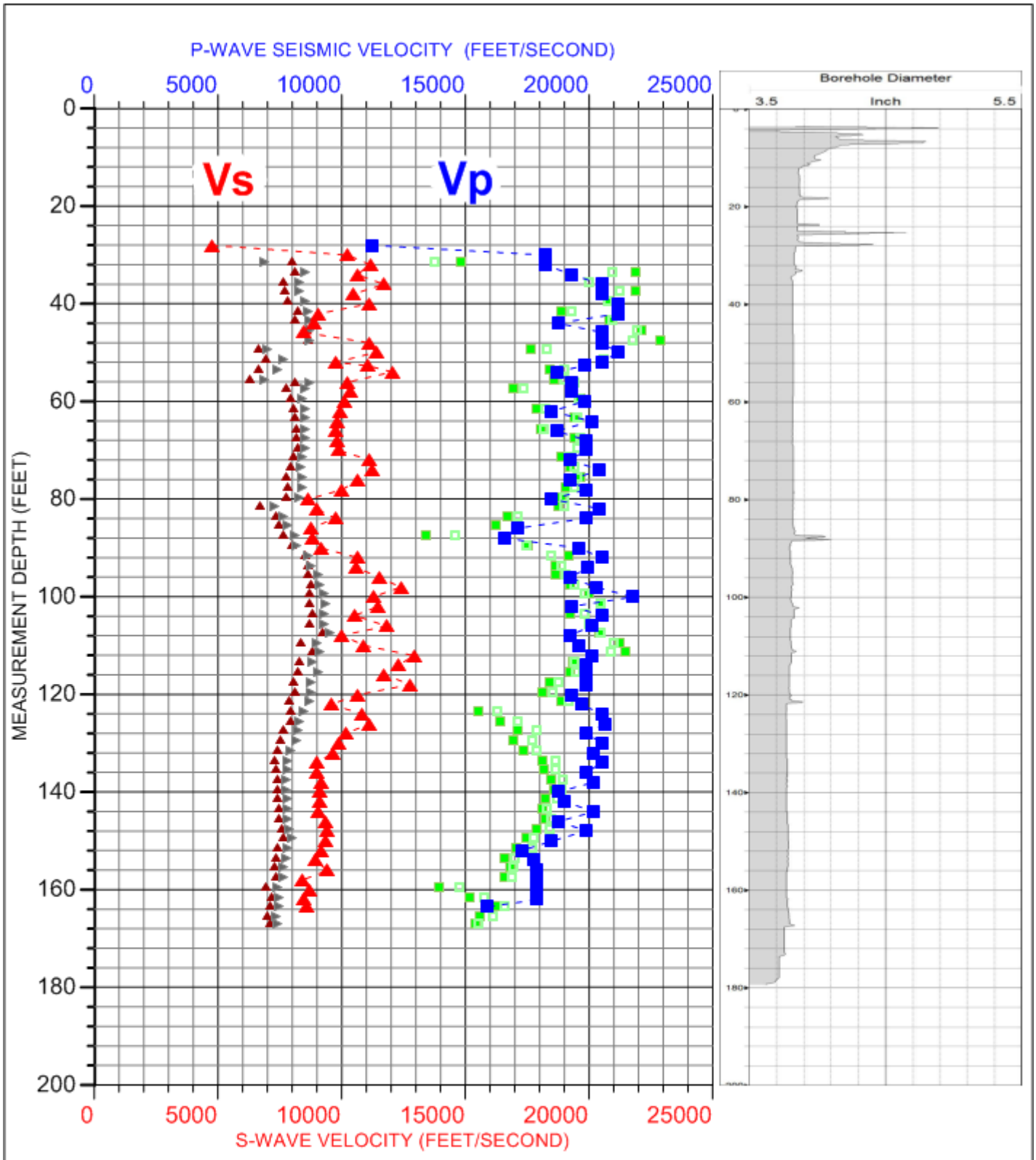
Appendix G.
Downhole Geophysics

Appendix G.
Downhole Geophysics

Appendix G-1
Downhole Geophysics
(P- and S-wave Velocities) Plots – Phase II

Appendix G-1
Downhole Geophysics
(P- and S-wave Velocities) Plots – Phase II



*Interval velocities should be used to calculate elastic moduli values

P- & S-WAVE VELOCITY LEGEND

- *Vs- R1-R2 interval
- Vs- Tx-R1 direct
- Vs- Tx-R2 direct
- *Vp- R1-R2 interval
- Vp- Tx-R1 direct
- Vp- Tx-R2 direct

NORCAL

SUSPENSION P- AND S-WAVE VELOCITY PROFILE BOREHOLE CB-2

LOCATION: Centenial Dam Project, Placer Co.

CLIENT: AECOM

NORCAL GEOPHYSICAL CONSULTANTS INC.

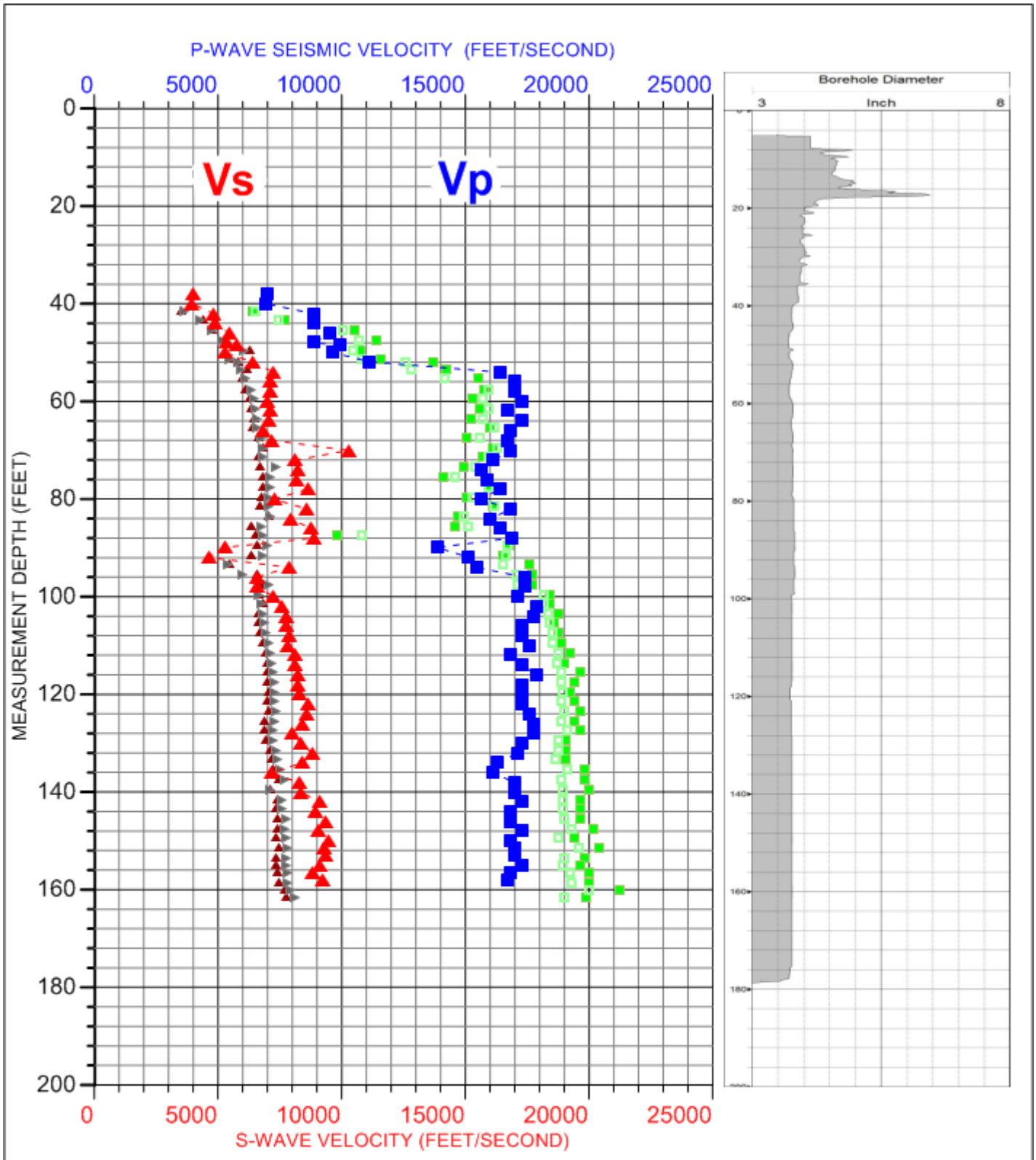
JOB #: 15-533.73B

DATE: NOV., 2015

DRAWN BY: W. HENRICH

APPROVED BY: WJH

PLATE 1



*Interval velocities should be used to calculate elastic moduli values

P- & S-WAVE VELOCITY LEGEND

- *Vs- R1-R2 interval
- Vs- Tx-R1 direct
- Vs- Tx-R2 direct
- *Vp- R1-R2 interval
- Vp- Tx-R1 direct
- Vp- Tx-R2 direct

NORCAL

SUSPENSION P- AND S-WAVE VELOCITY PROFILE BOREHOLE CB-5

LOCATION: Centenial Dam Project, Placer Co., CA

CLIENT: AECOM

NORCAL GEOPHYSICAL CONSULTANTS INC.

JOB #: 15-533.73B

DATE: Nov., 2015

DRAWN BY: W. HENRICH

APPROVED BY: WJH

PLATE 2

Appendix G-2
Downhole Geophysics (P-wave Velocities) Report – Phase III

Appendix G-2
Downhole Geophysics (P-wave Velocities) Report – Phase III

NORCAL
GEOPHYSICAL CONSULTANTS INC.
A Terracon COMPANY

September 7, 2016

AECOM
1333 Broadway, Suite 800
Oakland, CA 94612-1924

SUBJECT: BOREHOLE GEOPHYSICAL LOGGING REPORT
Centennial Dam, NID Phase 3 Geotechnical Investigation
North and South Borrow Areas
Nevada County, California

NORCAL JOB No. NS165019A

ATTN: Ms. Sheri Janowski, Project Engineering Geologist

This report summarizes the findings of a borehole geophysical investigation performed by NORCAL Geophysical Consultants, Inc. at the subject site for AECOM. The investigation was conducted in several separate mobilizations between the periods June 2 through June 28, 2016 by NORCAL Professional Geophysicist William J. Henrich (PGp No. 893). Ms. Kate Zeiger and Mr. Ben Kozlowiez Geologists of URS provided background information, coordination and on-site logistical support.

1.0 INTRODUCTION

At total of six boreholes were geophysically logged using a downhole sonic method. Four boreholes were completed at the South Borrow Area; two boreholes were completed at the North Borrow Area. The purpose of the geophysical logging was to profile P-wave velocities in underlying metamorphic basalt. These sonic velocity data will be used to locally characterize the rock mass in terms of depth of weathering and rock quality.

1.1 BOREHOLE CONDITIONS

Sonic full waveform logging was conducted in 4-inch diameter core holes (HQ size). Borehole depths ranged from 55-to 200- feet below ground surface (bgs). The boreholes penetrated shallow alluvium, intensely weathered to fresh, intensely fractured to un-fractured metamorphic basalt. Generally 3 to 19.5 feet of conductor casing (steel *hwt* casing at 4.25 inches in diameter) was installed in the upper section of the boreholes to prevent caving. All boreholes were flushed with water prior to geophysical logging. Water level in several boreholes dropped several tens of feet prior to surveying. In these instances, we added water to the boreholes just before and sometimes during the logging operation to raise the water level to surface. This water addition was required as sonic logging needs a water or drilling fluid column to operate.

1.2 BOREHOLE LOCATIONS

The sonic logging was distributed over two potential borrow sites. These sites are referred to as South and North Borrow Areas. The following figures show these areas, the location of the sonic logged borehole and these relationships to proposed seismic lines.

Figure 1. South Borrow Area

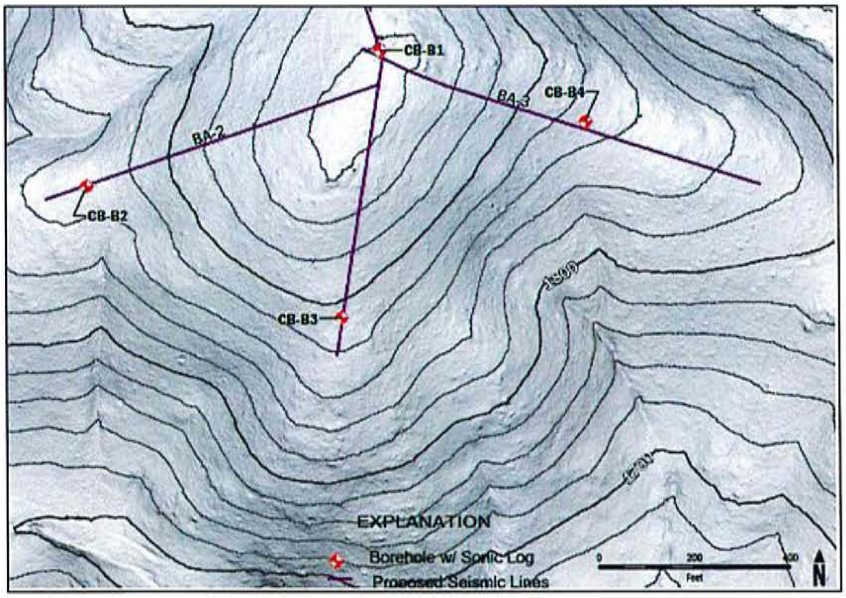
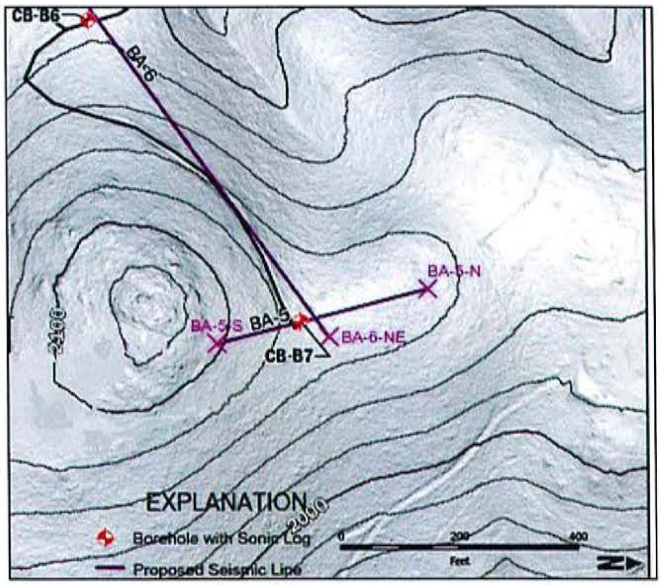


Figure 2. North Borrow Area



2.0 INSTRUMENTATION

NORCAL conducted geophysical borehole logging using a digital ***MICROLOGGER2*** System manufactured by **Robertson Geologging, Ltd.** This system consisted the following components:

- control console,
- computer,
- motorized cable winch,
- Sonic Probe
- Caliper Probe

3.0 METHODOLOGY-DATA ACQUISITION

3.1 Sonic Full Waveform

The compensated sonic full waveform logging for P-wave velocity profiling represents highly specialized down the borehole/well technology. Complete descriptions of the methodology, data acquisition and data analysis procedures are presented in Appendix A.

3.2 Caliper

Caliper logs are a measure of the borehole diameter versus depth. The tool was used both as a survey technique to assess borehole stability and quantify the relative consolidation of bedrock. The caliper tool consists of three interconnected mechanical arms that are spring loaded against the borehole wall. The horizontal deflections of the arms gauge the borehole diameter in units of inches with depth. The logging measurement was made in the up-hole direction at a speed of approximately 10-ft per minute. The data sampling rate for this instrument was every 0.5 feet.

4.0 LOG PRESENTATIONS

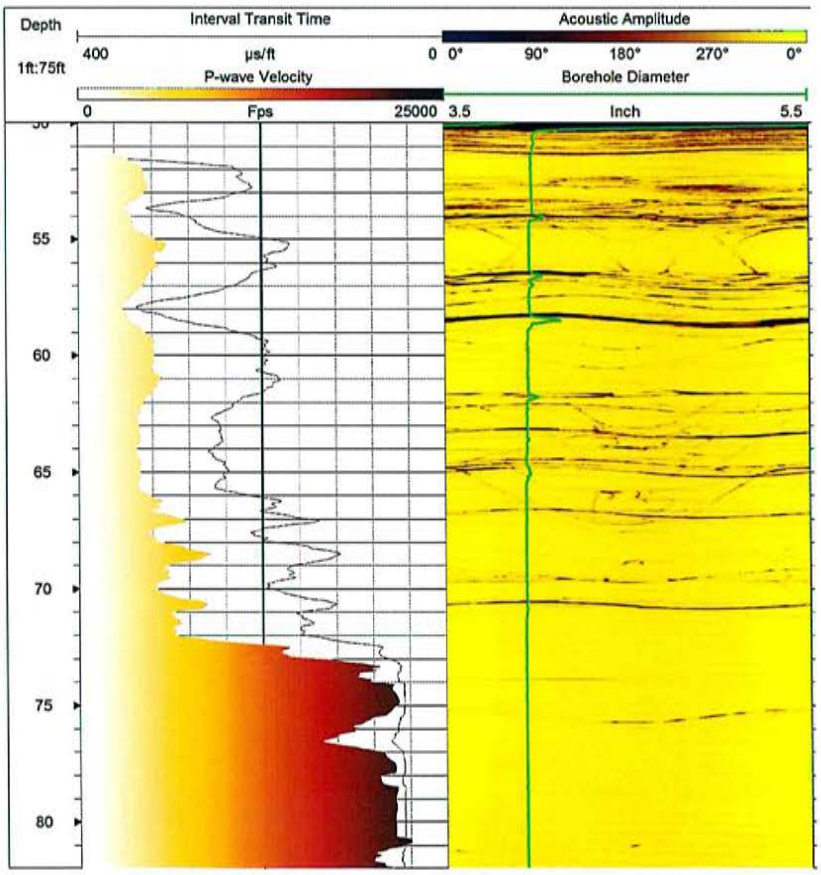
Sonic logs for both borrow areas are present in Appendix B. These log plots show continuous transit times (slowness) and converted sonic P-wave velocities in the left track and full sonic waveforms associated at the near and far detector traces in tracks 2 and 3, respectively. For clarity, the transit times were plotted in reverse order, i.e. values decrease from left to right on the horizontal axis. This is to avoid overprinting on top of the P-wave velocity trace which has been shaded with a horizontal color gradient spectrum. The red-crimson color shades represent the highest P-wave velocity; lighter yellow color shades represent low P-wave velocities. Note, the near and far waveforms are plotted on one-foot depth increments. These are representative of the total log measurement. The transit times and converted P-wave velocities are actually measured every 0.02 feet. We have also shaded interval transit time curves that have apparent

interval time values equal to or less than 200 micro-seconds. This is because 200 micro-seconds represents the lowest P-wave measurement threshold for a sonic tool. Implications of the 200 micro-second threshold are discussed in the following section.

Results of caliper logging are presented in the far right track labeled as Borehole Diameter. The logs horizontal scale ranges from 3.5- to 5.5-inches.

5.0 FORMATION EFFECTS ON SONIC LOGS

The frequency of fractures, occurrence of open fracture apertures, the intensity of weathering along fracture planes and water saturation have a large influence on sonic velocity. Without addressing the water saturation factor, the adjacent figure illustrates the effects of fractures on P-wave velocity. Visible fractures are indicated on the acoustic amplitude image (yellow) as dark sinusoidal bands (see rightmost track in figure). Analyzing this log, fractures in varying frequency are present from 50 to 71 feet. Deflections on the caliper log (green) suggest some of these fractures are open. The effect on P-wave velocity is dramatic. Below 72 feet the P-wave velocity ranges from 17500 to 22000 fps. These velocities represent hard, little weathered bedrock. Above the 72 feet, the P-wave velocities decrease significantly to a range of less than 5000 up to 7500 fps. This magnitude of velocity decrease correlates to moderate to highly fractured bedrock. Weathering of the bedrock via open fractures also may have contributed to the large P-wave velocity decrease.



6.0 INTERPRETATION

6.1 South Borrow Area

Sonic logging was conducted in Boreholes CB-B1,-B2,-B3 and CB-B4. Based on the P-wave velocity magnitudes, variations in the P-wave velocity profile, changes in signal amplitude of the near and far waveforms and to some extent, variations in borehole diameter, the bedrock was characterized into three velocity layers. Table 1 presented below quantifies the velocity ranges and depth intervals of these three velocity layers interpreted for the South Borrow Area.
The lower layer (3) has very high P-wave velocities and represents fresh to little weathered, strong metamorphic basalt. Going up the borehole, a sharp reduction in P-wave marks a transition to an intermediate P-wave velocity layer (2) that represents moderately weathered and fractured metamorphic basalt. This transition middle layer ranges from a few feet up to 18 feet in thickness depending on the borehole location. The upper P-wave velocity layer (1) shows P-wave velocities less than 5000 fps and loss of waveform signal. This upper layer represents highly weathered, slight to highly fractured basalt. Apparent P-wave velocities less than 5000 fps layer were shaded a brown color in Track 1 on the sonic plots in Appendix B. Note, velocities below 5000 fps are not quantifiable and should only be used an indication of highly weathered and fractured bedrock.

Table 1. South Borrow Area, Velocity Layers, P-Wave Velocities and Depth Ranges

Borehole Label	Velocity Layer	P-Wave Velocity Range (fps)	Depth Range (feet bgs)	Bedrock Description
CB-B1	1	< 5000 fps	26-64	Highly weathered & fractured
	2	5000-20000	64-75	Moderately weathered & fractured
	3	15000-22000	75-200	Fresh w/fracture zones
CB-B2	1	< 5000 fps	20-48.5	Highly weathered & fractured
	2	5000-20000	48.5-66	Moderately weathered & fractured
	3	15000-22000	66-89	Fresh with some fracture zones
CB-B3	1	< 5000 fps	22-66	Highly weathered & fractured
	2	5000-20000	66-72	Moderately weathered & fractured
	3	15000-22000	72-89	Fresh and very slightly fractured
CB-B4	1	< 5000 fps	20-56	Highly weathered & fractured
	2	5000-18000	56-68	Moderately weathered & fractured
	3	17000-18000	72-89	Fresh w/fracture zones

6.2 North Borrow Area

Sonic logging was conducted in Boreholes CB-B6 and CB-B7. The velocity layering configuration in this area is the same as the South Borrow Area. Our interpretation as to the velocity ranges and depth intervals are presented in Table 2. Note, that the depth to the high velocity layer is relatively shallow and the velocity transition velocity layers appears much thinner compared to the South Borrow Area.

Table 2. North Borrow Area, Velocity Layers, P-Wave velocity and Depth ranges

Borehole Label	Velocity Layer	P-Wave Velocity Range (fps)	Depth Range (feet bgs)	Bedrock Description
CB-B6	1	< 5000 fps	10-28	Highly weathered & fractured
	2	5000-15000	28-32	Moderately weathered & fractured
	3	15000-17500	32-52	Fresh w/fracture zones
CB-B7	1	< 5000 fps	3-7	Highly weathered & fractured
	2	5000-12500	7-9	Moderately weathered & fractured
	3	12500-18500	9-45	Mostly fresh, w/ significant fracture zones 18- to 21- and 38- to 44-ft bgs

The sonic log of Borehole CB-B7 (see Appendix B) shows significant reductions to P-wave velocities within the high velocity layer (Velocity Layer 3). The largest reduction in velocity is shown from 38- to 44- ft bgs. This velocity effect is the result of a fracture zone. The fracture zone is also indicated by washouts on the caliper log.

7.0 STANDARD CARE

The scope of NORCAL's services for this project consisted of using geophysical logging techniques to measure sonic P- wave velocities. The accuracy of our findings is subject to specific site conditions and limitations inherent to the techniques used. We performed our services in a manner consistent with the level of skill ordinarily exercised by members of the profession currently employing similar methods. No warranty, with respect to the performance of services or products delivered under this agreement, expressed or implied, is made by NORCAL.

We appreciate the opportunity to provide our services to AECOM for this project. If you have any questions, or require additional geophysical services, please do not hesitate to call on us.

Sincerely,

NORCAL Geophysical Consultants, Inc.

William J. Henrich PGp
Professional Geophysicist PGp893

REGISTERED GEOPHYSICIST
WILLIAM J. HENRICH
No. 893
STATE OF CALIFORNIA

Exp 05/31/2018

WJH/
Appendices: Appendix A: Sonic Full Waveform Logging
Appendix B: Sonic Logging Plots

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Appendix A:

Sonic Full Waveform Logging

APPENDIX A

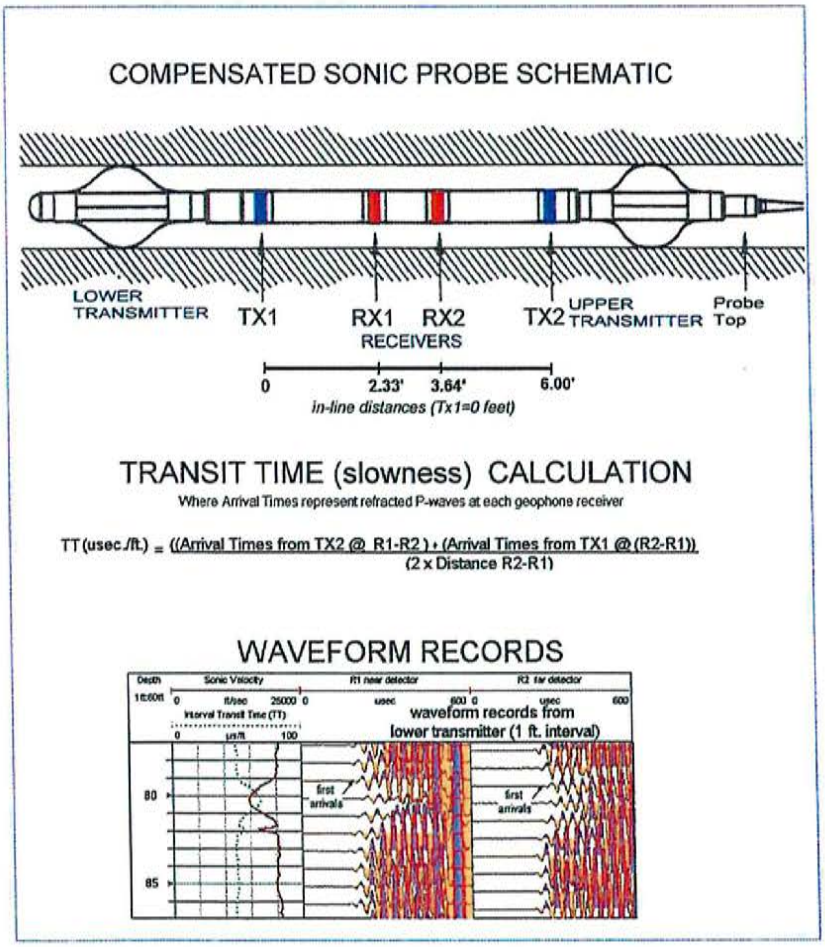
SONIC FULL-WAVEFORM LOGGING

1) Methodology–Data Acquisition

The sonic logging consists of measuring the transmission times from an acoustic energy source to a series of geophone detectors located at fixed distances along the probe. The acoustic energy is imparted to the borehole fluid in sound bursts at a center frequency of 20 kHz from a piezo metric designed transmitter. The energy travels through the borehole fluid and intersects the borehole wall setting up refracted P- and converted P- to S-wave energy that in "fast" formations, arrive at the geophone receivers before direct fluid waves. A fluid column is necessary to acquire sonic data.

Our sonic tool consisted of two transmitters and two receivers that schematically are represented on Figure 1. This acquisition system is set to measure transit times (difference in first arriving P-wave travel times between two receivers) in two phases. Initially, the lower transmitter fires into the two inner receivers (TX1 to RX1 & RX2); this is followed immediately by a second firing- recording sequence as the upper transmitter (TX2 to R2 & R1) fires into the same inner pair of receivers. Within the data acquisition system, first arrivals are detected by an internal zero-crossing threshold technique. These lower and upper interval transit times are averaged to produce a compensated formation interval transit time (slowness). The term "compensation" means that any timing errors associated with probe standoff or borehole washouts are effectively eliminated by this averaging process. The compensated interval transit time (TT) formula is presented in the adjacent figure.

Figure 1. Sonic Probe Schematic



Prior to logging, the apparent strength of the sonic signal is gauged by observing an assembled

full waveform in test mode. Electronic gain is increased at each detector to boost signal amplitude.

Sonic interval transit data are acquired with the probe moving up the borehole at 8 feet per minute. The data sampling increment was every 0.02 feet. In addition to the interval transit time, sonic full waveform records from the near and far detectors relative to the lower transmitter are compiled every foot on the log plot. We acquired two logs in each borehole to verify consistency in the interval transit times.

2) Log Presentation

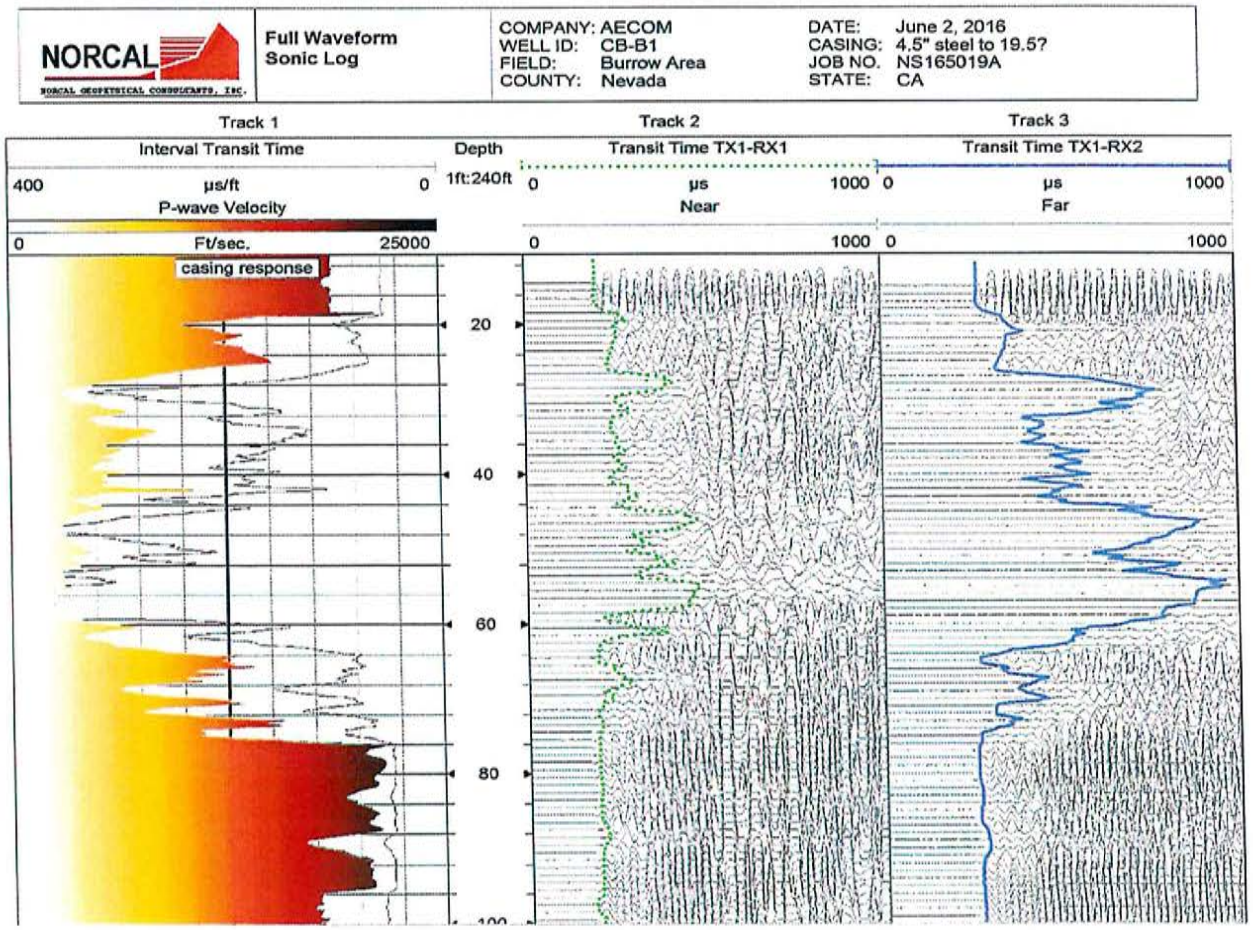
Referring to Figure 1, the basic log display consists of the following elements versus depth left to right as follows as:

Track 1- Interval transit time (TT) plotted in reverse scale
- P-wave velocity (reciprocal of transit time)

Track 2- Transit or arrival time in micro-seconds from the lower Transmitter to "Near 'receiver.
- Sonic waveforms recorded at the "Near' receiver plotted as wiggle traces

Track 3- Transit or arrival time in micro-seconds from the lower Transmitter to "Far' receiver
- Sonic waveforms recorded at the "Far' receiver plotted as wiggle traces

Figure 2. Full Waveform Sonic Log Plot



3) Data Reduction

We converted the interval transit times (TT) into sonic P-wave velocities using the reciprocal formula 1 / (.000001 x TT). This formula produces P-wave velocities in units of feet per second (fps). The lower limit velocity limit of detection with the borehole sonic method is 5000 fps. This velocity corresponds to direct fluid arrivals and not refractions from the formation. Velocities shown on the sonic log plot below 5000 are not factual and should not be taken as absolute velocity measurements. All plotting and velocity calculations we made using the computer program WELLCAD Version 5.1 published by ALT (Luxembourg).

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Appendix B:

Sonic Log Plots

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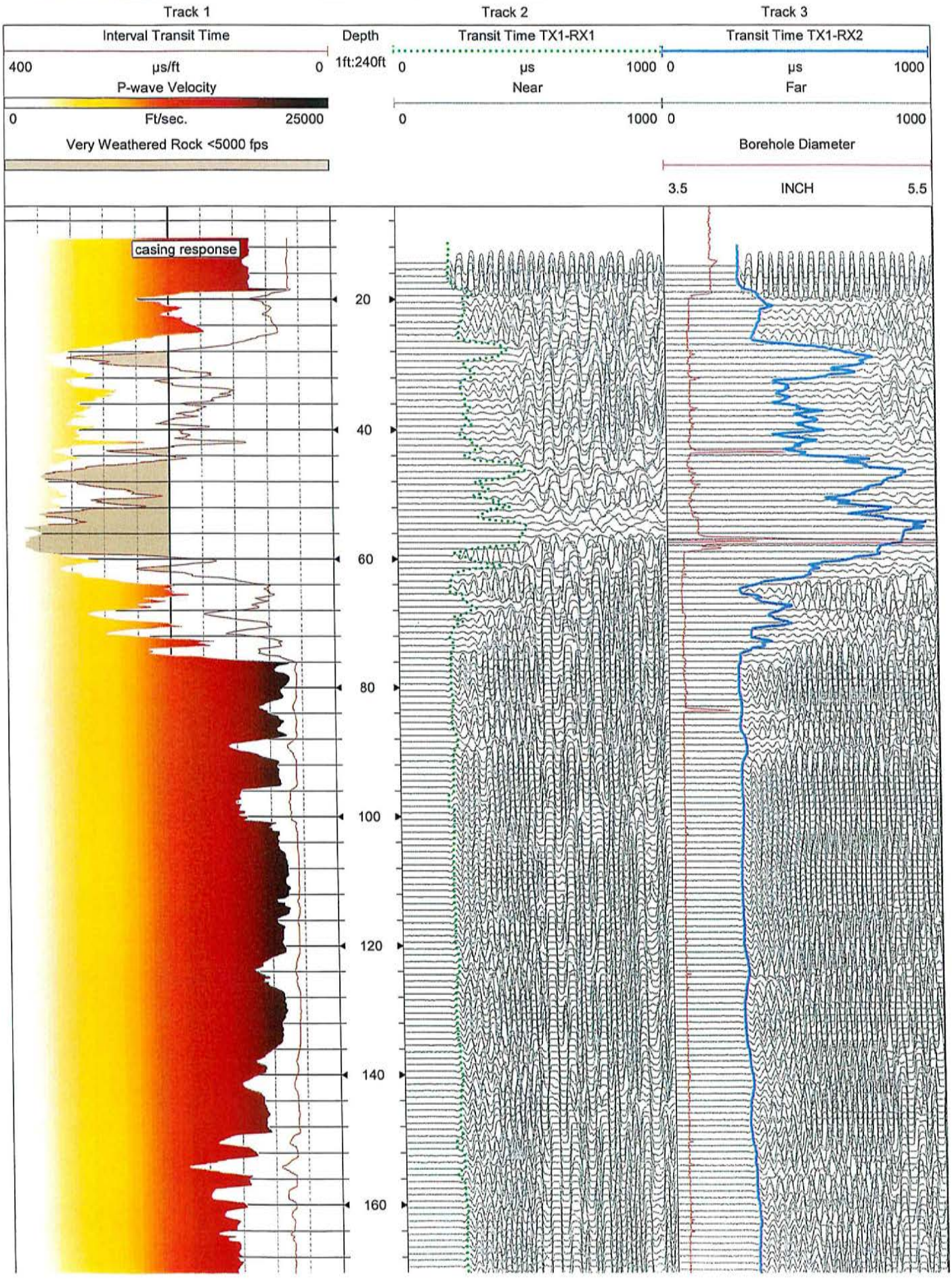
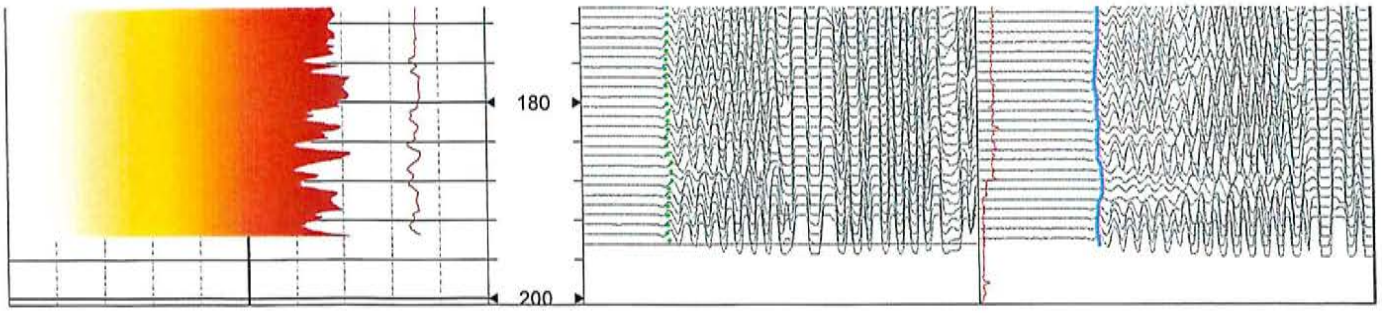
Full Waveform Sonic Log

COMPANY:	AECOM	DATE:	June 2, 2016
WELL ID:	CB-B1	CASING:	4.5" steel to 19.5
FIELD:	South Borrow Area	JOB NO.	NS165019A
COUNTY:	Nevada	STATE:	CA



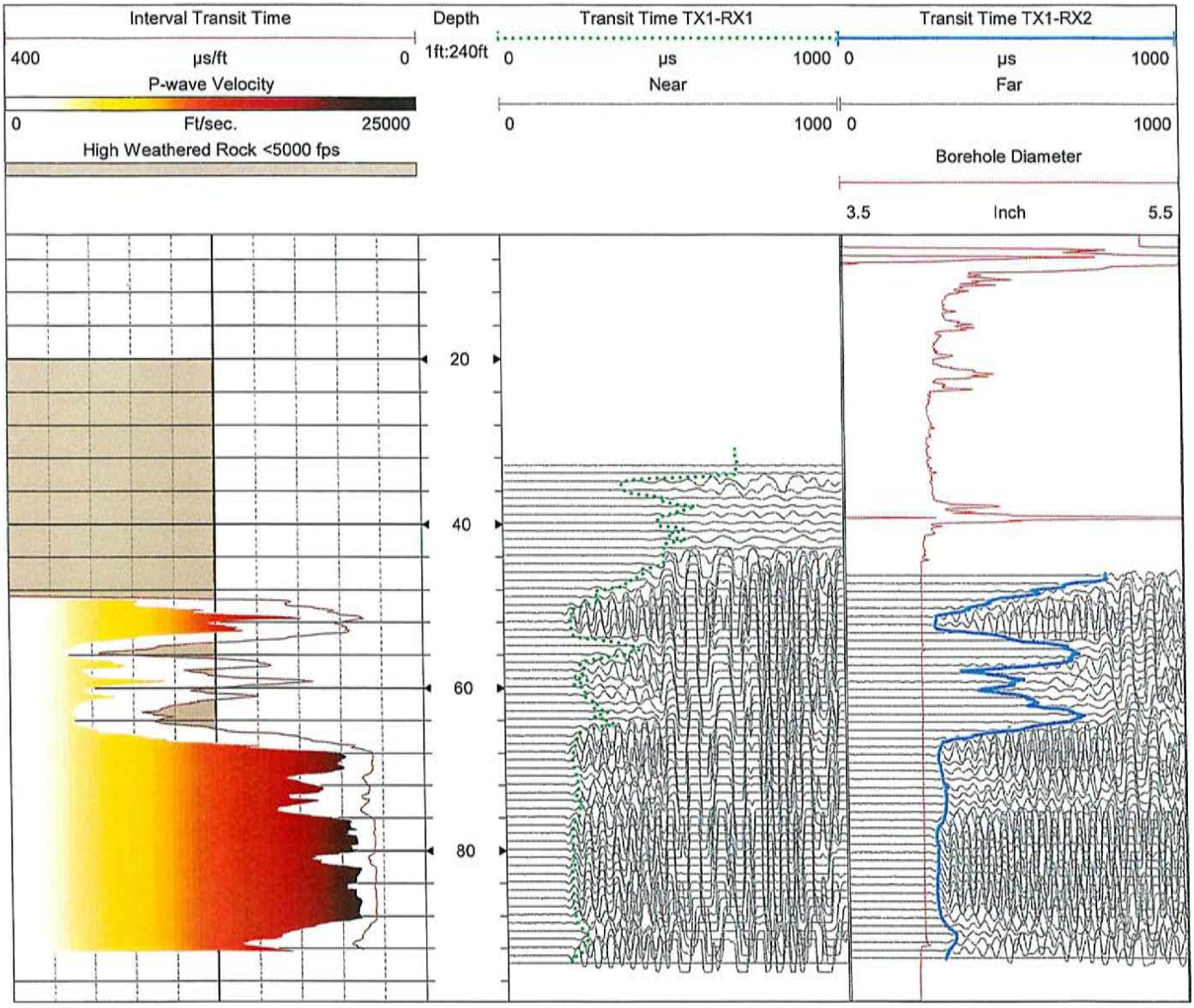

180
200

NORCAL GEOPHYSICAL CONSULTANTS, INC.

Fullwave Sonic Log

COMPANY:	AECOM	DATE:	June 9, 2016
WELL ID:	CB-B2	CASING:	4.5" steel to 10
FIELD:	South Borrow Area	JOB NO.	165019A
COUNTY:	Nevada	STATE:	CA

NOTES: Run-2 Increase gain

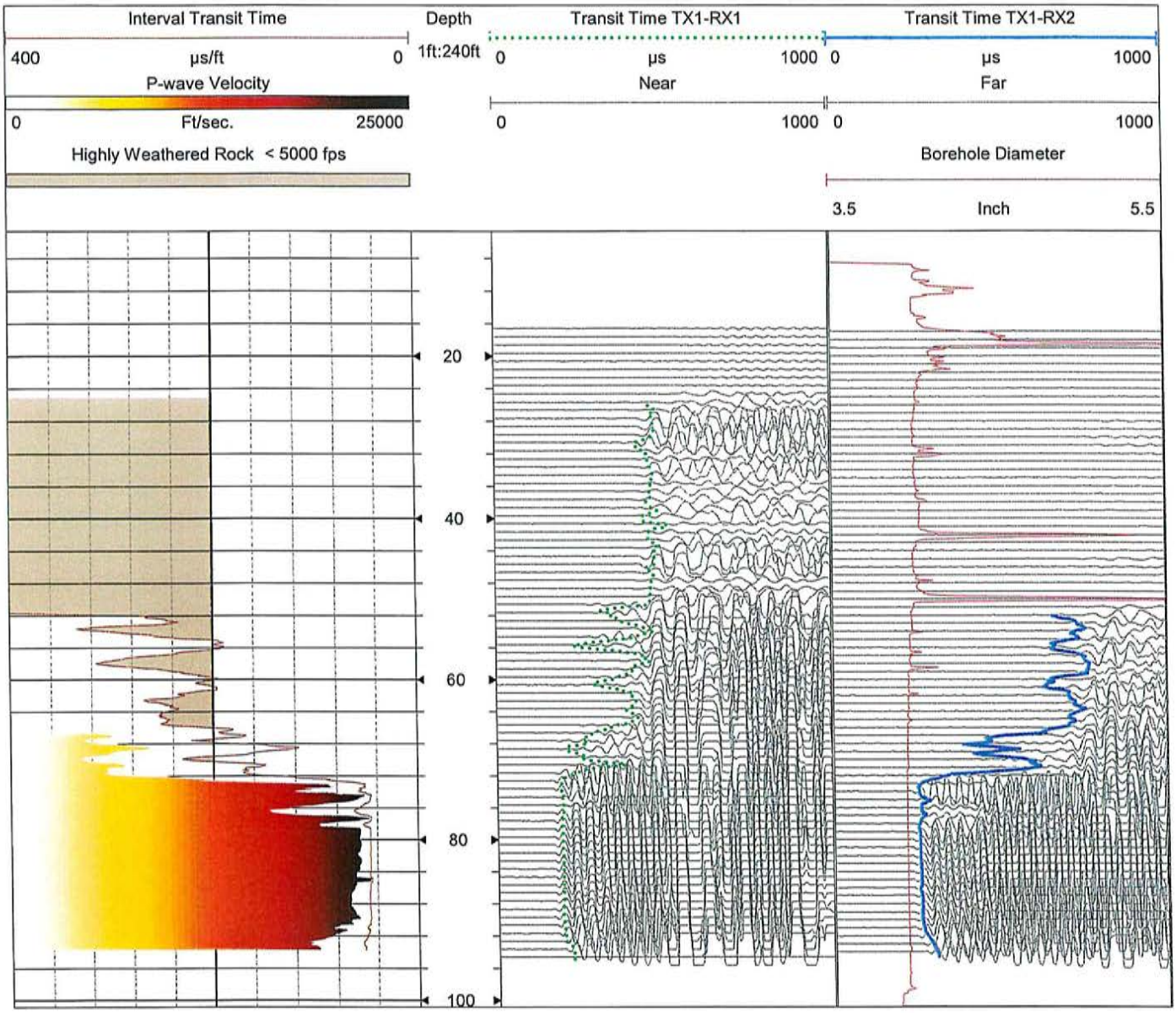


NORCAL GEOPHYSICAL CONSULTANTS, INC.

Fullwave Sonic Log

COMPANY:	AECOM	DATE:	June 11 2016
WELL ID:	CB-B3	CASING:	4.5" steel to 10 ft
FIELD:	South Borrow Area	JOB NO.	NS165019A
COUNTY:	Nevada	STATE:	CA

NOTES: run-1

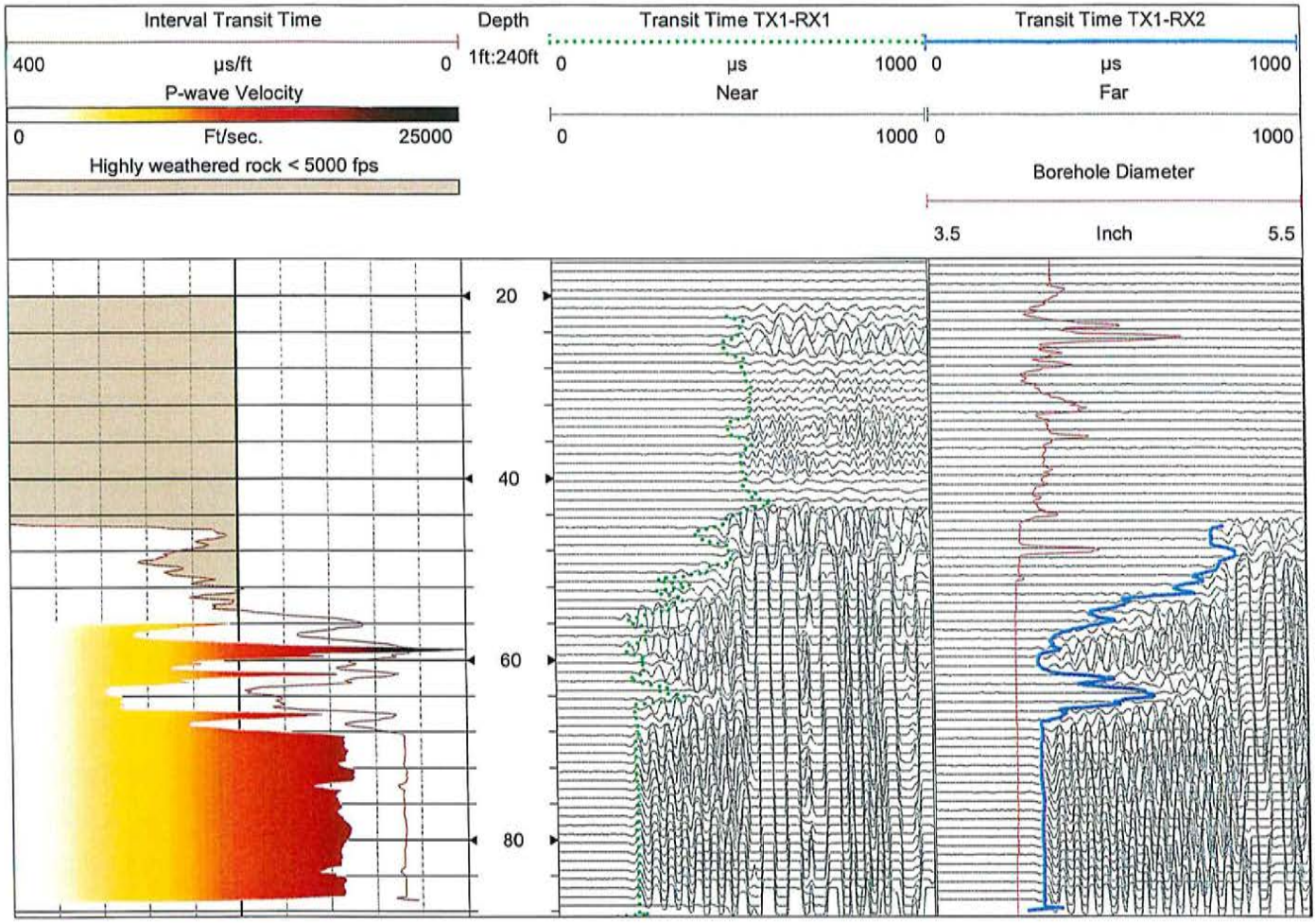


NORCAL GEOPHYSICAL CONSULTANTS, INC.

SONIC FULL WAVEFORM LOG

COMPANY:	AECOM	DATE:	JUNE 9, 2016
WELL ID:	CB-B4	CASING:	HWT CASING to 9 ft
FIELD:	South Borrow Area	JOB NO.	NS165019A
COUNTY:	NEVADA	STATE:	CA

NOTES: Run-2 Add water to borehole

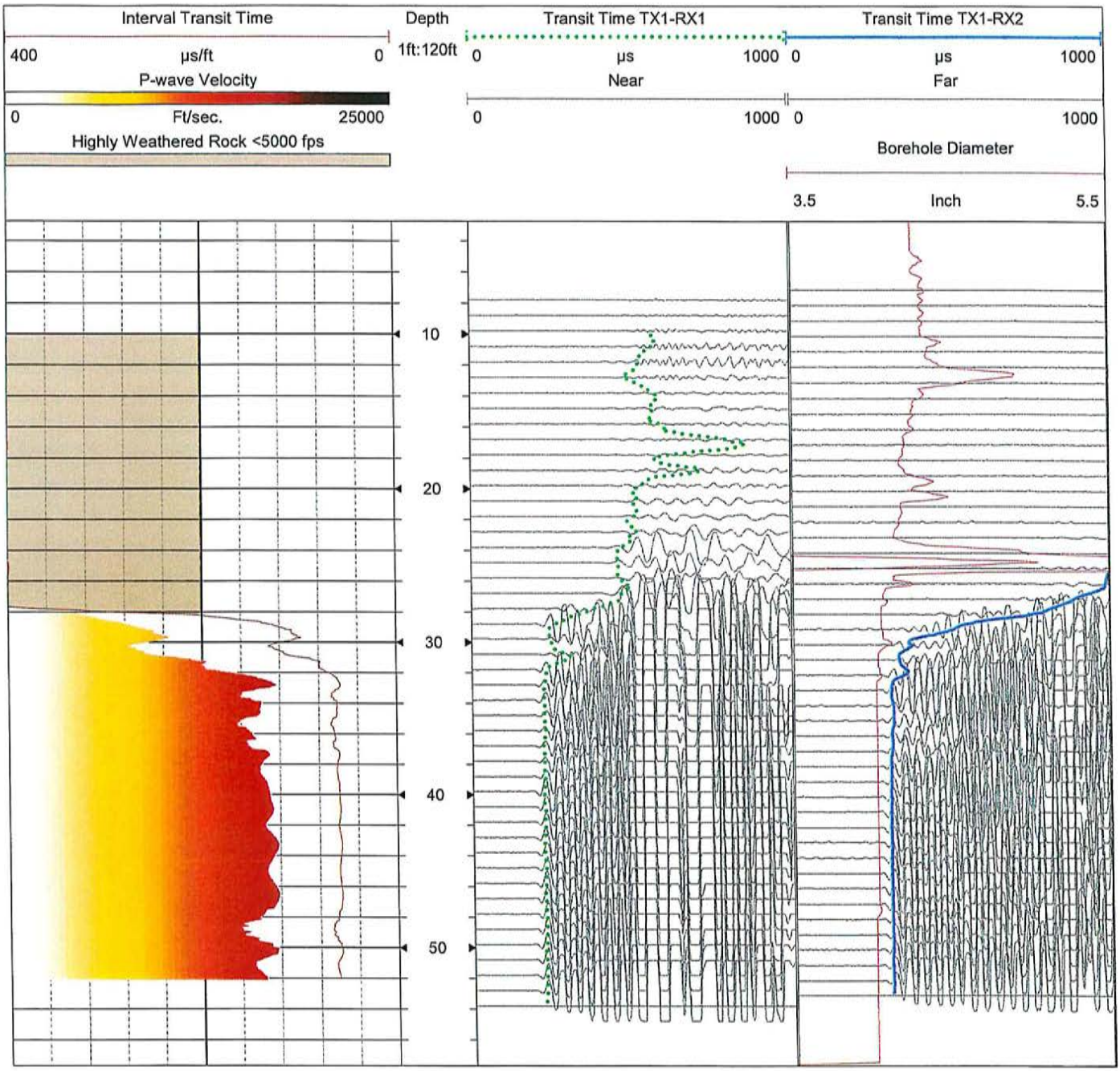


NORCAL GEOPHYSICAL CONSULTANTS, INC.

Fullwave Sonic Log

COMPANY:	AECOM	DATE:	June 25, 2016
WELL ID:	CB-B6	CASING:	4.5 in. diam steel to 5 ft
FIELD:	North Borrow Area	JOB NO.	NS165019A
COUNTY:	Nevada	STATE:	CA

NOTES:

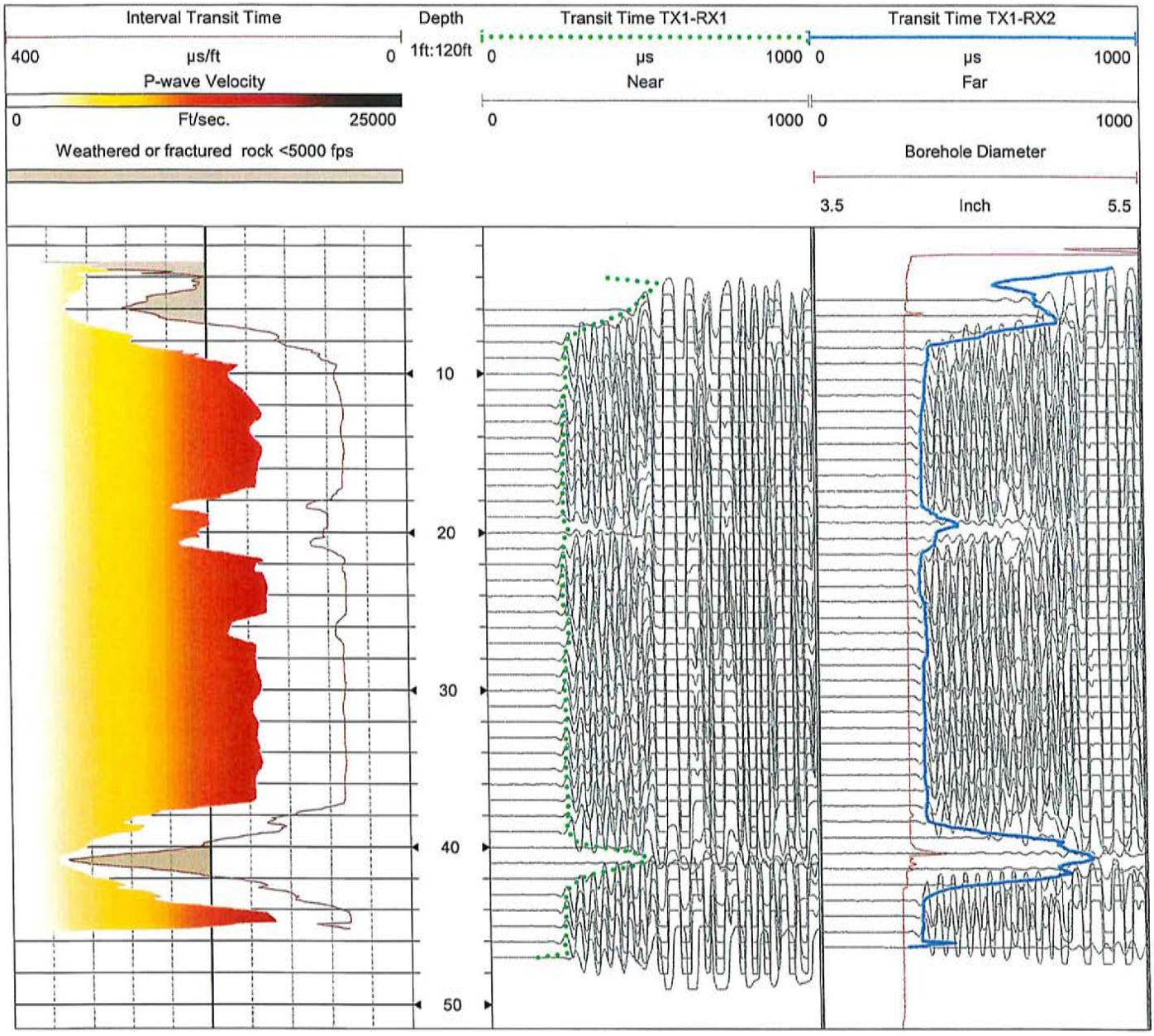


NORCAL GEOPHYSICAL CONSULTANTS, INC.

Fullwave Sonic Log

COMPANY:	AECOM	DATE:	June 28, 2016
WELL ID:	CB-B7	CASING:	4.5" steel to 3 ft.
FIELD:	North Borrow Area	JOB NO.	165019A
COUNTY:	Nevada	STATE:	CA

NOTES:



Appendix H.
Laboratory Test Data

Appendix H.
Laboratory Test Data

Appendix H-1
Unconfined Compressive Strength Test Data – Dam Site

Appendix H-1
Unconfined Compressive Strength Test Data – Dam Site

Summary of Unconfined Compressive Strength Test Results

Axis No.	Abutment	Boring No.	Depth Range of Test Sample (ft)	Degree of Weathering	Unconfined Compressive Strength (psi)
2	Left	CB-1	126.8-127.3	slightly to moderately weathered	2667
		CB-1	140.7-141.5	fresh	12543
		CB-2	30.3-31.0	slightly weathered to fresh	24095
		CB-2	123.9-124.6	slightly weathered to fresh	18997
		CB-10	45.1-45.7	highly to moderately weathered	705
		CB-12	35.2-35.5	slightly weathered	1804
		CB-12	47.7-48.6	fresh	9360
		CB-17	8.0-9.2	moderately weathered	9004
		CB-20	16.8-17.9	slightly weathered	11480
		CB-20	24.7-25.6	slightly weathered	9889
		CB-20	63.3-64.4	slightly weathered	4457
	Right	CB-3	55.1-55.4	slightly weathered	6461
		CB-3	63.3-63.8	slightly weathered	10020
		CB-3	121.3-121.9	moderately weathered	1902
		CB-4	17.2-17.79	slightly weathered	26636
		CB-4	61.8-62.5	slightly weathered	17808
		CB-13	98.5-99.0	slightly weathered	18909
		CB-13	114.8-116.0	slightly weathered	35673
		CB-13	137.5-138.5	slightly weathered	18386
		CB-14	77.5-78.5	slightly to moderately weathered	5840
		CB-18	30.9-31.7	slightly weathered	7769
		CB-18	36.0-37.3	slightly weathered	8726
		CB-18	53.0-53.9	slightly weathered	17460
		CB-15	24.0-24.7	slightly weathered	9509
		CB-15	56.2-57.2	slightly weathered	9233
		CB-15	67.1-68.3	slightly weathered	5102

Summary of Unconfined Compressive Strength Test Results

	Channel	CB-16	41.0-41.8	slightly weathered	15889
		CB-16	49.3-50.0	slightly weathered	11459
		CB-16	62.8-63.7	fresh	9630
		CB-16	88.7-90.1	slightly weathered to fresh	15284
		CB-16A	33.1-33.6	slightly weathered	20085
		CB-16A	37.9-39.1	slightly weathered	21853

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Compressive Strength of Intact Rock

ASTM D7012

DSA File #:
DSA Appl #:

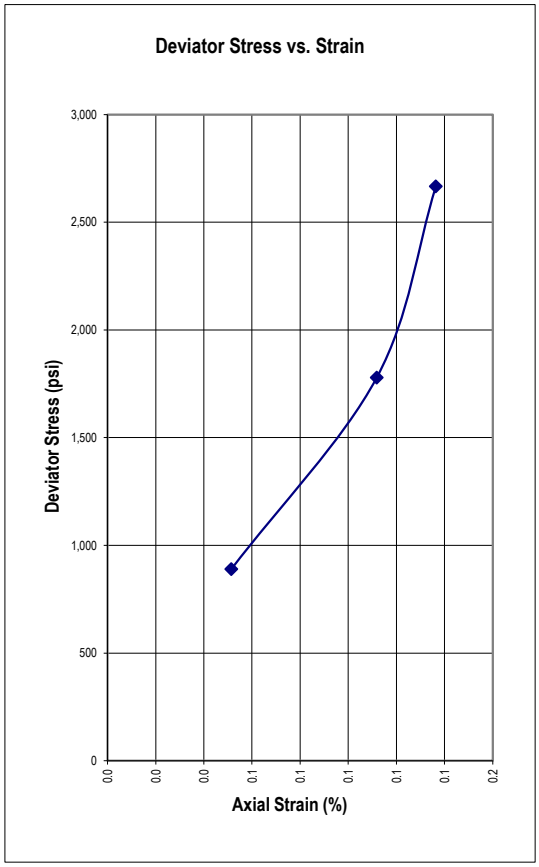
Project No.:	4438-01	Project Name:	NID Water Storage	Date:	12/8/2015
Sample No.:	CB-1 126.8-127.3	Boring/Trench No.:		Depth (ft.)	Tested By: DWP/CAJ
Soil Description:					Check By: Draft
Sample Location:					Lab No.: 15-15-549

Sample Data		
Tare Number	I.D.	JD
Tare Weight	(gm)	190 50
Wet Core + Tare	(gm)	958.70
Dry Core + Tare	(gm)	920.80
Weight of Water	(gm)	37.90
Dry Weight	(gm)	730 30
Moisture Content	(%)	5.19
Core Height	(in)	4.472
Sample Diameter	(in)	2 392
Wet Unit Weight	(pcf)	145.49
Dry Unit Weight	(pcf)	138 32
Specific Gravity	(g/cc)	2.72
Saturation	(%)	62.16
Strain Rate	psi/second	28.99
compression machine	D	15-08-029CT

Photo At Failure

Compressive Strength = 2,666.7 psi

Elapsed Time (Seconds)	Strain Units (0.0001in/unit)	Strain Percent (%)	Area (in^2)	Load lbs	Deviator Stress (psi)
4	23	0.05	4.496	4000.00	889.66
45	50	0.11	4.499	8000.00	1778.25
92	61	0.14	4.500	12000.00	2666.71



HOLDREGE & KULL

(530) 478-1305 - Fax (530) 478-1019 - 792 Searls Ave.- Nevada City, CA 95959 - A California Corporation

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CONSULTING ENGINEERS • GEOLOGISTS

Compressive Strength of Intact Rock

ASTM D7012

DSA File #:
DSA Appl #:

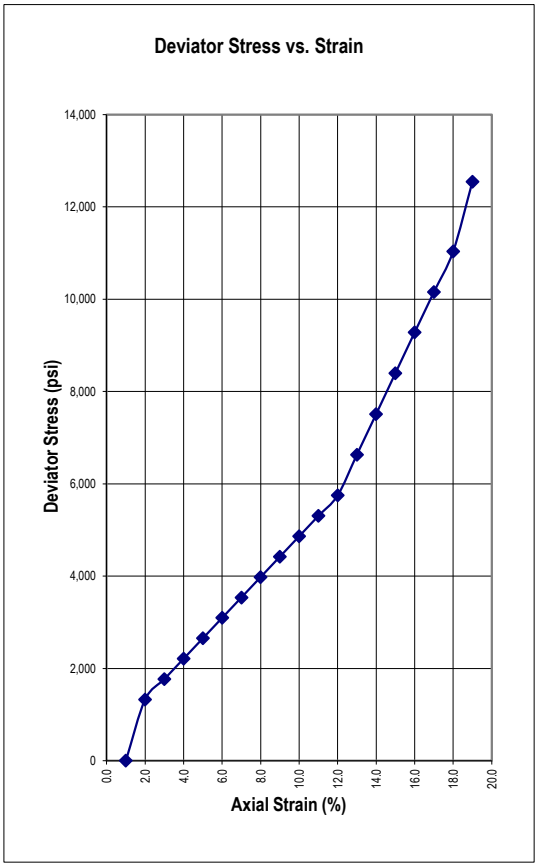
Project No.:	4438-01	Project Name:		Date:	12/8/2015
Sample No.:	CB-1 140.7-141.5	Boring/Trench No.:		Depth (ft.)	Tested By: DWP/CAJ
Soil Description:					Check By: Draft
Sample Location:					Lab No.: 15-15-549

Sample Data		
Tare Number	I.D.	BK
Tare Weight	(gm)	319.10
Wet Core + Tare	(gm)	1225.40
Dry Core + Tare	(gm)	1222.60
Weight of Water	(gm)	2.80
Dry Weight	(gm)	903 50
Moisture Content	(%)	0.31
Core Height	(in)	4 578
Sample Diameter	(in)	2.400
Wet Unit Weight	(pcf)	166 56
Dry Unit Weight	(pcf)	166.05
Specific Gravity	(g/cc)	2.72
Saturation	(%)	38.01
Strain Rate	psi/second	57.02
compression machine	D	15-08-029CT

Photo At Failure

Compressive Strength = 12,543.3 psi

Elapsed Time (Seconds)	Strain Units (0.0001in/unit)	Strain Percent (%)	Area (in^2)	Load lbs	Deviator Stress (psi)
4	0			4000.00	
8	1	0.00	4.524	6000.00	1326.26
22	1	0.00	4.524	8000.00	1768.35
33	1	0.00	4.524	10000.00	2210.44
42	1	0.00	4.524	12000.00	2652.52
50	1	0.00	4.524	14000.00	3094.61
59	1	0.00	4.524	16000.00	3536.70
64	1	0.00	4.524	18000.00	3978.79
72	1	0.00	4.524	20000.00	4420.87
85	1	0.00	4.524	22000.00	4862.96
92	1	0.00	4.524	24000.00	5305.05
108	1	0.00	4.524	26000.00	5747.14
115	4	0.01	4.524	30000.00	6630.88
131	38	0.08	4.528	34000.00	7509.41
142	19	0.0415028	4.526	38000.00	8396.36
164	21	0.0458716	4.526	42000.00	9279.78
186	60	0.1310616	4.530	46000.00	10154.91
205	75	0.163827	4.531	50000.00	11034.32
220	85	0.1856706	4.532	56850.00	12543.28



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Compressive Strength of Intact Rock

ASTM D7012

DSA File #:
DSA Appl #:

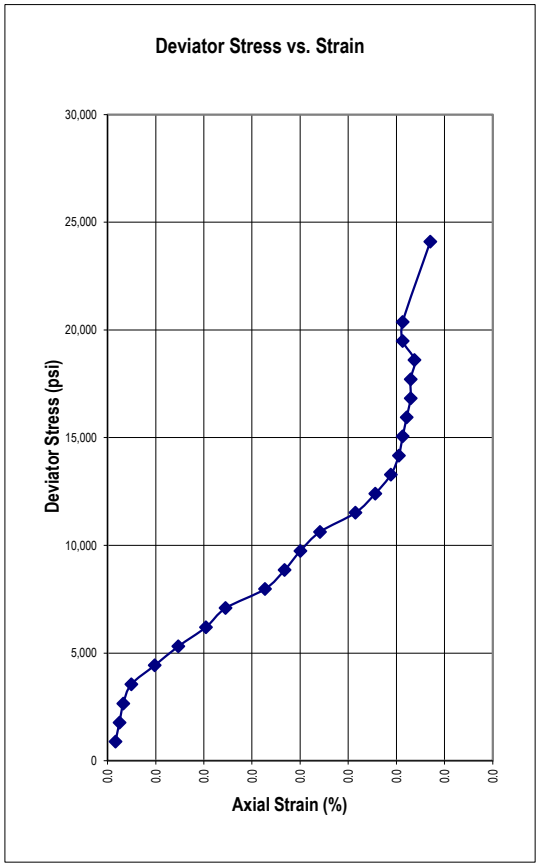
Project No.:	4438-01	Project Name:	NID Water Storage	Date:	12/8/2015
Sample No.:	CB-2 30.3-31.0	Boring/Trench No.:		Depth (ft.)	Tested By: DWP/CAJ
Soil Description:					Check By: Draft
Sample Location:					Lab No.: 15-15-549

Sample Data		
Tare Number	I.D.	F
Tare Weight	(gm)	321.00
Wet Core + Tare	(gm)	1227.60
Dry Core + Tare	(gm)	1225.20
Weight of Water	(gm)	2.40
Dry Weight	(gm)	904 20
Moisture Content	(%)	0.27
Core Height	(in)	1223 200
Sample Diameter	(in)	2 398
Wet Unit Weight	(pcf)	0.62
Dry Unit Weight	(pcf)	0.62
Specific Gravity	(g/cc)	2.72
Saturation	(%)	0.00
Strain Rate	psi/second	68.65
compression machine	D	15-08-029CT

Photo At Failure

Compressive Strength = 24,094.5 psi

Elapsed Time (Seconds)	Strain Units (0.0001in/unit)	Strain Percent (%)	Area (in^2)	Load lbs	Deviator Stress (psi)
10	2	0.00	4.516	4000.00	885.67
20	3	0.00	4.516	8000.00	1771.34
29	4	0.00	4.516	12000.00	2657.01
39	6	0.00	4.516	16000.00	3542.68
68	12	0.00	4.516	20000.00	4428.34
89	18	0.00	4.516	24000.00	5314.01
101	25	0.00	4.516	28000.00	6199.67
112	30	0.00	4.516	32000.00	7085.34
131	40	0.00	4.516	36000.00	7971.00
152	45	0.00	4.516	40000.00	8856.66
161	49	0.00	4.516	44000.00	9742.33
172	54	0.00	4.516	48000.00	10627.99
192	63	0.00	4.516	52000.00	11513.65
201	68	0.00	4.516	56000.00	12399.31
214	72	0.0005886	4.516	60000.00	13284.97
228	74	0.000605	4.516	64000.00	14170.63
254	75	0.0006131	4.516	68000.00	15056.29
264	76	0.0006213	4.516	72000.00	15941.95
273	77	0.0006295	4.516	76000.00	16827.62
284	77	0.0006295	4.516	80000.00	17713.28
310	78	0.0006377	4.516	84000.00	18598.94
328	75	0.0006131	4.516	88000.00	19484.61
340	75	0.0006131	4.516	92000.00	20370.28
351	82	0.0006704	4.516	108820.00	24094.48



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Compressive Strength of Intact Rock

ASTM D7012

DSA File #:
DSA Appl #:

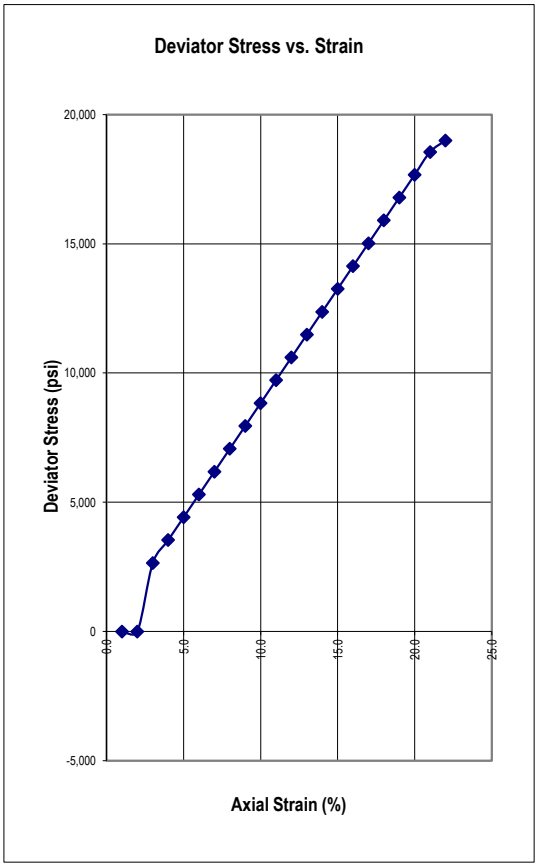
Project No.:	4438-01	Project Name:	NID Water Storage	Date:	12/8/2015
Sample No.:	CB-2 123.9-124.6	Boring/Trench No.:		Depth (ft.)	Tested By: DWP/CAJ
Soil Description:					Check By: Draft
Sample Location:					Lab No.: 15-15-549

Sample Data		
Tare Number	I.D.	LJ
Tare Weight	(gm)	306 50
Wet Core + Tare	(gm)	1249.20
Dry Core + Tare	(gm)	1244.90
Weight of Water	(gm)	4.30
Dry Weight	(gm)	938.40
Moisture Content	(%)	0.46
Core Height	(in)	4.812
Sample Diameter	(in)	2.401
Wet Unit Weight	(pcf)	164.69
Dry Unit Weight	(pcf)	163 94
Specific Gravity	(g/cc)	2.72
Saturation	(%)	35.28
Strain Rate	psi/second	46.36
compression machine	D	15-08-029CT

Photo At Failure

Compressive Strength = 18,997.2 psi

Elapsed Time (Seconds)	Strain Units (0.0001in/unit)	Strain Percent (%)	Area (in^2)	Load lbs	Deviator Stress (psi)
4	0			4000.00	
36	0			8000.00	
61	1	0.00	4.528	12000.00	2650.32
82	1	0.00	4.528	16000.00	3533.76
101	1	0.00	4.528	20000.00	4417.20
122	1	0.00	4.528	24000.00	5300.64
135	1	0.00	4.528	28000.00	6184.08
153	1	0.00	4.528	32000.00	7067.52
169	2	0.00	4.528	36000.00	7950.79
181	2	0.00	4.528	40000.00	8834.21
200	2	0.00	4.528	44000.00	9717.63
219	2	0.00	4.528	48000.00	10601.05
235	2	0.00	4.528	52000.00	11484.47
255	3	0.01	4.528	56000.00	12367.64
272	3	0.0062344	4.528	60000.00	13251.04
289	3	0.0062344	4.528	64000.00	14134.44
307	3	0.0062344	4.528	68000.00	15017.85
326	3	0.0062344	4.528	72000.00	15901.25
345	2	0.0041563	4.528	76000.00	16785.00
370	2	0.0041563	4.528	80000.00	17668.42
383	2	0.0041563	4.528	84000.00	18551.84
405	4	0.0083126	4.528	86020.00	18997.18
				90020.00	
				94020.00	



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Compressive Strength of Intact Rock

ASTM D7012

DSA File #:
DSA Appl #:

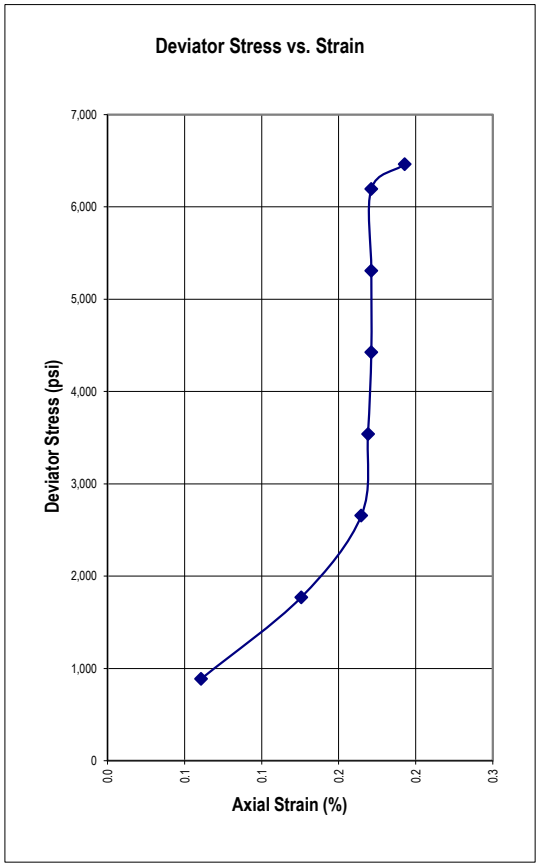
Project No.:	4438-01	Project Name:	NID Water Storage	Date:	12/8/2015
Sample No.:	CB3 55.1-55.4	Boring/Trench No.:		Depth (ft.)	Tested By: DWP/CAJ
Soil Description:					Check By: Draft
Sample Location:					Lab No.: 15-15-549

Sample Data		
Tare Number	I.D.	D
Tare Weight	(gm)	316.70
Wet Core + Tare	(gm)	1243.30
Dry Core + Tare	(gm)	1231.10
Weight of Water	(gm)	12.20
Dry Weight	(gm)	914.40
Moisture Content	(%)	1.33
Core Height	(in)	4.614
Sample Diameter	(in)	2 397
Wet Unit Weight	(pcf)	169 39
Dry Unit Weight	(pcf)	167.16
Specific Gravity	(g/cc)	2.72
Saturation	(%)	235.77
Strain Rate	psi/second	30.33
compression machine	D	15-08-029CT

Photo At Failure

Compressive Strength = 6,460.5 psi

Elapsed Time (Seconds)	Strain Units (0.0001in/unit)	Strain Percent (%)	Area (in^2)	Load lbs	Deviator Stress (psi)
14	28	0.06	4.515	4000.00	885.87
58	58	0.13	4.518	8000.00	1770.59
85	76	0.16	4.520	12000.00	2654.85
115	78	0.17	4.520	16000.00	3539.64
149	79	0.17	4.520	20000.00	4424.46
160	79	0.17	4.520	24000.00	5309.35
194	79	0.17	4.520	28000.00	6194.24
213	89	0.19	4.521	29210.00	6460.51



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Compressive Strength of Intact Rock

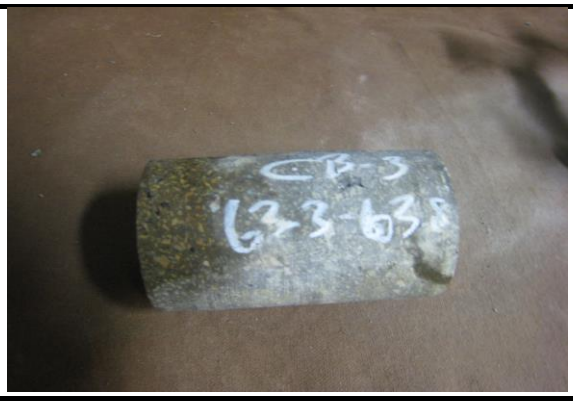
ASTM D7012

DSA File #:
DSA Appl #:

Project No.:	4438-01	Project Name:	NID Water Storage	Date:	12/8/2015
Sample No.:	CB-3 63.3-63.8	Boring/Trench No.:		Depth (ft.)	Tested By: DWP/CAJ
Soil Description:					Check By: Draft
Sample Location:					Lab No.: 15-15-549

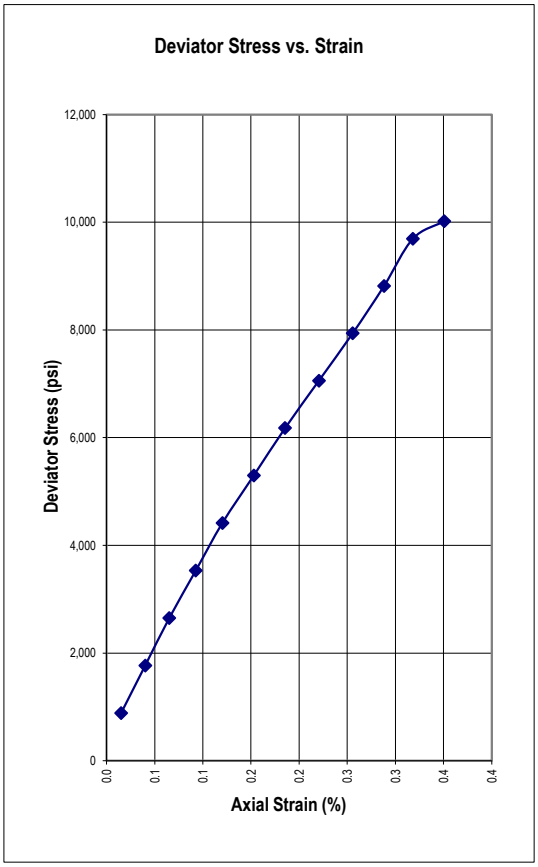
Sample Data		
Tare Number	I.D.	DE
Tare Weight	(gm)	258 90
Wet Core + Tare	(gm)	1067.50
Dry Core + Tare	(gm)	1060.80
Weight of Water	(gm)	6.70
Dry Weight	(gm)	801 90
Moisture Content	(%)	0.84
Core Height	(in)	3 990
Sample Diameter	(in)	2.400
Wet Unit Weight	(pcf)	170 50
Dry Unit Weight	(pcf)	169.09
Specific Gravity	(g/cc)	2.72
Saturation	(%)	603.75
Strain Rate	psi/second	43.57
compression machine	D	15-08-029CT

Photo At Failure



Compressive Strength = 10,020.2 psi

Elapsed Time (Seconds)	Strain Units (0.0001in/unit)	Strain Percent (%)	Area (in^2)	Load lbs	Deviator Stress (psi)
12	6	0.02	4.525	4000.00	884.06
45	16	0.04	4.526	8000.00	1767.68
69	26	0.07	4.527	12000.00	2650.85
89	37	0.09	4.528	16000.00	3533.50
107	48	0.12	4.529	20000.00	4415.65
128	61	0.15	4.531	24000.00	5297.05
145	74	0.19	4.532	28000.00	6177.88
163	88	0.22	4.534	32000.00	7057.95
179	102	0.26	4.535	36000.00	7937.40
199	115	0.29	4.537	40000.00	8816.46
218	127	0.32	4.538	44000.00	9695.18
230	140	0.35	4.540	45490.00	10020.22
				49490.00	
				53490.00	
				57490.00	
				61490.00	
				65490.00	
				69490.00	
				73490.00	
				77490.00	
				81490.00	
				85490.00	
				89490.00	
				93490.00	



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Compressive Strength of Intact Rock

ASTM D7012

DSA File #:
DSA Appl #:

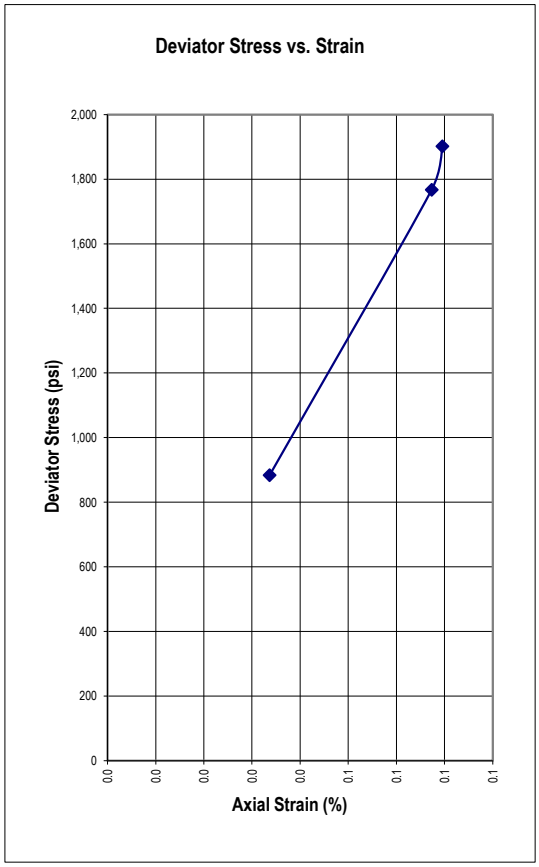
Project No.:	4438-01	Project Name:	NID Water Storage	Date:	12/8/2015
Sample No.:	CB-3 121.3-121.9	Boring/Trench No.:		Depth (ft.)	Tested By: DWP/CAJ
Soil Description:					Check By: Draft
Sample Location:					Lab No.: 15-15-549

Sample Data		
Tare Number	I.D.	JF
Tare Weight	(gm)	192.40
Wet Core + Tare	(gm)	987 30
Dry Core + Tare	(gm)	943.60
Weight of Water	(gm)	43.70
Dry Weight	(gm)	751 20
Moisture Content	(%)	5.82
Core Height	(in)	4.456
Sample Diameter	(in)	2.400
Wet Unit Weight	(pcf)	150.09
Dry Unit Weight	(pcf)	141.84
Specific Gravity	(g/cc)	2.72
Saturation	(%)	80.46
Strain Rate	psi/second	23.77
compression machine	D	15-08-029CT

Photo At Failure

Compressive Strength = 1,901.9 psi

Elapsed Time (Seconds)	Strain Units (0.0001in/unit)	Strain Percent (%)	Area (in^2)	Load lbs	Deviator Stress (psi)
20	15	0.03	4.525	4000.00	883.90
78	30	0.07	4.527	8000.00	1767.20
80	31	0.07	4.527	8610.00	1901.90



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Compressive Strength of Intact Rock

ASTM D7012

DSA File #:
DSA Appl #:

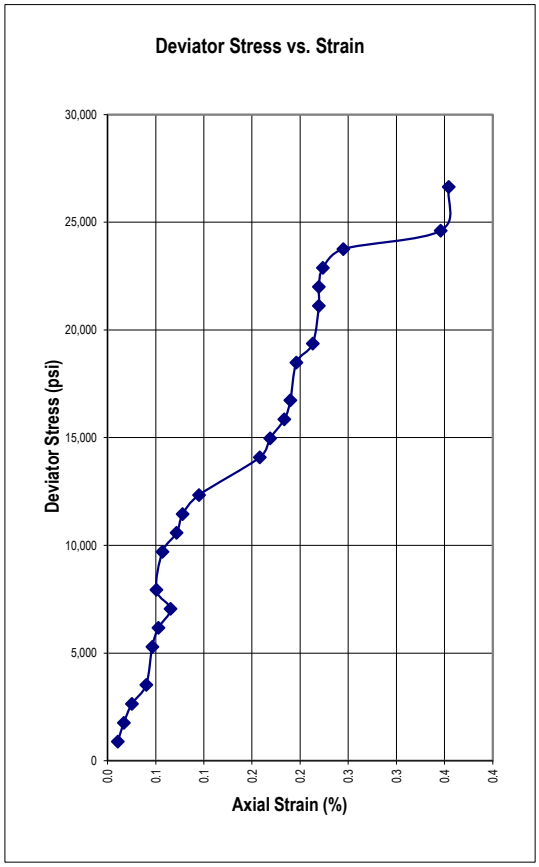
Project No.:	4438-01	Project Name:	NID Water Storage	Date:	12/8/2015
Sample No.:	CB-4 17.2-17.79	Boring/Trench No.:		Depth (ft.)	Tested By: DWP/CAJ
Soil Description:					Check By: Draft
Sample Location:					Lab No.: 15-15-549

Sample Data		
Tare Number	I.D.	B
Tare Weight	(gm)	320 30
Wet Core + Tare	(gm)	1205.90
Dry Core + Tare	(gm)	1203.20
Weight of Water	(gm)	2.70
Dry Weight	(gm)	882 90
Moisture Content	(%)	0.31
Core Height	(in)	4.740
Sample Diameter	(in)	2.403
Wet Unit Weight	(pcf)	156.80
Dry Unit Weight	(pcf)	156 32
Specific Gravity	(g/cc)	2.72
Saturation	(%)	9.70
Strain Rate	psi/second	65.77
compression machine	D	15-08-029CT

Photo At Failure

Compressive Strength = 26,636.1 psi

Elapsed Time (Seconds)	Strain Units (0.0001in/unit)	Strain Percent (%)	Area (in^2)	Load lbs	Deviator Stress (psi)
19	5	0.01	4.536	4000.00	881.89
40	8	0.02	4.536	8000.00	1763.68
56	12	0.03	4.536	12000.00	2645.29
87	19	0.04	4.537	16000.00	3526.54
98	22	0.05	4.537	24000.00	5289.47
111	25	0.05	4.538	28000.00	6170.66
135	31	0.07	4.538	32000.00	7051.29
147	24	0.05	4.538	36000.00	7933.87
158	27	0.06	4.538	44000.00	9696.34
182	34	0.07	4.538	48000.00	10576.26
194	37	0.08	4.539	52000.00	11456.89
218	45	0.09	4.540	56000.00	12336.11
230	75	0.16	4.542	64000.00	14089.48
244	80	0.17	4.543	68000.00	14968.49
269	87	0.1835443	4.544	72000.00	15846.64
282	90	0.1898734	4.544	76000.00	16725.95
296	93	0.1962025	4.544	84000.00	18485.40
320	101	0 2130802	4.545	88000.00	19362.39
338	104	0 2194093	4.545	96000.00	21121.26
350	104	0 2194093	4.545	100000.00	22001.32
382	106	0 2236287	4.545	104000.00	22880.40
395	116	0 2447257	4.546	108000.00	23755.39
404	164	0 3459916	4.551	112000.00	24610.21
405	168	0 3544304	4.551	121230.00	26636.10



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Compressive Strength of Intact Rock

ASTM D7012

DSA File #:
DSA Appl #:

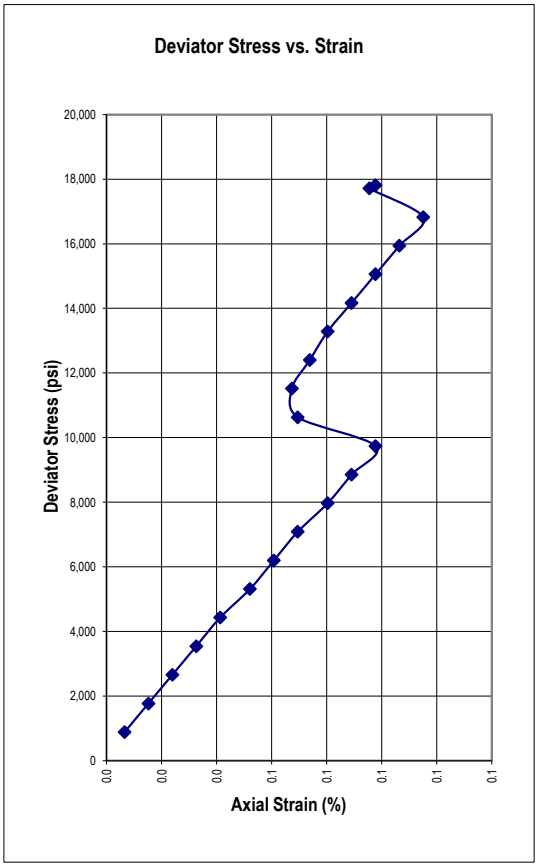
Project No.:	4438-01	Project Name:	NID Water Storage	Date:	12/8/2015
Sample No.:	CB-4 61.8-62.5	Boring/Trench No.:		Depth (ft.)	Tested By: DWP/CAJ
Soil Description:					Check By: Draft
Sample Location:					Lab No.: 15-15-549

Sample Data		
Tare Number	I.D.	JT
Tare Weight	(gm)	219.60
Wet Core + Tare	(gm)	1135.10
Dry Core + Tare	(gm)	1132.10
Weight of Water	(gm)	3.00
Dry Weight	(gm)	912 50
Moisture Content	(%)	0.33
Core Height	(in)	4.603
Sample Diameter	(in)	2 397
Wet Unit Weight	(pcf)	167.76
Dry Unit Weight	(pcf)	167 21
Specific Gravity	(g/cc)	2.72
Saturation	(%)	59.30
Strain Rate	psi/second	56.36
compression machine	D	15-08-029CT

Photo At Failure

Compressive Strength = 17,808.3 psi

Elapsed Time (Seconds)	Strain Units (0.0001in/unit)	Strain Percent (%)	Area (in^2)	Load lbs	Deviator Stress (psi)
14	3	0.01	4.513	4000.00	886.35
41	7	0.02	4.513	8000.00	1772.55
61	11	0.02	4.514	12000.00	2658.59
79	15	0.03	4.514	16000.00	3544.48
83	19	0.04	4.514	20000.00	4430.21
110	24	0.05	4.515	24000.00	5315.68
124	28	0.06	4.515	28000.00	6201.09
135	32	0.07	4.516	32000.00	7086.34
151	37	0.08	4.516	36000.00	7971.27
165	41	0.09	4.517	40000.00	8856.19
199	45	0.10	4.517	44000.00	9740.96
192	32	0.07	4.516	48000.00	10629.51
205	31	0.07	4.516	52000.00	11515.55
219	34	0.07	4.516	56000.00	12400.56
235	37	0.0803824	4.516	60000.00	13285.44
247	41	0.0890723	4.517	64000.00	14169.91
263	45	0.0977623	4.517	68000.00	15054.22
276	49	0.1064523	4.517	72000.00	15938.37
292	53	0.1151423	4.518	76000.00	16822.37
315	44	0.0955898	4.517	80000.00	17711.23
316	45	0.0977623	4.517	80440.00	17808.25
				84440.00	
				88440.00	
				92440.00	



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Compressive Strength of Intact Rock

ASTM D7012

DSA File #:
DSA Appl #:

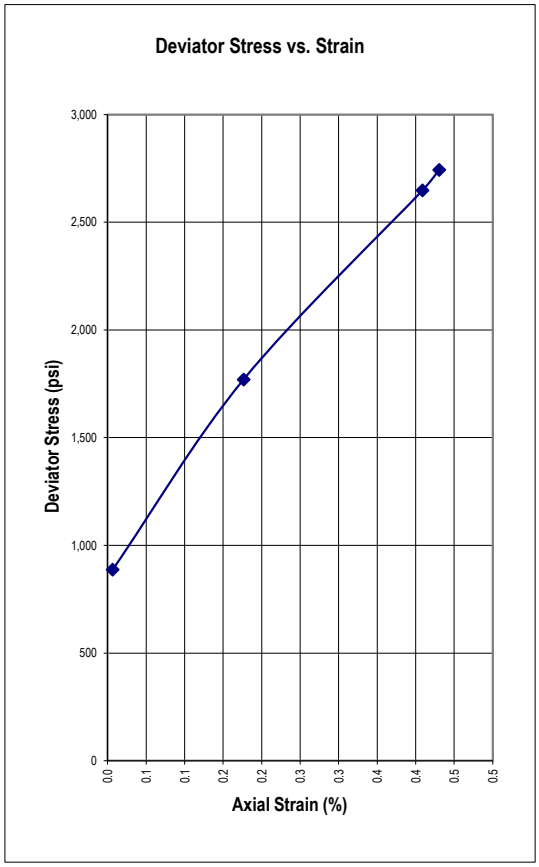
Project No.:	4438-01	Project Name:	NID Water Storage	Date:	12/8/2015
Sample No.:	CB5 35.9-36.8	Boring/Trench No.:		Depth (ft.)	Tested By: DWP/CAJ
Soil Description:					Check By: Draft
Sample Location:					Lab No.: 15-15-549

Sample Data		
Tare Number	I.D.	J4
Tare Weight	(gm)	228.80
Wet Core + Tare	(gm)	1146.70
Dry Core + Tare	(gm)	1120.70
Weight of Water	(gm)	26.00
Dry Weight	(gm)	891 90
Moisture Content	(%)	2.92
Core Height	(in)	4.646
Sample Diameter	(in)	2 397
Wet Unit Weight	(pcf)	166.64
Dry Unit Weight	(pcf)	161 92
Specific Gravity	(g/cc)	2.72
Saturation	(%)	164.41
Strain Rate	psi/second	18.53
compression machine	D	15-08-029CT

Photo At Failure

Compressive Strength = 2,742.7 psi

Elapsed Time (Seconds)	Strain Units (0.0001in/unit)	Strain Percent (%)	Area (in^2)	Load lbs	Deviator Stress (psi)
54	3	0.01	4.513	4000.00	886.35
97	82	0.18	4.521	8000.00	1769.69
147	190	0.41	4.531	12000.00	2648.35
148	200	0.43	4.532	12430.00	2742.66



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Compressive Strength of Intact Rock

ASTM D7012

DSA File #:
DSA Appl #:

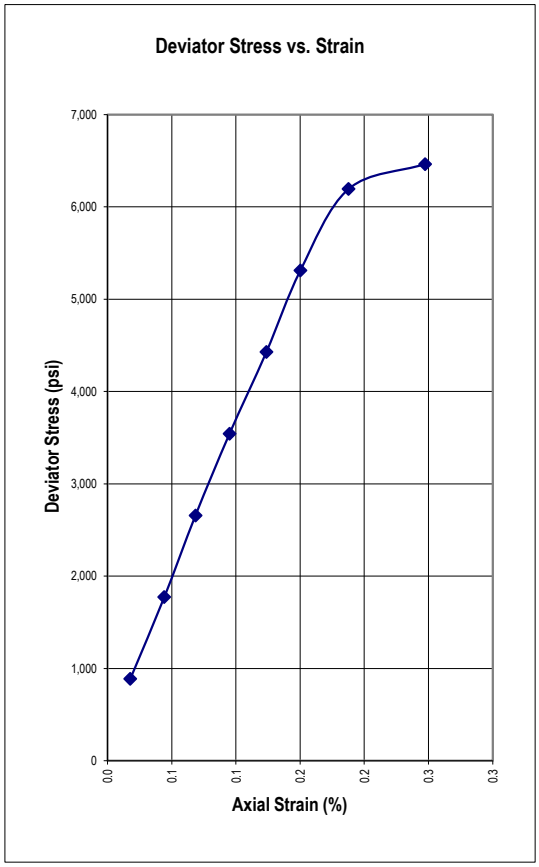
Project No.:	4438-01	Project Name:	NID Water Storage	Date:	12/8/2015
Sample No.:	CB-5 51.6-52.7	Boring/Trench No.:		Depth (ft.)	Tested By: DWP/CAJ
Soil Description:					Check By: Draft
Sample Location:					Lab No.: 15-15-549

Sample Data		
Tare Number	I.D.	E
Tare Weight	(gm)	322.80
Wet Core + Tare	(gm)	1227.20
Dry Core + Tare	(gm)	1215.80
Weight of Water	(gm)	11.40
Dry Weight	(gm)	893.00
Moisture Content	(%)	1.28
Core Height	(in)	4 527
Sample Diameter	(in)	2 397
Wet Unit Weight	(pcf)	168 50
Dry Unit Weight	(pcf)	166 38
Specific Gravity	(g/cc)	2.72
Saturation	(%)	172 57
Strain Rate	psi/second	41.20
compression machine	D	15-08-029CT

Photo At Failure

Compressive Strength = 6,463.6 psi

Elapsed Time (Seconds)	Strain Units (0.0001in/unit)	Strain Percent (%)	Area (in^2)	Load lbs	Deviator Stress (psi)
15	8	0.02	4.513	4000.00	886.25
42	20	0.04	4.515	8000.00	1772.03
65	31	0.07	4.516	12000.00	2657.41
85	43	0.09	4.517	16000.00	3542.27
101	56	0.12	4.518	20000.00	4426.56
118	68	0.15	4.519	24000.00	5310.46
138	85	0.19	4.521	28000.00	6193.21
157	112	0.25	4.524	29240.00	6463.62



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Compressive Strength of Intact Rock

ASTM D7012

DSA File #:
DSA Appl #:

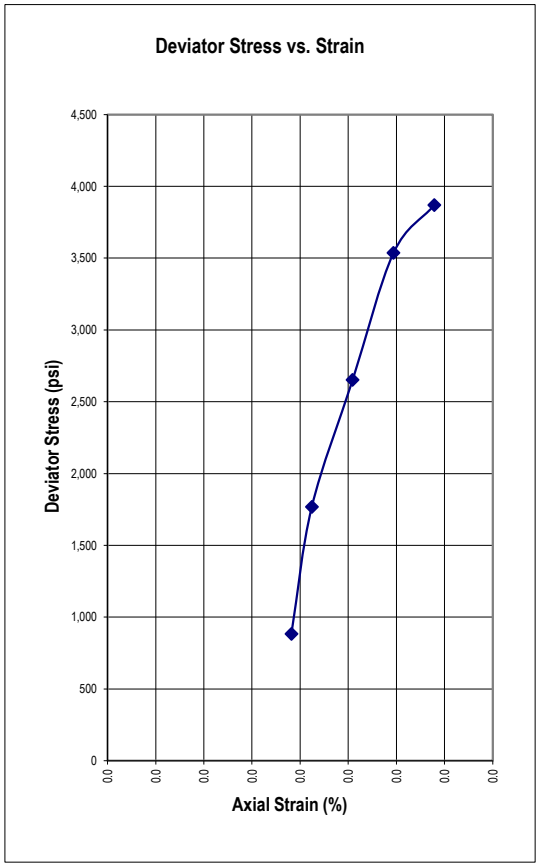
Project No.:	4438-01	Project Name:	NID Water Storage	Date:	12/8/2015
Sample No.:	CB-5 69.8-71.0	Boring/Trench No.:		Depth (ft.)	Tested By: DWP/CAJ
Soil Description:					Check By: Draft
Sample Location:					Lab No.: 15-15-549

Sample Data		
Tare Number	I.D.	IJ
Tare Weight	(gm)	218 50
Wet Core + Tare	(gm)	1206.90
Dry Core + Tare	(gm)	1193.80
Weight of Water	(gm)	13.10
Dry Weight	(gm)	975 30
Moisture Content	(%)	1.34
Core Height	(in)	4.714
Sample Diameter	(in)	2.400
Wet Unit Weight	(pcf)	176.41
Dry Unit Weight	(pcf)	174.07
Specific Gravity	(g/cc)	2.72
Saturation	(%)	-146.48
Strain Rate	psi/second	35.50
compression machine	D	15-08-029CT

Photo At Failure

Compressive Strength = 3,869.2 psi

Elapsed Time (Seconds)	Strain Units (0.0001in/unit)	Strain Percent (%)	Area (in^2)	Load lbs	Deviator Stress (psi)
8	9	0.02	4.525	4000.00	884.03
37	10	0.02	4.525	8000.00	1768.01
56	12	0.03	4.525	12000.00	2651.91
77	14	0.03	4.525	16000.00	3535.73
109	16	0.03	4.525	17510.00	3869.25



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Compressive Strength of Intact Rock

ASTM D7012

DSA File #:
DSA Appl #:

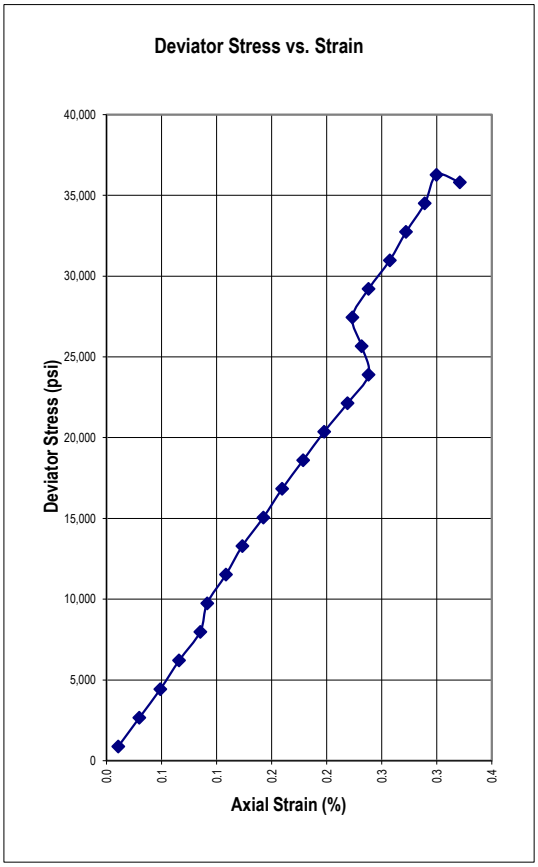
Project No.:	4438-01	Project Name:	NID Water Storage	Date:	12/8/2015
Sample No.:	CB-6 44.0-45.0	Boring/Trench No.:		Depth (ft.)	Tested By: DWP/CAJ
Soil Description:					Check By: Draft
Sample Location:					Lab No.: 15-15-549

Sample Data		
Tare Number	I.D.	5
Tare Weight	(gm)	117.40
Wet Core + Tare	(gm)	944.40
Dry Core + Tare	(gm)	940.40
Weight of Water	(gm)	4.00
Dry Weight	(gm)	823.00
Moisture Content	(%)	0.49
Core Height	(in)	4.702
Sample Diameter	(in)	2 396
Wet Unit Weight	(pcf)	148.47
Dry Unit Weight	(pcf)	147.75
Specific Gravity	(g/cc)	2.72
Saturation	(%)	8.89
Strain Rate	PSI/Second	67.16
compression machine	D	15-08-029CT

Photo At Failure

Compressive Strength = 36,264.0 psi

Elapsed Time (Seconds)	Strain Units (0.0001in/unit)	Strain Percent (%)	Area (in^2)	Load lbs	Deviator Stress (psi)
36	5	0.01	4.509	4000.00	887.05
65	14	0.03	4.510	12000.00	2660.65
91	23	0.05	4.511	20000.00	4433.57
115	31	0.07	4.512	28000.00	6205.95
136	40	0.09	4.513	36000.00	7977.55
160	43	0.09	4.513	44000.00	9749.71
182	51	0.11	4.514	52000.00	11520.43
205	58	0.12	4.514	60000.00	13290.82
228	67	0.14	4.515	68000.00	15060.04
253	75	0.16	4.516	76000.00	16828.94
279	84	0.18	4.517	84000.00	18596.84
303	93	0.20	4.518	92000.00	20364.07
339	103	0.22	4.519	100000.00	22130.14
357	112	0.24	4.520	108000.00	23895.96
379	109	0 2318113	4.519	116000.00	25667.68
410	105	0 2233045	4.519	124000.00	27440.20
435	112	0 2381914	4.520	132000.00	29206.18
470	121	0 2573318	4.520	140000.00	30970.31
494	128	0 2722188	4.521	148000.00	32735.15
520	136	0 2892325	4.522	156000.00	34498.73
548	141	0.299866	4.522	164000.00	36264.03
560	151	0 3211331	4.523	161970.00	35807.51



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Compressive Strength of Intact Rock

ASTM D7012

DSA File #:
DSA Appl #:

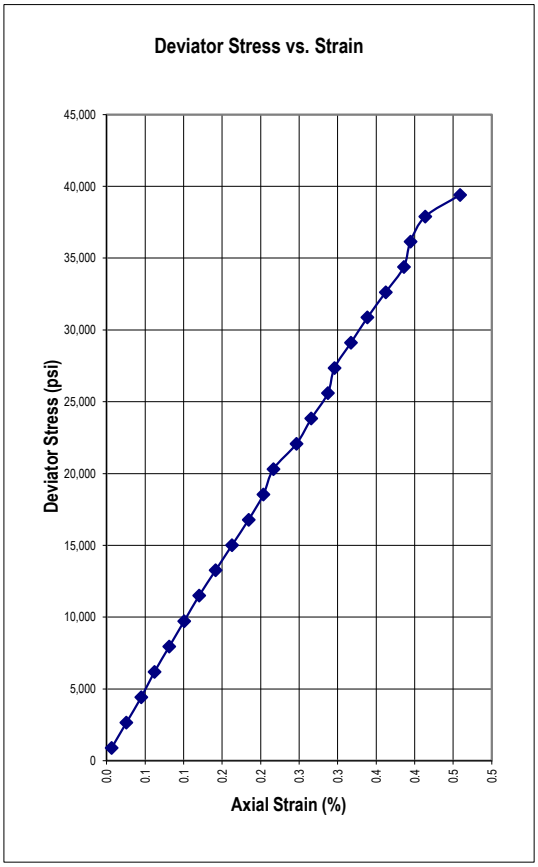
Project No.:	4438-01	Project Name:	NID Water Storage	Date:	12/8/2015
Sample No.:	CB-6 88.6-89.5	Boring/Trench No.:		Depth (ft.)	Tested By: DWP/CAJ
Soil Description:					Check By: Draft
Sample Location:					Lab No.: 15-15-549

Sample Data		
Tare Number	I.D.	EJ
Tare Weight	(gm)	190 90
Wet Core + Tare	(gm)	988 50
Dry Core + Tare	(gm)	986.00
Weight of Water	(gm)	2.50
Dry Weight	(gm)	795.10
Moisture Content	(%)	0.31
Core Height	(in)	4.664
Sample Diameter	(in)	2 399
Wet Unit Weight	(pcf)	144.00
Dry Unit Weight	(pcf)	143 55
Specific Gravity	(g/cc)	2.72
Saturation	(%)	4.69
Strain Rate	psi/second	67.70
compression machine	D	15-08-029CT

Photo At Failure

Compressive Strength = 39,398.1 psi

Elapsed Time (Seconds)	Strain Units (0.0001in/unit)	Strain Percent (%)	Area (in^2)	Load lbs	Deviator Stress (psi)
9	3	0.01	4.520	4000.00	884.87
53	12	0.03	4.521	12000.00	2654.11
79	21	0.05	4.522	20000.00	4422.66
106	29	0.06	4.523	28000.00	6190.67
129	38	0.08	4.524	36000.00	7957.89
150	47	0.10	4.525	44000.00	9724.44
171	56	0.12	4.526	52000.00	11490.30
197	66	0.14	4.527	60000.00	13255.19
217	76	0.16	4.528	68000.00	15019.32
244	86	0.18	4.528	76000.00	16782.69
265	95	0.20	4.529	84000.00	18545.71
291	101	0.22	4.530	92000.00	20309.35
315	115	0.25	4.531	100000.00	22068.74
340	124	0.27	4.532	108000.00	23829.62
366	134	0.287307	4.533	116000.00	25589.28
390	138	0 2958834	4.534	124000.00	27351.70
420	148	0 3173242	4.535	132000.00	29110.07
445	158	0.338765	4.535	140000.00	30867.68
472	169	0 3623499	4.537	148000.00	32623.82
500	180	0 3859348	4.538	156000.00	34379.13
532	184	0 3945111	4.538	164000.00	36139.05
565	193	0.4138079	4.539	172000.00	37894.59
591	214	0.4588336	4.541	178905.00	39398.06



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Compressive Strength of Intact Rock

ASTM D7012

DSA File #:
DSA Appl #:

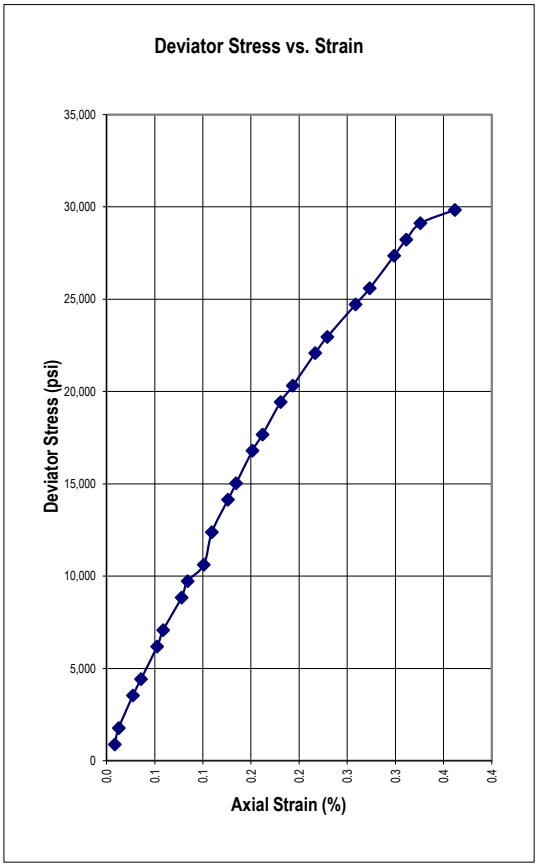
Project No.:	4438-01	Project Name:	NID Water Storage	Date:	12/8/2015
Sample No.:	CB-8 23.9-24.9	Boring/Trench No.:		Depth (ft.)	Tested By: DWP/CAJ
Soil Description:					Check By: Draft
Sample Location:					Lab No.: 15-15-549

Sample Data		
Tare Number	I.D.	H
Tare Weight	(gm)	330 90
Wet Core + Tare	(gm)	1240.30
Dry Core + Tare	(gm)	1237.10
Weight of Water	(gm)	3.20
Dry Weight	(gm)	906 20
Moisture Content	(%)	0.35
Core Height	(in)	4.755
Sample Diameter	(in)	2 399
Wet Unit Weight	(pcf)	161.04
Dry Unit Weight	(pcf)	160.48
Specific Gravity	(g/cc)	2.72
Saturation	(%)	16.66
Strain Rate	PSI/Second	81.08
compression machine	D	15-08-029CT

Photo At Failure

Compressive Strength = 29,837.8 psi

Elapsed Time (Seconds)	Strain Units (0.0001in/unit)	Strain Percent (%)	Area (in^2)	Load lbs	Deviator Stress (psi)
5	4	0.01	4.521	4000.00	884.86
21	6	0.01	4.521	8000.00	1769.64
49	13	0.03	4.521	16000.00	3538.76
60	17	0.04	4.522	20000.00	4423.08
82	25	0.05	4.523	28000.00	6191.26
96	28	0.06	4.523	32000.00	7075.28
116	37	0.08	4.524	40000.00	8842.43
125	40	0.08	4.524	44000.00	9726.06
143	48	0.10	4.525	48000.00	10608.46
152	52	0.11	4.525	56000.00	12375.49
174	60	0.13	4.526	64000.00	14141.04
184	64	0.13	4.526	68000.00	15023.59
202	72	0.15	4.527	76000.00	16788.24
213	77	0.16	4.527	80000.00	17669.97
384	86	0.1808623	4.528	88000.00	19433.28
245	92	0.1934805	4.529	92000.00	20314.04
267	103	0 2166141	4.530	100000.00	22075.36
277	109	0 2292324	4.531	104000.00	22955.47
302	123	0 2586751	4.532	112000.00	24713.98
315	130	0 2733964	4.533	116000.00	25592.85
336	142	0.298633	4.534	124000.00	27350.95
347	148	0 3112513	4.534	128000.00	28229.67
361	155	0 3259727	4.535	132000.00	29107.54
368	172	0 3617245	4.537	135360.00	29837.76



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Compressive Strength of Intact Rock

ASTM D7012

DSA File #:
DSA Appl #:

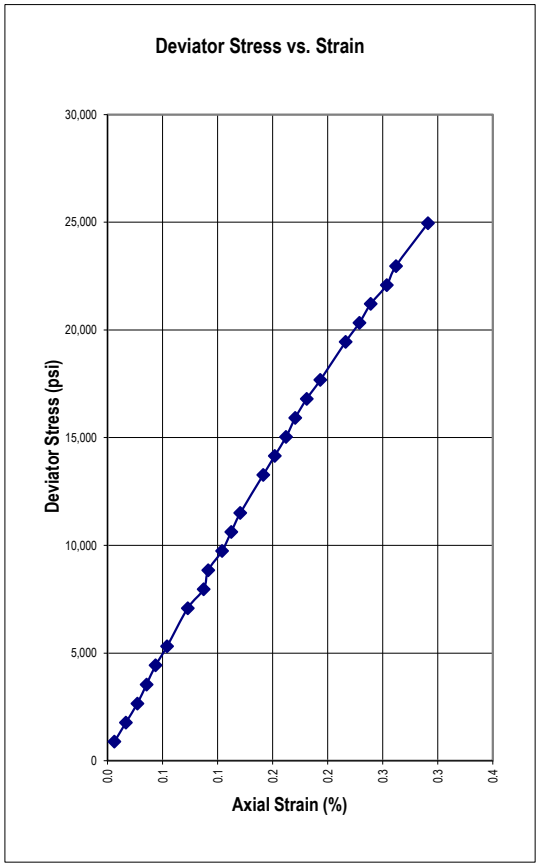
Project No.:	4438-01	Project Name:	NID Water Storage	Date:	12/8/2015
Sample No.:	CB-9 17.5-18.0	Boring/Trench No.:		Depth (ft.)	Tested By: DWP/CAJ
Soil Description:					Check By: Draft
Sample Location:					Lab No.: 15-15-549

Sample Data		
Tare Number	I.D.	CJ
Tare Weight	(gm)	190 50
Wet Core + Tare	(gm)	1106.00
Dry Core + Tare	(gm)	1103.70
Weight of Water	(gm)	2 300
Dry Weight	(gm)	913 20
Moisture Content	(%)	0.25
Core Height	(in)	4.808
Sample Diameter	(in)	2 398
Wet Unit Weight	(pcf)	160.47
Dry Unit Weight	(pcf)	160.07
Specific Gravity	(g/cc)	2.72
Saturation	(%)	11.35
Strain Rate	PSI/Second	77.01
compression machine	D	15-08-029CT

Photo At Failure

Compressive Strength = 24,951.7 psi

Elapsed Time (Seconds)	Strain Units (0.0001in/unit)	Strain Percent (%)	Area (in^2)	Load lbs	Deviator Stress (psi)
16	3	0.01	4.517	4000.00	885.61
50	8	0.02	4.517	8000.00	1771.04
67	13	0.03	4.518	12000.00	2656.29
80	17	0.04	4.518	16000.00	3541.43
91	21	0.04	4.518	20000.00	4426.41
101	26	0.05	4.519	24000.00	5311.14
121	35	0.07	4.520	32000.00	7080.20
136	42	0.09	4.520	36000.00	7964.06
147	44	0.09	4.520	40000.00	8848.59
151	50	0.10	4.521	44000.00	9732.23
161	54	0.11	4.521	48000.00	10616.10
171	58	0.12	4.522	52000.00	11499.82
191	68	0.14	4.523	60000.00	13266.26
210	73	0.15	4.523	64000.00	14149.20
219	78	0.1622296	4.524	68000.00	15031.96
229	82	0.1705491	4.524	72000.00	15914.86
240	87	0.1809484	4.525	76000.00	16797.27
260	93	0.1934276	4.525	80000.00	17679.13
269	104	0 2163062	4.526	88000.00	19442.59
279	110	0 2287854	4.527	92000.00	20323.80
291	115	0 2391847	4.527	96000.00	21205.23
302	122	0 2537438	4.528	100000.00	22085.56
313	126	0 2620632	4.528	104000.00	22967.06
324	140	0 2911814	4.530	113020.00	24951.73



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Compressive Strength of Intact Rock

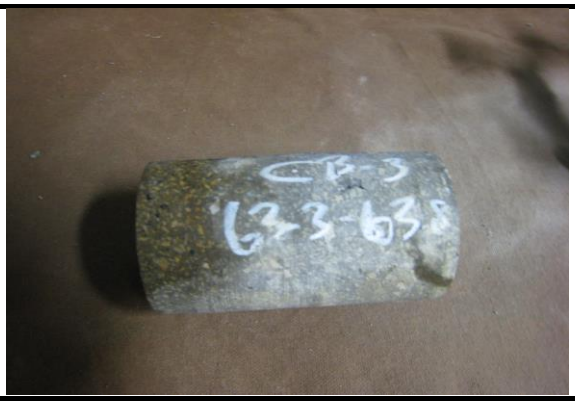
ASTM D7012

DSA File #:
DSA Appl #:

Project No.:	4438-01	Project Name:	NID Water Storage	Date:	12/8/2015
Sample No.:	CB-9 62.5-63.1	Boring/Trench No.:		Depth (ft.)	Tested By: DWP/CAJ
Soil Description:					Check By: Draft
Sample Location:					Lab No.: 15-15-549

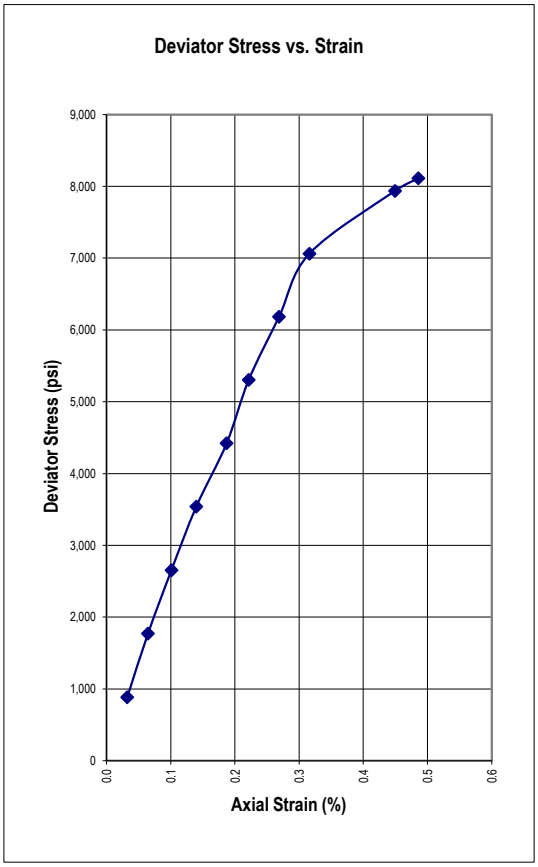
Sample Data		
Tare Number	I.D.	HJ
Tare Weight	(gm)	190.60
Wet Core + Tare	(gm)	1108.80
Dry Core + Tare	(gm)	1097.80
Weight of Water	(gm)	11.00
Dry Weight	(gm)	907 20
Moisture Content	(%)	1.21
Core Height	(in)	4.652
Sample Diameter	(in)	2 398
Wet Unit Weight	(pcf)	166 34
Dry Unit Weight	(pcf)	164 35
Specific Gravity	(g/cc)	2.72
Saturation	(%)	100.73
Strain Rate	psi/second	46.36
compression machine	D	15-08-029CT

Photo At Failure



Compressive Strength = 8,113.0 psi

Elapsed Time (Seconds)	Strain Units (0.0001in/unit)	Strain Percent (%)	Area (in^2)	Load lbs	Deviator Stress (psi)
6	15	0.03	4.518	4000.00	885.38
33	30	0.06	4.519	8000.00	1770.20
53	47	0.10	4.521	12000.00	2654.32
70	65	0.14	4.523	16000.00	3537.73
86	87	0.19	4.525	20000.00	4420.07
100	103	0.22	4.526	24000.00	5302.25
118	125	0.27	4.529	28000.00	6183.03
133	147	0.32	4.531	32000.00	7062.97
168	209	0.45	4.537	36000.00	7935.22
175	226	0.49	4.538	36820.00	8112.98
				40820.00	
				44820.00	
				48820.00	
				52820.00	
				56820.00	
				60820.00	
				64820.00	
				68820.00	
				72820.00	
				76820.00	
				80820.00	
				84820.00	
				88820.00	
				92820.00	



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Compressive Strength of Intact Rock

ASTM D7012

DSA File #:
DSA Appl #:

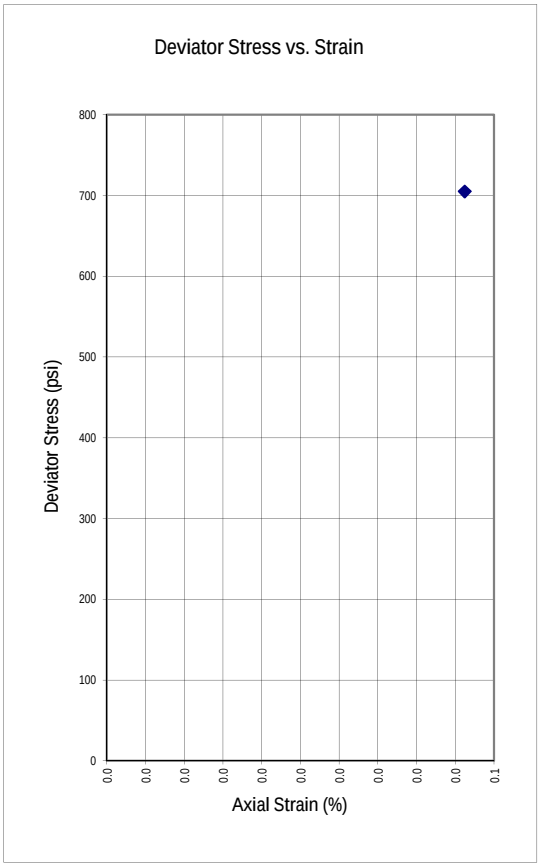
Project No.:	4438-01	Project Name:	NID Water Storage	Date:	9/13/2016
Sample No.:	CB-10, 45.1-45.7	Boring/Trench No.:		Depth (ft.)		Tested By:	DCK
Soil Description:					Check By:	CRK
Sample Location:					Lab No.:	20

Sample Data		
Tare Number	I.D.	JD
Tare Weight	(gm)	190.50
Wet Core + Tare	(gm)	956.68
Dry Core + Tare	(gm)	929.35
Weight of Water	(gm)	27 33
Dry Weight	(gm)	738.85
Moisture Content	(%)	3.70
Core Height	(in)	4.760
Sample Diameter	(in)	2.370
Wet Unit Weight	(pcf)	138.88
Dry Unit Weight	(pcf)	133.92
Specific Gravity	(g/cc)	2.72
Saturation	(%)	37.63
Strain Rate	psi/second	58.72
compression machine	ID	15-08-029CT

Photo At Failure

Compressive Strength = 704.6 psi

Elapsed Time (Seconds)	Strain Units (0.0001in/unit)	Strain Percent (%)	Area (in^2)	Load lbs	Deviator Stress (psi)
12	22	0.05	4.414	3110.00	704.65



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Compressive Strength of Intact Rock

ASTM D7012

DSA File #:
DSA Appl #:

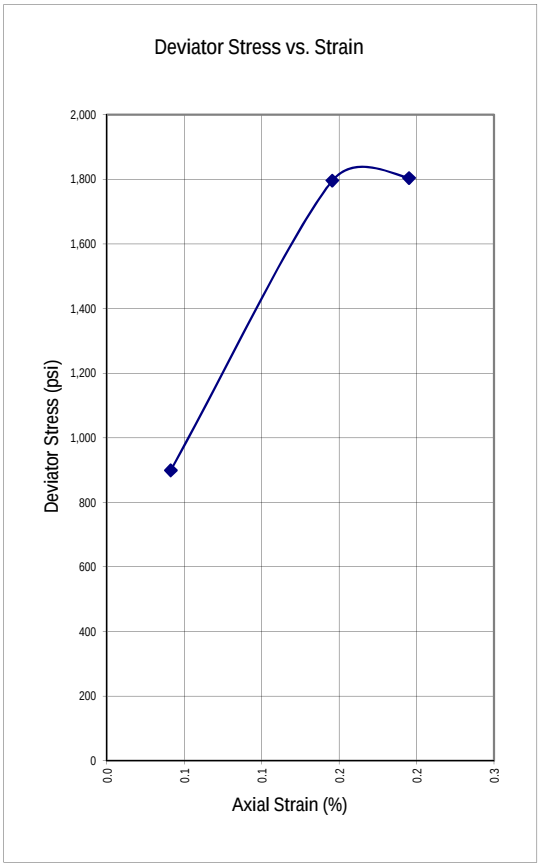
Project No.:	4438-01	Project Name:	NID Water Storage	Date:	9/13/2016
Sample No.:	CB12, 35.2-35.5	Boring/Trench No.:		Depth (ft.)		Tested By:	DCK
Soil Description:					Check By:	CRK
Note:	Height to diameter ratio corrected				Lab No.:	29

Sample Data		
Tare Number	I.D.	JF
Tare Weight	(gm)	192.40
Wet Core + Tare	(gm)	903.50
Dry Core + Tare	(gm)	891.50
Weight of Water	(gm)	12.00
Dry Weight	(gm)	699.10
Moisture Content	(%)	1.72
Core Height	(in)	3.640
Sample Diameter	(in)	2.380
Wet Unit Weight	(pcf)	167.14
Dry Unit Weight	(pcf)	164.32
Specific Gravity	(g/cc)	2.72
Saturation	(%)	141.76
Strain Rate	psi/second	26 53
compression machine	ID	15-08-029CT

Photo At Failure

Compressive Strength = 1,803.7 psi

Elapsed Time (Seconds)	Strain Units (0.0001in/unit)	Strain Percent (%)	Area (in^2)	Load lbs	Deviator Stress (psi)
6	15	0.04	4.451	4000.00	898.75
56	53	0.15	4.455	8000.00	1795.62
68	71	0 20	4.458	8040.00	1803.70



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Compressive Strength of Intact Rock

ASTM D7012

DSA File #:
DSA Appl #:

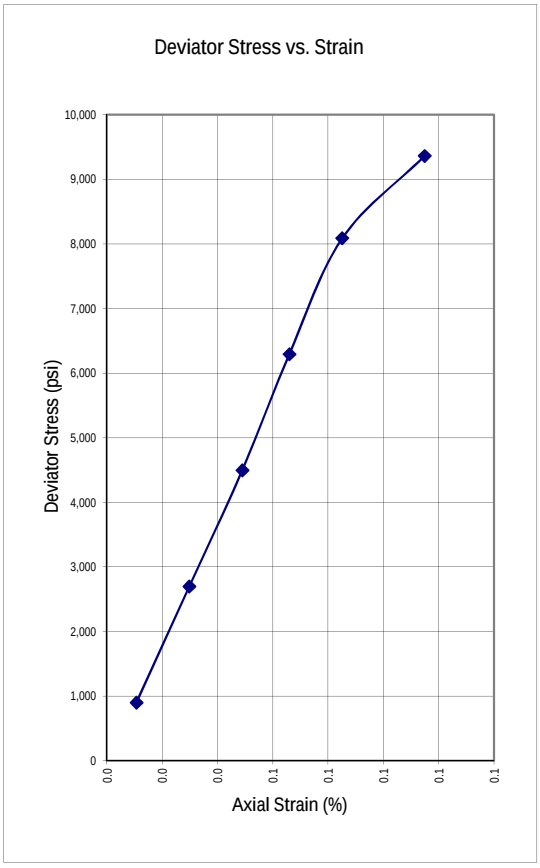
Project No.:	4438-01	Project Name:	NID Water Storage	Date:	9/12/2016
Sample No.:	CB-12, 47.7-48.6	Boring/Trench No.:		Depth (ft.)		Tested By:	DCK
Soil Description:					Check By:	CRK
Sample Location:					Lab No.:	16

Sample Data		
Tare Number	I.D.	H
Tare Weight	(gm)	330.90
Wet Core + Tare	(gm)	1245.60
Dry Core + Tare	(gm)	1239.90
Weight of Water	(gm)	5.70
Dry Weight	(gm)	909.00
Moisture Content	(%)	0.63
Core Height	(in)	4.700
Sample Diameter	(in)	2.380
Wet Unit Weight	(pcf)	166.50
Dry Unit Weight	(pcf)	165.47
Specific Gravity	(g/cc)	2.72
Saturation	(%)	66 22
Strain Rate	PSI/Second	64 55
compression machine	ID	15-08-029CT

Photo At Failure

Compressive Strength = 9,360.3 psi

Elapsed Time (Seconds)	Strain Units (0.0001in/unit)	Strain Percent (%)	Area (in^2)	Load lbs	Deviator Stress (psi)
36	5	0.01	4.449	4000.00	899.02
65	14	0.03	4.450	12000.00	2696.55
91	23	0.05	4.451	20000.00	4493.38
115	31	0.07	4.452	28000.00	6289.67
136	40	0.09	4.453	36000.00	8085.17
145	54	0.11	4.454	41690.00	9360.28



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Compressive Strength of Intact Rock

ASTM D7012

DSA File #:
DSA Appl #:

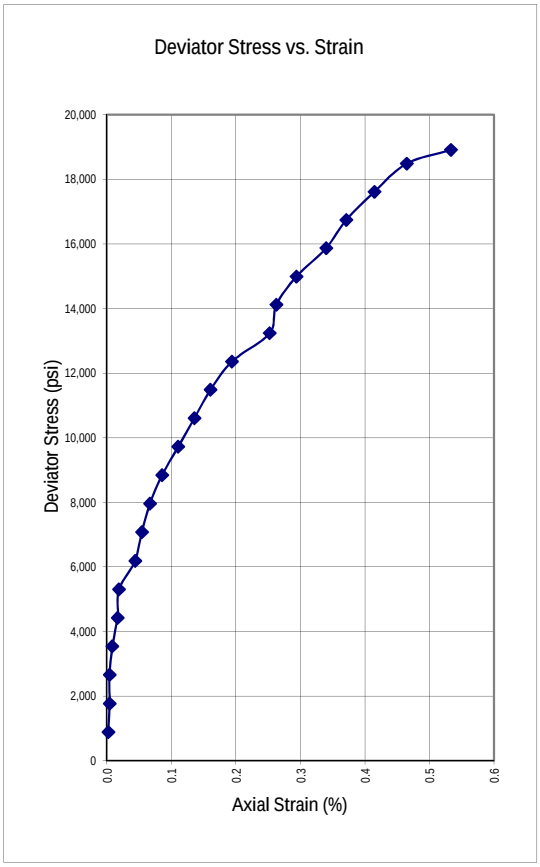
Project No.:	4438-01	Project Name:	NID Water Storage	Date:	9/13/2016
Sample No.:	CB-13, 98.5-99.0	Boring/Trench No.:		Depth (ft.)		Tested By:	DCK
Soil Description:					Check By:	CRK
Sample Location:					Lab No.:	25

Sample Data		
Tare Number	I.D.	EJ
Tare Weight	(gm)	190.90
Wet Core + Tare	(gm)	989.30
Dry Core + Tare	(gm)	983.60
Weight of Water	(gm)	5.70
Dry Weight	(gm)	792.70
Moisture Content	(%)	0.72
Core Height	(in)	4.800
Sample Diameter	(in)	2.400
Wet Unit Weight	(pcf)	139.94
Dry Unit Weight	(pcf)	138.94
Specific Gravity	(g/cc)	2.72
Saturation	(%)	8.83
Strain Rate	psi/second	46 23
compression machine	ID	15-08-029CT

Photo At Failure

Compressive Strength = 18,908.8 psi

Elapsed Time (Seconds)	Strain Units (0.0001in/unit)	Strain Percent (%)	Area (in^2)	Load lbs	Deviator Stress (psi)
19	1	0.00	4.524	4000.00	884.18
39	2	0.00	4.524	8000.00	1768.31
55	2	0.00	4.524	12000.00	2652.47
86	4	0.01	4.524	16000.00	3536.48
86	8	0.02	4.525	20000.00	4420.23
95	9	0.02	4.525	24000.00	5304.17
103	21	0.04	4.526	28000.00	6186.65
122	26	0.05	4.526	32000.00	7069.72
138	32	0.07	4.527	36000.00	7952.44
146	41	0.09	4.528	40000.00	8834.39
158	53	0.11	4.529	44000.00	9715.40
176	65	0.14	4.530	48000.00	10595.96
188	77	0.16	4.531	52000.00	11476.08
201	93	0.19	4.533	56000.00	12354.73
235	121	0 2520833	4.535	60000.00	13229.48
266	126	0.2625	4.536	64000.00	14109.97
289	141	0.29375	4.537	68000.00	14987.15
315	163	0 3395833	4.539	72000.00	15861.45
336	178	0 3708333	4.541	76000.00	16737.39
361	199	0.4145833	4.543	80000.00	17610.57
391	223	0.4645833	4.545	84000.00	18481.81
409	256	0 5333333	4.548	86000.00	18908.79



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Compressive Strength of Intact Rock

ASTM D7012

DSA File #:
DSA Appl #:

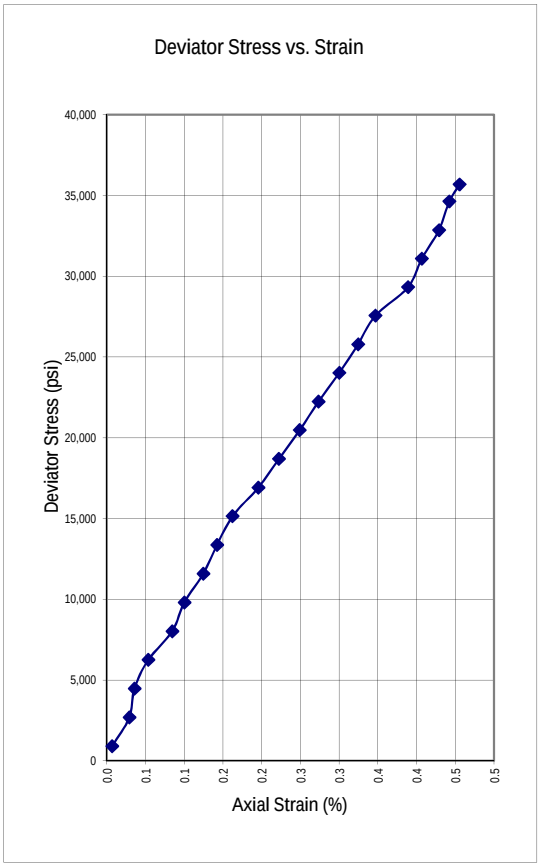
Project No.:	4438-01	Project Name:	NID Water Storage	Date:	9/18/2016
Sample No.:	CB-13, 114.8-116.0	Boring/Trench No.:		Depth (ft.)		Tested By:	DCK
Soil Description:					Check By:	CRK
Sample Location:					Lab No.:	22

Sample Data		
Tare Number	I.D.	JD
Tare Weight	(gm)	190.50
Wet Core + Tare	(gm)	995.60
Dry Core + Tare	(gm)	984.30
Weight of Water	(gm)	11 30
Dry Weight	(gm)	793.80
Moisture Content	(%)	1.42
Core Height	(in)	4.500
Sample Diameter	(in)	2.390
Wet Unit Weight	(pcf)	151.79
Dry Unit Weight	(pcf)	149.66
Specific Gravity	(g/cc)	2.72
Saturation	(%)	28.87
Strain Rate	psi/second	77.89
compression machine	ID	15-08-029CT

Photo At Failure

Compressive Strength = 35,672.7 psi

Elapsed Time (Seconds)	Strain Units (0.0001in/unit)	Strain Percent (%)	Area (in^2)	Load lbs	Deviator Stress (psi)
35	3	0.01	4.487	4000.00	891.55
48	13	0.03	4.488	12000.00	2674.05
55	16	0.04	4.488	20000.00	4456.46
61	24	0.05	4.489	28000.00	6237.93
73	38	0.08	4.490	36000.00	8017.70
82	45	0.10	4.491	44000.00	9797.89
122	56	0.12	4.492	52000.00	11576.49
136	64	0.14	4.493	60000.00	13355.11
151	73	0.16	4.494	68000.00	15132.76
188	88	0 20	4.495	76000.00	16907.44
201	100	0 22	4.496	84000.00	18682.17
215	112	0 25	4.497	92000.00	20455.96
252	123	0 27	4.499	100000.00	22229.29
266	135	0 30	4.500	108000.00	24001.22
302	146	0 3244444	4.501	116000.00	25772.76
330	156	0 3466667	4.502	124000.00	27544.05
374	175	0 3888889	4.504	132000.00	29308.66
382	183	0.4066667	4.505	140000.00	31079.40
421	193	0.4288889	4.506	148000.00	32848.03
446	199	0.4422222	4.506	156000.00	34618.97
458	205	0.4555556	4.507	160770.00	35672.73



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Compressive Strength of Intact Rock

ASTM D7012

DSA File #:
DSA Appl #:

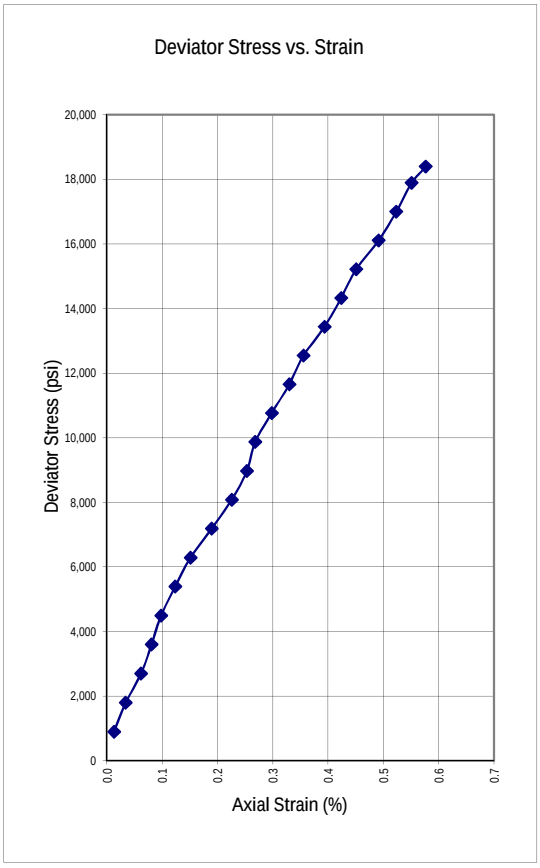
Project No.:	4438-01	Project Name:	NID Water Storage	Date:	9/13/2016
Sample No.:	CB-13, 137.5-138.5	Boring/Trench No.:		Depth (ft.)		Tested By:	DCK
Soil Description:					Check By:	CRK
Sample Location:					Lab No.:	23

Sample Data		
Tare Number	I.D.	IJ
Tare Weight	(gm)	218.50
Wet Core + Tare	(gm)	996.20
Dry Core + Tare	(gm)	983.60
Weight of Water	(gm)	12.60
Dry Weight	(gm)	765.10
Moisture Content	(%)	1.65
Core Height	(in)	4.700
Sample Diameter	(in)	2.380
Wet Unit Weight	(pcf)	141.57
Dry Unit Weight	(pcf)	139.27
Specific Gravity	(g/cc)	2.72
Saturation	(%)	20.48
Strain Rate	psi/second	54.72
compression machine	ID	15-08-029CT

Photo At Failure

Compressive Strength = 18,386.0 psi

Elapsed Time (Seconds)	Strain Units (0.0001in/unit)	Strain Percent (%)	Area (in^2)	Load lbs	Deviator Stress (psi)
8	6	0.01	4.449	4000.00	899.00
15	16	0.03	4.450	8000.00	1797.62
35	29	0.06	4.452	12000.00	2695.69
55	38	0.08	4.452	16000.00	3593.56
61	46	0.10	4.453	20000.00	4491.18
75	58	0.12	4.454	24000.00	5388.04
86	71	0.15	4.456	28000.00	6284.31
99	89	0.19	4.457	32000.00	7179.32
112	106	0 23	4.459	36000.00	8073.80
175	119	0 25	4.460	40000.00	8968.40
189	126	0 27	4.461	44000.00	9863.77
198	140	0 30	4.462	48000.00	10757.27
206	155	0 33	4.464	52000.00	11649.97
213	167	0 36	4.465	56000.00	12542.91
234	185	0 393617	4.466	60000.00	13433.67
254	199	0.4234043	4.468	64000.00	14324.96
269	212	0.4510638	4.469	68000.00	15216.04
284	231	0.4914894	4.471	72000.00	16104.56
301	246	0 5234043	4.472	76000.00	16993.81
322	259	0 5510638	4.473	80000.00	17883.25
336	271	0 5765957	4.475	82270.00	18385.96



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Compressive Strength of Intact Rock

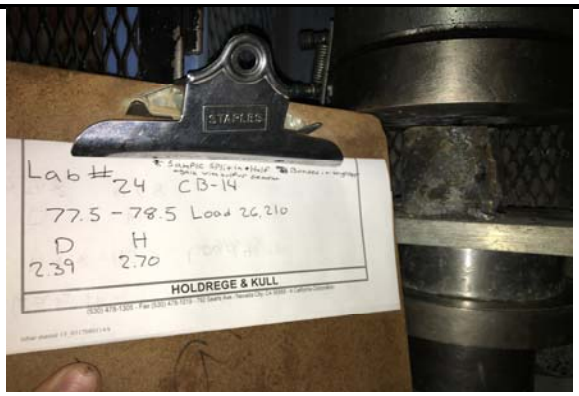
ASTM D7012

DSA File #:
DSA Appl #:

Project No.:	4438-01	Project Name:	NID Water Storage	Date:	9/13/2016
Sample No.:	CB-14, 77.5-78.5	Boring/Trench No.:		Depth (ft.)		Tested By:	DCK
Soil Description:					Check By:	CRK
Note:	Height to diameter ratio off. Correction made, UCS only, no strain				Lab No.:	24

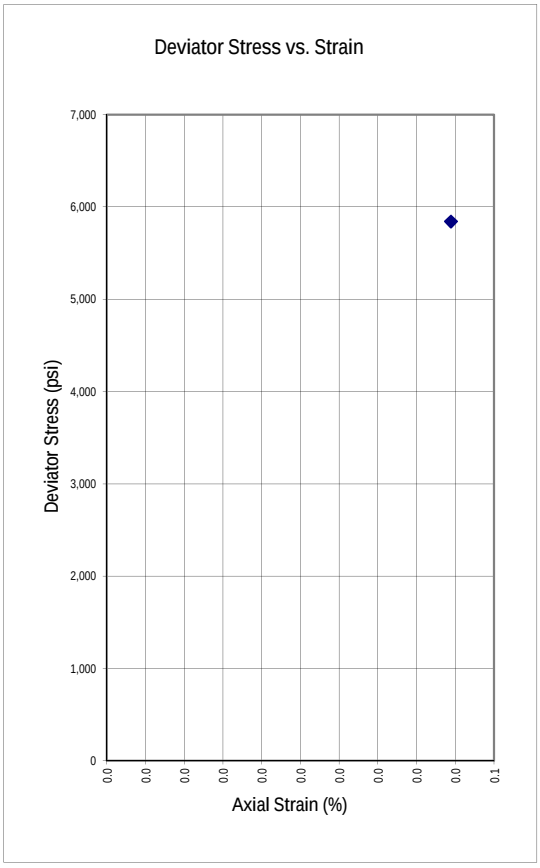
Sample Data		
Tare Number	I.D.	HJ
Tare Weight	(gm)	190.60
Wet Core + Tare	(gm)	658.30
Dry Core + Tare	(gm)	642.30
Weight of Water	(gm)	16.00
Dry Weight	(gm)	451.70
Moisture Content	(%)	3.54
Core Height	(in)	2.700
Sample Diameter	(in)	2.390
Wet Unit Weight	(pcf)	146.96
Dry Unit Weight	(pcf)	141.93
Specific Gravity	(g/cc)	2.72
Saturation	(%)	49 20
Strain Rate	psi/second	
compression machine	ID	15-08-029CT

Photo At Failure



Compressive Strength = 5,839.7 psi

Elapsed Time (Seconds)	Strain Units (0.0001in/unit)	Strain Percent (%)	Area (in^2)	Load lbs	Deviator Stress (psi)
	12	0.04	4.488	26210.00	5839.67



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Compressive Strength of Intact Rock

ASTM D7012

DSA File #:
DSA Appl #:

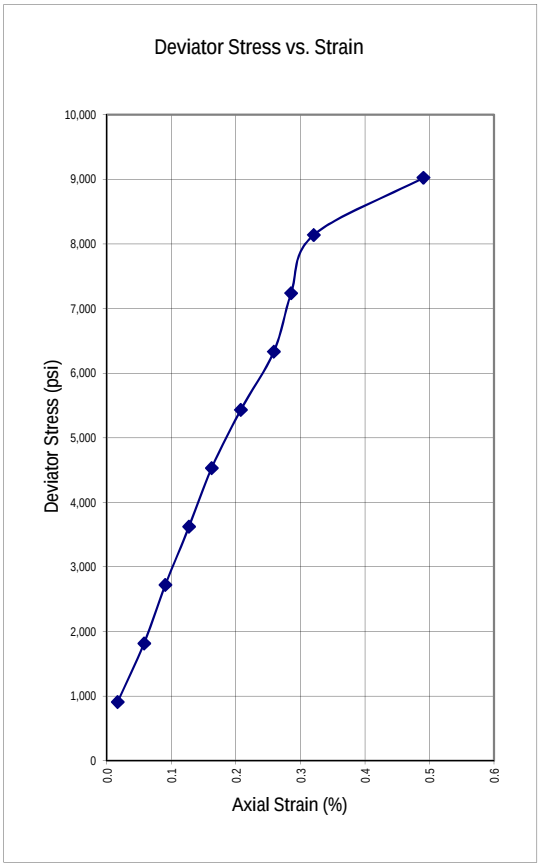
Project No.:	4438-01	Project Name:	NID Water Storage	Date:	9/13/2016
Sample No.:	CB-15, 24.0-24.7	Boring/Trench No.:		Depth (ft.)	Tested By: DCK
Soil Description:					Check By: CRK
Sample Location:					Lab No.: 18

Sample Data		
Tare Number	I.D.	H
Tare Weight	(gm)	330.90
Wet Core + Tare	(gm)	1162.25
Dry Core + Tare	(gm)	1155.04
Weight of Water	(gm)	7.21
Dry Weight	(gm)	824.14
Moisture Content	(%)	0.87
Core Height	(in)	4.870
Sample Diameter	(in)	2.370
Wet Unit Weight	(pcf)	147.28
Dry Unit Weight	(pcf)	146.01
Specific Gravity	(g/cc)	2.72
Saturation	(%)	14.65
Strain Rate	psi/second	47.78
compression machine	ID	15-08-029CT

Photo At Failure

Compressive Strength = 9,509.0 psi

Elapsed Time (Seconds)	Strain Units (0.0001in/unit)	Strain Percent (%)	Area (in^2)	Load lbs	Deviator Stress (psi)
32	8	0.02	4.412	4000.00	906.57
56	28	0.06	4.414	8000.00	1812.40
71	44	0.09	4.415	12000.00	2717.70
86	62	0.13	4.417	16000.00	3622.26
103	79	0.16	4.419	20000.00	4526.25
123	101	0 21	4.421	24000.00	5429.04
136	126	0 26	4.423	28000.00	6330.62
148	139	0 29	4.424	32000.00	7233.06
167	156	0 32	4.426	36000.00	8134.34
186	239	0.49	4.433	40000.00	9022.71
199	255	0 52	4.435	42170.00	9509.05



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Compressive Strength of Intact Rock

ASTM D7012

DSA File #:
DSA Appl #:

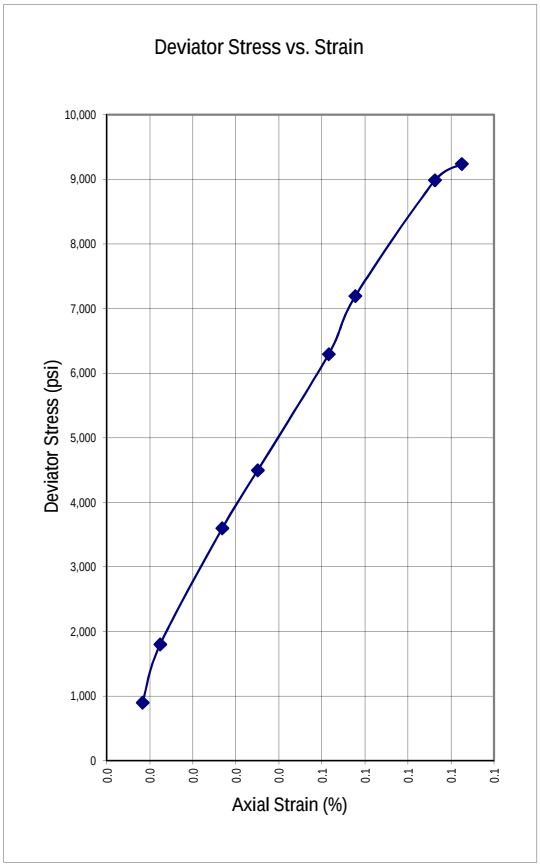
Project No.:	4438-01	Project Name:	NID Water Storage	Date:	9/12/2016
Sample No.:	CB-15, 56.2-57.2	Boring/Trench No.:		Depth (ft.)		Tested By:	DCK
Soil Description:					Check By:	CRK
Sample Location:					Lab No.:	14

Sample Data		
Tare Number	I.D.	IJ
Tare Weight	(gm)	218.50
Wet Core + Tare	(gm)	1200.23
Dry Core + Tare	(gm)	1186.89
Weight of Water	(gm)	13 34
Dry Weight	(gm)	968.39
Moisture Content	(%)	1.38
Core Height	(in)	4.850
Sample Diameter	(in)	2.380
Wet Unit Weight	(pcf)	173.18
Dry Unit Weight	(pcf)	170.83
Specific Gravity	(g/cc)	2.72
Saturation	(%)	-583.43
Strain Rate	PSI/Second	76 94
compression machine	ID	15-08-029CT

Photo At Failure

Compressive Strength = 9,233.1 psi

Elapsed Time (Seconds)	Strain Units (0.0001in/unit)	Strain Percent (%)	Area (in^2)	Load lbs	Deviator Stress (psi)
5	4	0.01	4.449	4000.00	899.04
26	6	0.01	4.449	8000.00	1798.01
49	13	0.03	4.450	16000.00	3595.50
63	17	0.04	4.450	20000.00	4494.01
86	25	0.05	4.451	28000.00	6290.57
98	28	0.06	4.451	32000.00	7188.78
115	37	0.08	4.452	40000.00	8984.31
120	40	0.08	4.452	41110.00	9233.05



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Compressive Strength of Intact Rock

ASTM D7012

DSA File #:
DSA Appl #:

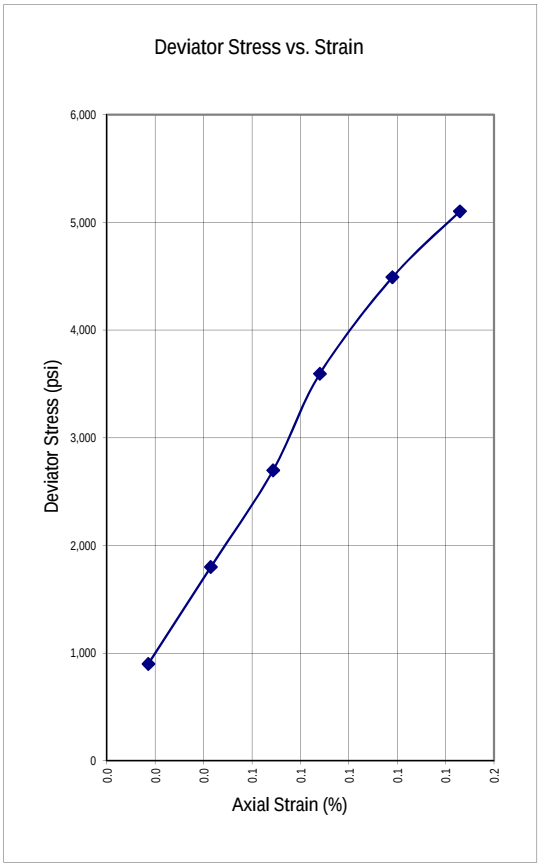
Project No.:	4438-01	Project Name:	NID Water Storage	Date:	9/13/2016
Sample No.:	CB-15, 67.1-68.3	Boring/Trench No.:		Depth (ft.)		Tested By:	DCK
Soil Description:					Check By:	CRK
Sample Location:					Lab No.:	19

Sample Data		
Tare Number	I.D.	D
Tare Weight	(gm)	316.70
Wet Core + Tare	(gm)	1241.86
Dry Core + Tare	(gm)	1234.20
Weight of Water	(gm)	7.66
Dry Weight	(gm)	917.50
Moisture Content	(%)	0.83
Core Height	(in)	4.660
Sample Diameter	(in)	2.380
Wet Unit Weight	(pcf)	169.85
Dry Unit Weight	(pcf)	168.45
Specific Gravity	(g/cc)	2.72
Saturation	(%)	298.61
Strain Rate	psi/second	168.37
compression machine	ID	

Photo At Failure

Compressive Strength = 5,101.8 psi

Elapsed Time (Seconds)	Strain Units (0.0001in/unit)	Strain Percent (%)	Area (in^2)	Load lbs	Deviator Stress (psi)
27	8	0.02	4.450	4000.00	898.96
50	20	0.04	4.451	8000.00	1797.46
65	32	0.07	4.452	12000.00	2695.50
88	41	0.09	4.453	16000.00	3593.30
121	55	0.12	4.454	20000.00	4490.28
135	68	0.15	4.455	22730.00	5101.78



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Compressive Strength of Intact Rock

ASTM D7012

DSA File #:
DSA Appl #:

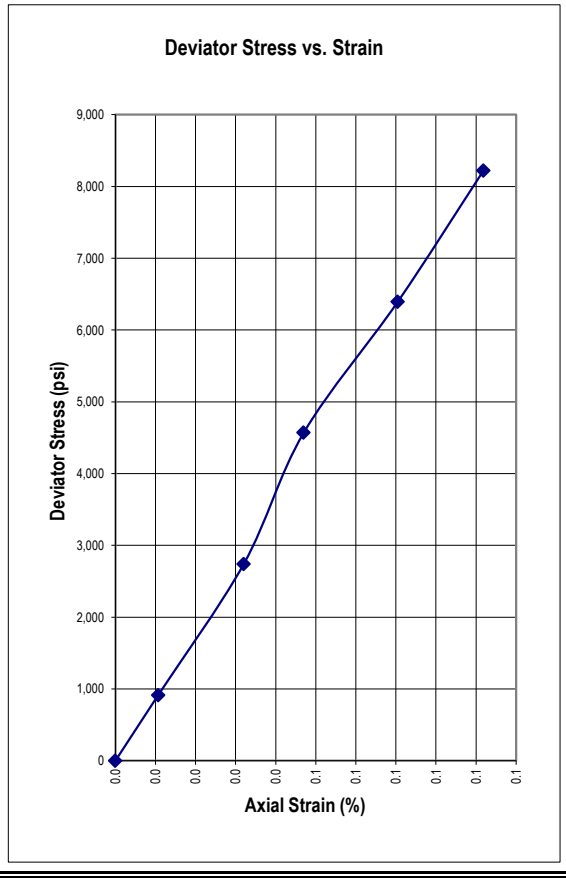
Project No.:	4438-02	Project Name:	NID Water Storage			Date:	12/6/2016
Sample No.:	CB-16	Boring/Trench No.:	-	Depth (ft.)	41-41.8	Tested By:	DCK
Soil Description:						Check By:	DRAFT
Sample Location:						Lab No.:	3

Sample Data		
Tare Number	I.D.	HJ
Tare Weight	(gm)	190.09
Wet Core + Tare	(gm)	1067.84
Dry Core + Tare	(gm)	1066.45
Weight of Water	(gm)	1.39
Dry Weight	(gm)	876.36
Moisture Content	(%)	0.16
Core Height	(in)	4.680
Sample Diameter	(in)	2.360
Wet Unit Weight	(pcf)	163.19
Dry Unit Weight	(pcf)	162.93
Specific Gravity	(g/cc)	2.72
Saturation	(%)	10.35
Strain Rate	psi/second	292.48
compression machine	ID	15-08-029CT

Photo At Failure

Compressive Strength = 15,888.7 psi

Elapsed Time (Seconds)	Strain Units (0.0001in/unit)	Strain Percent (%)	Area (in^2)	Load lbs	Deviator Stress (psi)
0	0	0.00	0.000	0.00	0.00
22	5	0.01	4.375	4000.00	914.32
54	15	0.03	4.376	12000.00	2742.38
75	22	0.05	4.376	20000.00	4569.95
102	33	0.07	4.377	28000.00	6396.43
125	43	0.09	4.378	36000.00	8222.23
149	54	0.12	4.379	44000.00	10047.02
170	65	0.14	4.380	52000.00	11870.96
194	64	0.14	4.380	60000.00	13697.55
219	72	0.15	4.381	68000.00	15521.24
238	72	0.15	4.381	69610.00	15888.73



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Compressive Strength of Intact Rock

ASTM D7012

DSA File #:
DSA Appl #:

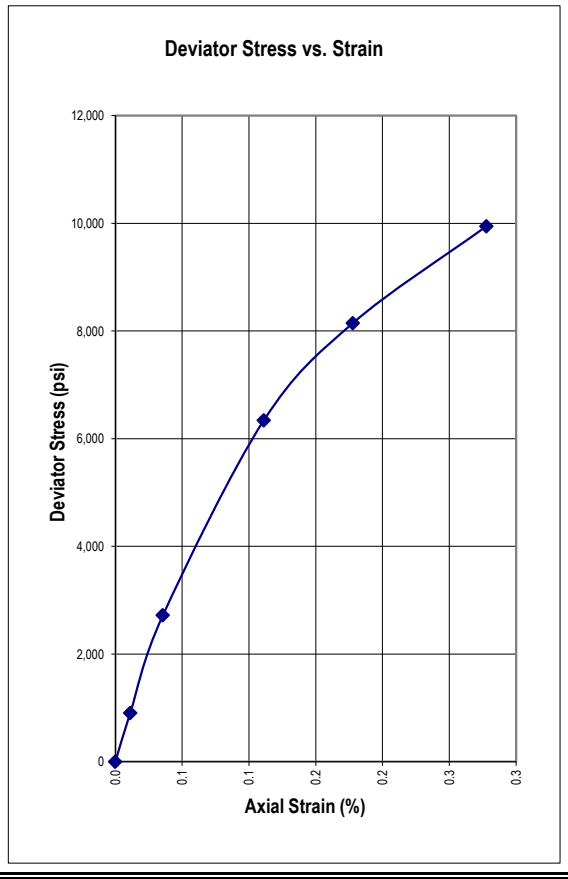
Project No.:	4438-02	Project Name:	NID Water Storage			Date:	12/6/2016
Sample No.:	CB-16	Boring/Trench No.:	-	Depth (ft.)	49.3-50	Tested By:	DCK
Soil Description:						Check By:	DRAFT
Sample Location:						Lab No.:	5

Sample Data		
Tare Number	I.D.	EJ
Tare Weight	(gm)	191.09
Wet Core + Tare	(gm)	1061.36
Dry Core + Tare	(gm)	1057.67
Weight of Water	(gm)	3.69
Dry Weight	(gm)	866.58
Moisture Content	(%)	0.43
Core Height	(in)	4.500
Sample Diameter	(in)	2.370
Wet Unit Weight	(pcf)	166.86
Dry Unit Weight	(pcf)	166.15
Specific Gravity	(g/cc)	2.72
Saturation	(%)	53.76
Strain Rate	psi/second	100.50
compression machine	ID	15-08-029CT

Photo At Failure

Compressive Strength = 11,458.5 psi

Elapsed Time (Seconds)	Strain Units (0.0001in/unit)	Strain Percent (%)	Area (in^2)	Load lbs	Deviator Stress (psi)
0	0	0.00	0.000	0.00	0.00
12	5	0.01	4.412	4000.00	906.62
28	16	0.04	4.413	12000.00	2719.19
51	50	0.11	4.416	28000.00	6339.99
65	80	0.18	4.419	36000.00	8145.98
79	125	0.28	4.424	44000.00	9946.22
114	125	0.28	4.424	50690.00	11458.50



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Compressive Strength of Intact Rock

ASTM D7012

DSA File #:

DSA Appl #:

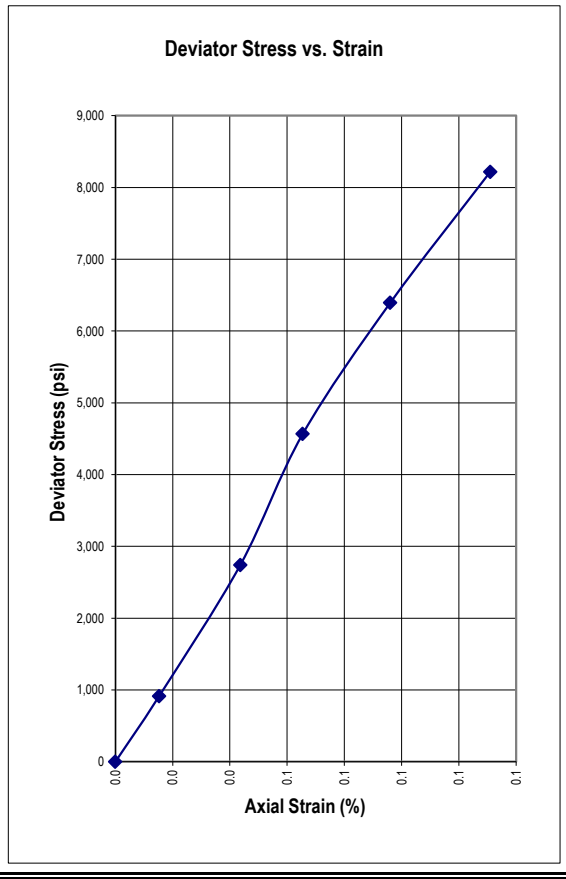
Project No.:	4438-02	Project Name:	NID Water Storage			Date:	12/6/2016
Sample No.:	CB-16	Boring/Trench No.:	-	Depth (ft.)	62.8-63.7	Tested By:	DCK
Soil Description:						Check By:	DRAFT
Sample Location:						Lab No.:	6

Sample Data		
Tare Number	I.D.	AJ
Tare Weight	(gm)	194.03
Wet Core + Tare	(gm)	1094.50
Dry Core + Tare	(gm)	1091.70
Weight of Water	(gm)	2.80
Dry Weight	(gm)	897.67
Moisture Content	(%)	0.31
Core Height	(in)	4.580
Sample Diameter	(in)	2.360
Wet Unit Weight	(pcf)	171.07
Dry Unit Weight	(pcf)	170.54
Specific Gravity	(g/cc)	2.80
Saturation	(%)	35.63
Strain Rate	psi/second	109.43
compression machine	ID	15-08-029CT

Photo At Failure

Compressive Strength = 9,629.9 psi

Elapsed Time (Seconds)	Strain Units (0.0001in/unit)	Strain Percent (%)	Area (in^2)	Load lbs	Deviator Stress (psi)
0	0	0.00	0.000	0.00	0.00
14	7	0.02	4.375	4000.00	914.28
28	20	0.04	4.376	12000.00	2742.06
45	30	0.07	4.377	20000.00	4569.11
63	44	0.10	4.379	28000.00	6394.80
75	60	0.13	4.380	36000.00	8219.01
88	60	0.13	4.380	42180.00	9629.94



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Compressive Strength of Intact Rock

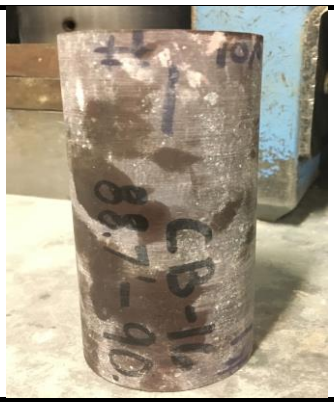
ASTM D7012

DSA File #:
DSA Appl #:

Project No.:	4438-02	Project Name:	NID Water Storage			Date:	12/6/2016
Sample No.:	CB-16	Boring/Trench No.:	-	Depth (ft.)	88.7-90.1	Tested By:	DCK
Soil Description:						Check By:	DRAFT
Sample Location:						Lab No.:	1

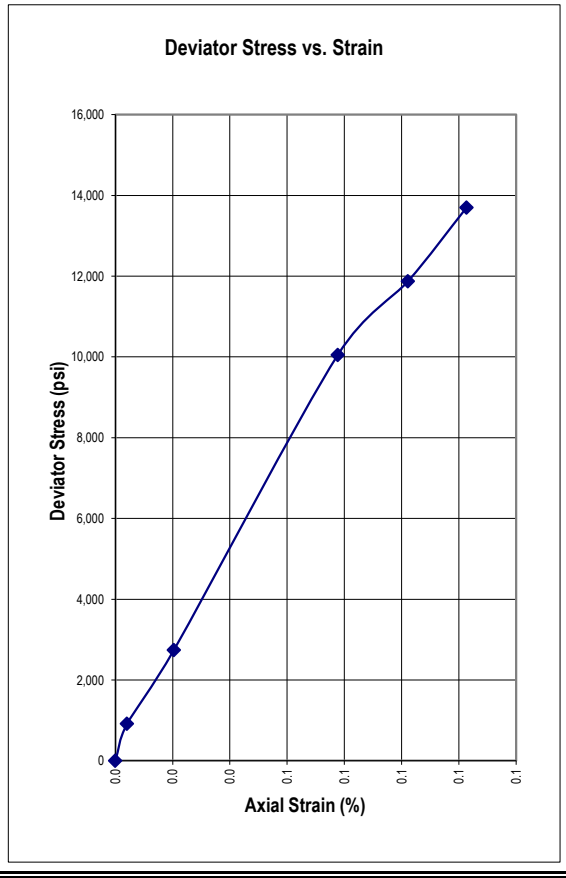
Sample Data		
Tare Number	I.D.	CJ
Tare Weight	(gm)	189.80
Wet Core + Tare	(gm)	1110.27
Dry Core + Tare	(gm)	1107.52
Weight of Water	(gm)	2.75
Dry Weight	(gm)	917.72
Moisture Content	(%)	0.30
Core Height	(in)	4.890
Sample Diameter	(in)	2.360
Wet Unit Weight	(pcf)	163.78
Dry Unit Weight	(pcf)	163.30
Specific Gravity	(g/cc)	2.72
Saturation	(%)	20.69
Strain Rate	psi/second	126.31
compression machine	ID	15-08-029CT

Photo At Failure



Compressive Strength = 15,284.1 psi

Elapsed Time (Seconds)	Strain Units (0.0001in/unit)	Strain Percent (%)	Area (in^2)	Load lbs	Deviator Stress (psi)
0	0	0.00	0.000	0.00	
28	2	0.00	4.375	4000.00	914.38
40	10	0.02	4.375	12000.00	2742.70
66	38	0.08	4.378	44000.00	10050.81
95	50	0.10	4.379	52000.00	11875.32
108	60	0.12	4.380	60000.00	13699.48
121	60	0.12	4.380	66940.00	15284.06



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Compressive Strength of Intact Rock

ASTM D7012

DSA File #:
DSA Appl #:

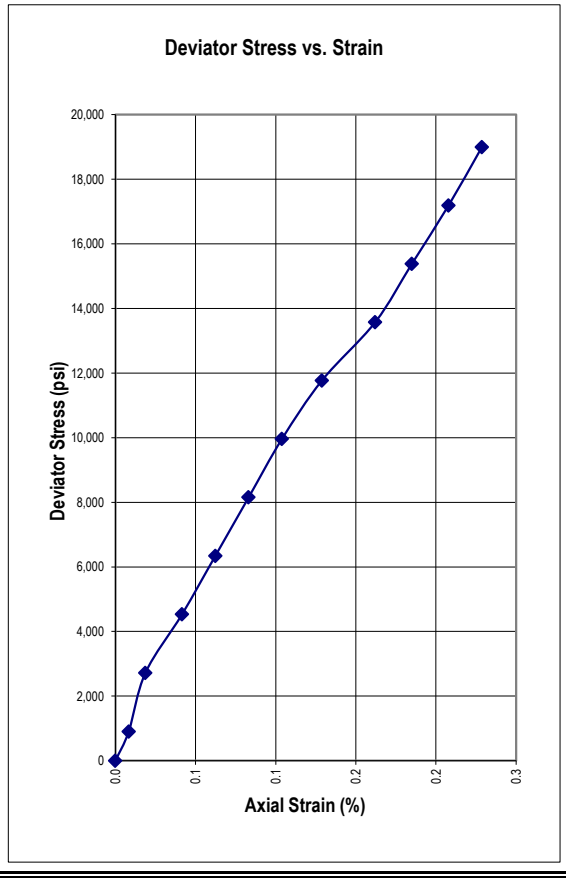
Project No.:	4438-02	Project Name:	NID Water Storage			Date:	12/6/2016
Sample No.:	CB-16A	Boring/Trench No.:	-	Depth (ft.)	33.1-33.6	Tested By:	DCK
Soil Description:						Check By:	DRAFT
Sample Location:						Lab No.:	4

Sample Data		
Tare Number	I.D.	JDA
Tare Weight	(gm)	314.08
Wet Core + Tare	(gm)	1177.55
Dry Core + Tare	(gm)	1175.16
Weight of Water	(gm)	2.39
Dry Weight	(gm)	861.08
Moisture Content	(%)	0.28
Core Height	(in)	4.810
Sample Diameter	(in)	2.370
Wet Unit Weight	(pcf)	154.88
Dry Unit Weight	(pcf)	154.45
Specific Gravity	(g/cc)	2.72
Saturation	(%)	7.63
Strain Rate	psi/second	121.00
compression machine	ID	15-08-029CT

Photo At Failure

Compressive Strength = 20,085.4 psi

Elapsed Time (Seconds)	Strain Units (0.0001in/unit)	Strain Percent (%)	Area (in^2)	Load lbs	Deviator Stress (psi)
0	0	0.00	0.000	0.00	0.00
30	4	0.01	4.412	4000.00	906.65
55	9	0.02	4.412	12000.00	2719.65
68	20	0.04	4.413	20000.00	4531.72
79	30	0.06	4.414	28000.00	6343.08
90	40	0.08	4.415	36000.00	8153.70
100	50	0.10	4.416	44000.00	9963.56
111	62	0.13	4.417	52000.00	11772.17
122	78	0.16	4.419	60000.00	13578.75
134	89	0.19	4.420	68000.00	15385.73
145	100	0.21	4.421	76000.00	17191.87
156	110	0.23	4.422	84000.00	18997.58
166	110	0.23	4.422	88810.00	20085.42



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Compressive Strength of Intact Rock

ASTM D7012

DSA File #:
DSA Appl #:

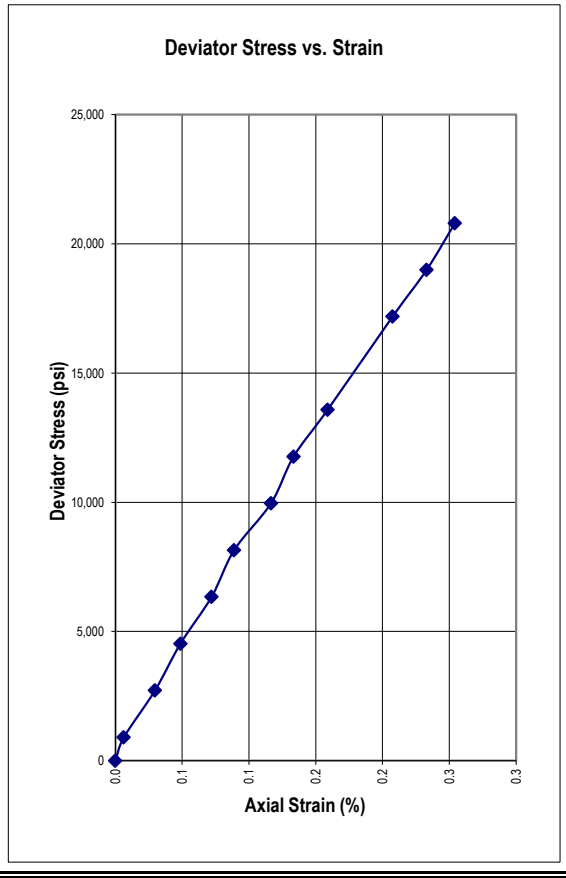
Project No.:	4438-02	Project Name:	NID Water Storage			Date:	12/6/2016
Sample No.:	CB-16A	Boring/Trench No.:	-	Depth (ft.)	37.9-39.1	Tested By:	DCK
Soil Description:						Check By:	DRAFT
Sample Location:						Lab No.:	2

Sample Data		
Tare Number	I.D.	AA
Tare Weight	(gm)	226.74
Wet Core + Tare	(gm)	1143.26
Dry Core + Tare	(gm)	1142.16
Weight of Water	(gm)	1.10
Dry Weight	(gm)	915.42
Moisture Content	(%)	0.12
Core Height	(in)	4.720
Sample Diameter	(in)	2.370
Wet Unit Weight	(pcf)	167.53
Dry Unit Weight	(pcf)	167.33
Specific Gravity	(g/cc)	2.72
Saturation	(%)	22.83
Strain Rate	psi/second	80.64
compression machine	ID	15-08-029CT

Photo At Failure

Compressive Strength = 21,852.9 psi

Elapsed Time (Seconds)	Strain Units (0.0001in/unit)	Strain Percent (%)	Area (in^2)	Load lbs	Deviator Stress (psi)
0	0	0.00	0.000	0.00	0.00
21	3	0.01	4.412	4000.00	906.66
42	14	0.03	4.413	12000.00	2719.35
72	23	0.05	4.414	20000.00	4531.39
102	34	0.07	4.415	28000.00	6342.47
127	42	0.09	4.415	36000.00	8153.22
150	55	0.12	4.417	44000.00	9962.30
166	63	0.13	4.417	52000.00	11771.63
182	75	0.16	4.419	60000.00	13579.20
215	98	0.21	4.421	76000.00	17191.92
232	110	0.23	4.422	84000.00	18996.75
249	120	0.25	4.423	92000.00	20801.55
271	120	0.25	4.423	96650.00	21852.93



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Compressive Strength of Intact Rock

ASTM D7012

DSA File #:
DSA Appl #:

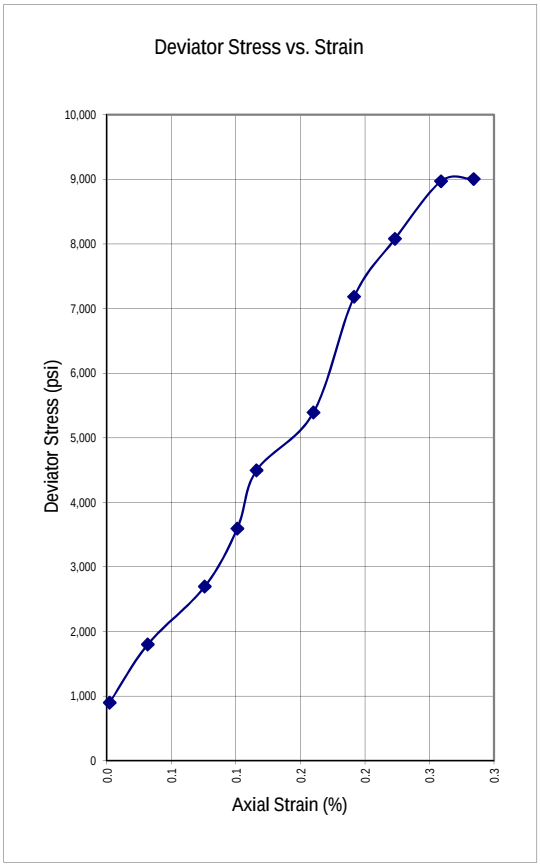
Project No.:	4438-01	Project Name:	NID Water Storage	Date:	9/12/2016
Sample No.:	CB-12, 8.0-9.2	Boring/Trench No.:		Depth (ft.)		Tested By:	DCK
Soil Description:					Check By:	CRK
Sample Location:					Lab No.:	17

Sample Data		
Tare Number	I.D.	F
Tare Weight	(gm)	321.00
Wet Core + Tare	(gm)	1239.10
Dry Core + Tare	(gm)	1228.60
Weight of Water	(gm)	10.500
Dry Weight	(gm)	907.60
Moisture Content	(%)	1.16
Core Height	(in)	4.750
Sample Diameter	(in)	2.380
Wet Unit Weight	(pcf)	165.36
Dry Unit Weight	(pcf)	163.47
Specific Gravity	(g/cc)	2.72
Saturation	(%)	82 23
Strain Rate	PSI/Second	51.45
compression machine	ID	15-08-029CT

Photo At Failure

Compressive Strength = 9,003.7 psi

Elapsed Time (Seconds)	Strain Units (0.0001in/unit)	Strain Percent (%)	Area (in^2)	Load lbs	Deviator Stress (psi)
12	1	0.00	4.449	4000.00	899.10
23	15	0.03	4.450	8000.00	1797.67
68	36	0.08	4.452	12000.00	2695.31
91	48	0.10	4.453	16000.00	3592.83
108	55	0.12	4.454	20000.00	4490.38
121	76	0.16	4.456	24000.00	5386.07
136	91	0.19	4.457	32000.00	7179.16
145	106	0 22	4.459	36000.00	8073.99
167	123	0 26	4.460	40000.00	8967.89
175	135	0 28	4.461	40170.00	9003.72



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Compressive Strength of Intact Rock

ASTM D7012

DSA File #:
DSA Appl #:

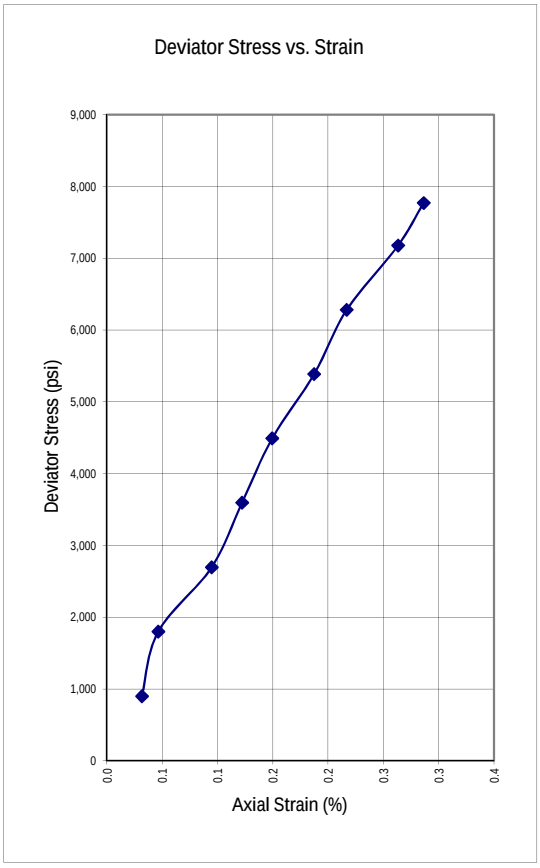
Project No.:	4438-01	Project Name:	NID Water Storage	Date:	9/13/2016
Sample No.:	CB-18, 30.9-31.7	Boring/Trench No.:		Depth (ft.)		Tested By:	DCK
Soil Description:					Check By:	CRK
Sample Location:					Lab No.:	26

Sample Data		
Tare Number	I.D.	F
Tare Weight	(gm)	321.00
Wet Core + Tare	(gm)	1224.20
Dry Core + Tare	(gm)	1220.90
Weight of Water	(gm)	3.30
Dry Weight	(gm)	899.90
Moisture Content	(%)	0.37
Core Height	(in)	4.750
Sample Diameter	(in)	2.380
Wet Unit Weight	(pcf)	162.68
Dry Unit Weight	(pcf)	162.09
Specific Gravity	(g/cc)	2.72
Saturation	(%)	21.15
Strain Rate	psi/second	50.12
compression machine	ID	15-08-029CT

Photo At Failure

Compressive Strength = 7,768.5 psi

Elapsed Time (Seconds)	Strain Units (0.0001in/unit)	Strain Percent (%)	Area (in^2)	Load lbs	Deviator Stress (psi)
6	15	0.03	4.450	4000.00	898.83
31	22	0.05	4.451	8000.00	1797.40
52	45	0.09	4.453	12000.00	2694.80
69	58	0.12	4.454	16000.00	3592.08
79	71	0.15	4.455	20000.00	4488.87
101	89	0.19	4.457	24000.00	5384.59
123	103	0 22	4.458	28000.00	6280.17
141	125	0 26	4.461	32000.00	7174.01
155	136	0 29	4.462	34660.00	7768.54



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Compressive Strength of Intact Rock

ASTM D7012

DSA File #:
DSA Appl #:

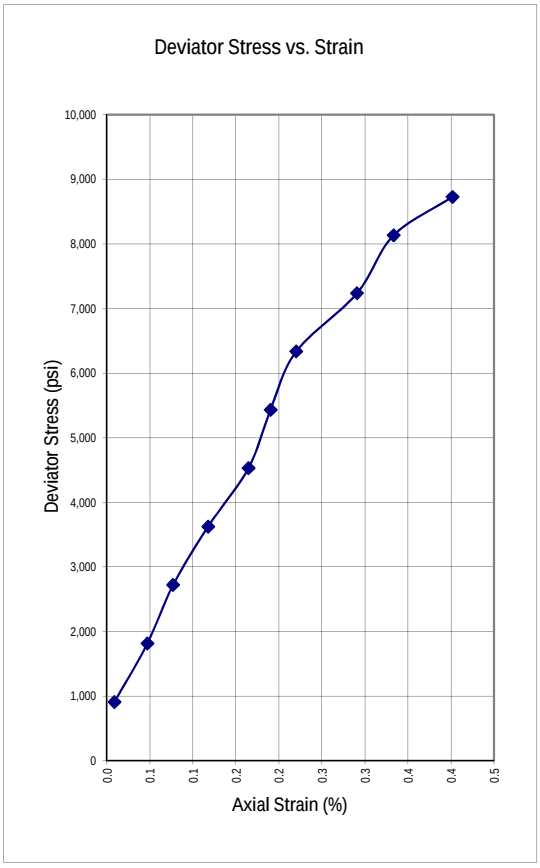
Project No.:	4438-01	Project Name:	NID Water Storage	Date:	9/14/2016
Sample No.:	CB-18, 36.0-37.3	Boring/Trench No.:		Depth (ft.)		Tested By:	DCK
Soil Description:					Check By:	CRK
Sample Location:					Lab No.:	28

Sample Data		
Tare Number	I.D.	D
Tare Weight	(gm)	316.70
Wet Core + Tare	(gm)	1227.80
Dry Core + Tare	(gm)	1220.10
Weight of Water	(gm)	7.70
Dry Weight	(gm)	903.40
Moisture Content	(%)	0.85
Core Height	(in)	4.680
Sample Diameter	(in)	2.370
Wet Unit Weight	(pcf)	167.97
Dry Unit Weight	(pcf)	166.55
Specific Gravity	(g/cc)	2.72
Saturation	(%)	121.35
Strain Rate	psi/second	52 57
compression machine	ID	15-08-029CT

Photo At Failure

Compressive Strength = 8,726.0 psi

Elapsed Time (Seconds)	Strain Units (0.0001in/unit)	Strain Percent (%)	Area (in^2)	Load lbs	Deviator Stress (psi)
4	4	0.01	4.412	4000.00	906.64
12	22	0.05	4.414	8000.00	1812.59
35	36	0.08	4.415	12000.00	2718.07
45	55	0.12	4.417	16000.00	3622.62
69	77	0.16	4.419	20000.00	4526.14
89	89	0.19	4.420	24000.00	5429.98
102	103	0 22	4.421	28000.00	6333.07
125	136	0 29	4.424	32000.00	7232.68
146	156	0 33	4.426	36000.00	8133.28
166	188	0.40	4.429	38650.00	8725.99



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Compressive Strength of Intact Rock

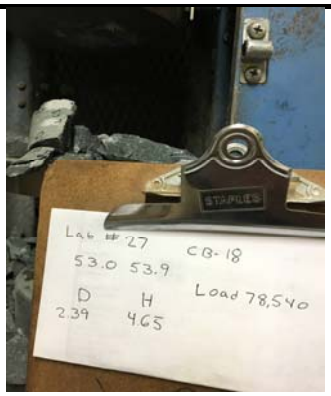
ASTM D7012

DSA File #:
DSA Appl #:

Project No.:	4438-01	Project Name:	NID Water Storage	Date:	9/14/2016
Sample No.:	CB-18, 53.0-53.9	Boring/Trench No.:		Depth (ft.)		Tested By:	DCK
Soil Description:					Check By:	CRK
Note:					Lab No.:	27

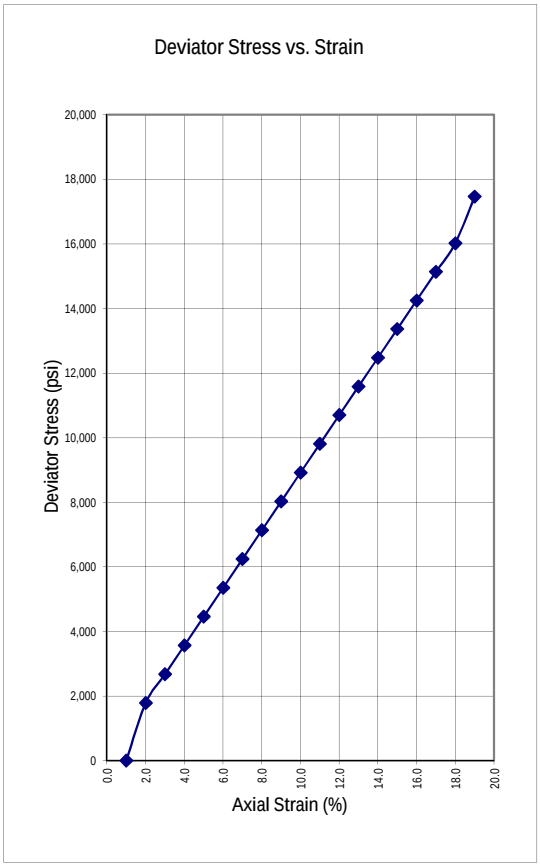
Sample Data		
Tare Number	I.D.	BK
Tare Weight	(gm)	319.10
Wet Core + Tare	(gm)	1226.30
Dry Core + Tare	(gm)	1223.80
Weight of Water	(gm)	2.50
Dry Weight	(gm)	904.70
Moisture Content	(%)	0.28
Core Height	(in)	4.650
Sample Diameter	(in)	2.390
Wet Unit Weight	(pcf)	165.52
Dry Unit Weight	(pcf)	165.06
Specific Gravity	(g/cc)	2.72
Saturation	(%)	26.60
Strain Rate	psi/second	55 25
compression machine	ID	15-08-029CT

Photo At Failure



Compressive Strength = 17,460.4 psi

Elapsed Time (Seconds)	Strain Units (0.0001in/unit)	Strain Percent (%)	Area (in^2)	Load lbs	Deviator Stress (psi)
6	0			4000.00	
9	1	0.00	4.486	8000.00	1783.18
21	1	0.00	4.486	12000.00	2674.77
38	1	0.00	4.486	16000.00	3566.36
52	1	0.00	4.486	20000.00	4457.95
71	1	0.00	4.486	24000.00	5349.54
91	1	0.00	4.486	28000.00	6241.13
106	1	0.00	4.486	32000.00	7132.72
123	1	0.00	4.486	36000.00	8024.31
143	1	0.00	4.486	40000.00	8915.90
162	4	0.01	4.487	44000.00	9806.85
183	26	0.06	4.489	48000.00	10693.32
199	33	0.07	4.489	52000.00	11582.69
213	42	0.09	4.490	56000.00	12471.25
225	51	0.1096774	4.491	60000.00	13359.46
277	63	0.1354839	4.492	64000.00	14246.41
263	79	0.1698925	4.494	68000.00	15131.60
289	93	0.2	4.495	72000.00	16016.86
316	123	0 2645161	4.498	78540.00	17460.43



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Compressive Strength of Intact Rock

ASTM D7012

DSA File #:
DSA Appl #:

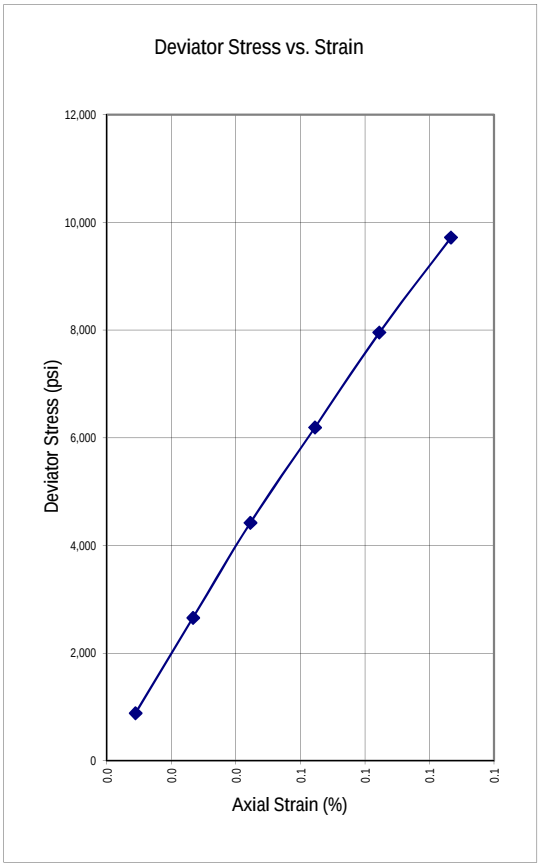
Project No.:	4438-01	Project Name:	NID Water Storage	Date:	9/12/2016
Sample No.:	CB-20, 16.8-17.9	Boring/Trench No.:		Depth (ft.)		Tested By:	DCK
Soil Description:					Check By:	CRK
Sample Location:					Lab No.:	15

Sample Data		
Tare Number	I.D.	JF
Tare Weight	(gm)	192.40
Wet Core + Tare	(gm)	982.30
Dry Core + Tare	(gm)	968.23
Weight of Water	(gm)	14.07
Dry Weight	(gm)	775.83
Moisture Content	(%)	1.81
Core Height	(in)	4.500
Sample Diameter	(in)	2.400
Wet Unit Weight	(pcf)	147.68
Dry Unit Weight	(pcf)	145.05
Specific Gravity	(g/cc)	2.72
Saturation	(%)	29.00
Strain Rate	psi/second	83.19
compression machine	ID	15-08-029CT

Photo At Failure

Compressive Strength = 11,480.0 psi

Elapsed Time (Seconds)	Strain Units (0.0001in/unit)	Strain Percent (%)	Area (in^2)	Load lbs	Deviator Stress (psi)
20	4	0.01	4.524	4000.00	884.12
40	12	0.03	4.525	12000.00	2651.88
53	20	0.04	4.526	20000.00	4419.01
65	29	0.06	4.527	28000.00	6185.37
80	38	0.08	4.528	36000.00	7951.03
120	48	0.11	4.529	44000.00	9715.76
138	57	0.13	4.530	52000.00	11479.96



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Compressive Strength of Intact Rock

ASTM D7012

DSA File #:
DSA Appl #:

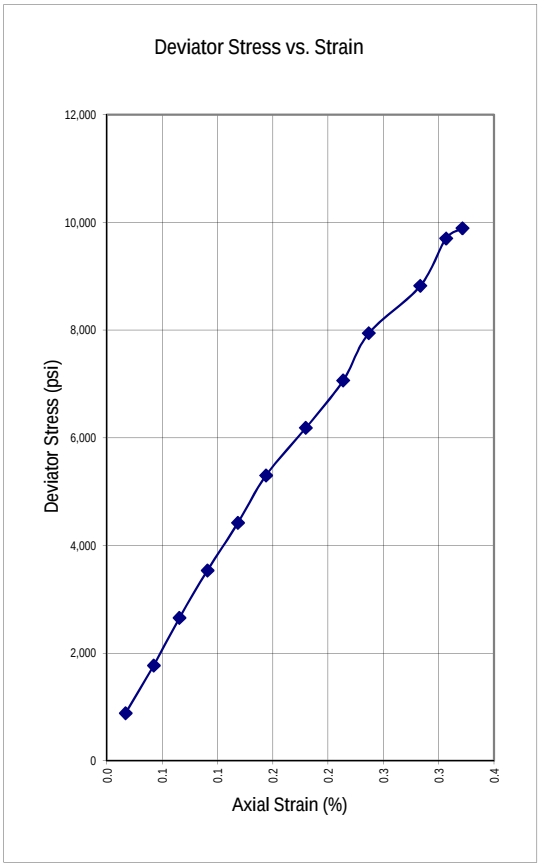
Project No.:	4438-01	Project Name:	NID Water Storage	Date:	9/14/2016
Sample No.:	CB-20, 24.7-25.6	Boring/Trench No.:		Depth (ft.)		Tested By:	DCK
Soil Description:					Check By:	CRK
Sample Location:					Lab No.:	12

Sample Data		
Tare Number	I.D.	E
Tare Weight	(gm)	322.80
Wet Core + Tare	(gm)	1225.50
Dry Core + Tare	(gm)	1218.20
Weight of Water	(gm)	7.30
Dry Weight	(gm)	895.40
Moisture Content	(%)	0.82
Core Height	(in)	4.730
Sample Diameter	(in)	2.400
Wet Unit Weight	(pcf)	160.57
Dry Unit Weight	(pcf)	159.27
Specific Gravity	(g/cc)	2.72
Saturation	(%)	33.77
Strain Rate	psi/second	44 96
compression machine	ID	15-08-029CT

Photo At Failure

Compressive Strength = 9,888.8 psi

Elapsed Time (Seconds)	Strain Units (0.0001in/unit)	Strain Percent (%)	Area (in^2)	Load lbs	Deviator Stress (psi)
15	8	0.02	4.525	4000.00	884.04
42	20	0.04	4.526	8000.00	1767.64
65	31	0.07	4.527	12000.00	2650.84
85	43	0.09	4.528	16000.00	3533.56
101	56	0.12	4.529	20000.00	4415.74
118	68	0.14	4.530	24000.00	5297.54
138	85	0.18	4.532	28000.00	6178.24
157	101	0 21	4.534	32000.00	7058.45
171	112	0 24	4.535	36000.00	7938.90
192	134	0 28	4.537	40000.00	8816.89
213	145	0 31	4.538	44000.00	9696.32
229	152	0 32	4.538	44880.00	9888.78



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Compressive Strength of Intact Rock

ASTM D7012

DSA File #:
DSA Appl #:

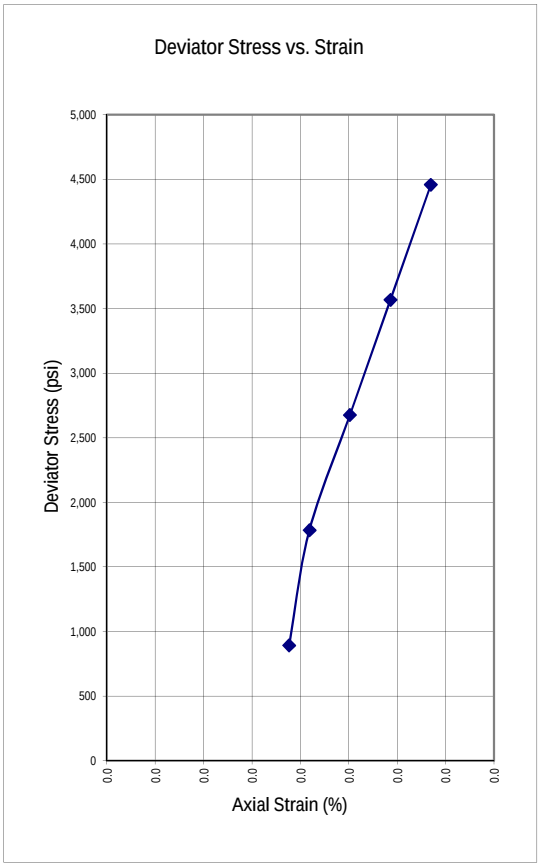
Project No.:	4438-01	Project Name:	NID Water Storage	Date:	9/12/2016
Sample No.:	CB-20, 63.3-64.4	Boring/Trench No.:		Depth (ft.)		Tested By:	DCK
Soil Description:					Check By:	CRK
Sample Location:					Lab No.:	13

Sample Data		
Tare Number	I.D.	IJ
Tare Weight	(gm)	218.50
Wet Core + Tare	(gm)	1125.60
Dry Core + Tare	(gm)	1109.10
Weight of Water	(gm)	16 50
Dry Weight	(gm)	890.60
Moisture Content	(%)	1.85
Core Height	(in)	4.780
Sample Diameter	(in)	2.390
Wet Unit Weight	(pcf)	161.00
Dry Unit Weight	(pcf)	158.07
Specific Gravity	(g/cc)	2.72
Saturation	(%)	68 34
Strain Rate	psi/second	
compression machine	ID	15-08-029CT

Photo At Failure

Compressive Strength = 4,456.6 psi

Elapsed Time (Seconds)	Strain Units (0.0001in/unit)	Strain Percent (%)	Area (in^2)	Load lbs	Deviator Stress (psi)
8	9	0.02	4.487	4000.00	891.44
37	10	0.02	4.487	8000.00	1782.84
56	12	0.03	4.487	12000.00	2674.15
77	14	0.03	4.488	16000.00	3565.39
109	16	0.03	4.488	20000.00	4456.55



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Appendix H-2
Unconfined Compressive Strength Test Data – Rock Borrow Areas

Appendix H-2
Unconfined Compressive Strength Test Data – Rock Borrow Areas

Summary of Unconfined Compressive Strength Test Results

Borrow Area	Boring No.	Depth Range of Test Sample (ft)	Degree of Weathering	Unconfined Compressive Strength (psi)
South	CB-B1	22.4-23.2	slightly weathered	2157
	CB-B1	60.0-60.9	slightly weathered	8237
	CB-B1	79.0-80.1	slightly weathered to fresh	21806
	CB-B2	49.4-50.3	slightly weathered	22197
	CB-B2	69.3-70.0	slightly weathered to fresh	9496
	CB-B3	51.2-52.3	slightly weathered	6970
	CB-B4	45.8-46.6	slightly weathered	11211
	CB-B4	55.0-55.7	slightly weathered	21583
North	CB-B6	29.2-30.0	slightly weathered	11484
	CB-B6	48.6-49.4	slightly weathered	13745
	CB-B7	8.0-9.0	slightly weathered	8521
	CB-B7	19.5-20.2	slightly weathered	14638
	CB-B8	59.5-60.4	slightly weathered	54054
	CB-B8	66.3-67.0	slightly weathered	18444

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ASTM D7012

DSA File #:
DSA Appl #:

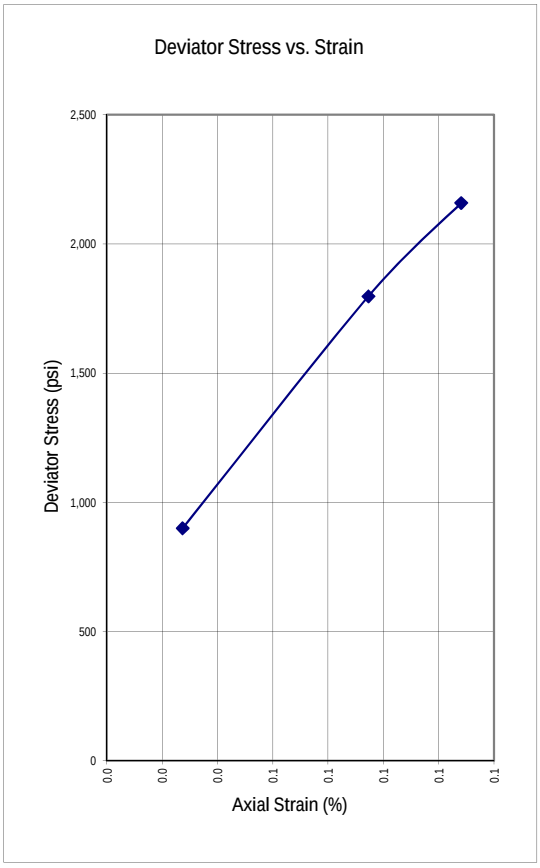
Project No.:	4438-01	Project Name:	NID Water Storage	Date:	9/13/2016
Sample No.:	CB-B1, 22.4-23.2	Boring/Trench No.:		Depth (ft.)		Tested By:	DCK
Soil Description:					Check By:	CRK
Sample Location:					Lab No.:	30

Sample Data		
Tare Number	I.D.	J4
Tare Weight	(gm)	228.80
Wet Core + Tare	(gm)	998.36
Dry Core + Tare	(gm)	996.30
Weight of Water	(gm)	2.06
Dry Weight	(gm)	767.50
Moisture Content	(%)	0.27
Core Height	(in)	4.760
Sample Diameter	(in)	2.380
Wet Unit Weight	(pcf)	138.32
Dry Unit Weight	(pcf)	137.95
Specific Gravity	(g/cc)	2.72
Saturation	(%)	3.17
Strain Rate	psi/second	46 90
compression machine	ID	15-08-029CT

Photo At Failure

Compressive Strength = 2,157.4 psi

Elapsed Time (Seconds)	Strain Units (0.0001in/unit)	Strain Percent (%)	Area (in^2)	Load lbs	Deviator Stress (psi)
5	13	0.03	4.450	4000.00	898.87
21	45	0.09	4.453	8000.00	1796.53
46	61	0.13	4.455	9610.00	2157.36



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Compressive Strength of Intact Rock

ASTM D7012

DSA File #:
DSA Appl #:

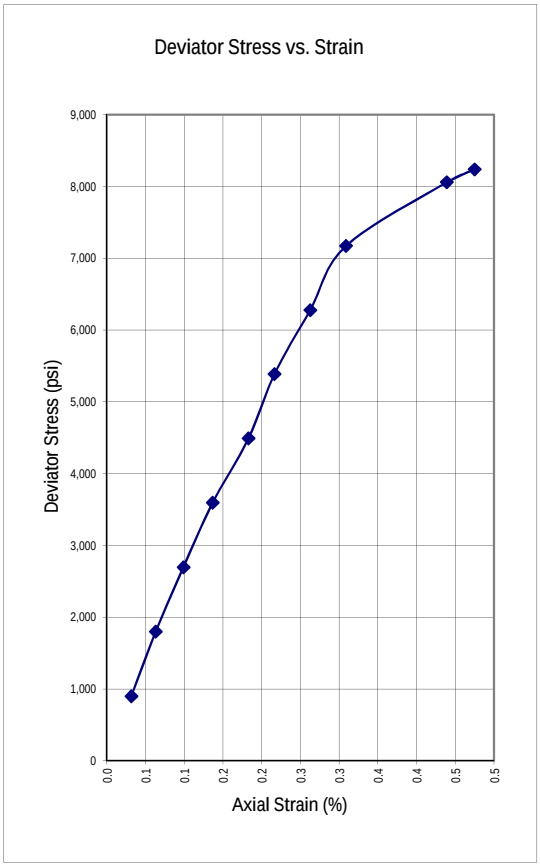
Project No.:	4438-01	Project Name:	NID Water Storage	Date:	9/13/2016
Sample No.:	CB-B1, 60.0-60.9	Boring/Trench No.:		Depth (ft.)		Tested By:	DCK
Soil Description:					Check By:	CRK
Sample Location:					Lab No.:	31

Sample Data		
Tare Number	I.D.	5
Tare Weight	(gm)	117.40
Wet Core + Tare	(gm)	1002.90
Dry Core + Tare	(gm)	987.20
Weight of Water	(gm)	15.70
Dry Weight	(gm)	869.80
Moisture Content	(%)	1.81
Core Height	(in)	4.760
Sample Diameter	(in)	2.380
Wet Unit Weight	(pcf)	159.16
Dry Unit Weight	(pcf)	156.33
Specific Gravity	(g/cc)	2.72
Saturation	(%)	57 31
Strain Rate	psi/second	47.07
compression machine	ID	15-08-029CT

Photo At Failure

Compressive Strength = 8,237.1 psi

Elapsed Time (Seconds)	Strain Units (0.0001in/unit)	Strain Percent (%)	Area (in^2)	Load lbs	Deviator Stress (psi)
6	15	0.03	4.450	4000.00	898.83
33	30	0.06	4.452	8000.00	1797.10
53	47	0.10	4.453	12000.00	2694.69
70	65	0.14	4.455	16000.00	3591.56
86	87	0.18	4.457	20000.00	4487.37
100	103	0 22	4.458	24000.00	5383.03
118	125	0 26	4.461	28000.00	6277.29
133	147	0 31	4.463	32000.00	7170.72
168	209	0.44	4.468	36000.00	8056.52
175	226	0.47	4.470	36820.00	8237.08



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ASTM D7012

DSA File #:
DSA Appl #:

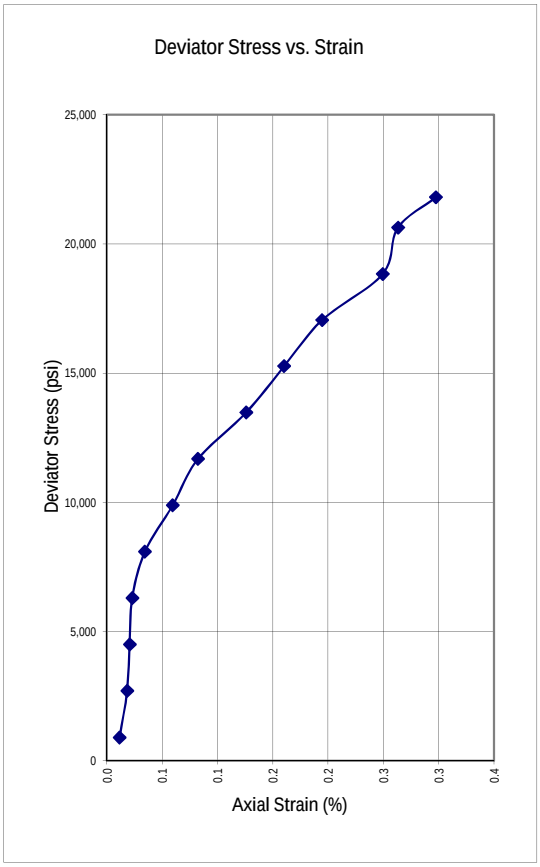
Project No.:	4438-01	Project Name:	NID Water Storage	Date:	9/12/2016
Sample No.:	CB-1, B-1 79.0-80.1	Boring/Trench No.:		Depth (ft.)	Tested By: DCK
Soil Description:					Check By: CRK
Sample Location:					Lab No.: 1

Sample Data		
Tare Number	I.D.	JF
Tare Weight	(gm)	192.40
Wet Core + Tare	(gm)	986.55
Dry Core + Tare	(gm)	980.60
Weight of Water	(gm)	5.95
Dry Weight	(gm)	788.20
Moisture Content	(%)	0.75
Core Height	(in)	4.370
Sample Diameter	(in)	2.380
Wet Unit Weight	(pcf)	155.48
Dry Unit Weight	(pcf)	154.31
Specific Gravity	(g/cc)	2.72
Saturation	(%)	20 55
Strain Rate	psi/second	49.67
compression machine	ID	15-08-029CT

Photo At Failure

Compressive Strength = 21,806.0 psi

Elapsed Time (Seconds)	Strain Units (0.0001in/unit)	Strain Percent (%)	Area (in^2)	Load lbs	Deviator Stress (psi)
35	5	0.01	4.449	4000.00	899.01
42	8	0.02	4.450	12000.00	2696.86
92	9	0.02	4.450	20000.00	4494.66
140	10	0.02	4.450	28000.00	6292.38
188	15	0.03	4.450	36000.00	8089.28
209	26	0.06	4.451	44000.00	9884.40
255	36	0.08	4.452	52000.00	11678.89
300	55	0.13	4.454	60000.00	13469.78
321	70	0.16	4.456	68000.00	15260.50
366	85	0.19	4.457	76000.00	17049.99
396	109	0 25	4.460	84000.00	18834.36
415	115	0 26	4.461	92000.00	20625.27
439	130	0 30	4.462	97300.00	21805.96



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Compressive Strength of Intact Rock

ASTM D7012

DSA File #:
DSA Appl #:

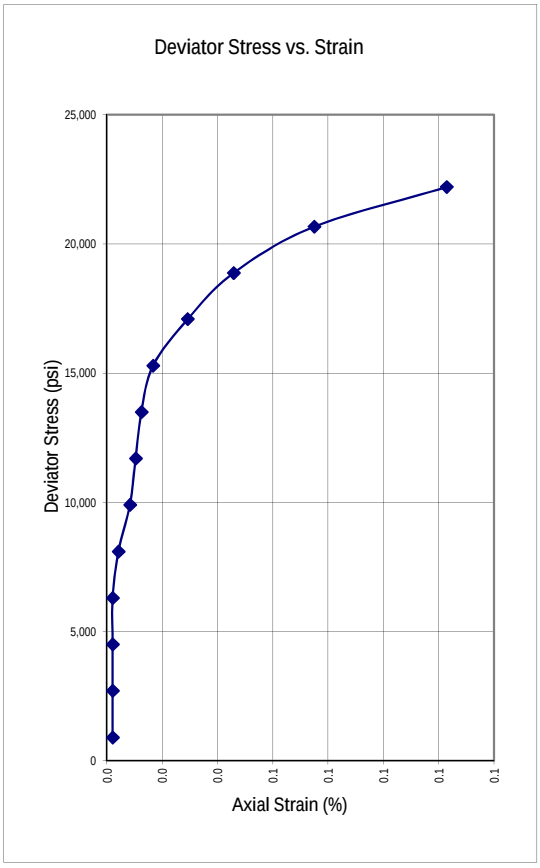
Project No.:	4438-01	Project Name:	NID Water Storage	Date:	9/12/2016
Sample No.:	CB-B2, 49.4-50.3	Boring/Trench No.:		Depth (ft.)		Tested By:	DCK
Soil Description:					Check By:	CRK
Sample Location:					Lab No.:	5

Sample Data		
Tare Number	I.D.	AJ
Tare Weight	(gm)	195.57
Wet Core + Tare	(gm)	1129.23
Dry Core + Tare	(gm)	1107.10
Weight of Water	(gm)	22.13
Dry Weight	(gm)	911.53
Moisture Content	(%)	2.43
Core Height	(in)	4.800
Sample Diameter	(in)	2.380
Wet Unit Weight	(pcf)	166.41
Dry Unit Weight	(pcf)	162.47
Specific Gravity	(g/cc)	2.72
Saturation	(%)	147.82
Strain Rate	psi/second	52.47
compression machine	ID	15-08-029CT

Photo At Failure

Compressive Strength = 22,196.6 psi

Elapsed Time (Seconds)	Strain Units (0.0001in/unit)	Strain Percent (%)	Area (in^2)	Load lbs	Deviator Stress (psi)
4	1	0.00	4.449	4000.00	899.10
26	1	0.00	4.449	12000.00	2697.29
44	1	0.00	4.449	20000.00	4495.49
81	1	0.00	4.449	28000.00	6293.69
135	2	0.00	4.449	36000.00	8091.72
162	4	0.01	4.449	44000.00	9889.46
196	5	0.01	4.449	52000.00	11687.30
226	6	0.01	4.449	60000.00	13485.07
269	8	0.02	4.450	68000.00	15282.44
301	14	0.03	4.450	76000.00	17078.24
346	22	0.05	4.451	84000.00	18872.80
389	36	0.08	4.452	92000.00	20664.18
423	59	0.12	4.454	98870.00	22196.61



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Compressive Strength of Intact Rock

ASTM D7012

DSA File #:
DSA Appl #:

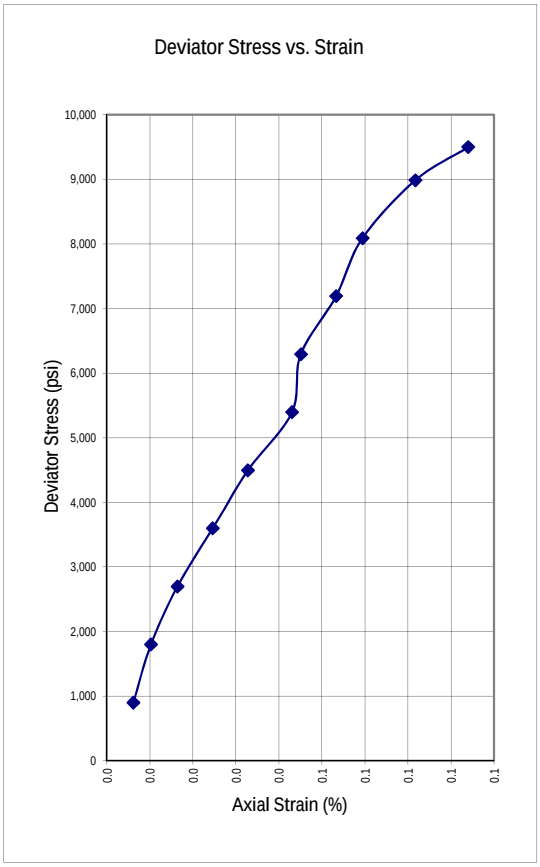
Project No.:	4438-01	Project Name:	NID Water Storage	Date:	9/12/2016
Sample No.:	CB-B2, 69.3-70.0	Boring/Trench No.:		Depth (ft.)		Tested By:	DCK
Soil Description:					Check By:	CRK
Sample Location:					Lab No.:	4

Sample Data		
Tare Number	I.D.	JD
Tare Weight	(gm)	192.27
Wet Core + Tare	(gm)	1130.00
Dry Core + Tare	(gm)	1129.20
Weight of Water	(gm)	0.80
Dry Weight	(gm)	936.93
Moisture Content	(%)	0.09
Core Height	(in)	4.880
Sample Diameter	(in)	2.380
Wet Unit Weight	(pcf)	164.40
Dry Unit Weight	(pcf)	164.26
Specific Gravity	(g/cc)	2.72
Saturation	(%)	6.98
Strain Rate	psi/second	69.82
compression machine	ID	15-08-029CT

Photo At Failure

Compressive Strength = 9,495.7 psi

Elapsed Time (Seconds)	Strain Units (0.0001in/unit)	Strain Percent (%)	Area (in^2)	Load lbs	Deviator Stress (psi)
5	3	0.01	4.449	4000.00	899.06
16	5	0.01	4.449	8000.00	1798.05
31	8	0.02	4.450	12000.00	2696.91
42	12	0.02	4.450	16000.00	3595.58
58	16	0.03	4.450	20000.00	4494.11
71	21	0.04	4.451	24000.00	5392.38
82	22	0.05	4.451	28000.00	6290.98
95	26	0.05	4.451	32000.00	7189.10
108	29	0.06	4.451	36000.00	8087.24
121	35	0.07	4.452	40000.00	8984.72
136	41	0.08	4.453	42280.00	9495.68
				4000.00	
				8000.00	



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Compressive Strength of Intact Rock

ASTM D7012

DSA File #:
DSA Appl #:

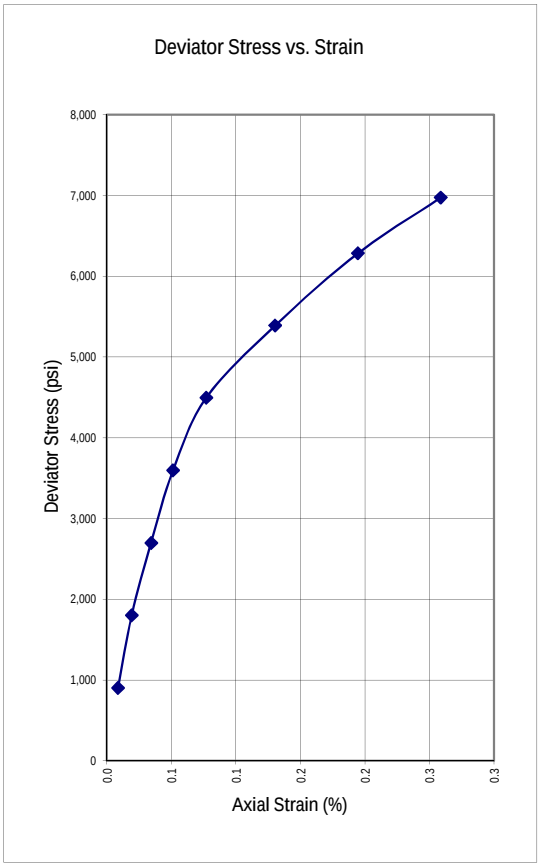
Project No.:	4438-01	Project Name:	NID Water Storage	Date:	9/12/2016
Sample No.:	CB-B3, 51.2-52.3	Boring/Trench No.:		Depth (ft.)		Tested By:	DCK
Soil Description:					Check By:	CRK
Sample Location:					Lab No.:	3

Sample Data		
Tare Number	I.D.	JT
Tare Weight	(gm)	219.60
Wet Core + Tare	(gm)	1053.50
Dry Core + Tare	(gm)	1038.70
Weight of Water	(gm)	14.80
Dry Weight	(gm)	819.10
Moisture Content	(%)	1.81
Core Height	(in)	4.680
Sample Diameter	(in)	2.380
Wet Unit Weight	(pcf)	152.44
Dry Unit Weight	(pcf)	149.74
Specific Gravity	(g/cc)	2.72
Saturation	(%)	36.82
Strain Rate	psi/second	42.76
compression machine	ID	15-08-029CT

Photo At Failure

Compressive Strength = 6,970.3 psi

Elapsed Time (Seconds)	Strain Units (0.0001in/unit)	Strain Percent (%)	Area (in^2)	Load lbs	Deviator Stress (psi)
5	4	0.01	4.449	4000.00	899.04
18	9	0.02	4.450	8000.00	1797.89
31	16	0.03	4.450	12000.00	2696.43
61	24	0.05	4.451	16000.00	3594.62
98	36	0.08	4.452	20000.00	4492.13
123	61	0.13	4.455	24000.00	5387.67
146	91	0.19	4.457	28000.00	6281.58
163	121	0 26	4.460	31090.00	6970.32



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Compressive Strength of Intact Rock

ASTM D7012

DSA File #:
DSA Appl #:

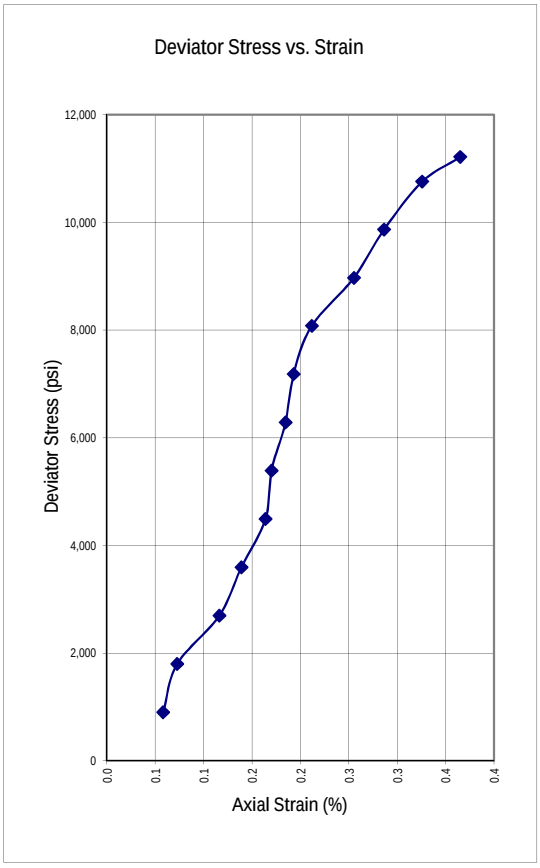
Project No.:	4438-01	Project Name:	NID Water Storage	Date:	9/12/2016
Sample No.:	CB-B4, 45.8-46.6	Boring/Trench No.:		Depth (ft.)		Tested By:	DCK
Soil Description:					Check By:	CRK
Sample Location:					Lab No.:	6

Sample Data		
Tare Number	I.D.	JK
Tare Weight	(gm)	311.56
Wet Core + Tare	(gm)	1135.25
Dry Core + Tare	(gm)	1129.54
Weight of Water	(gm)	5.71
Dry Weight	(gm)	817.98
Moisture Content	(%)	0.70
Core Height	(in)	4.820
Sample Diameter	(in)	2.380
Wet Unit Weight	(pcf)	146.20
Dry Unit Weight	(pcf)	145.19
Specific Gravity	(g/cc)	2.72
Saturation	(%)	11 24
Strain Rate	psi/second	52.88
compression machine	ID	15-08-029CT

Photo At Failure

Compressive Strength = 11,211.4 psi

Elapsed Time (Seconds)	Strain Units (0.0001in/unit)	Strain Percent (%)	Area (in^2)	Load lbs	Deviator Stress (psi)
14	28	0.06	4.451	4000.00	898.59
26	35	0.07	4.452	8000.00	1796.93
38	56	0.12	4.454	12000.00	2694.22
52	67	0.14	4.455	16000.00	3591.47
74	79	0.16	4.456	20000.00	4488.22
98	82	0.17	4.456	24000.00	5385.52
114	89	0.18	4.457	28000.00	6282.20
125	93	0.19	4.457	32000.00	7179.06
136	102	0 21	4.458	36000.00	8074.93
152	123	0 26	4.460	40000.00	8968.23
173	138	0 29	4.462	44000.00	9861.97
191	157	0 33	4.463	48000.00	10754.26
212	176	0 37	4.465	50060.00	11211.36



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Compressive Strength of Intact Rock

ASTM D7012

DSA File #:
DSA Appl #:

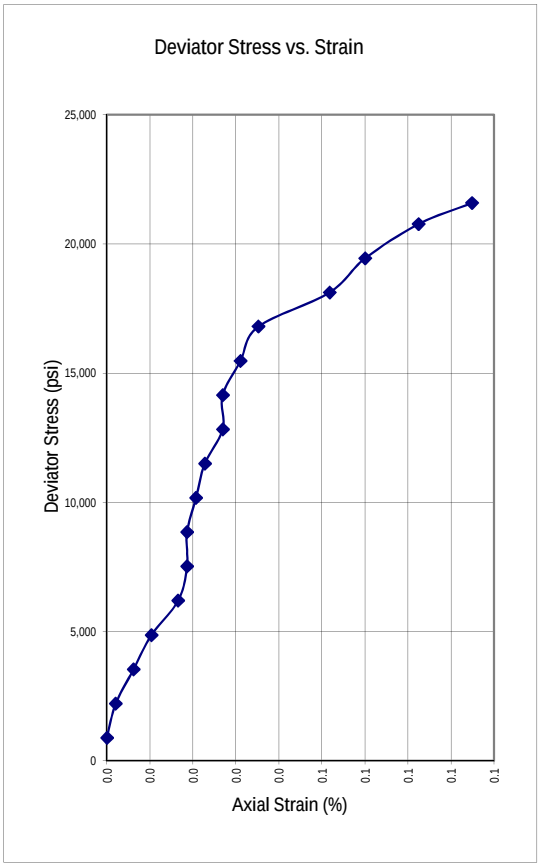
Project No.:	4438-01	Project Name:		Date:	9/12/2016
Sample No.:	CB-4-B4, 55.0-55.7	Boring/Trench No.:	Depth (ft.)	Tested By:	DCK
Soil Description:				Check By:	CRK
Sample Location:				Lab No.:	2

Sample Data		
Tare Number	I.D.	CJ
Tare Weight	(gm)	190.50
Wet Core + Tare	(gm)	1105.30
Dry Core + Tare	(gm)	1098 20
Weight of Water	(gm)	7.10
Dry Weight	(gm)	907.70
Moisture Content	(%)	0.78
Core Height	(in)	4.830
Sample Diameter	(in)	2.400
Wet Unit Weight	(pcf)	159.35
Dry Unit Weight	(pcf)	158.11
Specific Gravity	(g/cc)	2.72
Saturation	(%)	28 96
Strain Rate	psi/second	72.42
compression machine	ID	15-08-029CT

Photo At Failure

Compressive Strength = 21,582.5 psi

Elapsed Time (Seconds)	Strain Units (0.0001in/unit)	Strain Percent (%)	Area (in^2)	Load lbs	Deviator Stress (psi)
3	1	0.00	4.524	4000.00	884.19
8	1	0.00	4.524	10000.00	2210.44
19	3	0.01	4.524	16000.00	3536.56
29	5	0.01	4.524	22000.00	4862.56
42	8	0.02	4.525	28000.00	6188.33
61	9	0.02	4.525	34000.00	7514.25
82	9	0.02	4.525	40000.00	8840.29
96	10	0.02	4.525	46000.00	10166.13
112	11	0.02	4.525	52000.00	11491.91
135	13	0.03	4.525	58000.00	12817.36
142	13	0.03	4.525	64000.00	14143.30
168	15	0.03	4.525	70000.00	15468.59
171	17	0.04	4.525	76000.00	16793.78
191	25	0.05	4.526	82000.00	18116.60
239	29	0.06	4.527	88000.00	19440.59
256	35	0.07	4.527	94000.00	20763.51
298	41	0.08	4.528	97720.00	21582.53



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Compressive Strength of Intact Rock

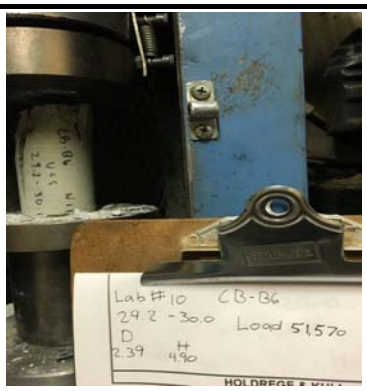
ASTM D7012

DSA File #:
DSA Appl #:

Project No.:	4438-01	Project Name:	NID Water Storage	Date:	9/12/2016
Sample No.:	CB-B6, 29.2-30.0	Boring/Trench No.:		Depth (ft.)		Tested By:	DCK
Soil Description:					Check By:	CRK
Note:	Strain was not acurate, so strain rate and estimated final strain is shown.				Lab No.:	10

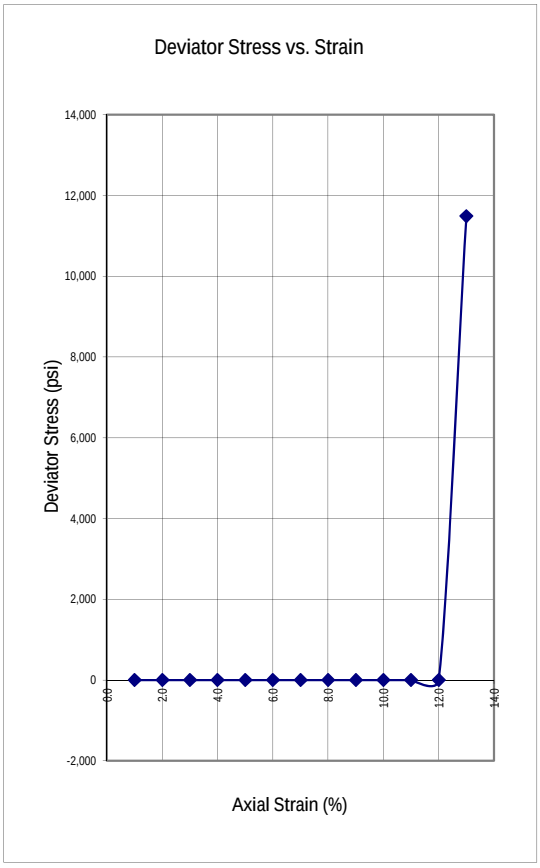
Sample Data		
Tare Number	I.D.	BA
Tare Weight	(gm)	320.80
Wet Core + Tare	(gm)	1137.23
Dry Core + Tare	(gm)	1101.35
Weight of Water	(gm)	35.88
Dry Weight	(gm)	780.55
Moisture Content	(%)	4.60
Core Height	(in)	4.900
Sample Diameter	(in)	2.390
Wet Unit Weight	(pcf)	141.36
Dry Unit Weight	(pcf)	135.15
Specific Gravity	(g/cc)	2.72
Saturation	(%)	48.86
Strain Rate	psi/second	54.17
compression machine	ID	15-08-029CT

Photo At Failure



Compressive Strength = 11,484.3 psi

Elapsed Time (Seconds)	Strain Units (0.0001in/unit)	Strain Percent (%)	Area (in^2)	Load lbs	Deviator Stress (psi)
				4000.00	
				8000.00	
				12000.00	
				16000.00	
				20000.00	
				24000.00	
				28000.00	
				32000.00	
				36000.00	
				40000.00	
				44000.00	
				48000.00	
212	46	0.09	4.490	51570.00	11484.27



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Compressive Strength of Intact Rock

ASTM D7012

DSA File #:
DSA Appl #:

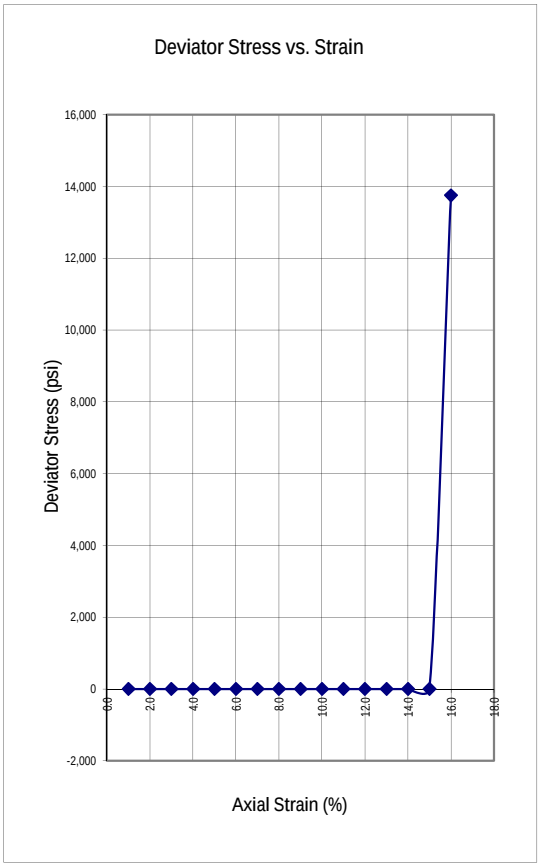
Project No.:	4438-01	Project Name:	NID Water Storage	Date:	9/12/2016
Sample No.:	CB-B6, 48.6-49.4	Boring/Trench No.:		Depth (ft.)		Tested By:	DCK
Soil Description:					Check By:	CRK
Note:	Strain was not acurate, so strain rate and estimated final strain is shown.				Lab No.:	9

Sample Data		
Tare Number	I.D.	KLM
Tare Weight	(gm)	253.11
Wet Core + Tare	(gm)	1104.60
Dry Core + Tare	(gm)	1101.23
Weight of Water	(gm)	3.37
Dry Weight	(gm)	848.12
Moisture Content	(%)	0.40
Core Height	(in)	4.820
Sample Diameter	(in)	2.390
Wet Unit Weight	(pcf)	149.88
Dry Unit Weight	(pcf)	149.28
Specific Gravity	(g/cc)	2.72
Saturation	(%)	7.89
Strain Rate	psi/second	53.69
compression machine	ID	15-08-029CT

Photo At Failure

Compressive Strength = 13,745.2 psi

Elapsed Time (Seconds)	Strain Units (0.0001in/unit)	Strain Percent (%)	Area (in^2)	Load lbs	Deviator Stress (psi)
				4000.00	
				8000.00	
				12000.00	
				16000.00	
				20000.00	
				24000.00	
				28000.00	
				32000.00	
				36000.00	
				40000.00	
				44000.00	
				48000.00	
				52000.00	
				56000.00	
				60000.00	
256	43	0.0892116	4.490	61720.00	13745.25



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Compressive Strength of Intact Rock

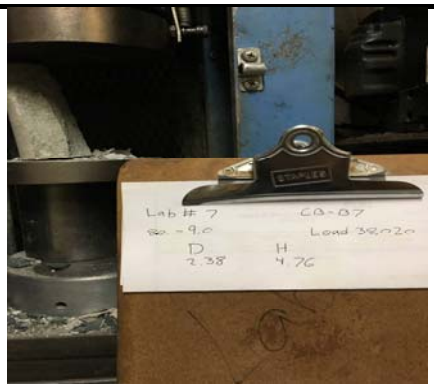
ASTM D7012

DSA File #:
DSA Appl #:

Project No.:	4438-01	Project Name:	NID Water Storage	Date:	9/12/2016
Sample No.:	CB-B7, 8.0-9.0	Boring/Trench No.:		Depth (ft.)		Tested By:	DCK
Soil Description:					Check By:	CRK
Sample Location:					Lab No.:	7

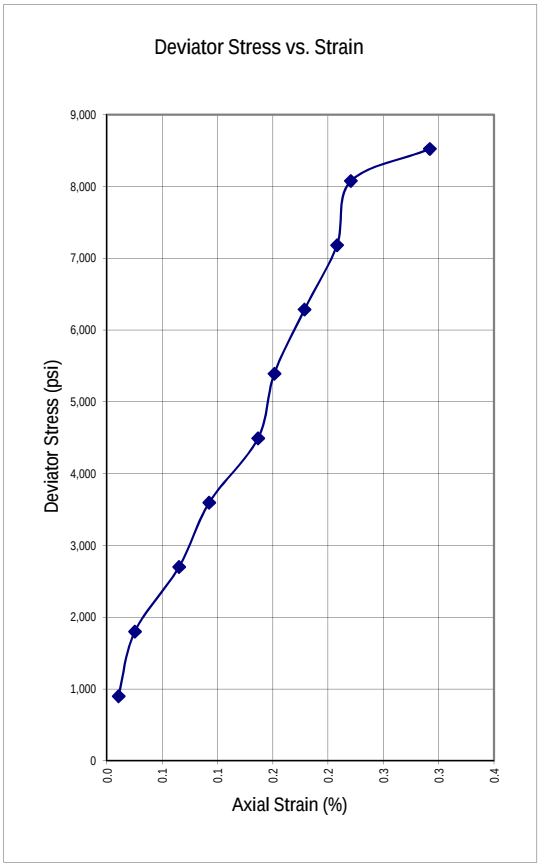
Sample Data		
Tare Number	I.D.	KLM
Tare Weight	(gm)	253.11
Wet Core + Tare	(gm)	1036.85
Dry Core + Tare	(gm)	1025.23
Weight of Water	(gm)	11.62
Dry Weight	(gm)	772.12
Moisture Content	(%)	1.50
Core Height	(in)	4.760
Sample Diameter	(in)	2.380
Wet Unit Weight	(pcf)	140.87
Dry Unit Weight	(pcf)	138.78
Specific Gravity	(g/cc)	2.72
Saturation	(%)	18 35
Strain Rate	psi/second	38 56
compression machine	ID	15-08-029CT

Photo At Failure



Compressive Strength = 8,521.2 psi

Elapsed Time (Seconds)	Strain Units (0.0001in/unit)	Strain Percent (%)	Area (in^2)	Load lbs	Deviator Stress (psi)
20	5	0.01	4.449	4000.00	899.02
34	12	0.03	4.450	8000.00	1797.78
57	31	0.07	4.452	12000.00	2695.59
79	44	0.09	4.453	16000.00	3593.14
96	65	0.14	4.455	20000.00	4489.45
121	72	0.15	4.456	24000.00	5386.54
156	85	0.18	4.457	28000.00	6282.58
167	99	0 21	4.458	32000.00	7177.98
198	105	0 22	4.459	36000.00	8074.20
221	139	0 29	4.462	38020.00	8521.15



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Compressive Strength of Intact Rock

ASTM D7012

DSA File #:
DSA Appl #:

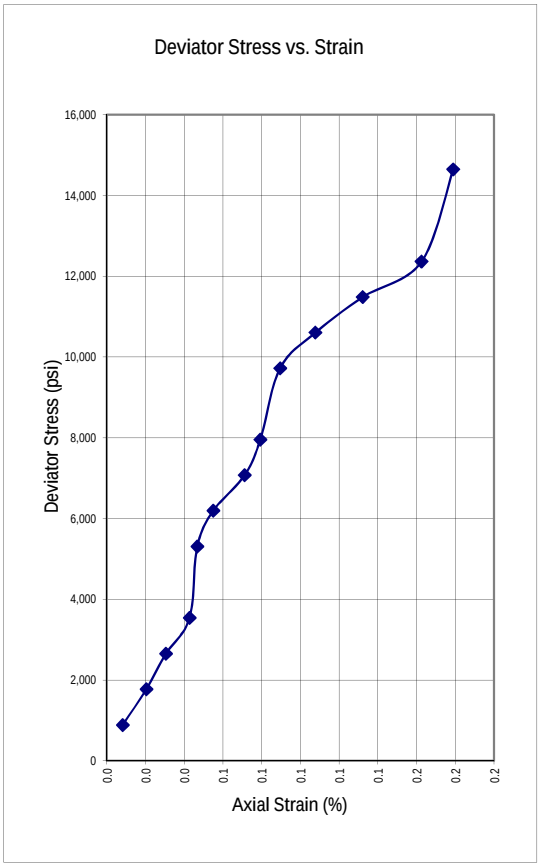
Project No.:	4438-01	Project Name:	NID Water Storage	Date:	9/12/2016
Sample No.:	CB-B7, 19.5-20.2	Boring/Trench No.:		Depth (ft.)		Tested By:	DCK
Soil Description:					Check By:	CRK
Sample Location:					Lab No.:	8

Sample Data		
Tare Number	I.D.	E
Tare Weight	(gm)	322.80
Wet Core + Tare	(gm)	1227.31
Dry Core + Tare	(gm)	1215.12
Weight of Water	(gm)	12.19
Dry Weight	(gm)	892.32
Moisture Content	(%)	1.37
Core Height	(in)	4.920
Sample Diameter	(in)	2.400
Wet Unit Weight	(pcf)	154.68
Dry Unit Weight	(pcf)	152.59
Specific Gravity	(g/cc)	2.72
Saturation	(%)	33.09
Strain Rate	psi/second	43.44
compression machine	ID	15-08-029CT

Photo At Failure

Compressive Strength = 14,638.1 psi

Elapsed Time (Seconds)	Strain Units (0.0001in/unit)	Strain Percent (%)	Area (in^2)	Load lbs	Deviator Stress (psi)
34	4	0.01	4.524	4000.00	884.12
66	10	0.02	4.525	8000.00	1768.03
89	15	0.03	4.525	12000.00	2651.77
116	21	0.04	4.526	16000.00	3535.27
132	23	0.05	4.526	24000.00	5302.68
155	27	0.05	4.526	28000.00	6185.96
179	35	0.07	4.527	32000.00	7068.52
205	39	0.08	4.527	36000.00	7951.44
223	44	0.09	4.528	44000.00	9717.44
251	53	0.11	4.529	48000.00	10598.90
276	65	0.13	4.530	52000.00	11479.34
325	80	0.16	4.531	56000.00	12358.59
337	88	0.18	4.532	66340.00	14638.13



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Compressive Strength of Intact Rock

ASTM D7012

DSA File #:
DSA Appl #:

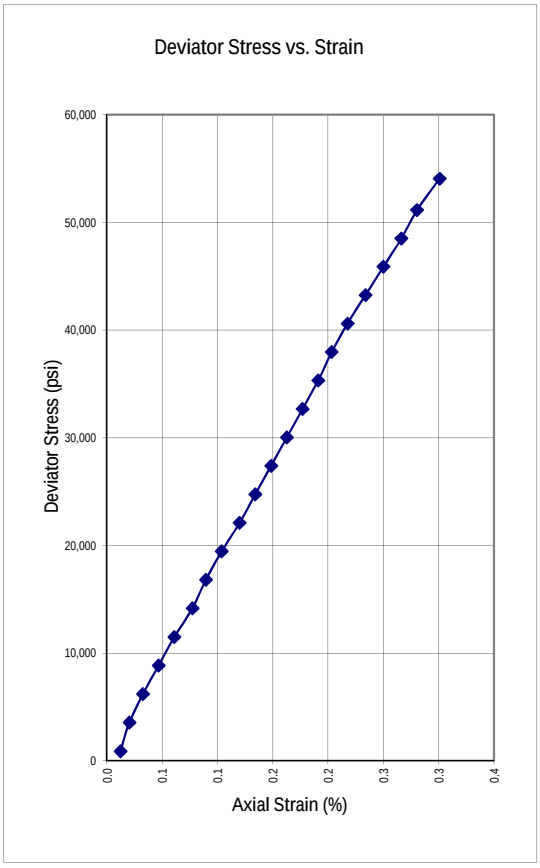
Project No.:	4438-01	Project Name:	NID Water Storage	Date:	9/12/2016
Sample No.:	CB-B8, 59.5-60.4	Boring/Trench No.:		Depth (ft.)		Tested By:	DCK
Soil Description:					Check By:	CRK
Note:	Sample exceeded 55,000 PSI, maximum of compression machine				Lab No.:	11

Sample Data		
Tare Number	I.D.	E
Tare Weight	(gm)	322.80
Wet Core + Tare	(gm)	1112.80
Dry Core + Tare	(gm)	1102.40
Weight of Water	(gm)	10.40
Dry Weight	(gm)	779.60
Moisture Content	(%)	1.33
Core Height	(in)	4.920
Sample Diameter	(in)	2.400
Wet Unit Weight	(pcf)	135.09
Dry Unit Weight	(pcf)	133.32
Specific Gravity	(g/cc)	2.72
Saturation	(%)	13 29
Strain Rate	psi/second	44.64
compression machine	ID	15-08-029CT

Photo At Failure

Compressive Strength = 54,053.5 psi

Elapsed Time (Seconds)	Strain Units (0.0001in/unit)	Strain Percent (%)	Area (in^2)	Load lbs	Deviator Stress (psi)
32	6	0.01	4.524	4000.00	884.09
63	10	0.02	4.525	16000.00	3536.06
88	16	0.03	4.525	28000.00	6187.35
198	23	0.05	4.526	40000.00	8837.81
154	30	0.06	4.527	52000.00	11487.51
196	38	0.08	4.527	64000.00	14136.18
240	44	0.09	4.528	76000.00	16784.66
258	51	0.10	4.529	88000.00	19432.11
300	59	0.12	4.529	100000.00	22078.35
317	66	0.13	4.530	112000.00	24724.22
356	73	0.15	4.531	124000.00	27369.35
375	80	0.16	4.531	136000.00	30013.72
459	87	0.18	4.532	148000.00	32657.33
491	94	0.19	4.533	160000.00	35300.19
508	100	0 203252	4.533	172000.00	37943.07
550	107	0 2174797	4.534	184000.00	40584.47
568	115	0 2337398	4.534	196000.00	43224.24
610	123	0 25	4.535	208000.00	45863.15
630	131	0 2662602	4.536	220000.00	48501.19
670	138	0 2804878	4.537	232000.00	51139.42
720	148	0 300813	4.538	245270.00	54053.48



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Compressive Strength of Intact Rock

ASTM D7012

DSA File #:
DSA Appl #:

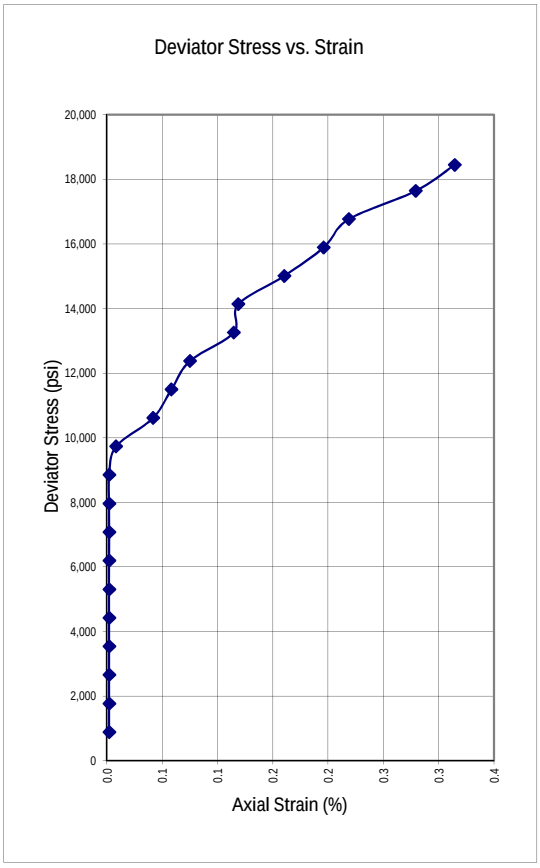
Project No.:	4438-01	Project Name:	NID Water Storage	Date:	9/13/2016
Sample No.:	CB-B8, 66.3-67.0	Boring/Trench No.:		Depth (ft.)		Tested By:	DCK
Soil Description:					Check By:	CRK
Sample Location:					Lab No.:	21

Sample Data		
Tare Number	I.D.	BK
Tare Weight	(gm)	319.10
Wet Core + Tare	(gm)	1231.30
Dry Core + Tare	(gm)	1222.90
Weight of Water	(gm)	8.40
Dry Weight	(gm)	903.80
Moisture Content	(%)	0.93
Core Height	(in)	4.800
Sample Diameter	(in)	2.400
Wet Unit Weight	(pcf)	159.89
Dry Unit Weight	(pcf)	158.42
Specific Gravity	(g/cc)	2.72
Saturation	(%)	35.41
Strain Rate	psi/second	74.67
compression machine	ID	15-08-029CT

Photo At Failure

Compressive Strength = 18,443.6 psi

Elapsed Time (Seconds)	Strain Units (0.0001in/unit)	Strain Percent (%)	Area (in^2)	Load lbs	Deviator Stress (psi)
6	1	0.00	4.524	4000.00	884.18
9	1	0.00	4.524	8000.00	1768.35
21	1	0.00	4.524	12000.00	2652.53
34	1	0.00	4.524	16000.00	3536.70
40	1	0.00	4.524	20000.00	4420.88
50	1	0.00	4.524	24000.00	5305.05
58	1	0.00	4.524	28000.00	6189.23
68	1	0.00	4.524	32000.00	7073.41
79	1	0.00	4.524	36000.00	7957.58
88	1	0.00	4.524	40000.00	8841.76
102	4	0.01	4.524	44000.00	9725.32
117	20	0.04	4.526	48000.00	10605.91
135	28	0.06	4.527	52000.00	11487.82
151	36	0.08	4.527	56000.00	12369.43
168	55	0.1145833	4.529	60000.00	13247.71
192	57	0.11875	4.529	64000.00	14130.31
207	77	0.1604167	4.531	68000.00	15007.19
217	94	0.1958333	4.533	72000.00	15884.33
224	105	0.21875	4.534	76000.00	16762.94
236	134	0 2791667	4.537	80000.00	17634.52
247	151	0 3145833	4.538	83700.00	18443.56
				4000.00	



Appendix I.
Point Load Test Data

Appendix I.
Point Load Test Data

Appendix I-1
Point Load Index Test Data – Dam Site

Appendix I-1
Point Load Index Test Data – Dam Site

Point Load Index Summary Table

Boring Number	Depth Interval		Rock Type[1]	Diameter (D)		Distance Between Contact Points (in)	Distance Between Contact Points (cm)	Length - Contact Points to End of Sample, L (in)	L/D[2]	Test Type[3]	Failure Load, P (kN)[4]	Uncorrected Point Load, I_S (Mpa)[5]	Size Correction Factor, F[6]	Point Load, $I_{S(50)}$ (MPa)[7]	Uniaxial Compressive Strength, s_c (Mpa)[8]	Uniaxial Compressive Strength, psi	Weathering
	Top	Bottom		(mm)	(in)												
CB-01	109.7	110.1	Basalt	60.00	2.38	2.36	6.00	1.00	0.42	d	4.92	1.37	1.09	1.48	33	4856	Mod Wx
CB-01	124.4	124.8	Basalt	60.00	2.39	2.36	6.00	1.25	0.53	d	2.17	0.60	1.09	0.65	15	2142	Sl–Mod Wx
CB-01	135.5	136.1	Basalt	60.00	2.39	2.36	6.00	1.00	0.42	d	19.74	5.48	1.09	5.95	134	19485	Sl Wx
CB-01	160.0	160.7	Basalt	60.00	2.39	2.36	6.00	2.25	0.95	d	24.83	6.90	1.09	7.49	169	24509	Fr
CB-02	17.0	17.8	Basalt	61.00	2.39	2.40	6.10	4.00	1.67	d	22.01	5.92	1.09	6.47	145	21019	Sl Wx
CB-02	32.5	33.1	Basalt	61.00	2.39	2.40	6.10	3.00	1.25	d	33.69	9.05	1.09	9.90	222	32173	Fr
CB-02	46.3	47.0	Basalt	61.00	2.38	2.40	6.10	3.00	1.25	d	25.89	6.96	1.09	7.61	170	24724	Fr
CB-03	38.1	38.4	Basalt	60.00	2.31	2.36	6.00	2.00	0.85	d	36.95	10.26	1.09	11.14	251	36472	Sl Wx
CB-03	68.7	69.2	Basalt	56.00	2.38	2.20	5.60	7.55	3.42	d	13.77	4.39	1.05	4.62	108	15603	Mod Wx
CB-03	100.1	100.6	Basalt	60.00	2.31	2.36	6.00	3.25	1.38	d	32.22	8.95	1.09	9.72	219	31803	Sl Wx
CB-03	121.7	122.1	Basalt	60.00	2.38	2.36	6.00	1.58	0.67	d	17.16	4.77	1.09	5.17	117	16938	Mod Wx
CB-03	123.3	123.9	Basalt	60.00	2.33	2.36	6.00	2.31	0.98	d	8.27	2.30	1.09	2.49	56	8163	Sl–Mod Wx
CB-03	160.4	161.0	Basalt	60.00	2.38	2.36	6.00	3.25	1.38	d	20.29	5.64	1.09	6.12	138	20027	Sl Wx
CB-04	12.3	12.7	Basalt	54.00	2.00	2.13	5.40	2.56	1.20	d	3.95	1.35	1.04	1.40	33	4813	Mod Wx
CB-04	16.0	16.6	Basalt	60.00	2.25	2.36	6.00	3.50	1.48	d	39.45	10.96	1.09	11.90	268	38940	Sl Wx
CB-04	28.0	28.3	Basalt	60.00	2.38	2.36	6.00	2.00	0.85	d	14.56	4.04	1.09	4.39	99	14372	Sl Wx
CB-04	37.6	38.0	Basalt	60.00	2.31	2.36	6.00	2.19	0.93	d	31.75	8.82	1.09	9.57	216	31339	Sl Wx
CB-04	70.5	70.9	Basalt	59.00	2.38	2.32	5.90	2.50	1.08	d	2.39	0.69	1.08	0.74	17	2440	Mod Wx
CB-04	80.5	81.1	Basalt	60.00	2.38	2.36	6.00	5.40	2.29	d	2.14	0.59	1.09	0.65	15	2112	Mod Wx
CB-04	80.9	81.3	Basalt	59.00	2.38	2.32	5.90	2.75	1.18	d	3.72	1.07	1.08	1.15	26	3797	Mod Wx
CB-04	83.0	83.6	Basalt	60.00	2.50	2.36	6.00	3.63	1.53	d	2.02	0.56	1.09	0.61	14	1994	Mod Wx
CB-04	95.1	95.5	Basalt	60.00	2.30	2.36	6.00	2.49	1.05	d	2.14	0.59	1.09	0.65	15	2112	Mod Wx
CB-04	124.1	124.7	Basalt	60.00	2.38	2.36	6.00	3.38	1.43	d	40.30	11.19	1.09	12.15	274	39779	Sl Wx

Notes:

[1] Based on Drill Logs

[2] ASTM D5731 calls for L/D > 0.5 for diametral test.

[3] d = diametral, a = axial, b = block, ir = irregular lump

Reading from testing apparatus

[5] $I_S = P/D^2$ (ASTM D5731 - for diametral test)

[6] $F = (D/50)^{0.5}$ (ASTM D5731 - for diametral test)

[7] $I_{S(50)} = I_S \times F$ (ASTM D5731)

[8] $s_c = I_S \times K$; I_s is uncorrected point load index; K=24.5 for ~60 mm diameter cores (ASTM D5731)

[9] Tests conducted on site at Nevada Irrigation District on November 18th and 23rd, 2015

POINT LOAD INDEX SUMMARY TABLE

Test Number	Test Order	Depth of Test	Boring Number	Date	Depth Interval		Rock Type[1]	Diameter (D)		Distance Between Contact Points (cm)	Distance Between Contact Points (in)	Length - Contact Points to End of Sample, L (in)	L/D[2]	Test Type[3]	Failure Load, P (kN)[4]	Uncorrected Point Load, I_S (Mpa)[5]	Size Correction Factor, F[6]	Point Load, $I_{S(50)}$ (MPa)[7]	Uniaxial Compressive Strength, s_c (Mpa)[8]	Uniaxial Compressive Strength, psi	Weathering	Notes
					Bottom	Top		(mm)	(in)													
CB10-1-26.1	1	26.1	CB-10	8/10/2016	25.9	26.3	Basalt	60.45	2.38	6.00	2.36	2.8	1.18	d	0.7	0.19	1.09	0.21	5	681	HW	
CB10-2-48.3	2	48.3	CB-10	8/10/2016	48.0	48.6	Basalt	58.67	2.31	6.00	2.36	1.7	0.74	d	NA		1.07				MW	Broke on preexisting plane; no load measured
CB10-3-35.8	3	35.8	CB-10	8/10/2016	35.7	36.0	Basalt	60.45	2.38	6.00	2.36	1.7	0.71	d	0.99	0.27	1.09	0.30	7	963	MW	
CB10-4-57.5	4	57.5	CB-10	8/10/2016	57.2	57.7	Basalt	60.45	2.38	6.00	2.36	2.5	1.05	d	15.26	4.18	1.09	4.55	102	14838	SW	Broke surficially
CB11-5-28.7	5	28.7	CB-11	8/10/2016	28.5	28.9	Basalt	60.45	2.38	6.00	2.36	2.0	0.84	d	18.23	4.99	1.09	5.43	122	17726	SW	Broke surficially on top and bottom
CB11-6-54.2	6	54.2	CB-11	8/10/2016	54.0	54.4	Basalt	60.45	2.38	6.00	2.36	2.2	0.92	d	22.13	6.06	1.09	6.60	148	21518	SW	Broke surficially on top
CB11-7-61.1	7	61.1	CB-11	8/10/2016	61.0	61.2	Basalt	60.45	2.38	6.00	2.36	1.4	0.59	d	2.24	0.61	1.09	0.67	15	2178	MW	Uneven surface
CB12-8-36.2	8	36.2	CB-12	8/10/2016	35.9	36.4	Basalt	60.71	2.39	6.00	2.36	2.7	1.13	d	23.4	6.35	1.09	6.93	156	22563	SW	Broke surficially on top and bottom
CB12-9-49.6	9	49.6	CB-12	8/10/2016	49.5	49.7	Breccia	60.45	2.38	6.00	2.36	1.4	0.59	d	16.79	4.59	1.09	5.00	113	16326	SW	Broke quasi surficially
CB13-19-54.3	19	54.3	CB-13	8/10/2016	54.0	54.5	Basalt	60.45	2.38	6.00	2.36	2.8	1.18	d	33.5	9.17	1.09	9.98	225	32574	SW	
CB13-20-81.5	20	81.5	CB-13	8/10/2016	81.3	81.6	Basalt	60.45	2.38	6.00	2.36	1.7	0.71	d	27.3	7.47	1.09	8.14	183	26545	SW	Broke surficially then loaded to 27.3 kN
CB13-21-87.2	21	87.2	CB-13	8/10/2016	86.9	87.5	Basalt	60.45	2.38	6.00	2.36	3.3	1.39	d	9	2.46	1.09	2.68	60	8751	SW	Broke on preexisting fracture
CB13-22-90.2	22	90.2	CB-13	8/10/2016	89.9	90.5	Basalt	60.45	2.38	6.00	2.36	2.6	1.09	d	24.28	6.64	1.09	7.24	163	23609	SW	Broke on preexisting fracture
CB13-23-114.5	23	114.5	CB-13	8/10/2016	114.2	114.8	Basalt	60.45	2.38	6.00	2.36	2.9	1.22	d	26.31	7.20	1.09	7.84	176	25583	SW	
CB14-24-62.7	24	62.7	CB-14	8/10/2016	62.4	63.0	Basalt	60.45	2.38	6.00	2.36	2.2	0.92	d	17.24	4.72	1.09	5.14	116	16763	SW	Broke surficially; L possibly too small due to inclined ends of sample
CB15-10-12.7	10	12.7	CB-15	8/10/2016	12.5	13.0	Basalt	60.20	2.37	6.00	2.36	2.9	1.22	d	17.09	4.72	1.09	5.13	116	16758	SW	Broke surficially
CB15-11-21.1	11	21.1	CB-15	8/10/2016	20.9	21.2	Basalt	60.20	2.37	6.00	2.36	1.2	0.51	d	18.36	5.07	1.09	5.51	124	18003	SW	Broke through short end; L possibly too small
CB15-12-25.3	12	25.3	CB-15	8/10/2016	24.9	25.5	Basalt	60.45	2.38	6.00	2.36	2.2	0.92	d	16.36	4.48	1.09	4.88	110	15908	SW	Broke surficially
CB15-13-28.3	13	28.3	CB-15	8/10/2016	28.0	28.6	Basalt	60.45	2.38	6.00	2.36	3.5	1.47	d	21.74	5.95	1.09	6.48	146	21139	SW	Broke surficially
CB15-14-43.8	14	43.8	CB-15	8/10/2016	43.6	44.0	Basalt	60.45	2.38	6.00	2.36	1.8	0.76	d	23.49	6.43	1.09	7.00	157	22841	SW	Broke surficially @ 18.69 kN continued loading till sample broke @ 23.49 kN
CB17-15-16.5	15	16.5	CB-17	8/10/2016	16.2	16.7	Basalt	60.45	2.38	6.00	2.36	2.3	0.97	d	25.04	6.85	1.09	7.46	168	24348	SW	Broke surficially @ 16.67 kN continued loading till sample broke @ 25.04 kN
CB18-25-10.6	25	10.6	CB-18	8/11/2016	10.3	10.8	Basalt	60.20	2.37	6.00	2.36	2.3	0.97	d	11.57	3.19	1.09	3.47	78	11345	SW	Broke on preexisting fracture
CB18-26-33.7	26	33.7	CB-18	8/11/2016	33.4	34.1	Basalt	60.45	2.38	6.00	2.36	3.5	1.47	d	17.19	4.70	1.09	5.12	115	16715	SW	Broke Surficially
CB19-16-20.9	16	20.9	CB-19	8/10/2016	20.5	21.2	Basalt	60.45	2.38	6.00	2.36	3.7	1.55	d	14.19	3.88	1.09	4.23	95	13798	SW	Broke surficially @ 14.19 kN continued loading till sample broke @ 14.19 kN on preexisting plane
CB19-17-26.5	17	26.5	CB-19	8/10/2016	26.3	26.8	Basalt	60.45	2.38	6.00	2.36	2.6	1.09	d	20.66	5.65	1.09	6.16	139	20089	SW	Broke surficially
CB19-18-42.4	18	42.4	CB-19	8/10/2016	42.0	42.7	Basalt	60.45	2.38	6.00	2.36	4.3	1.81	d	21.67	5.93	1.09	6.46	145	21071	SW	Broke surficially

Notes:

[1] Based on Drill Logs

[2] ASTM D5731 calls for L/D > 0.5 for diametral test.

[3] d = diametral, a = axial, b = block, ir = irregular lump

[4] Reading from testing apparatus

[5] $I_S = P/D^2$ (ASTM D5731 - for diametral test)

[6] $F = (D/50)^{0.45}$ (ASTM D5731 - for diametral test)

[7] $I_{S(50)} = I_S \times F$ (ASTM D5731)

[8] $s_c = I_S \times K$; I_s is uncorrected point load index; K=24.5 for ~60 mm diameter cores (ASTM D5731)

F	Fresh
SW	Slightly Weathered
MW	Moderately Weathered
HW	Highly Weathered
CW	Completely Weathered

Appendix I-2
Point Load Index Test Data – Rock Borrow Areas

Appendix I-2
Point Load Index Test Data – Rock Borrow Areas

ADSRP
26818793.020055

POINT LOAD TEST RESULTS
OW Borings

Test Number	Test Order	Depth of Test	Boring Number	Date	Depth Interval		Rock Type[1]	Diameter (D)		Distance Between Contact Points (cm)	Distance Between Contact Points (in)	Length - Contact Points to End of Sample, L (in)	L/D[2]	Test Type[3]	Failure Load, P (kN)[4]	Uncorrected Point Load, I_S (Mpa)[5]	Size Correction Factor, F[6]	Point Load, $I_{S(50)}$ (MPa)[7]	Uniaxial Compressive Strength, s_c (Mpa)[8]	Uniaxial Compressive Strength, psi	Weathering	Notes
					Bottom	Top		(mm)	(in)													
CBB1-27-38.6	27	38.6	CB-B1	8/11/2016	38.5	38 8	Basalt	60.45	2.38	6 00	2 36	1.4	0.59	d	18 05	4 94	1.09	5.38	121	17551	MW	
CBB3-28-34.7	28	34.7	CB-B3	8/11/2016	34.5	34 9	Basalt	60.45	2.38	6 00	2 36	2.3	0.97	d	25 51	6 98	1.09	7.60	171	24805	SW-MW	Broke surficially
CBB3-29-45.2	29	45.2	CB-B3	8/11/2016	45.0	45 3	Basalt	60.45	2.38	6 00	2 36	1.6	0.67	d	20 23	5 54	1.09	6.03	136	19671	SW	Broke along fabric
CbB6-30-42.3	30	42.3	Cb-B6	8/11/2016	42.0	42 6	Basalt	60.45	2.38	6 00	2 36	2.5	1.05	d	23.6	6.46	1.09	7.03	158	22948	SW	Broke surficially @ 19.36 kN continued loading till sample broke surficially @ 23 6 kN
CBB7-31-3 2	31	3.2	CB-B7	8/11/2016	3.0	3.5	Basalt	60.45	2.38	6 00	2 36	2.1	0.88	d	10 98	3 00	1.09	3.27	74	10676	SW	Broke surficially
CBB8-32-51.3	32	51.3	CB-B8	8/11/2016	51.0	51 6	Basalt	60.45	2.38	6 00	2 36	2.4	1.01	d	27 34	7.48	1.09	8.15	183	26584	SW	

Notes:

[1] Based on Drill Logs

[2] ASTM D5731 calls for L/D > 0 5 for diametral test.

[3] d = diametral, a = axial, b = block, ir = irregular lump

[4] Reading from testing apparatus

[5] $I_S = P/D^2$ (ASTM D5731 - for diametral test)

[6] $F = (D/50)^{0.45}$ (ASTM D5731 - for diametral test)

[7] $I_{S(50)} = I_S \times F$ (ASTM D5731)

[8] $s_c = I_S \times K$; I_s is uncorrected point load index; K=24 5 for ~60 mm diameter cores (ASTM D5731)

F	Fresh
SW	Slightly Weathered
MW	Moderately Weathered
HW	Highly Weathered
CW	Completely Weathered

Appendix J.
Durability Test Data – Rock Borrow Areas

Appendix J.
Durability Test Data – Rock Borrow Areas

Pavement Engineering Inc.
Redding • San Luis Obispo
Caltrans® / AMRL / QC • QA

SOUNDNESS OF AGGREGATE BY SODIUM SULFATE

AASHTO C 88

Project No.: 160023-02
Project Name: 2016 Laboratory Testing
Client: Holdrege & Kull - Nevada City
Lab No.: L162206
Sampled By / Date: Client
Tested By / Date: N. Trease / 9-8-2016
Material: 1-1/2" Processed Core Samples - North

H&K Project Name:
H&K Project No.: 4438-01

	CYCLES				
Time	1	2	3	4	5
In	20:00	19:00	20:00	18:00	16:00
out	13:00	13:00	14:00	11:00	9:00

LOSS GRADATION

Sieve Size U.S.	Sieve Size Metric	Starting Mass	Mass Retained After Cycles	Percent Loss	Sieve Percent Of Sample
1 1/2" - 3/4"	37.5mm - 19mm	1502.1		4.4%	100%
5/16"	16 mm		1435.4		

Sodium Sulfate Soundness (% Loss) 4.4%

$$\text{Percent Loss} = \frac{W_0 - W_F}{W_0} \times 100$$

Craig Long

Craig W. Long
Laboratory Operations Manager

Pavement Engineering Inc.
Redding • San Luis Obispo
Caltrans® / AMRL / QC • QA

SOUNDNESS OF AGGREGATE BY SODIUM SULFATE

AASHTO C 88

Project No.: 160023-02
Project Name: 2016 Laboratory Testing
Client: Holdrege & Kull - Nevada City
Lab No.: L162206
Sampled By / Date: Client
Tested By / Date: N. Trease / 9-8-2016
Material: 1-1/2" Processed Core Samples - South

H&K Project Name:
H&K Project No.: 4438-01

	CYCLES				
Time	1	2	3	4	5
In	20:00	19:00	20:00	18:00	16:00
out	13:00	13:00	14:00	11:00	9:00

LOSS GRADATION

Sieve Size U.S.	Sieve Size Metric	Starting Mass	Mass Retained After Cycles	Percent Loss	Sieve Percent Of Sample
1 1/2" - 3/4"	37.5mm - 19mm	1501.8		1.7%	100%
5/16"	16 mm		1476.0		

Sodium Sulfate Soundness (% Loss) 1.7%

$$\text{Percent Loss} = \frac{W_0 - W_F}{W_0} \times 100$$

Craig Long

Craig W. Long
Laboratory Operations Manager

Pavement Engineering Inc.
Redding • San Luis Obispo
Caltrans® / AMRL / QC • QA

Abraison Resistance by the Los Angeles Rattler

ASTM C 131 / AASHTO T 96

Project No.: 160023-02
Project Name: 2016 Laboratory Testing
Client: Holdrege & Kull
Material: North Bedrock Cores
Lab No.: L162206

Date Sampled:
Sampled By: Client
Date Tested: 9-7-2016
Tested By: Z. Thompson
H&K Project No.: 4438-01
H&K Sample No.: 1 & 2

Grading	Number of Spheres	Mass of Charge, g
A	12	5000 ± 25
B	11	4584 ± 25
C	8	3330 ± 20
D	6	2500 ± 15

Sieve Size		Mass of Indicated Sizes, g			
		Grading			
Passing	Retained on	A	B	C	D
37.5 mm	25.0 mm	1250 ± 25			
25.0 mm	19.0 mm	1250 ± 25			
19.0 mm	12.5 mm	1250 ± 10	2500 ± 10		
12.5 mm	9.5 mm	1250 ± 10	2500 ± 10		
9.5 mm	6.3 mm			2500 ± 10	
6.3 mm	4.75 mm			2500 ± 10	
4.75 mm	2.36 mm				5000 ± 10
Total		5000 ± 10	5000 ± 10	5000 ± 10	5000 ± 10

After 100 Revolutions	
Beginning Weight	5001
#4 Sieve Retained	4497
#12 Sieve Retained	4726

After 500 Revolutions	
Beginning Weight	5001
#4 Sieve Retained	3469
#12 Sieve Retained	3999

Percent Loss$_{100}$: 5.5

Percent Loss$_{500}$: 20.0

Percent Loss = [(Mi - Mf) / Mi] × 100

Pavement Engineering Inc.
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Caltrans® / AMRL / QC • QA

Abraison Resistance by the Los Angeles Rattler

ASTM C 131 / AASHTO T 96

Project No.: 160023-02
Project Name: 2016 Laboratory Testing
Client: Holdrege & Kull
Material: South Bedrock Cores
Lab No.: L162206

Date Sampled:
Sampled By: Client
Date Tested: 9-7-2016
Tested By: Z. Thompson
H&K Project No.: 4438-01
H&K Sample No.: 1 & 2

Grading	Number of Spheres	Mass of Charge, g
A	12	5000 ± 25
B	11	4584 ± 25
C	8	3330 ± 20
D	6	2500 ± 15

Sieve Size		Mass of Indicated Sizes, g			
		Grading			
Passing	Retained on	A	B	C	D
37.5 mm	25.0 mm	1250 ± 25			
25.0 mm	19.0 mm	1250 ± 25			
19.0 mm	12.5 mm	1250 ± 10	2500 ± 10		
12.5 mm	9.5 mm	1250 ± 10	2500 ± 10		
9.5 mm	6.3 mm			2500 ± 10	
6.3 mm	4.75 mm			2500 ± 10	
4.75 mm	2.36 mm				5000 ± 10
Total		5000 ± 10	5000 ± 10	5000 ± 10	5000 ± 10

After 100 Revolutions	
Beginning Weight	4999
#4 Sieve Retained	4520
#12 Sieve Retained	4734

After 500 Revolutions	
Beginning Weight	4999
#4 Sieve Retained	3540
#12 Sieve Retained	4031

Percent Loss$_{100}$: 5.3

Percent Loss$_{500}$: 19.4

Percent Loss = [(Mi - Mf) / Mi] × 100

HOLDREGE & KULL
CONSULTING ENGINEERS • GEOLOGISTS

Summary Report

Project No.:	**4438-01**	Project Name:	**NID Water Storage Project**	Date:	**9/9/16**
Sample No.:	**North**	Boring/Trench:	**-**	Depth, ft.: **-**	Tested By: **MLH**
Description:	**NID Water Storage Project**				Checked By: **MLH**
Sample Location					Lab. No.: **15-16-423**

TEST		METHOD	RESULTS	SPECIFICATIONS
Sieve Analyses			Percent	
Sieve Size Designation:			Passing	
U.S. Standard	Millimeters			
3.0 inch	**75**		**-**	
2.5 inch	**63**		**-**	
2.0 inch	**50.0**		**-**	
1.5 inch	**37.5**		**-**	
1.0 Inch	**25.0**		**-**	
3/4 Inch	**19.0**		**-**	
1/2 Inch	**12.5**		**-**	
3/8 Inch	**9.5**	**CTM 202**	**-**	
#4	**4.75**		**-**	
#8	**2.36**		**-**	
#16	**1.18**		**-**	
#30	**0.600**		**-**	
#50	**0.300**		**-**	
#60	**0.250**		**-**	
#100	**0.150**		**-**	
#200	**0.075**		**-**	
Resistance Value		CTM 301	**-**	
Sand Equivalent		CTM 217	**-**	
Durability, fine		CTM 229	**-**	
Durability, course		CDOT-229	**-**	

ADDITIONAL INFORMATION / RESULTS

TEST	METHOD	RESULTS	SPECIFICATIONS	
			Operating Range	Contract Compliance
Unit Weight of Aggregate (pcf):	ASTM C-29	**-**		
Maximum Dry Density (pcf):	ASTM D-1557	**-**		
Optimum Moisture (%):	ASTM D-1557	**-**		
Clay Lumps & Friable Particles:	ASTM C-142	**-**		
Clay Lumps & Friable Particles:	ASTM C-142	**-**		
Cleanness of Course Aggregate	CTM 227	**-**		
Percent Crushed Particles (%):	CDOT-205	**-**		
Percent of Crushed Particles				
Bulk Specific Gravity of Fine Aggregate:	ASTM C-128	**-**		
Absorption (%):	ASTM C-127	**0.780**		
Coefficient of Uniformity (Cu):	ASTM D-2487	**-**		
Coefficient of Curvature (Cc):	ASTM D-2487	**-**		
Fineness Modulus (FM):	ASTM C-136	**-**		
Bulk specific gravity	ASTM C-127	**2.746**		
Bulk specific gravity SSD	ASTM C-127	**2.767**		
Apparent specific gravity	ASTM C-127	**2.806**		
Density	ASTM C-127	**171.32**		

HOLDREGE & KULL
CONSULTING ENGINEERS • GEOLOGISTS

Summary Report

Project No.:	**4438-01**	Project Name:	**NID Water Storage Project**	Date:	**9/9/16**
Sample No.:	**South**	Boring/Trench:	**-**	Depth, ft.: **-**	Tested By: **MLH**
Description:	**NID Water Storage Project**				Checked By: **MLH**
Sample Location:					Lab. No.: **15-16-423**

TEST		METHOD	RESULTS	SPECIFICATIONS
Sieve Analyses			Percent	
Sieve Size Designation:			Passing	
U.S. Standard	Millimeters			
3.0 inch	**75**		**-**	
2.5 inch	**63**		**-**	
2.0 inch	**50.0**		**-**	
1.5 inch	**37.5**		**-**	
1.0 Inch	**25.0**		**-**	
3/4 Inch	**19.0**		**-**	
1/2 Inch	**12.5**		**-**	
3/8 Inch	**9.5**	**CTM 202**	**-**	
#4	**4.75**		**-**	
#8	**2.36**		**-**	
#16	**1.18**		**-**	
#30	**0.600**		**-**	
#50	**0.300**		**-**	
#60	**0.250**		**-**	
#100	**0.150**		**-**	
#200	**0.075**		**-**	
Resistance Value		CTM 301	**-**	
Sand Equivalent		CTM 217	**-**	
Durability, fine		CTM 229	**-**	
Durability, course		CDOT-229	**-**	

ADDITIONAL INFORMATION / RESULTS

TEST	METHOD	RESULTS	SPECIFICATIONS	
			Operating Range	Contract Compliance
Unit Weight of Aggregate (pcf):	ASTM C-29	**-**		
Maximum Dry Density (pcf):	ASTM D-1557	**-**		
Optimum Moisture (%):	ASTM D-1557	**-**		
Clay Lumps & Friable Particles:	ASTM C-142	**-**		
Clay Lumps & Friable Particles:	ASTM C-142	**-**		
Cleanness of Course Aggregate	CTM 227	**-**		
Percent Crushed Particles (%):	CDOT-205	**-**		
Percent of Crushed Particles				
Bulk Specific Gravity of Fine Aggregate:	ASTM C-128	**-**		
Absorption (%):	ASTM C-127	**0.210**		
Coefficient of Uniformity (Cu):	ASTM D-2487	**-**		
Coefficient of Curvature (Cc):	ASTM D-2487	**-**		
Fineness Modulus (FM):	ASTM C-136	**-**		
Bulk specific gravity	ASTM C-127	**2.803**		
Bulk specific gravity SSD	ASTM C-127	**2.809**		
Apparent specific gravity	ASTM C-127	**2.819**		
Density	ASTM C-127	**174.89**		

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