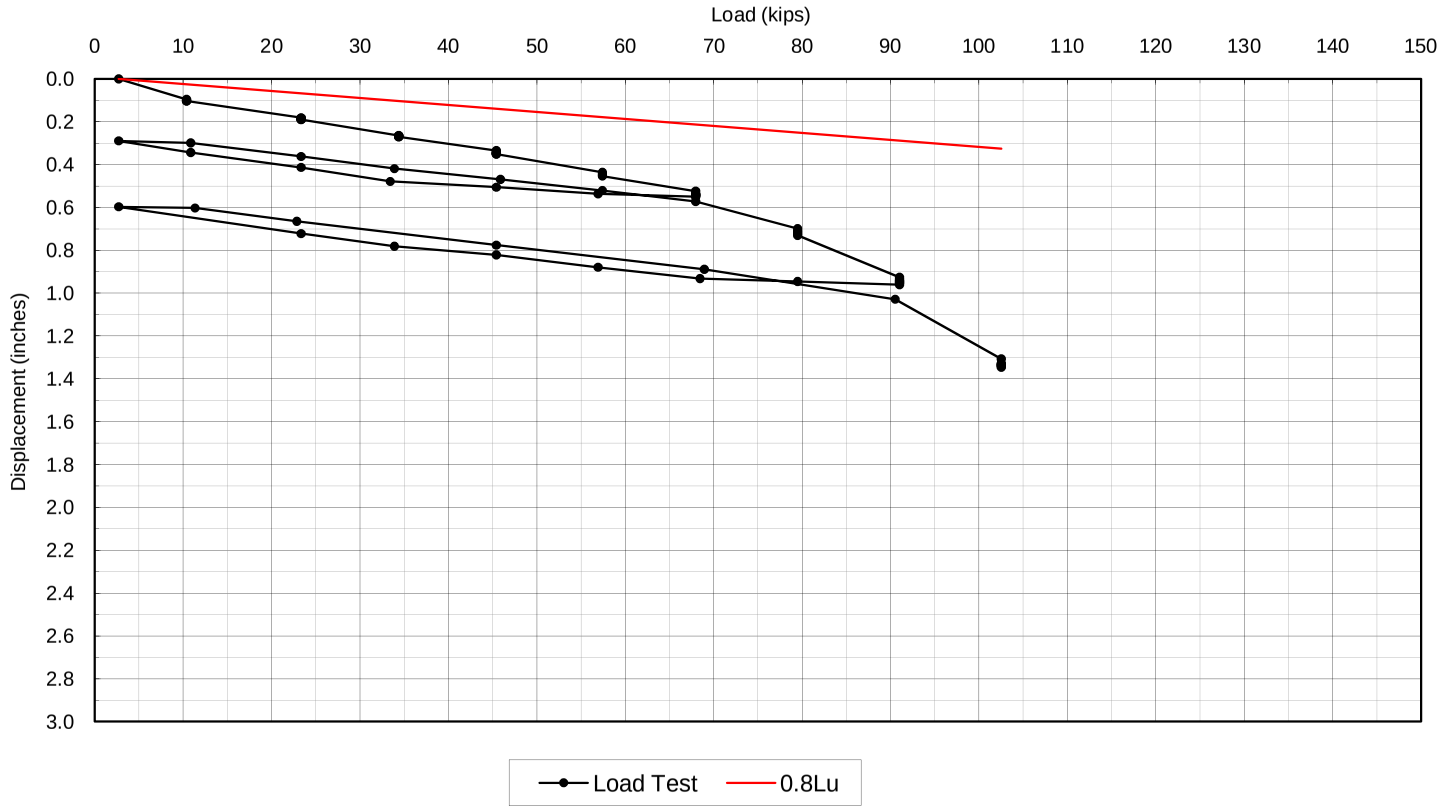
Project:	HBSN Testing Research Program	Manager:	Javier Rodriguez	Date Drilled:	5/6/2008
Location:	Salt Lake City, UT	Engineer:	Javier Rodriguez	Date Grouted:	5/6/2008
Client:	FHWA/ ADSC	Superint.:	Cary Lange		
Job No.:	07150064	Weather:	Sunny, 70 deg.	Capacity:	

Page: 1 of 1

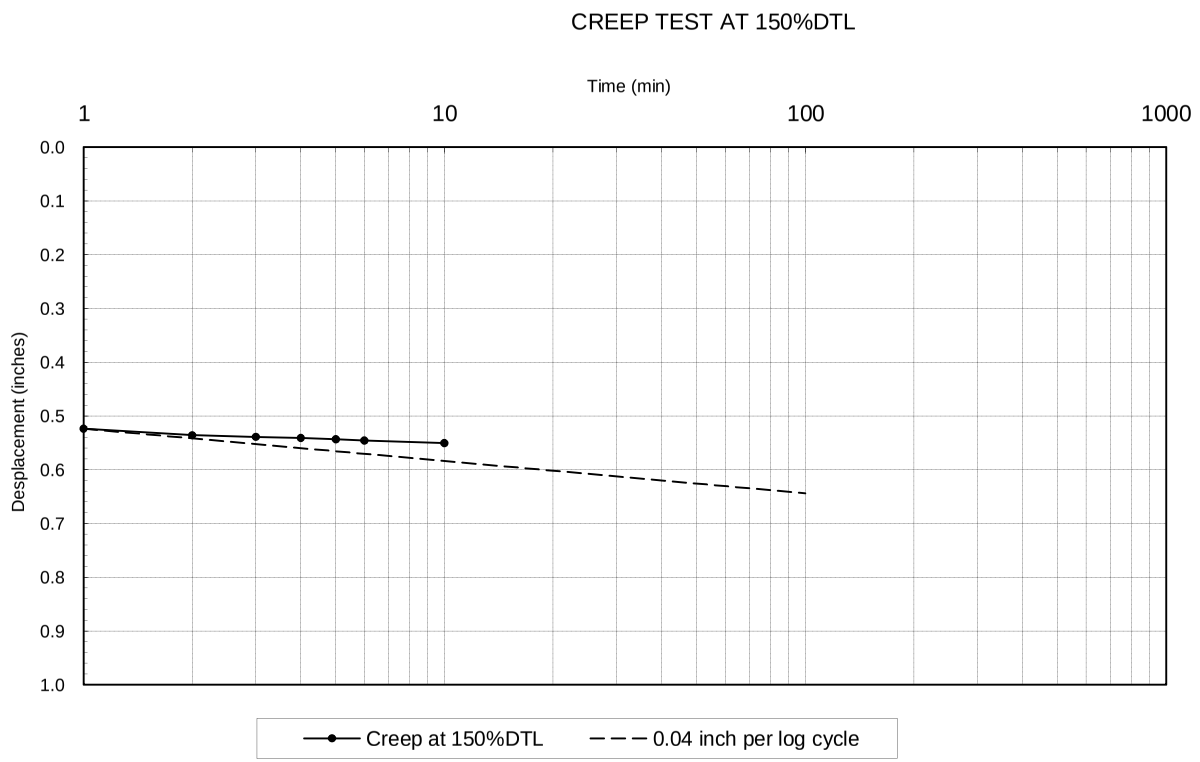
Cary Lange
Installer Representative
(Name and Date)

Andrew Baxter
Schnabel's Representative
(Name and Date)

VERIFICATION SOIL NAIL LOAD TEST
Hollow Core Bar Research - Salt Lake City, Utah



Type of Test: Verification	Bond: 6 ft Unbonded: 14.4 ft	Diameter: 6 in (nominal)	Hollow Core Bar Research Salt Lake City, Utah Test Nail: A1	**SCHNABEL ENGINEERING, LLC**	
				Verification Soil Nail Load Test	
Design Test Load (P) : 45 kip	Comments:			Hollow Core Bar Soil Nail Research	
				Salt Lake City, Utah	
Maximum Test Load: 200% P = 90 kip				5/30/2008	07150064



Type of Test: Verification	Bond: 6 ft Unbonded: 14.4 ft	Diameter: 6 in (nominal)	Hollow Core Bar Research Salt Lake City, Utah Test Nail: A1	**SCHNABEL ENGINEERING, LLC** Verification Soil Nail Load Test Hollow Core Bar Soil Nail Research Salt Lake City, Utah
Design Test Load (P) : 45 kip	Comments:			
Maximum Test Load: 200% P = 90 kip				5/30/2008 — 07150064

Soil Nail Verification Load Test Data

Schnabel Engineering

Project: Hollow Core Bar Soil Nail Research
Location: Salt Lake City Site, Utah
Client: ADSC

Performed: Nicholson Construction Company (Cary Lange)
Observed: Schnabel Engineering (Javier Rodriguez)
Data by: Schnabel Engineering (Javier Rodriguez)

Soil Nail: A1
Date: 5/30/2008

Design Test Load (P): 45 kips **# Dials:** 2 **Jack Calibration:** Pressure = 20.837 X reading (kip) + 23.646 (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	70.5	80.0	2.7	1		0.000	0.000			0.000	
25%	11.3	258.1	240.0	10.4	1		0.169	0.022			0.096	
	11.3	258.1	255.0	10.4	2		0.173	0.030			0.102	
	11.3	258.1	255.0	10.4	3		0.173	0.031			0.102	
	11.3	258.1	255.0	10.4	4		0.174	0.031			0.103	
	11.3	258.1	255.0	10.4	5		0.174	0.031			0.103	
	11.3	258.1	255.0	10.4	6		0.175	0.032			0.104	
	11.3	258.1	255.0	10.4	10		0.175	0.032			0.104	
50%	22.5	492.5	510.0	23.3	1		0.258	0.105			0.182	
	22.5	492.5	510.0	23.3	2		0.259	0.107			0.183	
	22.5	492.5	510.0	23.3	3		0.262	0.109			0.186	
	22.5	492.5	510.0	23.3	4		0.263	0.110			0.187	
	22.5	492.5	510.0	23.3	5		0.265	0.111			0.188	
	22.5	492.5	510.0	23.3	6		0.266	0.112			0.189	
	22.5	492.5	510.0	23.3	10		0.268	0.113			0.191	
75%	33.8	726.9	740.0	34.4	1		0.344	0.185			0.265	
	33.8	726.9	740.0	34.4	2		0.344	0.186			0.265	
	33.8	726.9	740.0	34.4	3		0.345	0.188			0.267	
	33.8	726.9	740.0	34.4	4		0.346	0.189			0.268	
	33.8	726.9	740.0	34.4	5		0.346	0.189			0.268	
	33.8	726.9	740.0	34.4	6		0.348	0.190			0.269	
	33.8	726.9	740.0	34.4	10		0.350	0.192			0.271	
100%	45.0	961.3	970.0	45.4	1		0.412	0.258			0.335	
	45.0	961.3	970.0	45.4	2		0.420	0.265			0.343	
	45.0	961.3	970.0	45.4	3		0.422	0.268			0.345	
	45.0	961.3	970.0	45.4	4		0.424	0.270			0.347	
	45.0	961.3	970.0	45.4	5		0.426	0.272			0.349	
	45.0	961.3	970.0	45.4	6		0.427	0.273			0.350	
	45.0	961.3	970.0	45.4	10		0.429	0.274			0.352	
125%	56.3	1195.7	1220.0	57.4	1		0.508	0.364			0.436	
	56.3	1195.7	1220.0	57.4	2		0.513	0.369			0.441	
	56.3	1195.7	1220.0	57.4	3		0.517	0.374			0.446	
	56.3	1195.7	1220.0	57.4	4		0.521	0.378			0.450	
	56.3	1195.7	1220.0	57.4	5		0.524	0.380			0.452	
	56.3	1195.7	1220.0	57.4	6		0.525	0.382			0.454	
	56.3	1195.7	1220.0	57.4	10		0.525	0.382			0.454	
150%	67.5	1430.1	1440.0	68.0	1		0.589	0.459			0.524	
	67.5	1430.1	1440.0	68.0	2		0.601	0.471			0.536	
	67.5	1430.1	1440.0	68.0	3		0.604	0.474			0.539	
	67.5	1430.1	1440.0	68.0	4		0.606	0.476			0.541	
	67.5	1430.1	1440.0	68.0	5		0.609	0.478			0.544	
	67.5	1430.1	1440.0	68.0	6		0.611	0.481			0.546	
	67.5	1430.1	1440.0	68.0	10		0.616	0.485			0.551	

Soil Nail Verification Load Test Data

Schnabel Engineering

Project: Hollow Core Bar Soil Nail Research
Location: Salt Lake City Site, Utah
Client: ADSC

Performed: Nicholson Construction Company (Cary Lange)
Observed: Schnabel Engineering (Javier Rodriguez)
Data by: Schnabel Engineering (Javier Rodriguez)

Soil Nail: A1
Date: 5/30/2008

Design Test Load (P): 45 kips **# Dials:** 2 **Jack Calibration:** Pressure = 20.837 X reading (kip) + 23.646 (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	1195.7	1210.0	56.9	1		0.603	0.470			0.537	
100%	45.0	961.3	970.0	45.4	1		0.573	0.438			0.506	
75%	33.8	726.9	720.0	33.4	1		0.572	0.385			0.479	
50%	22.5	492.5	510.0	23.3	1		0.482	0.345			0.414	
25%	11.3	258.1	250.0	10.9	1		0.409	0.278			0.344	
AL	2.3	70.5	80.0	2.7	1		0.348	0.231			0.290	
25%	11.3	258.1	250.0	10.9	1		0.360	0.238			0.299	
50%	22.5	492.5	510.0	23.3	1		0.428	0.296			0.362	
75%	33.8	726.9	730.0	33.9	1		0.486	0.352			0.419	
100%	45.0	961.3	980.0	45.9	1		0.536	0.403			0.470	
125%	56.3	1195.7	1220.0	57.4	1		0.587	0.455			0.521	
150%	67.5	1430.1	1440.0	68.0	1		0.636	0.508			0.572	
175%	78.8	1664.6	1680.0	79.5	1		0.759	0.638			0.699	
	78.8	1664.6	1680.0	79.5	2		0.771	0.650			0.711	
	78.8	1664.6	1680.0	79.5	3		0.772	0.655			0.714	
	78.8	1664.6	1680.0	79.5	4		0.772	0.655			0.714	
	78.8	1664.6	1680.0	79.5	5		0.782	0.661			0.722	
	78.8	1664.6	1680.0	79.5	6		0.785	0.664			0.725	
	78.8	1664.6	1680.0	79.5	10		0.791	0.671			0.731	
200%	90.0	1899.0	1920.0	91.0	1		0.987	0.866			0.927	
	90.0	1899.0	1920.0	91.0	2		0.997	0.877			0.937	
	90.0	1899.0	1920.0	91.0	3		1.002	0.882			0.942	
	90.0	1899.0	1920.0	91.0	4		1.007	0.886			0.947	
	90.0	1899.0	1920.0	91.0	5		1.010	0.890			0.950	
	90.0	1899.0	1920.0	91.0	6		1.014	0.894			0.954	
	90.0	1899.0	1920.0	91.0	10		1.021	0.900			0.961	
175%	78.8	1664.6	1680.0	79.5	1		1.006	0.885			0.946	
150%	67.5	1430.1	1450.0	68.5	1		0.993	0.871			0.932	
125%	56.3	1195.7	1210.0	56.9	1		0.941	0.818			0.880	
100%	45.0	961.3	970.0	45.4	1		0.883	0.760			0.822	
75%	33.8	726.9	730.0	33.9	1		0.841	0.721			0.781	
50%	22.5	492.5	510.0	23.3	1		0.783	0.661			0.722	
AL	2.3	70.5	80.0	2.7	1		0.651	0.543			0.597	
25%	11.3	258.1	260.0	11.3	1		0.658	0.547			0.603	
50%	22.5	492.5	500.0	22.9	1		0.724	0.606			0.665	
100%	45.0	961.3	970.0	45.4	1		0.836	0.716			0.776	
150%	67.5	1430.1	1460.0	68.9	1		0.949	0.829			0.889	
200%	90.0	1899.0	1910.0	90.5	1		1.088	0.969			1.029	

Soil Nail Verification Load Test Data

Schnabel Engineering

Project:	Hollow Core Bar Soil Nail Research	**Performed:**	Nicholson Construction Company (Cary Lange)	**Soil Nail:**	**A1**
Location:	Salt Lake City Site, Utah	**Observed:**	Schnabel Engineering (Javier Rodriguez)		
Client:	ADSC	**Data by:**	Schnabel Engineering (Javier Rodriguez)	**Date:**	5/30/2008

Design Test Load (P): 45 kips **# Dials:** 2 **Jack Calibration:** Pressure = 20.837 X reading (kip) + 23.646 (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:
225%	101.3	2133.4	2160.0	102.5	1		1.364	1.250			1.307	
	101.3	2133.4	2160.0	102.5	2		1.385	1.272			1.329	
	101.3	2133.4	2160.0	102.5	3		1.389	1.275			1.332	
	101.3	2133.4	2160.0	102.5	4		1.392	1.278			1.335	
	101.3	2133.4	2160.0	102.5	5		1.395	1.280			1.338	
	101.3	2133.4	2160.0	102.5	6		1.398	1.284			1.341	
	101.3	2133.4	2160.0	102.5	10		1.403	1.289			1.346	

ANCHOR STRESSING FORM

A1

Job Name: City Creek Center Block 76
Anchor Designation: FHWA HBSN-A1
Design Load (k): 45

B.10

Added Tail Length (ft): 3.0
Unstressed Tail (ft): 0.6
Free Length (ft): 14.8
Bond Length (ft): 6

NICHOLSON

Date:
Test By: BJH

Anchor Load %	Elapsed Time (min)	Actual Time	Anchor Load (kips)	JACK JD-203 Pressure Gauge Calc (psi)	JACK JD-203 Pressure Gauge ACTUAL A (psi)	Backup Gauge JD-203 ACTUAL B (psi)	GK1115 Readout: MG003 Calc ustrain (strain)	GK1115 Readout: MG003 ACTUAL 758 (strain)	Anchor Elongations Nail A Dial 1 (in)	Anchor Elongations Nail Extension B Dial 2 (in)	Anchor Elongations Nail Extension Average (in)	Anchor Elongations Actual Deflections (in)	Anchor Elongations Min .6* FL (in)	Anchor Elongations Max FL+.5*BL (in)	NOTES
5%	0		2	80	80	100	850	812	0.000	0.000			0.000	0.000	
25%	1		11	260	240	260	980	910	0.169	0.022			0.020	0.030	
	2				"	"		917	0.173	0.030					
	3				"	"		918	"	0.031					Bumped
	4				"	"		917	0.174	"					
	5				"	"		915	"	"					
	6				"	"		917	0.175	0.032					
	10				"			917	"	"					
50%	1		23	500	510	530	1140	1068	0.258	0.105			0.044	0.067	
	2				"	"		1071	0.259	0.107					
	3				"	"		1074	0.262	0.109					Bumped
	4				"	"		1076	0.263	0.110					
	5				"	"		1081	0.265	0.111					
	6				"	"		1081	0.266	0.112					
	10				"	"		1082	0.268	0.113					
75%	1		34	730	740	760	1300	1229	0.344	0.185			0.069	0.104	
	2				"	"		1231	0.344	0.186					
	3				"	"		1232	0.345	0.188					Bumped
	4				"	"		1231	0.346	0.189					
	5				"	"		1230	"	"					
	6				"	"		1233	0.348	0.190					
	10				"	"		1237	0.350	0.192					
100%	1		45	970	970	1000	1460	1366	0.412	0.258			0.094	0.141	
	2				"	"		1376	0.420	0.265					
	3				"	"		1379	0.422	0.268					Bumped
	4				"	"		1380	0.424	0.270					
	5				"	"		1332	0.425	0.272					
	6				"	"		1383	0.427	0.273					
	10				"	"		1383	0.429	0.274					
125%	1		57	1210	1220	1250	1620	1530	0.508	0.364			0.118	0.178	
	2				"	"		1537	0.513	0.369					
	3				"	"		1542	0.517	0.374					Bumped
	4				"	"		1547	0.521	0.378					
	5				"	"		1545	0.524	0.380					
	6				"	"		1546	0.525	0.382					
	10				"	"		1534	"	"					
150%	1		68	1440	1440	1470	1780	1652	0.584	0.459			0.143	0.215	
	2				"	"		1659	0.601	0.471					
	3				"	"		1662	0.604	0.474					Bumped
	4				"	"		1659	0.606	0.476					
	5				"	"		1661	0.609	0.478					
	6				"	"		1664	0.611	0.481					
	10				"	"		1661	0.616	0.485					
	20														
	30														
	50														
	60														

ANCHOR STRESSING FORM

Job Name: City Creek Center Block 76
Anchor Designation: FHWA HBSN-A1
Design Load (k): 45

Added Tail Length (ft): 3.0
Unstressed Tail (ft): 0.6
Free Length (ft): 14.8
Bond Length (ft): 6

NICHOLSON

Date:
Test By: BJH

Anchor Load %	Elapsed Time (min)	Actual Time	Anchor Load (kips)	JACK JD-203 Pressure Gauge Calc (psi)	JACK JD-203 Pressure Gauge ACTUAL A (psi)	Backup Gauge JD-203 ACTUAL B (psi)	GK1115 Readout: Calc ustrain (strain)	GK1115 Readout: MG003 ACTUAL (strain)	Anchor Elongations: Nail A Dial 1 (in)	Anchor Elongations: Nail Extension B Dial 2 (in)	Anchor Elongations: Nail Extension Average (in)	Anchor Elongations: Actual Deflections (in)	Anchor Elongations: Min .8* FL (in)	Anchor Elongations: Max FL+ .5*BL (in)	NOTES
125%	1		57	1210	1210	1230	1620	1581	0.603	0.470			0.118	0.178	
100%	1		45	970	970	1000	1460	1476	0.573	0.438			0.094	0.141	
75%	1		34	730	720	740	1300	1317	0.522	0.385			0.069	0.104	
50%	1		23	500	510	540	1140	1197	0.482	0.345			0.044	0.067	
25%	1		11	260	250	270	980	1002	0.409	0.278			0.020	0.030	
5%	1		2	80	80	100	850	873	0.348	0.231			0.000	0.000	
25%	1		11	260	250	270	980	917	0.360	0.238			0.020	0.030	
50%	1		23	500	510	540	1140	1105	0.423	0.296			0.044	0.067	
75%	1		34	730	730	760	1300	1268	0.486	0.352			0.069	0.104	
100%	1		45	970	980	1010	1460	1404	0.536	0.403			0.094	0.141	
125%	1		57	1210	1220	1250	1620	1545	0.587	0.455			0.118	0.178	
150%	1		68	1440	1440	1460	1780	1662	0.636	0.508			0.143	0.215	
175%	1		79	1680	1680	1710	1940	1815	0.759	0.638			0.167	0.252	
	2				"	"		1818	0.771	0.650					
	3				"	"		1822	0.772	0.655					
	5				"	"		1822	0.782	0.661					
	6				"	"		1822	0.785	0.664					
	10				"	"		1813	0.791	0.671					
200%	1		90	1910	1920	1950	2100	1954	0.987	0.866			0.192	0.289	
	2				"	"		1951	0.997	0.877					
	3				"	"		1949	1.002	0.882					
	4				"	"		1946	1.007	0.886					
	5				"	"		1948	1.010	0.890					
	6				"	"		1944	1.014	0.894					
	10				"	"		1941	1.021	0.900					
	20														
	30														
	50														
	60														
175%	1		79	1680	1680	1710	1940	1872	1.006	0.885			0.167	0.252	
150%	1		68	1440	1450	1470	1780	1816	0.993	0.871			0.143	0.215	
125%	1		57	1210	1210	1230	1620	1676	0.941	0.813			0.118	0.178	
100%	1		45	970	970	990	1460	1477	0.883	0.760			0.094	0.141	
75%	1		34	730	730	760	1300	1357	0.841	0.721			0.069	0.104	
50%	1		23	500	510	540	1140	1197	0.783	0.661			0.044	0.067	
5%	1		2	80	80	100	850	898	0.651	0.543			0.000	0.000	
25%	1		11	260	260	280	980	926	0.658	0.547			0.020	0.030	
50%	1		23	500	500	530	1140	1114	0.724	0.606			0.044	0.067	
100%	1		45	970	970	1000	1460	1415	0.836	0.716			0.094	0.141	
150%	1		68	1440	1450	1490	1780	1710	0.949	0.829			0.143	0.215	
200%	1		90	1910	1910	1940	2100	1949	1.083	0.969			0.192	0.289	
225%	1		102	2150	2160	2200	2260	2072	1.364	1.250			0.217	0.326	
	2				"	"		2056	1.3[illegible]	1.272					

ANCHOR STRESSING FORM

Job Name: City Creek Center Block 76
Anchor Designation: FHWA HBSN-A1
Design Load (k): 45

Added Tail Length (ft): 3.0
Unstressed Tail (ft): 0.6
Free Length (ft): 14.8
Bond Length (ft): 6

NICHOLSON

Date:
Test By: BJH

Anchor Load %	Elapsed Time (min)	Actual Time	Anchor Load (kips)	JACK JD-203 Pressure Gauge Calc (psi)	JACK JD-203 Pressure Gauge ACTUAL A (psi)	Backup Gauge JD-203 ACTUAL B (psi)	GK1115 Readout: MG003 Calc ustrain (strain)	GK1115 Readout: MG003 ACTUAL (strain)	Anchor Elongations Nail A Dial 1 (in)	Anchor Elongations Nail Extension B Dial 2 (in)	Anchor Elongations Nail Extension Average (in)	Anchor Elongations Actual Deflections (in)	Anchor Elongations Min 8" FL (in)	Anchor Elongations Max FL+ 5"BL (in)	NOTES
	3				2160	2200		2044	1.389	1.275					Bumped
	4				"	"		2041	1.392	1.278					Bar broke,
	5				"	"		2041	1.395	1.280					gauges are
	6				"	"		2043	1.398	1.284					uncalable.
	10				"	"		2056	1.403	1.289					
250%	1		113	2380			2420						0.241	0.363	
	2														
	3														
	4														
	5														Could not get
	6														above 2350, and
	10														that pressure for
275%	1		124	2620			2580						0.266	0.400	30 secs. then bar
	2														blew.
	3														
	4														
	5														
	6														
	10														
300%	1		136	2850			2740						0.290	0.437	
	2														
	3														
	4														
	5														
	6														
	10														
336%	1		152	3190			2970						0.325	0.489	
	2														
	3														
	4														
	5														
	6														
	10														
300%	1		136	2850			2740						0.290	0.437	
250%	1		113	2380			2420						0.241	0.363	
200%	1		90	1910			2100						0.192	0.289	
150%	1		68	1440			1780						0.143	0.215	
100%	1		45	970			1460						0.094	0.141	
50%	1		23	500			1140						0.044	0.067	
25%	1		11	260			980						0.020	0.030	
5%	1		2	80			850						0.000	0.000	
25%	1		11	260			980						0.020	0.030	
5%	0		2	80			850						0.000	0.000	

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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 (psi)	Gs	Observations of Grouting
	0						Include a description of drilling equipment		15:59	14:00	110	1.84	10 gal of grout added and filled to top of pipe.
	1				0:00	0:13							
	2				0:13	0:26	F-C Poorly Graded Sand with						Difficulty removing casing spinning both directions.
	3				0:26	0:51	Gravel (SP), trace silt, moist,						
	4				0:51	1:20	brown						After casing removal bar pulled out 1 ft.
	5				1:20	3:01	Loss of circulation						
	6				3:01	-							
	7				-	7:08							
	8				7:08	7:23							
	9				7:23	11:40	Repeated loss of circulation						Washed out to 2 ft from top of bond zone after casing removal.
	10				11:40	12:15	reamed hole 5 ft to regain						
	11				12:15	12:38	circulation						
	12				12:38	13:05							
	13				13:05	13:54							
	14				13:54	14:15							
	15				14:15	15:20							
	16				15:20	16:16							
	17				16:16	17:18							
	18						B.O.H. 18 ft						
	19												
	20												
							Installed temporary casing to tip of soil nail. Inserted solid bar with centralizers, PVC pipe and washout pipe. Poured grout with tremie pipe. Completely extracted temporary casing. Washed out along unbonded length.						

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 locatio of centralizers.

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Schnabel Engineering

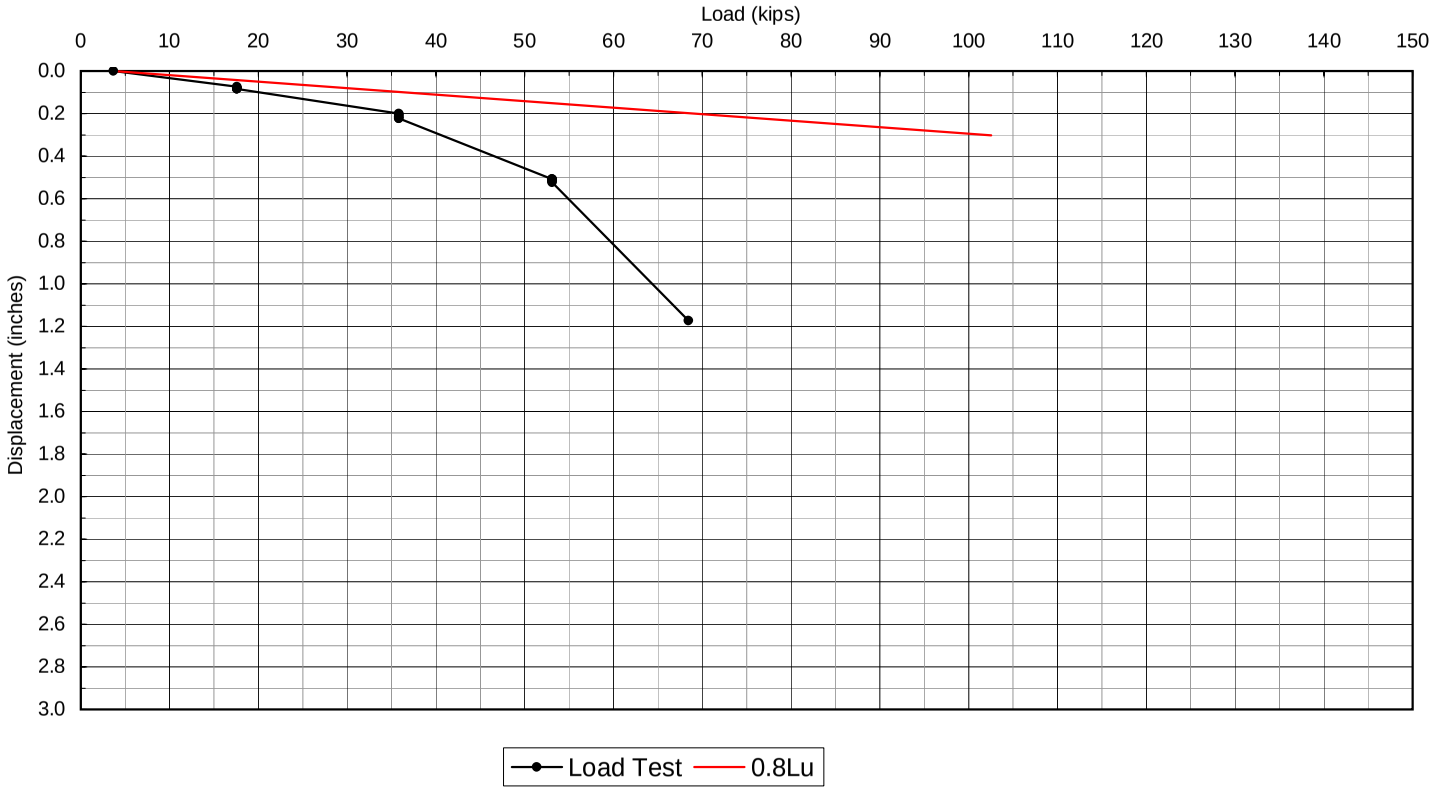
SOIL NAIL:	A2		
Soil Boring:	-		
Soil Nail Geometry:	Perpendicular to face		
Soil Nail elev.	~45		ft
Total casing length	22.33		ft
Total hole depth	18		ft
Total grout length	8*		ft
	Design	As-built	
Total bar length	20	20	ft
Bonded length	6	6	ft
Unbonded length	11	10	ft
Tail length	3 ft	4.0 ft	ft
Bit type	Sacrificial Wing		
Bit diameter	6		in
Hole inclination	15		degrees
Centralizers	2 @ 19.5 and 15.4 ft		
Reinforcing steel:			
Date of installation	5/6/2008		
Supplier	Williamsform		
Casing description			
Diameter/Thickness	4.5	0.25	in
Nail description	Solid bar		
	Design	As-built	
No. Bars	1	1	
Diameter	1.75	1.75	in
Primary grouting			
Date of grouting	5/6/2008		
Cement typ. & supp	Type 1		
Dosage / Admixture	Super-plasticizer		
Grouting method	Gravity		
Batch ID	GS	Cubes	
1	1.84	None	
2	-	-	
3	-	-	
Final	-	-	
Volume	Theor.	As-built	
Drilling Grout	-	-	gal
Final Grout	8.10	10	gal

Project:	HBSN Testing Research Program	Manager:	Javier Rodriguez	Date Drilled:	5/6/2008
Location:	Salt Lake City, UT	Engineer:	Javier Rodriguez	Date Grouted:	5/6/2008
Client:	FHWA/ ADSC	Superint.:	Cary Lange		
Job No.:	07150064	Weather:	Sunny, 70 deg. Capacity:	Page:	1 of 1

Cary Lange
Installer Representative
(Name and Date)

Andrew Baxter
Schnabel's Representative
(Name and Date)

VERIFICATION SOIL NAIL LOAD TEST
Hollow Core Bar Research - Salt Lake City, Utah



Type of Test: Verification	Bond: 6 ft Unbonded: 13.5 ft	Diameter: 6 in (nominal)	Hollow Core Bar Research Salt Lake City, Utah Test Nail: A2	**SCHNABEL ENGINEERING, LLC** Verification Soil Nail Load Test
Design Test Load (P) : 70 kip	Comments:			Hollow Core Bar Soil Nail Research Salt Lake City, Utah
Maximum Test Load: 200% P = 140 kip				Date: 5/30/08 — 07150064

Soil Nail Verification Load Test Data

Schnabel Engineering

Project: Hollow Core Bar Soil Nail Research
Location: Salt Lake City Site, Utah
Client: ADSC

Performed: Nicholson Construction Company (Cary Lange)
Observed: Schnabel Engineering (Javier Rodriguez)
Data by: Schnabel Engineering (Javier Rodriguez)

Soil Nail: A2
Date: 5/30/2008

Design Test Load (P): 70 kips **# Dials:** 2 **Jack Calibration:** Pressure = 20.837 X reading (kip) + 23.646 (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	3.5	96.6	100.0	3.7	1	4:00 PM	0.000	0.000			0.000	
25%	17.5	388.3	390.0	17.6	1		0.082	0.066			0.074	
	17.5	388.3	390.0	17.6	2		0.088	0.071			0.080	
	17.5	388.3	390.0	17.6	3		0.088	0.071			0.080	
	17.5	388.3	390.0	17.6	4		0.091	0.073			0.082	
	17.5	388.3	390.0	17.6	5		0.091	0.073			0.082	
	17.5	388.3	390.0	17.6	6		0.091	0.073			0.082	
	17.5	388.3	390.0	17.6	10		0.094	0.075			0.085	
50%	35.0	752.9	770.0	35.8	1		0.221	0.180			0.201	
	35.0	752.9	770.0	35.8	2		0.225	0.185			0.205	
	35.0	752.9	770.0	35.8	3		0.225	0.185			0.205	
	35.0	752.9	770.0	35.8	4		0.235	0.194			0.215	
	35.0	752.9	770.0	35.8	5		0.235	0.194			0.215	
	35.0	752.9	770.0	35.8	6		0.243	0.202			0.223	
	35.0	752.9	770.0	35.8	10		0.243	0.202			0.223	
75%	52.5	1117.6	1130.0	53.1	1		0.533	0.484			0.509	
	52.5	1117.6	1130.0	53.1	2		0.533	0.484			0.509	
	52.5	1117.6	1130.0	53.1	3		0.533	0.484			0.509	
	52.5	1117.6	1130.0	53.1	4		0.542	0.488			0.515	
	52.5	1117.6	1130.0	53.1	5		0.542	0.488			0.515	
	52.5	1117.6	1130.0	53.1	6		0.543	0.495			0.519	
	52.5	1117.6	1130.0	53.1	10		0.548	0.500			0.524	
100%	70.0	1482.2	1450.0	68.5	1		1.197	1.150			1.174	Anchor failed at 1450 psi
	70.0	1482.2	1450.0	68.5	2							
	70.0	1482.2	1450.0	68.5	3							
	70.0	1482.2	1450.0	68.5	4							
	70.0	1482.2	1450.0	68.5	5							
	70.0	1482.2	1450.0	68.5	6							
	70.0	1482.2	1450.0	68.5	10							

A2

ANCHOR STRESSING FORM

NICHOLSON

Job Name: City Creek Center Block 76
Anchor Designation: FHWA HBSN-A2
Design Load (k): 70

16:00

Added Tail Length (ft): 3.0
Unstressed Tail (ft): 0.6
Free Length (ft): 14.8
Bond Length (ft): 6

Date: 5-30-08
Test By: BJH

Anchor Load %	Elapsed Time (min)	Actual Time	Anchor Load (kips)	JACK JD-203 Pressure Gauge Calc (psi)	JACK JD-203 Pressure Gauge ACTUAL A (psi)	Backup Gauge JD-203 ACTUAL B (psi)	GK1115 Readout: MG003 Calc ustrain (strain)	GK1115 Readout: MG003 ACTUAL 761 (strain)	Anchor Elongations Nail A Dial 1 (in)	Anchor Elongations Nail Extension B Dial 2 (in)	Anchor Elongations Nail Extension Average (in)	Anchor Elongations Actual Deflections (in)	Anchor Elongations Min .8* FL (in)	Anchor Elongations Max FL+.5*BL (in)	NOTES
5%	0		4	100	100	120	870	850	0.000	0.000			0.000	0.000	
25%	1		18	390	390	420	1070	1011	0.082	0.060			0.030	0.046	
	2				"	"		1014	0.088	0.071					
	3				"	"		1010	"	"					
	4				"	"		1021	0.091	0.073					
	5				"	"		"	"	"					
	6				"	"		1015	"	"					
	10				"	"		1025	0.094	0.075					
50%	1		35	760	770	800	1310	1236	0.221	0.180			0.069	0.103	
	2				"	"		1235	0.222	0.185					Bumped
	3				"	"		"	"	"					
	4				"	"		1248	0.235	0.194					
	5				"	"		1234	"	"					
	6				"	"		1257	0.243	0.202					
	10				"	"		"	"	"					
75%	1		53	1120	1130	1160	1560	1500	0.533	0.484			0.107	0.160	
	2				"	"		1495	"	"					
	3				"	"		1494	"	"					
	4				"	"		1500	0.542	0.488					Bumped
	5				"	"		1490	"	"					
	6				"	"		1507	0.543	0.495					
	10				"	"		1500	0.548	0.500					
100%	1		70	~~1490~~	1450		1810	1556	1.197	1.150			0.145	0.218	Failed at 1450, Can't get any more P.S.I. just pulling out the anchor.
	2														
	3														
	4														
	5														
	6														
	10														
125%	1		88	1850			2060						0.183	0.275	
	2														
	3														
	4														
	5														
	6														
	10														
150%	1		105	2210			2300						0.221	0.332	
	2														
	3														
	4														
	5														
	6														
	10														
	20														
	30														
	50														
	60														

ANCHOR STRESSING FORM

NICHOLSON

Job Name: City Creek Center Block 76
Anchor Designation: FHWA HBSN-A2
Design Load (k): 70

Added Tail Length (ft): 3.0
Unstressed Tail (ft): 0.6
Free Length (ft): 14.8
Bond Length (ft): 6

Date:
Test By: BJH

Anchor Load	Elapsed Time	Actual Time	Anchor Load	JACK Pressure Gauge		JD-203 Backup Gauge JD-203	GK1115 Readout:	MG003	Anchor Elongations						NOTES
									Nail	Nail Extension	Nail Extension	Actual Deflections	Min 8" FL	Max FL+.5*BL	
				Calc	ACTUAL A	ACTUAL B	Calc ustrain	ACTUAL	A Dial 1	B Dial 2	Average				
%	(min)		(kips)	(psi)	(psi)	(psi)	(strain)	(strain)	(in)	(in)	(in)	(in)	(in)	(in)	
125%	1		88	1850			2060						0.183	0.275	
100%	1		70	1490			1810						0.145	0.218	
75%	1		53	1120			1560						0.107	0.160	
50%	1		35	760			1310						0.069	0.103	
25%	1		18	390			1070						0.030	0.046	
5%	1		4	100			870						0.000	0.000	
25%	1		18	390			1070						0.030	0.046	
50%	1		35	760			1310						0.069	0.103	
75%	1		53	1120			1560						0.107	0.160	
100%	1		70	1490			1810						0.145	0.218	
125%	1		88	1850			2060						0.183	0.275	
150%	1		105	2210			2300						0.221	0.332	
175%	1		123	2580			2550						0.259	0.389	
	2														
	3														
	5														
	6														
	10														
200%	1		140	2940			2800						0.297	0.447	
	2														
	3														
	4														
	5														
	6														
	10														
	20														
	30														
	50														
	60														
175%	1		123	2580			2550						0.259	0.389	
150%	1		105	2210			2300						0.221	0.332	
125%	1		88	1850			2060						0.183	0.275	
100%	1		70	1490			1810						0.145	0.218	
75%	1		53	1120			1560						0.107	0.160	
50%	1		35	760			1310						0.069	0.103	
5%	1		4	100			870						0.000	0.000	
25%	1		18	390			1070						0.030	0.046	
50%	1		35	760			1310						0.069	0.103	
100%	1		70	1490			1810						0.145	0.218	
150%	1		105	2210			2300						0.221	0.332	
200%	1		140	2940			2800						0.297	0.447	
217%	1		152	3190			2970						0.323	0.486	
	2														

ANCHOR STRESSING FORM

NICHOLSON

Job Name: City Creek Center Block 76
Anchor Designation: FHWA HBSN-A2
Design Load (k): 70

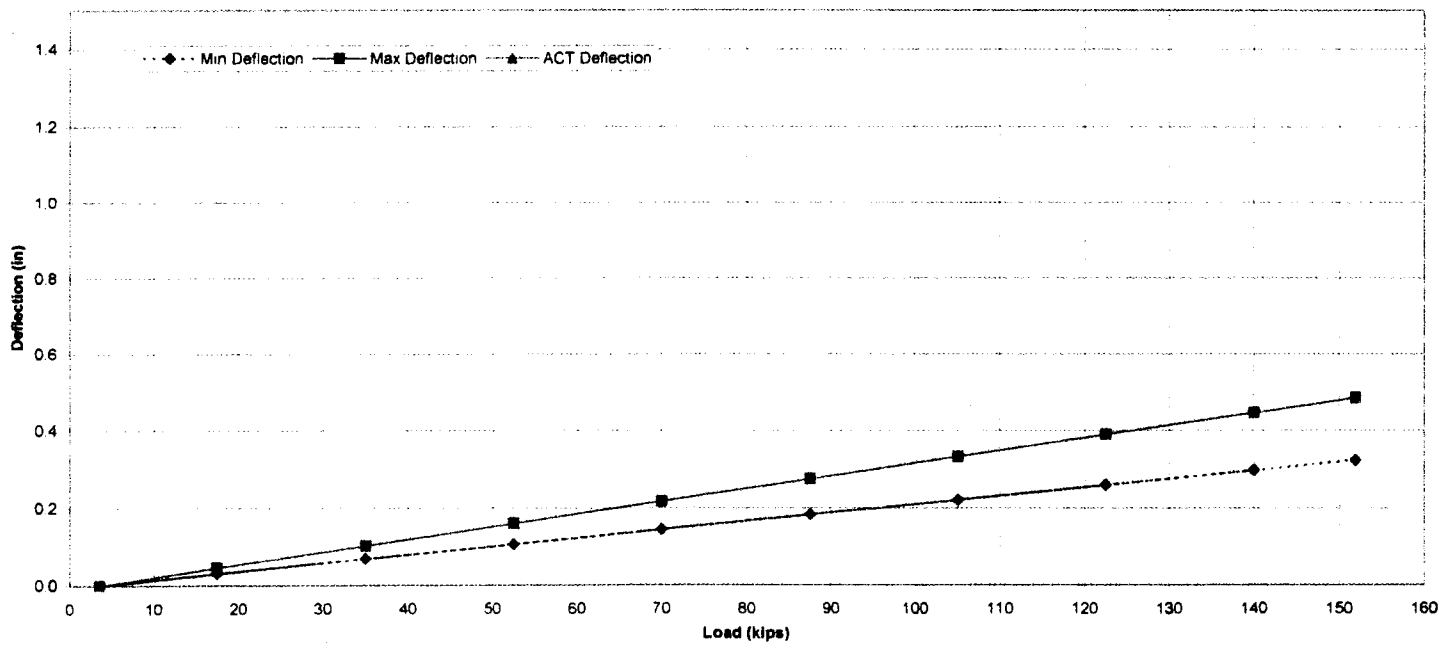
Added Tail Length (ft): 3.0
Unstressed Tail (ft): 0.6
Free Length (ft): 14.8
Bond Length (ft): 6

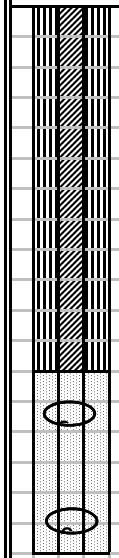
Date:
Test By: BJH

Anchor Load %	Elapsed Time (min)	Actual Time	Anchor Load (kips)	JACK JD-203 Pressure Gauge Calc (psi)	JACK JD-203 Pressure Gauge ACTUAL A (psi)	Backup Gauge JD-203 ACTUAL B (psi)	GK1115 Readout: MG003 Calc ustrain (strain)	GK1115 Readout: MG003 ACTUAL (strain)	Anchor Elongations: Nail A Dial 1 (in)	Nail Extension B Dial 2 (in)	Nail Extension Average (in)	Actual Deflections (in)	Min .8* FL (in)	Max FL+.5*BL (in)	NOTES
	3														
	4														
	5														
	6														
	10														
200%	1		140	2940			2800						0.297	0.447	
150%	1		105	2210			2300						0.221	0.332	
100%	1		70	1490			1810						0.145	0.218	
50%	1		35	760			1310						0.069	0.103	
5%	1		4	100	110	130	870	920	1.111	1.070			0.000	0.000	
25%	1		18	390	400	430	1070	1045	1.142	1.100			0.030	0.046	
5%	1		4	100			870						0.000	0.000	
5%	10		4	100			870						0.000	0.000	

A	-1.34523	kips	-57.7471
B	0.048039	kips/psi	0.070605
ZERO	28.04407	psi	819.4

Field Defelection Graph



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 (psi)	Gs	Observations of Grouting
	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 locatio of centralizers.				Include a description of drilling equipment		15:47	15:58	110	1.82	10.5 gal of grout, measured 1 ft from top of casing
	1				0:00	0:17							
	2				0:17	0:40	F-C Poorly Graded Sand with						
	3				0:40	1:03	Gravel (SP), trace silt, moist,						
	4				1:03	-	brown						Difficulty with casing removal
	5				-	1:50							
	6				1:50	2:07							
	7				2:07	3:58	Loss of circulation						
	8				3:58	4:13	Ream hole						
	9				4:13	6:54	Loss of circulation						After removal of top casing, bar pulled out 3 inches.
	10				6:54	7:25	Ream hole						
	11				12:40	13:18							
	12				13:18	14:07							
	13				14:07	14:20							Washout 2 ft from top of bond zone after casing removal.
	14				14:20	14:35							
	15				14:35	14:50	Ream hole						
	16				14:50	18:35							
	17				18:35	18:45							
	18				18:45	19:00							
	19						B.O.H. 18 ft						
	20												
70							Installed temporary casing to tip of soil nail. Inserted solid bar with centralizers, PVC pipe and washout pipe. Poured grout with tremie pipe. Completely extracted temporary casing. Washed out along unbonded length.						

Schnabel Engineering

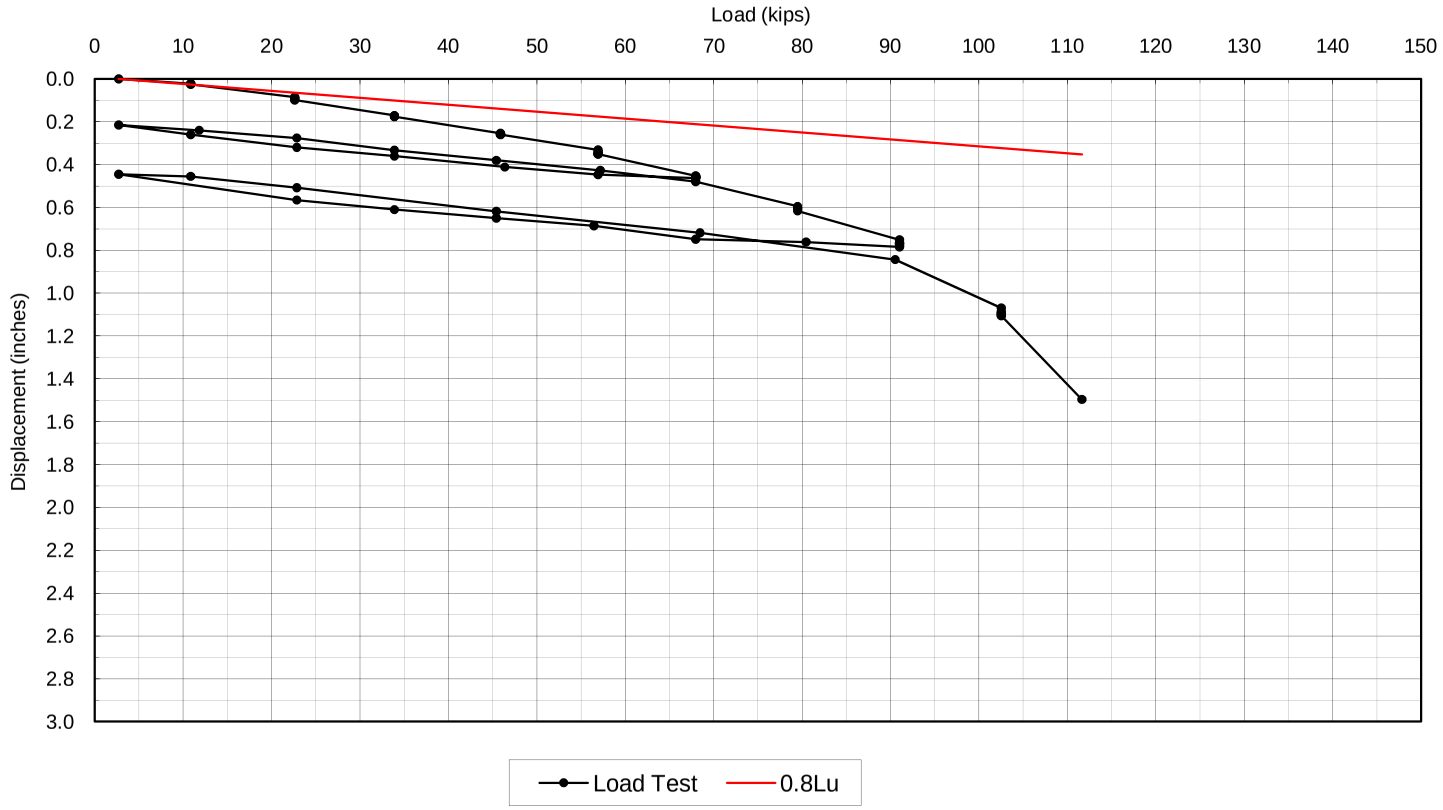
SOIL NAIL:	A3		
Soil Boring:	-		
Soil Nail Geometry:	Perp. to face		
Soil Nail elev.	~45		ft
Total casing length	22.33		ft
Total hole depth	18		ft
Total grout length	8ft		ft
	Design	As-built	
Total bar length	20	20	ft
Bonded length	6	6	ft
Unbonded length	11	10.75	ft
Tail length	3	3.25	ft
Bit type	Sacrificial Wing		
Bit diameter	6		in
Hole inclination	15		degrees
Centralizers	2 @ 19.5 and 15.4 ft		
Reinforcing steel:			
Date of installation	5/6/2008		
Supplier	Williamsform		
Casing description			
Diameter/Thickness	4.5	0.25	in
Nail description			
	Design	As-built	
No. Bars	1	1	
Diameter	1.75 in	1.75	in
Primary grouting			
Date of grouting	5/6/2008		
Cement typ. & supp	Type 1		
Dosage / Admixture	Super-plasticizer		
Grouting method	gravity		
Batch ID	GS	Cubes	
1	1.82	1 set	
2	-	-	
3	-	-	
Final	-	-	
Volume	Theor.	As-built	
Drilling Grout	-	-	gal
Final Grout	8.1	10	gal

Project:	HBSN Testing Research Program	Manager:	Javier Rodriguez	Date Drilled:	5/6/2008
Location:	Salt Lake City, UT	Engineer:	Javier Rodriguez	Date Grouted:	5/6/2008
Client:	FHWA/ ADSC	Superint.:	Cary Lange		
Job No.:	07150064	Weather:	Sunny, 70 deg.	Capacity:	
				Page:	1 of 1

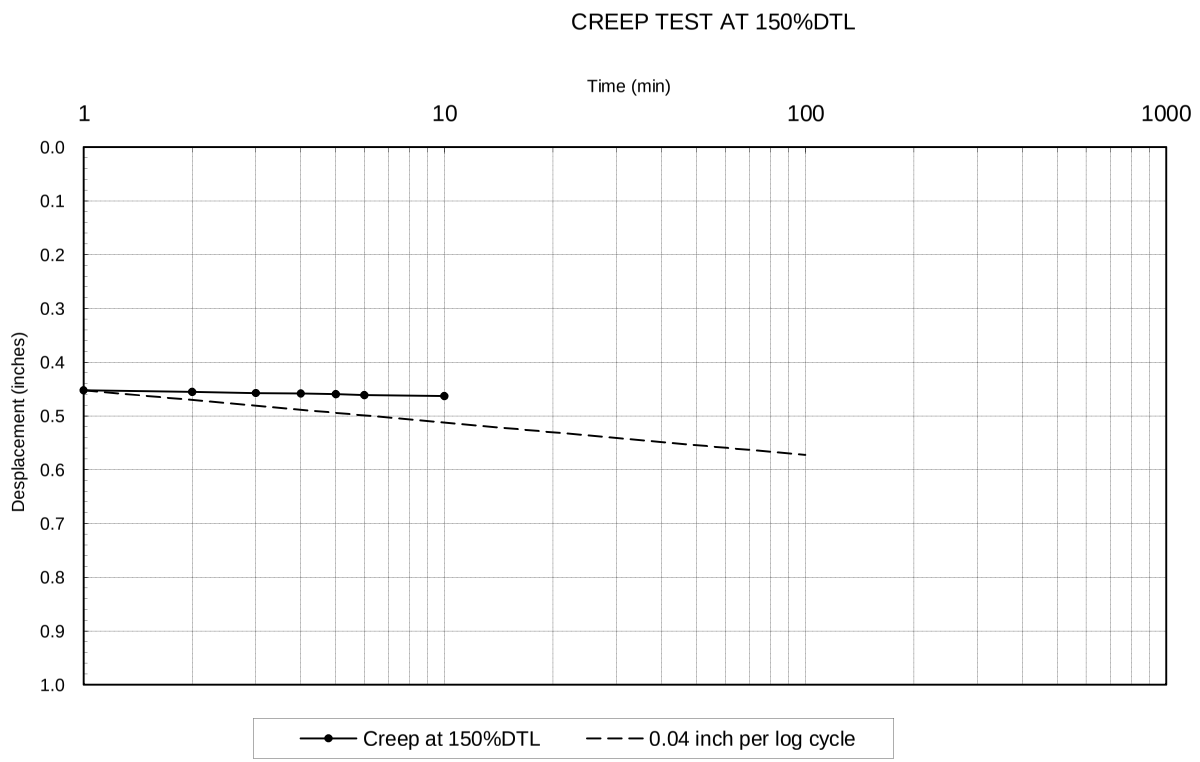
Cary Lange
Installer Representative
(Name and Date)

Andrew Baxter
Schnabel's Representative
(Name and Date)

VERIFICATION SOIL NAIL LOAD TEST
Hollow Core Bar Research - Salt Lake City, Utah



Type of Test: Verification	Bond: 6 ft Unbonded: 14.25 ft	Diameter: 6 in (nominal)	Hollow Core Bar Research Salt Lake City, Utah Test Nail: A3	**SCHNABEL ENGINEERING, LLC** Verification Soil Nail Load Test
Design Test Load (P) : 45 kip	Comments:			Hollow Core Bar Soil Nail Research Salt Lake City, Utah
Maximum Test Load: 200% P = 90 kip				Date: 5/30/08 — 07150064



Type of Test: Verification	Bond: 6 ft Unbonded: 14.25 ft	Diameter: 6 in (nominal)	Hollow Core Bar Research Salt Lake City, Utah Test Nail: A3	**SCHNABEL ENGINEERING, LLC** Verification Soil Nail Load Test
Design Test Load (P) : 45 kip	Comments:			Hollow Core Bar Soil Nail Research Salt Lake City, Utah
Maximum Test Load: 200% P = 90 kip				Date: 5/30/08 — 07150064

Soil Nail Verification Load Test Data

Schnabel Engineering

Project: Hollow Core Bar Soil Nail Research
Location: Salt Lake City Site, Utah
Client: ADSC

Performed: Nicholson Construction Company (Cary Lange)
Observed: Schnabel Engineering (Javier Rodriguez)
Data by: Schnabel Engineering (Javier Rodriguez)

Soil Nail: A3
Date: 5/30/2008

Design Test Load (P): 45 kips **# Dials:** 2 **Jack Calibration:** Pressure = 20.837 X reading (kip) + 23.646 (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	70.5	80.0	2.7	1	1:55 PM	0.000	0.000			0.000	
25%	11.3	258.1	250.0	10.9	1		0.024	0.021			0.023	
	11.3	258.1	250.0	10.9	2		0.024	0.021			0.023	
	11.3	258.1	250.0	10.9	3		0.024	0.021			0.023	
	11.3	258.1	250.0	10.9	4		0.024	0.021			0.023	
	11.3	258.1	250.0	10.9	5		0.024	0.021			0.023	
	11.3	258.1	250.0	10.9	6		0.025	0.022			0.024	
	11.3	258.1	250.0	10.9	10		0.027	0.024			0.026	
50%	22.5	492.5	495.0	22.6	1		0.094	0.076			0.085	
	22.5	492.5	495.0	22.6	2		0.099	0.081			0.090	
	22.5	492.5	495.0	22.6	3		0.099	0.081			0.090	
	22.5	492.5	495.0	22.6	4		0.101	0.085			0.093	
	22.5	492.5	495.0	22.6	5		0.101	0.085			0.093	
	22.5	492.5	495.0	22.6	6		0.101	0.085			0.093	
	22.5	492.5	495.0	22.6	10		0.108	0.090			0.099	
75%	33.8	726.9	730.0	33.9	1		0.180	0.162			0.171	
	33.8	726.9	730.0	33.9	2		0.180	0.162			0.171	
	33.8	726.9	730.0	33.9	3		0.180	0.166			0.173	
	33.8	726.9	730.0	33.9	4		0.183	0.166			0.175	
	33.8	726.9	730.0	33.9	5		0.183	0.168			0.176	
	33.8	726.9	730.0	33.9	6		0.185	0.168			0.177	
	33.8	726.9	730.0	33.9	10		0.185	0.168			0.177	
100%	45.0	961.3	980.0	45.9	1		0.262	0.246			0.254	
	45.0	961.3	980.0	45.9	2		0.263	0.249			0.256	
	45.0	961.3	980.0	45.9	3		0.263	0.249			0.256	
	45.0	961.3	980.0	45.9	4		0.265	0.250			0.258	
	45.0	961.3	980.0	45.9	5		0.267	0.252			0.260	
	45.0	961.3	980.0	45.9	6		0.267	0.252			0.260	
	45.0	961.3	980.0	45.9	10		0.267	0.253			0.260	
125%	56.3	1195.7	1210.0	56.9	1		0.337	0.327			0.332	
	56.3	1195.7	1210.0	56.9	2		0.346	0.335			0.341	
	56.3	1195.7	1210.0	56.9	3		0.346	0.335			0.341	
	56.3	1195.7	1210.0	56.9	4		0.354	0.343			0.349	
	56.3	1195.7	1210.0	56.9	5		0.356	0.345			0.351	
	56.3	1195.7	1210.0	56.9	6		0.356	0.345			0.351	
	56.3	1195.7	1210.0	56.9	10		0.357	0.346			0.352	
150%	67.5	1430.1	1440.0	68.0	1		0.456	0.449			0.453	
	67.5	1430.1	1440.0	68.0	2		0.459	0.452			0.456	
	67.5	1430.1	1440.0	68.0	3		0.461	0.454			0.458	
	67.5	1430.1	1440.0	68.0	4		0.462	0.455			0.459	
	67.5	1430.1	1440.0	68.0	5		0.463	0.456			0.460	
	67.5	1430.1	1440.0	68.0	6		0.465	0.458			0.462	
	67.5	1430.1	1440.0	68.0	10		0.466	0.460			0.463	

Soil Nail Verification Load Test Data

Schnabel Engineering

Project: Hollow Core Bar Soil Nail Research
Location: Salt Lake City Site, Utah
Client: ADSC

Performed: Nicholson Construction Company (Cary Lange)
Observed: Schnabel Engineering (Javier Rodriguez)
Data by: Schnabel Engineering (Javier Rodriguez)

Soil Nail: A3
Date: 5/30/2008

Design Test Load (P): 45 kips **# Dials:** 2 **Jack Calibration:** Pressure = 20.837 X reading (kip) + 23.646 (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	1195.7	1210.0	56.9	1		0.451	0.442			0.447	
100%	45.0	961.3	990.0	46.4	1		0.417	0.406			0.412	
75%	33.8	726.9	730.0	33.9	1		0.367	0.354			0.361	
50%	22.5	492.5	500.0	22.9	1		0.328	0.312			0.320	
25%	11.3	258.1	250.0	10.9	1		0.268	0.252			0.260	
AL	2.3	70.5	80.0	2.7	1		0.222	0.208			0.215	
25%	11.3	258.1	270.0	11.8	1		0.242	0.238			0.240	
50%	22.5	492.5	500.0	22.9	1		0.284	0.268			0.276	
75%	33.8	726.9	730.0	33.9	1		0.339	0.327			0.333	
100%	45.0	961.3	970.0	45.4	1		0.385	0.375			0.380	
125%	56.3	1195.7	1215.0	57.2	1		0.431	0.424			0.428	
150%	67.5	1430.1	1440.0	68.0	1		0.481	0.478			0.480	
175%	78.8	1664.6	1680.0	79.5	1		0.594	0.596			0.595	
	78.8	1664.6	1680.0	79.5	2		0.599	0.603			0.601	
	78.8	1664.6	1680.0	79.5	3		0.599	0.603			0.601	
	78.8	1664.6	1680.0	79.5	4		0.605	0.608			0.607	
	78.8	1664.6	1680.0	79.5	5		0.605	0.608			0.607	
	78.8	1664.6	1680.0	79.5	6		0.605	0.608			0.607	
	78.8	1664.6	1680.0	79.5	10		0.619	0.614			0.617	
200%	90.0	1899.0	1920.0	91.0	1		0.745	0.757			0.751	
	90.0	1899.0	1920.0	91.0	2		0.745	0.757			0.751	
	90.0	1899.0	1920.0	91.0	3		0.760	0.771			0.766	
	90.0	1899.0	1920.0	91.0	4		0.765	0.777			0.771	
	90.0	1899.0	1920.0	91.0	5		0.756	0.777			0.767	
	90.0	1899.0	1920.0	91.0	6		0.772	0.784			0.778	
	90.0	1899.0	1920.0	91.0	10		0.778	0.790			0.784	
175%	78.8	1664.6	1700.0	80.5	1		0.757	0.766			0.762	
150%	67.5	1430.1	1440.0	68.0	1		0.753	0.744			0.749	
125%	56.3	1195.7	1200.0	56.5	1		0.688	0.684			0.686	
100%	45.0	961.3	970.0	45.4	1		0.651	0.649			0.650	
75%	33.8	726.9	730.0	33.9	1		0.610	0.610			0.610	
50%	22.5	492.5	500.0	22.9	1		0.568	0.563			0.566	
AL	2.3	70.5	80.0	2.7	1		0.448	0.443			0.446	
25%	11.3	258.1	250.0	10.9	1		0.458	0.452			0.455	
50%	22.5	492.5	500.0	22.9	1		0.511	0.505			0.508	
100%	45.0	961.3	970.0	45.4	1		0.618	0.618			0.618	
150%	67.5	1430.1	1450.0	68.5	1		0.714	0.723			0.719	
200%	90.0	1899.0	1910.0	90.5	1		0.835	0.852			0.844	

Soil Nail Verification Load Test Data

Schnabel Engineering

Project: Hollow Core Bar Soil Nail Research
Location: Salt Lake City Site, Utah
Client: ADSC

Performed: Nicholson Construction Company (Cary Lange)
Observed: Schnabel Engineering (Javier Rodriguez)
Data by: Schnabel Engineering (Javier Rodriguez)

Soil Nail: A3
Date: 5/30/2008

Design Test Load (P): 45 kips
 # Dials: 2
Jack Calibration: Pressure = 20.837 X reading (kip) + 23.646 (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:
225%	101.3	2133.4	2160.0	102.5	1		1.054	1.084			1.069	
	101.3	2133.4	2160.0	102.5	2		1.054	1.084			1.069	
	101.3	2133.4	2160.0	102.5	3		1.075	1.098			1.087	
	101.3	2133.4	2160.0	102.5	4		1.081	1.104			1.093	
	101.3	2133.4	2160.0	102.5	5		1.086	1.108			1.097	
	101.3	2133.4	2160.0	102.5	6		1.092	1.115			1.104	
	101.3	2133.4	2160.0	102.5	10		1.094	1.117			1.106	
225%	101.3	2133.4	2350.0	111.6	1		1.480	1.512			1.496	
	101.3	2133.4	2350.0	111.6	2							
	101.3	2133.4	2350.0	111.6	3							
	101.3	2133.4	2350.0	111.6	4							
	101.3	2133.4	2350.0	111.6	5							
	101.3	2133.4	2350.0	111.6	6							
	101.3	2133.4	2350.0	111.6	10							

ANCHOR STRESSING FORM

A 3

Job Name: City Creek Center Block 76
Anchor Designation: FHWA HBSN-A3
Design Load (k): 45

13:55

Added Tail Length (ft): 3.0
Unstressed Tail (ft): 0.6
Free Length (ft): 14.8
Bond Length (ft): 6

NICHOLSON

Date: 5-30-08
Test By: BJH

Anchor Load %	Elapsed Time (min)	Actual Time	Anchor Load (kips)	JACK JD-203 Pressure Gauge Calc (psi)	JACK JD-203 Pressure Gauge ACTUAL A (psi)	Backup Gauge JD-203 ACTUAL B (psi)	GK1115 Readout: MG003 Calc ustrain (strain)	GK1115 Readout: MG003 ACTUAL 756 (strain)	Anchor Elongations Nail A Dial 1 (in)	Anchor Elongations Nail Extension B Dial 2 (in)	Anchor Elongations Nail Extension Average (in)	Anchor Elongations Actual Deflections (in)	Anchor Elongations Min 8" FL (in)	Anchor Elongations Max FL+.5*BL (in)	NOTES
5%	0		2	80	80	90	850	831	0.000	0.000			0.000	0.000	
25%	1		11	260	250	260	980	902	0.024	0.021			0.020	0.030	
	2				"	"		899	"	"					
	3				"	"		"	"	"					
	4				"	"		898	"	"					
	5				"	"		897	"	"					
	6				"	"		904	0.025	0.022					Bumped
	10				"	"		908	0.027	0.024					Bumped
50%	1		23	500	495	"	1140	1064	0.094	0.076			0.044	0.067	
	2				"	"		1064	0.099	0.081					Bumped
	3				"	"		1063	"	"					
	4				"	"		1069	0.101	0.085					Bumped
	5				"	"		"	"	"					
	6				"	"		"	"	"					
	10				"	"		1084	0.108	0.090					Bumped
75%	1		34	730	730	750	1300	1240	0.180	0.162			0.069	0.104	
	2				"	"		1237	"	"					
	3				"	"		1244	0.183	0.166					Bumped
	4				"	"		1243	"	"					
	5				"	"		1247	0.185	0.168					Bumped
	6				"	"		1241	"	"					
	10				"	"		1247	0.186	"					
100%	1		45	970	980	1000	1460	1417	0.262	0.246			0.094	0.141	
	2				"	"		1421	0.263	0.249					Bumped
	3				"	"		"	"	"					
	4				"	"		1418	0.265	0.250					
	5				"	"		1420	0.267	0.252					
	6				"	"		"	"	"					
	10				"	"		1423	"	0.253					Bumped
125%	1		57	1210	1210	1230	1620	1572	0.337	0.327			0.118	0.178	
	2				"	"		"	0.346	0.335					Bumped
	3				"	"		1560	"	"					"
	4				"	"		1584	0.354	0.343					
	5				"	"		1585	0.356	0.345					
	6				"	"		1574	"	"					
	10				"	"		1578	0.357	0.346					
150%	1		68	1440	1440	1460	1780	1760	0.456	0.449			0.143	0.215	Brake Bumped
	2				"	"		1754	0.459	0.452					Bumped
	3				"	"		1752	0.461	0.454					
	4				"	"		1750	0.462	0.455					
	5				"	"		1749	0.463	0.456					
	6				"	"		1748	0.465	0.458					
	10				"	"		1743	0.466	0.460					
	20														
	30														
	50														
	60														

ANCHOR STRESSING FORM

NICHOLSON

Job Name: City Creek Center Block 76
Anchor Designation: FHWA HBSN-A3
Design Load (k): 45

Added Tail Length (ft): 3.0
Unstressed Tail (ft): 0.6
Free Length (ft): 14.8
Bond Length (ft): 6

Date:
Test By: BJH

Anchor Load %	Elapsed Time (min)	Actual Time	Anchor Load (kips)	JACK Pressure Gauge JD-203 Calc (psi)	JACK Pressure Gauge JD-203 ACTUAL A (psi)	Backup Gauge JD-203 ACTUAL B (psi)	GK1115 Readout: MG003 Calc ustrain (strain)	GK1115 Readout: MG003 ACTUAL (strain)	Anchor Elongations Nail A Dial 1 (in)	Anchor Elongations Nail Extension B Dial 2 (in)	Anchor Elongations Nail Extension Average (in)	Anchor Elongations Actual Deflections (in)	Anchor Elongations Min 8" FL (in)	Anchor Elongations Max FL+.5*BL (in)	NOTES
125%	1		57	1210	"	1280	1620	1653	0.451	0.442			0.118	0.178	
100%	1		45	970	990	1000	1460	1512	0.417	0.406			0.094	0.141	
75%	1		34	730	730	750	1300	1317	0.367	0.354			0.069	0.104	
50%	1		23	500	500	520	1140	1169	0.328	0.312			0.044	0.067	
25%	1		11	260	250	260	980	979	0.268	0.257			0.020	0.030	
5%	1		2	80	80	110	850	862	0.222	0.208			0.000	0.000	
25%	1		11	260	270	300	980	939	0.242	0.238			0.020	0.030	
50%	1		23	500	500	515	1140	1074	0.284	0.268			0.044	0.067	
75%	1		34	730	730	760	1300	1268	0.339	0.327			0.069	0.104	
100%	1		45	970	970	1005	1460	1438	0.385	0.375			0.094	0.141	
125%	1		57	1210	1215	1240	1620	1604	0.431	0.424			0.118	0.178	
150%	1		68	1440	1440	1460	1780	1751	0.481	0.478			0.143	0.215	
175%	1		79	1680	1680	1710	1940	1929	0.594	0.596			0.167	0.252	
	2				"	"		1921	0.599	0.603					Bumped
	3				"	"		"	"	"					
	5				"	"		1919	0.605	0.608					
	6				"	"		1911	"	"					
	10				"	"		1918	0.619	0.614					
200%	1		90	1910	1920	1960	2100	2074	0.745	0.757			0.192	0.289	
	2				"	"		"	"	"					
	3			"	"	"		2071	0.760	0.771					Bumped
	4				"			2055	0.765	0.777					
	5				"	"		2032	"	"					
	6				"	"		2057	0.772	0.784					
	10				"	"		2059	0.778	0.790					
	20														
	30														
	50														
	60														
175%	1		79	1680	1700	1700	1940	1930	0.757	0.766			0.167	0.252	
150%	1		68	1440	1440	1460	1780	1861	0.753	0.744			0.143	0.215	
125%	1		57	1210	1200	1220	1620	1623	0.688	0.684			0.118	0.178	
100%	1		45	970	970	990	1460	1436	0.651	0.649			0.094	0.141	
75%	1		34	730	730	760	1300	1339	0.610	0.610			0.069	0.104	
50%	1		23	500	500	530	1140	1187	0.568	0.563			0.044	0.067	
5%	1		2	80	80	100	850	861	0.448	0.443			0.000	0.000	
25%	1		11	260	250	270	980	902	0.458	0.452			0.020	0.030	
50%	1		23	500	500	520	1140	1077	0.511	0.505			0.044	0.067	
100%	1		45	970	970	1000	1460	1440	0.618	0.618			0.094	0.141	
150%	1		68	1440	1450	1480	1780	1778	0.714	0.723			0.143	0.215	
200%	1		90	1910	1910	1930	2100	2055	0.835	0.852			0.192	0.289	
225%	1		102	2150	2160	2180	2260	2210	1.054	1.084			0.217	0.326	
	2				"	"		"	"	"					

ANCHOR STRESSING FORM

NICHOLSON

Job Name: City Creek Center Block 76
Anchor Designation: FHWA HBSN-A3
Design Load (k): 45

Added Tail Length (ft): 3.0
Unstressed Tail (ft): 0.6
Free Length (ft): 14.8
Bond Length (ft): 6

Date:
Test By: BJH

Anchor Load %	Elapsed Time (min)	Actual Time	Anchor Load (kips)	JACK JD-203 Pressure Gauge Calc (psi)	JACK JD-203 Pressure Gauge ACTUAL A (psi)	Backup Gauge JD-203 ACTUAL B (psi)	GK1115 Readout: MG003 Calc ustrain (strain)	GK1115 Readout: MG003 ACTUAL (strain)	Anchor Elongations Nail A Dial 1 (in)	Anchor Elongations Nail Extension B Dial 2 (in)	Anchor Elongations Nail Extension Average (in)	Anchor Elongations Actual Deflections (in)	Anchor Elongations Min .8* FL (in)	Anchor Elongations Max FL+.5*BL (in)	NOTES
	3				2160	2180		2172	1.075	1.098					Broke Bond
	4				"	"		2188	1.081	1.104					Bumped
	5				"	"		2182	1.086	1.108					Bumped
	6				"	"		2186	1.092	1.115					
	10				"	"		2179	1.094	1.117					
250%	1		113	~~2380~~	2350		2420	2181	1.480	1.512			0.241	0.363	Can't get it passed 2350 psi, HS just pulling out and losing pressure
	2														
	3														
	4														
	5														
	6														
	10														
275%	1		124	2620			2580						0.266	0.400	
	2														
	3														
	4														
	5														
	6														
	10														
300%	1		136	2850			2740						0.290	0.437	
	2														
	3														
	4														
	5														
	6														
	10														
336%	1		152	3190			2970						0.325	0.489	
	2														
	3														
	4														
	5														
	6														
	10														
300%	1		136	2850			2740						0.290	0.437	
250%	1		113	2380			2420						0.241	0.363	
200%	1		90	1910			2100						0.192	0.289	
150%	1		68	1440			1780						0.143	0.215	
100%	1		45	970			1460						0.094	0.141	
50%	1		23	500			1140						0.044	0.067	
25%	1		11	260			980						0.020	0.030	
5%	1		2	80			850						0.000	0.000	
25%	1		11	260	260	280	980	908	1.139	1.140			0.020	0.030	
5%	0		2	80	80	100	850	882	1.132	1.135			0.000	0.000	

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 (psi)	Gs	Observations of Grouting
	0												
	1				0:00	0:40	F-C Poorly Graded Gravel with						Did not ream hole, some cuttings but not as much as expected.
	2				0:40	0.042	Sand (GP), trace silt, moist,						Good circulation.
	3				0.042	1:20	brown						
	4				1:20	1:51	Loss of Circulation						Washed out 2 ft above bondzone.
	5				1:51	2:34							
	6				2:34	2:48							
	7				2:48	3:11							
	8				3:11	6:04	Backing Casing out/ Reaming						Grout volume (gage did not work) about 24.7 gal at 14 gal/ min.
	9				6:04	9:05	Hole						
	10				9:05	9:41							
	11				9:41	10:47							
	12				0:00	0:20			0:00	0:20			PVC (3 in.) installed over bar through steel casing, refused 1 ft before coupler, water then air injected to remove cuttings.
	13				0:20	0:44			0:20	0:44			
	14				0:44	1:10			0:44	1:10			
	15				1:10	1:30			1:10	1:30	75		
	16				1:30	1:40			1:30	1:40			
	17				1:40	1:46			1:40	1:46		1.86	Air injection resulted in grout removal, stopped blowing air. Could not measure new grout interface due to cuttings.
	18						B.O.H. 17 ft						
	19												
	20												
							Drilled 11 ft of temporary casing by air rotary method. Inserted hollow core bar to tip of casing and performed self-drilling - self-grouting from 11 to 17 ft. Grout was washed with water from wall face to two ft above top of bond zone. PVC pipe installed as bond breaker from wall face to top of bond zone. Temporary casing was completely extracted.							PVC cut at about 9 ft from top of bar PVC pulled with casing withdrawn, bar greased before installation. (NO PVC in hole) Full length of Bond zone may not be grouted.

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 Engineering

SOIL NAIL:	B1		
Soil Boring:	-		
Soil Nail Geometry:	Perpendicular to face		
Soil Nail elev.	~45		ft
Total casing length	11		ft
Total hole depth	17		ft
Total grout length	8		ft
	Design	As-built	
Total bar length	20	19.67	ft
Bonded length	6	6	ft
Unbonded length	11	10.58	ft
Tail length	3	3.1	ft
Bit type	Cross Cut		
Bit diameter	4		in
Hole inclination	15		degrees
Centralizers	None		
Reinforcing steel:			
Date of installation	5/7/2008		
Supplier	Williamsform		
Casing description	casing bit is 6 in OD		
Diameter/Thickness	4.5	0.25	in
Nail description	R51N - Hollow Core Bar		
	Design	As-built	
No. Bars	1	1	
Diameter	1.36	1.36	in
Primary grouting			
Date of grouting	5/7/2008		
Cement typ. & supp	Type 1		
Dosage / Admixture	Super-plasticizer		
Grouting method	Self drilling - Self grouting		
Batch ID	GS	Cubes	
1	1.86	1 Set	
2	-	-	
3	-	-	
Final	-	-	
Volume	Theor.	As-built	
Drilling Grout	-	24.7	gal
Final Grout	-	-	gal

Project: HBSN Testing Research Program
Location: Salt Lake City, UT
Client: FHWA/ ADSC
Job No.: 07150064

Manager: Javier Rodriguez
Engineer: Javier Rodriguez
Superint.: Cary Lange
Weather: Sunny, 70 deg. Capacity:

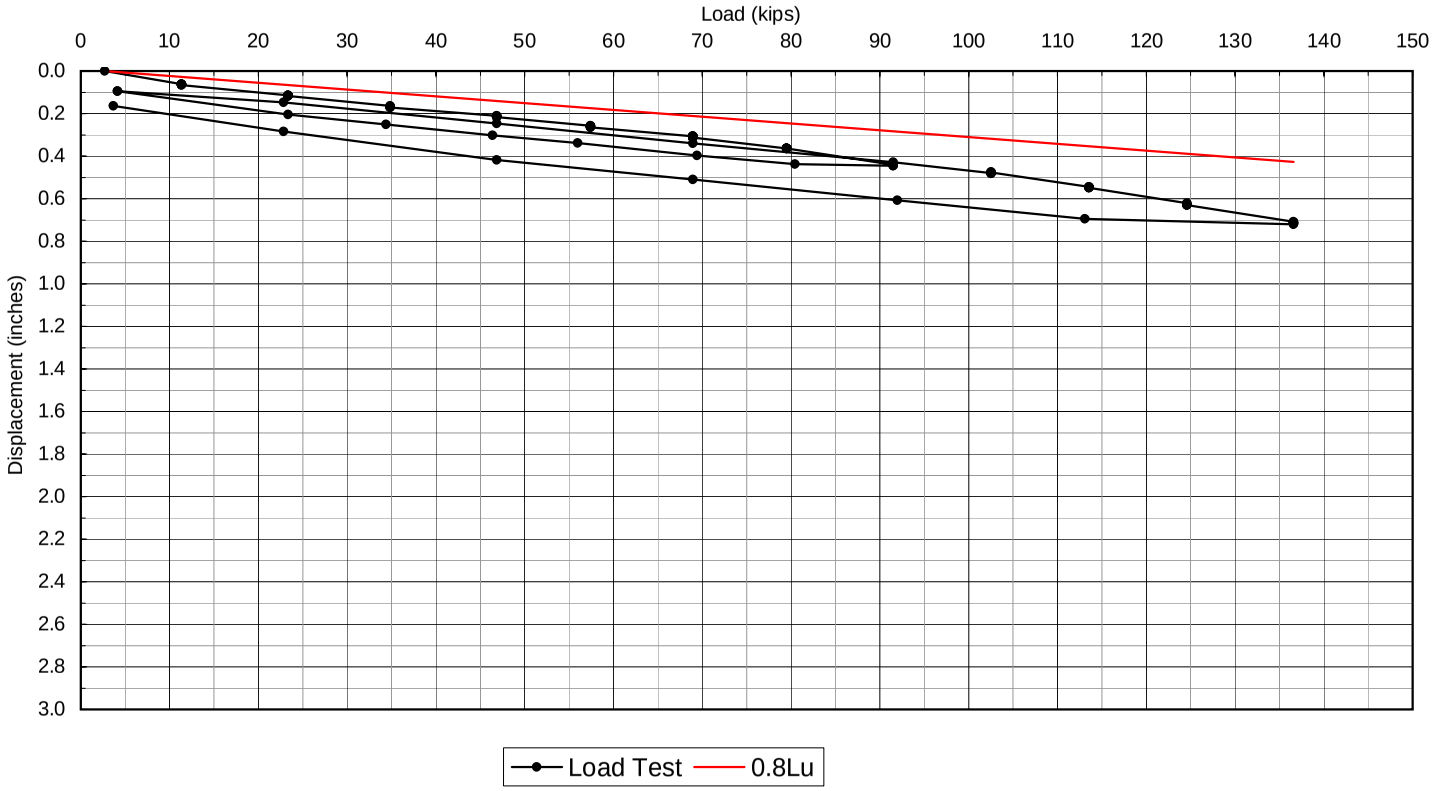
Date Drilled: 5/6/2008 (casing) 5/7/2008 (bar)
Date Grouted: 5/7/2008

Page: 1 of 1

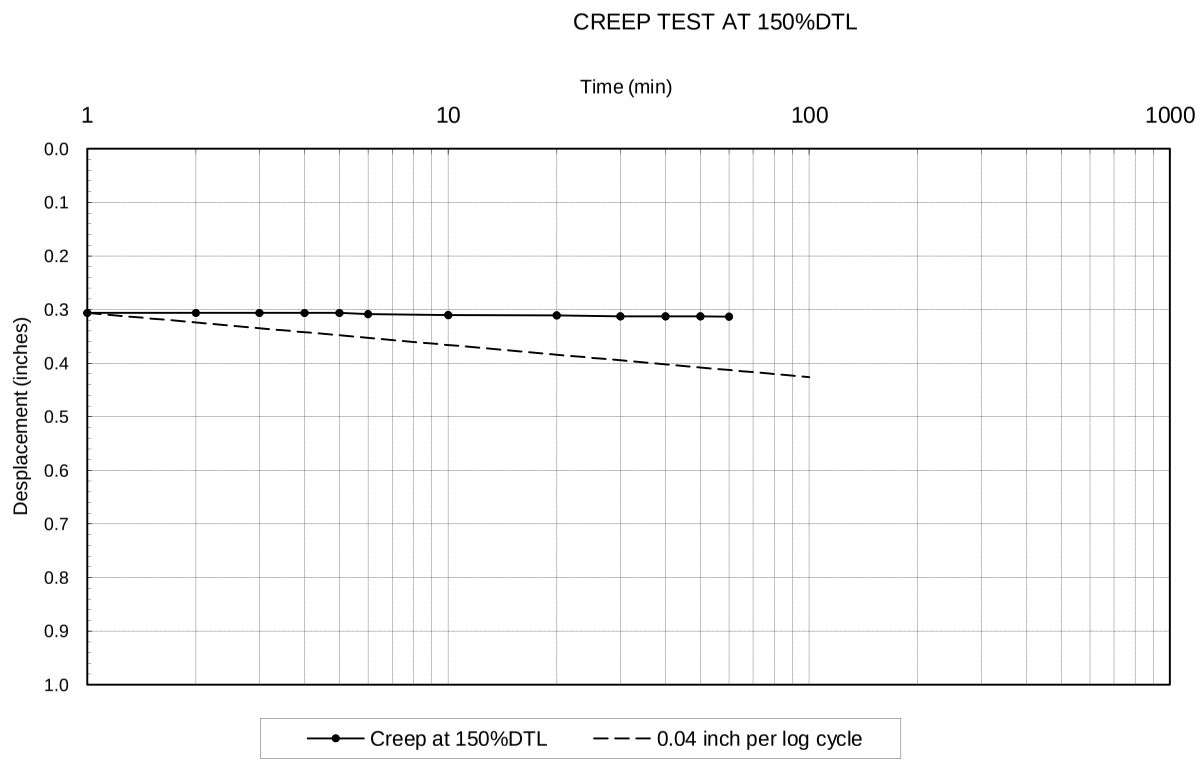
Cary Lange
Installer Representative
(Name and Date)

Andrew Baxter
Schnabel's Representative
(Name and Date)

VERIFICATION SOIL NAIL LOAD TEST
Hollow Core Bar Research - Salt Lake City, Utah



Type of Test: Verification	Bond: 6 ft Unbonded 14.1 ft	Diameter: 4 in (nominal)	Hollow Core Bar Research Salt Lake City, Utah Test Nail: B1	**SCHNABEL ENGINEERING, LLC** Verification Soil Nail Load Test
Design Test Load (P) : 45 kip	Comments:			Hollow Core Bar Soil Nail Research Salt Lake City, Utah
Maximum Test Load: 300% P = 135 kip				Date: 5/20/08 — 07150064



Type of Test: Verification	Bond: 6 ft Unbonded 14.1 ft	Diameter: 4 in (nominal)	Hollow Core Bar Research Salt Lake City, Utah Test Nail: B1	**SCHNABEL ENGINEERING, LLC** Verification Soil Nail Load Test
Design Test Load (P) : 45 kip	Comments:			Hollow Core Bar Soil Nail Research Salt Lake City, Utah
Maximum Test Load: 300% P = 135 kip				Date: 5/20/08 — 07150064

Soil Nail Verification Load Test Data

Schnabel Engineering

Project: Hollow Core Bar Soil Nail Research
Location: Salt Lake City Site, Utah
Client: ADSC

Performed: Nicholson Construction Company (Cary Lange)
Observed: Schnabel Engineering (Javier Rodriguez)
Data by: Schnabel Engineering (Javier Rodriguez)

Soil Nail: B1
Date: 5/20/2008

Design Test Load (P): 45 kips
 # Dials: 2
Jack Calibration: Pressure = 20.837 X reading (kip) + 23.646 (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	70.5	80.0	2.7	1	6:01 PM	0.000	0.000			0.000	
25%	11.3	258.1	260.0	11.3	1	6:02 PM	0.062	0.060			0.061	
	11.3	258.1	255.0	11.3	2	6:03 PM	0.064	0.061			0.063	
	11.3	258.1	255.0	11.3	3	6:04 PM	0.064	0.062			0.063	
	11.3	258.1	255.0	11.3	4	6:05 PM	0.064	0.062			0.063	
	11.3	258.1	255.0	11.3	5	6:06 PM	0.064	0.062			0.063	
	11.3	258.1	255.0	11.3	6	6:07 PM	0.066	0.064			0.065	
	11.3	258.1	255.0	11.3	10	6:11 PM	0.067	0.064			0.066	
50%	22.5	492.5	510.0	23.3	1	6:12 PM	0.114	0.114			0.114	
	22.5	492.5	510.0	23.3	2	6:13 PM	0.115	0.114			0.115	
	22.5	492.5	510.0	23.3	3	6:14 PM	0.116	0.115			0.116	
	22.5	492.5	510.0	23.3	4	6:15 PM	0.116	0.115			0.116	
	22.5	492.5	510.0	23.3	5	6:16 PM	0.118	0.116			0.117	
	22.5	492.5	510.0	23.3	6	6:17 PM	0.118	0.116			0.117	
	22.5	492.5	510.0	23.3	10	6:21 PM	0.118	0.116			0.117	
75%	33.8	726.9	750.0	34.9	1	6:22 PM	0.166	0.163			0.165	
	33.8	726.9	750.0	34.9	2	6:23 PM	0.170	0.165			0.168	
	33.8	726.9	750.0	34.9	3	6:24 PM	0.172	0.167			0.170	
	33.8	726.9	750.0	34.9	4	6:25 PM	0.172	0.167			0.170	
	33.8	726.9	750.0	34.9	5	6:26 PM	0.172	0.167			0.170	
	33.8	726.9	750.0	34.9	6	6:27 PM	0.172	0.167			0.170	
	33.8	726.9	750.0	34.9	10	6:31 PM	0.175	0.168			0.172	
100%	45.0	961.3	1000.0	46.9	1	6:32 PM	0.219	0.203			0.211	
	45.0	961.3	1000.0	46.9	2	6:33 PM	0.219	0.204			0.212	
	45.0	961.3	1000.0	46.9	3	6:34 PM	0.221	0.206			0.214	
	45.0	961.3	1000.0	46.9	4	6:35 PM	0.221	0.206			0.214	
	45.0	961.3	1000.0	46.9	5	6:36 PM	0.223	0.208			0.216	
	45.0	961.3	1000.0	46.9	6	6:37 PM	0.223	0.208			0.216	
	45.0	961.3	1000.0	46.9	10	6:41 PM	0.225	0.208			0.217	
125%	56.3	1195.7	1220.0	57.4	1	6:42 PM	0.272	0.242			0.257	
	56.3	1195.7	1220.0	57.4	2	6:43 PM	0.274	0.244			0.259	
	56.3	1195.7	1220.0	57.4	3	6:44 PM	0.275	0.245			0.260	
	56.3	1195.7	1220.0	57.4	4	6:45 PM	0.275	0.245			0.260	
	56.3	1195.7	1220.0	57.4	5	6:46 PM	0.278	0.246			0.262	
	56.3	1195.7	1220.0	57.4	6	6:47 PM	0.280	0.248			0.264	
	56.3	1195.7	1220.0	57.4	10	6:51 PM	0.280	0.248			0.264	

Soil Nail Verification Load Test Data

Schnabel Engineering

Project: Hollow Core Bar Soil Nail Research
Location: Salt Lake City Site, Utah
Client: ADSC

Performed: Nicholson Construction Company (Cary Lange)
Observed: Schnabel Engineering (Javier Rodriguez)
Data by: Schnabel Engineering (Javier Rodriguez)

Soil Nail: B1
Date: 5/20/2008

Design Test Load (P): 45 kips **# Dials:** 2 **Jack Calibration:** Pressure = 20.837 X reading (kip) + 23.646 (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:
150%	67.5	1430.1	1460.0	68.9	1	6:52 AM	0.328	0.285			0.307	
	67.5	1430.1	1460.0	68.9	2	6:53 AM	0.328	0.285			0.307	
	67.5	1430.1	1460.0	68.9	3	6:54 AM	0.328	0.285			0.307	
	67.5	1430.1	1460.0	68.9	4	6:55 AM	0.328	0.285			0.307	
	67.5	1430.1	1460.0	68.9	5	6:56 AM	0.328	0.285			0.307	
	67.5	1430.1	1460.0	68.9	6	6:57 AM	0.328	0.289			0.309	
	67.5	1430.1	1460.0	68.9	10	7:01 AM	0.332	0.289			0.311	
	67.5	1430.1	1460.0	68.9	20	7:11 AM	0.332	0.290			0.311	
	67.5	1430.1	1460.0	68.9	30	7:21 AM	0.335	0.291			0.313	
	67.5	1430.1	1460.0	68.9	40	7:31 AM	0.335	0.291			0.313	
	67.5	1430.1	1460.0	68.9	50	7:41 AM	0.335	0.291			0.313	
	67.5	1430.1	1460.0	68.9	60	7:51 AM	0.336	0.291			0.314	
175%	78.8	1664.6	1680.0	79.5	1	7:52 PM	0.391	0.336			0.364	
	78.8	1664.6	1680.0	79.5	2	7:53 PM	0.391	0.336			0.364	
	78.8	1664.6	1680.0	79.5	3	7:54 PM	0.391	0.336			0.364	
	78.8	1664.6	1680.0	79.5	4	7:55 PM	0.391	0.336			0.364	
	78.8	1664.6	1680.0	79.5	5	7:56 PM	0.391	0.336			0.364	
	78.8	1664.6	1680.0	79.5	6	7:57 PM	0.391	0.336			0.364	
	78.8	1664.6	1680.0	79.5	10	8:01 PM	0.391	0.336			0.364	
200%	90.0	1899.0	1930.0	91.5	1	8:02 PM	0.479	0.403			0.441	
	90.0	1899.0	1930.0	91.5	2	8:03 PM	0.479	0.403			0.441	
	90.0	1899.0	1930.0	91.5	3	8:04 PM	0.481	0.403			0.442	
	90.0	1899.0	1930.0	91.5	4	8:05 PM	0.481	0.403			0.442	
	90.0	1899.0	1930.0	91.5	5	8:06 PM	0.481	0.403			0.442	
	90.0	1899.0	1930.0	91.5	6	8:07 PM	0.485	0.404			0.445	
	90.0	1899.0	1930.0	91.5	10	8:11 PM	0.485	0.404			0.445	
175%	78.8	1664.6	1700.0	80.5	1		0.473	0.402			0.438	
150%	67.5	1430.1	1470.0	69.4	1		0.430	0.365			0.398	
125%	56.3	1195.7	1190.0	56.0	1		0.369	0.309			0.339	
100%	45.0	961.3	990.0	46.4	1		0.331	0.274			0.303	
75%	33.8	726.9	740.0	34.4	1		0.279	0.222			0.251	
50%	22.5	492.5	510.0	23.3	1		0.232	0.177			0.205	
AL	2.3	70.5	110.0	4.1	1		0.137	0.052			0.095	
	2.3	70.5	110.0	4.1	10		0.137	0.052			0.095	
50%	22.5	492.5	500.0	22.9	1		0.180	0.116			0.148	
100%	45.0	961.3	1000.0	46.9	1		0.278	0.216			0.247	
150%	67.5	1430.1	1460.0	68.9	1		0.376	0.305			0.341	
200%	90.0	1899.0	1930.0	91.5	1		0.468	0.389			0.429	

Soil Nail Verification Load Test Data

Schnabel Engineering

Project: Hollow Core Bar Soil Nail Research
Location: Salt Lake City Site, Utah
Client: ADSC

Performed: Nicholson Construction Company (Cary Lange)
Observed: Schnabel Engineering (Javier Rodriguez)
Data by: Schnabel Engineering (Javier Rodriguez)

Soil Nail: B1
Date: 5/20/2008

Design Test Load (P): 45 kips
 # Dials: 2
Jack Calibration: Pressure = 20.837 X reading (kip) + 23.646 (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:
225%	101.3	2133.4	2160.0	102.5	1		0.526	0.433			0.480	
	101.3	2133.4	2160.0	102.5	2		0.526	0.435			0.481	
	101.3	2133.4	2160.0	102.5	3		0.526	0.435			0.481	
	101.3	2133.4	2160.0	102.5	4		0.526	0.435			0.481	
	101.3	2133.4	2160.0	102.5	5		0.508	0.442			0.475	
	101.3	2133.4	2160.0	102.5	6		0.508	0.442			0.475	
	101.3	2133.4	2160.0	102.5	10		0.509	0.443			0.476	
250%	112.5	2367.8	2390.0	113.6	1		0.580	0.509			0.545	
	112.5	2367.8	2390.0	113.6	2		0.582	0.510			0.546	
	112.5	2367.8	2390.0	113.6	3		0.583	0.511			0.547	
	112.5	2367.8	2390.0	113.6	4		0.583	0.511			0.547	
	112.5	2367.8	2390.0	113.6	5		0.584	0.511			0.548	
	112.5	2367.8	2390.0	113.6	6		0.584	0.511			0.548	
	112.5	2367.8	2390.0	113.6	10		0.586	0.513			0.550	
275%	123.8	2602.2	2620.0	124.6	1		0.660	0.581			0.621	
	123.8	2602.2	2620.0	124.6	2		0.667	0.587			0.627	
	123.8	2602.2	2620.0	124.6	3		0.669	0.588			0.629	
	123.8	2602.2	2620.0	124.6	4		0.669	0.588			0.629	
	123.8	2602.2	2620.0	124.6	5		0.669	0.588			0.629	
	123.8	2602.2	2620.0	124.6	6		0.670	0.589			0.630	
	123.8	2602.2	2620.0	124.6	10		0.671	0.589			0.630	
300%	135.0	2836.6	2870.0	136.6	1		0.753	0.664			0.709	
	135.0	2836.6	2870.0	136.6	2		0.755	0.668			0.712	
	135.0	2836.6	2870.0	136.6	3		0.759	0.671			0.715	
	135.0	2836.6	2870.0	136.6	4		0.759	0.671			0.715	
	135.0	2836.6	2870.0	136.6	5		0.762	0.673			0.718	
	135.0	2836.6	2870.0	136.6	6		0.763	0.674			0.719	
	135.0	2836.6	2870.0	136.6	10		0.765	0.675			0.720	
250%	112.5	2367.8	2380.0	113.1	1		0.734	0.654			0.694	
200%	90.0	1899.0	1940.0	92.0	1		0.644	0.571			0.608	
150%	67.5	1430.1	1460.0	68.9	1		0.544	0.476			0.510	
100%	45.0	961.3	1000.0	46.9	1		0.458	0.379			0.419	
50%	22.5	492.5	500.0	22.9	1		0.261	0.308			0.285	
AL	2.3	70.5	100.0	3.7	1		0.200	0.128			0.164	
	2.3	70.5	100.0	3.7	2							
	2.3	70.5	100.0	3.7	3							
	2.3	70.5	100.0	3.7	4							
	2.3	70.5	100.0	3.7	5							
	2.3	70.5	100.0	3.7	6							
	2.3	70.5	100.0	3.7	10							

ANCHOR STRESSING FORM

Job Name: City Creek Center Block 76
Anchor Designation: FHWA HBSN-
Design Load (k): 45

B1

17:50

Stick out 19
Cut off 14"
Added Tail Length (ft): 36"
Unstressed Tail (ft): 8"
Free Length (ft): 15.0
Bond Length (ft): 6

NICHOLSON

Date: 5-20
Test By: BJH

Anchor Load %	Elapsed Time (min)	Actual Time	Anchor Load (kips)	JACK JD-203 Pressure Gauge Calc (psi)	JACK JD-203 Pressure Gauge ACTUAL A (psi)	Backup Gauge JD-203 ACTUAL B (psi)	GK1115 Readout: MG003 Calc ustrain (strain)	GK1115 Readout: MG003 ACTUAL 766 (strain)	Anchor Elongations Nail A Dial 1 (in)	Anchor Elongations Nail Extension B Dial 2 (in)	Anchor Elongations Nail Extension Average (in)	Anchor Elongations Actual Deflections (in)	Anchor Elongations Min 8" FL (in)	Anchor Elongations Max FL+.5*BL (in)	NOTES
5%	0		2	80	80	100	850	772	0.100	0.000					
25%	1		11	260	260	300	980	910	0.062	0.060			0.000	0.000	
	2				255	290		916	0.064	0.061			0.027	0.041	
	3				"	"		916	0.064	0.062					
	5				"	"		919	0.064	0.062					
	6				"	"		923	0.066	0.064					
	10				"	"		926	0.067	0.064					
50%	1		23	500	510	510	1140	1066	0.114	0.114			0.061	0.092	
	2				"	"		1068	0.115	0.114					Bumped
	3				"	520		1078	0.116	0.115					"
	5				"	"		1081	0.118	0.116					"
	6				"	"		1078	0.118	0.116					
	10				"	"		1080	0.118	0.116					
75%	1		34	730	750	780	1300	1228	0.166	0.163			0.095	0.142	
	2				"	"		1241	0.170	0.165					
	3				"	"		1250	0.172	0.167					
	5				"	"		1250	0.172	0.167					
	6				"	"		1250	0.172	0.167					
	10				"	"		1255	0.175	0.168					
100%	1		45	970	1000	1010	1460	1384	0.219	0.203			0.129	0.193	
	2				"	"		1387	0.219	0.204					
	3				"	"		1392	0.221	0.206					
	5				"	"		1401	0.223	0.208					
	6				"	"		1400	"	"					
	10				"	"		1401	0.225	"					
	20														
	30														
	50														
	80														
75%	1		34	730			1300						0.095	0.142	
50%	1		23	500			1140						0.061	0.092	
25%	1		11	260			980						0.027	0.041	
5%	10		2	80			850						0.000	0.000	
25%	1		11	260			980						0.027	0.041	
50%	1		23	500			1140						0.061	0.092	
75%	1		34	730			1300						0.095	0.142	
100%			45	970			1460						0.129	0.193	
125%	1		57	1210	1220	1250	1620	1533	0.272	0.242			0.163	0.244	
	2				"	"		1539	0.274	0.244					
	3				"	"		1545	0.275	0.245					
	5				"	"		1549	0.278	0.246					
	6				"	"		1555	0.280	0.248					
	10				"	"		1550	"	"					
150%	1		68	1440	1460	1490	1780	1683	0.328	0.285			0.197	0.295	
	0				"	"		1690	0.332	0.289					
	20				"	"		1690	0.332	0.290					6 min 0.289 0.331

1689
1490

ANCHOR STRESSING FORM

Job Name: City Creek Center Block 76
Anchor Designation: FHWA HBSN-
Design Load (k): 45

B1

Added Tail Length (ft): 1.7
Unstressed Tail (ft): 0.7
Free Length (ft): 15.0
Bond Length (ft): 6

NICHOLSON

Date:
Test By: BJH

Anchor Load %	Elapsed Time (min)	Actual Time	Anchor Load (kips)	JACK JD-203 Pressure Gauge Calc (psi)	JACK JD-203 Pressure Gauge ACTUAL A (psi)	Backup Gauge JD-203 ACTUAL B (psi)	GK1115 Readout: MG003 Calc ustrain (strain)	GK1115 Readout: MG003 ACTUAL (strain)	Anchor Elongations Nail A Dial 1 (in)	Anchor Elongations Nail Extension B Dial 2 (in)	Anchor Elongations Nail Extension Average (in)	Anchor Elongations Actual Deflections (in)	Anchor Elongations Min 8" FL (in)	Anchor Elongations Max FL+.5*BL (in)	NOTES
	30 s			1440	1400	1490		1697	0.335	0.291					
	50 s				"	"		1692	"	"					
	60 s				"	"		1696	0.336	0.291					
175%	1		79	1680	1680	1720	1940	1828	0.391	0.336			0.231	0.346	
	2				"	"		1831	0.391	0.336					
	3				"	"		1835	0.391	0.336					
	5				"	"		1830	0.391	0.336					
	6				"	"		"	"	"					
	10				"	"		"	"	"					
200%	1		90	1910	1930	1950	2100	2036	0.479	0.403			0.265	0.397	
	2				"	"		2036	"	"					
	3				"	"		2039	0.481	"					
	5				"	"		2037	"	"					
	6				"	"		2042	0.485	0.404					
	10				"	"		2032	0.485	0.401					
175%	1		79	1680	1700	1720	1940	1971	0.473	0.402			0.231	0.346	
150%	1		68	1440	1470	1490	1780	1811	0.430	0.365			0.197	0.295	
125%	1		57	1210	1190	1210	1620	1615	0.369	0.309			0.163	0.244	
100%	1		45	970	940	1000	1460	1485	0.321	0.274			0.129	0.193	
75%	1		34	730	740	750	1300	1319	0.279	0.222			0.095	0.142	
50%	1		23	500	510	515	1140	1158	0.232	0.177			0.061	0.092	
5%	10		2	80	110	115	850	875	0.137	0.052			0.000	0.000	
50%	1		23	500	500	520	1140	1070	0.180	0.116			0.061	0.092	
100%	1		45	970	1000	1010	1460	1407	0.278	0.216			0.129	0.193	
150%	1		68	1440	1460	1490	1780	1702	0.376	0.305			0.197	0.295	
200%	1		90	1910	1930	1950	2100	1969	0.468	0.389			0.265	0.397	
225%	1		102	2150	2160	2180	2260	2121	0.526	0.433			0.299	0.448	
	2				"	"		2116	0.526	0.435					
	3				"	"		2117	"	"					
	5				"	"		2035	0.508	0.442					Popped
	6				"	"		"	"	"					
	10				"	"		2037	0.509	0.443					
250%	1		113	2380	2390	2410	2420	2233	0.580	0.509			0.332	0.498	
	2				"	"		2233	0.582	0.510					
	3				"	"		2233	0.583	0.511					
	5				"	"		2237	0.584	0.511					
	6				"	"		"	"	"					
	10				"	"		2234	0.587	0.513					
275%	1		124	2620	2620	2660	2580	2395	0.660	0.581			0.366	0.549	
	2				"	"		2400	0.667	0.587					
	3				"	"		2402	0.669	0.588					
	5				"	"		2397	"	"					
	6				"	"		2403	0.670	0.589					

ANCHOR STRESSING FORM

B1

Job Name: City Creek Center Block 76
Anchor Designation: FHWA HBSN-
Design Load (k): 45

Added Tail Length (ft): 1.7
Unstressed Tail (ft): 0.7
Free Length (ft): 15.0
Bond Length (ft): 6

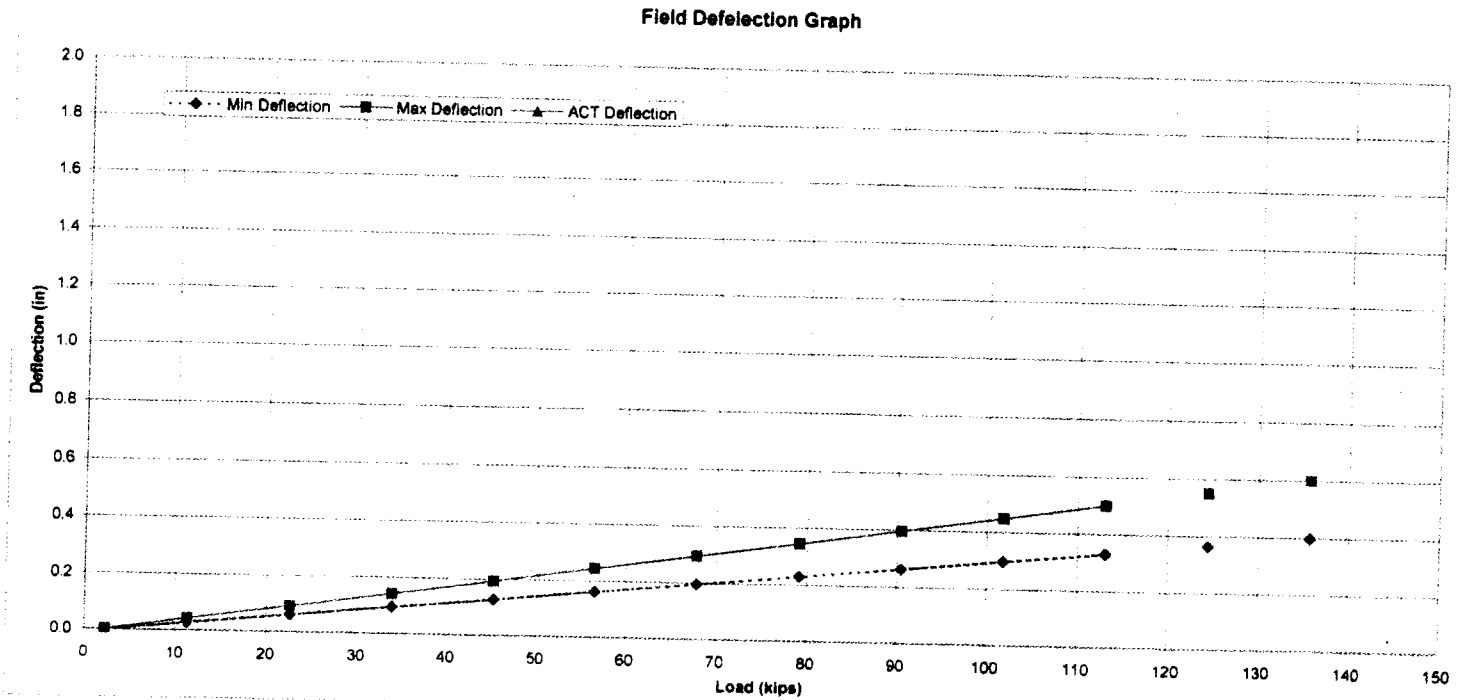
NICHOLSON

Date:
Test By: BJH

Anchor Load %	Elapsed Time (min)	Actual Time	Anchor Load (kips)	JACK JD-203 Pressure Gauge Calc (psi)	JACK JD-203 Pressure Gauge ACTUAL A (psi)	Backup Gauge JD-203 ACTUAL B (psi)	GK1115 Readout: MG003 Calc ustrain (strain)	GK1115 Readout: MG003 ACTUAL (strain)	Anchor Elongations: Nail A Dial 1 (in)	Anchor Elongations: Nail Extension B Dial 2 (in)	Anchor Elongations: Nail Extension Average (in)	Anchor Elongations: Actual Deflections (in)	Anchor Elongations: Min .8* FL (in)	Anchor Elongations: Max FL+.5*BL (in)	NOTES
	10			2620	2620	2660		2399	0.672	0.589					
300%	1		136	2850	2870	2900	2740	2545	0.753	0.664			0.400	0.600	
	2				"	"		2550	0.755	0.669					
	3				"	"		2555	0.759	0.671					
	5				"	"		2556	0.762	0.673					
	6				"	"		2558	0.763	0.674					
	10				"	"		2554	0.763	0.673					
250%	1		113	2380	2380	2400	2420	2396	0.734	0.654			0.332	0.498	
200%	1		90	1910	1940	1950	2100	2092	0.644	0.571			0.265	0.397	
150 250%	1		113	~~1490~~	1460	1490	2420	1780	0.544	0.476			0.332	0.498	
100 200%	1		90	~~960~~	1000	1010	2100	1484	0.438	0.379			0.265	0.397	
50%	1		23	500	500	500	1140	1134	0.308	0.261			0.061	0.092	
5%	1		2	80	100	100	850	855	0.200	0.128			0.000	0.000	
~~2%~~				~~40~~											

10 min

A	-1.34523 kips	-57.7471
B	0.048039 kips/psi	0.070609
ZERO	28.04407 psi	819.4



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 (psi)	Gs	Observations of Grouting
	0												~10 gal to fill casing
	1				0:00	0:07	F-C Poorly Graded Gravel with						
	2				0:07	0:35	Sand (GP), trace silt, moist,						
	3				0:35	1:02	brown						38 gal total
	4				1:02	1:29							
	5				1:29	1:52	Loss of Circulation						
	6				1:52	3:04	Ream Hole						Washed out grout 2 ft from top of bond zone. (measured with tape measure)
	7				3:04	3:20							
	8				3:20	3:46							
	9				3:46	7:20	Loss of Circulation						
	10				7:20	7:30							
	11				7:30	8:04							Washed out with tube 8.5 ft from end of bar.
	12				0:00	0:16			0:00	0:16	75		
	13				0:16	0:59			0:16	0:59			
	14				0:59	1:18			0:59	1:18			
	15				1:18	1:37			1:18	1:37			
	16				1:37	1:46			1:37				
	17				1:46	1:56				1:56		1.82	
	18						B.O.H. 17 ft						
	19												
	20												
88							Drilled 11 ft of temporary casing by air rotary method. Inserted hollow core bar to tip of casing and performed self-drilling - self-grouting from 11 to 17 ft. The HCB was drilled with a PVC pipe attached to the bar to serve as bond breaker from wall face to top of bond zone. Grout outside the PVC was washed with water from wall face to 2 ft above top of bond zone. Temporary casing was extracted.						

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 Engineering

SOIL NAIL:	B3		
Soil Boring:	-		
Soil Nail Geometry:	Perpendicular to face		
Soil Nail elev.	~45		ft
Total casing length	11		ft
Total hole depth	17		ft
Total grout length	8		ft
	Design	As-built	
Total bar length	20	19.67	ft
Bonded length	6	6	ft
Unbonded length	11	10.25	ft
Tail length	3	3.42	ft
Bit type	Cross Cut		
Bit diameter	4		in
Hole inclination	15		degrees
Centralizers	None		
Reinforcing steel:			
Date of installation	5/8/2008		
Supplier	Williamsform		
Casing description	casing bit is 6 in OD		
Diameter/Thickness	4.5	0.25	in
Nail description	R51N Hollow Core Bar		
	Design	As-built	
No. Bars	1	1	
Diameter	R51N	R51N	in
Primary grouting			
Date of grouting	5/8/2008		
Cement typ. & supp	Type 1		
Dosage / Admixture	Super-plasticizer		
Grouting method	Self-drilling - Self-grouting		
Batch ID	GS	Cubes	
1	1.82	1 Set	
2	-	-	
3	-	-	
Final	-	-	
Volume	Theor.	As-built	
Drilling Grout	-	38	gal
Final Grout	-	-	gal

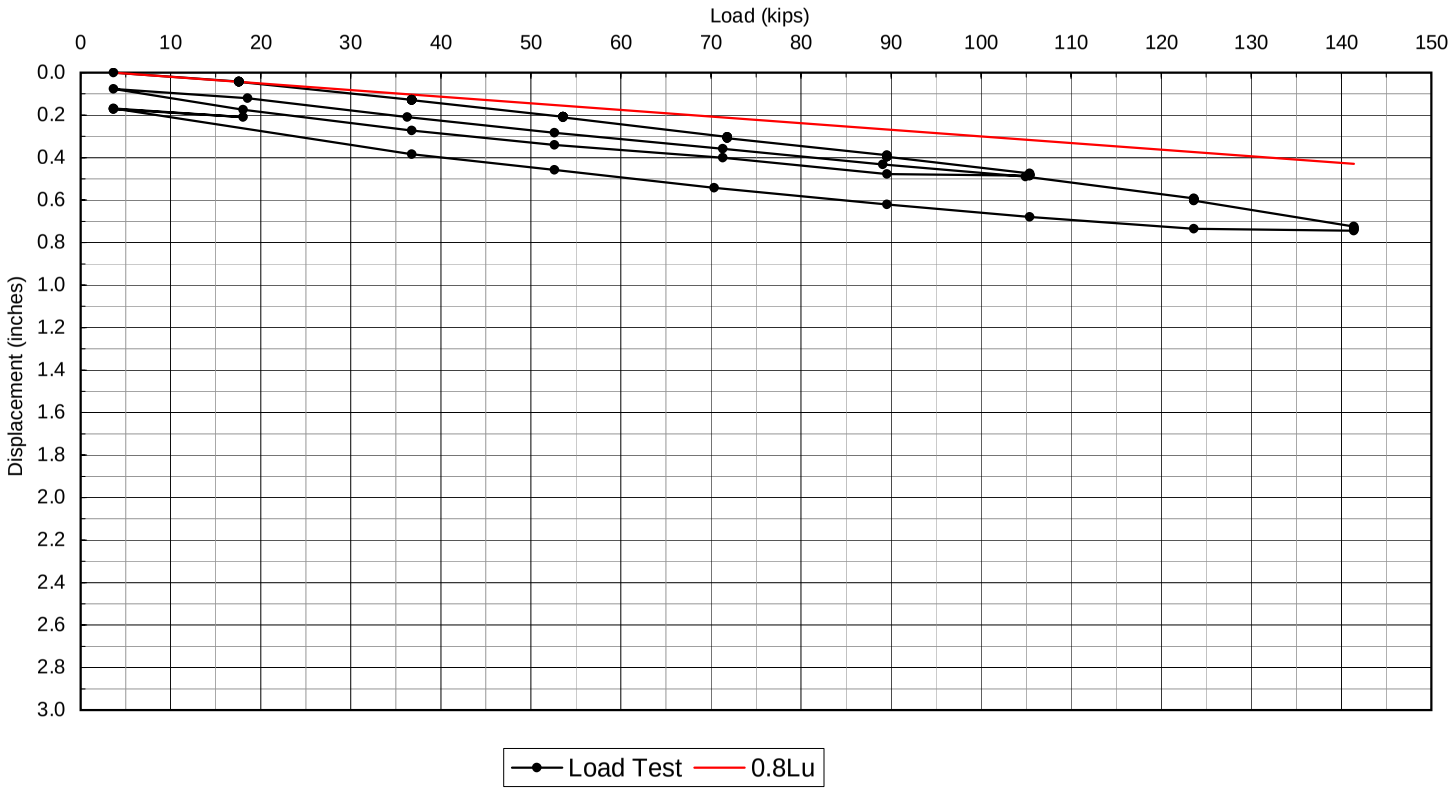
Project:	HBSN Testing Research Program	Manager:	Javier Rodriguez	Date Drilled:	5/8/2008
Location:	Salt Lake City, UT	Engineer:	Javier Rodriguez	Date Grouted:	5/8/2008
Client:	FHWA/ ADSC	Superint.:	Cary Lange		
Job No.:	07150064	Weather:	Sunny, 60 deg.	Capacity:	

Page: 1 of 1

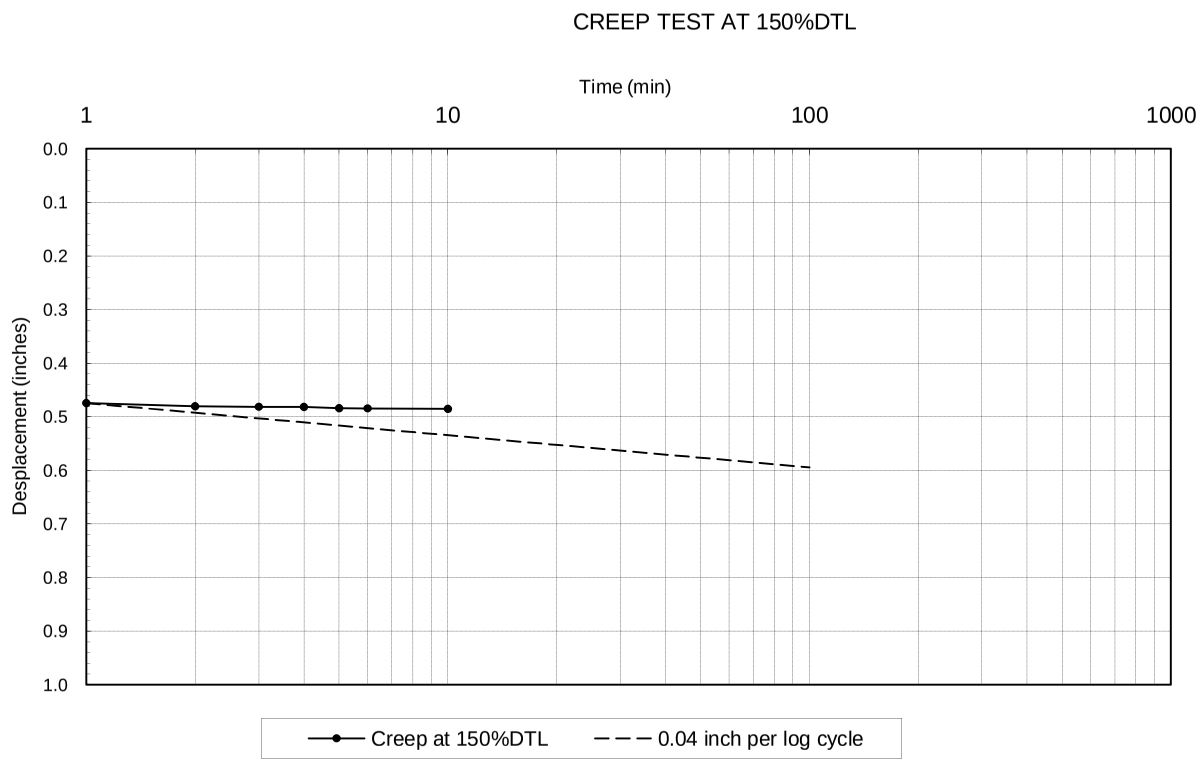
Cary Lange
Installer Representative
(Name and Date)

Andrew Baxter
Schnabel's Representative
(Name and Date)

VERIFICATION SOIL NAIL LOAD TEST
Hollow Core Bar Research - Salt Lake City, Utah



Type of Test: Verification	Bond: 6 ft Unbonded: 13.75 ft	Diameter: 6 in (nominal)	Hollow Core Bar Research Salt Lake City, Utah Test Nail: B3	**SCHNABEL ENGINEERING, LLC** Verification Soil Nail Load Test
Design Test Load (P) : 70 kip	Comments:			Hollow Core Bar Soil Nail Research Salt Lake City, Utah
Maximum Test Load: 200% P = 140 kip				Date: 5/21/08 — 07150064



Type of Test: Verification	Bond: 6 ft Unbonded: 13.75 ft	Diameter: 6 in (nominal)	Hollow Core Bar Research Salt Lake City, Utah Test Nail: B3	**SCHNABEL ENGINEERING, LLC** Verification Soil Nail Load Test Hollow Core Bar Soil Nail Research Salt Lake City, Utah
Design Test Load (P) : 70 kip	Comments:			
Maximum Test Load: 200% P = 140 kip				Date: 5/21/08 — 07150064

Soil Nail Verification Load Test Data

Schnabel Engineering

Project: Hollow Core Bar Soil Nail Research
Location: Salt Lake City Site, Utah
Client: ADSC

Performed: Nicholson Construction Company (Cary Lange)
Observed: Schnabel Engineering (Javier Rodriguez)
Data by: Schnabel Engineering (Javier Rodriguez)

Soil Nail: B3
Date: 5/21/2008

Design Test Load (P): 70 kips **# Dials:** 2 **Jack Calibration:** Pressure = 20.837 X reading (kip) + 23.646 (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	3.5	96.6	100.0	3.7	1	8:20 AM	0.000	0.000			0.000	
25%	17.5	388.3	390.0	17.6	1	8:21 AM	-0.001	0.084			0.042	
	17.5	388.3	390.0	17.6	2	8:22 AM	-0.001	0.084			0.042	
	17.5	388.3	390.0	17.6	3	8:23 AM	-0.001	0.084			0.042	
	17.5	388.3	390.0	17.6	4	8:24 AM	-0.001	0.084			0.042	
	17.5	388.3	390.0	17.6	5	8:25 AM	0.002	0.084			0.043	
	17.5	388.3	390.0	17.6	6	8:26 AM	0.002	0.084			0.043	
	17.5	388.3	390.0	17.6	10	8:30 AM	0.002	0.084			0.043	
50%	35.0	752.9	790.0	36.8	1	8:31 AM	0.079	0.176			0.128	
	35.0	752.9	790.0	36.8	2	8:32 AM	0.079	0.176			0.128	
	35.0	752.9	790.0	36.8	3	8:33 AM	0.080	0.176			0.128	
	35.0	752.9	790.0	36.8	4	8:34 AM	0.081	0.176			0.129	
	35.0	752.9	790.0	36.8	5	8:35 AM	0.082	0.176			0.129	
	35.0	752.9	790.0	36.8	6	8:36 AM	0.082	0.176			0.129	
	35.0	752.9	790.0	36.8	10	8:40 AM	0.083	0.177			0.130	
75%	52.5	1117.6	1140.0	53.6	1	8:41 AM	0.162	0.253			0.208	
	52.5	1117.6	1140.0	53.6	2	8:42 AM	0.162	0.253			0.208	
	52.5	1117.6	1140.0	53.6	3	8:43 AM	0.163	0.253			0.208	
	52.5	1117.6	1140.0	53.6	4	8:44 AM	0.163	0.253			0.208	
	52.5	1117.6	1140.0	53.6	5	8:45 AM	0.163	0.253			0.208	
	52.5	1117.6	1140.0	53.6	6	8:46 AM	0.166	0.254			0.210	
	52.5	1117.6	1140.0	53.6	10	8:50 AM	0.167	0.254			0.211	
100%	70.0	1482.2	1520.0	71.8	1	8:51 AM	0.258	0.346			0.302	
	70.0	1482.2	1520.0	71.8	2	8:52 AM	0.259	0.346			0.303	
	70.0	1482.2	1520.0	71.8	3	8:53 AM	0.260	0.347			0.304	
	70.0	1482.2	1520.0	71.8	4	8:54 AM	0.262	0.349			0.306	
	70.0	1482.2	1520.0	71.8	5	8:55 AM	0.263	0.350			0.307	
	70.0	1482.2	1520.0	71.8	6	8:56 AM	0.264	0.351			0.308	
	70.0	1482.2	1520.0	71.8	10	9:00 AM	0.265	0.353			0.309	
125%	87.5	1846.9	1890.0	89.6	1	9:01 AM	0.346	0.431			0.389	
	87.5	1846.9	1890.0	89.6	2	9:02 AM	0.349	0.434			0.392	
	87.5	1846.9	1890.0	89.6	3	9:03 AM	0.350	0.435			0.393	
	87.5	1846.9	1890.0	89.6	4	9:04 AM	0.352	0.436			0.394	
	87.5	1846.9	1890.0	89.6	5	9:05 AM	0.353	0.438			0.396	
	87.5	1846.9	1890.0	89.6	6	9:06 AM	0.353	0.438			0.396	
	87.5	1846.9	1890.0	89.6	10	9:10 AM	0.354	0.438			0.396	
150%	105.0	2211.5	2220.0	105.4	1	9:11 AM	0.433	0.516			0.475	
	105.0	2211.5	2220.0	105.4	2	9:12 AM	0.439	0.522			0.481	
	105.0	2211.5	2220.0	105.4	3	9:13 AM	0.440	0.523			0.482	
	105.0	2211.5	2220.0	105.4	4	9:14 AM	0.441	0.523			0.482	
	105.0	2211.5	2220.0	105.4	5	9:15 AM	0.443	0.525			0.484	
	105.0	2211.5	2220.0	105.4	6	9:16 AM	0.444	0.525			0.485	
	105.0	2211.5	2220.0	105.4	10	9:20 AM	0.445	0.526			0.486	

Soil Nail Verification Load Test Data

Schnabel Engineering

Project: Hollow Core Bar Soil Nail Research
Location: Salt Lake City Site, Utah
Client: ADSC

Performed: Nicholson Construction Company (Cary Lange)
Observed: Schnabel Engineering (Javier Rodriguez)
Data by: Schnabel Engineering (Javier Rodriguez)

Soil Nail: B3
Date: 5/21/2008

Design Test Load (P): 70 kips **# Dials:** 2 **Jack Calibration:** Pressure = 20.837 X reading (kip) + 23.646 (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%	87.5	1846.9	1890.0	89.6	1	9:21 AM	0.437	0.517			0.477	
100%	70.0	1482.2	1510.0	71.3	1	9:22 AM	0.359	0.442			0.401	
75%	52.5	1117.6	1120.0	52.6	1	9:23 AM	0.300	0.381			0.341	
50%	35.0	752.9	790.0	36.8	1	9:24 AM	0.234	0.312			0.273	
25%	17.5	388.3	400.0	18.1	1	9:25 AM	0.141	0.207			0.174	
AL	3.5	96.6	100.0	3.7	1	9:26 AM	0.064	0.089			0.077	
25%	17.5	388.3	410.0	18.5	1	9:27 AM	0.090	0.150			0.120	
50%	35.0	752.9	780.0	36.3	1	9:28 AM	0.171	0.247			0.209	
75%	52.5	1117.6	1120.0	52.6	1	9:29 AM	0.244	0.322			0.283	
100%	70.0	1482.2	1510.0	71.3	1	9:30 AM	0.318	0.398			0.358	
125%	87.5	1846.9	1880.0	89.1	1	9:31 AM	0.391	0.472			0.432	
150%	105.0	2211.5	2210.0	104.9	1	9:32 AM	0.450	0.530			0.490	
175%	122.5	2576.2	2600.0	123.6	1	9:33 AM	0.553	0.631			0.592	
	122.5	2576.2	2600.0	123.6	2	9:34 AM	0.556	0.634			0.595	
	122.5	2576.2	2600.0	123.6	3	9:35 AM	0.559	0.636			0.598	
	122.5	2576.2	2600.0	123.6	4	9:36 AM	0.559	0.637			0.598	
	122.5	2576.2	2600.0	123.6	5	9:37 AM	0.559	0.637			0.598	
	122.5	2576.2	2600.0	123.6	6	9:38 AM	0.562	0.639			0.601	
	122.5	2576.2	2600.0	123.6	10	9:42 AM	0.563	0.641			0.602	
200%	140.0	2940.8	2970.0	141.4	1	9:43 AM	0.687	0.763			0.725	
	140.0	2940.8	2970.0	141.4	2	9:44 AM	0.691	0.767			0.729	
	140.0	2940.8	2970.0	141.4	3	9:45 AM	0.694	0.769			0.732	
	140.0	2940.8	2970.0	141.4	4	9:46 AM	0.698	0.773			0.736	
	140.0	2940.8	2970.0	141.4	5	9:47 AM	0.701	0.776			0.739	
	140.0	2940.8	2970.0	141.4	6	9:48 AM	0.703	0.779			0.741	
	140.0	2940.8	2970.0	141.4	10	9:52 AM	0.705	0.782			0.744	
175%	122.5	2576.2	2600.0	123.6	1	9:53 AM	0.697	0.774			0.736	
150%	105.0	2211.5	2220.0	105.4	1	9:54 AM	0.639	0.718			0.679	
125%	87.5	1846.9	1890.0	89.6	1	9:55 AM	0.580	0.661			0.621	
100%	70.0	1482.2	1490.0	70.4	1	9:56 AM	0.501	0.582			0.542	
75%	52.5	1117.6	1120.0	52.6	1	9:57 AM	0.417	0.500			0.459	
50%	35.0	752.9	790.0	36.8	1	9:58 AM	0.342	0.425			0.384	
25%	17.5	388.3	400.0	18.1	1	9:59 AM						
AL	3.5	96.6	100.0	3.7	1	10:00 AM						
	3.5	96.6	100.0	3.7	10	10:09 AM						
25%	17.5	388.3	400.0	18.1	1	10:10 AM						

ANCHOR STRESSING FORM

Job Name: City Creek Center Block 76
Anchor Designation: FHWA HBSN-
Design Load (k): 70

B3

Added Tail Length (ft): 36
Unstressed Tail (ft): 9
Free Length (ft): 15.0
Bond Length (ft): 6

NICHOLSON

Date:
Test By: BJH

Anchor Load %	Elapsed Time (min)	Actual Time	Anchor Load (kips)	JACK JD-203 Pressure Gauge Calc (psi)	JACK JD-203 Pressure Gauge ACTUAL A (psi)	Backup Gauge JD-203 ACTUAL B (psi)	GK1115 Readout: MG003 Calc ustrain (strain)	GK1115 Readout: MG003 ACTUAL (strain)	Anchor Elongations Nail A Dial 1 (in)	Anchor Elongations Nail Extension B Dial 2 (in)	Anchor Elongations Nail Extension Average (in)	Anchor Elongations Actual Deflections (in)	Anchor Elongations Min .8* FL (in)	Anchor Elongations Max FL+.5*BL (in)	NOTES
5%	0		4	100	100	100	870	816	0.000	0.000			0.000	0.000	
25%	1		18	390	390	390	1070	964	0.001	0.084			0.042	0.063	
	2				"	"		962	"	"					
	3				"	"		964	"	"					
	4				"	"		"	"	"					
	5				"	"		968	0.002	0.084					
	6				"	"		"	"	"					
	10				"	"		971	"	"					
50%	1		35	760	810	810	1310	1222	0.029	0.176			0.094	0.142	
	2				"	"		1225	"	"					
	3				"	"		1222	0.030	"					
	4				"	"		1223	0.031	"					
	5				"	"		1225	0.032	"					
	6				"	"		1[illegible]	"	"					
	10				"	"		1234	0.033	0.177					
75%	1		53	1120	1140	1190	1560	1452	0.162	0.253			0.147	0.220	
	2				"	"		1450	"	"					
	3				"	"		1451	0.163	"					
	4				"	"		1452	"	"					
	5				"	"		1453	"	"					
	6				"	"		1459	0.166	0.254					Bumped
	10				"	"		1460	0.167	0.254					
100%	1		70	1490	1580	1540	1810	1702	0.252	0.346			0.199	0.299	
	2					"		1699	0.250	0.346					Bumped
	3				"	"		1701	0.260	0.343					
	4				"	"		1707	0.252	0.349					"
	5				"	"		[illegible]	0.263	0.350					"
	6				"			1714	0.264	0.351					"
	10				"	"		1715	0.265	0.353					"
125%	1		88	1850	1890	1900	2060	[illegible]	0.346	0.431			0.252	0.378	
	2				"	"	1931		0.347	0.434					Bumped
	3				"	"	1929		0.350	0.435					
	4				"	"	1933		0.352	0.435					"
	5				"	"	1936		0.353	0.436					"
	6				"	"	1932		"	"					
	10				"	"	1930		0.354	0.438					
150%	1		105	2210	2300	2350	2300	2140	0.433	0.516			0.304	0.456	
	2				"	"		2156	0.434	0.522					
	3							2162	0.440	0.522		Bumped			
	4				"	"		2163	0.441	0.523					
	5				"	"		2164	0.442	0.523					
	6				"	"		2168	0.444	0.525					
	10							[illegible]	0.445	0.525					
	20														
	30														
	50														
	60														

ANCHOR STRESSING FORM

Job Name: City Creek Center Block 76
Anchor Designation: FHWA HBSN-
Design Load (k): 70

Added Tail Length (ft): 1.7
Unstressed Tail (ft): 0.7
Free Length (ft): 15.0
Bond Length (ft): 6

NICHOLSON

Date:
Test By: BJH

Anchor Load %	Elapsed Time (min)	Actual Time	Anchor Load (kips)	JACK JD-203 Pressure Gauge Calc (psi)	JACK JD-203 Pressure Gauge ACTUAL A (psi)	Backup Gauge JD-203 ACTUAL B (psi)	GK1115 Readout: MG003 Calc ustrain (strain)	GK1115 Readout: MG003 ACTUAL (strain)	Anchor Elongations Nail A Dial 1 (in)	Anchor Elongations Nail Extension B Dial 2 (in)	Anchor Elongations Nail Extension Average (in)	Anchor Elongations Actual Deflections (in)	Anchor Elongations Min .8* FL (in)	Anchor Elongations Max FL+.5*BL (in)	NOTES
125%	1		88	1850	1890	[illegible]	2060	[illegible]	[illegible]	[illegible]					
100%	1		70	1490	[illegible]	[illegible]	1810	[illegible]	[illegible]	0.448			0.252	0.378	
75%	1		53	1120	[illegible]	[illegible]	1560	[illegible]	[illegible]	[illegible]			0.199	0.299	
50%	1		35	760	[illegible]	300	1310	[illegible]	[illegible]	[illegible]			0.147	0.220	
25%	1		18	390	[illegible]	[illegible]	1070	[illegible]	[illegible]	[illegible]			0.094	0.142	
5%	1		4	100	[illegible]	[illegible]	870	842	0.064	0.089			0.042	0.063	
25%	1		18	390	[illegible]	[illegible]	1070	974	0.095	[illegible]			0.000	0.000	
50%	1		35	760	750	800	1310	1224	[illegible]	[illegible]			0.042	0.063	
75%	1			1120	1120	[illegible]		1153	[illegible]	[illegible]			0.094	0.142	
100%	1			[illegible]	1490	240		[illegible]	[illegible]	[illegible]					
125%	1			[illegible]	1880	1900		1941	[illegible]	0.432					
150%	1			[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]					
175%	1		123	2580	2600	2620	2550	2500	[illegible]	0.631			0.357	0.535	
	2				"	"		2389	0.556	0.634					
	3				"	"		[illegible]	0.559	[illegible]					
	5				"	"		2390	[illegible]	[illegible]					
	6				"	"		2314	[illegible]	[illegible]					
	10				"	"		2381	[illegible]	0.641					
200%	1			[illegible]	[illegible]	2400		[illegible]	[illegible]	[illegible]					
	2				"	"		[illegible]	[illegible]	[illegible]					
	3				"	"		[illegible]		[illegible]					
	4					"		[illegible]	[illegible]	[illegible]					
	5					"		[illegible]	[illegible]		[illegible]				
	6					"		[illegible]	[illegible]	[illegible]					
	10				"			"	[illegible]	[illegible]					
	20														
	30														
	50														
	60														
175%	1		123	2580	2600	2620	2550	[illegible]	[illegible]	[illegible]			0.357	0.535	
150%	1		105	2210	[illegible]	[illegible]	2300	2220	[illegible]	0.713			0.304	0.456	
125%	1		88	1850	1810	[illegible]	2060	2058	[illegible]	0.641			0.252	0.378	
100%	1		70	1490	[illegible]	1500	1810	[illegible]	0.501	[illegible]			0.199	0.299	
75%	1		53	1120	1120	1130	1560	1524	[illegible]	[illegible]			0.147	0.220	
50%	1		35	760	790	[illegible]	1310	1312	[illegible]	[illegible]			0.094	0.142	
5%	1		4	100	[illegible]	[illegible]	870	845	[illegible]	[illegible]			0.000	0.000	
25%	1		18	390	[illegible]	[illegible]	1070	[illegible]	[illegible]	[illegible]			0.042	0.063	
5%	1		4	100		[illegible]	870	827	0.160	[illegible]			0.000	0.000	
	2				"	"		830	"	"					
	3				"	"		831	"	"					
	4				"	"		[illegible]	"	"					
	5				"	"		"	"	"					
	6				"	"		[illegible]	"	"					

ANCHOR STRESSING FORM

Job Name: City Creek Center Block 76
Anchor Designation: FHWA HBSN-
Design Load (k): 70

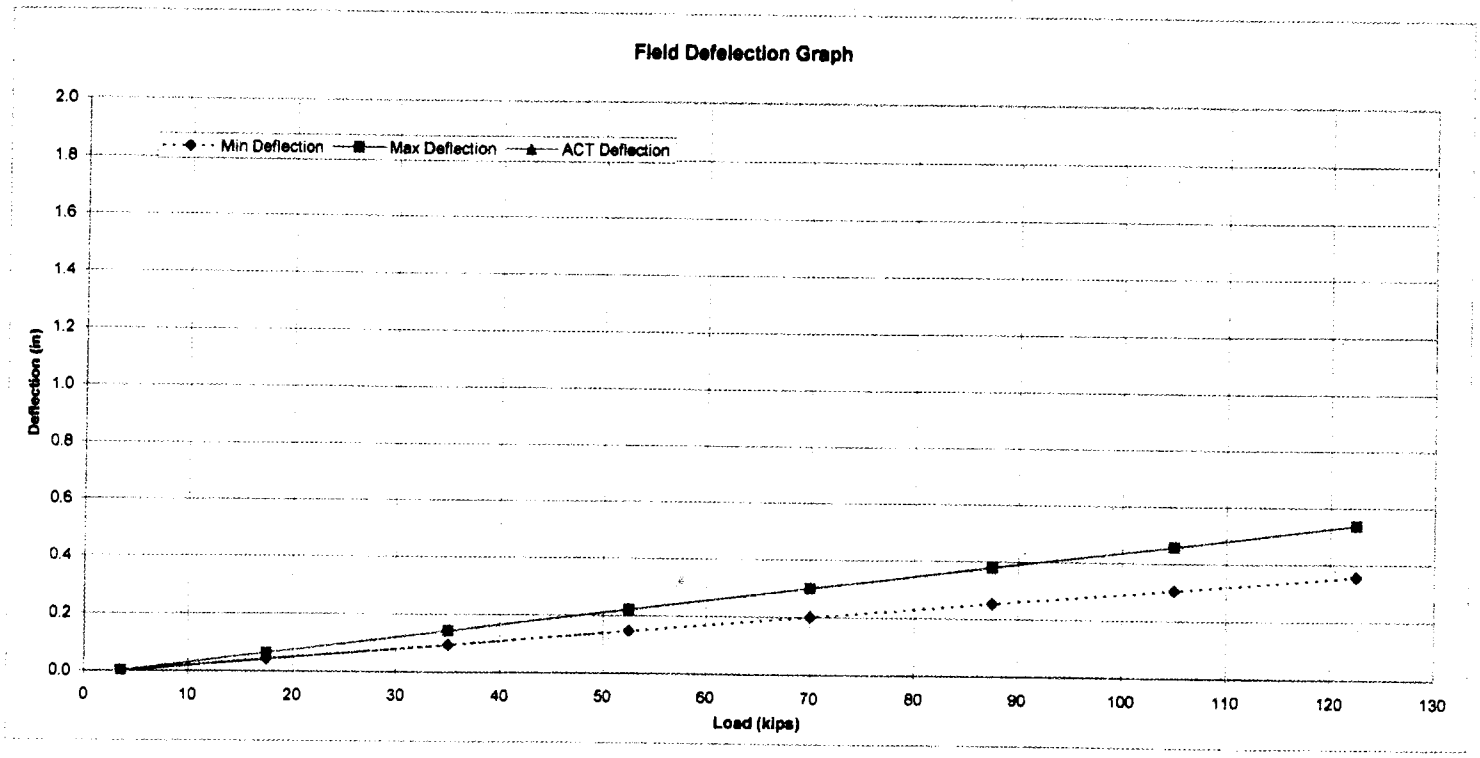
Added Tail Length (ft): 1.7
Unstressed Tail (ft): 0.7
Free Length (ft): 15.0
Bond Length (ft): 6

NICHOLSON

Date:
Test By: BJH

Anchor Load %	Elapsed Time (min)	Actual Time	Anchor Load (kips)	JACK JD-203 Pressure Gauge Calc (psi)	JACK JD-203 Pressure Gauge ACTUAL A (psi)	Backup Gauge JD-203 ACTUAL B (psi)	GK1115 Readout: Calc ustrain (strain)	GK1115 Readout: MG003 ACTUAL (strain)	Anchor Elongations: Nail A Dial 1 (in)	Anchor Elongations: Nail Extension B Dial 2 (in)	Anchor Elongations: Nail Extension Average (in)	Anchor Elongations: Actual Deflections (in)	Anchor Elongations: Min .8* FL (in)	Anchor Elongations: Max FL+.5*BL (in)	NOTES
	10			[illegible]	100	110		[illegible]	[illegible]	[illegible]					

A	-1.34523	kips	-57.7471
B	0.048039	kips/psi	0.070609
ZERO	28.04407	psi	819.4



[illegible] 370 400 420 [illegible] [illegible] 0.242

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 (psi)	Gs	Observations of Grouting
	0												~18 gal to fill casing
	1				0:00	0:15	F-C Poorly Graded Gravel with						
	2				0:15	0:19	Sand (GP), trace silt, moist,						
	3				0:19	0:35	brown						48 gal total.
	4				0:35	0:41							
	5				0:41	1:18	Loss of Circulation						
	6				1:18	1:40	Ream Hole						Washed out grout 0 to 2 ft
	7				1:40	2:03	Ream Hole						from top of bond zone
	8				2:03	2:06	F-C Poorly Graded Sand						(measured with tape
	9				2:06	2:09	(SP), trace silt, moist,						measure), difficulty getting
	10				2:09	2:13	brown						accurate value.
	11				2:13	2:15							
	12				0:00	0:08			0:00	0:08	75		Washed out with tube 8.5 ft
	13				0:08	0:13			0:08	0:13			from end of bar.
	14				0:13	0:17			0:13	0:17			
	15				0:17	0:30			0:17	0:30			
	16				0:30	0:41			0:30	0:41			
	17				0:41	1:04	Reamed Hole 3x		0:41	1:04		1.85	
	18				1:04	2:01			1:04	2:01			
	19						B.O.H. 18 ft						
	20												
							Drilled 11 ft of temporary casing by air rotary method. Inserted hollow core bar to tip of casing and performed self-drilling - self-grouting from 11 to 17 ft. The HCB was drilled with a PVC pipe attached to the bar to serve as as bond breaker from wall face to top of bond zone. Grout outside the PVC was washed with water from wall face to 2 ft above top of bond zone. Extracted temporary casing.						

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.

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Schnabel Engineering

SOIL NAIL:	B4		
Soil Boring:	-		
Soil Nail Geometry:	Perpendicular to face		
Soil Nail elev.	~45		ft
Total casing length	11		ft
Total hole depth	18		ft
Total grout length	9		ft
	Design	As-built	
Total bar length	20	19.67	ft
Bonded length	6	6	ft
Unbonded length	11	10.5	ft
Tail length	3	3.17	ft
Bit type	Cross Cut		
Bit diameter	4		in
Hole inclination	15		degrees
Centralizers	None		
Reinforcing steel:			
Date of installation	5/8/2008		
Supplier	Williamsform		
Casing description	casing bit is 6 in OD		
Diameter/Thickness	4.5	0.25	in
Nail description	R51N Hollow Core Bar		
	Design	As-built	
No. Bars	1	1	
Diameter	1.36	1.36	in
Primary grouting			
Date of grouting	5/8/2008		
Cement typ. & supp	Type 1		
Dosage / Admixture	Super-plasticizer		
Grouting method	Self-drilling - Self Grouting		
Batch ID	GS	Cubes	
1	1.85	1 Set	
2	-	-	
3	-	-	
Final	-	-	
Volume	Theor.	As-built	
Drilling Grout	-	48	gal
Final Grout	-	-	gal

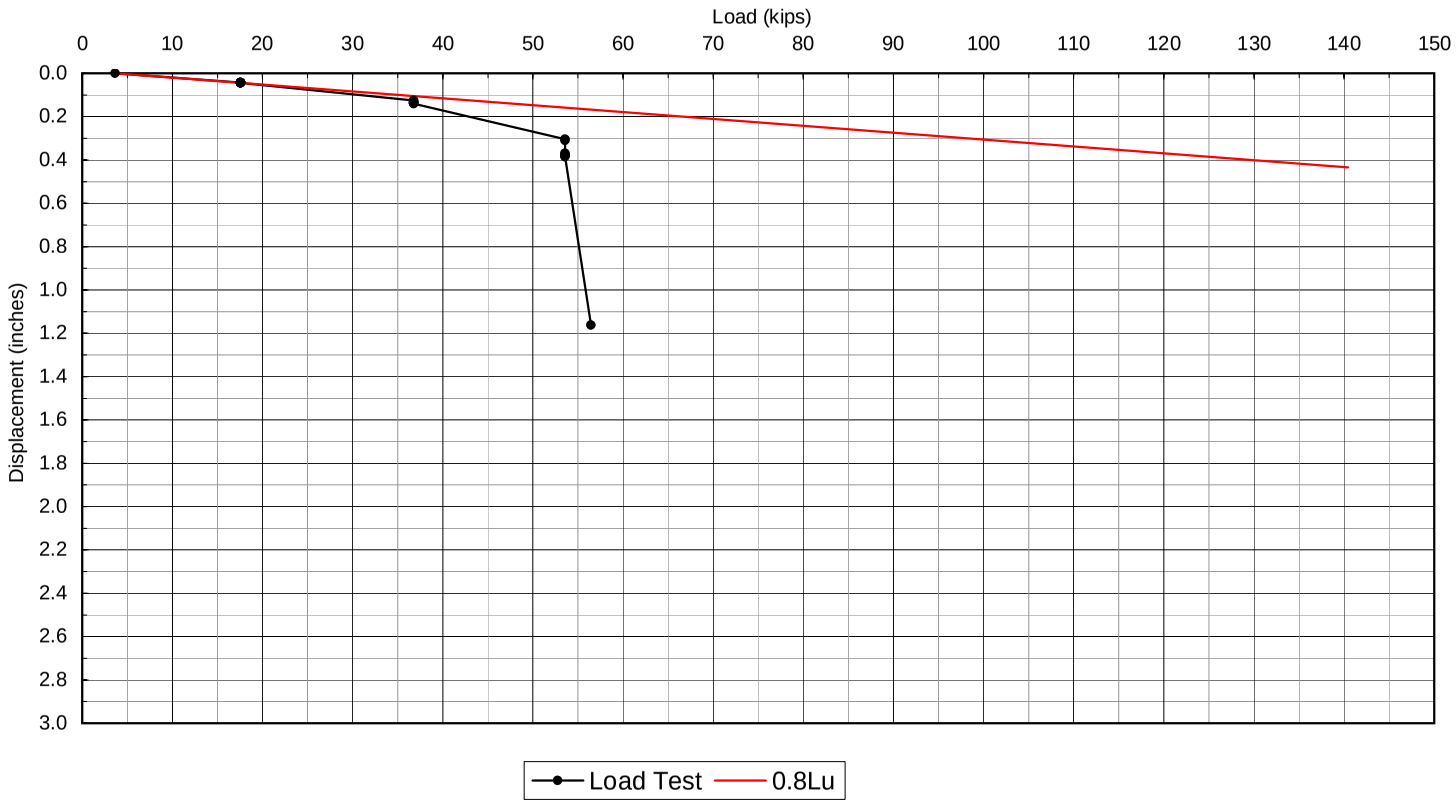
Project:	HBSN Testing Research Program	Manager:	Javier Rodriguez	Date Drilled:	5/8/2008
Location:	Salt Lake City, UT	Engineer:	Javier Rodriguez	Date Grouted:	5/8/2008
Client:	FHWA/ ADSC	Superint.:	Cary Lange		
Job No.:	07150064	Weather:	Sunny, 60 deg.	Capacity:	

Page: 1 of 1

Cary Lange
Installer Representative
(Name and Date)

Andrew Baxter
Schnabel's Representative
(Name and Date)

VERIFICATION SOIL NAIL LOAD TEST
Hollow Core Bar Research - Salt Lake City, Utah



Type of Test: Verification	Bond: 6 ft Unbonded: 14 ft	Diameter: 4 in (nominal)	Hollow Core Bar Research Salt Lake City, Utah Test Nail: B4	**SCHNABEL ENGINEERING, LLC**	
				Verification Soil Nail Load Test	
Design Test Load (P) : 70 kip	Comments:			Hollow Core Bar Soil Nail Research	
				Salt Lake City, Utah	
Maximum Test Load: 200% P = 140 kip				Date: 5/21/08	07150064

Soil Nail Verification Load Test Data

Schnabel Engineering

Project: Hollow Core Bar Soil Nail Research
Location: Salt Lake City Site, Utah
Client: ADSC

Performed: Nicholson Construction Company (Cary Lange)
Observed: Schnabel Engineering (Javier Rodriguez)
Data by: Schnabel Engineering (Javier Rodriguez)

Soil Nail: B4
Date: 5/21/2008

Design Test Load (P): 70 kips **# Dials:** 2 **Jack Calibration:** Pressure = 20.837 X reading (kip) + 23.646 (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	3.5	96.6	100.0	3.7	1	11:15 AM	0.000	0.000			0.000	
25%	17.5	388.3	390.0	17.6	1		0.065	0.020			0.043	
	17.5	388.3	390.0	17.6	2		0.065	0.020			0.043	
	17.5	388.3	390.0	17.6	3		0.065	0.020			0.043	
	17.5	388.3	390.0	17.6	4		0.065	0.020			0.043	
	17.5	388.3	390.0	17.6	5		0.067	0.021			0.044	
	17.5	388.3	390.0	17.6	6		0.069	0.021			0.045	
	17.5	388.3	390.0	17.6	10		0.069	0.021			0.045	
50%	35.0	752.9	790.0	36.8	1		0.158	0.093			0.126	
	35.0	752.9	790.0	36.8	2		0.162	0.098			0.130	
	35.0	752.9	790.0	36.8	3		0.168	0.103			0.136	
	35.0	752.9	790.0	36.8	4		0.169	0.104			0.137	
	35.0	752.9	790.0	36.8	5		0.170	0.105			0.138	
	35.0	752.9	790.0	36.8	6		0.171	0.107			0.139	
	35.0	752.9	790.0	36.8	10		0.172	0.108			0.140	
75%	52.5	1117.6	1140.0	53.6	1		0.329	0.279			0.304	
	52.5	1117.6	1140.0	53.6	2		0.335	0.285			0.310	
	52.5	1117.6	1140.0	53.6	3		0.443	0.295			0.369	
	52.5	1117.6	1140.0	53.6	4		0.450	0.302			0.376	
	52.5	1117.6	1140.0	53.6	5		0.454	0.305			0.380	
	52.5	1117.6	1140.0	53.6	6		0.456	0.306			0.381	
	52.5	1117.6	1140.0	53.6	10		0.461	0.311			0.386	
100%	70.0	1482.2	1430.0	67.5	1		1.174	1.150			1.162	Failed at 1200
	70.0	1482.2	1430.0	67.5	2							
	70.0	1482.2	1430.0	67.5	3							
	70.0	1482.2	1430.0	67.5	4							
	70.0	1482.2	1430.0	67.5	5							
	70.0	1482.2	1430.0	67.5	6							
	70.0	1482.2	1430.0	67.5	10							

ANCHOR STRESSING FORM

Job Name: City Creek Center Block 76
Anchor Designation: FHWA HBSN-
Design Load (k): 70

P7 10

Slope 19"
Cut 94"
Added Tail Length (ft): ~~14'~~ 36"
Unstressed Tail (ft): ~~8'~~ 96"
Free Length (ft): 15.0
Bond Length (ft): 6

NICHOLSON

Date:
Test By: BJH

Anchor Load %	Elapsed Time (min)	Actual Time	Anchor Load (kips)	JACK Pressure Gauge Calc (psi)	JD-203 Pressure Gauge ACTUAL A (psi)	Backup Gauge JD-203 ACTUAL B (psi)	GK1115 Readout: MG003 Calc ustrain (strain)	GK1115 Readout: MG003 ACTUAL (strain)	Anchor Elongations Nail A Dial 1 (in)	Nail Extension B Dial 2 (in)	Nail Extension Average (in)	Actual Deflections (in)	Min .8* FL (in)	Max FL+.5*BL (in)	NOTES
5%	0		4	100	110	110	870	854	0.001	0.001			0.000	0.000	
25%	1		18	390	410	420	1070	1[illegible]	0.035	0.020			0.042	0.063	
	2				"	"		974	"	"					
	3				"	"		974	"	"					
	4				"	"		972	"	"					
	5				"	"		979	0.067	0.021					Bump
	6				"	"		978	0.069	0.021					
	10				"	"		979	0.069	0.021					
50%	1		35	760	790	800	1310	1226	0.158	0.093			0.094	0.142	
	2				"	"		1234	0.162	0.098					Bumped
	3				"	"		1245	0.165	0.103					"
	4				"	"		1249	0.169	0.104					
	5				"	"		1248	0.170	0.105					
	6				"	"		1251	0.171	0.107					
	10				"	"		1256	0.172	0.108					
75%	1		53	1120	1140	1160	1560	1460	0.329	0.279			0.147	0.220	
	2				"	"		1466	0.335	0.285					Bumped
	3				"	"		1466	0.443	0.295					Bumped
	4				"	"		1459	0.450	0.302					
	5				"	"		1450	0.454	0.305					
	6				"	"		1451	0.456	0.306					
	10				"	"		1450	0.461	0.311					
100%	1		70	1490			1810	1532	1.174	1.150			0.199	0.299	
	2			100				833	0.844	0.891					
	3									went	1430	no higher			
	4									the fell to	1200	& wont	go	back up	
	5									lost	pulling	back out			
	6			1600				1450	2.101	2.048					
	10			1250						went	1500	then fell back to			
125%	1		88	1850			2060			.250			0.252	0.378	
	2														
	3														
	4														
	5														
	6														
	10														
150%	1		105	2210			2300						0.304	0.456	
	2														
	3														
	4														
	5														
	6														
	10														
	20														
	30														
	50														
	60														

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 (psi)	Gs	Observations of Grouting
	0						Include a description of drilling equipment						
	1				0:00	0:23			0:00	0:23			
	2				0:23	0:34	F-C Poorly Graded Gravel with		0:23	0:34			
	3				0:34	1:16	Sand (GP), trace silt, moist,		0:34	1:16			
	4				1:16	1:34	brown		1:16	1:34			
	5				1:34	1:50			1:34	1:50	75		
	6				1:50	2:05			1:50	2:05			36.4 gal
	7				0:00	0:14			0:00	0:14			
	8				0:14	0:41			0:14	0:41			
	9				0:41	0:57			0:41	0:57			
	10				0:57	1:19			0:57	1:19	85		
	11				1:19	1:36			1:19	1:36			
	12				1:36	2:05			1:36	2:05			
	13				2:05	2:35			2:05	2:35			
	14				2:35	3:09			2:35	3:09			
	15				3:09	3:37			3:09				
	16				3:37	4:05				4:05		1.88	
	17				4:05	4:21	Reamed Hole		4:05	4:21			97.4 gal. total
	18						B.O.H. 17 ft						
	19												
	20												
100							Installed self-drilling - self-grouting hollow core bar soil nail. The bar was drilled with the PVC pipe attached to serve as bond breaker. No casing or washout was performed.						

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 Engineering

SOIL NAIL:	C1		
Soil Boring:	-		
Soil Nail Geometry:	Perpendicular to face		
Soil Nail elev.	~45		ft
Total casing length	-		ft
Total hole depth	17		ft
Total grout length	17		ft
	Design	As-built	
Total bar length	20	19.67	ft
Bonded length	6	6	ft
Unbonded length	11	10.67	ft
Tail length	3	3	ft
Bit type	Cross Cut		
Bit diameter	4		in
Hole inclination	15		degrees
Centralizers	None		
Reinforcing steel:			
Date of installation	5/6/2008		
Supplier	Williamsform		
Casing description	casing bit is 6 in OD		
Diameter/Thickness	4.5	0.25	in
Nail description	R51 N Hollow Core Bar		
	Design	As-built	
No. Bars	1	1	
Diameter	1.36	1.36	in
Primary grouting			
Date of grouting	5/7/2008		
Cement typ. & supp	Type 1		
Dosage / Admixture	Super-plasticizer		
Grouting method	Self-drilling - Self-grouting		
Batch ID	GS	Cubes	
1	1.88	none	
2	-	-	
3	-	-	
Final	-	-	
Volume	Theor.	As-built	
Drilling Grout	-	97.4	gal
Final Grout	-	-	gal

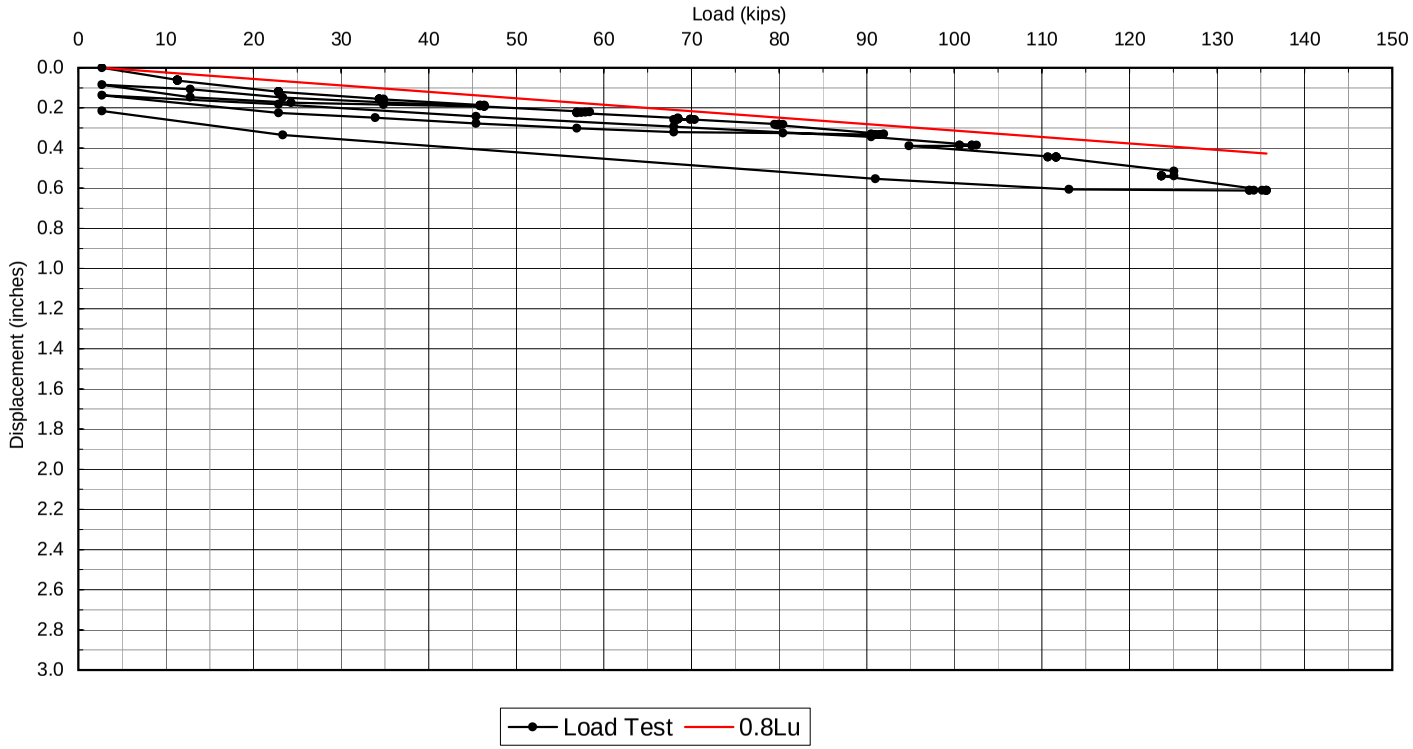
Project:	HBSN Testing Research Program	Manager:	Javier Rodriguez	Date Drilled:	5/7/2008
Location:	Salt Lake City, UT	Engineer:	Javier Rodriguez	Date Grouted:	5/7/2008
Client:	FHWA/ ADSC	Superint.:	Cary Lange		
Job No.:	07150064	Weather:	Sunny, 60 deg.	Capacity:	

Page: 1 of 1

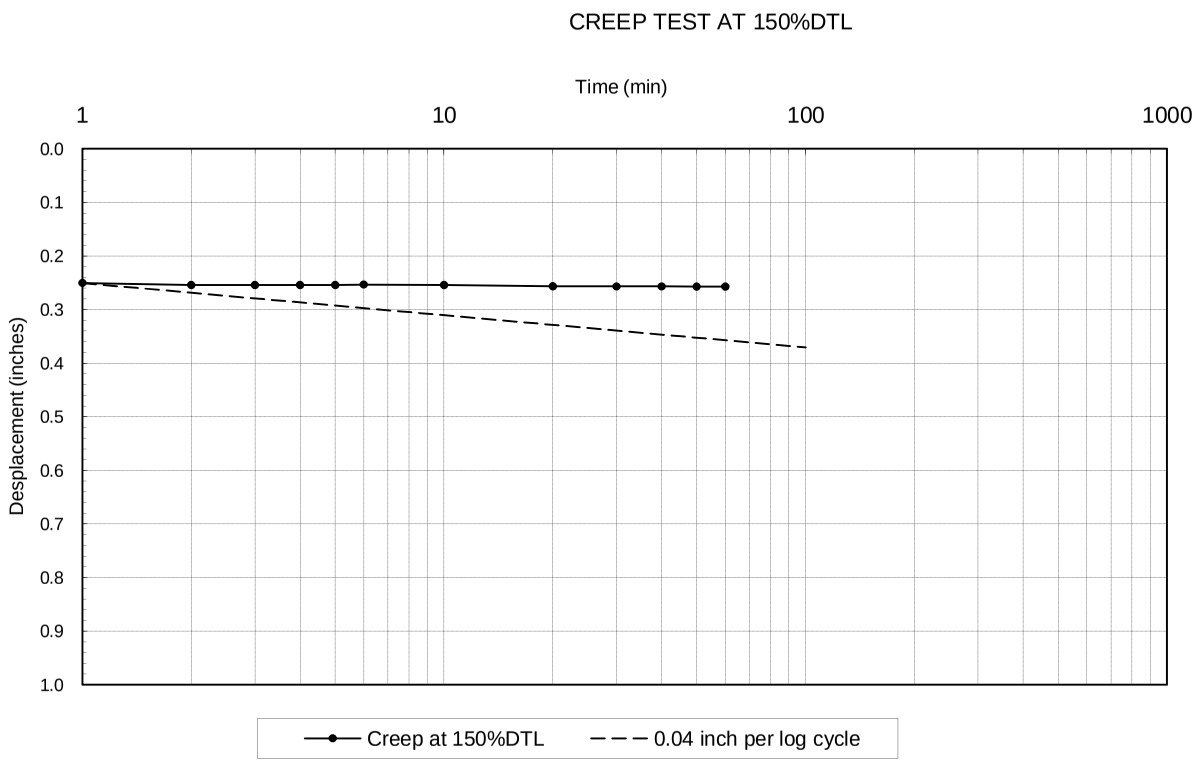
Cary Lange
Installer Representative
(Name and Date)

Andrew Baxter
Schnabel's Representative
(Name and Date)

VERIFICATION SOIL NAIL LOAD TEST
Hollow Core Bar Research - Salt Lake City, Utah



Type of Test: Creep	Bond: 6 ft Unbonded: 14.2 ft	Diameter: 4 in (nominal)	Hollow Core Bar Research Salt Lake City, Utah Test Nail: C1	**SCHNABEL ENGINEERING, LLC** Verification Soil Nail Load Test
Design Test Load (P) : 45 kip	Comments:			Hollow Core Bar Soil Nail Research Salt Lake City, Utah
Maximum Test Load: 300% P = 135 kip				Date: 5/21/08 — 07150064



Type of Test: Creep	Bond: 6 ft Unbonded: 14.2 ft	Diameter: 4 in (nominal)	Hollow Core Bar Research Salt Lake City, Utah Test Nail: C1	**SCHNABEL ENGINEERING, LLC** Verification Soil Nail Load Test
Design Test Load (P) : 45 kip	Comments:			Hollow Core Bar Soil Nail Research Salt Lake City, Utah
Maximum Test Load: 300% P = 135 kip				Date: 5/21/08 — 07150064

Soil Nail Verification Load Test Data

Schnabel Engineering

Project: Hollow Core Bar Soil Nail Research
Location: Salt Lake City Site, Utah
Client: ADSC

Performed: Nicholson Construction Company (Cary Lange)
Observed: Schnabel Engineering (Javier Rodriguez)
Data by: Schnabel Engineering (Javier Rodriguez)

Soil Nail: C1
Date: 5/21/2008

Design Test Load (P): 45 kips **# Dials:** 2 **Jack Calibration:** Pressure = 20.837 X reading (kip) + 23.646 (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	70.5	80.0	2.7	1	1:15 PM	0.000	0.000			0.000	
25%	11.3	258.1	260.0	11.3	1	1:16 PM	0.074	0.047			0.061	
	11.3	258.1	260.0	11.3	2	1:17 PM	0.075	0.049			0.062	
	11.3	258.1	260.0	11.3	3	1:18 PM	0.075	0.049			0.062	
	11.3	258.1	260.0	11.3	4	1:19 PM	0.075	0.049			0.062	
	11.3	258.1	260.0	11.3	5	1:20 PM	0.075	0.049			0.062	
	11.3	258.1	260.0	11.3	6	1:21 PM	0.075	0.049			0.062	
	11.3	258.1	260.0	11.3	10	1:25 PM	0.077	0.051			0.064	
50%	22.5	492.5	500.0	22.9	1	1:26 PM	0.135	0.103			0.119	
	22.5	492.5	500.0	22.9	2	1:27 PM	0.135	0.103			0.119	
	22.5	492.5	500.0	22.9	3	1:28 PM	0.135	0.103			0.119	
	22.5	492.5	500.0	22.9	4	1:29 PM	0.135	0.103			0.119	
	22.5	492.5	500.0	22.9	5	1:30 PM	0.135	0.103			0.119	
	22.5	492.5	500.0	22.9	6	1:31 PM	0.135	0.103			0.119	
	22.5	492.5	500.0	22.9	10	1:35 PM	0.135	0.103			0.119	
75%	33.8	726.9	750.0	34.9	1	1:36 PM	0.171	0.140			0.156	
	33.8	726.9	740.0	34.4	2	1:37 PM	0.171	0.140			0.156	
	33.8	726.9	740.0	34.4	3	1:38 PM	0.171	0.140			0.156	
	33.8	726.9	740.0	34.4	4	1:39 PM	0.171	0.140			0.156	

Soil Nail Verification Load Test Data

Schnabel Engineering

Project: Hollow Core Bar Soil Nail Research
Location: Salt Lake City Site, Utah
Client: ADSC

Performed: Nicholson Construction Company (Cary Lange)
Observed: Schnabel Engineering (Javier Rodriguez)
Data by: Schnabel Engineering (Javier Rodriguez)

Soil Nail: C1
Date: 5/21/2008

Design Test Load (P): 45 kips
 # Dials: 2
Jack Calibration: Pressure = 20.837 X reading (kip) + 23.646 (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:
	33.8	726.9	740.0	34.4	5	1:40 PM	0.171	0.140			0.156	
	33.8	726.9	740.0	34.4	6	1:41 PM	0.171	0.140			0.156	
	33.8	726.9	740.0	34.4	10	1:45 PM	0.171	0.140			0.156	
100%	45.0	961.3	990.0	46.4	1	1:46 PM	0.205	0.168			0.187	
	45.0	961.3	980.0	45.9	2	1:47 PM	0.205	0.169			0.187	
	45.0	961.3	980.0	45.9	3	1:48 PM	0.206	0.169			0.188	
	45.0	961.3	980.0	45.9	4	1:49 PM	0.206	0.169			0.188	
	45.0	961.3	990.0	46.4	5	1:50 PM	0.208	0.170			0.189	
	45.0	961.3	980.0	45.9	6	1:51 PM	0.208	0.170			0.189	
	45.0	961.3	980.0	45.9	10	1:55 PM	0.208	0.170			0.189	
	45.0	961.3	990.0	46.4	20	2:05 PM	0.212	0.174			0.193	
75%	33.8	726.9	750.0	34.9	1	2:06 PM	0.200	0.166			0.183	
50%	22.5	492.5	530.0	24.3	1	2:07 PM	0.190	0.158			0.174	
25%	11.3	258.1	290.0	12.8	1	2:08 PM	0.160	0.133			0.147	
AL	2.3	70.5	80.0	2.7	1	2:09 PM	0.105	0.063			0.084	
25%	11.3	258.1	290.0	12.8	1	2:10 PM	0.128	0.085			0.107	
50%	22.5	492.5	510.0	23.3	1	2:11 PM	0.165	0.131			0.148	
75%	33.8	726.9	750.0	34.9	1	2:12 PM	0.190	0.154			0.172	
100%	45.0	961.3	990.0	46.4	1	2:13 PM	0.212	0.175			0.194	

Soil Nail Verification Load Test Data

Schnabel Engineering

Project: Hollow Core Bar Soil Nail Research
Location: Salt Lake City Site, Utah
Client: ADSC

Performed: Nicholson Construction Company (Cary Lange)
Observed: Schnabel Engineering (Javier Rodriguez)
Data by: Schnabel Engineering (Javier Rodriguez)

Soil Nail: C1
Date: 5/21/2008

Design Test Load (P): 45 kips
 # Dials: 2
Jack Calibration: Pressure = 20.837 X reading (kip) + 23.646 (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	1195.7	1240.0	58.4	1	2:14 PM	0.240	0.199			0.220	
	56.3	1195.7	1230.0	57.9	2	2:15 PM	0.242	0.200			0.221	
	56.3	1195.7	1210.0	56.9	3	2:16 PM	0.242	0.200			0.221	
	56.3	1195.7	1210.0	56.9	4	2:17 PM	0.242	0.200			0.221	
	56.3	1195.7	1220.0	57.4	5	2:18 PM	0.243	0.202			0.223	
	56.3	1195.7	1210.0	56.9	6	2:19 PM	0.243	0.202			0.223	
	56.3	1195.7	1210.0	56.9	10	2:23 PM	0.244	0.204			0.224	
150%	67.5	1430.1	1450.0	68.5	1	2:28 PM	0.272	0.229			0.251	
	67.5	1430.1	1450.0	68.5	2	2:29 PM	0.277	0.232			0.255	
	67.5	1430.1	1450.0	68.5	3	2:30 PM	0.277	0.232			0.255	
	67.5	1430.1	1450.0	68.5	4	2:31 PM	0.277	0.232			0.255	
	67.5	1430.1	1450.0	68.5	5	2:32 PM	0.277	0.232			0.255	
	67.5	1430.1	1450.0	68.5	6	2:33 PM	0.276	0.231			0.254	
	67.5	1430.1	1450.0	68.5	10	2:37 PM	0.277	0.232			0.255	
	67.5	1430.1	1450.0	68.5	20	2:47 PM	0.279	0.234			0.257	
	67.5	1430.1	1480.0	69.9	30	2:57 PM	0.280	0.234			0.257	
	67.5	1430.1	1480.0	69.9	40	3:07 PM	0.280	0.234			0.257	
	67.5	1430.1	1440.0	68.0	50	3:17 PM	0.281	0.234			0.258	
	67.5	1430.1	1490.0	70.4	60	3:27 PM	0.281	0.234			0.258	

Soil Nail Verification Load Test Data

Schnabel Engineering

Project: Hollow Core Bar Soil Nail Research
Location: Salt Lake City Site, Utah
Client: ADSC

Performed: Nicholson Construction Company (Cary Lange)
Observed: Schnabel Engineering (Javier Rodriguez)
Data by: Schnabel Engineering (Javier Rodriguez)

Soil Nail: C1
Date: 5/21/2008

Design Test Load (P): 45 kips
 # Dials: 2
Jack Calibration: Pressure = 20.837 X reading (kip) + 23.646 (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	1664.6	1700.0	80.5	1	3:28 PM	0.308	0.256			0.282	
	78.8	1664.6	1690.0	80.0	2	3:29 PM	0.309	0.256			0.283	
	78.8	1664.6	1690.0	80.0	3	3:30 PM	0.309	0.256			0.283	
	78.8	1664.6	1690.0	80.0	4	3:31 PM	0.309	0.256			0.283	
	78.8	1664.6	1680.0	79.5	5	3:32 PM	0.309	0.256			0.283	
	78.8	1664.6	1690.0	80.0	6	3:33 PM	0.311	0.259			0.285	
	78.8	1664.6	1685.0	79.7	10	3:37 PM	0.311	0.259			0.285	
200%	90.0	1899.0	1940.0	92.0	1	3:38 PM	0.360	0.301			0.331	
	90.0	1899.0	1910.0	90.5	2	3:39 PM	0.360	0.301			0.331	
	90.0	1899.0	1930.0	91.5	3	3:40 PM	0.363	0.304			0.334	
	90.0	1899.0	1930.0	91.5	4	3:41 PM	0.363	0.304			0.334	
	90.0	1899.0	1920.0	91.0	5	3:42 PM	0.363	0.304			0.334	
	90.0	1899.0	1910.0	90.5	6	3:43 PM	0.363	0.304			0.334	
	90.0	1899.0	1920.0	91.0	10	3:47 PM	0.363	0.304			0.334	
175%	78.8	1664.6	1700.0	80.5	1	3:48 PM	0.355	0.296			0.326	
150%	67.5	1430.1	1440.0	68.0	1	3:49 PM	0.350	0.291			0.321	
125%	56.3	1195.7	1210.0	56.9	1	3:50 PM	0.330	0.272			0.301	
100%	45.0	961.3	970.0	45.4	1	3:51 PM	0.303	0.251			0.277	
75%	33.8	726.9	730.0	33.9	1	3:52 PM	0.275	0.222			0.249	

Soil Nail Verification Load Test Data

Schnabel Engineering

Project: Hollow Core Bar Soil Nail Research
Location: Salt Lake City Site, Utah
Client: ADSC

Performed: Nicholson Construction Company (Cary Lange)
Observed: Schnabel Engineering (Javier Rodriguez)
Data by: Schnabel Engineering (Javier Rodriguez)

Soil Nail: C1
Date: 5/21/2008

Design Test Load (P): 45 kips
 # Dials: 2
Jack Calibration: Pressure = 20.837 X reading (kip) + 23.646 (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	492.5	500.0	22.9	1	3:53 PM	0.249	0.200			0.225	
AL	2.3	70.5	80.0	2.7	1	3:54 PM	0.167	0.106			0.137	
50%	22.5	492.5	500.0	22.9	1	3:55 PM	0.210	0.153			0.182	
100%	45.0	961.3	970.0	45.4	1	3:56 PM	0.269	0.214			0.242	
150%	67.5	1430.1	1440.0	68.0	1	3:57 PM	0.321	0.265			0.293	
200%	90.0	1899.0	1910.0	90.5	1	3:58 PM	0.375	0.315			0.345	
225%	101.3	2133.4	2160.0	102.5	1	3:59 PM	0.419	0.351			0.385	
	101.3	2133.4	2150.0	102.0	2	4:00 PM	0.421	0.352			0.387	
	101.3	2133.4	2120.0	100.6	3	4:01 PM	0.421	0.352			0.387	
	101.3	2133.4	2120.0	100.6	4	4:02 PM	0.421	0.352			0.387	
	101.3	2133.4	2150.0	102.0	5	4:03 PM	0.421	0.352			0.387	
	101.3	2133.4	2150.0	102.0	6	4:04 PM	0.423	0.354			0.389	
	101.3	2133.4	2000.0	94.8	10	4:08 PM	0.423	0.354			0.389	

Soil Nail Verification Load Test Data

Schnabel Engineering

Project: Hollow Core Bar Soil Nail Research
Location: Salt Lake City Site, Utah
Client: ADSC

Performed: Nicholson Construction Company (Cary Lange)
Observed: Schnabel Engineering (Javier Rodriguez)
Data by: Schnabel Engineering (Javier Rodriguez)

Soil Nail: C1
Date: 5/21/2008

Design Test Load (P): 45 kips
 # Dials: 2
Jack Calibration: Pressure = 20.837 X reading (kip) + 23.646 (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	2367.8	2350.0	111.6	1	4:09 PM	0.484	0.405			0.445	
	112.5	2367.8	2350.0	111.6	2	4:10 PM	0.484	0.405			0.445	
	112.5	2367.8	2330.0	110.7	3	4:11 PM	0.484	0.405			0.445	
	112.5	2367.8	2330.0	110.7	4	4:12 PM	0.484	0.405			0.445	
	112.5	2367.8	2350.0	111.6	5	4:13 PM	0.485	0.406			0.446	
	112.5	2367.8	2350.0	111.6	6	4:14 PM	0.485	0.406			0.446	
	112.5	2367.8	2350.0	111.6	10	4:18 PM	0.486	0.407			0.447	
275%	123.8	2602.2	2630.0	125.1	1	4:19 PM	0.562	0.469			0.516	
	123.8	2602.2	2630.0	125.1	2	4:20 PM	0.585	0.491			0.538	
	123.8	2602.2	2600.0	123.6	3	4:21 PM	0.585	0.491			0.538	
	123.8	2602.2	2600.0	123.6	4	4:22 PM	0.585	0.491			0.538	
	123.8	2602.2	2600.0	123.6	5	4:23 PM	0.586	0.491			0.539	
	123.8	2602.2	2600.0	123.6	6	4:24 PM	0.586	0.491			0.539	
	123.8	2602.2	2600.0	123.6	10	4:28 PM	0.586	0.491			0.539	

Soil Nail Verification Load Test Data

Schnabel Engineering

Project: Hollow Core Bar Soil Nail Research
Location: Salt Lake City Site, Utah
Client: ADSC

Performed: Nicholson Construction Company (Cary Lange)
Observed: Schnabel Engineering (Javier Rodriguez)
Data by: Schnabel Engineering (Javier Rodriguez)

Soil Nail: C1
Date: 5/21/2008

Design Test Load (P): 45 kips
 # Dials: 2
Jack Calibration: Pressure = 20.837 X reading (kip) + 23.646 (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:
300%	135.0	2836.6	2850.0	135.6	1	4:29 PM	0.664	0.556			0.610	
	135.0	2836.6	2840.0	135.2	2	4:20 PM	0.664	0.556			0.610	
	135.0	2836.6	2810.0	133.7	3	4:21 PM	0.664	0.556			0.610	
	135.0	2836.6	2810.0	133.7	4	4:22 PM	0.665	0.556			0.611	
	135.0	2836.6	2850.0	135.6	5	4:23 PM	0.665	0.556			0.611	
	135.0	2836.6	2820.0	134.2	6	4:24 PM	0.665	0.556			0.611	
	135.0	2836.6	2850.0	135.6	10	4:28 PM	0.667	0.558			0.613	
250%	112.5	2367.8	2380.0	113.1	1	4:29 PM	0.660	0.552			0.606	
200%	90.0	1899.0	1920.0	91.0	1	4:30 PM	0.606	0.500			0.553	
50%	22.5	492.5	510.0	23.3	1	4:33 PM	0.384	0.284			0.334	
AL	2.3	70.5	80.0	2.7	1	4:34 PM	0.267	0.162			0.215	
	2.3	70.5	80.0	2.7	2	4:35 PM						
	2.3	70.5	80.0	2.7	3	4:37 PM						
	2.3	70.5	80.0	2.7	4	4:38 PM						
	2.3	70.5	80.0	2.7	5	4:39 PM						
	2.3	70.5	80.0	2.7	6	4:40 PM						
	2.3	70.5	80.0	2.7	10	4:44 PM						

ANCHOR STRESSING FORM

Job Name: City Creek Center Block 76
Anchor Designation: FHWA HBSN-
Design Load (k): 45

C1

13:10

Cut off 12"
Stretch 19"
Added Tail Length (ft): ~~1.7~~ 36"
Unstressed Tail (ft): 0.7 9"
Free Length (ft): 15.0
Bond Length (ft): 6

NICHOLSON

Date:
Test By: BJH

Anchor Load %	Elapsed Time (min)	Actual Time	Anchor Load (kips)	JACK JD-203 Pressure Gauge Calc (psi)	JACK JD-203 Pressure Gauge ACTUAL A (psi)	Backup Gauge JD-203 ACTUAL B (psi)	GK1115 Load Cell. Readout: MG003 Calc ustrain (strain)	GK1115 Load Cell. Readout: MG003 ACTUAL (strain)	Anchor Elongations Nail A Dial 1 (in)	Anchor Elongations Nail Extension B Dial 2 (in)	Anchor Elongations Nail Extension Average (in)	Anchor Elongations Actual Deflections (in)	Anchor Elongations Min .8* FL (in)	Anchor Elongations Max FL+.5*BL (in)	NOTES
5%	0		2	80	80	100	850	0908	0.000	0.000			0.000	0.000	
25%	1		11	260	260	280	980	0908	0.074	0.047			0.027	0.041	
	2				260	280		0915	0.075	0.049					
	3				260	280		0914	0.075	0.049					
	5				260	280		0914	0.075	0.049					
	6				260	270		0912	0.075	0.049					
	10				260	270		0922	0.077	0.051					
50%	1		23	500	500	530	1140	1081	0.135	0.103			0.061	0.092	
	2				500	520		1077	0.135	0.103					
	3				500	510		1077	0.135	0.103					
	5				500	510		1077	0.135	0.103					
	6				500	510		1075	0.135	0.103					
	10				500	505		1073	0.135	0.103					
75%	1		34	730	750	770	1300	1239	0.171	0.140			0.095	0.142	
	2				740	760		1241	0.171	0.140					
	3				740	750		1238	0.171	0.140					
	5				740	750		1239	0.171	0.140					
	6				740	750		1240	0.171	0.140					
	10				740	750		1245	0.171	0.140					
100%	1		45	970	990	1020	1460	1405	0.205	0.168			0.129	0.193	
	2				980	1010		1396	0.205	0.168					
	3				980	1000		1392	0.206	0.169					
	5				990	1010		1394	0.208	0.170					Bumped
	6				980	1000		1393	0.208	0.170					
	10				980	1000		1390	0.208	0.170					
	20				990	1010		1403	0.212	0.174					Bumped
	30														
	50														
	60														
75%	1		34	730	750	760	1300	1258	0.200	0.166			0.095	0.142	
50%	1		23	500	530	550	1140	1160	0.190	0.158			0.061	0.092	
25%	1		11	260	290	300	980	0991	0.160	0.133			0.027	0.041	
5%	10		2	80	80	90	850	0852	0.105	0.063			0.000	0.000	
25%	1		11	260	290	300	980	0922	0.128	0.085			0.027	0.041	
50%	1		23	500	540	520	1140	1066	0165	0.131			0.061	0.092	
75%	1		34	730	750	770	1300	1221	0190	0.154			0.095	0.142	
100%	1		45	970	990	1010	1460	1378	0.212	0.175			0.129	0.193	
125%	1		57	1210	1240	1250	1620	1528	0.240	0.199			0.163	0.244	
	2				1230	1250		1536	0.242	0.200					Bumped
	3				1210	1250		1527	0.242	0.200					
	5				1220	1250		1538	0.243	0.202					
	6				1210	1240		1534	0.243	0.202					
	10				1210	1240		1536	0.244	0.204					
150%	1		68	1440	1450	1490	1780	1689	0.272	0.229			0.197	0.295	
	10				"	"		1701	0.277	0.232					6min: 0.276
	30				"	"		1710	0.279	0.234					0.231

1699

ANCHOR STRESSING FORM

Job Name: City Creek Center Block 76
Anchor Designation: FHWA HBSN-
Design Load (k): 45

C 1

Added Tail Length (ft): 1.7
Unstressed Tail (ft): 0.7
Free Length (ft): 15.0
Bond Length (ft): 6

NICHOLSON

Date:
Test By: BJH

Anchor Load %	Elapsed Time (min)	Actual Time	Anchor Load (kips)	JACK Pressure Gauge JD-203 Calc (psi)	JACK Pressure Gauge JD-203 ACTUAL A (psi)	Backup Gauge JD-203 ACTUAL B (psi)	GK1115 Readout: MG003 Calc ustrain (strain)	GK1115 Readout: MG003 ACTUAL (strain)	Anchor Elongations: Nail A Dial 1 (in)	Nail Extension B Dial 2 (in)	Nail Extension Average (in)	Actual Deflections (in)	Min .8* FL (in)	Max FL+.5*BL (in)	NOTES
	30 5			1440	1480	1490		1711	0.280	0.234					
	50 8			1440	1440	1480		1705	0.281	0.234					
	60 10			1440	1490	1490		1703	0.281	0.234					
175%	1		79	1680	1700	1730	1940	1832	0.308	0.256			0.231	0.346	
	2				1690	1720		1832	0.309	0.256					
	3				1690	1720		1833	0.309	0.256					
	5				1680	1710		1827	0.309	0.256					
	6				1690	1710		1841	0.311	0.259					
	10				1685	1700		1843	0.311	0.259					Bumped
200%	1		90	1910	1940	1960	2100	1990	0.360	0.301			0.265	0.397	
	2				1910	1940		1982	0.360	0.301					
	3				1930	1950		1997	0.363	0.304					Bumped
	5				1920	1950		1995	0.363	0.304					"
	6				1910	1950		1992	0.363	0.304					
	10				1920	1950		1994	0.363	0.304					
175%	1		79	1680	1700	1720	1940	1858	0.355	0.296			0.231	0.346	
150%	1		68	1440	1440	1460	1780	1785	0.350	0.291			0.197	0.295	
125%	1		57	1210	1210	1220	1620	1613	0.330	0.272			0.163	0.244	
100%	1		45	970	970	990	1460	1556	0.303	0.251			0.129	0.193	
75%	1		34	730	730	750	1300	1300	0.275	0.227			0.095	0.142	
50%	1		23	500	500	530	1140	1152	0.249	0.200			0.061	0.092	
5%	10		2	80	80	110	850	888	0.167	0.106			0.000	0.000	
50%	1		23	500	500	525	1140	1065	0.210	0.153			0.061	0.092	
100%	1		45	970	970	1000	1460	1380	0.269	0.214			0.129	0.193	
150%	1		68	1440	1440	1480	1780	1678	0.321	0.265			0.197	0.295	
200%	1		90	1910	1910	1950	2100	1973	0.375	0.315			0.265	0.397	
225%	1		102	2150	2160	2200	2260	2148	0.419	0.351			0.299	0.448	
	2				2150	2180		2152	0.421	0.352					
	3				2120	2150		2152	0.421	0.352					
	5				2150	2190		2128	0.422	0.353					
	6				"	"		2134	0.423	0.354					
	10				2000	[illegible]		2126	[illegible]	0.351					
250%	1		113	2380		2420	2420	2264	0.484	0.405			0.332	0.498	
	2				2350	2380		2249	0.484	0.405					
	3				2330	2360		2246	0.484	0.405					
	5				2350	2400		2253	0.485	0.406					
	6				"	"		"	"	"					
	10				"	2410		2258	0.486	0.407					
275%	1		124	2620	2630	2680	2580	2373	0.562	0.469			0.366	0.549	
	2					2680		2428	0.585	0.491					Bumped
	3				2600	2630		2412	0.585	0.491					
	5				2600	2640		2413	0.586	0.49[illegible]					
	6				"	2630		[illegible]	"	"					

ANCHOR STRESSING FORM

Job Name: City Creek Center Block 76
Anchor Designation: FHWA HBSN-
Design Load (k): 45

C7

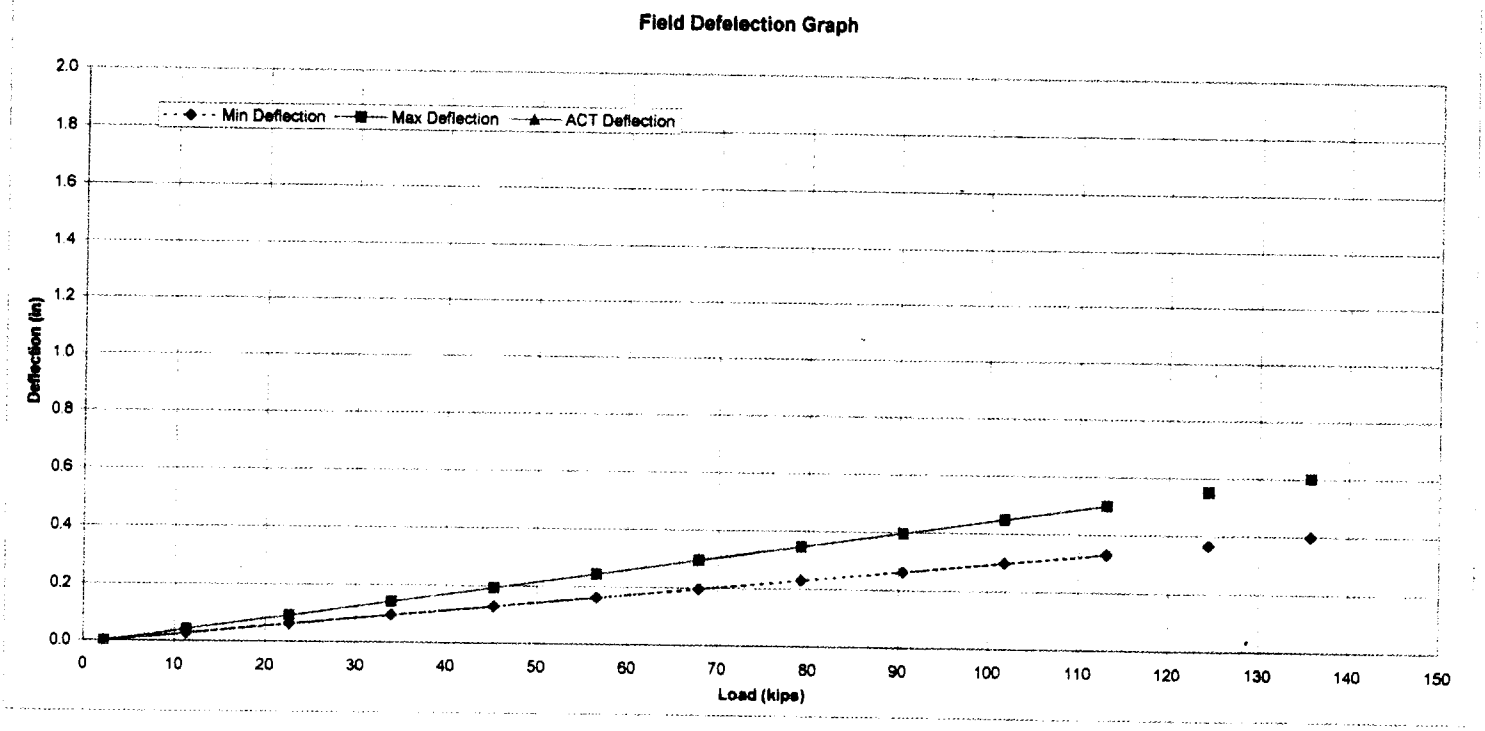
Added Tail Length (ft): 1.7
Unstressed Tail (ft): 0.7
Free Length (ft): 15.0
Bond Length (ft): 6

NICHOLSON

Date:
Test By: BJH

Anchor Load %	Elapsed Time (min)	Actual Time	Anchor Load (kips)	JACK JD-203 Pressure Gauge Calc (psi)	JACK JD-203 Pressure Gauge ACTUAL A (psi)	Backup Gauge JD-203 ACTUAL B (psi)	GK1115 Readout: MG003 Calc ustrain (strain)	GK1115 Readout: MG003 ACTUAL (strain)	Anchor Elongations: Nail A Dial 1 (in)	Anchor Elongations: Nail Extension B Dial 2 (in)	Anchor Elongations: Nail Extension Average (in)	Anchor Elongations: Actual Deflections (in)	Anchor Elongations: Min .8* FL (in)	Anchor Elongations: Max FL+.5*BL (in)	NOTES
	10				"	"		"	"	"					
300%	1		136	2850	2850	2900	2740	2557	0.664	0.556			0.400	0.600	
	2				2840	2890		2542	"	"					
	3				2810	2850		2530	"	"					
	5				2850	2890		2532	0.665	0.556					
	6				2820	2870		2538	"	"					
	10				2850	2900		2547	0.667	0.558					B
250%	1		113	2380	2380	2410	2420	2415	0.660	0.552			0.332	0.498	
200%	1		90	1910	1920	1950	2100	2085	0.606	0.500			0.265	0.397	
250%	1		113	2380	2360	2400	2420	2222	0.618	0.512			0.332	0.498	
200%	1		90	1910	1890	1920	2100	2063	0.600	0.496			0.265	0.397	
50%	1		23	500	510	530	1140	1149	0.384	0.284			0.061	0.092	
5%	1		2	80	80	100	850	866	0.267	0.162			0.000	0.000	
25%				260	260	280		918	0.278	0.172					

A	-1.34523 kips	-57.7471
B	0.048039 kips/psi	0.070609
ZERO	28.04407 psi	819.4



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 (psi)	Gs	Observations of Grouting
	0						Include a description of drilling equipment						
	1				0:00	0:02			0:00	0:02			
	2				0:02	0:20	F-C Poorly Graded Gravel with		0:02	0:20			
	3				0:20	0:35	Sand (GP), trace silt, moist,		0:20	0:35			
	4				0:35	0:50	brown		0:35	0:50			
	5				0:50	1:03			0:50	1:03			
	6				1:03	12:50			1:03	12:50			28 gal
	7				12:50	13:20			12:50	13:20			
	8				13:20	13:42			13:20	13:42	75		
	9				13:42	13:54			13:42	13:54			
	10				13:54	14:53			13:54	14:53			
	11				14:53	15:10			14:53	15:10			
	12				15:10	15:27			15:10	15:27			
	13				15:27	15:40			15:27	15:40			
	14				15:40	16:36			15:40	16:36	85		
	15				16:36	17:05			16:36	17:05			
	16				17:05	17:41			17:05	19:41			
	17				17:41	19:33	Reamed hole		19:41	19:33		1.84	100.9 gal. total
	18						B.O.H. 17 ft						
	19												
	20												
113							Installed self-drilling - self-grouting hollow core bar soil nail. The bar was drilled with the PVC pipe attached to serve as bond breaker. No casing or washout was performed.						

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:	C2		
Soil Boring:	-		
Soil Nail Geometry:	Perpendicular to face		
Soil Nail elev.	~45		ft
Total casing length	-		ft
Total hole depth	17		ft
Total grout length	17		ft
	Design	As-built	
Total bar length	20	19.67	ft
Bonded length	6	6	ft
Unbonded length	11	10.67	ft
Tail length	3	3	ft
Bit type	Cross Cut		
Bit diameter	4		in
Hole inclination	15		degrees
Centralizers	None		
Reinforcing steel:			
Date of installation	5/6/2008		
Supplier	Williamsform		
Casing description	casing bit is 6 in OD		
Diameter/Thickness	4.5	0.25	in
Nail description	R51N Hollow Core Bar		
	Design	As-built	
No. Bars	1	1	
Diameter	1.36	1.36	in
Primary grouting			
Date of grouting	5/7/2008		
Cement typ. & supp	Type 1		
Dosage / Admixture	Super-plasticizer		
Grouting method	Self-drilling - Self-grouting		
Batch ID	GS	Cubes	
1	1.84	none	
2	-	-	
3	-	-	
Final	-	-	
Volume	Theor.	As-built	
Drilling Grout			gal
Final Grout	-	-	gal

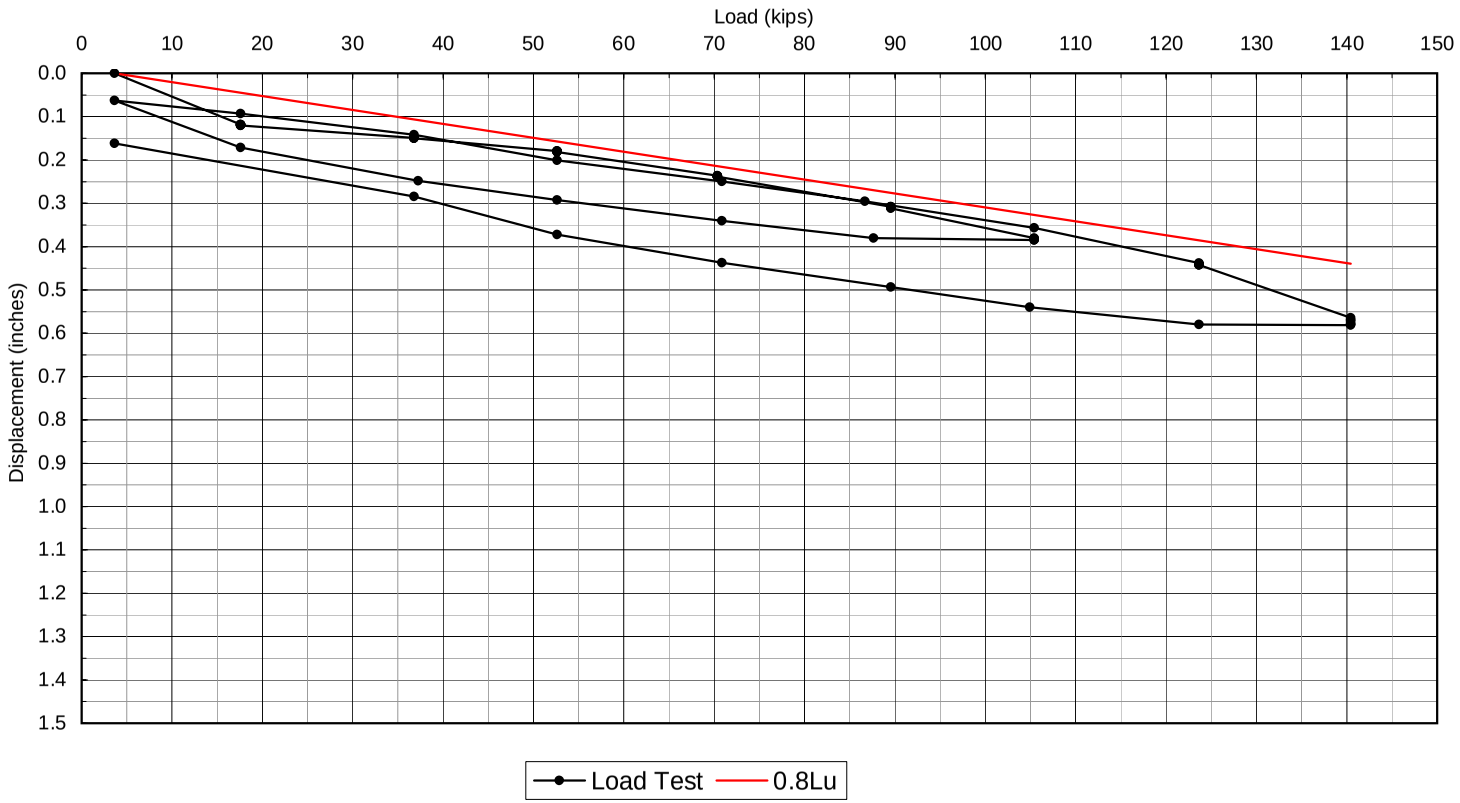
Project:	HBSN Testing Research Program	Manager:	Javier Rodriguez	Date Drilled:	5/7/2008
Location:	Salt Lake City, UT	Engineer:	Javier Rodriguez	Date Grouted:	5/7/2008
Client:	FHWA/ ADSC	Superint.:	Cary Lange		
Job No.:	07150064	Weather:	Sunny, 70 deg.	Capacity:	

Page: 1 of 1

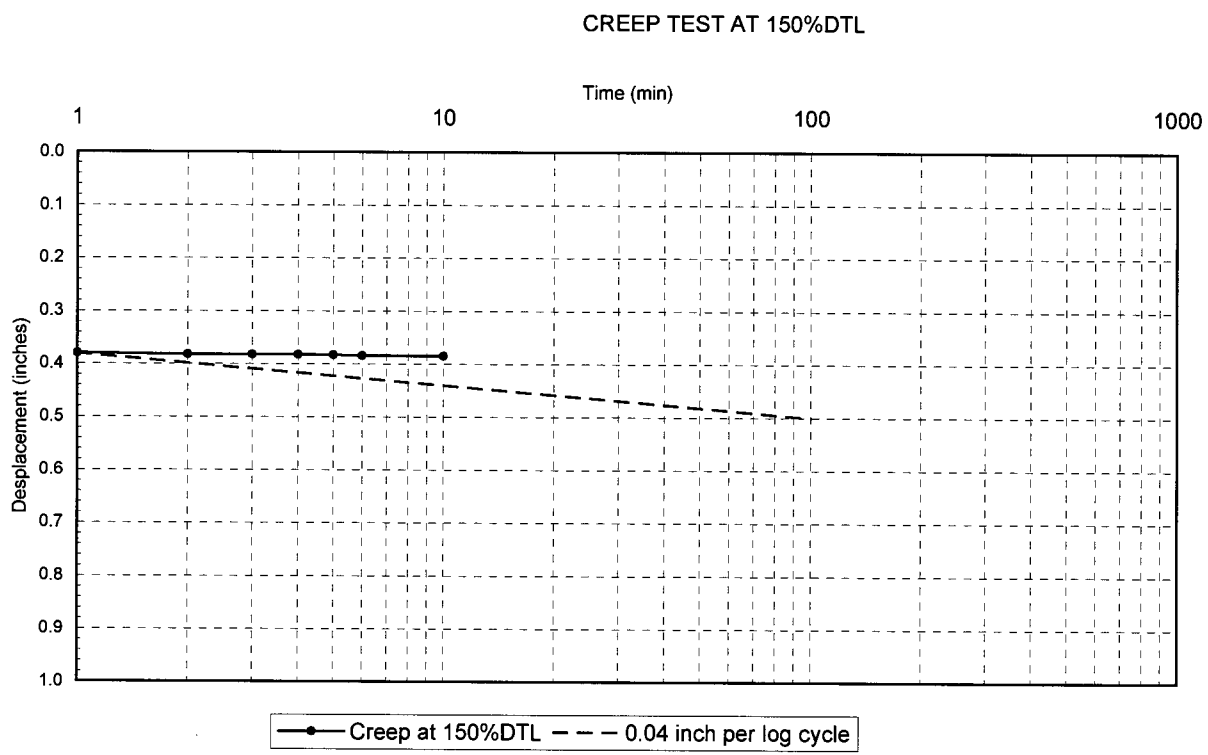
Cary Lange
Installer Representative
(Name and Date)

Andrew Baxter
Schnabel's Representative
(Name and Date)

VERIFICATION SOIL NAIL LOAD TEST
Hollow Core Bar Research - Salt Lake City, Utah



Type of Test: Verification	Bond: 6 ft Debonded: 14.2 ft	Diameter: 4 in (nominal)	Hollow Core Bar Research Salt Lake City, Utah Test Nail: C2	**SCHNABEL ENGINEERING, LLC** Verification Soil Nail Load Test
Design Test Load (P) : 70 kip	Comments:			Hollow Core Bar Soil Nail Research Salt Lake City, Utah
Maximum Test Load: 200% P = 140 kip				Date: 5/21/08 — 07150064



Type of Test: Verification	Bond: 6 ft Debonded: 14.2 ft	Diameter: 4 in (nominal)	Hollow Core Bar Research Salt Lake City, Utah Test Nail: C2	**SCHNABEL ENGINEERING, LLC** Verification Soil Nail Load Test Hollow Core Bar Soil Nail Research Salt Lake City, Utah
Design Test Load (P) : 70 kip	Comments:			
Maximum Test Load: 200% P = 140 kip				Date: 5/21/08 — 07150064

Soil Nail Verification Load Test Data

Schnabel Engineering

Project:	Hollow Core Bar Soil Nail Research	**Performed:**	Nicholson Construction Company (Cary Lange)	**Soil Nail:**	C2
Location:	Salt Lake City Site, Utah	**Observed:**	Schnabel Engineering (Javier Rodriguez)		
Client:	ADSC	**Data by:**	Schnabel Engineering (Javier Rodriguez)	**Date:**	5/21/2008

Design Test Load (P): 70 kips **# Dials:** 2 **Jack Calibration:** Pressure = 20.837 X reading (kip) + 23.646 (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	3.5	96.6	100.0	3.7	1	12:25 PM	0.000	0.000			0.000	
25%	17.5	388.3	390.0	17.6	1	12:26 PM	0.141	0.095			0.118	
	17.5	388.3	390.0	17.6	2	12:27 PM	0.143	0.095			0.119	
	17.5	388.3	390.0	17.6	3	12:28 PM	0.143	0.095			0.119	
	17.5	388.3	390.0	17.6	4	12:29 PM	0.143	0.095			0.119	
	17.5	388.3	390.0	17.6	5	12:30 PM	0.145	0.095			0.120	
	17.5	388.3	390.0	17.6	6	12:31 PM	0.146	0.095			0.121	
	17.5	388.3	390.0	17.6	10	12:35 PM	0.146	0.095			0.121	
50%	35.0	752.9	790.0	36.8	1	12:36 PM	0.206	0.092			0.149	
	35.0	752.9	790.0	36.8	2	12:37 PM	0.206	0.092			0.149	
	35.0	752.9	790.0	36.8	3	12:38 PM	0.206	0.092			0.149	
	35.0	752.9	790.0	36.8	4	12:39 PM	0.206	0.092			0.149	
	35.0	752.9	790.0	36.8	5	12:40 PM	0.206	0.092			0.149	
	35.0	752.9	790.0	36.8	6	12:41 PM	0.207	0.093			0.150	
	35.0	752.9	790.0	36.8	10	12:45 PM	0.207	0.093			0.150	
75%	52.5	1117.6	1120.0	52.6	1	12:46 PM	0.261	0.098			0.180	
	52.5	1117.6	1120.0	52.6	2	12:47 PM	0.261	0.098			0.180	
	52.5	1117.6	1120.0	52.6	3	12:48 PM	0.262	0.098			0.180	
	52.5	1117.6	1120.0	52.6	4	12:49 PM	0.263	0.099			0.181	
	52.5	1117.6	1120.0	52.6	5	12:50 PM	0.263	0.099			0.181	
	52.5	1117.6	1120.0	52.6	6	12:51 PM	0.263	0.099			0.181	
	52.5	1117.6	1120.0	52.6	10	12:55 PM	0.283	0.100			0.182	
100%	70.0	1482.2	1490.0	70.4	1	12:56 PM	0.327	0.146			0.237	
	70.0	1482.2	1490.0	70.4	2	12:57 PM	0.328	0.146			0.237	
	70.0	1482.2	1490.0	70.4	3	12:58 PM	0.329	0.147			0.238	
	70.0	1482.2	1490.0	70.4	4	12:59 PM	0.329	0.147			0.238	
	70.0	1462.2	1490.0	70.4	5	1:00 PM	0.330	0.147			0.239	
	70.0	1482.2	1490.0	70.4	6	1:01 PM	0.330	0.147			0.239	
	70.0	1482.2	1490.0	70.4	10	1:05 PM	0.330	0.147			0.239	
125%	87.5	1846.9	1890.0	89.6	1	1:06 PM	0.409	0.207			0.308	
	87.5	1646.9	1890.0	89.6	2	1:07 PM	0.409	0.207			0.308	
	87.5	1846.9	1890.0	89.6	3	1:08 PM	0.410	0.207			0.309	
	87.5	1846.9	1890.0	89.6	4	1:09 PM	0.410	0.207			0.309	
	87.5	1846.9	1890.0	89.6	5	1:10 PM	0.411	0.208			0.310	
	87.5	1846.9	1890.0	89.6	6	1:11 PM	0.411	0.208			0.310	
	87.5	1846.9	1890.0	89.6	10	1:15 PM	0.412	0.212			0.312	
150%	105.0	2211.5	2220.0	105.4	1	1:16 PM	0.490	0.271			0.381	
	105.0	2211.5	2220.0	105.4	2	1:17 PM	0.493	0.272			0.383	
	105.0	2211.5	2220.0	105.4	3	1:18 PM	0.493	0.272			0.383	
	105.0	2211.5	2220.0	105.4	4	1:19 PM	0.494	0.272			0.383	
	105.0	2211.5	2220.0	105.4	5	1:20 PM	0.494	0.273			0.384	
	105.0	2211.5	2220.0	105.4	6	1:21 PM	0.496	0.273			0.385	
	105.0	2211.5	2220.0	105.4	10	1:25 PM	0.496	0.274			0.385	

Soil Nail Verification Load Test Data

Schnabel Engineering

Project:	Hollow Core Bar Soil Nail Research	**Performed:**	Nicholson Construction Company (Cary Lange)	**Soil Nail:**	C2
Location:	Salt Laka City Site, Utah	**Observed:**	Schnabel Engineering (Javier Rodriguez)		
Client:	ADSC	**Data by:**	Schnabel Engineering (Javier Rodriguez)	**Date:**	5/21/2008

Design Test Load (P): 70 kips **# Dials:** 2 **Jack Calibration:** Pressure = 20.837 X reading (kip) + 23.646 (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%	87.5	1846.9	1850.0	87.6	1	1:26 PM	0.467	0.274			0.361	
100%	70.0	1482.2	1500.0	70.9	1	1:27 PM	0.440	0.241			0.341	
75%	52.5	1117.6	1120.0	52.6	1	1:28 PM	0.390	0.195			0.293	
50%	35.0	752.9	800.0	37.3	1	1:29 PM	0.339	0.157			0.248	
25%	17.5	368.3	390.0	17.6	1	1:30 PM	0.245	0.098			0.172	
AL	3.5	96.6	100.0	3.7	1	1:31 PM	0.100	0.025			0.063	
25%	17.5	388.3	390.0	17.6	1	1:32 PM	0.190	-0.004			0.093	
50%	35.0	752.9	790.0	36.8	1	1:33 PM	0.276	0.008			0.142	
75%	52.5	1117.6	1120.0	52.6	1	1:34 PM	0.339	0.063			0.201	
100%	70.0	1482.2	1500.0	70.9	1	1:35 PM	0.395	0.104			0.250	
125%	87.5	1846.9	1830.0	86.7	1	1:36 PM	0.447	0.144			0.296	
150%	105.0	2211.5	2220.0	105.4	1	1:37 PM	0.511	0.202			0.357	
175%	122.5	2576.2	2600.0	123.6	1	1:38 PM	0.603	0.273			0.438	
	122.5	2576.2	2600.0	123.6	2	1:39 PM	0.606	0.274			0.440	
	122.5	2576.2	2600.0	123.6	3	1:40 PM	0.606	0.274			0.440	
	122.5	2576.2	2600.0	123.6	4	1:41 PM	0.607	0.275			0.441	
	122.5	2576.2	2600.0	123.6	5	1:42 PM	0.608	0.276			0.442	
	122.5	2576.2	2600.0	123.6	6	1:43 PM	0.609	0.276			0.443	
	122.5	2576.2	2600.0	123.6	10	1:47 PM	0.609	0.276			0.443	
200%	140.0	2940.8	2950.0	140.4	1	1:48 PM	0.745	0.383			0.564	
	140.0	2940.8	2950.0	140.4	2	1:49 PM	0.752	0.386			0.569	
	140.0	2940.8	2950.0	140.4	3	1:50 PM	0.754	0.387			0.571	
	140.0	2940.8	2950.0	140.4	4	1:51 PM	0.757	0.390			0.574	
	140.0	2940.8	2950.0	140.4	5	1:52 PM	0.762	0.394			0.578	
	140.0	2940.8	2950.0	140.4	6	1:53 PM	0.764	0.395			0.580	
	140.0	2940.8	2950.0	140.4	10	1:57 PM	0.766	0.396			0.581	
175%	122.5	2576.2	2600.0	123.6	1	1:58 PM	0.764	0.396			0.580	
150%	105.0	2211.5	2210.0	104.9	1	1:59 PM	0.719	0.361			0.540	
125%	87.5	1846.9	1890.0	89.6	1	2:00 PM	0.671	0.315			0.493	
100%	70.0	1482.2	1500.0	70.9	1	2:01 PM	0.613	0.261			0.437	
75%	52.5	1117.6	1120.0	52.6	1	2:02 PM	0.545	0.200			0.373	
50%	35.0	752.9	790.0	36.8	1	2:03 PM	0.449	0.119			0.284	
AL	3.5	96.6	100.0	3.7	1	2:05 PM	0.246	0.078			0.162	

ANCHOR STRESSING FORM

Job Name: City Creek Center Block 76 C2
Anchor Designation: FHWA HBSN-
Design Load (k): 70

12.15

Stick out 19"
Cut off 13"
Added Tail Length (ft): 36"
Unstressed Tail (ft): 9'6"
Free Length (ft): 15.0
Bond Length (ft): 6

NICHOLSON

Date: 5-21-08
Test By: BJH

Anchor Load %	Elapsed Time (min)	Actual Time	Anchor Load (kips)	JACK Pressure Gauge Calc (psi)	JD-203 ACTUAL A (psi)	Backup Gauge JD-203 ACTUAL B (psi)	GK1115 Readout: MG003 Calc ustrain (strain)	ACTUAL 756 (strain)	Anchor Elongations Nail A Dial 1 (in)	Nail Extension B Dial 2 (in)	Nail Extension Average (in)	Actual Deflections (in)	Min .8* FL (in)	Max FL+.5*BL (in)	NOTES
5%	0		4	100	00	10	870	820	0.000	0.000			0.000	0.000	
25%	1		18	390	340	420	1070	951	0.141	0.095			0.042	0.063	
	2				"	"		953	0.143	"					
	3				"	"		952	"	"					
	4				"	"		949	"	"					
	5				"	"		952	0.145	"					
	6				"	"		955	0.146	"					
	10				"	"		955	"	"					
50%	1		35	760	790	810	1310	1189	0.206	0.092			0.094	0.142	
	2				"	"		1187	"	"					
	3				"	"		1185	"	"					
	4				"	"		1184	"	"					
	5				"	"		"	"	"					
	6				"	"		1187	0.207	0.093					
	10				"	"		1185	"	"					
75%	1		53	1120	1120	1150	1560	1397	0.261	0.098			0.147	0.220	
	2				"	"		1392	"	"					
	3				"	"		1401	0.262	"					
	4				"	"		1401	0.263	0.099					
	5				"	"		1400	"	"					
	6				"	"		"	"	"					
	10				"	"		1400	0.263	0.100					
100%	1		70	1490	1490	1510	1810	1620	0.327	0.146			0.199	0.299	
	2				"	"		1624	0.328	"					
	3				"	"		1627	0.329	0.147					
	4				"	"		"	"	"					
	5				"	"		1630	0.330	0.147					
	6				"	"		"	"	"					
	10				"	"		"	"	"					
125%	1		88	1850	1890	1900	2060	1839	0.409	0.207			0.252	0.378	
	2				"	"		1882	"	0.207					
	3				"	"		1887	0.410	"					
	4				"	"		"	"	"					
	5				"	"		1890	0.411	0.208					
	6				"	"		"	"	"					
	10				"	"		"	0.412	0.212					
150%	1		105	2210	2220	2250	2300	2120	0.490	0.271			0.304	0.456	
	2				"	"		2122	0.493	0.272					
	3				"	"		2116	"	"					
	4				"	"		2124	0.494	"					
	5				"	"		2126	"	0.273					
	6				"	"		2128	0.496	"					
	10				"	"		2123	0.496	0.274					
	20														
	30														
	50														
	60														

ANCHOR STRESSING FORM

C2

Job Name: City Creek Center Block 76
Anchor Designation: FHWA HBSN-
Design Load (k): 70

Added Tail Length (ft): 1.7
Unstressed Tail (ft): 0.7
Free Length (ft): 15.0
Bond Length (ft): 6

NICHOLSON

Date:
Test By: BJH

Anchor Load %	Elapsed Time (min)	Actual Time	Anchor Load (kips)	JACK Pressure Gauge JD-203 Calc (psi)	JACK Pressure Gauge JD-203 ACTUAL A (psi)	Backup Gauge JD-203 ACTUAL B (psi)	GK1115 Readout: MG003 Calc ustrain (strain)	GK1115 Readout: MG003 ACTUAL (strain)	Anchor Elongations Nail A Dial 1 (in)	Anchor Elongations Nail Extension B Dial 2 (in)	Anchor Elongations Nail Extension Average (in)	Anchor Elongations Actual Deflections (in)	Anchor Elongations Min .8* FL (in)	Anchor Elongations Max FL+.5*BL (in)	NOTES
125%	1		88	1850	1850	1890	2060	2020	0.427	0.274			0.252	0.378	
100%	1		70	1490	1500	1520	1810	1725	0.440	0.241			0.199	0.299	
75%	1		53	1120	1120	1140	1560	1472	0.390	0.195			0.147	0.220	
50%	1		35	760	800	810	1310	1269	0.339	0.157			0.094	0.142	
25%	1		18	390	390	410	1070	1002	0.245	0.098			0.042	0.063	
5%	1		4	100	100	110	870	841	0.100	0.025			0.000	0.000	
25%	1		18	390	390	410	1070	950	0.190	0.004			0.042	0.063	
50%	1		35	760	790	810	1310	1175	0.276	0.008			0.094	0.142	
75%	1			1120	1120	1150		1394	0.339	0.063					
100%	1			1490	1500	1510		1626	0.395	0.104					
125%	1			1850	1830	1850		1849	0.447	0.144					
150%	1			2210	2220	2250		2122	0.511	0.202					
175%	1		123	2580	2600	2610	2550	2330	0.603	0.273			0.357	0.535	
	2				"	"		2364	0.606	0.274					B.T.
	3				"	"		"	"	"					
	5				"	"		2368	0.607	0.275					
	6				"	"		2368	0.608	0.276					
	10				"	"		2365	0.609	"					
200%	1			2940	2950	2990		2611	0.745	0.383					
	2				"	"		2614	0.752	0.386					
	3				"	"		2608	0.754	0.387					
	4				"	"		2612	0.757	0.390					
	5				"	"		2622	0.762	0.394					
	6				"	"		2623	0.764	0.395					
	10				"	"		2617	0.766	0.396					
	20														
	30														
	50														
	60														
175%	1		123	2580	[illegible]	2620	2550	[illegible]	0.704	[illegible]			0.357	0.535	
150%	1		105	2210	[illegible]	[illegible]	2300	[illegible]	[illegible]	[illegible]			0.304	0.456	
125%	1		88	1850	1890	1910	2060	2022	0.671	[illegible]			0.252	0.378	
100%	1		70	1490	[illegible]	[illegible]	1810	[illegible]	0.613	[illegible]			0.199	0.299	
75%	1		53	1120	1120	1150	1560	1515	0.545	0.200			0.147	0.220	
50%	1		35	760	790	800	1310	1149	0.449	0.119			0.094	0.142	
5%	1		4	100	100	100	870	836	0.246	0.078			0.000	0.000	
25%	1		18	390	390	410	1070	943	0.211	0.100			0.042	0.063	
5%	1		4	100	100	110	870	824	0.220				0.000	0.000	
	2				"	"		826	0.225				[illegible]	[illegible]	
	3														
	4														
	5														
	6														

ANCHOR STRESSING FORM

Job Name: City Creek Center Block 76
Anchor Designation: FHWA HBSN-
Design Load (k): 70

C2

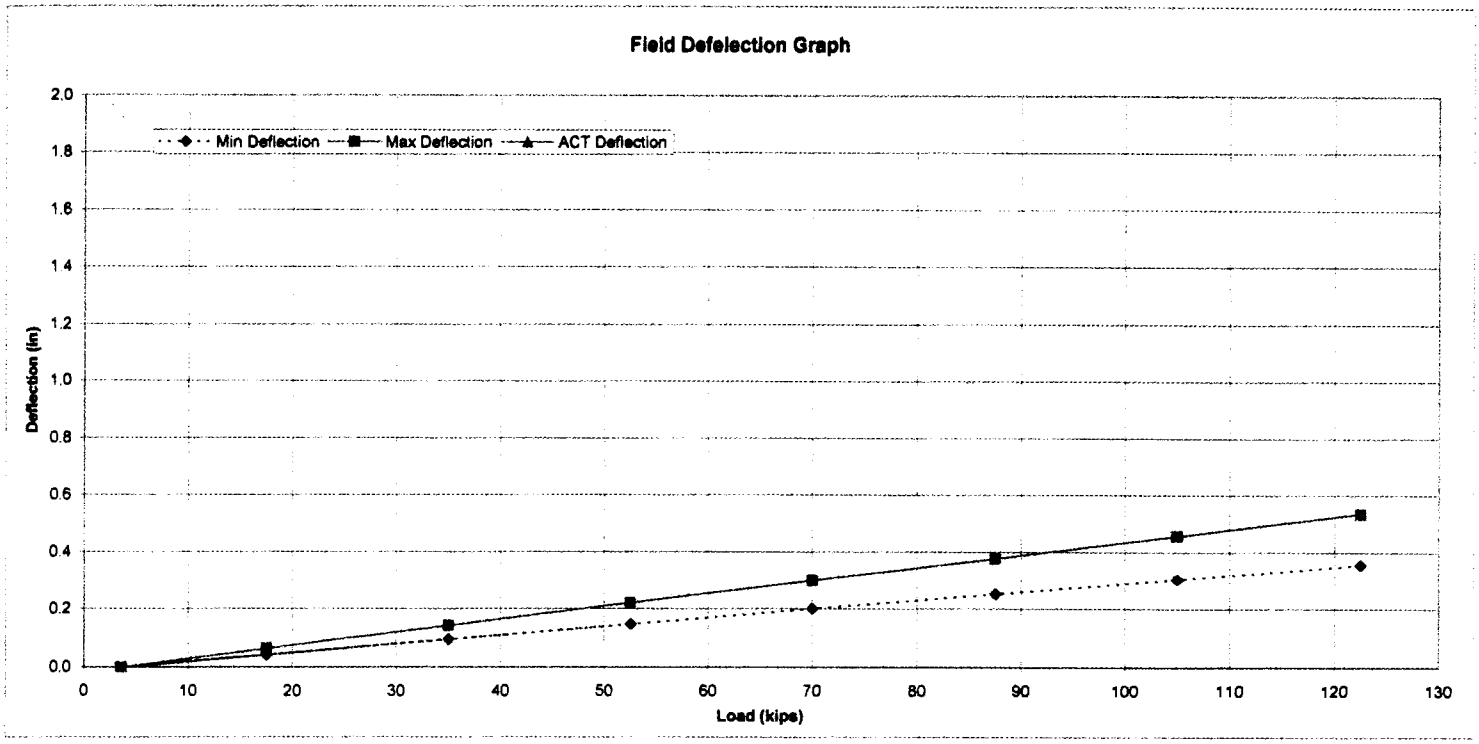
Added Tail Length (ft): 1.7
Unstressed Tail (ft): 0.7
Free Length (ft): 15.0
Bond Length (ft): 6

NICHOLSON

Date:
Test By: BJH

Anchor Load %	Elapsed Time (min)	Actual Time	Anchor Load (kips)	JACK JD-203 Pressure Gauge Calc (psi)	ACTUAL A (psi)	Backup Gauge JD-203 ACTUAL B (psi)	GK1115 Readout: MG003 Calc ustrain (strain)	ACTUAL (strain)	Anchor Elongations Nail A Dial 1 (in)	Nail Extension B Dial 2 (in)	Nail Extension Average (in)	Actual Deflections (in)	Min .8* FL (in)	Max FL+.6*BL (in)	NOTES
	10														

A	-1.34523 kips	-57.7471
B	0.048039 kips/psi	0.070609
ZERO	28.04407 psi	819.4



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 (psi)	Gs	Observations of Grouting
	0						Include a description of drilling equipment						
	1				0:00				0:00				
	2						F-C Poorly Graded Gravel with						
	3						Sand (GP), trace silt, moist,				75		
	4						brown						
	5												
	6					1:04				1:04		1.86	About 14 gal. Reset gage.
	7				13:11	13:21			13:11	13:21			
	8				13:21	13:34			13:21	13:34	90		
	9				13:34	13:53			13:34	13:53			
	10				13:53	14:04			13:53	14:04			
	11				14:04	14:15			14:04	14:15			
	12				14:15	14:55			14:15	14:55			
	13				14:55	15:33			14:55	15:33	90		Grout observed out of top section of
	14				15:33	16:15			15:33	16:15			PVC, grout between PVC and bar.
	15				16:15	16:52			16:15	16:52			
	16				16:52	17:32			16:52	17:32			
	17				17:32	18:13			17:32	18:13			58.5 gal
	18						B.O.H. 17 ft						
	19												
	20												
							Installed self-drilling - self-grouting hollow core bar soil nail. The bar was drilled with the PVC pipe attached to serve as bond breaker. No casing or washout was performed.						

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.

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Schnabel Engineering

SOIL NAIL:	C3		
Soil Boring:	-		
Soil Nail Geometry:	Perpendicular to face		
Soil Nail elev.	~45		ft
Total casing length	no casing		ft
Total hole depth	17		ft
Total grout length	17		ft
	Design	As-built	
Total bar length	20	19.67	ft
Bonded length	6	6	ft
Unbonded length	11	10.67	ft
Tail length	3	2.9	ft
Bit type	Cross Cut		
Bit diameter	4		in
Hole inclination	15		degrees
Centralizers	None		
Reinforcing steel:			
Date of installation	5/6/2008		
Supplier	Williamsform		
Casing description	casing bit is 6 in OD		
Diameter/Thickness	4.5	0.25	in
Nail description	R51N Hollow Core Bar		
	Design	As-built	
No. Bars	1	1	
Diameter	1.36	1.36	in
Primary grouting			
Date of grouting	5/7/2008		
Cement typ. & supp	Type 1		
Dosage / Admixture	Super-plasticizer		
Grouting method	Self-drilling - Self-grouting		
Batch ID	GS	Cubes	
1	1.86	1 SET	
2	-	-	
3	-	-	
Final	-	-	
Volume	Theor.	As-built	
Drilling Grout	-	72.5	gal
Final Grout	-	-	gal

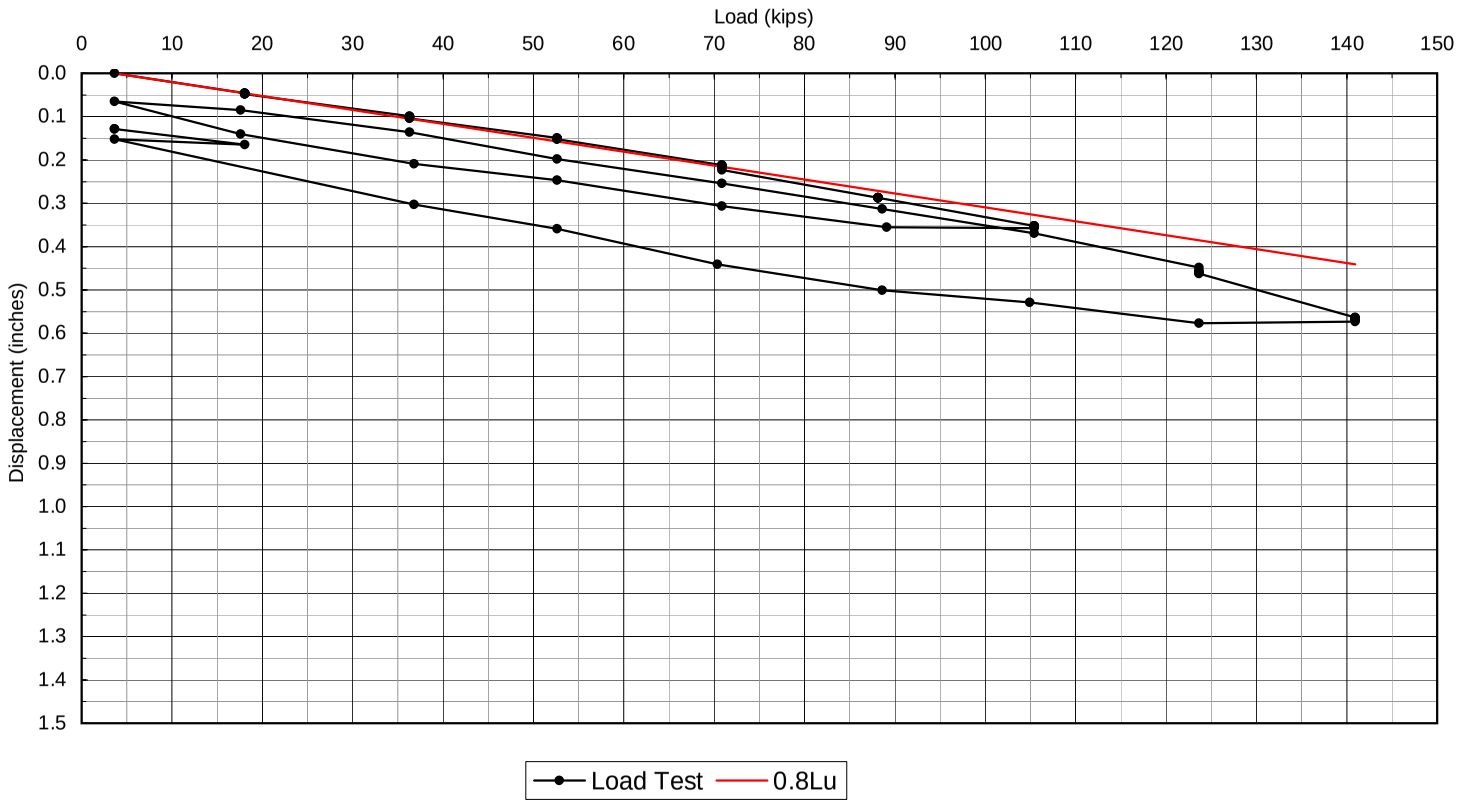
Project:	HBSN Testing Research Program	Manager:	Javier Rodriguez	Date Drilled:	5/7/2008
Location:	Salt Lake City, UT	Engineer:	Javier Rodriguez	Date Grouted:	5/7/2008
Client:	FHWA/ ADSC	Superint.:	Cary Lange		
Job No.:	07150064	Weather:	Sunny, 70 deg.	Capacity:	

Page: 1 of 1

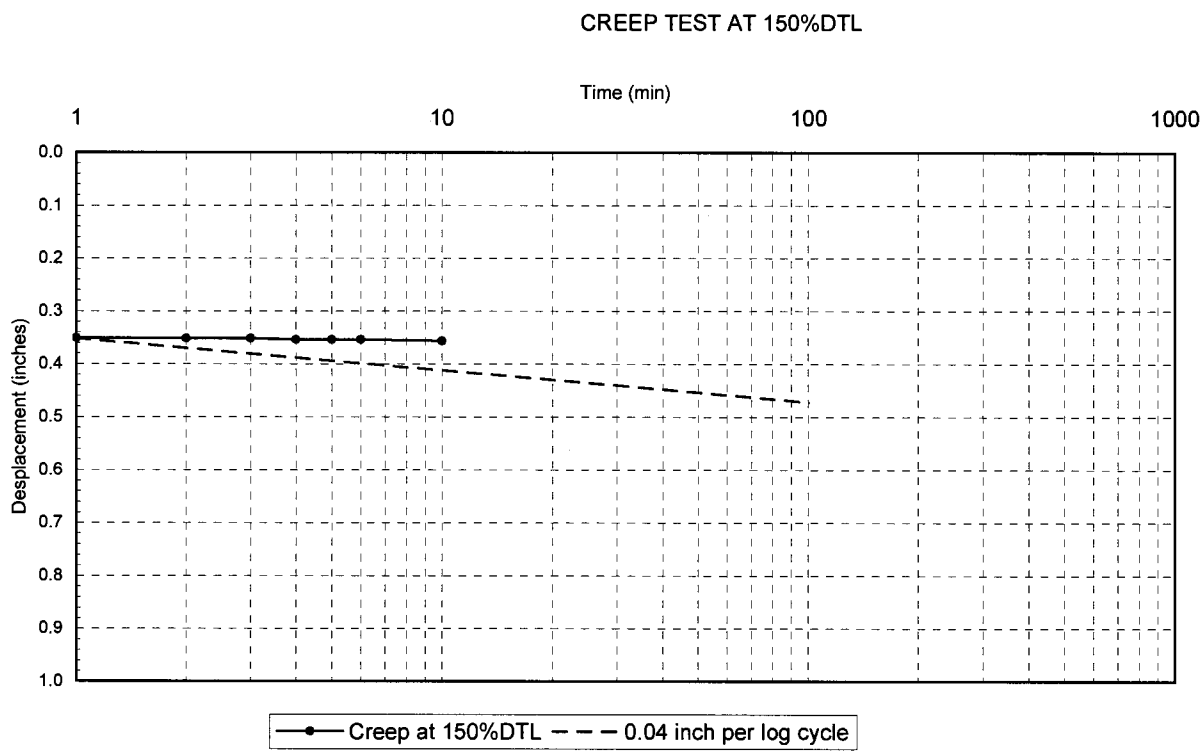
Cary Lange
Installer Representative
(Name and Date)

Andrew Baxter
Schnabel's Representative
(Name and Date)

VERIFICATION SOIL NAIL LOAD TEST
Hollow Core Bar Research - Salt Lake City, Utah



Type of Test: Verification	Bond: 6 ft Unbonded: 14.2 ft	Diameter: 4 in (nominal)	Hollow Core Bar Research Salt Lake City, Utah Test Nail: C3	**SCHNABEL ENGINEERING, LLC** Verification Soil Nail Load Test
Design Test Load (P) : 70 kip	Comments:			Hollow Core Bar Soil Nail Research Salt Lake City, Utah
Maximum Test Load: 200% P = 140 kip				Date: 5/21/08 — 07150064



Type of Test: Verification	Bond: 6 ft Unbonded: 14.2 ft	Diameter: 4 in (nominal)	Hollow Core Bar Research Salt Lake City, Utah Test Nail: C3	**SCHNABEL ENGINEERING, LLC** Verification Soil Nail Load Test Hollow Core Bar Soil Nail Research Salt Lake City, Utah
Design Test Load (P) : 70 kip	Comments:			
Maximum Test Load: 200% P = 140 kip				Date: 5/21/08 — 07150064

Soil Nail Verification Load Test Data

Schnabel Engineering

Project:	Hollow Core Bar Soil Nail Research	**Performed:**	Nicholson Construction Company (Cary Lange)	**Soil Nail:**	C3
Location:	Salt Lake City Site, Utah	**Observed:**	Schnabel Engineering (Javier Rodriguez)		
Client:	ADSC	**Data by:**	Schnabel Engineering (Javier Rodriguez)	**Date:**	5/21/2008

Design Test Load (P): 70 kips **# Dials:** 2 **Jack Calibration:** Pressure = 20.837 X reading (kip) + 23.646 (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	3.5	96.6	100.0	3.7	1	3:14 PM	0.000	0.000			0.000	
25%	17.5	388.3	400.0	18.1	1	3:15 PM	0.010	0.081			0.046	
	17.5	388.3	400.0	18.1	2	3:16 PM	0.010	0.081			0.046	
	17.5	388.3	400.0	18.1	3	3:17 PM	0.012	0.083			0.048	
	17.5	388.3	400.0	18.1	4	3:18 PM	0.012	0.083			0.048	
	17.5	388.3	400.0	18.1	5	3:19 PM	0.012	0.083			0.048	
	17.5	388.3	400.0	18.1	6	3:20 PM	0.012	0.083			0.048	
	17.5	388.3	400.0	18.1	10	3:24 PM	0.013	0.083			0.048	
50%	35.0	752.9	780.0	36.3	1	3:25 PM	0.056	0.142			0.099	
	35.0	752.9	780.0	36.3	2	3:26 PM	0.056	0.143			0.100	
	35.0	752.9	780.0	36.3	3	3:27 PM	0.058	0.144			0.101	
	35.0	752.9	780.0	36.3	4	3:28 PM	0.058	0.144			0.101	
	35.0	752.9	780.0	36.3	5	3:29 PM	0.058	0.144			0.101	
	35.0	752.9	780.0	36.3	6	3:30 PM	0.060	0.147			0.104	
	35.0	752.9	780.0	36.3	10	3:34 PM	0.060	0.148			0.104	
75%	52.5	1117.6	1120.0	52.6	1	3:35 PM	0.106	0.193			0.150	
	52.5	1117.6	1120.0	52.6	2	3:36 PM	0.107	0.194			0.151	
	52.5	1117.6	1120.0	52.6	3	3:37 PM	0.107	0.194			0.151	
	52.5	1117.6	1120.0	52.6	4	3:38 PM	0.107	0.194			0.151	
	52.5	1117.6	1120.0	52.6	5	3:39 PM	0.108	0.195			0.152	
	52.5	1117.6	1120.0	52.6	6	3:40 PM	0.108	0.195			0.152	
	52.5	1117.6	1120.0	52.6	10	3:44 PM	0.109	0.196			0.153	
100%	70.0	1482.2	1500.0	70.9	1	3:45 PM	0.168	0.256			0.212	
	70.0	1482.2	1500.0	70.9	2	3:46 PM	0.168	0.256			0.212	
	70.0	1482.2	1500.0	70.9	3	3:47 PM	0.171	0.257			0.214	
	70.0	1482.2	1500.0	70.9	4	3:48 PM	0.171	0.257			0.214	
	70.0	1482.2	1500.0	70.9	5	3:49 PM	0.173	0.259			0.216	
	70.0	1482.2	1500.0	70.9	6	3:50 PM	0.175	0.265			0.220	
	70.0	1482.2	1500.0	70.9	10	3:54 PM	0.178	0.268			0.223	
125%	87.5	1846.9	1860.0	88.1	1	3:55 PM	0.244	0.331			0.288	
	87.5	1846.9	1860.0	88.1	2	3:56 PM	0.244	0.331			0.288	
	87.5	1846.9	1860.0	88.1	3	3:57 PM	0.244	0.331			0.288	
	87.5	1846.9	1860.0	88.1	4	3:58 PM	0.244	0.331			0.288	
	87.5	1846.9	1860.0	88.1	5	3:59 PM	0.244	0.331			0.288	
	87.5	1846.9	1860.0	88.1	6	4:00 PM	0.244	0.331			0.288	
	87.5	1846.9	1860.0	88.1	10	4:04 PM	0.244	0.331			0.288	
150%	105.0	2211.5	2220.0	105.4	1	4:05 PM	0.308	0.396			0.352	
	105.0	2211.5	2220.0	105.4	2	4:06 PM	0.309	0.396			0.353	
	105.0	2211.5	2220.0	105.4	3	4:07 PM	0.309	0.396			0.353	
	105.0	2211.5	2220.0	105.4	4	4:08 PM	0.311	0.398			0.355	
	105.0	2211.5	2220.0	105.4	5	4:09 PM	0.311	0.398			0.355	
	105.0	2211.5	2220.0	105.4	6	4:10 PM	0.311	0.398			0.355	
	105.0	2211.5	2220.0	105.4	10	4:14 PM	0.314	0.401			0.358	

Soil Nail Verification Load Test Data

Schnabel Engineering

Project: Hollow Core Bar Soil Nail Research
Location: Salt Lake City Site, Utah
Client: ADSC

Performed: Nicholson Construction Company (Cary Lange)
Observed: Schnabel Engineering (Javier Rodriguez)
Data by: Schnabel Engineering (Javier Rodriguez)

Soil Nail: C3
Date: 5/21/2008

Design Test Load (P): 70 kips **# Dials:** 2 **Jack Calibration:** Pressure = 20.837 X reading (kip) + 23.646 (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%	87.5	1846.9	1880.0	89.1	1	4:15 PM	0.312	0.398			0.355	
100%	70.0	1482.2	1500.0	70.9	1	4:16 PM	0.262	0.351			0.307	
75%	52.5	1117.6	1120.0	52.6	1	4:17 PM	0.201	0.293			0.247	
50%	35.0	752.9	790.0	36.8	1	4:18 PM	0.162	0.256			0.209	
25%	17.5	388.3	390.0	17.6	1	4:19 PM	0.095	0.185			0.140	
AL	3.5	96.6	100.0	3.7	1	4:20 PM	0.033	0.097			0.065	
25%	17.5	388.3	390.0	17.6	1	4:21 PM	0.044	0.126			0.085	
50%	35.0	752.9	780.0	36.3	1	4:22 PM	0.088	0.184			0.136	
75%	52.5	1117.6	1120.0	52.6	1	4:23 PM	0.155	0.241			0.198	
100%	70.0	1482.2	1500.0	70.9	1	4:24 PM	0.208	0.300			0.254	
125%	87.5	1846.9	1870.0	88.6	1	4:25 PM	0.267	0.359			0.313	
150%	105.0	2211.5	2220.0	105.4	1	4:26 PM	0.324	0.415			0.370	
175%	122.5	2576.2	2600.0	123.6	1	4:27 PM	0.402	0.494			0.448	
	122.5	2576.2	2600.0	123.6	2	4:28 PM	0.410	0.501			0.456	
	122.5	2576.2	2600.0	123.6	3	4:29 PM	0.413	0.505			0.459	
	122.5	2576.2	2600.0	123.6	4	4:30 PM	0.415	0.506			0.461	
	122.5	2576.2	2600.0	123.6	5	4:31 PM	0.415	0.506			0.461	
	122.5	2576.2	2600.0	123.6	6	4:32 PM	0.415	0.506			0.461	
	122.5	2576.2	2600.0	123.6	10	4:36 PM	0.417	0.508			0.463	
200%	140.0	2940.8	2960.0	140.9	1	4:37 PM	0.516	0.611			0.564	
	140.0	2940.8	2960.0	140.9	2	4:38 PM	0.516	0.612			0.564	
	140.0	2940.8	2960.0	140.9	3	4:39 PM	0.519	0.614			0.567	
	140.0	2940.8	2960.0	140.9	4	4:40 PM	0.520	0.615			0.568	
	140.0	2940.8	2960.0	140.9	5	4:41 PM	0.523	0.618			0.571	
	140.0	2940.8	2960.0	140.9	6	4:42 PM	0.523	0.618			0.571	
	140.0	2940.8	2960.0	140.9	10	4:46 PM	0.525	0.621			0.573	
175%	122.5	2576.2	2600.0	123.6	1	4:47 PM	0.527	0.627			0.577	
150%	105.0	2211.5	2210.0	104.9	1		0.478	0.579			0.529	
125%	87.5	1846.9	1870.0	88.6	1		0.471	0.530			0.501	
100%	70.0	1482.2	1490.0	70.4	1		0.421	0.461			0.441	
75%	52.5	1117.6	1120.0	52.6	1		0.305	0.413			0.359	
50%	35.0	752.9	790.0	36.8	1		0.249	0.356			0.303	
AL	3.5	96.6	100.0	3.7	1		0.108	0.197			0.153	
25%	17.5	388.3	400.0	18.1	1		0.116	0.213			0.165	
AL	3.5	96.6	100.0	3.7	1		0.088	0.169			0.129	
	3.5	96.6	100.0	3.7	10		0.088	0.169			0.129	

ANCHOR STRESSING FORM

Job Name: City Creek Center Block 76
Anchor Designation: FHWA HBSN- C3
Design Load (k): 70

3:05

Added Tail Length (ft): 36"
Unstressed Tail (ft): 9"
Free Length (ft): 15.0
Bond Length (ft): 6

NICHOLSON

Date: 5-21-08
Test By: BJH

Anchor Load %	Elapsed Time (min)	Actual Time	Anchor Load (kips)	JACK Pressure Gauge Calc (psi)	JD-203 ACTUAL A (psi)	Backup Gauge JD-203 ACTUAL B (psi)	GK1115 Readout: MG003 Calc ustrain (strain)	ACTUAL 750 (strain)	Anchor Elongations Nail A Dial 1 (in)	Nail Extension B Dial 2 (in)	Nail Extension Average (in)	Actual Deflections (in)	Min .8* FL (in)	Max FL+.5*BL (in)	NOTES
5%	0		4	100	100	110	870	829	0.000	0.000			0.000	0.000	
25%	1		18	390	400	420	1070	1015	0.010	0.081			0.042	0.063	
	2				"	"		1022	"	"					
	3				"	"		1028	0.012	0.083					
	4				"	"		"	"	"					
	5				"	"		1025	"	"					
	6				"	"		"	"	"					
	10				"	"		"	0.013	"					
50%	1		35	760	780	800	1310	1268	0.056	0.142			0.094	0.142	
	2				"	"		1273	"	0.143					
	3				"	"		1282	0.058	0.144					
	4				"	"		1280	"	"					
	5				"	"		1275	"	"					
	6				"	"		1288	0.060	0.147					Bumped
	10				"	"		1283	0.060	0.148					
75%	1		53	1120	1120	1150	1560	1502	0.106	0.193			0.147	0.220	
	2				"	"		1508	0.107	0.194					
	3				"	"		1503	"	"					
	4				"	"		1500	"	"					
	5				"	"		1504	0.108	0.195					
	6				"	"		1502	"	"					
	10							1499	0.109	0.196					
100%	1		70	1490	1500	1530	1810	1756	0.168	0.256			0.199	0.299	
	2				"	"		"	"	"					
	3				"	"		1743	0.181	0.257					
	4				"	"		1742	"	"					
	5				"	"		1741	0.173	0.259					
	6				"	"		1751	0.175	0.265					Bumped
	10				"	"		1754	0.178	0.268					
125%	1		88	1850	1860	1900	2060	2011	0.244	0.331			0.252	0.378	
	2				"	"		2006	0.244	0.331					
	3				"	"		199[illegible]	"	"					
	4				"	"			"	"					
	5				"	"		2000	"	"					
	6				"	"		"	"	"					
	10							2006	0.245	"					
150%	1		105	2210	2220	2250	2300	2214	0.308	0.396			0.304	0.456	
	2				"	"		2216	0.309	0.396					
	3				"	"		2207	"	"					
	4				"	"		2214	0.311	0.393					
	5				"	"		2210	"	"					
	6				"	"		"	"	"					
	10				"	"		2222	0.314	0.401					
	20														
	30														
	50														
	60														

ANCHOR STRESSING FORM

NICHOLSON

Job Name: City Creek Center Block 76
Anchor Designation: FHWA HBSN-
Design Load (k): 70

C3

Added Tail Length (ft): 1.7
Unstressed Tail (ft): 0.7
Free Length (ft): 15.0
Bond Length (ft): 6

Date:
Test By: BJH

Anchor Load %	Elapsed Time (min)	Actual Time	Anchor Load (kips)	JACK Pressure Gauge JD-203 Calc (psi)	JACK Pressure Gauge JD-203 ACTUAL A (psi)	Backup Gauge JD-203 ACTUAL B (psi)	GK1115 Readout: MG003 Calc ustrain (strain)	GK1115 Readout: MG003 ACTUAL (strain)	Anchor Elongations: Nail A Dial 1 (in)	Anchor Elongations: Nail Extension B Dial 2 (in)	Anchor Elongations: Nail Extension Average (in)	Anchor Elongations: Actual Deflections (in)	Anchor Elongations: Min .8* FL (in)	Anchor Elongations: Max FL+.5*BL (in)	NOTES
125%	1		88	1850	1880	1900	2060	2[illegible]	0.212	[illegible]			0.252	0.378	
100%	1		70	1490	1500	1520	1810	1852	0.262	0.351			0.199	0.299	
75%	1		53	1120	1120	1150	1560	1[illegible]2	0.201	0.293			0.147	0.220	
50%	1		35	760	790	810	1310	1366	0.162	0.256			0.094	0.142	
25%	1		18	390	390	420	1070	1087	0.095	0.185			0.042	0.063	
5%	1		4	100	100	110	870	862	0.033	0.097			0.000	0.000	
25%	1		18	390	390	420	1070	1008	0.044	0.126			0.042	0.063	
50%	1		35	760	780	800	1310	1258	0.088	0.184			0.094	0.142	
75%	1			1120	1120	1150		1492	0.155	0.241					
100%	1			1490	1500	1520		1744	0.208	0.300					
125%	1			1850	1870	1900		2008	0.267	0.359					
150%	1			2210		2250		2237	0.324	0.415					
175%	1		123	2580	2600	2620	2550	2455	0.402	0.494			0.357	0.535	
	2				"	"		2460	0.410	0.501					
	3				"	"		2456	0.413	0.505					
	5				"	"		2458	0.413	0.506					
	6				"	"		2460	"	"					
	10				"	"		2459	0.417	0.508					
200%	1			2740	2960	2990		2703	0.516	0.611					
	2				"	"		2692	0.516	0.612					
	3				"	"		2691	0.519	0.614					
	4				"	"		2693	0.520	0.610					
	5				"	"		2699	0.523	0.618					
	6				"	"		2696	"	"					
	10				"	"		2701	0.520	0.621					
	20														
	30														
	50														
	60														
175%	1		123	2580	2600	2620	2550	2[illegible]	0.527	0.627			0.357	0.535	bur jumped
150%	1		105	2210	2210	2220	2300	2383	0.478	0.579			0.304	0.456	broke bond
125%	1		88	1850	1870	1890	2060	2133	0.471	0.520			0.252	0.378	
100%	1		70	1490	1490	1510	1810	1[illegible]	0.421	0.461			0.199	0.299	
75%	1		53	1120	1120	1140	1560	1600	0.305	0.413			0.147	0.220	
50%	1		35	760	790	805	1310	1386	0.249	0.356			0.094	0.142	
5%	1		4	100	100	110	870	910	0.108	0.197			0.000	0.000	
25%	1		18	390	400	430	1070	1007	0.116	0.213			0.042	0.063	
5%	1		4	100	100	110	870	863	0.088	0.169			0.000	0.000	
	2				"	"		866	"	"					
	3				"	"		867	"	"					
	4				"	"		868	"	"					
	5				"	"		869	"	"					
	6				"	"		"	"	"					

ANCHOR STRESSING FORM

Job Name: City Creek Center Block 76
Anchor Designation: FHWA HBSN-
Design Load (k): 70

C3

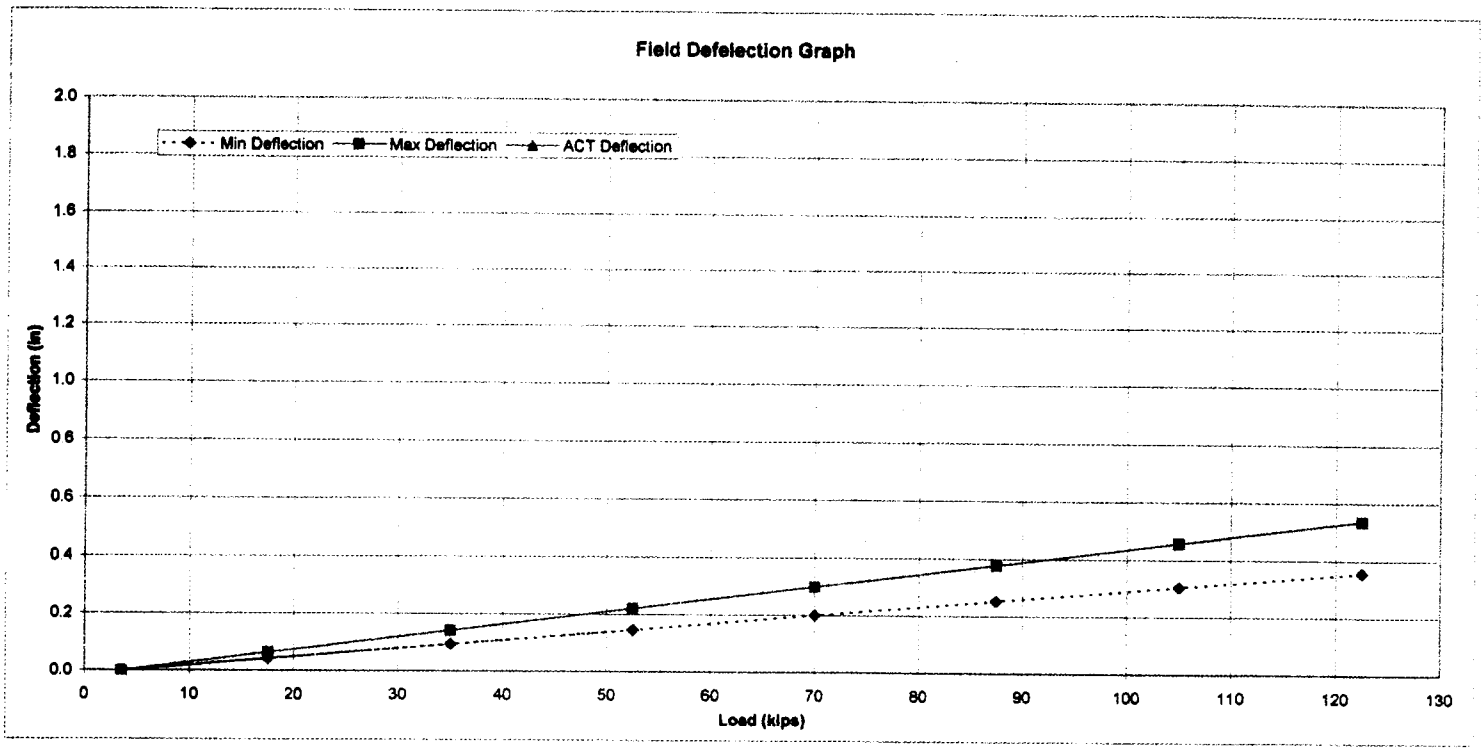
Added Tail Length (ft): 1.7
Unstressed Tail (ft): 0.7
Free Length (ft): 15.0
Bond Length (ft): 6

NICHOLSON

Date:
Test By: BJH

Anchor Load %	Elapsed Time (min)	Actual Time	Anchor Load (kips)	JACK JD-203 Pressure Gauge Calc (psi)	ACTUAL A (psi)	Backup Gauge JD-203 ACTUAL B (psi)	GK1115 Readout: Calc ustrain (strain)	MG003 ACTUAL (strain)	Anchor Elongations Nail A Dial 1 (in)	Nail Extension B Dial 2 (in)	Nail Extension Average (in)	Actual Deflections (in)	Min .8* FL (in)	Max FL+.5*BL (in)	NOTES
	10				100	110		869	0.088	0.169					

A	-1.34523	kips	-57.7471
B	0.048039	kips/psi	0.070609
ZERO	28.04407	psi	819.4



25.1 390 400 420 1002 0.104 0.199

APPENDIX C

Jack and Load Cell Calibrations

National Calibration Inc.
420 West Lawndale Drive
Salt Lake City, UT 84115
(602) 437-0114

The Quality People
Since 1955

ONLINE RECORDS powered by CalHub

Calibration Report

Report No: 91820 **Order No:** 19687-S80040

Customer:	Nicholson Construction Co. 2125 N. Redwood Rd. Salt Lake City, UT 84116	**Calibration Date:**	03/19/2008
		Recall Date:	03/19/2009
		Ambient Temperature:	65.5°F
		Relative Humidity:	30%
Equipment Type:	Hydraulic Ram	**Received:**	In Tolerance
Make:	Power Team	**Returned:**	In Tolerance
Model:	Y26/200 Ton	**Received Condition:**	Fair
Asset Number:	JD203A/JD203B	**Accuracy:**	± 2%
Serial Number:	305967/04-84371	**Capacity:**	200 ton
Procedure:	Commercial Data		
Technician:	Wickham, Rod	**Authorized By:**	

The accuracy of this instrument has been verified under conditions stated in the applicable test procedure. The uncertainty of the calibration process is implicit in the ASTM method. Our standards have traceability to NIST and evidence is on file at our Metrology Laboratory. This certificate shall not be reproduced, except in full, without the written approval of National Calibration Inc.

Recall dates are based on customer's requirements or on assumed normal usage. However, any number of factors can necessitate alternative recall intervals. This certificate applies only to the metrological quantities listed below. Compliance statement relates to the manufacturer's published specifications.

Standards Used

Asset	Make	Model	Description	Cal Date	Due Date
7000169	Coti	CP200	500k Load Cell	04/22/2008	4/22/2009

Test Data

PSI	Lbs	PSI	Lbs	PSI	Lbs	PSI	Lbs
0	0	1,900	89,573	3,800	181,230	5,700	271,928
100	4,635	2,000	94,375	3,900	186,028	5,800	276,635
200	9,270	2,100	99,223	4,000	190,825	5,900	281,343
300	13,905	2,200	104,070	4,100	195,640	6,000	286,050
400	18,540	2,300	108,918	4,200	200,455	6,100	291,028
500	23,175	2,400	113,765	4,300	205,270	6,200	296,005
600	27,810	2,500	118,613	4,400	210,085	6,300	300,983
700	32,445	2,600	123,460	4,500	214,900	6,400	305,960
800	37,080	2,700	128,308	4,600	219,715	6,500	310,938
900	41,715	2,800	133,155	4,700	224,530	6,600	315,915
1,000	46,350	2,900	138,003	4,800	229,345	6,700	320,893
1,100	51,153	3,000	142,850	4,900	234,160	6,800	325,870
1,200	55,955	3,100	147,648	5,000	238,975	6,900	330,848
1,300	60,758	3,200	152,445	5,100	243,683	7,000	335,825
1,400	65,560	3,300	157,243	5,200	248,390	7,100	340,505
1,500	70,363	3,400	162,040	5,300	253,098	7,200	345,185
1,600	75,165	3,500	166,838	5,400	257,805	7,300	349,865
1,700	79,968	3,600	171,635	5,500	262,513	7,400	354,545
1,800	84,770	3,700	176,433	5,600	267,220	7,500	359,225

The Quality People
Since 1955

Calibration Report
Asset Number: JD203A/JD203B
Date: 03/19/2008

PSI	Lbs	PSI	Lbs	PSI	Lbs	PSI	Lbs
7,600	363,905						
7,700	368,585						
7,800	373,265						
7,900	377,945						
8,000	382,625						
8,100	387,493						
8,200	392,360						
8,300	397,228						
8,400	402,095						
8,500	406,963						
8,600	411,830						
8,700	416,698						
8,800	421,565						
8,900	426,433						
9,000	431,300						

National Calibration Inc.
420 West Lawndale Drive
Salt Lake City, UT 84115
(602) 437-0114

The Quality People
Since 1955

ONLINE RECORDS powered by CalHub

Calibration Report

Report No: 91814 **Order No:** 19687-S80040

Customer:	Nicholson Construction Co. 2125 N. Redwood Rd. Salt Lake City, UT 84116	**Calibration Date:**	04/11/2008
		Recall Date:	04/11/2009
		Ambient Temperature:	68°F
		Relative Humidity:	32%
Equipment Type:	Load Cell w/ Display	**Received:**	In Tolerance
Make:	Geokon	**Returned:**	In Tolerance
Model:	400K/GK-501	**Received Condition:**	Fair
Asset Number:	GK1115/MG003	**Accuracy:**	± 1% of Rdg
Serial Number:	GK1115/MG003	**Capacity:**	400000 lb
Procedure:	Eng-12		
Technician:	Wickham, Rod	**Authorized By:**	

The accuracy of this instrument has been verified under conditions stated in the applicable test procedure. The uncertainty of the calibration process is implicit in the ASTM method. Our standards have traceability to NIST and evidence is on file at our Metrology Laboratory. This certificate shall not be reproduced, except in full, without the written approval of National Calibration Inc.

Recall dates are based on customer's requirements or on assumed normal usage. However, any number of factors can necessitate alternative recall intervals. This certificate applies only to the metrological quantities listed below. Compliance statement relates to the manufacturer's published specifications.

Standards Used

Asset	Make	Model	Description	Cal Date	Due Date
7000678	Morehouse	10,000 lbs	Load Cell	04/10/2007	6/10/2008

Test Data

True Load	Run 1	Run 2	Run 3	Average
lbs	counts	counts	counts	counts
0	760	761	761	761
40,000	1,328	1,328	1,329	1,328
80,000	1,923	1,922	1,922	1,922
120,000	2,510	2,508	2,509	2,509
160,000	3,087	3,087	3,088	3,087
200,000	3,659	3,659	3,662	3,660
240,000	4,227	4,228	4,228	4,228
280,000	4,789	4,788	4,790	4,789
320,000	5,347	5,347	5,348	5,347
360,000	5,905	5,904	5,901	5,903
400,000	6,459	6,458	6,462	6,460

Sheet 1 of 2

Schnabel
Schnabel Engineering

Hollow Core Bar Research

Excavation of Soil Nails – Block 76 Site, NV

Project Number

07150064

Sheet 2 of 2

Schnabel Engineering

Hollow Core Bar Research

Excavation of Soil Nails – Block 76 Site, NV

Project Number

07150064