15 May 2014
AMEC Project No. 13-517-00063
Revision No. 1

PRELIMINARY GEOTECHNICAL ENGINERING STUDY

ROADWAY SAMPLING AND TESTING
B.I.A. PROJECT N5001 (1) 1, 2 & 4, NEWCOMB TO TOADLENA
NAVAJO NATION, NEW MEXICO
ARCHITECT ENGINEERS IDIQ CONTRACT NO. A12PC0121

Submitted To:

Bureau of Indian Affairs Navajo Regional Office
Division of Acquisition
P. O. Box 2060
301 West Hill, Room 346
Gallup, New Mexico 87305-1060

Submitted By:

AMEC Environment & Infrastructure, Inc.
8519 Jefferson, NE
Albuquerque, New Mexico 87113

15 May 2014
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Bureau of Indian Affairs Navajo Regional Office
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P. O. Box 2060
301 West Hill, Room 346
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RE: PRELIMINARY GEOTECHNICAL ENGINEERING STUDY
ROADWAY SAMPLING AND TESTING
B.I.A. PROJECT N5001 (1) 1, 2 & 4
NEWCOMB TO TOADLENA, NAVAJO NATION, NEW MEXICO
ARCHITECT ENGINEERS IDIQ CONTRACT NO. A12PC00121

Attention: Ms. Ella M. Dempsey:

Our Geotechnical Engineering Study on the referenced project is enclosed. The report includes the results of exploratory drilling, laboratory analyses and recommended criteria for pavement design and related earthwork.

Should any questions arise concerning this report, we would be pleased to discuss them with you.

Respectfully submitted,

AMEC Environment & Infrastructure, Inc.

RALPH E. CROCKETT NEW MEXICO #10867 REGISTERED PROFESSIONAL ENGINEER

Ralph E. Crockett, P.E.
Senior Geotechnical Engineer

Reviewed by:

Lee J. Mitchell, P.E.
Senior Project Engineer

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TABLE OF CONTENTS

LIST OF TABLES

APPENDIX A

APPENDIX B

APPENDIX C

1.0 INTRODUCTION

This report is for a preliminary geotechnical engineering study made by this firm for the proposed improvements to Indian Route (N5001) from Newcomb to Toadlena, New Mexico. The objectives of the study will be to characterize and evaluate subsurface conditions at the proposed project alignment and to provide geotechnical data for pavement design and related earthwork.

2.0 PROJECT DESCRIPTION

We understand that the project consists of rebuilding approximately 20116.8 m (12.5 miles) of the existing N5001 roadway from Newcomb to Toadlena, New Mexico. The geotechnical/paving study is for determination of subgrade conditions for design of hot mix asphalt pavement sections.

Should final design details vary significantly from those outlined above, this firm should be notified for review and possible modification of recommendations.

3.0 INVESTIGATION

3.1 Subsurface Investigation

This subsurface investigation included the excavation of a total of ninety-nine (99) borings at approximate 201 meter (1/8-mile) intervals to depths of 1 meter (3.28 feet) below existing grade, or refusal on bedrock, utilizing a truck-mounted CME rotary drill rig equipped with 8 inch O.D. hollow stem auger. During the field study, soils encountered were continuously examined, visually classified, and logged. Results of the field study are presented in Appendix A, which includes a brief description of drilling and sampling equipment and procedures, and logs of the test borings with coordinates describing their locations.

3.2 Laboratory Analysis

Laboratory testing and analysis relating to pavement design addressed subgrade soil specimens. Soil testing included: grain-size analysis, Atterberg Limits, AASHTO soil classification, chloride, sulfate, pH and R-value tests. The results of these tests are provided in Appendix B.

4.0 SITE CONDITIONS & GEOTECHNICAL PROFILE

4.1 Site Conditions

The project alignment consists of an existing two lane, unimproved road running southwest to west from Newcomb to Toadlena. The area is primarily rural and undeveloped in use. The project alignment consists of rolling hills and valleys.

4.2 Geological Setting

Indian Service Route (ISR) 5001 is located along the western margin of the San Juan Basin just east of the Chuska Mts. As you travel west to east along ISR 5001 from Toadlena to Newcomb you are traveling up the geologic section. Bedrock in the Toadlena area consists of the upper Triassic Chinle Formation and the Jurassic Morrison Formation. Bedrock in the Newcomb area consists of the upper Cretaceous Menefee Formation which is conformably overlain by the upper Cretaceous Tohatchi Formation that is in turn unconformably overlain by the late Eocene Chuska Sandstone. There is a Quaternary landslide debris approximately one mile to the north, south , and west of Toadlena.

The Chinle Formation consists of interbedded and variegated mudstone and lenticular sandstone that is orange to purple.

The Morrison Formation consists of variegated and interbedded mudstone, sandstone, limestone, and conglomerate that is buff brown, light purple, and light green.

The Menefee Formation in this area is likely the Cleary Coal member of the Formation. The Cleary Coal member consists of 90 to 180 feet of interbedded mudstone, silty sandstone, and thin to moderately thick coal.

The Tohatchi consists of interbedded shale and sandstone with local thin interbeds of carbonaceous material or coal.

The Chuska Sandstone consists of subrounded to round quartz grains (50-82 percent) and feldspar grains (23 to 33 percent) and rock fragments (up to 20 percent).

Quaternary landslide debris is composed primarily of Chuska Sandstone.

4.3 Geotechnical Profile

As indicated by the exploratory borings, the soils along the alignment consist primarily of clayey sand (SC) and sandy clay (CL). The sandy clay generally contains occasional gravel up to 19 mm (3/4-inch) diameter and is of medium plasticity. The clayey sand is predominantly fine to medium grained, contains occasional gravel to 50.8 mm (2-inch) diameter and is of medium plasticity. Some areas of silty sand (SM) were also encountered along the alignment. The silty sand is generally fine grained, and nonplastic.

4.4 Soil Moisture & Groundwater Conditions

No free groundwater was encountered in the borings. Soil moisture contents were generally moderate to moderately high.

5.0 DISCUSSION & RECOMMENDATIONS

5.1 R-Value Test Data

Ninety-nine AASHTO classifications and twelve R-value tests were performed on near surface soils along the alignment. Results of the AASHTO classification are presented in Appendix B of this report. The R-value test results are presented in the table below.

Table 5.1: R-value Test Data

Boring No.	Depth (meter)	R-value	AASHTO Classification
B-6	0 – 1	11	A-2-6
B-16	0 – 1	26	A-4
B-23	0 – 1	33	A-4
B-32	0 – 1	36	A-4
B-39	0 – 1	16	A-4
B-50	0 – 1	8	A-7-6
B-57	0.15 – 0.73	27	A-4
B-63	0 – 1	40	A-2-6
B-68	0 – 1	9	A-7-6
B-74	0 – 1	68	A-1-b
B-85	0 – 1	73	A-2-4
B-98	0.22 – 1	8	A-6

5.2 Traffic Analysis

The design Average Daily Traffic for 2033 was provided by the BIA. The design ESAL uses a 2033 average daily traffic of 282 vehicles per day and the following vehicles types and percentages:

TABLE 5.2 VEHICLE TYPE, PERCENTAGE AND ESAL EQUIVALENCY

Vehicle Type	Traffic Percentage	ESAL Equivalency Factor
Automobile	57.5	0.0008
Other 4 Wheel Traffic	41.0	0.0087
Single Trailer Truck	0.5	2.3719
Bus	1.0	0.6808

ESAL = Equivalent 18 kip Single Axle Load.

The resulting roadway design ESAL for the project is 46,936. Accounting for 1 lane traffic in each direction, the design lane ESAL is 23,468, which rounds to 23,500. Traffic calculations are presented in Appendix D.

5.3 Pavement Design Alternatives

Statistical analysis of R-values correlated to sieve and Atterberg Limits tests of the 99 soil samples obtained along the roadway alignment indicate that 95 percent (94 of 99 samples) possess R-values of 10 or greater. 85 percent of the samples (84 of 99 samples) possess an R-value of 20 or greater. This indicates that 1005.8 meters (0.625 miles) and 3025.6 meters (1.88 miles) of the 12.5 miles of roadway would require replacement to achieve the required R-value of 10 and 20, respectively. The replacement would need to be achieved in the upper 609.6 mm (2 feet) of the subgrade soils below the pavement section. The following table indicates the boring locations with R-value ≤10 and ≤20. This table was developed using both actual R-value test results and NMDOT correlation of R-values to AASHTO Soil Classifications.

Boring Locations with R-values ≤10	Boring Locations with R-values ≤20
B-10* (B-9 to B-11)	B-6** (B-5 to B-7)
B-46* (B-45 to B46)	B-8* (B-7 to B-9)
B-50** (B-49 to B-51)	B-26* (B-25 to B-27)
B-68** (B-67 to B-69)	B-56* (B-55 to B-57)
B-95* (B-94 to B-96)	B-89* (B-88 to B-93)
	B-90* (B-88 to B-93)
	B-91* (B-88 to B-93)
	B-92* (B-88 to B-93)
	B-98** (B-97 to B-99+)
	B-99* (B-97 to B-99+)

* R-value estimated using NMDOT correlation chart to AASHTO Soil Classification.
** R-value derived from R-value testing of soil sample.

It should be noted that these R-value materials may exist up to 200 meters in either direction of the boring location. The construction QC will need to verify the limits of R-value material that does not meet design requirements.

Pavement sections are provided for each option and method presented below. These options vary the base course thickness in an attempt to reduce the asphalt thickness. Caution should be exercised when evaluating these options, as higher construction costs may be associated with the use of thicker base course sections as multiple lifts will be required. In addition, asphalt sections that are very thin relative to the base course thickness may tend to show premature failure (rutting, cracking, etc.) even though the resulting structural section meets the design structural number.

5.3.1 Structural Design – Option 1, Subgrade Soils with R-Value ≥ 10

The following table presents the design weighted structural number, S_N, asphalt thickness and resulting structural number for each roadway alternative:

TABLE 5.3.1 PAVEMENT SECTIONS

Roadway	Weighted Design SN	Base Course (BC) Thickness (mm)	Asphalt Concrete (AC) Thickness (mm)	Resulting SN
BIA Road N5001	2.29	127.0	101.6	2.31
BIA Road N5001	2.29	177.8	88.9	2.31

A structural coefficient of 0.44 was used for AC. A structural coefficient of 0.11 was used for BC.

The pavement design sections listed above are based on the upper 609.6 mm (2 feet) of subgrade soils along having a design R-value of 10. The contractor shall be required to remove and replace the upper 609.6 mm (2 feet) of subgrade material that does not meet the minimum R-value criteria.

The contractor is responsible for site soil management to meet the R-value requirement of the upper 609.6 mm (2 feet) of pavement subgrade soil. The R-value of pavement subgrade soils during construction will be verified through indexing and NMDOT R-value estimating procedures. Pavement subgrade soils in the upper 609.6 mm (2 feet) shall conform to the following lower limit AASHTO gradation specifications for given R-values:

AASHTO GRADATION SPECIFICATIONS

R-value	Percent Passing			Liquid Limit	Plasticity Index
	#10	#40	#200		
10	No Limit	No Limit	No Limit	40 Max	15 Max

If the estimated R-value of the pavement subgrade material fails to meet the required value by more than six (6) R-value units, a laboratory R-value test may be required as directed by the engineer. Any material not meeting the required R-value shall be removed and replaced with material having at least the design R-value or the pavement section shall be redesigned. Contractor materials quality control shall be verified through the engineer.

5.3.2 Structural Design – Option 2, Subgrade Soils with R-value ≥20

The following table presents the design weighted structural number, S_N, asphalt thickness and resulting structural number for each roadway alternative using an in-situ R-value of 20:

TABLE 5.3.2 PAVEMENT SECTIONS

Roadway	Weighted Design SN	Base Course (BC) Thickness (mm)	Asphalt Concrete (AC) Thickness (mm)	Resulting SN
BIA Road N5001	2.01	101.6	101.6	2.20
BIA Road N5001	2.01	177.8	76.2	2.42

A structural coefficient of 0.44 was used for AC. A structural coefficient of 0.11 was used for BC.

The pavement design sections listed above are based on the upper 609.6 mm (2 feet) of subgrade soils along having a design R-value of 20. The contractor shall be required to remove and replace the upper 609.6 mm (2 feet) of subgrade material that does not meet the minimum R-value criteria.

The contractor is responsible for site soil management to meet the R-value requirement of the upper 609.6 mm (2 feet) of pavement subgrade soil. The R-value of pavement subgrade soils during construction will be verified through indexing and NMDOT R-value estimating procedures. Pavement subgrade soils in the upper 609.6 mm (2 feet) shall conform to the following lower limit AASHTO gradation specifications for given R-values.

R-value	Percent Passing			Liquid Limit	Plasticity Index
	#10	#40	#200		
20	No Limit	No Limit	No Limit	40 max	10 max

If the estimated R-value of the pavement subgrade material fails to meet the required value by more than six (6) R-value units, a laboratory R-value test may be required as directed by the engineer. Any material not meeting the required R-value, shall be removed and replaced with material having at least the design R-value or the pavement section shall be redesigned. Contractor materials quality control shall be verified through the engineer.

5.3.3 Soil Treatment

In addition to standard asphalt concrete and aggregate base course pavement sections, the existing soils could be treated, using lime, cement or other additives to create a subbase pavement layer to reduce asphalt and base course thicknesses. The upper 8 inches of the subgrade soils should be treated and compacted to achieve minimum unconfined compressive strengths of 14.06 kg/cm^2 (200 psi).

Soil treatment as described above would result in the following pavement sections:

Table 5.3.3 PAVEMENT SECTIONS

Subgrade R-value	Subbase Thickness (mm)	Base Course (BC) Thickness (mm)	Asphalt Concrete (AC) Thickness (mm)	Resulting SN
≥10	203.2	76.2	63.5	2.47
≥20	203.2	50.8	50.8	2.14

Structural coefficients: AC=.44, BC=.10, Subbase=.125

5.4 Pavement Construction Considerations

Pavement subgrade compaction shall conform to the "Standard Specifications for Construction of Roads and Bridges on Federal Highway projects", FP03. All asphalt concrete pavement shall be designed and constructed in accordance with the "Standard Specifications for Construction of Roads and Bridges on Federal Highway projects", FP03.

The soils throughout the project area that will be encountered during earthwork operations can be excavated with normal earth moving equipment. Based upon the data available, it appears that some of the excavated soils will not be suitable for reuse as subgrade fill if Option 1 or 2 is selected. Imported fill or soil amendment will be necessary to achieve required R-values.

5.5 CONSTRUCTION OBSERVATION & TESTING

Recommendations presented in the previous sections of this report are predicated on there being continuous observation and testing by the geotechnical engineer's representative during earthwork operations. Verification of recommended moisture increases and required degree of compaction in the various areas of the project should be performed in accordance with "Specifications for Earthwork", Appendix C.

APPENDIX A

Test Drilling Equipment & Procedures

ASTM Soil Classification

Terminology Used to Describe the Relative Density, Consistency or Firmness of Soils

Site Plans

Logs of Testing Borings

TEST DRILLING EQUIPMENT & PROCEDURES

Drilling Equipment - Truck-mounted drill rigs powered with gasoline or diesel engines are used in advancing test borings. Drilling through soil or softer rock is performed with hollow-stem auger or continuous flight auger. Carbide insert teeth are normally used on the auger bits so they can often penetrate rock or very strongly cemented soils which require blasting or very heavy equipment for excavation. Where refusal is experienced in auger drilling, the holes are sometimes advanced with tricone gear bits and NX rods using water or air as a drilling fluid.

Test Pit Equipment – Test pits are excavated using gasoline or diesel powered excavator. Typical excavators are normally backhoes, or front end loaders.

Sampling Procedures - Dynamically driven tube samples are usually obtained at selected intervals in the borings by the AASHTO T206 procedures. In most cases, 50.8 mm (2-inch) O.D., 34.9 mm (1-3/8-inch) I.D. samplers are used to obtain the standard penetration resistance. "Undisturbed" samples of firmer soils are often obtained with 76.2 mm (3-inch) O.D. samplers lined with 61.5 mm (2.42-inch) I.D. brass rings. The driving energy is generally recorded as the number of blows of a 63.50 kilogram (140-pound), 762 mm (30-inch) free-fall drop hammer required to advance the samplers in 152.4 mm (6-inch) increments. However, in stratified soils, driving resistance is sometimes recorded in 50.8 or 76.2 mm (2 or 3-inch) increments so that soil changes and the presence of scattered gravel or cemented layers can be readily detected and the realistic penetration values obtained for consideration in design. These values are expressed in blows per foot on the logs. "Undisturbed" sampling of softer soils is sometimes performed with thin-walled Shelby tubes (AASHTO T207). Where samples of rock are required, they are obtained by NX diamond core drilling. Tube samples are labeled and placed in water-tight containers to maintain field moisture contents for testing. When necessary for testing, larger bulk samples are taken from auger cuttings.

Continuous Penetration Tests - Continuous penetration tests are performed by driving a 50.8 mm (2-inch) O.D. blunt nosed penetrometer adjacent to or in the bottom of borings. The penetrometer is attached to 41.3 mm (1-5/8-inch) O.D. drill rods to provide clearance to minimize side friction so that pene-tration values are as nearly as possible a measure of end resistance. Penetration values are recorded as the number of blows of a 63.50 kilogram (140-pound), 762 mm (30-inch) free-fall drop hammer required to advance the penetrometer in one-foot increments or less.

Boring Records - Drilling operations are directed by our field engineer or geologist who examines soil recovery and prepares boring logs. Soils are visually classified in accordance with the AASHTO Soil Classification System, with appropriate group symbols being shown on the logs.

TERMINOLOGY USED TO DESCRIBE THE RELATIVE DENSITY, CONSISTENCY OR FIRMNESS OF SOILS

The terminology used on the boring logs to describe the relative density, consistency or firmness of soils relative to the standard penetration resistance is presented below. The standard penetration resistance (N) in blows per foot is obtained by AASHTO T206 procedure using 50.8 mm (2") O.D., 34.9 mm (1-3/8") I.D. samplers.

1. Relative Density Terms for description of relative density of cohensionless, uncemented sands and sand-gravel mixtures.

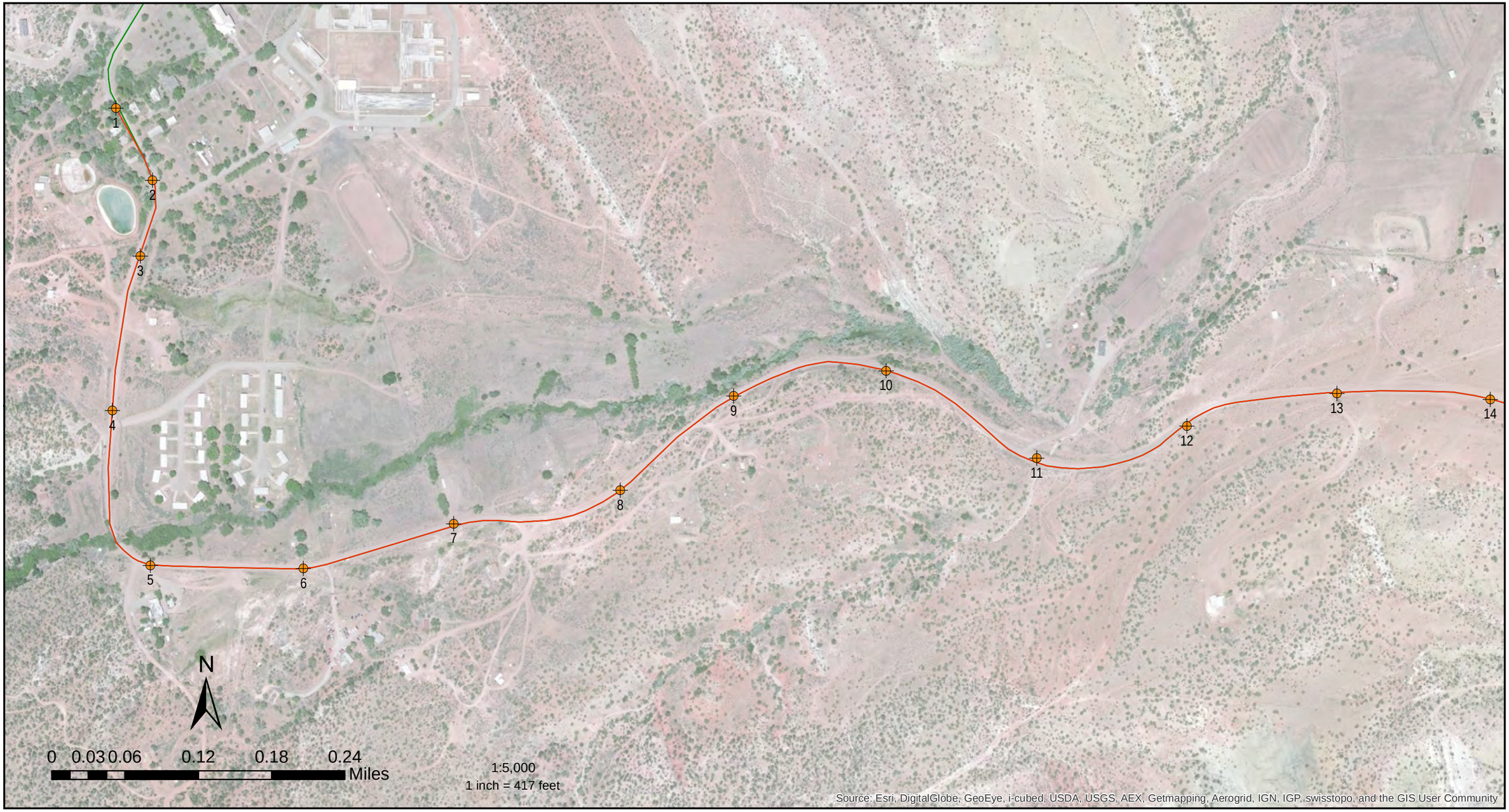
N	Relative Density
0-4	Very loose
5-10	Loose
11-30	Medium dense
31-50	Dense
50+	Very dense

2. Relative Consistency Terms for the description of clays which are saturated or near saturation.

N	Relative Consistency	Remarks
0-2	Very Soft	Easily penetrated several inches with fist
3-4	Soft	Easily penetrated several inches with thumb
5-8	Medium stiff	Can be penetrated several inches with thumb with moderate effort
9-15	Stiff	Readily indented with thumb, but penetrated only with great effort
16-30	Very stiff	Readily indented with thumbnail
30+	Hard	Indented only with difficulty by thumbnail

3. Relative Firmness Terms for the description of partially saturated and/or cemented soils which commonly occur in the Southwest including clays, cemented granular materials, silts and silty and clayey granular soils:

N	Relative Density
0-4	Very soft
5-8	Soft
9-15	Moderately firm
16-30	Firm
31-50	Very firm
50+	Hard



CLIENT

Bureau of Indian Affairs

AMEC Environment & Infrastructure
8519 Jefferson, NE
Albuquerque, New Mexico 87113

DWN BY: CP

CHKD BY: REC

DATUM: N/A

PROJECTION: N/A

SCALE: See Plan

PROJECT

ROADWAY SAMPLING
NEWCOMB TO TOADLENA

TITLE

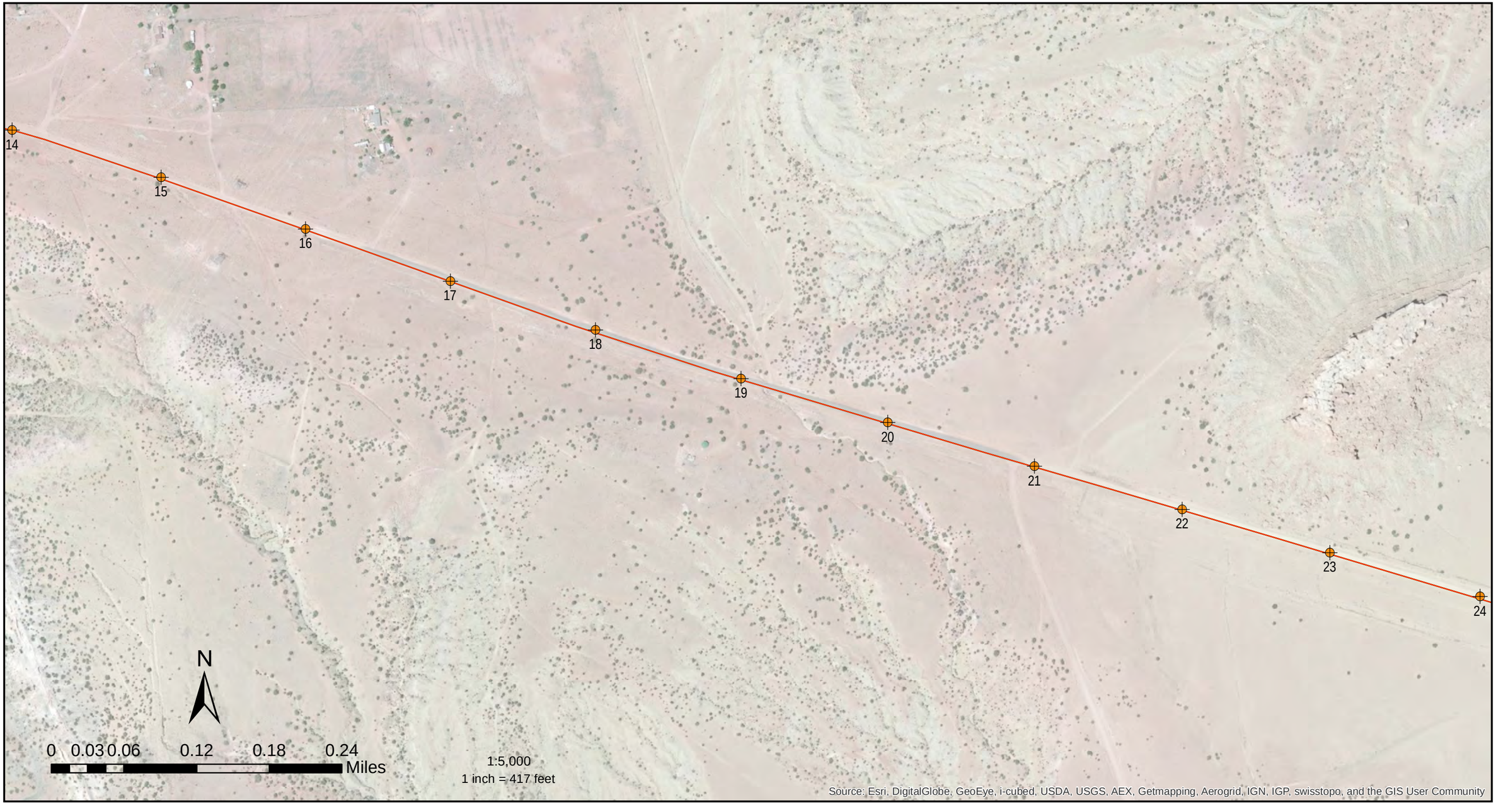
BORING LOCATIONS

DATE: 11/20/2013

PROJECT NO: 13-517-00063

REV. NO.:

FIGURE NO.: *1*



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PROJECTION:	N/A
SCALE:	See Plan

PROJECT
ROADWAY SAMPLING
NEWCOMB TO TOADLENA

TITLE
BORING LOCATIONS

DATE:	11/20/2013
PROJECT NO:	13-517-00063
REV. NO.:	
FIGURE NO.:	2

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PROJECT

ROADWAY SAMPLING
NEWCOMB TO TOADLENA

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BORING LOCATIONS

DATE: 11/20/2013
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FIGURE NO.: 3

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PROJECT
ROADWAY SAMPLING
NEWCOMB TO TOADLENA

TITLE
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DATE:	11/20/2013
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REV. NO.:	
FIGURE NO.:	*4*

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PROJECT

ROADWAY SAMPLING
NEWCOMB TO TOADLENA

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BORING LOCATIONS

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REV. NO.:
FIGURE NO.: 5

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PROJECT

ROADWAY SAMPLING
NEWCOMB TO TOADLENA

TITLE

BORING LOCATIONS

DATE: 11/20/2013
PROJECT NO: 13-517-00063
REV. NO.:
FIGURE NO.: 6

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PROJECT
ROADWAY SAMPLING
NEWCOMB TO TOADLENA

TITLE
BORING LOCATIONS

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REV. NO.:
FIGURE NO.: 7

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PROJECT

ROADWAY SAMPLING
NEWCOMB TO TOADLENA

TITLE

BORING LOCATIONS

DATE: 11/20/2013
PROJECT NO: 13-517-00063
REV. NO.:
FIGURE NO.: 8

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PROJECT
ROADWAY SAMPLING
NEWCOMB TO TOADLENA

TITLE
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DATE: 11/20/2013
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FIGURE NO.: 9

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SCALE:	See Plan

PROJECT

ROADWAY SAMPLING
NEWCOMB TO TOADLENA

TITLE

BORING LOCATIONS

DATE:	11/20/2013
PROJECT NO:	13-517-00063
REV. NO.:	
FIGURE NO.:	10

PROJECT B.I.A Project N5001 (1) 1,2 & 4, Newcomb to Toadlena
Navajo Nation, New Mexico

JOB NO. 13-517-00063 **DATE** 9/25/13

LOCATION N. 4012561.41
E. 689320.97
RIG TYPE CME-75
BORING TYPE 152.4 mm H.S.A
SURFACE ELEV. 2062.40
DATUM

Depth in Meters	Blows per 152 mm	Graphical Log	Sample	Sample Type	Blow Counts	Dry Density Kg. per Cubic meter	Moisture Content Percent of Dry Weight	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0.0										101.6 mm Asphalt, 177.8 mm Base coarse
										101.6 mm organic, black
				A				SC-SM	A-4	**CLAYEY SAND SILT** occasional gravel to 12.7 mm, predominantly fine grained, low to medium placitiy, brown
0.5										
1.0										Stopped auger at 1 m (3.28')
1.5										

GROUNDWATER

	DEPTH (m)	HOUR	DATE
▽			
▼			

SAMPLE TYPE
A - Auger cuttings; NR-No Recovery
S - 51mm O.D. 35mm I.D. tube sample.
U - 76mm O.D. 61mm I.D. tube sample.
T - 25mm O.D. thin-walled tube sample

LOG OF TEST BORING NO. B-1

PROJECT B.I.A Project N5001 (1) 1,2 & 4, Newcomb to Toadlena
Navajo Nation, New Mexico

JOB NO. 13-517-00063 **DATE** 9/25/13

LOCATION N. 4012467.74
E. 689372.56
RIG TYPE CME-75
BORING TYPE 152.4 mm H.S.A
SURFACE ELEV. 2063.33
DATUM

Depth In Meters	Blows per 152 mm	Graphical Log	Sample	Sample Type	Blow Counts	Dry Density Kg. per Cubic meter	Moisture Content Percent of Dry Weight	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0.0										76.2 mm Asphalt, 177.8 Base Course
										76.2 mm organics, black
				A				CL-ML	A-4	**SANDY SILTY CLAY** trace gravel to 9.52 mm, low plasticity, brown
0.5										
1.0										Stopped auger at 1 M (3.28')
1.5										

GROUNDWATER

DEPTH (m)	HOUR	DATE

SAMPLE TYPE
A - Auger cuttings; NR-No Recovery
S - 51mm O.D. 35mm I.D. tube sample.
U - 76mm O.D. 61mm I.D. tube sample.
T - 25mm O.D. thin-walled tube sample

LOG OF TEST BORING NO. B-2

PROJECT B.I.A Project N5001 (1) 1,2 & 4, Newcomb to Toadlena
Navajo Nation, New Mexico

JOB NO. 13-517-00063 **DATE** 9/25/13

LOCATION N. 4012367.23
E. 689359.54
RIG TYPE CME-75
BORING TYPE 152.4 mm H.S.A
SURFACE ELEV. 2064.35
DATUM

Depth In Meters	Blows per 152 mm	Graphical Log	Sample	Sample Type	Blow Counts	Dry Density Kg. per Cubic meter	Moisture Content Percent of Dry Weight	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0.0										76.2 mm Asphalt, 177.8 mm Base coarse
										50.8 mm organics, black
				A				CL-ML	A-4	**SANDY SILTY CLAY** low plasticity, brown
0.5										
1.0										Stopped auger at 1 M (3.28')
1.5										

GROUNDWATER

	DEPTH (m)	HOUR	DATE
▽			
▼			

SAMPLE TYPE
A - Auger cuttings; NR-No Recovery
S - 51mm O.D. 35mm I.D. tube sample.
U - 76mm O.D. 61mm I.D. tube sample.
T - 25mm O.D. thin-walled tube sample

LOG OF TEST BORING NO. B-3

PROJECT B.I.A Project N5001 (1) 1,2 & 4, Newcomb to Toadlena
Navajo Nation, New Mexico

JOB NO. 13-517-00063 **DATE** 9/25/13

LOCATION N. 4012162.67
E. 689329.48
RIG TYPE CME-75
BORING TYPE 152.4 mm H.S.A
SURFACE ELEV. 2066.55
DATUM

Depth In Meters	Blows per 152 mm	Graphical Log	Sample	Sample Type	Blow Counts	Dry Density Kg. per Cubic meter	Moisture Content Percent of Dry Weight	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0.0										50.8 mm Asphalt
				A				CL	A-4	**SANDY CLAY** trace gravel to 9.52 mm, low to medium plasticity, brown
0.5										
1.0										Stopped auger 1 M (3.28')
1.5										

GROUNDWATER

	DEPTH (m)	HOUR	DATE
▽			
▼			

SAMPLE TYPE
A - Auger cuttings; NR-No Recovery
S - 51mm O.D. 35mm I.D. tube sample.
U - 76mm O.D. 61mm I.D. tube sample.
T - 25mm O.D. thin-walled tube sample

LOG OF TEST BORING NO. B-4

PROJECT B.I.A Project N5001 (1) 1,2 & 4, Newcomb to Toadlena
Navajo Nation, New Mexico

JOB NO. 13-517-00063 **DATE** 9/25/13

LOCATION N. 4011960.22
E. 689385.89
RIG TYPE CME-75
BORING TYPE 152.4 mm H.S.A
SURFACE ELEV. 2063.79
DATUM

Depth in Meters	Blows per 152 mm	Graphical Log	Sample	Sample Type	Blow Counts	Dry Density Kg. per Cubic meter	Moisture Content Percent of Dry Weight	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0.0				A				SC-SM		50.8 mm millings on surface
									A-4	**CLAYEY SAND SILT** trace gravel to 19.05 mm, predominantly fine grained, low plasticity, dark brown
0.5										
1.0										Stopped auger at 1 M (3.28')
1.5										

GROUNDWATER

	DEPTH (m)	HOUR	DATE
▽			
▼			

SAMPLE TYPE
A - Auger cuttings; NR-No Recovery
S - 51mm O.D. 35mm I.D. tube sample.
U - 76mm O.D. 61mm I.D. tube sample.
T - 25mm O.D. thin-walled tube sample

LOG OF TEST BORING NO. B-5

PROJECT B.I.A Project N5001 (1) 1,2 & 4, Newcomb to Toadlena
Navajo Nation, New Mexico

JOB NO. 13-517-00063 **DATE** 9/25/13

LOCATION N. 4011962.68
E. 689587.97
RIG TYPE CME-75
BORING TYPE 152.4 mm H.S.A
SURFACE ELEV. 2050.38
DATUM

Depth in Meters	Blows per 152 mm	Graphical Log	Sample	Sample Type	Blow Counts	Dry Density Kg. per Cubic meter	Moisture Content Percent of Dry Weight	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0.0										50.8 mm millings on surface
				A				SC	A-2-6	**SANDY CLAY** trace gravel to 19.05 mm, predominantly fine grained, medium plasticity, dark brown
0.5										
1.0										Stopped auger at 1 M (3.28')
1.5										

GROUNDWATER

	DEPTH (m)	HOUR	DATE
▽			
▼			

SAMPLE TYPE
A - Auger cuttings; NR-No Recovery
S - 51mm O.D. 35mm I.D. tube sample.
U - 76mm O.D. 61mm I.D. tube sample.
T - 25mm O.D. thin-walled tube sample

LOG OF TEST BORING NO. B-6

PROJECT B.I.A Project N5001 (1) 1,2 & 4, Newcomb to Toadlena
Navajo Nation, New Mexico

JOB NO. 13-517-00063 **DATE** 9/25/13

LOCATION N. 4012028.02
E. 689784.27
RIG TYPE CME-75
BORING TYPE 152.4 mm H.S.A
SURFACE ELEV. 2038.37
DATUM

Depth in Meters	Blows per 152 mm	Graphical Log	Sample	Sample Type	Blow Counts	Dry Density Kg. per Cubic meter	Moisture Content Percent of Dry Weight	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0.0				A				SM	A-4	**SILTY SAND** trace gravel to 9.52 mm, predominantly fine grained, non plastic to low plasticity, brown
0.5										
1.0										Stopped auger at 1 M (3.28')
1.5										

GROUNDWATER

DEPTH (m)	HOUR	DATE

SAMPLE TYPE
A - Auger cuttings; NR-No Recovery
S - 51mm O.D. 35mm I.D. tube sample.
U - 76mm O.D. 61mm I.D. tube sample.
T - 25mm O.D. thin-walled tube sample

LOG OF TEST BORING NO. B-7

PROJECT B.I.A Project N5001 (1) 1,2 & 4, Newcomb to Toadlena
Navajo Nation, New Mexico

JOB NO. 13-517-00063 **DATE** 9/25/13

LOCATION N. 4012079.27
E. 690002.38
RIG TYPE CME-75
BORING TYPE 152.4 mm H.S.A
SURFACE ELEV. 2024.79
DATUM

Depth in Meters	Blows per 152 mm	Graphical Log	Sample	Sample Type	Blow Counts	Dry Density Kg. per Cubic meter	Moisture Content Percent of Dry Weight	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0.0				A				CL	A-6	**SANDY CLAY** trace gravel to 12.7 mm, medium plasticity, light brown
0.5										
1.0										Stopped auger at 1M (3.28')
1.5										

GROUNDWATER

DEPTH (m)	HOUR	DATE

SAMPLE TYPE
A - Auger cuttings; NR-No Recovery
S - 51mm O.D. 35mm I.D. tube sample.
U - 76mm O.D. 61mm I.D. tube sample.
T - 25mm O.D. thin-walled tube sample

LOG OF TEST BORING NO. B-8

PROJECT B.I.A Project N5001 (1) 1,2 & 4, Newcomb to Toadlena
Navajo Nation, New Mexico

JOB NO. 13-517-00063 **DATE** 9/25/13

LOCATION N. 4012208.23
E. 690147.48
RIG TYPE CME-75
BORING TYPE 152.4 mm H.S.A
SURFACE ELEV. 2015.79
DATUM

Depth in Meters	Blows per 152 mm	Graphical Log	Sample	Sample Type	Blow Counts	Dry Density Kg. per Cubic meter	Moisture Content Percent of Dry Weight	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0.0				A				SC		25.4 mm millings on surface
									A-2-4	**CLAYEY SAND** trace gravel to 25..4 mm, predominantly fine grained, medium plasticity, dark brown
0.5										
1.0										Stopped auger at 1 M (3.28')
1.5										

GROUNDWATER

DEPTH (m)	HOUR	DATE

SAMPLE TYPE
A - Auger cuttings; NR-No Recovery
S - 51mm O.D. 35mm I.D. tube sample.
U - 76mm O.D. 61mm I.D. tube sample.
T - 25mm O.D. thin-walled tube sample

LOG OF TEST BORING NO. B-9

PROJECT B.I.A Project N5001 (1) 1,2 & 4, Newcomb to Toadlena
Navajo Nation, New Mexico

JOB NO. 13-517-00063 **DATE** 9/25/13

LOCATION N. 4012248.31
E. 690347.59
RIG TYPE CME-75
BORING TYPE 152.4 mm H.S.A
SURFACE ELEV. 2005.99
DATUM

Depth In Meters	Blows per 152 mm	Graphical Log	Sample	Sample Type	Blow Counts	Dry Density Kg. per Cubic meter	Moisture Content Percent of Dry Weight	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0.0				A				CL	A-6	**SANDY CLAY** medium plasticity, dark brown
0.5										
1.0										Stopped auger at 1 M (3.28')
1.5										

GROUNDWATER

DEPTH (m)	HOUR	DATE

SAMPLE TYPE
A - Auger cuttings; NR-No Recovery
S - 51mm O.D. 35mm I.D. tube sample.
U - 76mm O.D. 61mm I.D. tube sample.
T - 25mm O.D. thin-walled tube sample

LOG OF TEST BORING NO. B-10

PROJECT B.I.A Project N5001 (1) 1,2 & 4, Newcomb to Toadlena
Navajo Nation, New Mexico

JOB NO. 13-517-00063 **DATE** 9/25/13

LOCATION N. 4012139.46
E. 690549.87
RIG TYPE CME-75
BORING TYPE 152.4 mm H.S.A
SURFACE ELEV. 1987.75
DATUM

Depth in Meters	Blows per 152 mm	Graphical Log	Sample	Sample Type	Blow Counts	Dry Density Kg. per Cubic meter	Moisture Content Percent of Dry Weight	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0.0				A				SC-SM	A-2-4	**CLAYEY SILTY SAND** trace gravel to 31.75 mm, predominantly fine grained, low plasticity, dark brown
0.5										
1.0										Stopped auger at 1 M (3.28')
1.5										

GROUNDWATER

DEPTH (m)	HOUR	DATE

SAMPLE TYPE
A - Auger cuttings; NR-No Recovery
S - 51mm O.D. 35mm I.D. tube sample.
U - 76mm O.D. 61mm I.D. tube sample.
T - 25mm O.D. thin-walled tube sample

LOG OF TEST BORING NO. B-11

PROJECT B.I.A Project N5001 (1) 1,2 & 4, Newcomb to Toadlena
Navajo Nation, New Mexico

JOB NO. 13-517-00063 **DATE** 9/25/13

LOCATION N. 4012188.66
E. 690746.12
RIG TYPE CME-75
BORING TYPE 152.4 mm H.S.A
SURFACE ELEV. 1991.78
DATUM

Depth in Meters	Blows per 152 mm	Graphical Log	Sample	Sample Type	Blow Counts	Dry Density Kg. per Cubic meter	Moisture Content Percent of Dry Weight	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0.0				A				SC-SM		25.4 mm millings on surface
									A-4	**CLAYEY SILTYSAND** trace gravel to 12.7 mm, low plasticity, light brown
0.5										
1.0										Stopped auger at 1 M (3.28')
1.5										

GROUNDWATER

	DEPTH (m)	HOUR	DATE
▽			
▼			

SAMPLE TYPE
A - Auger cuttings; NR-No Recovery
S - 51mm O.D. 35mm I.D. tube sample.
U - 76mm O.D. 61mm I.D. tube sample.
T - 25mm O.D. thin-walled tube sample

LOG OF TEST BORING NO. B-12

PROJECT B.I.A Project N5001 (1) 1,2 & 4, Newcomb to Toadlena
Navajo Nation, New Mexico

JOB NO. 13-517-00063 **DATE** 9/25/13

LOCATION N. 4012237.85
E. 690942.38
RIG TYPE CME-75
BORING TYPE 152.4 mm H.S.A
SURFACE ELEV. 1985.56
DATUM

Depth in Meters	Blows per 152 mm	Graphical Log	Sample	Sample Type	Blow Counts	Dry Density Kg. per Cubic meter	Moisture Content Percent of Dry Weight	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0.0				A				SC-SM	A-2-4	**CLAYEY SAND**, some gravel to 25.4 mm and cobbles to 177.8 mm on the surface, predominantly fine grained, low plasticity, light brown
0.5										
1.0										Stopped auger at 1 M (3.28')
1.5										

GROUNDWATER

	DEPTH (m)	HOUR	DATE
▽			
▼			

SAMPLE TYPE
A - Auger cuttings; NR-No Recovery
S - 51mm O.D. 35mm I.D. tube sample.
U - 76mm O.D. 61mm I.D. tube sample.
T - 25mm O.D. thin-walled tube sample

LOG OF TEST BORING NO. B-13

PROJECT B.I.A Project N5001 (1) 1,2 & 4, Newcomb to Toadlena
Navajo Nation, New Mexico

JOB NO. 13-517-00063 **DATE** 9/25/13

LOCATION N. 4012236.73
E. 691145.11
RIG TYPE CME-75
BORING TYPE 152.4 mm H.S.A
SURFACE ELEV. 1976.63
DATUM

Depth in Meters	Blows per 152 mm	Graphical Log	Sample	Sample Type	Blow Counts	Dry Density Kg. per Cubic meter	Moisture Content Percent of Dry Weight	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0.0				A				SC	A-2-4	**CLAYEY SAND** with gravel to 76.2 mm, trace cobbles to 254 mm on the surface, predominantly fine grained, low plasticity, light brown
0.5										
1.0										Stopped auger at 1 M (3.28')
1.5										

GROUNDWATER

	DEPTH (m)	HOUR	DATE
▽			
▼			

SAMPLE TYPE
A - Auger cuttings; NR-No Recovery
S - 51mm O.D. 35mm I.D. tube sample.
U - 76mm O.D. 61mm I.D. tube sample.
T - 25mm O.D. thin-walled tube sample

LOG OF TEST BORING NO. B-14

PROJECT B.I.A Project N5001 (1) 1,2 & 4, Newcomb to Toadlena
Navajo Nation, New Mexico

JOB NO. 13-517-00063 **DATE** 9/25/13

LOCATION N. 4012180.83
E. 691344.81
RIG TYPE CME-75
BORING TYPE 152.4 mm H.S.A
SURFACE ELEV. 1968.48
DATUM

Depth in Meters	Blows per 152 mm	Graphical Log	Sample	Sample Type	Blow Counts	Dry Density Kg. per Cubic meter	Moisture Content Percent of Dry Weight	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0.0				A				SC-SM	A-2-4	**CLAYEY SAND** some gravel to 25.4 mm, tace cobbles to 152.4 mm on the surface, predominantly fine grained, low plasticity, light brown
										Refusal at .4064 M due to cobbles
0.5										
1.0										
1.5										

GROUNDWATER

	DEPTH (m)	HOUR	DATE
▽			
▼			

SAMPLE TYPE
A - Auger cuttings; NR-No Recovery
S - 51mm O.D. 35mm I.D. tube sample.
U - 76mm O.D. 61mm I.D. tube sample.
T - 25mm O.D. thin-walled tube sample

LOG OF TEST BORING NO. B-15

PROJECT B.I.A Project N5001 (1) 1,2 & 4, Newcomb to Toadlena
Navajo Nation, New Mexico

JOB NO. 13-517-00063 **DATE** 9/25/13

LOCATION N. 4012118.08
E. 691539.36
RIG TYPE CME-75
BORING TYPE 152.4 mm H.S.A
SURFACE ELEV. 1960.99
DATUM

Depth in Meters	Blows per 152 mm	Graphical Log	Sample	Sample Type	Blow Counts	Dry Density Kg. per Cubic meter	Moisture Content Percent of Dry Weight	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0.0				A				SC-SM		25.4 mm millings on surface
									A-4	**CLAYEY SAND** trace gral to 19.05 mm, predominantly fine grained, low plasticity, light brown
0.5										
1.0										Stopped auger at 1 M (3.28')
1.5										

GROUNDWATER

	DEPTH (m)	HOUR	DATE
▽			
▼			

SAMPLE TYPE
A - Auger cuttings; NR-No Recovery
S - 51mm O.D. 35mm I.D. tube sample.
U - 76mm O.D. 61mm I.D. tube sample.
T - 25mm O.D. thin-walled tube sample

LOG OF TEST BORING NO. B-16

PROJECT B.I.A Project N5001 (1) 1,2 & 4, Newcomb to Toadlena
Navajo Nation, New Mexico

JOB NO. 13-517-00063 **DATE** 9/25/13

LOCATION N. 4012055.32
E. 691733.91
RIG TYPE CME-75
BORING TYPE 152.4 mm H.S.A
SURFACE ELEV. 1953.39
DATUM

Depth in Meters	Blows per 152 mm	Graphical Log	Sample	Sample Type	Blow Counts	Dry Density Kg. per Cubic meter	Moisture Content Percent of Dry Weight	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0.0				A				SC-SM		25.4 mm millings on surface
									A-4	**CLAYEY SAND** trace gravel to 25.4 mm, predominantly fine grained, low plasticity, brown
0.5										
1.0										Stopped auger at 1 M (3.28')
1.5										

GROUNDWATER

	DEPTH (m)	HOUR	DATE
▽			
▼			

SAMPLE TYPE
A - Auger cuttings; NR-No Recovery
S - 51mm O.D. 35mm I.D. tube sample.
U - 76mm O.D. 61mm I.D. tube sample.
T - 25mm O.D. thin-walled tube sample

LOG OF TEST BORING NO. B-17

PROJECT B.I.A Project N5001 (1) 1,2 & 4, Newcomb to Toadlena
Navajo Nation, New Mexico

JOB NO. 13-517-00063 **DATE** 9/25/13

LOCATION N. 4011996.88
E. 691929.23
RIG TYPE CME-75
BORING TYPE 152.4 mm H.S.A
SURFACE ELEV. 1945.38
DATUM

Depth in Meters	Blows per 152 mm	Graphical Log	Sample	Sample Type	Blow Counts	Dry Density Kg. per Cubic meter	Moisture Content Percent of Dry Weight	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0.0				A				SC		25.4 mm millings on surface
									A-2-6	**CLAYEY SAND** trace gravel to 25.4 mm, predominantly fine grained, medium plasticity, brown
0.5										
1.0										Stopped auger at 1 M (3.28')
1.5										

GROUNDWATER

	DEPTH (m)	HOUR	DATE
▽			
▼			

SAMPLE TYPE
A - Auger cuttings; NR-No Recovery
S - 51mm O.D. 35mm I.D. tube sample.
U - 76mm O.D. 61mm I.D. tube sample.
T - 25mm O.D. thin-walled tube sample

LOG OF TEST BORING NO. B-18

PROJECT B.I.A Project N5001 (1) 1,2 & 4, Newcomb to Toadlena
Navajo Nation, New Mexico

JOB NO. 13-517-00063 **DATE** 9/25/13

LOCATION N. 4011938.44
E. 692124.56
RIG TYPE CME-75
BORING TYPE 152.4 mm H.S.A
SURFACE ELEV. 1939.99
DATUM

Depth in Meters	Blows per 152 mm	Graphical Log	Sample	Sample Type	Blow Counts	Dry Density Kg. per Cubic meter	Moisture Content Percent of Dry Weight	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0.0				A				SM		25.4 mm millings on surface
									A-2-4	**SILTY SAND** occasional cobbles to 101.6 mm , predominantiy fine grained, nonplastic, brown
0.5										Refusal at .4064 M due to cobbles
1.0										
1.5										

GROUNDWATER

	DEPTH (m)	HOUR	DATE
▽			
▼			

SAMPLE TYPE
A - Auger cuttings; NR-No Recovery
S - 51mm O.D. 35mm I.D. tube sample.
U - 76mm O.D. 61mm I.D. tube sample.
T - 25mm O.D. thin-walled tube sample

LOG OF TEST BORING NO. B-19

PROJECT B.I.A Project N5001 (1) 1,2 & 4, Newcomb to Toadlena
Navajo Nation, New Mexico

JOB NO. 13-517-00063 **DATE** 9/24/13

LOCATION N. 4011886.44
E. 692321.69
RIG TYPE CME-75
BORING TYPE 152.4 mm H.S.A
SURFACE ELEV. 1933.19
DATUM

Depth in Meters	Blows per 152 mm	Graphical Log	Sample	Sample Type	Blow Counts	Dry Density Kg. per Cubic meter	Moisture Content Percent of Dry Weight	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0.0				A				SC		25.4 mm millings on surface
									A-2-4	**CLAYEY SAND** trace gravel to 25.4 mm, predominantly fine grained, medium plasticity, brown
0.5										
										Refusal at 0.6096 M due to cobbles
1.0										
1.5										

GROUNDWATER

DEPTH (m)	HOUR	DATE

SAMPLE TYPE
A - Auger cuttings; NR-No Recovery
S - 51mm O.D. 35mm I.D. tube sample.
U - 76mm O.D. 61mm I.D. tube sample.
T - 25mm O.D. thin-walled tube sample

LOG OF TEST BORING NO. B-20

PROJECT B.I.A Project N5001 (1) 1,2 & 4, Newcomb to Toadlena
Navajo Nation, New Mexico

JOB NO. 13-517-00063 **DATE** 9/24/13

LOCATION N. 4011834.45
E. 692518.82
RIG TYPE CME-75
BORING TYPE 152.4 mm H.S.A
SURFACE ELEV. 1924.75
DATUM

Depth In Meters	Blows per 152 mm	Graphical Log	Sample	Sample Type	Blow Counts	Dry Density Kg. per Cubic meter	Moisture Content Percent of Dry Weight	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0.0				A				SC	A-2-4	**CLAYEY SAND** trace gravel to 50.8 mm, predominantly fine grained, medium plasticity, brown
0.5										
1.0										Stopped auger at 1 M (3.28')
1.5										

GROUNDWATER

	DEPTH (m)	HOUR	DATE
▽			
▼			

SAMPLE TYPE
A - Auger cuttings; NR-No Recovery
S - 51mm O.D. 35mm I.D. tube sample.
U - 76mm O.D. 61mm I.D. tube sample.
T - 25mm O.D. thin-walled tube sample

LOG OF TEST BORING NO. B-21

PROJECT B.I.A Project N5001 (1) 1,2 & 4, Newcomb to Toadlena
Navajo Nation, New Mexico

JOB NO. 13-517-00063 **DATE** 9/24/13

LOCATION N. 4011783.49
E. 692716.85
RIG TYPE CME-75
BORING TYPE 152.4 mm H.S.A
SURFACE ELEV. 1926.04
DATUM

Depth in Meters	Blows per 152 mm	Graphical Log	Sample	Sample Type	Blow Counts	Dry Density Kg. per Cubic meter	Moisture Content Percent of Dry Weight	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0.0				A				SM	A-4	**SILTY SAND** predominantly fine grained, low plasticity, yellowish-brown
0.5										
1.0										Stopped auger at 1 M (3.28')
1.5										

GROUNDWATER

DEPTH (m)	HOUR	DATE

SAMPLE TYPE
A - Auger cuttings; NR-No Recovery
S - 51mm O.D. 35mm I.D. tube sample.
U - 76mm O.D. 61mm I.D. tube sample.
T - 25mm O.D. thin-walled tube sample

LOG OF TEST BORING NO. B-22

PROJECT B.I.A Project N5001 (1) 1,2 & 4, Newcomb to Toadlena
Navajo Nation, New Mexico

JOB NO. 13-517-00063 **DATE** 9/24/13

LOCATION N. 4011732.53
E. 692914.88
RIG TYPE CME-75
BORING TYPE 152.4 mm H.S.A
SURFACE ELEV. 1921.46
DATUM

Depth in Meters	Blows per 152 mm	Graphical Log	Sample	Sample Type	Blow Counts	Dry Density Kg. per Cubic meter	Moisture Content Percent of Dry Weight	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0.0				A				CL	A-4	**SANDY CLAY** medium plasticity, yellowish-brown
0.5										
1.0										Stopped auger at 1 M (3.28')
1.5										

GROUNDWATER

DEPTH (m)	HOUR	DATE

SAMPLE TYPE
A - Auger cuttings; NR-No Recovery
S - 51mm O.D. 35mm I.D. tube sample.
U - 76mm O.D. 61mm I.D. tube sample.
T - 25mm O.D. thin-walled tube sample

LOG OF TEST BORING NO. B-23

PROJECT B.I.A Project N5001 (1) 1,2 & 4, Newcomb to Toadlena
Navajo Nation, New Mexico

JOB NO. 13-517-00063 **DATE** 9/24/13

LOCATION N. 4011680.67
E. 693116.49
RIG TYPE CME-75
BORING TYPE 152.4 mm H.S.A
SURFACE ELEV. 1911.66
DATUM

Depth In Meters	Blows per 152 mm	Graphical Log	Sample	Sample Type	Blow Counts	Dry Density Kg. per Cubic meter	Moisture Content Percent of Dry Weight	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0.0				A				ML	A-4	**SILTY CLAYEY SAND** low plasticity, yellowish-brown
0.5										
1.0										Stopped auger at 1 M (3.28')
1.5										

GROUNDWATER

DEPTH (m)	HOUR	DATE

SAMPLE TYPE
A - Auger cuttings; NR-No Recovery
S - 51mm O.D. 35mm I.D. tube sample.
U - 76mm O.D. 61mm I.D. tube sample.
T - 25mm O.D. thin-walled tube sample

LOG OF TEST BORING NO. B-24

PROJECT B.I.A Project N5001 (1) 1,2 & 4, Newcomb to Toadlena
Navajo Nation, New Mexico

JOB NO. 13-517-00063 **DATE** 9/24/13

LOCATION N. 4011628.81
E. 693318.11
RIG TYPE CME-75
BORING TYPE 152.4 mm H.S.A
SURFACE ELEV. 1902.74
DATUM

Depth in Meters	Blows per 152 mm	Graphical Log	Sample	Sample Type	Blow Counts	Dry Density Kg. per Cubic meter	Moisture Content Percent of Dry Weight	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0.0				A				CL	A-4	**SANDY CLAY** medium plasticity, yellowish-brown
0.5										
1.0										Stopped auger at 1 M (3.28')
1.5										

GROUNDWATER

DEPTH (m)	HOUR	DATE

SAMPLE TYPE
A - Auger cuttings; NR-No Recovery
S - 51mm O.D. 35mm I.D. tube sample.
U - 76mm O.D. 61mm I.D. tube sample.
T - 25mm O.D. thin-walled tube sample

LOG OF TEST BORING NO. B-25

PROJECT B.I.A Project N5001 (1) 1,2 & 4, Newcomb to Toadlena
Navajo Nation, New Mexico

JOB NO. 13-517-00063 **DATE** 9/24/13

LOCATION N. 4011583.21
E. 693516.36
RIG TYPE CME-75
BORING TYPE 152.4 mm H.S.A
SURFACE ELEV. 1891.19
DATUM

Depth In Meters	Blows per 152 mm	Graphical Log	Sample	Sample Type	Blow Counts	Dry Density Kg. per Cubic meter	Moisture Content Percent of Dry Weight	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0.0				A				SC	A-6	**CLAYEY SAND** predominantly fine grained, medium plasticity, yellowish-brown
0.5										
1.0										Stopped auger at 1 M (3.28')
1.5										

GROUNDWATER

DEPTH (m)	HOUR	DATE

SAMPLE TYPE
A - Auger cuttings; NR-No Recovery
S - 51mm O.D. 35mm I.D. tube sample.
U - 76mm O.D. 61mm I.D. tube sample.
T - 25mm O.D. thin-walled tube sample

LOG OF TEST BORING NO. B-26

PROJECT B.I.A Project N5001 (1) 1,2 & 4, Newcomb to Toadlena
Navajo Nation, New Mexico

JOB NO. 13-517-00063 **DATE** 9/24/13

LOCATION N. 4011595.68
E. 693723.53
RIG TYPE CME-75
BORING TYPE 152.4 mm H.S.A
SURFACE ELEV. 1886.10
DATUM

Depth in Meters	Blows per 152 mm	Graphical Log	Sample	Sample Type	Blow Counts	Dry Density Kg. per Cubic meter	Moisture Content Percent of Dry Weight	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0.0				A				SM	A-2-4	**SILTY SAND** predominantly fine grained, nonplastic, yellow-brown
0.5										
1.0										Stopped auger at 1 M (3.28')
1.5										

GROUNDWATER

	DEPTH (m)	HOUR	DATE
▽			
▼			

SAMPLE TYPE
A - Auger cuttings; NR-No Recovery
S - 51mm O.D. 35mm I.D. tube sample.
U - 76mm O.D. 61mm I.D. tube sample.
T - 25mm O.D. thin-walled tube sample

LOG OF TEST BORING NO. B-27

PROJECT B.I.A Project N5001 (1) 1,2 & 4, Newcomb to Toadlena
Navajo Nation, New Mexico

JOB NO. 13-517-00063 **DATE** 9/24/13

LOCATION N. 4011616.35
E. 693927.83
RIG TYPE CME-75
BORING TYPE 152.4 mm H.S.A
SURFACE ELEV. 1876.68
DATUM

Depth In Meters	Blows per 152 mm	Graphical Log	Sample	Sample Type	Blow Counts	Dry Density Kg. per Cubic meter	Moisture Content Percent of Dry Weight	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0.0				A				SM	A-2-4	**SILTY SAND** trace gravel to 9.525 mm, predominantly fine grained, nonplastic, yellow-brown
0.5				A				CL-ML	A-4	**SANDY SILTY CLAY** low plasticity, black
1.0										Stopped auger at 1 M (3.28')
1.5										

GROUNDWATER

	DEPTH (m)	HOUR	DATE
▽			
▼			

SAMPLE TYPE
A - Auger cuttings; NR-No Recovery
S - 51mm O.D. 35mm I.D. tube sample.
U - 76mm O.D. 61mm I.D. tube sample.
T - 25mm O.D. thin-walled tube sample

LOG OF TEST BORING NO. B-28

PROJECT B.I.A Project N5001 (1) 1,2 & 4, Newcomb to Toadlena
Navajo Nation, New Mexico

JOB NO. 13-517-00063 **DATE** 9/24/13

LOCATION N. 4011654.06
E. 694129.13
RIG TYPE CME-75
BORING TYPE 152.4 mm H.S.A
SURFACE ELEV. 1868.63
DATUM

Depth in Meters	Blows per 152 mm	Graphical Log	Sample	Sample Type	Blow Counts	Dry Density Kg. per Cubic meter	Moisture Content Percent of Dry Weight	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0.0				A					A-2-4	**SANDSTONE** weathered, nonplastic, yellow-brown note: refusal at surface, move east 7.62 M
0.5										
1.0										Stopped auger at 1 M (3.28')
1.5										

GROUNDWATER

	DEPTH (m)	HOUR	DATE
▽			
▼			

SAMPLE TYPE
A - Auger cuttings; NR-No Recovery
S - 51mm O.D. 35mm I.D. tube sample.
U - 76mm O.D. 61mm I.D. tube sample.
T - 25mm O.D. thin-walled tube sample

LOG OF TEST BORING NO. B-29

PROJECT B.I.A Project N5001 (1) 1,2 & 4, Newcomb to Toadlena
Navajo Nation, New Mexico

JOB NO. 13-517-00063 **DATE** 9/24/13

LOCATION N. 4011648.4
E. 694345.36
RIG TYPE CME-75
BORING TYPE 152.4 mm H.S.A
SURFACE ELEV. 1874.13
DATUM

Depth in Meters	Blows per 152 mm	Graphical Log	Sample	Sample Type	Blow Counts	Dry Density Kg. per Cubic meter	Moisture Content Percent of Dry Weight	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0.0				A				SM	A-2-4	**SILTY SAND** predominantly fine grained, nonplastic, brown
0.5										
1.0										Stopped auger at 1 M (3.28')
1.5										

GROUNDWATER

	DEPTH (m)	HOUR	DATE
▽			
▼			

SAMPLE TYPE
A - Auger cuttings; NR-No Recovery
S - 51mm O.D. 35mm I.D. tube sample.
U - 76mm O.D. 61mm I.D. tube sample.
T - 25mm O.D. thin-walled tube sample

LOG OF TEST BORING NO. B-30

PROJECT B.I.A Project N5001 (1) 1,2 & 4, Newcomb to Toadlena
Navajo Nation, New Mexico

JOB NO. 13-517-00063 **DATE** 9/24/13

LOCATION N. 4011733.85
E. 694525.96
RIG TYPE CME-75
BORING TYPE 152.4 mm H.S.A
SURFACE ELEV. 1859.79
DATUM

Depth In Meters	Blows per 152 mm	Graphical Log	Sample	Sample Type	Blow Counts	Dry Density Kg. per Cubic meter	Moisture Content Percent of Dry Weight	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0.0				A				SM	A-2-4	**SAND** predominantly fine grained, nonplastic, yellowish-brown
0.5										
1.0										Stopped auger at 1 M (3.28')
1.5										

GROUNDWATER

DEPTH (m)	HOUR	DATE

SAMPLE TYPE
A - Auger cuttings; NR-No Recovery
S - 51mm O.D. 35mm i.D. tube sample.
U - 76mm O.D. 61mm i.D. tube sample.
T - 25mm O.D. thin-walled tube sample

LOG OF TEST BORING NO. B-31

PROJECT B.I.A Project N5001 (1) 1,2 & 4, Newcomb to Toadlena
Navajo Nation, New Mexico

JOB NO. 13-517-00063 **DATE** 9/24/13

LOCATION N. 4011799.06
E. 694724.18
RIG TYPE CME-75
BORING TYPE 152.4 mm H.S.A
SURFACE ELEV. 1861.20
DATUM

Depth in Meters	Blows per 152 mm	Graphical Log	Sample	Sample Type	Blow Counts	Dry Density Kg. per Cubic meter	Moisture Content Percent of Dry Weight	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0.0				A				SM	A-4	**SILTY SAND** predominantly fine grained, low plasticity, yellowish-brown
0.5										
1.0										Stopped auger at 1 M (3.28')
1.5										

GROUNDWATER

DEPTH (m)	HOUR	DATE

SAMPLE TYPE
A - Auger cuttings; NR-No Recovery
S - 51mm O.D. 35mm I.D. tube sample.
U - 76mm O.D. 61mm I.D. tube sample.
T - 25mm O.D. thin-walled tube sample

LOG OF TEST BORING NO. B-32

PROJECT B.I.A Project N5001 (1) 1,2 & 4, Newcomb to Toadlena
Navajo Nation, New Mexico

JOB NO. 13-517-00063 **DATE** 9/24/13

LOCATION N. 4011818.28
E. 694927.39
RIG TYPE CME-75
BORING TYPE 152.4 mm H.S.A
SURFACE ELEV. 1856.14
DATUM

Depth in Meters	Blows per 152 mm	Graphical Log	Sample	Sample Type	Blow Counts	Dry Density Kg. per Cubic meter	Moisture Content Percent of Dry Weight	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0.0				A				CL	A-4	**SANDY CLAY** medium plasticity, yellowish-brown
0.5										
1.0										Stopped auger at 1 M (3.28')
1.5										

GROUNDWATER

DEPTH (m)	HOUR	DATE

SAMPLE TYPE
A - Auger cuttings; NR-No Recovery
S - 51mm O.D. 35mm I.D. tube sample.
U - 76mm O.D. 61mm I.D. tube sample.
T - 25mm O.D. thin-walled tube sample

LOG OF TEST BORING NO. B-33

PROJECT B.I.A Project N5001 (1) 1,2 & 4, Newcomb to Toadlena
Navajo Nation, New Mexico

JOB NO. 13-517-00063 **DATE** 9/24/13

LOCATION N. 4011830.51
E. 695130.75
RIG TYPE CME-75
BORING TYPE 152.4 mm H.S.A
SURFACE ELEV. 1848.92
DATUM

Depth in Meters	Blows per 152 mm	Graphical Log	Sample	Sample Type	Blow Counts	Dry Density Kg. per Cubic meter	Moisture Content Percent of Dry Weight	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0.0				A				SM	A-2-4	**SILTY SAND** predominantly fine grained, nonplastic, yellowish-brown
0.5										
1.0										Stopped auger at 1 M (3.28')
1.5										

GROUNDWATER

	DEPTH (m)	HOUR	DATE
▽			
▼			

SAMPLE TYPE
A - Auger cuttings; NR-No Recovery
S - 51mm O.D. 35mm I.D. tube sample.
U - 76mm O.D. 61mm I.D. tube sample.
T - 25mm O.D. thin-walled tube sample

LOG OF TEST BORING NO. B-34

PROJECT B.I.A Project N5001 (1) 1,2 & 4, Newcomb to Toadlena
Navajo Nation, New Mexico

JOB NO. 13-517-00063 **DATE** 9/24/13

LOCATION N. 4011805.37
E. 695335.49
RIG TYPE CME-75
BORING TYPE 152.4 mm H.S.A
SURFACE ELEV. 1844.05
DATUM

Depth in Meters	Blows per 152 mm	Graphical Log	Sample	Sample Type	Blow Counts	Dry Density Kg. per Cubic meter	Moisture Content Percent of Dry Weight	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0.0				A				SM	A-2-4	**SILTY SAND** trace gravel to 12.7 mm, predominantly fine grained, nonplastic, brown
0.5										
1.0										Stopped auger at 1 M (3.28')
1.5										

GROUNDWATER

DEPTH (m)	HOUR	DATE

SAMPLE TYPE
A - Auger cuttings; NR-No Recovery
S - 51mm O.D. 35mm I.D. tube sample.
U - 76mm O.D. 61mm I.D. tube sample.
T - 25mm O.D. thin-walled tube sample

LOG OF TEST BORING NO. B-35

PROJECT B.I.A Project N5001 (1) 1,2 & 4, Newcomb to Toadlena
Navajo Nation, New Mexico

JOB NO. 13-517-00063 **DATE** 9/24/13

LOCATION N. 4011781.99
E. 695551.46
RIG TYPE CME-75
BORING TYPE 152.4 mm H.S.A
SURFACE ELEV. 1835.27
DATUM

Depth in Meters	Blows per 152 mm	Graphical Log	Sample	Sample Type	Blow Counts	Dry Density Kg. per Cubic meter	Moisture Content Percent of Dry Weight	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0.0				A				SM	A-4	**SILTY SAND** trace gravel to 25.4 mm, predominantly fine grained, brown
0.5										
1.0										Stopped auger at 1 M (3.28')
1.5										

GROUNDWATER

	DEPTH (m)	HOUR	DATE
▽			
▼			

SAMPLE TYPE
A - Auger cuttings; NR-No Recovery
S - 51mm O.D. 35mm I.D. tube sample.
U - 76mm O.D. 61mm I.D. tube sample.
T - 25mm O.D. thin-walled tube sample

LOG OF TEST BORING NO. B-36

PROJECT B.I.A Project N5001 (1) 1,2 & 4, Newcomb to Toadlena
Navajo Nation, New Mexico

JOB NO. 13-517-00063 **DATE** 9/24/13

LOCATION N. 4011866.12
E. 695738.22
RIG TYPE CME-75
BORING TYPE 152.4 mm H.S.A
SURFACE ELEV. 1837.63
DATUM

Depth in Meters	Blows per 152 mm	Graphical Log	Sample	Sample Type	Blow Counts	Dry Density Kg. per Cubic meter	Moisture Content Percent of Dry Weight	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0.0				A				SM	A-2-4	**SILTY SAND** trace gravel to 76.2 mm, predominantly fine grained, nonplastic, brown
0.5										color change to light brown
1.0										Stopped auger at 1 M (3.28')
1.5										

GROUNDWATER

	DEPTH (m)	HOUR	DATE
▽			
▼			

SAMPLE TYPE
A - Auger cuttings; NR-No Recovery
S - 51mm O.D. 35mm I.D. tube sample.
U - 76mm O.D. 61mm I.D. tube sample.
T - 25mm O.D. thin-walled tube sample

LOG OF TEST BORING NO. B-37

PROJECT B.I.A Project N5001 (1) 1,2 & 4, Newcomb to Toadlena
Navajo Nation, New Mexico

JOB NO. 13-517-00063 **DATE** 9/24/13

LOCATION N. 4011923.54
E. 695934.07
RIG TYPE CME-75
BORING TYPE 152.4 mm H.S.A
SURFACE ELEV. 1830.01
DATUM

Depth in Meters	Blows per 152 mm	Graphical Log	Sample	Sample Type	Blow Counts	Dry Density Kg. per Cubic meter	Moisture Content Percent of Dry Weight	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0.0				NR				SM		**SILTY SAND** with cobbles to 228.6 mm, predominantly fine grained, nonplastic, brown
										Refusal at 0.3048 M due to cobbles
0.5										
1.0										
1.5										

GROUNDWATER

DEPTH (m)	HOUR	DATE

SAMPLE TYPE
A - Auger cuttings; NR-No Recovery
S - 51mm O.D. 35mm I.D. tube sample.
U - 76mm O.D. 61mm I.D. tube sample.
T - 25mm O.D. thin-walled tube sample

LOG OF TEST BORING NO. B-38

PROJECT B.I.A Project N5001 (1) 1,2 & 4, Newcomb to Toadlena
Navajo Nation, New Mexico

JOB NO. 13-517-00063 **DATE** 9/24/13

LOCATION N. 4011980.96
E. 696129.91
RIG TYPE CME-75
BORING TYPE 152.4 mm H.S.A
SURFACE ELEV. 1820.83
DATUM

Depth in Meters	Blows per 152 mm	Graphical Log	Sample	Sample Type	Blow Counts	Dry Density Kg. per Cubic meter	Moisture Content Percent of Dry Weight	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0.0				A				CL	A-4	**SANDY CLAY** trace gravel to 9.52 mm, predominantly fine grained, medium plasticity, reddish-brown
0.5										
1.0										Stopped auger at 1 M (3.28')
1.5										

GROUNDWATER

DEPTH (m)	HOUR	DATE

SAMPLE TYPE
A - Auger cuttings; NR-No Recovery
S - 51mm O.D. 35mm I.D. tube sample.
U - 76mm O.D. 61mm I.D. tube sample.
T - 25mm O.D. thin-walled tube sample

LOG OF TEST BORING NO. B-39

PROJECT B.I.A Project N5001 (1) 1,2 & 4, Newcomb to Toadlena
Navajo Nation, New Mexico

JOB NO. 13-517-00063 **DATE** 9/24/13

LOCATION N. 4011912.13
E. 696315.08
RIG TYPE CME-75
BORING TYPE 152.4 mm H.S.A
SURFACE ELEV. 1819.66
DATUM

Depth in Meters	Blows per 152 mm	Graphical Log	Sample	Sample Type	Blow Counts	Dry Density Kg. per Cubic meter	Moisture Content Percent of Dry Weight	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0.0				A				GP-GM	A-1-a	**SANDY SILTY GRAVEL** with cobbles to 101.6 MM and gravel to 76.2 mm, predominantly fine to medium grained, nonplastic to low plasticity, brown
0.5										
1.0										Stopped auger at 1 M (3.28')
1.5										

GROUNDWATER

DEPTH (m)	HOUR	DATE

SAMPLE TYPE
A - Auger cuttings; NR-No Recovery
S - 51mm O.D. 35mm I.D. tube sample.
U - 76mm O.D. 61mm I.D. tube sample.
T - 25mm O.D. thin-walled tube sample

LOG OF TEST BORING NO. B-40

PROJECT B.I.A Project N5001 (1) 1,2 & 4, Newcomb to Toadlena
Navajo Nation, New Mexico

JOB NO. 13-517-00063 **DATE** 9/24/13

LOCATION N. 4012006.6
E. 696536.22
RIG TYPE CME-75
BORING TYPE 152.4 mm H.S.A
SURFACE ELEV. 1814.99
DATUM

Depth in Meters	Blows per 152 mm	Graphical Log	Sample	Sample Type	Blow Counts	Dry Density Kg. per Cubic meter	Moisture Content Percent of Dry Weight	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0.0				A				CL-ML	A-4	**SANDY SILTY CLAY** trace gravel to 19.05 mm, low plasticity, brown
0.5										
1.0										Stopped auger at 1 M (3.28')
1.5										

GROUNDWATER

	DEPTH (m)	HOUR	DATE
▽			
▼			

SAMPLE TYPE
A - Auger cuttings; NR-No Recovery
S - 51mm O.D. 35mm I.D. tube sample.
U - 76mm O.D. 61mm I.D. tube sample.
T - 25mm O.D. thin-walled tube sample

LOG OF TEST BORING NO. B-41

PROJECT B.I.A Project N5001 (1) 1,2 & 4, Newcomb to Toadlena
Navajo Nation, New Mexico

JOB NO. 13-517-00063 **DATE** 9/24/13

LOCATION N. 4012052.26
E. 696734.02
RIG TYPE CME-75
BORING TYPE 152.4 mm H.S.A
SURFACE ELEV. 1818.15
DATUM

Depth In Meters	Blows per 152 mm	Graphical Log	Sample	Sample Type	Blow Counts	Dry Density Kg. per Cubic meter	Moisture Content Percent of Dry Weight	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0.0				A				GP_GM	A-1-a	**GRAVELLY SILTY SAND** some silt, trace cobbles to 101.6 mm, predominantly fine grained, nonplastic, brown
0.5										
1.0										Stopped auger at 1 M (3.28')
1.5										

GROUNDWATER

DEPTH (m)	HOUR	DATE

SAMPLE TYPE
A - Auger cuttings; NR-No Recovery
S - 51mm O.D. 35mm I.D. tube sample.
U - 76mm O.D. 61mm I.D. tube sample.
T - 25mm O.D. thin-walled tube sample

LOG OF TEST BORING NO. B-42

PROJECT B.I.A Project N5001 (1) 1,2 & 4, Newcomb to Toadlena
Navajo Nation, New Mexico

JOB NO. 13-517-00063 **DATE** 9/24/13

LOCATION N. 4012097.93
E. 696931.83
RIG TYPE CME-75
BORING TYPE 152.4 mm H.S.A
SURFACE ELEV. 1813.23
DATUM

Depth in Meters	Blows per 152 mm	Graphical Log	Sample	Sample Type	Blow Counts	Dry Density Kg. per Cubic meter	Moisture Content Percent of Dry Weight	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0.0				A				SM	A-2-4	**SILTY SAND** trace gravel to 25.4 mm and cobbles at the surface, predominantly fine grained, nonplastic, light brown
0.5										increasing gravels
1.0										Stopped auger at 1 M (3.28')
1.5										

GROUNDWATER

	DEPTH (m)	HOUR	DATE
▽			
▼			

SAMPLE TYPE
A - Auger cuttings; NR-No Recovery
S - 51mm O.D. 35mm I.D. tube sample.
U - 76mm O.D. 61mm I.D. tube sample.
T - 25mm O.D. thin-walled tube sample

LOG OF TEST BORING NO. B-43

PROJECT B.I.A Project N5001 (1) 1,2 & 4, Newcomb to Toadlena
Navajo Nation, New Mexico

JOB NO. 13-517-00063 **DATE** 9/24/13

LOCATION N. 4012178.64
E. 697117.39
RIG TYPE CME-75
BORING TYPE 152.4 mm H.S.A
SURFACE ELEV. 1807.45
DATUM

Depth In Meters	Blows per 152 mm	Graphical Log	Sample	Sample Type	Blow Counts	Dry Density Kg. per Cubic meter	Moisture Content Percent of Dry Weight	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0.0				A				GP-GM	A-1-a	**GRAVELLY SILTY SAND** with gravel to 76.2 mm, predominantly fine grained, nonplastic, brown
0.5										
1.0										Stopped auger at 1 M (3.28')
1.5										

GROUNDWATER

	DEPTH (m)	HOUR	DATE
▽			
▼			

SAMPLE TYPE
A - Auger cuttings; NR-No Recovery
S - 51mm O.D. 35mm I.D. tube sample.
U - 76mm O.D. 61mm I.D. tube sample.
T - 25mm O.D. thin-walled tube sample

LOG OF TEST BORING NO. B-44

PROJECT B.I.A Project N5001 (1) 1,2 & 4, Newcomb to Toadlena
Navajo Nation, New Mexico

JOB NO. 13-517-00063 **DATE** 9/24/13

LOCATION N. 4012272.69
E. 697295.09
RIG TYPE CME-75
BORING TYPE 152.4 mm H.S.A
SURFACE ELEV. 1807.29
DATUM

Depth in Meters	Blows per 152 mm	Graphical Log	Sample	Sample Type	Blow Counts	Dry Density Kg. per Cubic meter	Moisture Content Percent of Dry Weight	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0.0				A				SM	A-1-b	**SILTY SAND** with cobbles to 127.0 mm and gravel to 76.2 mm, predominantly fine grained, nonplastic, brown
0.5										Refusal at .6604 M due to cobbles
1.0										
1.5										

GROUNDWATER

	DEPTH (m)	HOUR	DATE
▽			
▼			

SAMPLE TYPE
A - Auger cuttings; NR-No Recovery
S - 51mm O.D. 35mm I.D. tube sample.
U - 76mm O.D. 61mm I.D. tube sample.
T - 25mm O.D. thin-walled tube sample

LOG OF TEST BORING NO. B-45

PROJECT B.I.A Project N5001 (1) 1,2 & 4, Newcomb to Toadlena
Navajo Nation, New Mexico

JOB NO. 13-517-00063 **DATE** 9/24/13

LOCATION N. 4012288.7
E. 697485.26
RIG TYPE CME-75
BORING TYPE 152.4 mm H.S.A
SURFACE ELEV. 1806.60
DATUM

Depth In Meters	Blows per 152 mm	Graphical Log	Sample	Sample Type	Blow Counts	Dry Density Kg. per Cubic meter	Moisture Content Percent of Dry Weight	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0.0										Asphalt millings on surface
				A				CH	A-7-6	**SANDY CLAY** trace calcareous cementation, medium to high plasticity, yellowish-brown
0.5										
1.0										Stopped auger at 1 M (3.28')
1.5										

GROUNDWATER

	DEPTH (m)	HOUR	DATE
▽			
▼			

SAMPLE TYPE
A - Auger cuttings; NR-No Recovery
S - 51mm O.D. 35mm I.D. tube sample.
U - 76mm O.D. 61mm I.D. tube sample.
T - 25mm O.D. thin-walled tube sample

LOG OF TEST BORING NO. B-46

PROJECT B.I.A Project N5001 (1) 1,2 & 4, Newcomb to Toadlena
Navajo Nation, New Mexico

JOB NO. 13-517-00063 **DATE** 9/24/13

LOCATION N. 4012192.33
E. 697691.7
RIG TYPE CME-75
BORING TYPE 152.4 mm H.S.A
SURFACE ELEV. 1809.22
DATUM

Depth in Meters	Blows per 152 mm	Graphical Log	Sample	Sample Type	Blow Counts	Dry Density Kg. per Cubic meter	Moisture Content Percent of Dry Weight	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0.0				A						Asphalt millings on surface
								SM	A-2-4	**SILTY SAND** trace gravel to 12.7 mm, predominantly fine grained, nonplastic, yellowish-brown
0.5										
1.0										Stoppped auger at 1 M (3.28')
1.5										

GROUNDWATER

	DEPTH (m)	HOUR	DATE
▽			
▼			

SAMPLE TYPE
A - Auger cuttings; NR-No Recovery
S - 51mm O.D. 35mm I.D. tube sample.
U - 76mm O.D. 61mm I.D. tube sample.
T - 25mm O.D. thin-walled tube sample

LOG OF TEST BORING NO. B-47

PROJECT B.I.A Project N5001 (1) 1,2 & 4, Newcomb to Toadlena
Navajo Nation, New Mexico

JOB NO. 13-517-00063 **DATE** 9/24/13

LOCATION N. 4012068.05
E. 697851.78
RIG TYPE CME-75
BORING TYPE 152.4 mm H.S.A
SURFACE ELEV. 1802.38
DATUM

Depth In Meters	Blows per 152 mm	Graphical Log	Sample	Sample Type	Blow Counts	Dry Density Kg. per Cubic meter	Moisture Content Percent of Dry Weight	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0.0				A				SM	A-2-4	**SILTY SAND** trace gravel to 19.05 mm and cobbles on surface, predominantly fine grained, nonplastic, brown
0.5										
1.0										Stoppped auger at 1 M (3.28')
1.5										

GROUNDWATER

DEPTH (m)	HOUR	DATE

SAMPLE TYPE
A - Auger cuttings; NR-No Recovery
S - 51mm O.D. 35mm I.D. tube sample.
U - 76mm O.D. 61mm I.D. tube sample.
T - 25mm O.D. thin-walled tube sample

LOG OF TEST BORING NO. B-48

PROJECT B.I.A Project N5001 (1) 1,2 & 4, Newcomb to Toadlena
Navajo Nation, New Mexico

JOB NO. 13-517-00063 **DATE** 9/24/13

LOCATION N. 4012037.52
E. 698069.43
RIG TYPE CME-75
BORING TYPE 152.4 mm H.S.A
SURFACE ELEV. 1811.55
DATUM

Depth in Meters	Blows per 152 mm	Graphical Log	Sample	Sample Type	Blow Counts	Dry Density Kg. per Cubic meter	Moisture Content Percent of Dry Weight	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0.0				A				SM	A-2-4	**SILTY SAND** trace gravel to 12.7 mm and 152.4 mm cobbles on suface, predominantly fine grained, nonplastic, brown
0.5										
1.0										Stoppped auger at 1 M (3.28')
1.5										

GROUNDWATER

	DEPTH (m)	HOUR	DATE
▽			
▼			

SAMPLE TYPE
A - Auger cuttings; NR-No Recovery
S - 51mm O.D. 35mm I.D. tube sample.
U - 76mm O.D. 61mm I.D. tube sample.
T - 25mm O.D. thin-walled tube sample

LOG OF TEST BORING NO. B-49

PROJECT B.I.A Project N5001 (1) 1,2 & 4, Newcomb to Toadlena
Navajo Nation, New Mexico

JOB NO. 13-517-00063 **DATE** 9/24/13

LOCATION N. 4012092.02
E. 698264.66
RIG TYPE CME-75
BORING TYPE 152.4 mm H.S.A
SURFACE ELEV. 1814.08
DATUM

Depth In Meters	Blows per 152 mm	Graphical Log	Sample	Sample Type	Blow Counts	Dry Density Kg. per Cubic meter	Moisture Content Percent of Dry Weight	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0.0				A				CH	A-7-6	**SANDY CLAY** trace gravel to 12.7 mm and 127.0 mm cobbles on surface, medium plasticity, dark brown
0.5										trace weathered shale
1.0										Stoppped auger at 1 M (3.28')
1.5										

GROUNDWATER

	DEPTH (m)	HOUR	DATE
▽			
▼			

SAMPLE TYPE
A - Auger cuttings; NR-No Recovery
S - 51mm O.D. 35mm I.D. tube sample.
U - 76mm O.D. 61mm I.D. tube sample.
T - 25mm O.D. thin-walled tube sample

LOG OF TEST BORING NO. B-50

PROJECT B.I.A Project N5001 (1) 1,2 & 4, Newcomb to Toadlena
Navajo Nation, New Mexico

JOB NO. 13-517-00063 **DATE** 9/24/13

LOCATION N. 4012135.15
E. 698464.73
RIG TYPE CME-75
BORING TYPE 152.4 mm H.S.A
SURFACE ELEV. 1807.16
DATUM

Depth In Meters	Blows per 152 mm	Graphical Log	Sample	Sample Type	Blow Counts	Dry Density Kg. per Cubic meter	Moisture Content Percent of Dry Weight	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0.0				A				SM	A-1-b	**SILTY SAND** some cobble to 127.0 mm and gravel to 50.8 mm, predominantly fine grained, nonplastic, brown
0.5										
1.0										Stopped auger at 1 M (3.28')
1.5										

GROUNDWATER

	DEPTH (m)	HOUR	DATE
▽			
▼			

SAMPLE TYPE
A - Auger cuttings; NR-No Recovery
S - 51mm O.D. 35mm i.D. tube sample.
U - 76mm O.D. 61mm i.D. tube sample.
T - 25mm O.D. thin-walled tube sample

LOG OF TEST BORING NO. B-51

PROJECT B.I.A Project N5001 (1) 1,2 & 4, Newcomb to Toadlena
Navajo Nation, New Mexico

JOB NO. 13-517-00063 **DATE** 9/24/13

LOCATION N. 4012066.59
E. 698656.16
RIG TYPE CME-75
BORING TYPE 152.4 mm H.S.A
SURFACE ELEV. 1806.28
DATUM

Depth in Meters	Blows per 152 mm	Graphical Log	Sample	Sample Type	Blow Counts	Dry Density Kg. per Cubic meter	Moisture Content Percent of Dry Weight	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0.0				A				SM	A-2-4	**SILTY SAND** trace gravel to 9.52 mm, predominantly fine grained, nonplastic, brown
0.5										**SANDSTONE** weathered, nonplastic, greenish-brown
1.0										End of Boring @ 3.28'
1.5										

GROUNDWATER

DEPTH (m)	HOUR	DATE

SAMPLE TYPE
A - Auger cuttings; NR-No Recovery
S - 51mm O.D. 35mm I.D. tube sample.
U - 76mm O.D. 61mm I.D. tube sample.
T - 25mm O.D. thin-walled tube sample

LOG OF TEST BORING NO. B-52

PROJECT B.I.A Project N5001 (1) 1,2 & 4, Newcomb to Toadlena
Navajo Nation, New Mexico

JOB NO. 13-517-00063 **DATE** 9/24/13

LOCATION N. 4011998.03
E. 698847.58
RIG TYPE CME-75
BORING TYPE 152.4 mm H.S.A
SURFACE ELEV. 1813.80
DATUM

Depth In Meters	Blows per 152 mm	Graphical Log	Sample	Sample Type	Blow Counts	Dry Density Kg. per Cubic meter	Moisture Content Percent of Dry Weight	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0.0				A				SM	A-2-4	**SILTY SAND** trace gravel to 9.52 mm and 127.0 mm cobbles on the surface, predominantly fine grained, nonplastic, brown
0.5										
1.0										Stopped auger at 1 M (3.28')
1.5										

GROUNDWATER

	DEPTH (m)	HOUR	DATE
▽			
▼			

SAMPLE TYPE
A - Auger cuttings; NR-No Recovery
S - 51mm O.D. 35mm I.D. tube sample.
U - 76mm O.D. 61mm I.D. tube sample.
T - 25mm O.D. thin-walled tube sample

LOG OF TEST BORING NO. B-53

PROJECT B.I.A Project N5001 (1) 1,2 & 4, Newcomb to Toadlena
Navajo Nation, New Mexico

JOB NO. 13-517-00063 **DATE** 9/24/13

LOCATION N. 4011981.45
E. 699051.32
RIG TYPE CME-75
BORING TYPE 152.4 mm H.S.A
SURFACE ELEV. 1811.76
DATUM

Depth in Meters	Blows per 152 mm	Graphical Log	Sample	Sample Type	Blow Counts	Dry Density Kg. per Cubic meter	Moisture Content Percent of Dry Weight	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0.0				A				GP-GM	A-1-a	**GRAVELLY SILTY SAND** with gravel to 31.75 mm, predominantly fine grained, nonplastic, light brown
0.5										
1.0										Stopped auger at 1 M (3.28')
1.5										

GROUNDWATER

DEPTH (m)	HOUR	DATE

SAMPLE TYPE
A - Auger cuttings; NR-No Recovery
S - 51mm O.D. 35mm I.D. tube sample.
U - 76mm O.D. 61mm I.D. tube sample.
T - 25mm O.D. thin-walled tube sample

LOG OF TEST BORING NO. B-54

PROJECT B.I.A Project N5001 (1) 1,2 & 4, Newcomb to Toadlena
Navajo Nation, New Mexico

JOB NO. 13-517-00063 **DATE** 9/24/13

LOCATION N. 4012049.1
E. 699251.23
RIG TYPE CME-75
BORING TYPE 152.4 mm H.S.A
SURFACE ELEV. 1808.55
DATUM

Depth In Meters	Blows per 152 mm	Graphical Log	Sample	Sample Type	Blow Counts	Dry Density Kg. per Cubic meter	Moisture Content Percent of Dry Weight	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0.0										Asphalt millings
				A				SM	A-1-b	**SILTY SAND** trace cobbles to 203.2 mm, with gravel to 50.8 mm, predominantly fine grained, nonplastic, yellowish-brown
0.5										
1.0										Stopped auger at 1 M (3.28')
1.5										

GROUNDWATER

DEPTH (m)	HOUR	DATE

SAMPLE TYPE
A - Auger cuttings; NR-No Recovery
S - 51mm O.D. 35mm I.D. tube sample.
U - 76mm O.D. 61mm I.D. tube sample.
T - 25mm O.D. thin-walled tube sample

LOG OF TEST BORING NO. B-55

PROJECT B.I.A Project N5001 (1) 1,2 & 4, Newcomb to Toadlena
Navajo Nation, New Mexico

JOB NO. 13-517-00063 **DATE** 9/24/13

LOCATION N. 4012114.77
E. 699444.53
RIG TYPE CME-75
BORING TYPE 152.4 mm H.S.A
SURFACE ELEV. 1805.42
DATUM

Depth in Meters	Blows per 152 mm	Graphical Log	Sample	Sample Type	Blow Counts	Dry Density Kg. per Cubic meter	Moisture Content Percent of Dry Weight	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0.0				A				CL	A-6	**SANDY CLAY** trace gravel to 12.7 mm, predominantly fine grained, medium plasticity, yellowish-brown
0.5										
1.0										Stopped auger at 1 M (3.28')
1.5										

GROUNDWATER

DEPTH (m)	HOUR	DATE

SAMPLE TYPE
A - Auger cuttings; NR-No Recovery
S - 51mm O.D. 35mm I.D. tube sample.
U - 76mm O.D. 61mm I.D. tube sample.
T - 25mm O.D. thin-walled tube sample

LOG OF TEST BORING NO. B-56

PROJECT B.I.A Project N5001 (1) 1,2 & 4, Newcomb to Toadlena
Navajo Nation, New Mexico

JOB NO. 13-517-00063 **DATE** 9/24/13

LOCATION N. 4012180.44
E. 699637.84
RIG TYPE CME-75
BORING TYPE 152.4 mm H.S.A
SURFACE ELEV. 1802.61
DATUM

Depth in Meters	Blows per 152 mm	Graphical Log	Sample	Sample Type	Blow Counts	Dry Density Kg. per Cubic meter	Moisture Content Percent of Dry Weight	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0.0										Asphalt millings
								SC	A-4	**CLAYEY SAND** trace gravel to 12.7 mm, predominantly fine grained, low plasticity, brown
				A						
0.5										
								SM	A-2-4	**SAND** trace gravel to 12.7 mm, nonplastic , brown
1.0										Stopped auger at 1 M (3.28')
1.5										

GROUNDWATER

DEPTH (m)	HOUR	DATE

SAMPLE TYPE
A - Auger cuttings; NR-No Recovery
S - 51mm O.D. 35mm I.D. tube sample.
U - 76mm O.D. 61mm I.D. tube sample.
T - 25mm O.D. thin-walled tube sample

LOG OF TEST BORING NO. B-57

PROJECT B.I.A Project N5001 (1) 1,2 & 4, Newcomb to Toadlena
Navajo Nation, New Mexico

JOB NO. 13-517-00063 **DATE** 9/24/13

LOCATION N. 4012246.77
E. 699827.69
RIG TYPE CME-75
BORING TYPE 152.4 mm H.S.A
SURFACE ELEV. 1802.11
DATUM

Depth in Meters	Blows per 152 mm	Graphical Log	Sample	Sample Type	Blow Counts	Dry Density Kg. per Cubic meter	Moisture Content Percent of Dry Weight	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0.0				A				SM	A-2-4	**SILTY SAND** predominantly fine grained, nonplastic, brown
0.5										
1.0										Stopped auger at 1 M (3.28')
1.5										

GROUNDWATER

	DEPTH (m)	HOUR	DATE
▽			
▼			

SAMPLE TYPE
A - Auger cuttings; NR-No Recovery
S - 51mm O.D. 35mm I.D. tube sample.
U - 76mm O.D. 61mm I.D. tube sample.
T - 25mm O.D. thin-walled tube sample

LOG OF TEST BORING NO. B-58

PROJECT B.I.A Project N5001 (1) 1,2 & 4, Newcomb to Toadlena
Navajo Nation, New Mexico

JOB NO. 13-517-00063 **DATE** 9/24/13

LOCATION N. 4012339.45
E. 700012.99
RIG TYPE CME-75
BORING TYPE 152.4 mm H.S.A
SURFACE ELEV. 1802.93
DATUM

Depth in Meters	Blows per 152 mm	Graphical Log	Sample	Sample Type	Blow Counts	Dry Density Kg. per Cubic meter	Moisture Content Percent of Dry Weight	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0.0				A				SM	A-2-4	**SILTY SAND** trace gravel to 12.7 mm, predominantly fine grained, nonplastic, greenish-brown
0.5										
1.0										Stopped auger at 1 M (3.28')
1.5										

GROUNDWATER

	DEPTH (m)	HOUR	DATE
▽			
▼			

SAMPLE TYPE
A - Auger cuttings; NR-No Recovery
S - 51mm O.D. 35mm I.D. tube sample.
U - 76mm O.D. 61mm I.D. tube sample.
T - 25mm O.D. thin-walled tube sample

LOG OF TEST BORING NO. B-59

PROJECT B.I.A Project N5001 (1) 1,2 & 4, Newcomb to Toadlena
Navajo Nation, New Mexico

JOB NO. 13-517-00063 **DATE** 9/24/13

LOCATION N. 4012472.38
E. 700166.89
RIG TYPE CME-75
BORING TYPE 152.4 mm H.S.A
SURFACE ELEV. 1803.91
DATUM

Depth in Meters	Blows per 152 mm	Graphical Log	Sample	Sample Type	Blow Counts	Dry Density Kg. per Cubic meter	Moisture Content Percent of Dry Weight	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0.0				A				SC	A-2-6	**CLAYEY SAND** trace gravel to 25.4 mm, predominantly fine grained, medium plasticity, light brown
0.5										
1.0										Stopped auger at 1 M (3.28')
1.5										

GROUNDWATER

	DEPTH (m)	HOUR	DATE
▽			
▼			

SAMPLE TYPE
A - Auger cuttings; NR-No Recovery
S - 51mm O.D. 35mm I.D. tube sample.
U - 76mm O.D. 61mm I.D. tube sample.
T - 25mm O.D. thin-walled tube sample

LOG OF TEST BORING NO. B-60

PROJECT B.I.A Project N5001 (1) 1,2 & 4, Newcomb to Toadlena
Navajo Nation, New Mexico

JOB NO. 13-517-00063 **DATE** 9/24/13

LOCATION N. 4012605.31
E. 700320.8
RIG TYPE CME-75
BORING TYPE 152.4 mm H.S.A
SURFACE ELEV. 1802.01
DATUM

Depth in Meters	Blows per 152 mm	Graphical Log	Sample	Sample Type	Blow Counts	Dry Density Kg. per Cubic meter	Moisture Content Percent of Dry Weight	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0.0				A				SC	A-2-4	**CLAYEY SAND** trace gravel to 25.4 mm, predominantly fine grained, low to medium plasticity, brown to light brown
0.5										increasing gravels
1.0										Stopped auger at 1 M (3.28')
1.5										

GROUNDWATER

	DEPTH (m)	HOUR	DATE
▽			
▼			

SAMPLE TYPE
A - Auger cuttings; NR-No Recovery
S - 51mm O.D. 35mm I.D. tube sample.
U - 76mm O.D. 61mm I.D. tube sample.
T - 25mm O.D. thin-walled tube sample

LOG OF TEST BORING NO. B-61

PROJECT B.I.A Project N5001 (1) 1,2 & 4, Newcomb to Toadlena
Navajo Nation, New Mexico

JOB NO. 13-517-00063 **DATE** 9/24/13

LOCATION N. 4012741.02
E. 700471.26
RIG TYPE CME-75
BORING TYPE 152.4 mm H.S.A
SURFACE ELEV. 1797.83
DATUM

Depth in Meters	Blows per 152 mm	Graphical Log	Sample	Sample Type	Blow Counts	Dry Density Kg. per Cubic meter	Moisture Content Percent of Dry Weight	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0.0				A				SC	A-2-4	**CLAYEY SAND** trace gravel to 19.05 mm, predominantly fine grained, medium plasticity, light brown
0.5										
1.0										Stopped auger at 1 M (3.28')
1.5										

GROUNDWATER

	DEPTH (m)	HOUR	DATE
▽			
▼			

SAMPLE TYPE
A - Auger cuttings; NR-No Recovery
S - 51mm O.D. 35mm I.D. tube sample.
U - 76mm O.D. 61mm I.D. tube sample.
T - 25mm O.D. thin-walled tube sample

LOG OF TEST BORING NO. B-62

PROJECT B.I.A Project N5001 (1) 1,2 & 4, Newcomb to Toadlena
Navajo Nation, New Mexico

JOB NO. 13-517-00063 **DATE** 9/24/13

LOCATION N. 4012876.73
E. 700621.72
RIG TYPE CME-75
BORING TYPE 152.4 mm H.S.A
SURFACE ELEV. 1794.23
DATUM

Depth in Meters	Blows per 152 mm	Graphical Log	Sample	Sample Type	Blow Counts	Dry Density Kg. per Cubic meter	Moisture Content Percent of Dry Weight	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0.0				A				SC	A-2-6	**CLAYEY SAND** trace gravel to 19.05 mm, predominantly fine grained, medium plasticity, brown to light brown
0.5										
1.0										Stopped auger at 1 M (3.28')
1.5										

GROUNDWATER

DEPTH (m)	HOUR	DATE

SAMPLE TYPE
A - Auger cuttings; NR-No Recovery
S - 51mm O.D. 35mm I.D. tube sample.
U - 76mm O.D. 61mm I.D. tube sample.
T - 25mm O.D. thin-walled tube sample

LOG OF TEST BORING NO. B-63

PROJECT B.I.A Project N5001 (1) 1,2 & 4, Newcomb to Toadlena
Navajo Nation, New Mexico

JOB NO. 13-517-00063 **DATE** 9/24/13

LOCATION N. 4013009.63
E. 700774.04
RIG TYPE CME-75
BORING TYPE 152.4 mm H.S.A
SURFACE ELEV. 1791.66
DATUM

Depth in Meters	Blows per 152 mm	Graphical Log	Sample	Sample Type	Blow Counts	Dry Density Kg. per Cubic meter	Moisture Content Percent of Dry Weight	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0.0				A				SC	A-2-4	**CLAYEY SAND** trace clay with gravel to 19.05 mm, predominantly fine grained, low to medium plasticity, brown
0.5								SM	A-1-b	**SAND** trace gravel to 25.4 mm, nonplastic, brown
1.0										Stopped auger at 1 M (3.28')
1.5										

GROUNDWATER

	DEPTH (m)	HOUR	DATE
▽			
▼			

SAMPLE TYPE
A - Auger cuttings; NR-No Recovery
S - 51mm O.D. 35mm I.D. tube sample.
U - 76mm O.D. 61mm I.D. tube sample.
T - 25mm O.D. thin-walled tube sample

LOG OF TEST BORING NO. B-64

PROJECT B.I.A Project N5001 (1) 1,2 & 4, Newcomb to Toadlena
Navajo Nation, New Mexico

JOB NO. 13-517-00063 **DATE** 9/24/13

LOCATION N. 4013142.54
E. 700926.37
RIG TYPE CME-75
BORING TYPE 152.4 mm H.S.A
SURFACE ELEV. 1790.05
DATUM

Depth in Meters	Blows per 152 mm	Graphical Log	Sample	Sample Type	Blow Counts	Dry Density Kg. per Cubic meter	Moisture Content Percent of Dry Weight	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0.0				A				SM	A-1-b	**SILTY SAND** with gravel to 50.8 mm, predominantly fine grained, nonplastic, light brown
0.5										
1.0										Stopped auger at 1 M (3.28')
1.5										

GROUNDWATER

	DEPTH (m)	HOUR	DATE
▽			
▼			

SAMPLE TYPE
A - Auger cuttings; NR-No Recovery
S - 51mm O.D. 35mm I.D. tube sample.
U - 76mm O.D. 61mm I.D. tube sample.
T - 25mm O.D. thin-walled tube sample

LOG OF TEST BORING NO. B-65

PROJECT B.I.A Project N5001 (1) 1,2 & 4, Newcomb to Toadlena
Navajo Nation, New Mexico

JOB NO. 13-517-00063 **DATE** 9/24/13

LOCATION N. 4013278.74
E. 701077.69
RIG TYPE CME-75
BORING TYPE 152.4 mm H.S.A
SURFACE ELEV. 1787.35
DATUM

Depth in Meters	Blows per 152 mm	Graphical Log	Sample	Sample Type	Blow Counts	Dry Density Kg. per Cubic meter	Moisture Content Percent of Dry Weight	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0.0				A				SM	A-1-b	**SILTY SAND** with gravel to 38.1 mm, predominantly fine grained, nonplastic, light brown
0.5										
1.0										Stopped auger at 1 M (3.28')
1.5										

GROUNDWATER

DEPTH (m)	HOUR	DATE

SAMPLE TYPE
A - Auger cuttings; NR-No Recovery
S - 51mm O.D. 35mm I.D. tube sample.
U - 76mm O.D. 61mm I.D. tube sample.
T - 25mm O.D. thin-walled tube sample

LOG OF TEST BORING NO. B-66

PROJECT B.I.A Project N5001 (1) 1,2 & 4, Newcomb to Toadlena
Navajo Nation, New Mexico

JOB NO. 13-517-00063 **DATE** 9/24/13

LOCATION N. 4013414.94
E. 701229
RIG TYPE CME-75
BORING TYPE 152.4 mm H.S.A
SURFACE ELEV. 1783.82
DATUM

Depth In Meters	Blows per 152 mm	Graphical Log	Sample	Sample Type	Blow Counts	Dry Density Kg. per Cubic meter	Moisture Content Percent of Dry Weight	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0.0				A				SM	A-2-4	**SILTY SAND** trace gravel to 19.05 mm, predominantly fine grained, nonplastic, light brown
0.5										
1.0										Stopped auger at 1 M (3.28')
1.5										

GROUNDWATER

DEPTH (m)	HOUR	DATE

SAMPLE TYPE
A - Auger cuttings; NR-No Recovery
S - 51mm O.D. 35mm I.D. tube sample.
U - 76mm O.D. 61mm I.D. tube sample.
T - 25mm O.D. thin-walled tube sample

LOG OF TEST BORING NO. B-67

PROJECT B.I.A Project N5001 (1) 1,2 & 4, Newcomb to Toadlena
Navajo Nation, New Mexico

JOB NO. 13-517-00063 **DATE** 9/24/13

LOCATION N. 4013548.14
E. 701381.26
RIG TYPE CME-75
BORING TYPE 152.4 mm H.S.A
SURFACE ELEV. 1781.05
DATUM

Depth In Meters	Blows per 152 mm	Graphical Log	Sample	Sample Type	Blow Counts	Dry Density Kg. per Cubic meter	Moisture Content Percent of Dry Weight	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0.0				A				SP		**SAND** trace gravel to 25.4 mm, nonplastic, light brown
				A				CL	A-7-6	**SAND CLAY** trace gravel to 9.52 mm, medium plasticity, brown
0.5										
1.0										Stopped auger at 1 M (3.28')
1.5										

GROUNDWATER

DEPTH (m)	HOUR	DATE

SAMPLE TYPE
A - Auger cuttings; NR-No Recovery
S - 51mm O.D. 35mm I.D. tube sample.
U - 76mm O.D. 61mm I.D. tube sample.
T - 25mm O.D. thin-walled tube sample

LOG OF TEST BORING NO. B-68

PROJECT B.I.A Project N5001 (1) 1,2 & 4, Newcomb to Toadlena
Navajo Nation, New Mexico

JOB NO. 13-517-00063 **DATE** 9/24/13

LOCATION N. 4013681.34
E. 701533.51
RIG TYPE CME-75
BORING TYPE 152.4 mm H.S.A
SURFACE ELEV. 1779.04
DATUM

Depth in Meters	Blows per 152 mm	Graphical Log	Sample	Sample Type	Blow Counts	Dry Density Kg. per Cubic meter	Moisture Content Percent of Dry Weight	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0.0				A				SC	A-2-6	**CLAYEY SAND** with gravel to 25.4 mm, predominantly fine grained, medium plasticity, light brown
0.5										
1.0										Stopped auger at 1 M (3.28')
1.5										

GROUNDWATER

	DEPTH (m)	HOUR	DATE
▽			
▼			

SAMPLE TYPE
A - Auger cuttings; NR-No Recovery
S - 51mm O.D. 35mm I.D. tube sample.
U - 76mm O.D. 61mm I.D. tube sample.
T - 25mm O.D. thin-walled tube sample

LOG OF TEST BORING NO. B-69

PROJECT B.I.A Project N5001 (1) 1,2 & 4, Newcomb to Toadlena
Navajo Nation, New Mexico

JOB NO. 13-517-00063 **DATE** 9/24/13

LOCATION N. 4013817.07
E. 701685
RIG TYPE CME-75
BORING TYPE 152.4 mm H.S.A
SURFACE ELEV. 1776.11
DATUM

Depth In Meters	Blows per 152 mm	Graphical Log	Sample	Sample Type	Blow Counts	Dry Density Kg. per Cubic meter	Moisture Content Percent of Dry Weight	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0.0				A				SC	A-2-4	**CLAYEY SAND** trace gravel to 19.05 mm, predominantly fine grained, medium plasticity, brown
0.5										
1.0										Stopped auger at 1 M (3.28')
1.5										

GROUNDWATER

	DEPTH (m)	HOUR	DATE
▽			
▼			

SAMPLE TYPE
A - Auger cuttings; NR-No Recovery
S - 51mm O.D. 35mm I.D. tube sample.
U - 76mm O.D. 61mm I.D. tube sample.
T - 25mm O.D. thin-walled tube sample

LOG OF TEST BORING NO. B-70

PROJECT B.I.A Project N5001 (1) 1,2 & 4, Newcomb to Toadlena
Navajo Nation, New Mexico

JOB NO. 13-517-00063 **DATE** 9/24/13

LOCATION N. 4013952.8
E. 701836.49
RIG TYPE CME-75
BORING TYPE 152.4 mm H.S.A
SURFACE ELEV. 1774.88
DATUM

Depth in Meters	Blows per 152 mm	Graphical Log	Sample	Sample Type	Blow Counts	Dry Density Kg. per Cubic meter	Moisture Content Percent of Dry Weight	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0.0				A				SM	A-1-b	**SILTY SAND** trace gravel to 25.4 mm, predominantly fine grained, nonplastic, light brown
0.5										
1.0										Stopped auger at 1 M (3.28')
1.5										

GROUNDWATER

	DEPTH (m)	HOUR	DATE
▽			
▼			

SAMPLE TYPE
A - Auger cuttings; NR-No Recovery
S - 51mm O.D. 35mm I.D. tube sample.
U - 76mm O.D. 61mm I.D. tube sample.
T - 25mm O.D. thin-walled tube sample

LOG OF TEST BORING NO. B-71

PROJECT B.I.A Project N5001 (1) 1,2 & 4, Newcomb to Toadlena
Navajo Nation, New Mexico

JOB NO. 13-517-00063 **DATE** 9/24/13

LOCATION N. 4014088.01
E. 701988.95
RIG TYPE CME-75
BORING TYPE 152.4 mm H.S.A
SURFACE ELEV. 1773.97
DATUM

Depth in Meters	Blows per 152 mm	Graphical Log	Sample	Sample Type	Blow Counts	Dry Density Kg. per Cubic meter	Moisture Content Percent of Dry Weight	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0.0				A				SP-SM	A-1-b	**SANDY SILT** with gravel to 25.4 mm, predominantly fine grained, nonplastic, light brown
0.5										
1.0										Stopped auger at 1 M (3.28')
1.5										

GROUNDWATER

	DEPTH (m)	HOUR	DATE
▽			
▼			

SAMPLE TYPE
A - Auger cuttings; NR-No Recovery
S - 51mm O.D. 35mm I.D. tube sample.
U - 76mm O.D. 61mm I.D. tube sample.
T - 25mm O.D. thin-walled tube sample

LOG OF TEST BORING NO. B-72

PROJECT B.I.A Project N5001 (1) 1,2 & 4, Newcomb to Toadlena
Navajo Nation, New Mexico

JOB NO. 13-517-00063 **DATE** 9/24/13

LOCATION N. 4014223.23
E. 702141.4
RIG TYPE CME-75
BORING TYPE 152.4 mm H.S.A
SURFACE ELEV. 1768.51
DATUM

Depth in Meters	Blows per 152 mm	Graphical Log	Sample	Sample Type	Blow Counts	Dry Density Kg. per Cubic meter	Moisture Content Percent of Dry Weight	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0.0				A				SC-SM	A-2-4	**CLAYEY SILTY SAND** trace gravel to 31.75 mm, predominantl fine grained, low plasticity, light brown
0.5										
1.0										Stopped auger at 1 M (3.28')
1.5										

GROUNDWATER

	DEPTH (m)	HOUR	DATE
▽			
▼			

SAMPLE TYPE
A - Auger cuttings; NR-No Recovery
S - 51mm O.D. 35mm I.D. tube sample.
U - 76mm O.D. 61mm I.D. tube sample.
T - 25mm O.D. thin-walled tube sample

LOG OF TEST BORING NO. B-73

PROJECT B.I.A Project N5001 (1) 1,2 & 4, Newcomb to Toadlena
Navajo Nation, New Mexico

JOB NO. 13-517-00063 **DATE** 9/24/13

LOCATION N. 4014358.71
E. 702291.93
RIG TYPE CME-75
BORING TYPE 152.4 mm H.S.A
SURFACE ELEV. 1767.24
DATUM

Depth in Meters	Blows per 152 mm	Graphical Log	Sample	Sample Type	Blow Counts	Dry Density Kg. per Cubic meter	Moisture Content Percent of Dry Weight	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0.0				A				SM	A-1-b	**SILTY SAND** with gravel to 25.4 mm, predominantly fine grained, nonplastic, light brown
0.5										
1.0										Stopped auger at 1 M (3.28')
1.5										

GROUNDWATER

DEPTH (m)	HOUR	DATE

SAMPLE TYPE
A - Auger cuttings; NR-No Recovery
S - 51mm O.D. 35mm I.D. tube sample.
U - 76mm O.D. 61mm I.D. tube sample.
T - 25mm O.D. thin-walled tube sample

LOG OF TEST BORING NO. B-74

PROJECT B.I.A Project N5001 (1) 1,2 & 4, Newcomb to Toadlena
Navajo Nation, New Mexico

JOB NO. 13-517-00063 **DATE** 9/24/13

LOCATION N. 4014494.18
E. 702442.47
RIG TYPE CME-75
BORING TYPE 152.4 mm H.S.A
SURFACE ELEV. 1765.72
DATUM

Depth In Meters	Blows per 152 mm	Graphical Log	Sample	Sample Type	Blow Counts	Dry Density Kg. per Cubic meter	Moisture Content Percent of Dry Weight	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0.0				A				SM	A-1-b	**SILTY SAND** trace gravel to 25.4 mm, predominantly fine grained, nonplastic, brown
0.5										
1.0										Stopped auger at 1 M (3.28')
1.5										

GROUNDWATER

	DEPTH (m)	HOUR	DATE
▽			
▼			

SAMPLE TYPE
A - Auger cuttings; NR-No Recovery
S - 51mm O.D. 35mm I.D. tube sample.
U - 76mm O.D. 61mm I.D. tube sample.
T - 25mm O.D. thin-walled tube sample

LOG OF TEST BORING NO. B-75

PROJECT B.I.A Project N5001 (1) 1,2 & 4, Newcomb to Toadlena
Navajo Nation, New Mexico

JOB NO. 13-517-00063 **DATE** 9/24/13

LOCATION N. 4014627.34
E. 702596
RIG TYPE CME-75
BORING TYPE 152.4 mm H.S.A
SURFACE ELEV. 1765.11
DATUM

Depth In Meters	Blows per 152 mm	Graphical Log	Sample	Sample Type	Blow Counts	Dry Density Kg. per Cubic meter	Moisture Content Percent of Dry Weight	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0.0								SM		**SILTY SAND** trace gravel to 25.4 mm, predominantly fine grained, nonplastic, light brown
				A				SC-SM	A-2-4	**CLAYEY SAND** trace gravel to 19.05 mm, predominantly fine grained, trace calcareous cementation, low plasticity, brown with light brown
0.5										
1.0										Stopped auger at 1 M (3.28')
1.5										

GROUNDWATER

	DEPTH (m)	HOUR	DATE
▽			
▼			

SAMPLE TYPE
A - Auger cuttings; NR-No Recovery
S - 51mm O.D. 35mm I.D. tube sample.
U - 76mm O.D. 61mm I.D. tube sample.
T - 25mm O.D. thin-walled tube sample

LOG OF TEST BORING NO. B-76

PROJECT B.I.A Project N5001 (1) 1,2 & 4, Newcomb to Toadlena
Navajo Nation, New Mexico

JOB NO. 13-517-00063 **DATE** 9/24/13

LOCATION N. 4014760.51
E. 702749.53
RIG TYPE CME-75
BORING TYPE 152.4 mm H.S.A
SURFACE ELEV. 1764.99
DATUM

Depth In Meters	Blows per 152 mm	Graphical Log	Sample	Sample Type	Blow Counts	Dry Density Kg. per Cubic meter	Moisture Content Percent of Dry Weight	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0.0				A				SM	A-2-4	**SILTY SAND** with gravel to 19.05 mm, predominantly fine grained, nonplastic, tan
0.5										
1.0										Stopped auger at 1 M (3.28')
1.5										

GROUNDWATER

DEPTH (m)	HOUR	DATE

SAMPLE TYPE
A - Auger cuttings; NR-No Recovery
S - 51mm O.D. 35mm I.D. tube sample.
U - 76mm O.D. 61mm I.D. tube sample.
T - 25mm O.D. thin-walled tube sample

LOG OF TEST BORING NO. B-77

PROJECT B.I.A Project N5001 (1) 1,2 & 4, Newcomb to Toadlena
Navajo Nation, New Mexico

JOB NO. 13-517-00063 **DATE** 9/24/13

LOCATION N. 4014897.28
E. 702900.93
RIG TYPE CME-75
BORING TYPE 152.4 mm H.S.A
SURFACE ELEV. 1761.75
DATUM

Depth in Meters	Blows per 152 mm	Graphical Log	Sample	Sample Type	Blow Counts	Dry Density Kg. per Cubic meter	Moisture Content Percent of Dry Weight	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0.0				A				SP-SM	A-1-b	**SANDY SILT** with gravel to 25.4 mm, predominantly fine grained, nonplastic, tan
0.5										
1.0										Stopped auger at 1 M (3.28')
1.5										

GROUNDWATER

	DEPTH (m)	HOUR	DATE
▽			
▼			

SAMPLE TYPE
A - Auger cuttings; NR-No Recovery
S - 51mm O.D. 35mm I.D. tube sample.
U - 76mm O.D. 61mm I.D. tube sample.
T - 25mm O.D. thin-walled tube sample

LOG OF TEST BORING NO. B-78

PROJECT B.I.A Project N5001 (1) 1,2 & 4, Newcomb to Toadlena
Navajo Nation, New Mexico

JOB NO. 13-517-00063 **DATE** 9/24/13

LOCATION N. 4015034.05
E. 703052.33
RIG TYPE CME-75
BORING TYPE 152.4 mm H.S.A
SURFACE ELEV. 1759.64
DATUM

Depth in Meters	Blows per 152 mm	Graphical Log	Sample	Sample Type	Blow Counts	Dry Density Kg. per Cubic meter	Moisture Content Percent of Dry Weight	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0.0				A				SC	A-2-4	**CLAYEY SAND** with gravel to 25.4 mm, trace calcareous cementation, predominantly fine grained, medium grained, tan
0.5										increasing gravels
1.0										Stopped auger at 1 M (3.28')
1.5										

GROUNDWATER

DEPTH (m)	HOUR	DATE

SAMPLE TYPE
A - Auger cuttings; NR-No Recovery
S - 51mm O.D. 35mm I.D. tube sample.
U - 76mm O.D. 61mm I.D. tube sample.
T - 25mm O.D. thin-walled tube sample

LOG OF TEST BORING NO. B-79

PROJECT B.I.A Project N5001 (1) 1,2 & 4, Newcomb to Toadlena
Navajo Nation, New Mexico

JOB NO. 13-517-00063 **DATE** 9/24/13

LOCATION N. 4015165.61
E. 703207.64
RIG TYPE CME-75
BORING TYPE 152.4 mm H.S.A
SURFACE ELEV. 1758.89
DATUM

Depth In Meters	Blows per 152 mm	Graphical Log	Sample	Sample Type	Blow Counts	Dry Density Kg. per Cubic meter	Moisture Content Percent of Dry Weight	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0.0				A				SM	A-1-b	**SILTY SAND** with gravel to 25.4 mm, predominantly fine grained, nonplastic, light brown
0.5										
1.0										Stopped auger at 1 M (3.28')
1.5										

GROUNDWATER

DEPTH (m)	HOUR	DATE

SAMPLE TYPE
A - Auger cuttings; NR-No Recovery
S - 51mm O.D. 35mm I.D. tube sample.
U - 76mm O.D. 61mm I.D. tube sample.
T - 25mm O.D. thin-walled tube sample

LOG OF TEST BORING NO. B-80

PROJECT B.I.A Project N5001 (1) 1,2 & 4, Newcomb to Toadlena
Navajo Nation, New Mexico

JOB NO. 13-517-00063 **DATE** 9/24/13

LOCATION N. 4015281.32
E. 703375.37
RIG TYPE CME-75
BORING TYPE 152.4 mm H.S.A
SURFACE ELEV. 1755.33
DATUM

Depth In Meters	Blows per 152 mm	Graphical Log	Sample	Sample Type	Blow Counts	Dry Density Kg. per Cubic meter	Moisture Content Percent of Dry Weight	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0.0				A				SC-SM	A-1-b	**CLAYEY SAND** with gravel to 25.4 mm, predominantly fine grained, low plasticity, light brown
0.5										
1.0										Stopped auger at 1 M (3.28')
1.5										

GROUNDWATER

DEPTH (m)	HOUR	DATE

SAMPLE TYPE
A - Auger cuttings; NR-No Recovery
S - 51mm O.D. 35mm I.D. tube sample.
U - 76mm O.D. 61mm I.D. tube sample.
T - 25mm O.D. thin-walled tube sample

LOG OF TEST BORING NO. B-81

PROJECT B.I.A Project N5001 (1) 1,2 & 4, Newcomb to Toadlena
Navajo Nation, New Mexico

JOB NO. 13-517-00063 **DATE** 9/24/13

LOCATION N. 4015409.8
E. 703533.66
RIG TYPE CME-75
BORING TYPE 152.4 mm H.S.A
SURFACE ELEV. 1752.04
DATUM

Depth in Meters	Blows per 152 mm	Graphical Log	Sample	Sample Type	Blow Counts	Dry Density Kg. per Cubic meter	Moisture Content Percent of Dry Weight	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0.0				A				SC	A-1-b	**CLAYEY SAND** with gravel to 38.1 mm, predominantly fine grained, low plasticity, brown
0.5										
1.0										Stopped auger at 1 M (3.28')
1.5										

GROUNDWATER

DEPTH (m)	HOUR	DATE

SAMPLE TYPE
A - Auger cuttings; NR-No Recovery
S - 51mm O.D. 35mm I.D. tube sample.
U - 76mm O.D. 61mm I.D. tube sample.
T - 25mm O.D. thin-walled tube sample

LOG OF TEST BORING NO. B-82

PROJECT B.I.A Project N5001 (1) 1,2 & 4, Newcomb to Toadlena
Navajo Nation, New Mexico

JOB NO. 13-517-00063 **DATE** 9/24/13

LOCATION N. 4015553.6
E. 703677.67
RIG TYPE CME-75
BORING TYPE 152.4 mm H.S.A
SURFACE ELEV. 1753.37
DATUM

Depth In Meters	Blows per 152 mm	Graphical Log	Sample	Sample Type	Blow Counts	Dry Density Kg. per Cubic meter	Moisture Content Percent of Dry Weight	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0.0				A				SM	A-1-b	**SILTY SAND** with gravel to 31.75 mm, predominantly fine grained, non plastic to low plasticity, brown
0.5										
										Refusal at 0.6096 M due to cobbles
1.0										
1.5										

GROUNDWATER

DEPTH (m)	HOUR	DATE

SAMPLE TYPE
A - Auger cuttings; NR-No Recovery
S - 51mm O.D. 35mm I.D. tube sample.
U - 76mm O.D. 61mm I.D. tube sample.
T - 25mm O.D. thin-walled tube sample

LOG OF TEST BORING NO. B-83

PROJECT B.I.A Project N5001 (1) 1,2 & 4, Newcomb to Toadlena
Navajo Nation, New Mexico

JOB NO. 13-517-00063 **DATE** 9/24/13

LOCATION N. 4015659.84
E. 703851.79
RIG TYPE CME-75
BORING TYPE 152.4 mm H.S.A
SURFACE ELEV. 1754.89
DATUM

Depth in Meters	Blows per 152 mm	Graphical Log	Sample	Sample Type	Blow Counts	Dry Density Kg. per Cubic meter	Moisture Content Percent of Dry Weight	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0.0				A				SM	A-1-b	**SILTY SAND** with gravel to 25.4 mm, predominantly fine grained, non plastic to low plasticity, light brown
0.5										
1.0										Stopped auger at 1 M (3.28')
1.5										

GROUNDWATER

DEPTH (m)	HOUR	DATE

SAMPLE TYPE
A - Auger cuttings; NR-No Recovery
S - 51mm O.D. 35mm I.D. tube sample.
U - 76mm O.D. 61mm I.D. tube sample.
T - 25mm O.D. thin-walled tube sample

LOG OF TEST BORING NO. B-84

PROJECT B.I.A Project N5001 (1) 1,2 & 4, Newcomb to Toadlena
Navajo Nation, New Mexico

JOB NO. 13-517-00063 **DATE** 9/24/13

LOCATION N. 4015766.07
E. 704025.91
RIG TYPE CME-75
BORING TYPE 152.4 mm H.S.A
SURFACE ELEV. 1748.62
DATUM

Depth in Meters	Blows per 152 mm	Graphical Log	Sample	Sample Type	Blow Counts	Dry Density Kg. per Cubic meter	Moisture Content Percent of Dry Weight	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0.0				A				SM	A-2-4	**SILTY SAND** with gravel to 25.4 mm, predominantly fine grained, nonplastic, light brown
0.5										
1.0										Stopped auger at 1 M (3.28')
1.5										

GROUNDWATER

	DEPTH (m)	HOUR	DATE
▽			
▼			

SAMPLE TYPE
A - Auger cuttings; NR-No Recovery
S - 51mm O.D. 35mm I.D. tube sample.
U - 76mm O.D. 61mm I.D. tube sample.
T - 25mm O.D. thin-walled tube sample

LOG OF TEST BORING NO. B-85

PROJECT B.I.A Project N5001 (1) 1,2 & 4, Newcomb to Toadlena
Navajo Nation, New Mexico

JOB NO. 13-517-00063 **DATE** 9/24/13

LOCATION N. 4015881.59
E. 704214.9
RIG TYPE CME-75
BORING TYPE 152.4 mm H.S.A
SURFACE ELEV. 1748.14
DATUM

Depth In Meters	Blows per 152 mm	Graphical Log	Sample	Sample Type	Blow Counts	Dry Density Kg. per Cubic meter	Moisture Content Percent of Dry Weight	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0.0				A				SM	A-1-b	**SILTY SAND** with gravel to 38.1 mm, predominantly fine grained, nonplastic, light brown
0.5										
1.0										Stopped auger at 1 M (3.28')
1.5										

GROUNDWATER

	DEPTH (m)	HOUR	DATE
▽			
▼			

SAMPLE TYPE
A - Auger cuttings; NR-No Recovery
S - 51mm O.D. 35mm I.D. tube sample.
U - 76mm O.D. 61mm I.D. tube sample.
T - 25mm O.D. thin-walled tube sample

LOG OF TEST BORING NO. B-86

PROJECT B.I.A Project N5001 (1) 1,2 & 4, Newcomb to Toadlena
Navajo Nation, New Mexico

JOB NO. 13-517-00063 **DATE** 9/24/13

LOCATION N. 4016023.07
E. 704392.54
RIG TYPE CME-75
BORING TYPE 152.4 mm H.S.A
SURFACE ELEV. 1740.17
DATUM

Depth in Meters	Blows per 152 mm	Graphical Log	Sample	Sample Type	Blow Counts	Dry Density Kg. per Cubic meter	Moisture Content Percent of Dry Weight	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0.0				A				GP-GM	A-1-a	**GRAVELLY SILTY SAND** some silt, predominantly fine grained, nonplastic, light brown
0.5										
1.0										Stopped auger at 1 M (3.28')
1.5										

GROUNDWATER

DEPTH (m)	HOUR	DATE

SAMPLE TYPE
A - Auger cuttings; NR-No Recovery
S - 51mm O.D. 35mm I.D. tube sample.
U - 76mm O.D. 61mm I.D. tube sample.
T - 25mm O.D. thin-walled tube sample

LOG OF TEST BORING NO. B-87

PROJECT B.I.A Project N5001 (1) 1,2 & 4, Newcomb to Toadlena
Navajo Nation, New Mexico

JOB NO. 13-517-00063 **DATE** 9/24/13

LOCATION N. 4016200.38
E. 704504.42
RIG TYPE CME-75
BORING TYPE 152.4 mm H.S.A
SURFACE ELEV. 1734.92
DATUM

Depth In Meters	Blows per 152 mm	Graphical Log	Sample	Sample Type	Blow Counts	Dry Density Kg. per Cubic meter	Moisture Content Percent of Dry Weight	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0.0				A				SC-SM	A-4	**CLAYEY SAND** trace gravel to 12.70 mm, predominantly fine grained, low plasticity, brown
0.5										
1.0										Stopped auger at 1 M (3.28')
1.5										

GROUNDWATER

DEPTH (m)	HOUR	DATE

SAMPLE TYPE
A - Auger cuttings; NR-No Recovery
S - 51mm O.D. 35mm I.D. tube sample.
U - 76mm O.D. 61mm I.D. tube sample.
T - 25mm O.D. thin-walled tube sample

LOG OF TEST BORING NO. B-88

PROJECT B.I.A Project N5001 (1) 1,2 & 4, Newcomb to Toadlena
Navajo Nation, New Mexico

JOB NO. 13-517-00063 **DATE** 9/24/13

LOCATION N. 4016388.93
E. 704596.24
RIG TYPE CME-75
BORING TYPE 152.4 mm H.S.A
SURFACE ELEV. 1728.88
DATUM

Depth In Meters	Blows per 152 mm	Graphical Log	Sample	Sample Type	Blow Counts	Dry Density Kg. per Cubic meter	Moisture Content Percent of Dry Weight	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0.0				A				SC	A-6	**CLAYEY SAND** trace gravel to 12.70 mm, predominantly fine grained, medium plasticity, brown
0.5										
1.0										Stopped auger at 1 M (3.28')
1.5										

GROUNDWATER

	DEPTH (m)	HOUR	DATE
▽			
▼			

SAMPLE TYPE
A - Auger cuttings; NR-No Recovery
S - 51mm O.D. 35mm I.D. tube sample.
U - 76mm O.D. 61mm I.D. tube sample.
T - 25mm O.D. thin-walled tube sample

LOG OF TEST BORING NO. B-89

PROJECT B.I.A Project N5001 (1) 1,2 & 4, Newcomb to Toadlena
Navajo Nation, New Mexico

JOB NO. 13-517-00063 **DATE** 9/24/13

LOCATION N. 4016560.4
E. 704695.87
RIG TYPE CME-75
BORING TYPE 152.4 mm H.S.A
SURFACE ELEV. 1724.33
DATUM

Depth In Meters	Blows per 152 mm	Graphical Log	Sample	Sample Type	Blow Counts	Dry Density Kg. per Cubic meter	Moisture Content Percent of Dry Weight	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0.0				A				SC	A-6	**CLAYEY SAND** trace gravel to 25.4 mm, predominantly fine grained, medium plasticity, brown
0.5										
1.0										Stopped auger at 1 M (3.28')
1.5										

GROUNDWATER

	DEPTH (m)	HOUR	DATE
▽			
▼			

SAMPLE TYPE
A - Auger cuttings; NR-No Recovery
S - 51mm O.D. 35mm I.D. tube sample.
U - 76mm O.D. 61mm I.D. tube sample.
T - 25mm O.D. thin-walled tube sample

LOG OF TEST BORING NO. B-90

PROJECT B.I.A Project N5001 (1) 1,2 & 4, Newcomb to Toadlena
Navajo Nation, New Mexico

JOB NO. 13-517-00063 **DATE** 9/24/13

LOCATION N. 4016731.87
E. 704795.51
RIG TYPE CME-75
BORING TYPE 152.4 mm H.S.A
SURFACE ELEV. 1723.66
DATUM

Depth in Meters	Blows per 152 mm	Graphical Log	Sample	Sample Type	Blow Counts	Dry Density Kg. per Cubic meter	Moisture Content Percent of Dry Weight	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0.0				A				SC	A-6	**CLAYEY SAND** trace gravel to 9.52 mm, predominantly fine grained, medium plasticity, brown
0.5				A				CL		**SILTY CLAY** trace gravel to 25.4 mm, medium plasticity, light brown
1.0										Stopped auger at 1 M (3.28')
1.5										

GROUNDWATER

DEPTH (m)	HOUR	DATE

SAMPLE TYPE
A - Auger cuttings; NR-No Recovery
S - 51mm O.D. 35mm I.D. tube sample.
U - 76mm O.D. 61mm I.D. tube sample.
T - 25mm O.D. thin-walled tube sample

LOG OF TEST BORING NO. B-91

PROJECT B.I.A Project N5001 (1) 1,2 & 4, Newcomb to Toadlena
Navajo Nation, New Mexico

JOB NO. 13-517-00063 **DATE** 9/24/13

LOCATION N. 4016871.39
E. 704942.46
RIG TYPE CME-75
BORING TYPE 152.4 mm H.S.A
SURFACE ELEV. 1723.33
DATUM

Depth In Meters	Blows per 152 mm	Graphical Log	Sample	Sample Type	Blow Counts	Dry Density Kg. per Cubic meter	Moisture Content Percent of Dry Weight	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0.0				A				SC	A-6	**CLAYEY SAND** trace gravel to 12.70 mm, predominantly fine grained, medium plasticity, light brown
0.5										
1.0										Stopped auger at 1 M (3.28')
1.5										

GROUNDWATER

DEPTH (m)	HOUR	DATE

SAMPLE TYPE
A - Auger cuttings; NR-No Recovery
S - 51mm O.D. 35mm I.D. tube sample.
U - 76mm O.D. 61mm I.D. tube sample.
T - 25mm O.D. thin-walled tube sample

LOG OF TEST BORING NO. B-92

PROJECT B.I.A Project N5001 (1) 1,2 & 4, Newcomb to Toadlena
Navajo Nation, New Mexico

JOB NO. 13-517-00063 **DATE** 9/24/13

LOCATION N. 4017010.92
E. 705089.42
RIG TYPE CME-75
BORING TYPE 152.4 mm H.S.A
SURFACE ELEV. 1721.49
DATUM

Depth In Meters	Blows per 152 mm	Graphical Log	Sample	Sample Type	Blow Counts	Dry Density Kg. per Cubic meter	Moisture Content Percent of Dry Weight	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0.0				A				SC	A-2-6	**CLAYEY SAND** trace gravel to 12.70 mm, predominantly fine grained, medium plasticity, brown
0.5										
1.0										Stopped auger at 1 M (3.28')
1.5										

GROUNDWATER

DEPTH (m)	HOUR	DATE

SAMPLE TYPE
A - Auger cuttings; NR-No Recovery
S - 51mm O.D. 35mm I.D. tube sample.
U - 76mm O.D. 61mm I.D. tube sample.
T - 25mm O.D. thin-walled tube sample

LOG OF TEST BORING NO. B-93

PROJECT B.I.A Project N5001 (1) 1,2 & 4, Newcomb to Toadlena
Navajo Nation, New Mexico

JOB NO. 13-517-00063 **DATE** 9/24/13

LOCATION N. 4017151.16
E. 705238.18
RIG TYPE CME-75
BORING TYPE 152.4 mm H.S.A
SURFACE ELEV. 1718.78
DATUM

Depth in Meters	Blows per 152 mm	Graphical Log	Sample	Sample Type	Blow Counts	Dry Density Kg. per Cubic meter	Moisture Content Percent of Dry Weight	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0.0				A				SC	A-2-6	**CLAYEY SAND** with gravel to 25.4 mm, predominantly fine grained, medium plasticity, light brown
0.5										
										Refusal at .6858 M
1.0										
1.5										

GROUNDWATER

DEPTH (m)	HOUR	DATE

SAMPLE TYPE
A - Auger cuttings; NR-No Recovery
S - 51mm O.D. 35mm I.D. tube sample.
U - 76mm O.D. 61mm I.D. tube sample.
T - 25mm O.D. thin-walled tube sample

LOG OF TEST BORING NO. B-94

PROJECT B.I.A Project N5001 (1) 1,2 & 4, Newcomb to Toadlena
Navajo Nation, New Mexico

JOB NO. 13-517-00063 **DATE** 9/24/13

LOCATION N. 4017301.6
E. 705376.44
RIG TYPE CME-75
BORING TYPE 152.4 mm H.S.A
SURFACE ELEV. 1711.12
DATUM

Depth in Meters	Blows per 152 mm	Graphical Log	Sample	Sample Type	Blow Counts	Dry Density Kg. per Cubic meter	Moisture Content Percent of Dry Weight	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0.0				A				CL	A-7-6	**SANDY CLAY** trace gravel to 12.70 mm, high plasticity, yellowish-brown
0.5										
1.0										Stopped auger at 1 M (3.28')
1.5										

GROUNDWATER

DEPTH (m)	HOUR	DATE

SAMPLE TYPE
A - Auger cuttings; NR-No Recovery
S - 51mm O.D. 35mm I.D. tube sample.
U - 76mm O.D. 61mm I.D. tube sample.
T - 25mm O.D. thin-walled tube sample

LOG OF TEST BORING NO. B-95

PROJECT B.I.A Project N5001 (1) 1,2 & 4, Newcomb to Toadlena
Navajo Nation, New Mexico

JOB NO. 13-517-00063 **DATE** 9/24/13

LOCATION N. 4017456.17
E. 705507.93
RIG TYPE CME-75
BORING TYPE 152.4 mm H.S.A
SURFACE ELEV. 1700.58
DATUM

Depth in Meters	Blows per 152 mm	Graphical Log	Sample	Sample Type	Blow Counts	Dry Density Kg. per Cubic meter	Moisture Content Percent of Dry Weight	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0.0				A				SM	A-2-4	**SILTY SAND** weathered sandstone, trace gravel (top 25.4 mm) to 12.70 mm, predominantly fine grained, non plastic, tan
0.5										
1.0										Stopped auger at 1 M (3.28')
1.5										

GROUNDWATER

DEPTH (m)	HOUR	DATE

SAMPLE TYPE
A - Auger cuttings; NR-No Recovery
S - 51mm O.D. 35mm I.D. tube sample.
U - 76mm O.D. 61mm I.D. tube sample.
T - 25mm O.D. thin-walled tube sample

LOG OF TEST BORING NO. B-96

PROJECT B.I.A Project N5001 (1) 1,2 & 4, Newcomb to Toadlena
Navajo Nation, New Mexico

JOB NO. 13-517-00063 **DATE** 9/24/13

LOCATION N. 4017610.75
E. 705639.41
RIG TYPE CME-75
BORING TYPE 152.4 mm H.S.A
SURFACE ELEV. 1695.88
DATUM

Depth in Meters	Blows per 152 mm	Graphical Log	Sample	Sample Type	Blow Counts	Dry Density Kg. per Cubic meter	Moisture Content Percent of Dry Weight	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0.0										50.8 mm Asphalt millings
				A				CL	A-4	**SANDY CLAY** occasional gravel to 9.52 mm, predominantly fine grained, medium plasticity, yellowish-brown
0.5										
1.0										Stopped auger at 1 M (3.28')
1.5										

GROUNDWATER

DEPTH (m)	HOUR	DATE

SAMPLE TYPE
A - Auger cuttings; NR-No Recovery
S - 51mm O.D. 35mm I.D. tube sample.
U - 76mm O.D. 61mm I.D. tube sample.
T - 25mm O.D. thin-walled tube sample

LOG OF TEST BORING NO. B-97

PROJECT B.I.A Project N5001 (1) 1,2 & 4, Newcomb to Toadlena
Navajo Nation, New Mexico

JOB NO. 13-517-00063 **DATE** 9/24/13

LOCATION N. 4017721.03
E. 705812.41
RIG TYPE CME-75
BORING TYPE 152.4 mm H.S.A
SURFACE ELEV. 1694.47
DATUM

Depth In Meters	Blows per 152 mm	Graphical Log	Sample	Sample Type	Blow Counts	Dry Density Kg. per Cubic meter	Moisture Content Percent of Dry Weight	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0.0										101.6 mm Asphalt, 127.0 mm Base Course
				A				CL	A-6	**SANDY CLAY** trace gravel to 12.70 mm, medium plasticity, brown
0.5										
1.0										Stopped auger at 1 M (3.28')
1.5										

GROUNDWATER

	DEPTH (m)	HOUR	DATE
▽			
▼			

SAMPLE TYPE
A - Auger cuttings; NR-No Recovery
S - 51mm O.D. 35mm I.D. tube sample.
U - 76mm O.D. 61mm I.D. tube sample.
T - 25mm O.D. thin-walled tube sample

LOG OF TEST BORING NO. B-98

PROJECT B.I.A Project N5001 (1) 1,2 & 4, Newcomb to Toadlena
Navajo Nation, New Mexico

JOB NO. 13-517-00063 **DATE** 9/24/13

LOCATION N. 4017728.23
E. 706027.56
RIG TYPE CME-75
BORING TYPE 152.4 mm H.S.A
SURFACE ELEV. 1692.26
DATUM

Depth in Meters	Blows per 152 mm	Graphical Log	Sample	Sample Type	Blow Counts	Dry Density Kg. per Cubic meter	Moisture Content Percent of Dry Weight	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0.0										63.5 mm Asphalt, 127.0 mm Base Course
				A				CL	A-6	**SANDY CLAY** trace gravel to 9.52 mm, medium plasticity, brown
0.5										
1.0										Stopped auger at 1 M (3.28')
1.5										

GROUNDWATER

DEPTH (m)	HOUR	DATE

SAMPLE TYPE
A - Auger cuttings; NR-No Recovery
S - 51mm O.D. 35mm I.D. tube sample.
U - 76mm O.D. 61mm I.D. tube sample.
T - 25mm O.D. thin-walled tube sample

LOG OF TEST BORING NO. B-99

APPENDIX B

Laboratory Testing Procedures

Classification Test Data

R-Value Test Data

Chloride, Sulfate & pH Test Data

LABORATORY TESTING PROCEDURES

R-Value Tests (AASHTO T-190): The R-Value is the resistance of the soil determined by a stabilometer, which is a closed-system triaxial test. A vertical pressure is applied to a sample approximately 101.6 mm (4 in.) diameter by 114.3 mm (4.5 in.) in height, and the resulting horizontal pressures induced in the fluid within the rubber membrane are measured. If the sample has no shear resistance the R-Value is 0, while if the sample is rigid with no deformation the R-Value is 100. To ensure the sample is saturated, an exudation pressure of 2068.4 kN/m^2 (300 psi) is used.

Consolidation Tests Soiltest or Clockhouse apparatus of the "floating-ring" type are employed for the one-dimensional consolidation tests. They are designed to receive one inch high, 63.5 mm (2.5 inch) O.D. brass liner rings with soil specimens as secured in the field. Procedures for the tests generally are those outlined in ASTM D2435. Loads are applied in several increments to the upper surface of the test specimen and the resulting deformations are recorded at selected time intervals for each increment. For soils which are essentially saturated, each increment of load is maintained until the deformation versus log of time curve indicates completion of primary consolidation. For partially saturated soils, each increment of load is maintained until the rate of deformation is equal or less than 1/10,000 inch per hour. Applied loads are such that each new increment is equal to the total previously applied loading. Porous stones are placed in contact with the top and bottom of the specimens to permit free addition or expulsion of water. For partially saturated soils, the tests are normally performed at in situ moisture conditions until consolidation is complete under stresses approximately equal to those which will be imposed by the combined overburden and foundation loads. The samples are then submerged to show the effect of moisture increase and the tests continued under higher loadings. Generally, the tests are continued to about twice the anticipated curve due to overburden and structural loads, with a rebound curve then being established by releasing loads.

Client: Bureau of Indian Affairs
1001 Indian School Road
Albuquerque, NM 87104-

Attention: Ella M. Dempsey

Project Name: B.I.A Project N5001 (1) 1,2 & 4, Newcomb to Toadlena

Navajo Nations, NM

Project Manager: Ralph Crockett

Report Date: October 04, 2013

Project #: 13-517-00063
Work Order #: 1
Sampled By: Carlton Pine
Date Sampled: 9/27/2013

Sieve Anaiaysis (AASHTO T11-05/T27-11)
Plasticity Index (AASHTO T89-10/T90-00)
Soil Classification (AASHTO M145-91)

SOILS / AGGREGATES

				Sieve Sizes																			Sieve Result are as Percent Passing.
Sample Location	Soil Class.	L.L.	P.I.	#200	#100	#50	#40	#30	#16	#10	#8	#4	1/4"	3/8"	1/2"	3/4'	1"	1 1/4"	1 1/2"	2"	2 1/2"	3"	6"	12"	Lab Number
B1 @ .45-1.0 m	A-4	23	6	45	65	80	85	87	90	91	91	94		97	100										13-1077-001
B2 @ .43-1.0 m	A-4	24	6	52	77	89	91	93	95	95	96	97		99	100										13-1077-002
B3 @ .36-.97 m	A-4	24	7	52	81	84	87	90	92	93	95	98		99	100										13-1077-003
B4 @ .61-1.0 m	A-4	27	9	53	84	94	96	97	99	99	99	99		100											13-1077-004
B5 @ 0-1.0 m	A-4	23	5	41	68	83	87	88	90	92	93	96		99	100										13-1077-005
B6 @ 0-1.0 m	A-2-6	37	20	35	61	81	84	86	86	87	87	89		92	94	96	100								13-1077-006
B7 @ 0-1.0 m	A-4	23	3	45	80	94	97	98	99	100															13-1077-007
B8 @ 0-1.0 m	A-6	33	18	64	81	89	91	93	95	95	95	97		99	99	100									13-1077-008
B9 @ 0-1.0 m	A-2-4	25	10	30	43	55	61	65	69	70	70	73		80	84	84	100								13-1077-009
B10 @ 0-1.0 m	A-6	35	19	59	76	90	95	97	99	99	99	100													13-1077-010
B11 @ 0-1.0 m	A-2-4	22	5	23	39	56	62	65	67	68	68	71		77	81	89	92	100							13-1077-011
B12 @ 0-1.0 m	A-4	21	4	36	62	90	94	96	97	97	98	98		99	100										13-1077-012
B13 @ 0-1.0 m	A-2-4	24	6	22	39	57	64	68	71	72	72	76		82	86	91	93	100							13-1077-013
B14 @ 0-1.0 m	A-2-4	27	9	24	38	53	58	61	63	64	64	66		70	71	76	78	80	80	85		85	100		13-1077-014
B15 @ 0-.43 m	A-2-4	25	7	33	61	77	82	84	85	86	86	88		91	92	96	97	100							13-1077-015

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Client: Bureau of Indian Affairs
1001 Indian School Road
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Attention: Ella M. Dempsey

Project Name: B.I.A Project N5001 (1) 1,2 & 4, Newcomb to Toadlena

Navajo Nations, NM

Project Manager: Ralph Crockett

Report Date: October 04, 2013

Project #: 13-517-00063
Work Order #: 1
Sampled By: Carlton Pine
Date Sampled: 9/27/2013

Sieve Analaysis (AASHTO T11-05/T27-11)
Plasticity Index (AASHTO T89-10/T90-00)
Soil Classification (AASHTO M145-91)

SOILS / AGGREGATES

				Sieve Sizes																			Sieve Result are as Percent Passing.
Sample Location	Soil Class.	L.L.	P.I.	#200	#100	#50	#40	#30	#16	#10	#8	#4	1/4"	3/8"	1/2"	3/4'	1"	1 1/4"	1 1/2"	2"	2 1/2"	3"	6"	12"	Lab Number
B16 @ 0-1.0 m	A-4	25	7	41	71	92	96	98	99	99	99	100													13-1077-016
B17 @ 0-1.0 m	A-4	24	7	39	63	84	91	94	96	96	97	97		98	100										13-1077-017
B18 @ 0-1.0 m	A-2-6	28	11	35	60	80	88	92	95	95	95	97		99	100										13-1077-018
B19 @ 0-.43 m	A-2-4	NV	NP	16	33	54	60	63	66	67	68	71		76	79	85	85	85	90	100					13-1077-019
B20 @ 0-.61 m	A-2-4	26	10	33	56	72	80	83	86	87	87	90		94	96	100									13-1077-020
B 21 @ 0-1.0 m	A-2-4	26	9	32	63	82	89	93	97	97	98	99		99	100										13-1077-021
B22 @ 0-1.0 m	A-4	24	3	46	87	93	94	96	97	98	98	99		100											13-1077-022
B23 @ 0-1.0 m	A-4	28	8	57	87	93	94	95	97	97	97	98		100											13-1077-023
B24 @ 0-1.0 m	A-4	25	3	52	88	93	95	95	97	97	97	98		99	100										13-1077-024
B25 @ 0-1.0 m	A-4	26	10	51	88	93	95	96	98	98	98	99		100											13-1077-025
B26 @ 0-1.0 m	A-6	29	12	46	85	94	96	98	100																13-1077-026
B27 @ 0-1.0 m	A-2-4	24	NP	31	72	79	82	83	86	86	87	91		97	98	100									13-1077-027
B28 @ 0-.73 m	A-2-4	27	NP	34	73	78	79	81	85	87	87	91		95	96	100									13-1077-028
B28 @ .73-1.0 m	A-4	28	6	53	88	92	93	94	96	97	97	97		98	99	100									13-1077-029
B29 @ 0-1.0 m	A-2-4	NV	NP	25	73	80	83	85	89	91	92	96		100											13-1077-030

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Attention: Ella M. Dempsey

Project Name: B.I.A Project N5001 (1) 1,2 & 4, Newcomb to Toadlena

Navajo Nations, NM

Project Manager: Ralph Crockett

Report Date: October 07, 2013

Project #: 13-517-00063
Work Order #: 1
Sampled By: Carlton Pine
Date Sampled: 9/27/2013

Sieve Analaysis (AASHTO T11-05/T27-11)
Plasticity Index (AASHTO T89-10/T90-00)
Soil Classification (AASHTO M145-91)

SOILS / AGGREGATES

				Sieve Sizes																Sieve Result are as Percent Passing.				
Sample Location	Soil Class.	L.L.	P.I.	#200	#100	#50	#40	#30	#16	#10	#8	#4	1/4"	3/8"	1/2"	3/4'	1"	t 1/4"	1 1/2"	2"	2 1/2"	3"	6"	12"	Lab Number
B30 @ 0-1.0 m	A-2-4	22	NP	31	83	96	97	97	98	99	99	100													13-1077-031
B31 @ 0-1.0 m	A-2-4	NV	NP	30	79	96	98	98	99	99	99	100													13-1077-032
B32 @ 0-1.0 m	A-4	23	3	41	83	93	95	96	97	97	98	99		99	99	100									13-1077-033
B33 @ 0-1.0 m	A-4	26	9	63	96	99	100																		13-1077-034
B34 @ 0-1.0 m	A-2-4	NV	NP	25	72	95	97	98	99	99	99	100													13-1077-035
B35 @ 0-1.0 m	A-2-4	20	NP	25	47	79	85	88	91	93	93	97		100											13-1077-036
B36 @ 0-1.0 m	A-2-4	NV	NP	19	45	80	83	84	86	86	87	89		93	94	96	100								13-1077-037
B37 @ 0-1.0 m	A-2-4	NV	NP	16	32	57	62	67	71	72	72	75		79	82	87	91	99	100						13-1077-038
B39 @ 0-1.0 m	A-4	25	10	50	76	91	94	98	99	99	100														13-1077-039
B40 @ 0-1.0 m	A-1-a	20	2	8.6	14	22	25	26	28	29	29	32		39	42	51	60	71	76	100					13-1077-040
B41 @ 0-1.0 m	A-4	25	7	51	76	90	94	96	97	97	97	98		98	98	98	100								13-1077-041
B42 @ 0-1.0 m	A-1-a	NV	NP	4.8	8	11	13	14	15	16	16	19		26	33	49	62	72	77	83		88	100		13-1077-042
B43 @ 0-1.0 m	A-2-4	NV	NP	24	51	82	88	90	92	92	92	94		96	97	98	100								13-1077-043
B44 @0-1.0 m	A-1-a	NV	NP	6.9	9	16	23	30	33	35	35	40		50	56	70	80	69	98	100					13-1077-044
B45 @ 0-.67 m	A-1-b	NV	NP	13	19	35	40	43	45	46	47	52		61	68	79	86	95	100						13-1077-045

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Attention: Ella M. Dempsey

Project Name: B.I.A Project N5001 (1) 1,2 & 4, Newcomb to Toadlena

Navajo Nations, NM

Project Manager: Ralph Crockett

Report Date: October 10, 2013

Project #: 13-517-00063
Work Order #: 1
Sampled By: Carlton Pine
Date Sampled: 9/27/2013

Sieve Analaysis (AASHTO T11-05/T27-11)
Plasticity Index (AASHTO T89-10/T90-00)
Soil Classification (AASHTO M145-91)

SOILS / AGGREGATES

				Sieve Sizes																			Sieve Result are as Percent Passing.
Sample Location	Soil Class.	L.L.	P.I.	#200	#100	#50	#40	#30	#16	#10	#8	#4	1/4"	3/8"	1/2"	3/4'	1"	1 1/4"	1 1/2"	2"	2 1/2"	3"	6"	12"	Lab Number
B46 @ 0-1.0 m	A-7-6	53	31	70	73	75	76	78	83	90	93	99		100											13-1077-046
B47 @ 0-1.0 m	A-2-4	NV	NP	21	42	74	80	83	85	86	87	89		91	93	93	96	100							13-1077-047
B48 @ 0-1.0 m	A-2-4	NV	NP	18	35	59	68	73	77	79	80	84		89	91	94	95	100							13-1077-048
B49 @ 0-1.0 m	A-2-4	23	NP	28	54	92	98	99	100																13-1077-049
B50 @ 0-1.0 m	A-7-6	42	22	63	73	78	80	81	87	89	90	95		99	99	100									13-1077-050
B51 @ 0-1.0 m	A-1-b	26	NP	13	22	34	38	40	43	44	45	53		67	73	86	97	100							13-1077-051
B52 @ 0-.73 m	A-2-4	NV	NP	22	33	80	93	95	97	97	97	98		98	98	100									13-1077-052
B53 @ 0-1.0 m	A-2-4	24	NP	32	60	86	93	97	99	99	99	99		100											13-1077-053
B54 @ 0-1.0 m	A-1-a	NV	NP	9.9	16	25	29	31	34	36	37	42		55	61	75	81	88	100						13-1077-054
B55 @ 0-1.0 m	A-1-b	25	NP	17	26	38	43	47	50	53	54	60		70	76	88	96	100							13-1077-055
B56 @ 0-1.0 m	A-6	28	13	50	69	94	97	98	99	99	99	100													13-1077-056
B57 @ .15-.73 m	A-4	25	8	36	55	77	86	91	94	95	95	97		99	100										13-1077-057
B58 @ 0-1.0 m	A-2-4	NV	NP	27	66	92	98	100																	13-1077-058
B59 @ 0-1.0 m	A-2-4	26	NP	26	70	93	95	96	97	98	98	99		100											13-1077-059
B60 @ 0-1.0 m	A-2-6	27	11	30	44	64	74	80	86	89	90	95		99	100										13-1077-060

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Client: Bureau of Indian Affairs
1001 Indian School Road
Albuquerque, NM 87104-

Attention: Ella M. Dempsey

Project Name: B.I.A Project N5001 (1) 1,2 & 4, Newcomb to Toadlena

Navajo Nations, NM

Project Manager: Ralph Crockett

Report Date: October 08, 2013

Project #: 13-517-00063
Work Order #: 1
Sampled By: Carlton Pine
Date Sampled: 9/27/2013

Sieve Analaysis (AASHTO T11-05/T27-11)
Plasticity Index (AASHTO T89-10/T90-00)
Soil Classification (AASHTO M145-91)

SOILS / AGGREGATES

				Sieve Sizes																				Sieve Result are as Percent Passing.
Sample Location	Soil Class.	L.L.	P.I.	#200	#100	#50	#40	#30	#16	#10	#8	#4	1/4"	3/8"	1/2"	3/4"	1"	1 1/4"	1 1/2"	2"	2 1/2"	3"	6"	12"	Lab Number
B61 @ 0-1.0 m	A-2-4	29	9	27	44	68	78	84	90	92	93	97		98	100										13-1077-061
B62 @ 0-1.0 m	A-2-4	26	10	23	35	54	63	69	75	78	80	88		95	97	100									13-1077-062
B63 @ 0-1.0 m	A-2-6	30	13	33	48	69	79	85	91	93	94	97		99	99	100									13-1077-063
B64 @ 0-.79 m	A-2-4	28	9	22	34	53	62	68	73	74	75	81		86	91	95	98	98	100						13-1077-064
B65 @ 0-1.0 m	A-1-b	NV	NP	14	24	38	43	47	51	53	54	61		70	75	85	93	100							13-1077-065
B67 @ 0-1.0 m	A-2-4	26	NP	31	52	76	82	85	91	93	94	96		99	100										13-1077-067
B68 @ .12-1..0 m	A-7-6	47	30	69	76	86	91	94	98	98	98	99		100											13-1077-068
B69 @ 0-1.0 m	A-2-6	30	12	21	33	50	56	60	65	66	68	74		82	85	86	90	100							13-1077-069
B70 @ 0-1.0 m	A-2-4	25	9	29	50	74	84	89	92	93	94	97		99	100										13-1077-070
B71 @ 0-1.0 m	A-1-b	NV	NP	16	25	39	45	49	57	60	62	71		81	84	88	90	100							13-1077-071
B72 @ 0-1.0 m	A-1-b	NV	NP	12	22	37	43	47	52	58	61	74		87	95	100									13-1077-072
B73 @ 0-1.0 m	A-2-4	26	5	18	31	49	56	61	67	72	75	84		91	95	99	100								13-1077-073
B74 @ 0-1.0 m	A-1-b	NV	NP	15	25	41	50	56	62	66	69	78		88	96	100									13-1077-074
B75 @ 0-1.0 m	A-1-b	NV	NP	14	23	36	41	44	51	53	55	65		76	80	94	100								13-1077-075
B76 @ .10-1.0 m	A-2-4	22	6	30	44	62	69	74	79	83	85	91		96	96	100									13-1077-076

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Attention: Ella M. Dempsey

Project Name: B.I.A Project N5001 (1) 1,2 & 4, Newcomb to Toadlena

Navajo Nations, NM

Project Manager: Ralph Crockett

Report Date: October 17, 2013

Project #: 13-517-00063
Work Order #: 1
Sampled By: Carlton Pine
Date Sampled: 9/27/2013

Sieve Analaysis (AASHTO T11-05/T27-11)
Plasticity Index (AASHTO T89-10/T90-00)
Soil Classification (AASHTO M145-91)

SOILS / AGGREGATES

				Sieve Sizes																			Sieve Result are as Percent Passing.	
Sample Location	Soil Class.	L.L.	P.I.	#200	#100	#50	#40	#30	#16	#10	#8	#4	1/4"	3/8"	1/2"	3/4'	1"	1 1/4"	1 1/2"	2"	2 1/2"	3"	6"	12"	Lab Number
B77 @ 0-1.0 m	A-2-4	23	NP	16	28	44	52	58	65	70	73	82		90	92	97	100								13-1077-077
B78 @ 0-1.0 m	A-1-b	NV	NP	10	18	28	33	36	44	46	49	58		69	71	79	85	100							13-1077-078
B79 @ 0-1.0 m	A-2-4	30	9	27	42	60	66	69	75	78	79	88		94	96	97	100								13-1077-079
B80 @ 0-1.0 m	A-1-b	26	NP	14	22	32	37	41	50	54	56	67		80	86	89	92	100							13-1077-080
B81 @ 0-1.0 m	A-1-b	25	5	17	29	41	47	51	56	61	64	74		86	89	96	100								13-1077-081
B82 @ 0-1.0 m	A-1-b	23	4	16	25	36	40	43	47	48	50	55		64	72	87	93	100							13-1077-082
B83 @ 0-.60 m	A-1-b	23	2	16	26	38	43	47	55	58	60	67		73	74	77	82	100							13-1077-083
B84 @ 0-1.0 m	A-1-b	27	4	17	29	43	49	52	58	60		61		76	79	83	91	100							13-1077-084
B85 @ 0-1.0 m	A-2-4	NV	NP	26	45	59	64	67	73	74	75	79		83	85	88	92	100							13-1077-085
B86 @ 0-1.0 m	A-1-b	23	NP	13	20	31	36	40	47	50	51	59		70	78	87	89	100							13-1077-086
B87 @ 0-1.0 m	A-1-a	24	NP	10	17	25	27	29	31	34	35	40		51	60	73	84	100							13-1077-087
B88 @ 0-1.0 m	A-4	24	4	40	56	83	86	87	90	90	91	94		98	99	100									13-1077-088
B89 @ 0-1.0 m	A-6	32	17	46	63	79	85	88	92	93	93	96		100											13-1077-089
B90 @ 0-1.0 m	A-6	30	14	37	54	72	81	86	89	91	92	93		96	97	100									13-1077-090
B91 @ 0-.55 m	A-6	31	18	44	62	75	81	85	89	91	92	96		99	99	100									13-1077-091

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Attention: Ella M. Dempsey

Project Name: B.I.A Project N5001 (1) 1,2 & 4, Newcomb to Toadlena

Navajo Nations, NM

Project Manager: Ralph Crockett

Report Date: October 16, 2013

Project #: 13-517-00063
Work Order #: 1
Sampled By: Carlton Pine
Date Sampled: 9/27/2013

Sieve Analaysis (AASHTO T11-05/T27-11)
Plasticity Index (AASHTO T89-10/T90-00)
Soil Classification (AASHTO M145-91)

SOILS / AGGREGATES

				Sieve Sizes																				Sieve Result are as Percent Passing.
Sample Location	Soil Class.	L.L.	P.I.	#200	#100	#50	#40	#30	#16	#10	#8	#4	1/4"	3/8"	1/2"	3/4'	1"	1 1/4"	1 1/2"	2"	2 1/2"	3"	6"	12"	Lab Number
B91 @ .55-1.0 m	A-2-6	35	18	33	50	66	72	75	79	82	84	88		94	100										13-1077-092
B92 @ 0-1.0 m	A-6	31	11	38	53	69	76	81	87	89	90	96		99	99	100									13-1077-093
B93 @ 0-1.0 m	A-2-6	32	14	29	42	60	67	72	75	77	79	84		93	100										13-1077-094
B94 @ 0-.67 m	A-2-6	25	11	31	44	65	74	79	83	84	85	89		96	98	100									13-1077-095
B95 @ 0-1.0 m	A-7-6	47	29	81	87	90	91	92	93	94	94	95		96	98	99	100								13-1077-096
B96 @ 0-1.0 m	A-2-4	21	NP	30	59	68	69	70	72	72	73	80		90	93	95	100								13-1077-097
B97 .15-1.0 m	A-4	26	8	54	72	80	83	84	86	88	89	94		99	100										13-1077-098
B98 .22-1.0 m	A-6	32	17	65	79	87	90	91	94	95	95	98		100											13-1077-099
B99 @ .20-1.0 m	A-6	28	13	54	76	89	92	94	95	96	97	99		100											13-1077-100

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Attention: Ella M. Dempsey

Project Name: B.I.A Project N5001 (1) 1,2 & 4, Newcomb to Toadlena

Navajo Nations, NM

Project Manager: Ralph Crockett

Report Date: October 04, 2013

Project #: 13-517-00063
Work Order #: 1
Sampled By: Carlton Pine
Date Sampled: 9/27/2013

Sieve Analaysis (AASHTO T11-05/T27-11)
Plasticity Index (AASHTO T89-10/T90-00)
Soil Classification (AASHTO M145-91)

SOILS / AGGREGATES

Lab Number	Sample Location	Soil Class.	L.L.	P.I.	D10	D20	D30	D50	D60	D70	CC	CU	Cmu
13-1077-001	B1 @ .45-1.0 m	A-4	23	6	0	0	0	0.088	0.124	0.185	0	0	0
13-1077-002	B2 @ .43-1.0 m	A-4	24	6	0	0	0	0	0.092	0.122	0	0	0
13-1077-003	B3 @ .36-.97 m	A-4	24	7	0	0	0	0	0.09	0.114	0	0	0
13-1077-004	B4 @ .61-1.0 m	A-4	27	9	0	0	0	0	0.087	0.109	0	0	0
13-1077-005	B5 @ 0-1.0 m	A-4	23	5	0	0	0	0.093	0.121	0.161	0	0	0
13-1077-006	B6 @ 0-1.0 m	A-2-6	37	20	0	0	0	0.111	0.147	0.207	0	0	0
13-1077-007	B7 @ 0-1.0 m	A-4	23	3	0	0	0	0.081	0.099	0.122	0	0	0
13-1077-008	B8 @ 0-1.0 m	A-6	33	18	0	0	0	0	0	0.094	0	0	0
13-1077-009	B9 @ 0-1.0 m	A-2-4	25	10	0	0	0.074	0.224	0.391	2.211	0	0	0
13-1077-010	B10 @ 0-1.0 m	A-6	35	19	0	0	0	0	0.077	0.117	0	0	0
13-1077-011	B11 @ 0-1.0 m	A-2-4	22	5	0	0	0.101	0.231	0.367	3.620	0	0	0
13-1077-012	B12 @ 0-1.0 m	A-4	21	4	0	0	0	0.108	0.142	0.183	0	0	0
13-1077-013	B13 @ 0-1.0 m	A-2-4	24	6	0	0	0.101	0.227	0.347	0.935	0	0	0
13-1077-014	B14 @ 0-1.0 m	A-2-4	27	9	0	0	0.100	0.255	0.514	9.994	0	0	0
13-1077-015	B15 @ 0-.43 m	A-2-4	25	7	0	0	0	0.114	0.147	0.219	0	0	0
13-1077-016	B16 @ 0-1.0 m	A-4	25	7	0	0	0	0.092	0.116	0.146	0	0	0
13-1077-017	B17 @ 0-1.0 m	A-4	24	7	0	0	0	0.102	0.138	0.19	0	0	0
13-1077-018	B18 @ 0-1.0 m	A-2-6	28	11	0	0	0	0.112	0.148	0.21	0	0	0
13-1077-019	B19 @ 0-.43 m	A-2-4	NV	NP	0	0.086	0.131	0.260	0.415	3.907	0	0	45.5
13-1077-020	B20 @ 0-.61 m	A-2-4	26	10	0	0	0	0.123	0.175	0.268	0	0	0
13-1077-021	B 21 @ 0-1.0 m	A-2-4	26	9	0	0	0	0.111	0.139	0.190	0	0	0

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Attention: Ella M. Dempsey

Project Name: B.I.A Project N5001 (1) 1,2 & 4, Newcomb to Toadlena

Navajo Nations, NM

Project Manager: Ralph Crockett

Report Date: October 17, 2013

Project #: 13-517-00063
Work Order #: 1
Sampled By: Carlton Pine
Date Sampled: 9/27/2013

Sieve Analaysis (AASHTO T11-05/T27-11)
Plasticity Index (AASHTO T89-10/T90-00)
Soil Classification (AASHTO M145-91)

SOILS / AGGREGATES

Lab Number	Sample Location	Soil Class.	L.L.	P.I.	D10	D20	D30	D50	D60	D70	CC	CU	Cmu
13-1077-022	B22 @ 0-1.0 m	A-4	24	3	0	0	0	0.079	0.094	0.112	0	0	0
13-1077-023	B23 @ 0-1.0 m	A-4	28	8	0	0	0	0	0.079	0.100	0	0	0
13-1077-024	B24 @ 0-1.0 m	A-4	25	3	0	0	0	0	0.087	0.106	0	0	0
13-1077-025	B25 @ 0-1.0 m	A-4	26	10	0	0	0	0	0.087	0.106	0	0	0
13-1077-026	B26 @ 0-1.0 m	A-6	29	12	0	0	0	0.079	0.095	0.114	0	0	0
13-1077-027	B27 @ 0-1.0 m	A-2-4	24	NP	0	0	0	0.103	0.122	0.145	0	0	0
13-1077-028	B28 @ 0-.73 m	A-2-4	27	NP	0	0	0	0.098	0.118	0.141	0	0	0
13-1077-029	B28 @ .73-1.0 m	A-4	28	6	0	0	0	0	0.085	0.104	0	0	0
13-1077-030	B29 @ 0-1.0 m	A-2-4	NV	NP	0	0	0.08	0.107	0.124	0.144	0	0	0
13-1077-031	B30 @ 0-1.0 m	A-2-4	22	NP	0	0	0	0.096	0.11	0.126	0	0	0
13-1077-032	B31 @ 0-1.0 m	A-2-4	NV	NP	0	0	0.074	0.099	0.114	0.132	0	0	0
13-1077-033	B32 @ 0-1.0 m	A-4	23	3	0	0	0	0.086	0.102	0.120	0	0	0
13-1077-034	B33 @ 0-1.0 m	A-4	26	9	0	0	0	0	0	0.086	0	0	0
13-1077-035	B34 @ 0-1.0 m	A-2-4	NV	NP	0	0	0.079	0.107	0.125	0.145	0	0	0
13-1077-036	B35 @ 0-1.0 m	A-2-4	20	NP	0	0	0.085	0.159	0.197	0.244	0	0	0
13-1077-037	B36 @ 0-1.0 m	A-2-4	NV	NP	0	0.075	0.098	0.164	0.2	0.244	0	0	3.253
13-1077-038	B37 @ 0-1.0 m	A-2-4	NV	NP	0	0.087	0.137	0.247	0.366	1.050	0	0	12.12
13-1077-039	B39 @ 0-1.0 m	A-4	25	10	0	0	0	0	0.097	0.128	0	0	0
13-1077-040	B40 @ 0-1.0 m	A-1-a	20	2	0.089	0.255	2.769	18.16	25.58	31.08	3.361	286.8	121.7
13-1077-041	B41 @ 0-1.0 m	A-4	25	7	0	0	0	0	0.096	0.128	0	0	0
13-1077-042	B42 @ 0-1.0 m	A-1-a	NV	NP	0.236	5.311	11.2	19.31	24.05	30.36	22.11	102.0	5.717

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Attention: Ella M. Dempsey

Project Name: B.I.A Project N5001 (1) 1,2 & 4, Newcomb to Toadlena

Navajo Nations, NM

Project Manager: Ralph Crockett

Report Date: October 10, 2013

Project #: 13-517-00063
Work Order #: 1
Sampled By: Carlton Pine
Date Sampled: 9/27/2013

Sieve Analaysis (AASHTO T11-05/T27-11)
Plasticity Index (AASHTO T89-10/T90-00)
Soil Classification (AASHTO M145-91)

SOILS / AGGREGATES

Lab Number	Sample Location	Soil Class.	L.L.	P.I.	D10	D20	D30	D50	D60	D70	CC	CU	Cmu
13-1077-043	B43 @ 0-1.0 m	A-2-4	NV	NP	0	0	0.086	0.147	0.184	0.229	0	0	0
13-1077-044	B44 @0-1.0 m	A-1-a	NV	NP	0.168	0.362	0.634	9.502	14.31	19.23	0.167	85.36	53.13
13-1077-045	B45 @ 0-.67 m	A-1-b	NV	NP	0	0.155	0.24	3.684	8.633	13.62	0	0	88.06
13-1077-046	B46 @ 0-1.0 m	A-7-6	53	31	0	0	0	0	0	0	0	0	0
13-1077-047	B47 @ 0-1.0 m	A-2-4	NV	NP	0	0	0.101	0.178	0.219	0.271	0	0	0
13-1077-048	B48 @ 0-1.0 m	A-2-4	NV	NP	0	0.080	0.123	0.230	0.308	0.494	0	0	6.176
13-1077-049	B49 @ 0-1.0 m	A-2-4	23	NP	0	0	0.077	0.135	0.168	0.201	0	0	0
13-1077-050	B50 @ 0-1.0 m	A-7-6	42	22	0	0	0	0	0	0.121	0	0	0
13-1077-051	B51 @ 0-1.0 m	A-1-b	26	NP	0	0.125	0.238	3.704	6.844	11.00	0	0	88.07
13-1077-052	B52 @ 0-.73 m	A-2-4	NV	NP	0	0	0.127	0.193	0.223	0.258	0	0	0
13-1077-053	B53 @ 0-1.0 m	A-2-4	24	NP	0	0	0	0.116	0.149	0.193	0	0	0
13-1077-054	B54 @ 0-1.0 m	A-1-a	NV	NP	0.075	0.206	0.496	7.314	12.19	16.51	0.270	163.1	80.05
13-1077-055	B55 @ 0-1.0 m	A-1-b	25	NP	0	0.096	0.189	1.115	4.881	9.538	0	0	98.93
13-1077-056	B56 @ 0-1.0 m	A-6	28	13	0	0	0	0.075	0.108	0.155	0	0	0
13-1077-057	B57 @ .15-.73 m	A-4	25	8	0	0	0	0.125	0.176	0.241	0	0	0
13-1077-058	B58 @ 0-1.0 m	A-2-4	NV	NP	0	0	0.078	0.112	0.135	0.168	0	0	0
13-1077-059	B59 @ 0-1.0 m	A-2-4	26	NP	0	0	0.079	0.109	0.128	0.152	0	0	0
13-1077-060	B60 @ 0-1.0 m	A-2-6	27	11	0	0	0.075	0.186	0.261	0.37	0	0	0
13-1077-061	B61 @ 0-1.0 m	A-2-4	29	9	0	0	0.083	0.179	0.238	0.320	0	0	0
13-1077-062	B62 @ 0-1.0 m	A-2-4	26	10	0	0	0.109	0.255	0.374	0.670	0	0	0
13-1077-063	B63 @ 0-1.0 m	A-2-6	30	13	0	0	0	0.161	0.222	0.307	0	0	0

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Attention: Ella M. Dempsey

Project Name: B.I.A Project N5001 (1) 1,2 & 4, Newcomb to Toadlena

Navajo Nations, NM

Project Manager: Ralph Crockett

Report Date: October 08, 2013

Project #: 13-517-00063
Work Order #: 1
Sampled By: Carlton Pine
Date Sampled: 9/27/2013

Sieve Analaysis (AASHTO T11-05/T27-11)
Plasticity Index (AASHTO T89-10/T90-00)
Soil Classification (AASHTO M145-91)

SOILS / AGGREGATES

Lab Number	Sample Location	Soil Class.	L.L.	P.I.	D10	D20	D30	D50	D60	D70	CC	CU	Cmu
13-1077-064	B64 @ 0-.79 m	A-2-4	28	9	0	0	0.118	0.266	0.386	0.793	0	0	0
13-1077-065	B65 @ 0-1.0 m	A-1-b	NV	NP	0	0.114	0.203	0.966	4.427	9.589	0	0	83.92
13-1077-067	B67 @ 0-1.0 m	A-2-4	26	NP	0	0	0	0.139	0.187	0.248	0	0	0
13-1077-068	B68 @ .12-1..0 m	A-7-6	47	30	0	0	0	0	0	0.084	0	0	0
13-1077-069	B69 @ 0-1.0 m	A-2-6	30	12	0	0	0.127	0.305	0.599	3.098	0	0	0
13-1077-070	B70 @ 0-1.0 m	A-2-4	25	9	0	0	0.077	0.149	0.198	0.262	0	0	0
13-1077-071	B71 @ 0-1.0 m	A-1-b	NV	NP	0	0.099	0.190	0.643	2.051	4.273	0	0	43.04
13-1077-072	B72 @ 0-1.0 m	A-1-b	NV	NP	0	0.127	0.215	0.918	2.300	3.871	0	0	30.55
13-1077-073	B73 @ 0-1.0 m	A-2-4	26	5	0	0.082	0.145	0.317	0.557	1.601	0	0	19.59
13-1077-074	B74 @ 0-1.0 m	A-1-b	NV	NP	0	0.105	0.183	0.426	0.964	2.584	0	0	24.53
13-1077-075	B75 @ 0-1.0 m	A-1-b	NV	NP	0	0.116	0.216	1.083	3.397	6.647	0	0	57.07
13-1077-076	B76 @ .10-1.0 m	A-2-4	22	6	0	0	0	0.191	0.278	0.449	0	0	0
13-1077-077	B77 @ 0-1.0 m	A-2-4	23	NP	0	0.092	0.161	0.385	0.721	1.934	0	0	21.02
13-1077-078	B78 @ 0-1.0 m	A-1-b	NV	NP	0	0.171	0.335	2.631	5.433	11.11	0	0	65.05
13-1077-079	B79 @ 0-1.0 m	A-2-4	30	9	0	0	0.086	0.201	0.293	0.642	0	0	0
13-1077-080	B80 @ 0-1.0 m	A-1-b	26	NP	0	0.126	0.263	1.185	3.033	5.479	0	0	43.52
13-1077-081	B81 @ 0-1.0 m	A-1-b	25	5	0	0.086	0.160	0.558	1.852	3.578	0	0	41.44
13-1077-082	B82 @ 0-1.0 m	A-1-b	23	4	0	0.103	0.206	2.516	6.922	11.90	0	0	116.1
13-1077-083	B83 @ 0-.60 m	A-1-b	23	2	0	0.098	0.189	0.765	2.461	6.815	0	0	69.75
13-1077-084	B84 @ 0-1.0 m	A-1-b	27	4	0	0.088	0.159	0.478	2.055	5.626	0	0	64.07
13-1077-085	B85 @ 0-1.0 m	A-2-4	NV	NP	0	0	0.086	0.191	0.322	0.856	0	0	0

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Client: Bureau of Indian Affairs
1001 Indian School Road
Albuquerque, NM 87104-

Attention: Ella M. Dempsey

Project Name: B.I.A Project N5001 (1) 1,2 & 4, Newcomb to Toadlena

Navajo Nations, NM

Project Manager: Ralph Crockett

Report Date: October 16, 2013

Project #: 13-517-00063
Work Order #: 1
Sampled By: Carlton Pine
Date Sampled: 9/27/2013

Sieve Analaysis (AASHTO T11-05/T27-11)
Plasticity Index (AASHTO T89-10/T90-00)
Soil Classification (AASHTO M145-91)

SOILS / AGGREGATES

Lab Number	Sample Location	Soil Class.	L.L.	P.I.	D10	D20	D30	D50	D60	D70	CC	CU	Cmu
13-1077-086	B86 @ 0-1.0 m	A-1-b	23	NP	0	0.145	0.279	2.102	5.139	9.630	0	0	66.52
13-1077-087	B87 @ 0-1.0 m	A-1-a	24	NP	0	0.199	0.789	8.759	12.89	17.61	0	0	88.27
13-1077-088	B88 @ 0-1.0 m	A-4	24	4	0	0	0	0.114	0.165	0.213	0	0	0
13-1077-089	B89 @ 0-1.0 m	A-6	32	17	0	0	0	0.088	0.133	0.202	0	0	0
13-1077-090	B90 @ 0-1.0 m	A-6	30	14	0	0	0	0.125	0.187	0.274	0	0	0
13-1077-091	B91 @ 0-.55 m	A-6	31	18	0	0	0	0.094	0.137	0.225	0	0	0
13-1077-092	B91 @ .55-1.0 m	A-2-6	35	18	0	0	0	0.153	0.234	0.383	0	0	0
13-1077-093	B92 @ 0-1.0 m	A-6	31	11	0	0	0	0.13	0.201	0.305	0	0	0
13-1077-094	B93 @ 0-1.0 m	A-2-6	32	14	0	0	0.078	0.205	0.304	0.518	0	0	0
13-1077-095	B94 @ 0-.67 m	A-2-6	25	11	0	0	0	0.181	0.252	0.358	0	0	0
13-1077-096	B95 @ 0-1.0 m	A-7-6	47	29	0	0	0	0	0	0	0	0	0
13-1077-097	B96 @ 0-1.0 m	A-2-4	21	NP	0	0	0	0.119	0.159	0.686	0	0	0
13-1077-098	B97 .15-1.0 m	A-4	26	8	0	0	0	0	0.095	0.141	0	0	0
13-1077-099	B98 .22-1.0 m	A-6	32	17	0	0	0	0	0	0.095	0	0	0
13-1077-100	B99 @ .20-1.0 m	A-6	28	13	0	0	0	0	0.089	0.123	0	0	0

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Attn: Ella M. Dempsey

Project Name: B.I.A Project N5001 (1) 1,2 & 4, Newcomb to Toadlena

Report Date: October 16, 2013

Project #: 13-517-00063
Work Order #: 1
Lab #: 13-1077-006
Sampled By: Carlton Pine
Date Sampled: 9/27/2013
Color & Type of Material: See Boring Log

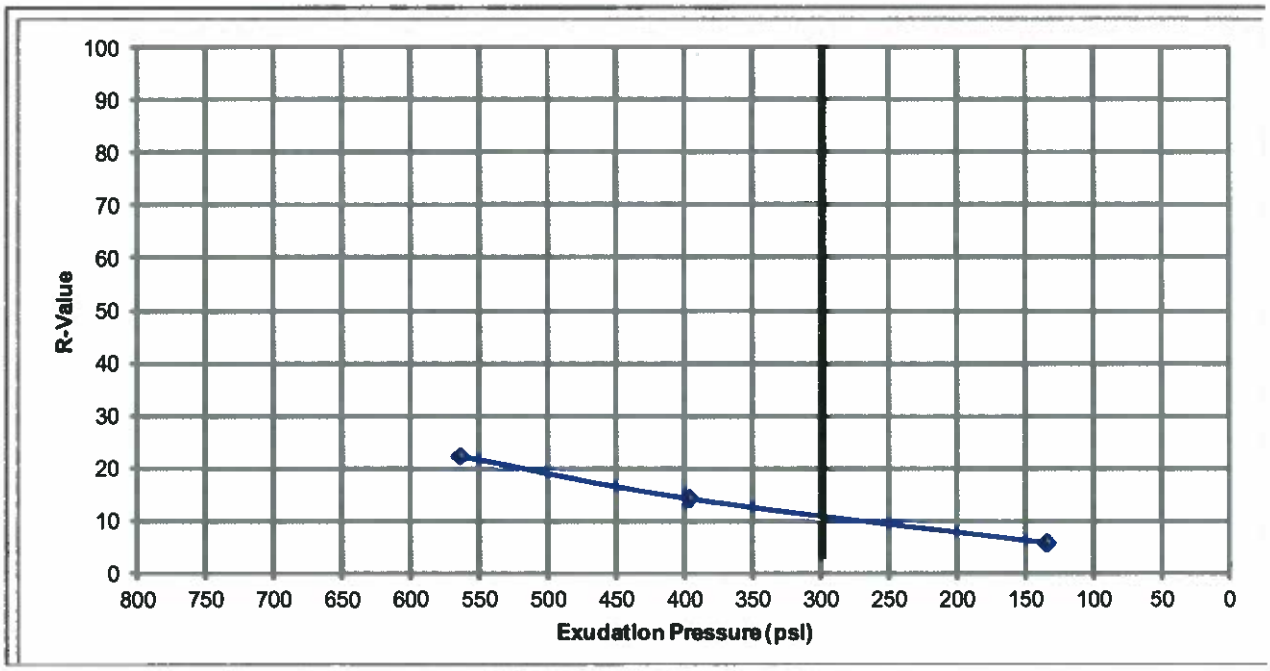
Sample Source: B6 @ 0-1.0 m

Project Manager: Ralph Crockett

SOILS / AGGREGATES

RESISTANCE R-VALUE AND EXPANSION PRESSURE OF COMPACTED SOILS (AASHTO T190-09)

Specimen id.	A	B	C
Moisture (%):	#Name?	#Name?	#Name?
Compactor Pressure (psi):	125	75	50
Specimen Height (in):	2.48	2.57	2.48
Dry Density (pcf):	#Name?	#Name?	#Name?
Horizontal Pressure @ 1000lbs (psi):	52	57	65
Horizontal Pressure @ 2000lbs (psi):	114	125	143
Displacement:	3.50	4.58	4.90
Expansion Pressure (psi):	#Name?	#Name?	#Name?
Exudation Pressure (psi):	#Name?	#Name?	#Name?
R-Value:	#Name?	#Name?	#Name?



R-Value at 300psi: 11

Reviewed By:_____
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Attn: Eila M. Dempsey

Project Name: B.I.A Project N5001 (1) 1,2 & 4, Newcomb to Toadlena

Report Date: October 16, 2013

Project #: 13-517-00063
Work Order #: 1
Lab #: 13-1077-016
Sampled By: Carlton Pine
Date Sampled: 9/27/2013
Color & Type of Material: See Boring Log

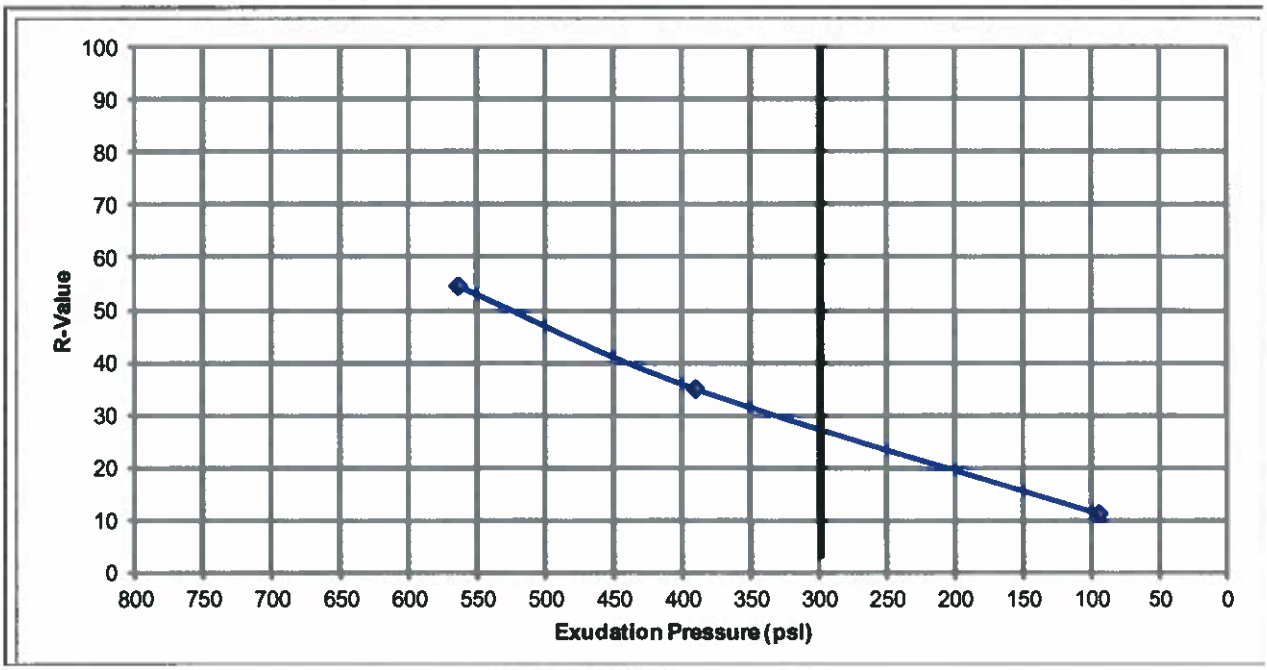
Sample Source: B16 @ 0-1.0 m

Project Manager: Ralph Crockett

SOILS / AGGREGATES

RESISTANCE R-VALUE AND EXPANSION PRESSURE OF COMPACTED SOILS (AASHTO T190-09)

Specimen Id.	A	B	C
Moisture (%):	12.0%	12.8%	15.5%
Compactor Pressure (psi):	125	100	50
Specimen Height (in):	2.50	2.44	2.53
Dry Density (pcf):	121.5	120.2	114.9
Horizontal Pressure @ 1000lbs (psi):	30	48	58
Horizontal Pressure @ 2000lbs (psi):	60	88	133
Displacement:	3.50	3.60	4.13
Expansion Pressure (psi):	-0.692	-0.331	0.000
Exudation Pressure (psi):	565	391	95
R-Value:	54	35	11



R-Value at 300psi: 26

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Attn: Ella M. Dempsey

Project Name: B.I.A Project N5001 (1) 1,2 & 4, Newcomb to Toadlena

Report Date: October 22, 2013

Project #: 13-517-00063
Work Order #: 1
Lab #: 13-1077-023
Sampled By: Carlton Pine
Date Sampled: 9/27/2013
Color & Type of Material: See Boring Log

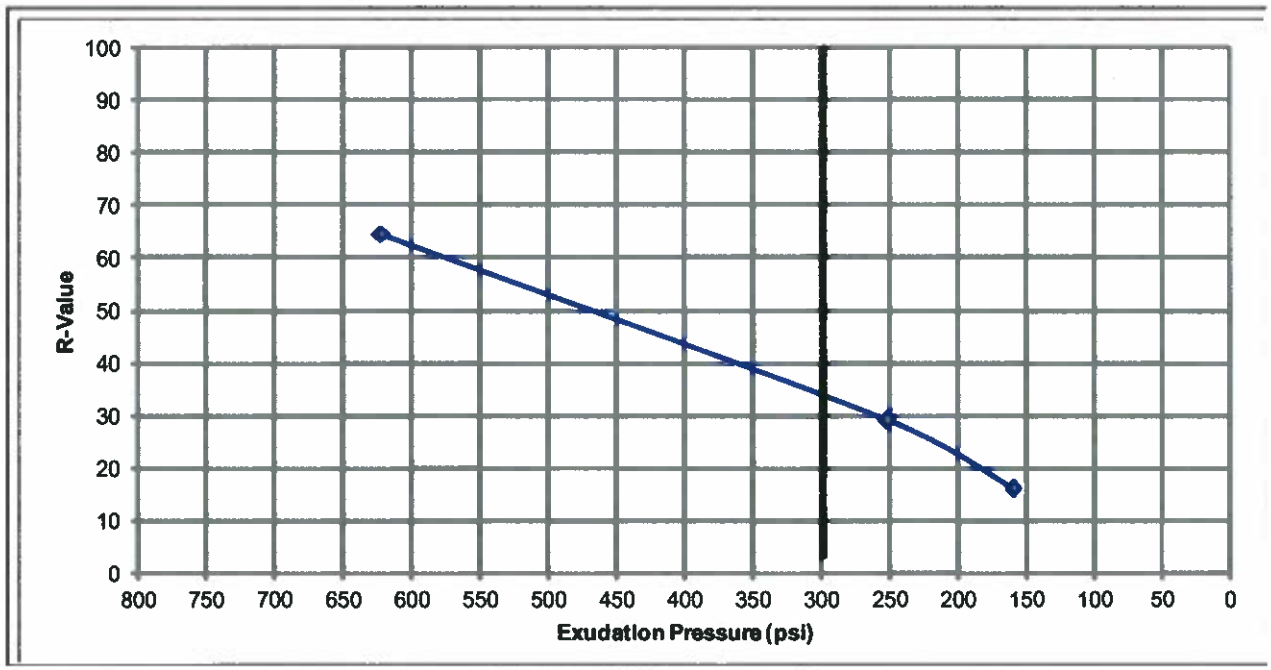
Sample Source: B23 @ 0-1.0 m

Project Manager: Ralph Crockett

SOILS / AGGREGATES

RESISTANCE R-VALUE AND EXPANSION PRESSURE OF COMPACTED SOILS (AASHTO T190-09)

Specimen Id.	A	B	C
Moisture (%):	14.4%	15.4%	16.3%
Compactor Pressure (psi):	250	140	100
Specimen Height (in):	2.49	2.52	2.51
Dry Density (pcf):	117.8	114.9	114.3
Horizontal Pressure @ 1000lbs (psi):	25	40	51
Horizontal Pressure @ 2000lbs (psi):	45	99	124
Displacement:	3.52	3.77	3.84
Expansion Pressure (psi):	0.000	0.000	0.000
Exudation Pressure (psi):	624	253	161
R-Value:	64	29	16



R-Value at 300psi: 33

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Attn: Ella M. Dempsey

Project Name: B.I.A Project N5001 (1) 1,2 & 4, Newcomb to Toadlena

Report Date: October 16, 2013

Project #: 13-517-00063
Work Order #: 1
Lab #: 13-1077-033
Sampled By: Carlton Pine
Date Sampled: 9/27/2013
Color & Type of Material: See Boring Log

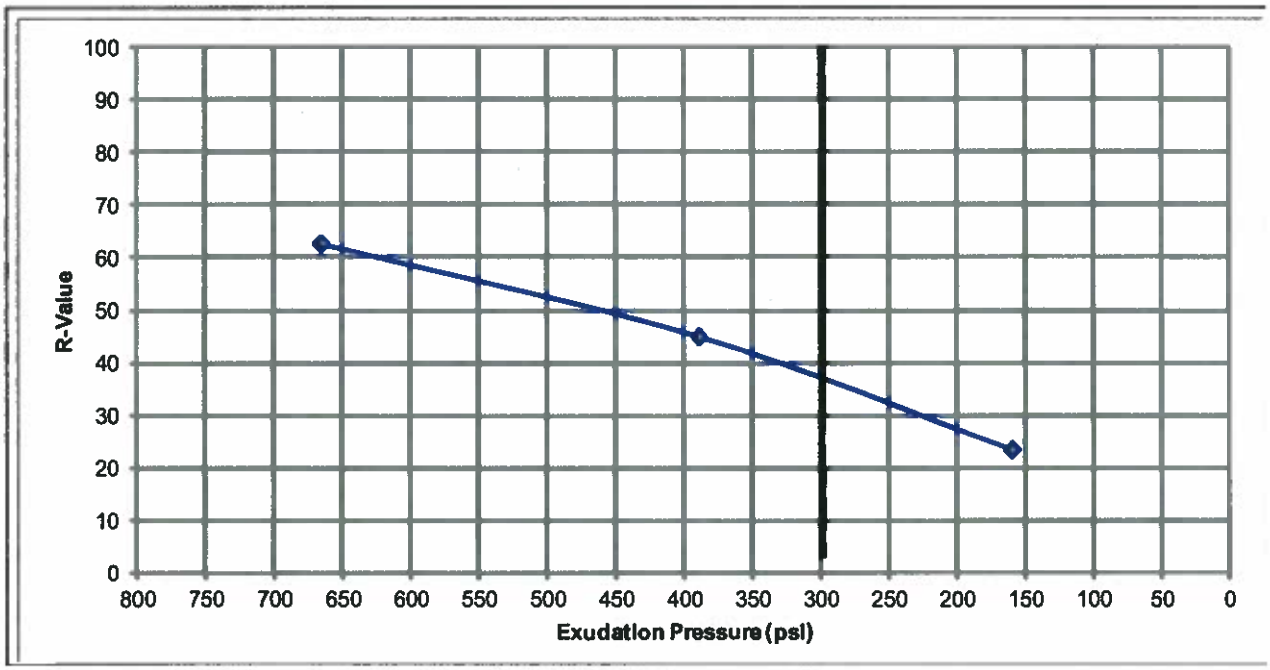
Sample Source: B32 @ 0-1.0 m

Project Manager: Ralph Crockett

SOILS / AGGREGATES

RESISTANCE R-VALUE AND EXPANSION PRESSURE OF COMPACTED SOILS (AASHTO T190-09)

Specimen Id.	A	B	C
Moisture (%):	11.4%	12.3%	14.1%
Compactor Pressure (psi):	350	225	100
Specimen Height (in):	2.50	2.51	2.50
Dry Density (pcf):	120.1	119.4	117.0
Horizontal Pressure @ 1000lbs (psi):	22	35	44
Horizontal Pressure @ 2000lbs (psi):	44	70	102
Displacement:	3.95	3.96	4.70
Expansion Pressure (psi):	0.000	0.000	0.000
Exudation Pressure (psi):	667	391	160
R-Value:	63	45	23



R-Value at 300psi: 36

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Attn: Ella M. Dempsey

Project Name: B.I.A Project N5001 (1) 1,2 & 4, Newcomb to Toadiena

Report Date: October 22, 2013

Project #: 13-517-00063
Work Order #: 1
Lab #: 13-1077-039
Sampled By: Carlton Pine
Date Sampled: 9/27/2013
Color & Type of Material: See Boring Log

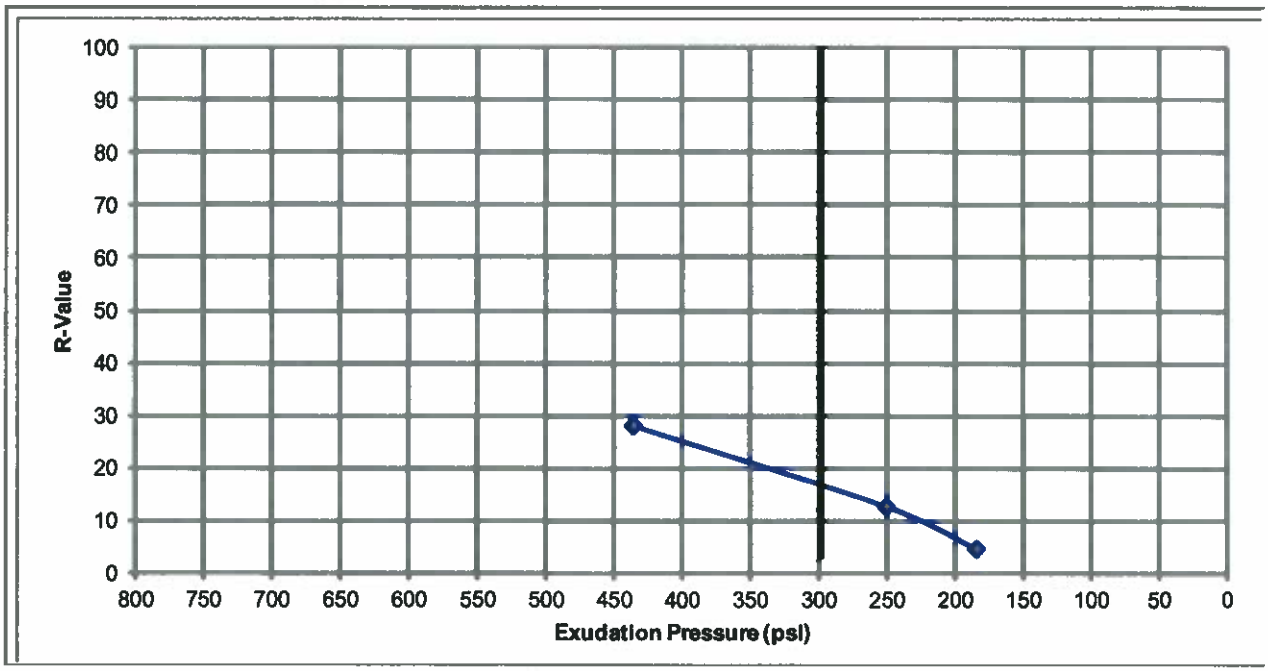
Sample Source: B39 @ 0-1.0 m

Project Manager: Ralph Crockett

SOILS / AGGREGATES

RESISTANCE R-VALUE AND EXPANSION PRESSURE OF COMPACTED SOILS (AASHTO T190-09)

Specimen Id.	A	B	C
Moisture (%):	13.8%	14.7%	16.5%
Compactor Pressure (psi):	150	75	50
Specimen Height (in):	2.40	2.50	2.57
Dry Density (pcf):	119.9	114.0	110.6
Horizontal Pressure @ 1000lbs (psi):	43	52	65
Horizontal Pressure @ 2000lbs (psi):	103	133	150
Displacement:	3.25	3.51	3.70
Expansion Pressure (psi):	0.000	0.000	0.000
Exudation Pressure (psi):	437	252	185
R-Value:	28	13	5



R-Value at 300psi: 16

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Client: Bureau of Indian Affairs
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Attn: Elia M. Dempsey

Project Name: B.I.A Project N5001 (1) 1,2 & 4, Newcomb to Toadlena

Report Date: October 16, 2013

Project #: 13-517-00063
Work Order #: 1
Lab #: 13-1077-050
Sampled By: Carlton Pine
Date Sampled: 9/27/2013
Color & Type of Material: See Boring Log

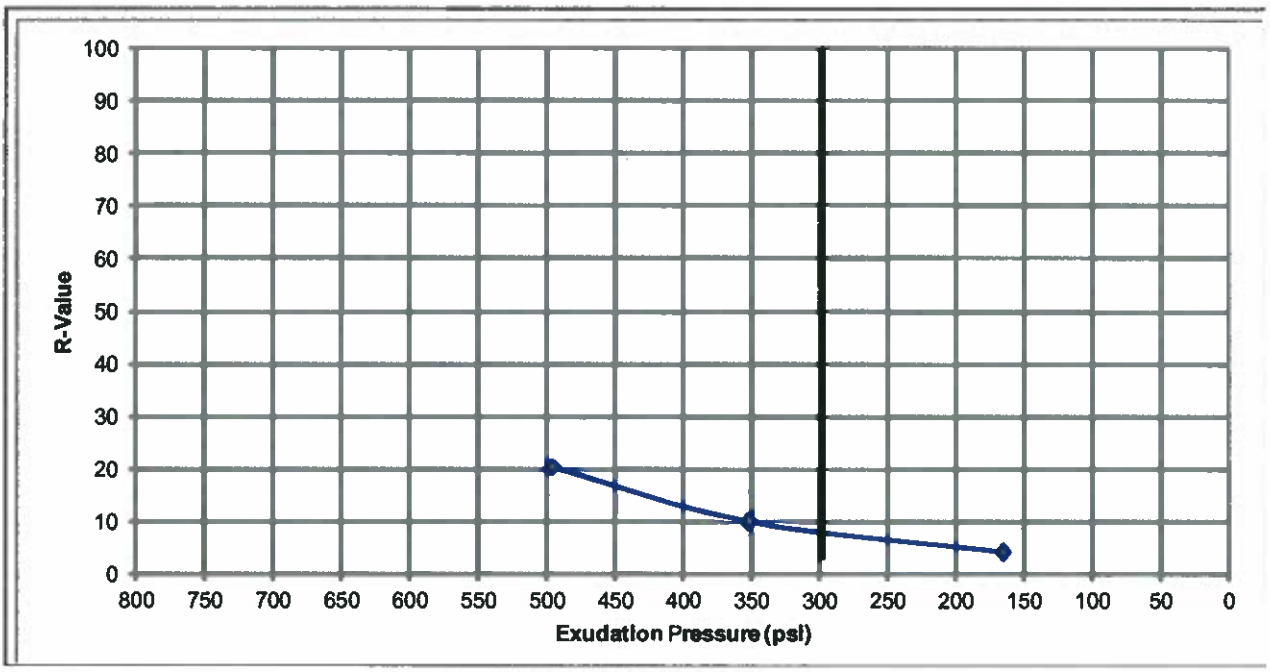
Sample Source: B50 @ 0-1.0 m

Project Manager: Ralph Crockett

SOILS / AGGREGATES

RESISTANCE R-VALUE AND EXPANSION PRESSURE OF COMPACTED SOILS (AASHTO T190-09)

Specimen id.	A	B	C
Moisture (%):	14.7%	17.0%	20.1%
Compactor Pressure (psi):	100	80	50
Specimen Height (in):	2.53	2.51	2.52
Dry Density (pcf):	116.1	113.8	106.5
Horizontal Pressure @ 1000lbs (psi):	48	58	70
Horizontal Pressure @ 2000lbs (psi):	118	135	148
Displacement:	3.47	4.21	4.60
Expansion Pressure (psi):	-1.654	-0.752	-0.722
Exudation Pressure (psi):	497	353	167
R-Value:	20	10	4



R-Value at 300psi: 8

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Attn: Eila M. Dempsey

Project Name: B.I.A Project N5001 (1) 1,2 & 4, Newcomb to Toadlena

Report Date: October 16, 2013

Project #: 13-517-00063
Work Order #: 1
Lab #: 13-1077-057
Sampled By: Carlton Pine
Date Sampled: 9/27/2013
Color & Type of Material: See Boring Log

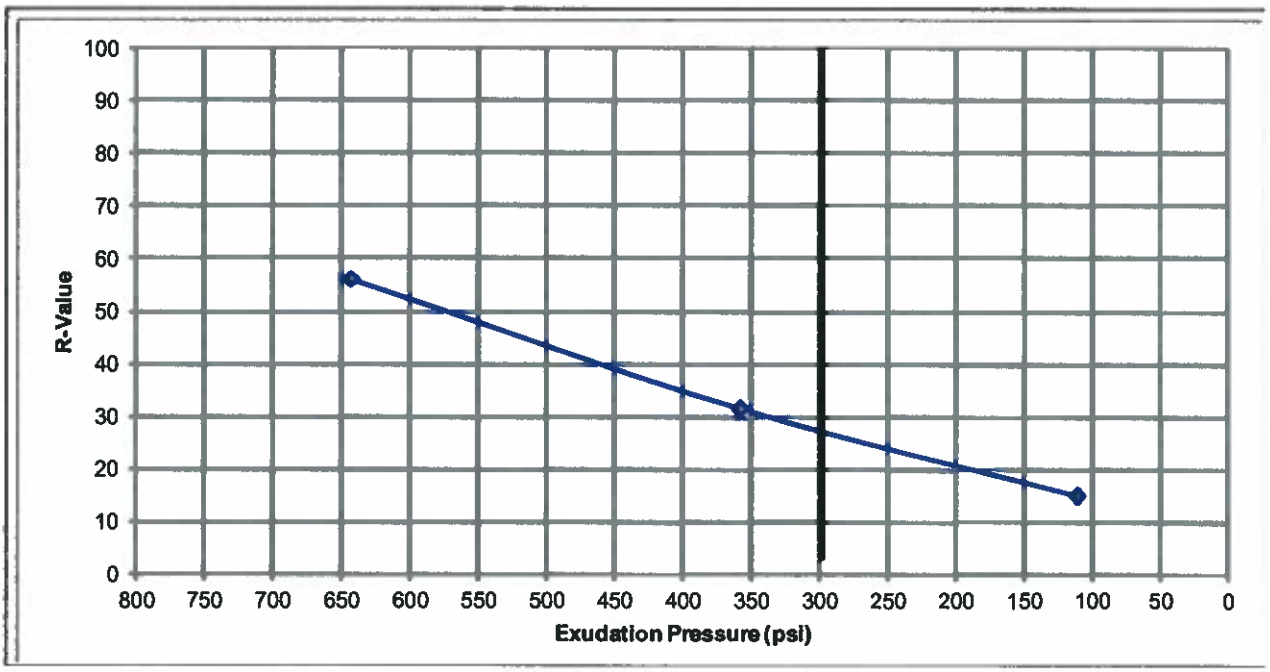
Sample Source: B57 @ .15-.73 m

Project Manager: Ralph Crockett

SOILS / AGGREGATES

RESISTANCE R-VALUE AND EXPANSION PRESSURE OF COMPACTED SOILS (AASHTO T190-09)

Specimen Id.	A	B	C
Moisture (%):	#Name?	#Name?	#Name?
Compactor Pressure (psi):	120	90	50
Specimen Height (in):	2.50	2.52	2.50
Dry Density (pcf):	#Name?	#Name?	#Name?
Horizontal Pressure @ 1000lbs (psi):	27	48	55
Horizontal Pressure @ 2000lbs (psi):	56	96	124
Displacement:	3.63	3.65	4.14
Expansion Pressure (psi):	#Name?	#Name?	#Name?
Exudation Pressure (psi):	#Name?	#Name?	#Name?
R-Value:	#Name?	#Name?	#Name?



R-Value at 300psi: 27

Reviewed By: _____
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Client: Bureau of Indian Affairs
1001 Indian School Road
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Attn: Ella M. Dempsey

Project Name: B.I.A Project N5001 (1) 1,2 & 4, Newcomb to Toadlena

Report Date: October 22, 2013

Project #: 13-517-00063
Work Order #: 1
Lab #: 13-1077-063
Sampled By: Carlton Pine
Date Sampled: 9/27/2013
Color & Type of Material: See Boring Log

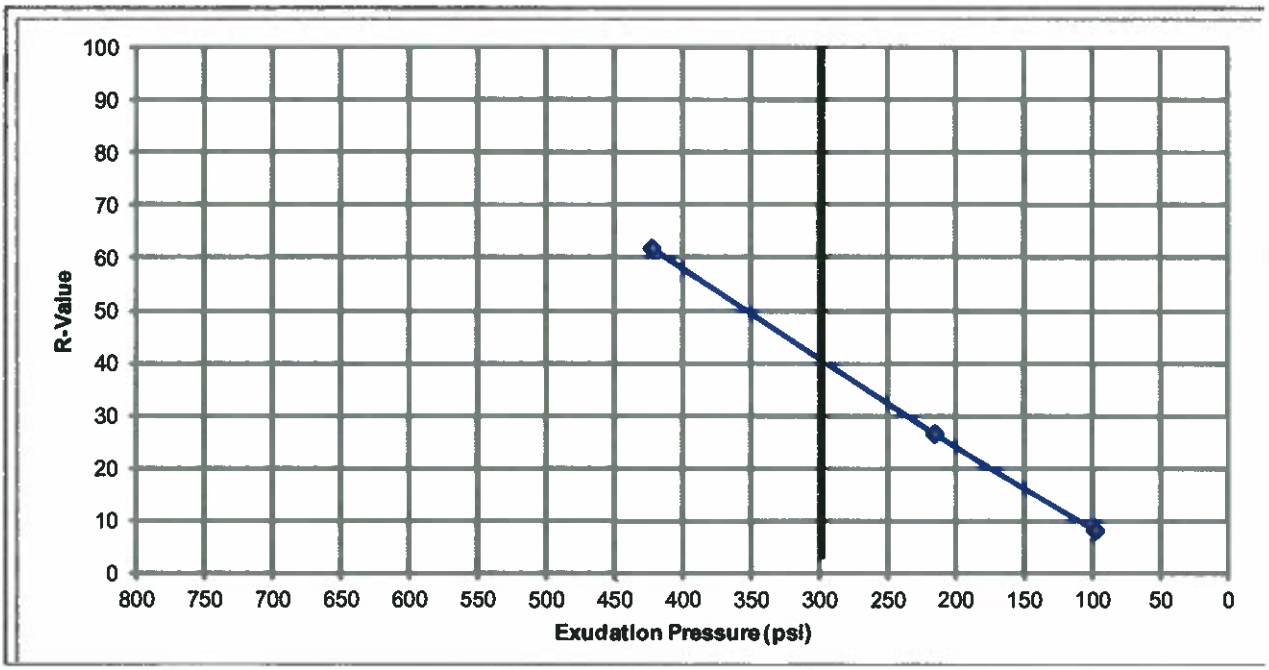
Sample Source: B63 @ 0-1.0 m

Project Manager: Ralph Crockett

SOILS / AGGREGATES

RESISTANCE R-VALUE AND EXPANSION PRESSURE OF COMPACTED SOILS (AASHTO T190-09)

Specimen Id.	A	B	C
Moisture (%):	13.6%	15.5%	17.3%
Compactor Pressure (psi):	350	140	50
Specimen Height (in):	2.52	2.54	2.63
Dry Density (pcf):	115.9	114.1	108.7
Horizontal Pressure @ 1000lbs (psi):	23	51	62
Horizontal Pressure @ 2000lbs (psi):	49	105	143
Displacement:	3.51	3.65	3.92
Expansion Pressure (psi):	0.000	0.000	0.000
Exudation Pressure (psi):	424	216	98
R-Value:	62	26	8



R-Value at 300psi: 40

Reviewed By: _____
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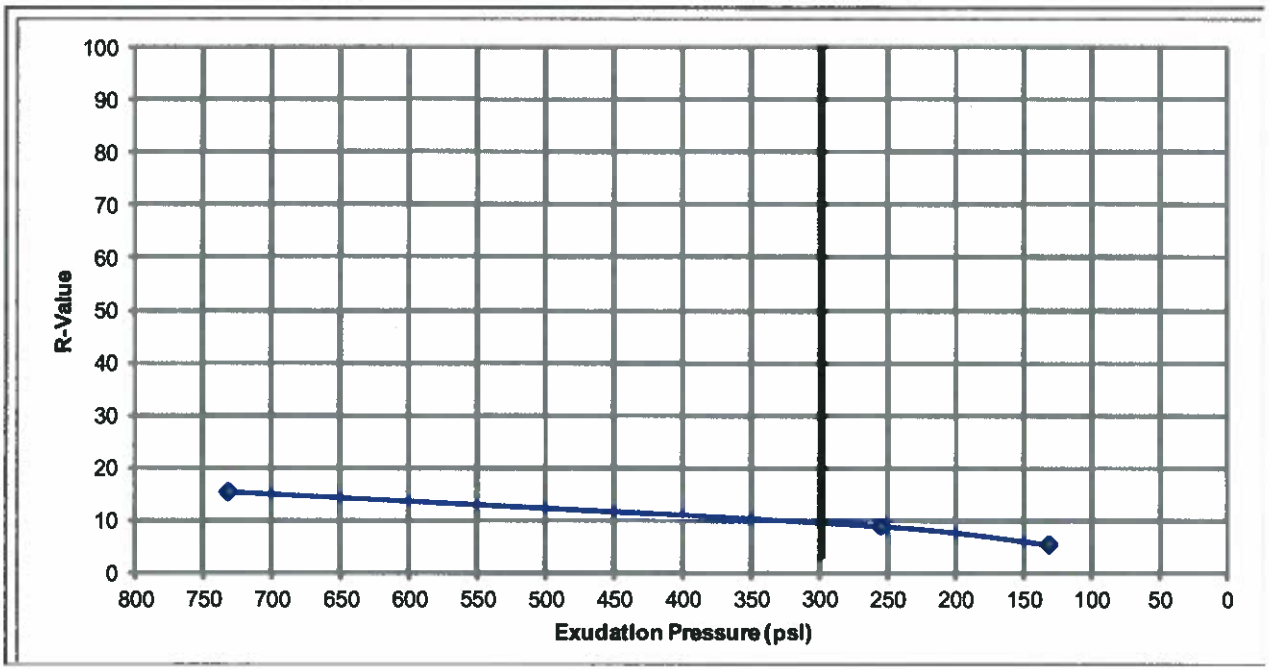
Client:	Bureau of Indian Affairs 1001 Indian School Road Albuquerque, NM 87104-	**Report Date:** October 22, 2013	
Attn:	Ella M. Dempsey	**Project #:** 13-517-00063 **Work Order #:** 1 **Lab #:** 13-1077-068	
Project Name:	B.I.A Project N5001 (1) 1,2 & 4, Newcomb to Toadlena	**Sampled By:** Carlton Pine **Date Sampled:** 9/27/2013 **Color & Type of Material:** See Boring Log	
Project Manager:	Ralph Crockett	**Sample Source:** B68 @ .12-1..0 m	

SOILS / AGGREGATES

RESISTANCE R-VALUE AND EXPANSION PRESSURE OF COMPACTED SOILS (AASHTO T190-09)

Specimen Id.	A	B	C
Moisture (%):	17.1%	18.5%	19.5%
Compactor Pressure (psi):	75	50	40
Specimen Height (in):	2.49	2.55	2.49
Dry Density (pcf):	116.8	114.4	114.7
Horizontal Pressure @ 1000lbs (psi):	55	65	74
Horizontal Pressure @ 2000lbs (psi):	125	137	145
Displacement:	3.88	4.32	4.61
Expansion Pressure (psi):	0.000	-0.150	0.000
Exudation Pressure (psi):	733	256	132
R-Value:	15	9	5



R-Value at 300psi: 9

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Client: Bureau of Indian Affairs
1001 Indian School Road
Albuquerque, NM 87104-

Attn: Ella M. Dempsey

Project Name: B.I.A Project N5001 (1) 1,2 & 4, Newcomb to Toadlena

Report Date: October 22, 2013

Project #: 13-517-00063
Work Order #: 1
Lab #: 13-1077-074
Sampled By: Carlton Pine
Date Sampled: 9/27/2013
Color & Type of Material: See Boring Log

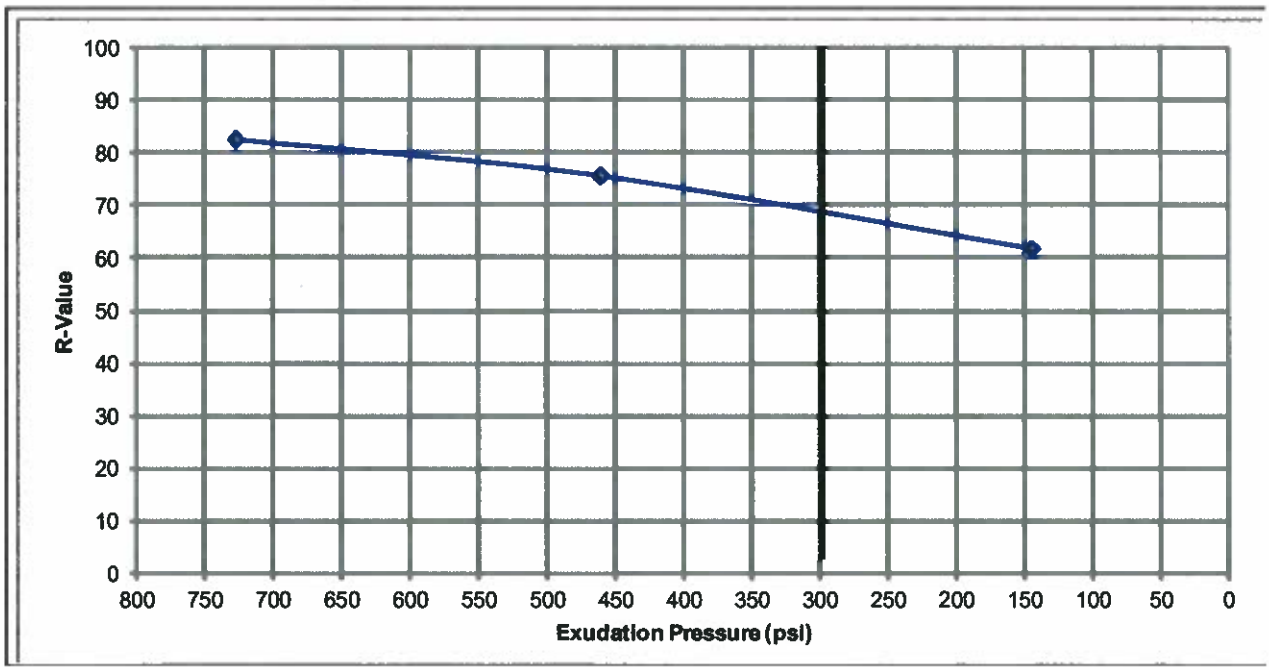
Sample Source: B74 @ 0-1.0 m

Project Manager: Ralph Crockett

SOILS / AGGREGATES

RESISTANCE R-VALUE AND EXPANSION PRESSURE OF COMPACTED SOILS (AASHTO T190-09)

Specimen Id.	A	B	C
Moisture (%):	10.5%	11.4%	12.3%
Compactor Pressure (psi):	250	250	150
Specimen Height (in):	2.47	2.50	2.56
Dry Density (pcf):	124.2	123.8	119.8
Horizontal Pressure @ 1000lbs (psi):	14	20	28
Horizontal Pressure @ 2000lbs (psi):	22	31	52
Displacement:	3.38	3.39	3.40
Expansion Pressure (psi):	0.000	0.000	0.000
Exudation Pressure (psi):	729	462	146
R-Value:	82	75	62



R-Value at 300psi: 68

Reviewed By:_____
Jan

Distribution: Client ☑ File: ☑ Supplier: ☑ Email: ☐ Other: Addressee (1)

AMEC Environment & Infrastructure, Inc.
8519 Jefferson NE
Albuquerque, NM 87113
Tel 5058211801
Fax 5058217371
www.amec.com

Client: Bureau of Indian Affairs
1001 Indian School Road
Albuquerque, NM 87104-

Attn: Ella M. Dempsey

Project Name: B.I.A Project N5001 (1) 1,2 & 4, Newcomb to Toadlena

Report Date: October 22, 2013

Project #: 13-517-00063
Work Order #: 1
Lab #: 13-1077-085
Sampled By: Carlton Pine
Date Sampled: 9/27/2013
Color & Type of Material: See Boring Log

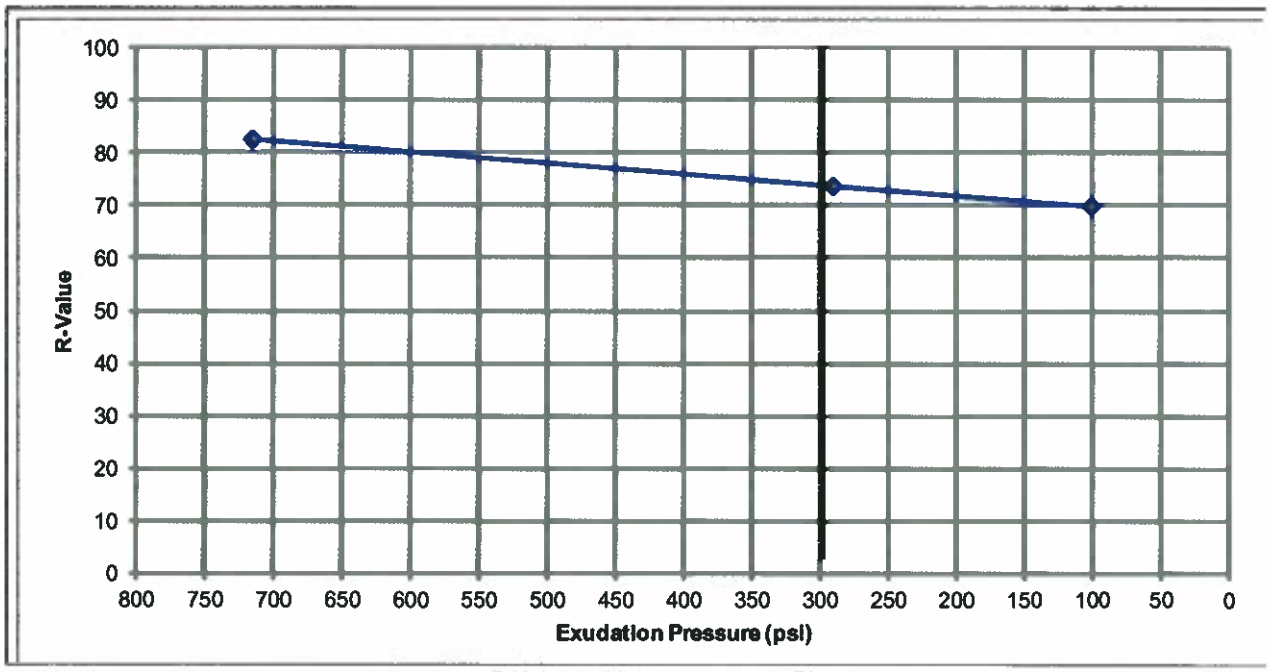
Sample Source: B85 @ 0-1.0 m

Project Manager: Ralph Crockett

SOILS / AGGREGATES

RESISTANCE R-VALUE AND EXPANSION PRESSURE OF COMPACTED SOILS (AASHTO T190-09)

Specimen Id.	A	B	C
Moisture (%):	13.2%	13.7%	14.6%
Compactor Pressure (psi):	280	260	25
Specimen Height (in):	2.50	2.57	2.63
Dry Density (pcf):	120.1	115.9	112.6
Horizontal Pressure @ 1000lbs (psi):	10	14	18
Horizontal Pressure @ 2000lbs (psi):	17	28	32
Displacement:	4.52	4.54	4.96
Expansion Pressure (psi):	0.150	0.000	-0.150
Exudation Pressure (psi):	717	291	101
R-Value:	82	74	70



R-Value at 300psi: 73

Reviewed By:_____
Jan

Distribution: Client ☑ File: ☑ Supplier: ☑ Email: ☐ Other: Addressee (1)

AMEC Environment & Infrastructure, Inc.
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Client: Bureau of Indian Affairs
1001 Indian School Road
Albuquerque, NM 87104-

Attn: Ella M. Dempsey

Project Name: B.I.A Project N5001 (1) 1,2 & 4, Newcomb to Toadlena

Report Date: October 22, 2013

Project #: 13-517-00063
Work Order #: 1
Lab #: 13-1077-099
Sampled By: Carlton Pine
Date Sampled: 9/27/2013
Color & Type of Material: See Boring Log

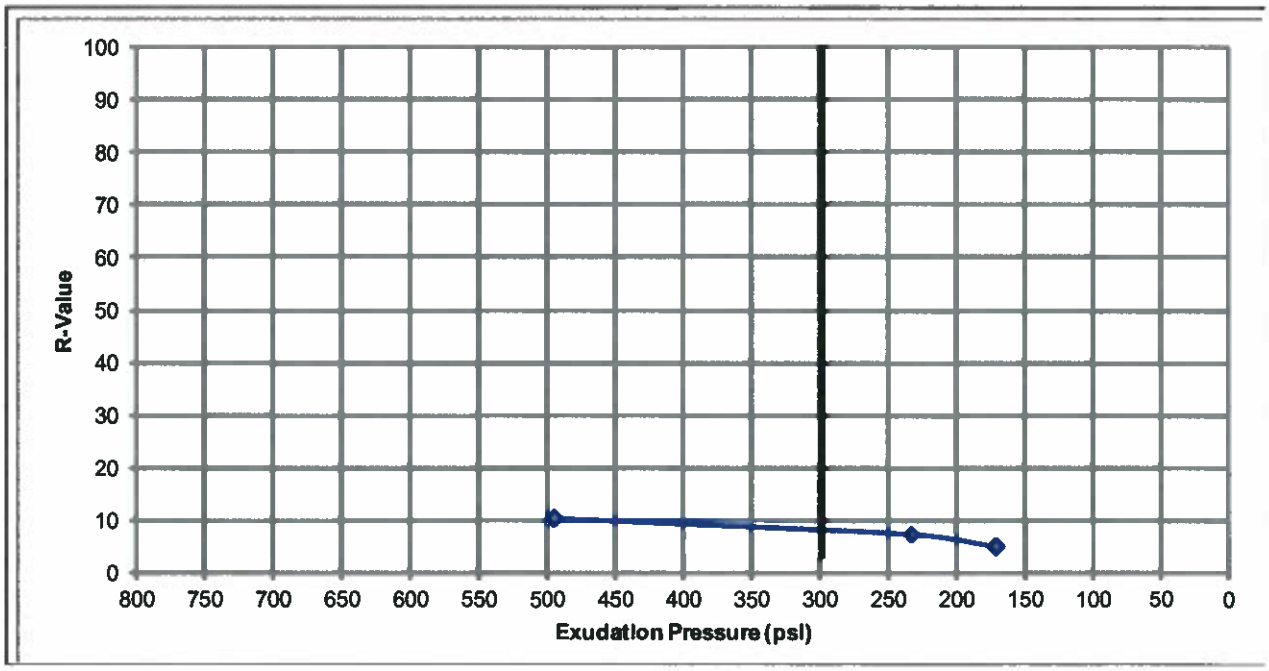
Sample Source: B98 .22-1.0 m

Project Manager: Ralph Crockett

SOILS / AGGREGATES

RESISTANCE R-VALUE AND EXPANSION PRESSURE OF COMPACTED SOILS (AASHTO T190-09)

Specimen Id.	A	B	C
Moisture (%):	18.2%	19.2%	20.6%
Compactor Pressure (psi):	50	50	25
Specimen Height (in):	2.57	2.54	2.55
Dry Density (pcf):	108.5	106.4	103.3
Horizontal Pressure @ 1000lbs (psi):	60	65	68
Horizontal Pressure @ 2000lbs (psi):	136	140	146
Displacement:	4.10	4.48	4.68
Expansion Pressure (psi):	-0.662	-0.180	-0.421
Exudation Pressure (psi):	496	234	172
R-Value:	10	7	5



R-Value at 300psi: 8

Reviewed By: _____
Jan

Distribution: Client ☑ File: ☑ Supplier: ☑ Email: ☐ Other: Addressee (1)

AMEC Environment & Infrastructure, Inc.
8519 Jefferson NE
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HALL
ENVIRONMENTAL
ANALYSIS
LABORATORY

Hall Environmental Analysis Laboratory
4901 Hawkins NE
Albuquerque, NM 87109
TEL: 505-345-3975 FAX: 505-345-4107
Website: www.hallenvironmental.com

May 15, 2014

Ralph Crockett
AMEC
8519 Jefferson Street, NE
Albuquerque, NM 87113
TEL: (505) 821-1801
FAX (505) 821-7371

RE: B.I.A. Project N5001(1)1,2&4 OrderNo.: 1405442
Newcomb To Toadlena Navajo Nation, NM

Dear Ralph Crockett:

Hall Environmental Analysis Laboratory received 3 sample(s) on 5/12/2014 for the analyses presented in the following report.

These were analyzed according to EPA procedures or equivalent. To access our accredited tests please go to www.hallenvironmental.com or the state specific web sites. In order to properly interpret your results it is imperative that you review this report in its entirety. See the sample checklist and/or the Chain of Custody for information regarding the sample receipt temperature and preservation. Data qualifiers or a narrative will be provided if the sample analysis or analytical quality control parameters require a flag. When necessary, data qualifers are provided on both the sample analysis report and the QC summary report, both sections should be reviewed. All samples are reported, as received, unless otherwise indicated. Lab measurement of analytes considered field parameters that require analysis within 15 minutes of sampling such as pH and residual chlorine are qualified as being analyzed outside of the recommended holding time.

Please don't hesitate to contact HEAL for any additional information or clarifications.

ADHS Cert #AZ0682 -- NMED-DWB Cert #NM9425 -- NMED-Micro Cert #NM0190

Sincerely,

Andy Freeman
Laboratory Manager
4901 Hawkins NE
Albuquerque, NM 87109

Analytical Report
Lab Order **1405442**
Date Reported: **5/15/2014**

Hall Environmental Analysis Laboratory, Inc.

CLIENT: AMEC
Project: B.I.A. Project N5001(1)1,2&4
Lab ID: 1405442-001 **Matrix:** SOIL

Client Sample ID: 1351700063 B1 (.4-1m)
Collection Date: 5/12/2014 10:45:00 AM
Received Date: 5/12/2014 10:57:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 300.0: ANIONS						Analyst: **JRR**	
Chloride	59	1.5		mg/Kg	1	5/13/2014 3:16:52 PM	13142
Sulfate	1400	30		mg/Kg	20	5/13/2014 3:29:16 PM	13142
SM4500-H+B: PH						Analyst: **TMG**	
pH	8.06	1.68		pH Units	1	5/13/2014 11:40:00 AM	R18561

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
O	RSD is greater than RSDlimit	P	Sample pH greater than 2.
R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
S	Spike Recovery outside accepted recovery limits		

Hall Environmental Analysis Laboratory, Inc.

CLIENT: AMEC
Client Sample ID: 1351700063 B48 (0-1m)
Project: B.I.A. Project N5001(1)1,2&4
Collection Date: 5/12/2014 10:45:00 AM
Lab ID: 1405442-002 **Matrix:** SOIL
Received Date: 5/12/2014 10:57:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 300.0: ANIONS						Analyst: **JRR**	
Chloride	6.4	1.5		mg/Kg	1	5/13/2014 3:41:41 PM	13142
Sulfate	520	30		mg/Kg	20	5/13/2014 3:54:06 PM	13142
SM4500-H+B: PH						Analyst: **TMG**	
pH	8.37	1.68		pH Units	1	5/13/2014 11:40:00 AM	R18561

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
O	RSD is greater than RSDlimit	P	Sample pH greater than 2.
R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
S	Spike Recovery outside accepted recovery limits		

Hall Environmental Analysis Laboratory, Inc.

CLIENT: AMEC
Client Sample ID: 1351700063 B99 (0-1m)
Project: B.I.A. Project N5001(1)1,2&4
Collection Date: 5/12/2014 10:45:00 AM
Lab ID: 1405442-003 **Matrix:** SOIL **Received Date:** 5/12/2014 10:57:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 300.0: ANIONS						Analyst: **JRR**	
Chloride	52	1.5		mg/Kg	1	5/13/2014 4:06:31 PM	13142
Sulfate	1000	30		mg/Kg	20	5/13/2014 4:18:55 PM	13142
SM4500-H+B: PH						Analyst: **TMG**	
pH	8.47	t.68		pH Units	1	5/13/2014 11:40:00 AM	R18561

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
O	RSD is greater than RSDlimit	P	Sample pH greater than 2.
R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
S	Spike Recovery outside accepted recovery limits		

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1405442**

15-May-14

Client: AMEC

Project: B.I.A. Project N5001(1)1,2&4

Sample ID	MB-13142	SampType:	MBLK	TestCode:	EPA Method 300.0: Anions				
Client ID:	PBS	Batch ID:	13142	RunNo:	18590				
Prep Date:	5/13/2014	Analysis Date:	5/13/2014	SeqNo:	536900	Units:	mg/Kg		

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Chloride	ND	1.5								
Sulfate	ND	1.5								

Sample ID	LCS-13142	SampType:	LCS	TestCode:	EPA Method 300.0: Anions				
Client ID:	LCSS	Batch ID:	13142	RunNo:	18590				
Prep Date:	5/13/2014	Analysis Date:	5/13/2014	SeqNo:	536901	Units:	mg/Kg		

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Chloride	14	1.5	15.00	0	96.1	90	110			
Sulfate	29	1.5	30.00	0	96.6	90	110			

Qualifiers:

- * Value exceeds Maximum Contaminant Level.
- E Value above quantitation range
- J Analyte detected below quantitation limits
- O RSD is greater than RSDlimit
- R RPD outside accepted recovery limits
- S Spike Recovery outside accepted recovery limits
- B Analyte detected in the associated Method Blank
- H Holding times for preparation or analysis exceeded
- ND Not Detected at the Reporting Limit
- P Sample pH greater than 2.
- RL Reporting Detection Limit

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1405442**

15-May-14

Client: AMEC

Project: B.I.A. Project N5001(1)1,2&4

Sample ID	1405442-001ADUP	SampType:	DUP			TestCode:	SM4500-H+B: pH				
Client ID:	1351700063 B1 (.4-1	Batch ID:	R18561			RunNo:	18561				
Prep Date:		Analysis Date:	5/13/2014			SeqNo:	536129	Units:	pH Units		
Analyte		Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
pH		8.09	1.68								

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
O	RSD is greater than RSDlimit	P	Sample pH greater than 2.
R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
S	Spike Recovery outside accepted recovery limits		

APPENDIX C

Specifications for Earthwork

Pavement Design Worksheets

SPECIFICATIONS FOR EARTHWORK

1.0 SCOPE

Includes all clearing and grubbing, removal of obstructions, general excavating, grading and filling, and any related items necessary to complete the grading for the entire project in accordance with these specifications.

2.0 SUBSURFACE SOIL DATA

Subsurface soil investigations have been made, and the results are available for examination by the contractor. The contractor is expected to examine the site and determine for himself the character of materials to be encountered.

No additional allowance will be made for rock removal, site clearing and grading, filling, compaction, disposal, or removal of any unclassified materials.

3.0 CLEARING & GRUBBING

A. General: Clearing and grubbing will be required for all areas shown on the plans to be excavated or on which fill is to be constructed.

B. Clearing: Clearing shall consist of removal and disposal of trees and other vegetation as well as down timber, snags, brush, existing foundations, slabs, and rubbish within the areas to be cleared.

C. Grubbing: Stumps, matted roots, and roots larger than 50.8 mm (2 inches) in diameter shall be removed from within 152.4 mm (6 inches) of the surface of areas on which fills are to be constructed except in roadways. Materials as described above within 457.2 mm (18 inches) of finished subgrade of roadways in either cut or fill sections shall be removed. Areas disturbed by grubbing will be filled as specified herein for EMBANKMENT.

D. Grass & Topsoil: Grass, grass roots, and incidental topsoil shall not be left beneath a fill area, nor shall this material be used as fill material. Grass, grass roots, and topsoil may be stockpiled and later used in the top 6 inches of fills outside roadways.

4.0 EARTH EXCAVATION

A. Earth excavation shall consist of the excavation and removal of suitable soils for use as embankment, as well as the satisfactory disposal of all vegetation, existing man-made fill, debris, and deleterious materials encountered within the area to be graded and/or in a borrow area.

B. Excavated areas shall be continuously maintained such that the surface shall be smooth and have sufficient slope to allow water to drain from the surface.

5.0 EMBANKMENT

A. General: Embankments shall consist of a controlled fill constructed in areas indicated on the grading plans.

B. Materials:

(1) Physical Characteristics: Embankment fill material that is to be used as materiel other than roadway subbase shall consist of soils that conform to the following physical characteristics:

Sieve Size (Square Openings)	Percent Passing by Weight
76.2 mm (3 inch)	100
4.75 mm (No. 4)	50-100
75 µm (No. 200)	20-60

The plasticity index of the material, as determined in accordance with ASTM D4318, shall not exceed 10. Results of our investigation indicate that some of the on-site soils will meet these requirements, however, some imported fill will probably be required. The fill materials shall be free from roots, grass, other vegetable matter, clay lumps, rocks larger than 152mm (6 inches), or other deleterious materials.

(2) Borrow: When the quantity of suitable material required for embankments is not available within the limits of the jobsite, the contractor shall provide sufficient materials to construct the embankments to the lines, elevations, and cross sections shown on the drawings from borrow areas. The contractor shall obtain from owners of said borrow areas the right to excavate material, shall pay all royalties and other charges involved, and shall pay all expenses in developing the source, including the cost of right-of-way required for hauling the material.

C. Construction:

(1) Paved Areas (Option 1, R-value > 10): The upper 0.609 M (2 feet) of subgrade soils directly below pavement sections shall have a minimum R-value of 10. Paved areas shall be overexcavated to such an extent so as to provide a minimum depth of 0.609 M (2 feet) of fill, having an R-value of 10, if the existing soils have an R-value of less than 10.

(2) Paved Areas (Option 2, R-value .20): The upper 0.609 M (2 feet) of subgrade soils directly below pavement sections shall have a minimum R-value of 20. Paved areas shall be overexcavated to such an extent so as to provide a minimum depth of 2.0 feet of fill, having an R-value of 20, if the existing soils have an R-value of less than 20.

(3) General: Prior to placement of fill or the construction of pavement sections, paved areas shall be inspected and approved by a representative of the geotechnical engineer to insure satisfactory removal of native soils and the removal of any existing man-made fill.
The exposed cut surface, as well as surfaces to receive fill, soil or base course shall be scarified to a minimum depth of 203.2 mm (8 inches) and watered a necessary to bring the upper 304.8 mm (12 inches) as close as practicable to optimum moisture content or above. The upper 203.2 mm (8 inches) of the native soils shall then be compacted to a minimum of 95 percent of maximum dry density as determined in accordance with ASTM D1557. Where soft, wet soils are encountered at the bottom of cut surfaces, the surface can be stabilized by working large rock into the subgrade. This shall be done only at the discretion of the geotechnical engineer.

Where vibratory compaction equipment is used, it shall be the contractor's responsibility to insure that the vibrations do not damage nearby buildings or other adjacent property.

(4) Compaction: Fill shall be spread in layers not exceeding 203.2 mm (8 inches), watered as necessary, and compacted. Moisture content at the time of compaction shall be within +/-2 percent of optimum moisture. A density of not less than 95 percent of maximum dry density within paved areas shall be obtained for the structural fill or lime stabilized soil. Structural fill, as well as the native soils, outside the paved areas shall be compacted to 90 percent of maximum dry density.

Optimum moisture content and maximum dry density for each soil type used shall be determined in accordance with ASTM D1557.

(5) Weather Limitations: Controlled fill and lime stabilized soil shall not be constructed when the atmospheric temperature is below 1.667 degrees C (35 degrees F). When the temperature falls below 1.667 degrees C (35° degrees F), it shall be the responsibility of the contractor to protect all areas of completed work against any detrimental effects of ground freezing by methods approved by the geotechnical engineer. Any areas that are damaged by freezing shall be reconditioned, reshaped, and compacted by the contractor in conformance with the requirements of this specification without additional cost to the owner.

D. Slope Protection & Drainage: The edges of the controlled fill embankments shall be graded to the contours shown on the drawings and compacted to the density required in paragraph 5.C(2). Slopes steeper than 1 vertical to 3 horizontal shall be protected from erosion.

6. INSPECTION & TESTS

A. Field Inspection & Testing: The owner shall employ the services of a registered, licensed geotechnical engineer to observe and test all controlled earthwork. The geotechnical engineer shall provide continuous on-site observation by experienced personnel during construction of controlled earthwork. The contractor shall notify the engineer at least two working days in advance of any field operations of controlled earthwork, or of any resumption of

operations after stoppages. Tests of fill materials and embankments will be made at the following suggested minimum rates:

(1) One field density test for each 418.0 m^2 (500 square yards) of original ground surface prior to placing fill.

(2) One field density test for each 191.1 m^3 (250 cubic yards) of fill or each layer of fill for each work area, whichever is the greater number of tests.

(3) One moisture-density curve for each type of material used, as indicated by sieve analysis and plasticity index.

B. Report of Field Density Tests: The geotechnical engineer shall submit, daily, the results of field density tests required by these specifications.

C. Costs of Tests & Inspection: The costs of tests, inspection and engineering, as specified in this section of the specifications, shall be borne by the owner.

amec

SHEET 1 OF 1

PROJECT BIA N5001 PROJECT NO. 13-517-00063

SUBJECT ESAL Determination BY AEC DATE 10/26/13

REVIEWED BY WJM DATE 11/22/13

From BIA: Traffic$_{(2033)}$ = 282 vehicles per day

use: 57.5% cars @ 0.0008 ESAL's/vehicle

41% other 4wd vehicles @ 0.0087 ESAL's/vehicle

0.5% Single Trailer Trucks @ 2.3719 ESAL's/vehicle

1% Bus @ 0.6808 ESAL's/vehicle

Total ESAL's/day = 282 [(.575 x 0.0008) + (0.41 x 0.0087) + (.005 x 2.3719) + (.01 x 0.6808)]

= 282 [(0.0005) + (0.0036) + (0.119) + (0.0068)]

= 6.4296 ESAL's/day

6.4296 ESAL's/day x 365 days x 20 years = 46,936 total ESAL's

46,936 x .5 (two-way traffic) = 23,468 total ESAL's/lane

say 23,500

WinPAS

Pavement Thickness Design According to

1993 AASHTO Guide for Design of Pavements Structures

American Concrete Pavement Association

Flexible Design Inputs

Agency: B.I.A.
Company:
Contractor: AMEC
Project Description: BIA Road N5001
Location: Toadlena to Newcomb, New Mexico

Flexible Pavement Design/Evaluation

R-value = 10

Structural Number	2.31		**Soil Resilient Modulus**	3,053.70	**psi**
Design ESALs	23,500.00		**Initial Serviceability**	4.20	
Reliability	71.41	**percent**	**Terminal Serviceability**	2.25	
Overall Deviation	0.45				

Layer Thickness Determination

Layer Material	Layer Coefficient	Drainage Coefficient	Layer Thickness	Layer SN
Asphalt Cement Concrete	0.44	1.00	3.50	1.54
Graded Stone Base	0.11	1.00	7.00	0.77
			Σ SN	2.31

WinPAS

Pavement Thickness Design According to

1993 AASHTO Guide for Design of Pavements Structures

American Concrete Pavement Association

Flexible Design Inputs

Agency: B.I.A.

Company:

Contractor: AMEC

Project Description: BIA Road N5001

Location: Toadlena to Newcomb, New Mexico

Flexible Pavement Design/Evaluation

R-value = 10

Structural Number	2.31		**Soil Resilient Modulus**	3,053.70 psi
Design ESALs	23,500.00		**Initial Serviceability**	4.20
Reliability	71.41	percent	**Terminal Serviceability**	2.25
Overall Deviation	0.45			

Layer Thickness Determination

Layer Material	Layer Coefficient	Drainage Coefficient	Layer Thickness	Layer SN
Asphalt Cement Concrete	0.44	1.00	4.00	1.76
Graded Stone Base	0.11	1.00	5.00	0.55
			Σ SN	2.31

5/13/2014 4:47:31 PM

Engineer: REC

WinPAS

Pavement Thickness Design According to

1993 AASHTO Guide for Design of Pavements Structures

American Concrete Pavement Association

Flexible Design Inputs

Agency: B.I.A.

Company:

Contractor: AMEC

Project Description: BIA Road N5001

Location: Toadlena to Newcomb, New Mexico

Flexible Pavement Design/Evaluation

R-value = 10

Structural Number	2.47		**Soil Resilient Modulus**	3,053.70 psi
Design ESALs	23,500.00		**Initial Serviceability**	4.20
Reliability	83.17	percent	**Terminal Serviceability**	2.25
Overall Deviation	0.45			

Layer Thickness Determination

Layer Material	Layer Coefficient	Drainage Coefficient	Layer Thickness	Layer SN
Asphalt Cement Concrete	0.44	1.00	2.50	1.10
Graded Stone Base	0.11	1.00	3.00	0.33
Granular Subbase	0.13	1.00	8.00	1.04
			Σ SN	2.47

WinPAS

Pavement Thickness Design According to

1993 AASHTO Guide for Design of Pavements Structures

American Concrete Pavement Association

Flexible Design Inputs

Agency: B.I.A.
Company:
Contractor: AMEC
Project Description: BIA Road N5001
Location: Toadlena to Newcomb, New Mexico

Flexible Pavement Design/Evaluation

R-value = 20

Structural Number	2.09		**Soil Resilient Modulus**	4,305.40	**psi**
Design ESALs	23,500.00		**Initial Serviceability**	4.20	
Reliability	77.59	**percent**	**Terminal Serviceability**	2.25	
Overall Deviation	0.45				

Layer Thickness Determination

Layer Material	Layer Coefficient	Drainage Coefficient	Layer Thickness	Layer SN
Asphalt Cement Concrete	0.44	1.00	3.00	1.32
Graded Stone Base	0.11	1.00	7.00	0.77
			Σ SN	2.09

WinPAS

Pavement Thickness Design According to

1993 AASHTO Guide for Design of Pavements Structures

American Concrete Pavement Association

Flexible Design Inputs

Agency: B.I.A.
Company:
Contractor: AMEC
Project Description: BIA Road N5001
Location: Toadlena to Newcomb, New Mexico

Flexible Pavement Design/Evaluation

R-value = 20

Structural Number	2.20		**Soil Resilient Modulus**	4,305.40 **psi**
Design ESALs	23,500.00		**Initial Serviceability**	4.20
Reliability	85.20	**percent**	**Terminal Serviceability**	2.25
Overall Deviation	0.45			

Layer Thickness Determination

Layer Material	Layer Coefficient	Drainage Coefficient	Layer Thickness	Layer SN
Asphalt Cement Concrete	0.44	1.00	4.00	1.76
Graded Stone Base	0.11	1.00	4.00	0.44
			Σ SN	2.20

Engineer: REC

WinPAS

Pavement Thickness Design According to

1993 AASHTO Guide for Design of Pavements Structures

American Concrete Pavement Association

Flexible Design Inputs

Agency: B.I.A.
Company:
Contractor: AMEC
Project Description: BIA Road N5001
Location: Toadlena to Newcomb, New Mexico

Flexible Pavement Design/Evaluation

R-value = 20

Structural Number	2.14		**Soil Resilient Modulus**	4,305.40 psi
Design ESALs	23,500.00		**Initial Serviceability**	4.20
Reliability	81.11	percent	**Terminal Serviceability**	2.25
Overall Deviation	0.45			

Layer Thickness Determination

Layer Material	Layer Coefficient	Drainage Coefficient	Layer Thickness	Layer SN
Asphalt Cement Concrete	0.44	1.00	2.00	0.88
Graded Stone Base	0.11	1.00	2.00	0.22
Granular Subbase	0.13	1.00	8.00	1.04
			Σ SN	2.14

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Engineer: REC