United States Department of the Interior
Bureau of Indian Affairs
Navajo Regional Office
P. O. Box 1060
Gallup, New Mexico 87305-1060

IN REPLY REFER TO:
DIVISION OF TRANSPORTATION
MIC: 370

MEMORANDUM

February 7, 2013

To: Mr. Albert Lee, Highway Design Section Chief

From: Mr. Alfred Myron, Materials Engineer

Subject: Design Recommendation – Subgrade Stabilization, Project N7054 (1)2&3 – Pinedale, NM

1. This report is not necessarily based upon the recommendations contained in the geotechnical report by KLEINFELDER WEST, INC. dated May 31, 2012. Kleinfelder's geotechnical report covered **12.9 km (8.0 miles) of existing roadway alignment**. Their geotechnical report covered only a recommendation for stabilization of the existing 6-inches (0 to 15cm depth) soils in the existing roadway and not necessarily a newly constructed finished subgrade.

2. Based upon the report, **KLEINFELDER did not clearly specify** where (no station limits) to perform the soil stabilization work as they state:

> *"5. In our opinion, the N7054 alignment is a good candidate for an NRDOT field trial of the RoadPacker Plus and RoadBond products. There are more slightly sandy, less clayey portions of the alignment, as evidenced by the laboratory tests. These sections appear to be good locations to test the RoadBond product, with the rest of the alignment apparently more suitable for RoadPacker Plus. The material vendor should be consulted for recommendations as to which product is better suited to each reach of the N7054 alignment. Some blending of soils along the alignment may be required or beneficial."*

3. As KLEINFELDER's recommended locations for soil stabilization are very unclear; we recommend the following:

a. During actual construction of the roadway, the contractor shall sample the top 12-inches (304mm) of the newly finished subgrade in accordance with Section 204 of the contract supplemental specifications.
b. If the soil sample is classified as A-2-4 or A-4 and is **non-plastic**; **no soil stabilization work shall be performed at this location.**
c. If the soil sample is classified as A-6 or A-7-6 and has a **PI > 10; soil stabilization can be performed.** The soil stabilizing product can be RoadPacker Plus, RoadBond, RoadBond EN-1 or any other product approved by NRDOT. The contractor must follow the manufacturer's recommendations for the product he chooses to use.

Section 213-Subgrade Stabilization, FP-2003

The top 150 mm (6-inches) of the finished subgrade shall be soil stabilized ONLY if test data indicates that the soil is A-6 or A-7-6 with a PI > 10. This recommendation is for only the main roadway section hence the turnouts are not included. The contractor must follow the manufacturer's direction and instruction in applying the soil stabilizer.

Prepared by: _____ Date 2-08-13
Regional Materials Engineer

Approved by: _____ Date 2/8/13
Planning & Design Branch Chief

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Division of Transportation
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May 31, 2012
File No.: 126434.5-ALB12RP001

Ms. Ella M. Dempsey
Contract Specialist (Contracting Officer)
BIA-Navajo Regional Office Div. of Acquisition
PO Box 1060
301 West Hill, Room 346
Gallup, NM 87301

Subject: Task Order No.: A12PD00508, Project N7054(1)2&3
Kleinfelder Project # 126434

Dear Ms. Dempsey:

Kleinfelder West Inc. (Kleinfelder) has completed all work under this task order. This report documents the results of our field and laboratory testing programs and contains our recommendations relative to stabilizing the subgrade soils on this portion of the N7054 alignment.

Introduction

Kleinfelder was engaged to sample and test the near surface soils along an approximately 12.9 km (8.0 miles) portion of the N7054 road alignment northeast of Gallup, NM. This task order was performed pursuant to BIA solicitation # N0037012010 and our proposal dated March 9, 2012.

It is our understanding that the Navajo Region Division of Transportation (NRDOT) plans to improve this road by applying a stabilization product to the existing subgrade. The location of the project and of the N7054 alignment and test borings are shown on Figures 1 and 2.

Field and Laboratory Test Programs

Kleinfelder performed sixty-two test borings along or near the centerline of the present N7054 (currently an unimproved road), to a depth of approximately 91 cm (3 feet) at the locations shown on Figure 2. The boring locations were established using a precision GPS receiver. A sample of the upper 15 cm (approximately 6 inches) of the existing subgrade soils at each boring location was obtained and returned to our laboratory for testing. An additional sample of the soils blended from a depth of 15 cm to 91 cm depth (about 6 inches to 3 feet) was also obtained from each boring and returned to our laboratory. The blended samples from 15 cm to 91 cm depth were not tested, since only the top 15 cm of subgrade soils are normally treated during construction.

Hydrometer Particle Size Analysis of Soils tests (AASHTO T-88) were performed on the shallow (0 to 15 cm depth) samples recovered from each of the test borings in order to determine the silt and clay fractions. pH tests were performed on each of the recovered shallow subgrade samples. A few Atterberg Limits (AASHTO T-89, T-90) tests were also performed as an aid in classification of the subgrade soils. These results are presented graphically along the alignment profile in Appendix A.

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The original solicitation did not specify performing Cation Exchange Capacity (CEC) tests on the subgrade samples. The CEC test is used to determine how the clay particles in the soil hold or reject free water molecules, and the CEC test is a necessary prequalification procedure for use of potential stabilization agents (RoadPacker Plus and RoadBond). After discussion with Harold Riley, Director of the NRDOT, the performance of CEC tests was added to the scope of the task order, and a CEC test was performed on each recovered shallow subgrade sample. These results are also presented graphically in Appendix A.

One California Bearing Ratio (CBR) test (AASHTO T-193) was performed, at Kleinfelder's discretion, in order to evaluate the performance of a proposed subgrade treatment product, RoadPacker Plus. This test was performed on a blended sample of the shallow subgrade soils along the N7054 alignment and which was treated with the RoadPacker Plus product in accordance with the manufacturer's recommendations. The CBR results are presented in Appendix B.

Discussion, Conclusions and Recommendations

1. In general, the near surface materials to a depth of 15 cm (about 6 inches) consist of varying amounts of fine sands, silts, and medium plasticity clays. Please reference the laboratory testing section of this report to view the % minus #200 sieve particle size fractional gradations of these near-surface soils along the alignment. AASHTO classifications of the shallow subsoils are also presented along with the laboratory test results.

2. A stated purpose of this task order was for Kleinfelder to recommend a method of stabilizing the shallow subgrade soils on the N7054 alignment. The types of subgrade soils found on N7054 can be stabilized to some extent by the addition of lime or Portland cement. It is our understanding that the NRDOT has had only limited success with stabilizing similar types of soils using lime treatment, and, for this reason, lime and cement stabilization was not considered further in our evaluation. It is further our understanding that the desires to identify a different stabilizing method or stabilizing agent with a higher probability of long term stabilization of these soils.

3. The shallow subgrade soils on the N7054 alignment in general meet the criteria for use, as established by the manufacturer of one or both of the two proprietary products RoadPacker Plus or RoadBond. The soils requirements for the RoadPacker Plus and RoadBond products are sufficiently complex to preclude listing them here, but they can be obtained at the website www.roadpackers.com. The pH of the native near-surface soils is near or at the upper limit (pH = 8.25) of the acceptable pH range for the use of the RoadPacker plus product. The RoadBond product does not have this pH limitation. Different segments of the alignment do not meet the particle size (gradation) and CEC requirements of the RoadPacker Plus product, and may be more suitable for the RoadBond product. In general, the sandier reaches have both low clay content and accompanying low CEC values. Please refer to the laboratory test results, which are organized by position along the N7054 alignment, to determine which segments are suitable for the RoadPacker Plus product and those which are suitable for RoadBond.

4. A one-mile test section of RoadPacker Plus-treated dirt road south of Santa Fe, NM (Spur Ranch Road) has been observed by Kleinfelder for a period of more than six months. This section of Spur Ranch Road has exhibited some surface degradation and muddiness following periods of heavy precipitation. The RoadPacker Plus vendor claims that this degradation and muddiness is because the subgrade materials for this test section of road did not fully meet the criteria for its use as noted in (3.) above.

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Because of this observation of surface degradation in the presence of water, Kleinfelder elected to perform a California Bearing Ratio (CBR) test on a blended sample of the shallow subgrade soils from a selection of borings from N7054, (with the exception of a few of the most sandy samples, which were not included). The blended sample was tested after treating with the RoadPacker Plus product. This CBR test was not specified in the solicitation, but was added at our discretion, to better evaluate how the RoadPacker Plus product performed when the subgrade soils are wetted following application of RoadPacker Plus.

This laboratory CBR test consisted of blending the subgrade soils with the recommended proportion of the RoadPacker Plus product, then molding and compacting a treated CBR specimen containing the RoadPacker Plus product to an estimated 95% of AASHTO T-180 maximum dry density. The treated and compacted CBR specimen was then allowed to cure under ambient room conditions for three days, and then subsequently submerged under water for four days. Following the four day submergence period, the specimen was subjected to the CBR penetration test, with a resulting corrected CBR value of 55 at 0.1 inch penetration. 55 is a high CBR value for a subgrade material and it appears that the RoadPacker Plus performed very well under these laboratory conditions.

5. In our opinion, the N7054 alignment is a good candidate for an NRDOT field trial of the RoadPacker Plus and RoadBond products. There are more slightly sandy, less clayey portions of the alignment, as evidenced by the laboratory tests. These sections appear to be good locations to test the RoadBond product, with the rest of the alignment apparently more suitable for RoadPacker Plus. The material vendor should be consulted for recommendations as to which product is better suited to each reach of the N7054 alignment. Some blending of soils along the alignment may be required or beneficial.

6. It is important that the RoadPacker Plus and RoadBond products are thoroughly mixed with the native subgrade materials and applied in accordance with the vendor's recommendations.

7. For this first field trial of the RoadPacker Plus or RoadBond products, it is recommended that a single contractor be engaged to both provide the RoadPacker Plus and RoadBond products, and to also construct the road, in order that there is no question as to who is responsible for the success and performance of the installation. NRDOT should attempt to negotiate a construction contract that includes a performance bond of several years for the constructed road.

   Once the RoadPacker Plus and RoadBond products have been successfully qualified in the field for the subgrade soils typically found on Navajo Nation lands and roads, then NRDOT could consider using Tribal resources to place RoadPacker products on other NRDOT projects.

Limitations

Kleinfelder has no direct involvement with or responsibility for the selection, application and processing of the RoadPacker Plus, RoadBond, or other subgrade improvement products or methods which might be used by NRDOT on N7054 and other NRDOT roads. It remains the contractor's responsibility for the correct selection, application, and processing of these products, and for the ultimate success of the project, commensurate with the level of risk willing to be undertaken by NRDOT.

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Kleinfelder's work was performed in a manner consistent with that level of care and skill ordinarily exercised by other members of Kleinfelder's profession practicing in the same locality, under similar conditions and at the date the services are provided. Our conclusions, opinions and recommendations are based on a limited number of observations and data. It is possible that conditions could vary between or beyond the data evaluated. Kleinfelder makes no other representation, guarantee or warranty, express or implies, regarding the services, communication (oral or written), report, opinion, or instrument of service provided.

The scope of our services does not include services related to construction safety precautions and our recommendations are not intended to direct the contractor's methods, techniques, sequences, or procedures except as specifically described in our report for consideration in design. The scope of our services for this report did not include any environmental assessment or evaluation regarding the presence or absence of wetlands or hazardous or toxic materials in the soil, surface water, groundwater, air, or below or around the site.

This report may be used only by the Client and the registered design professional in charge and only for the purposes stated for this specific engagement within a reasonable time from its issuance, but in no event later than two (2) years from the date of the report.

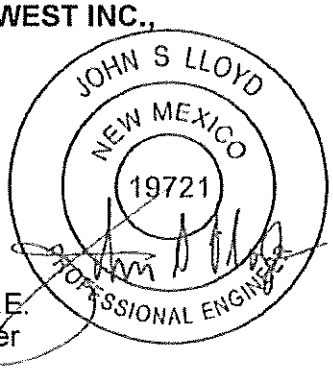
The work performed was based on project information provided by the Client. If the Client does not retain Kleinfelder to review any plans and specifications, including any revisions or modifications to the plans and specifications, Kleinfelder assumes no responsibility for the suitability of our recommendations. In addition, if there are any changes in the field to the plans and specifications, the Client must obtain written approval from Kleinfelder's engineer that such changes do not affect our recommendations. Failure to do so will vitiate Kleinfelder's recommendations.

Closure

It has been our pleasure to be involved with NRDOT on this important project. We look forward to the performance of a field trial and the information that should be gained therefrom. Please keep us advised of the progress of a field trial, if one is undertaken.

Respectfully submitted,

KLEINFELDER WEST INC.,



John S. Lloyd, P.E.
Principal Engineer

Reviewed by:

Joseph P. Laird, P.E.
Senior Engineer

Appendices:
Figure 1 – Site Location Map
Figure 2 – Borehole Location Map
Appendix A – Graphical Profile of Laboratory Test Results
Appendix B – California Bearing Ratio of Laboratory – Compacted Soils

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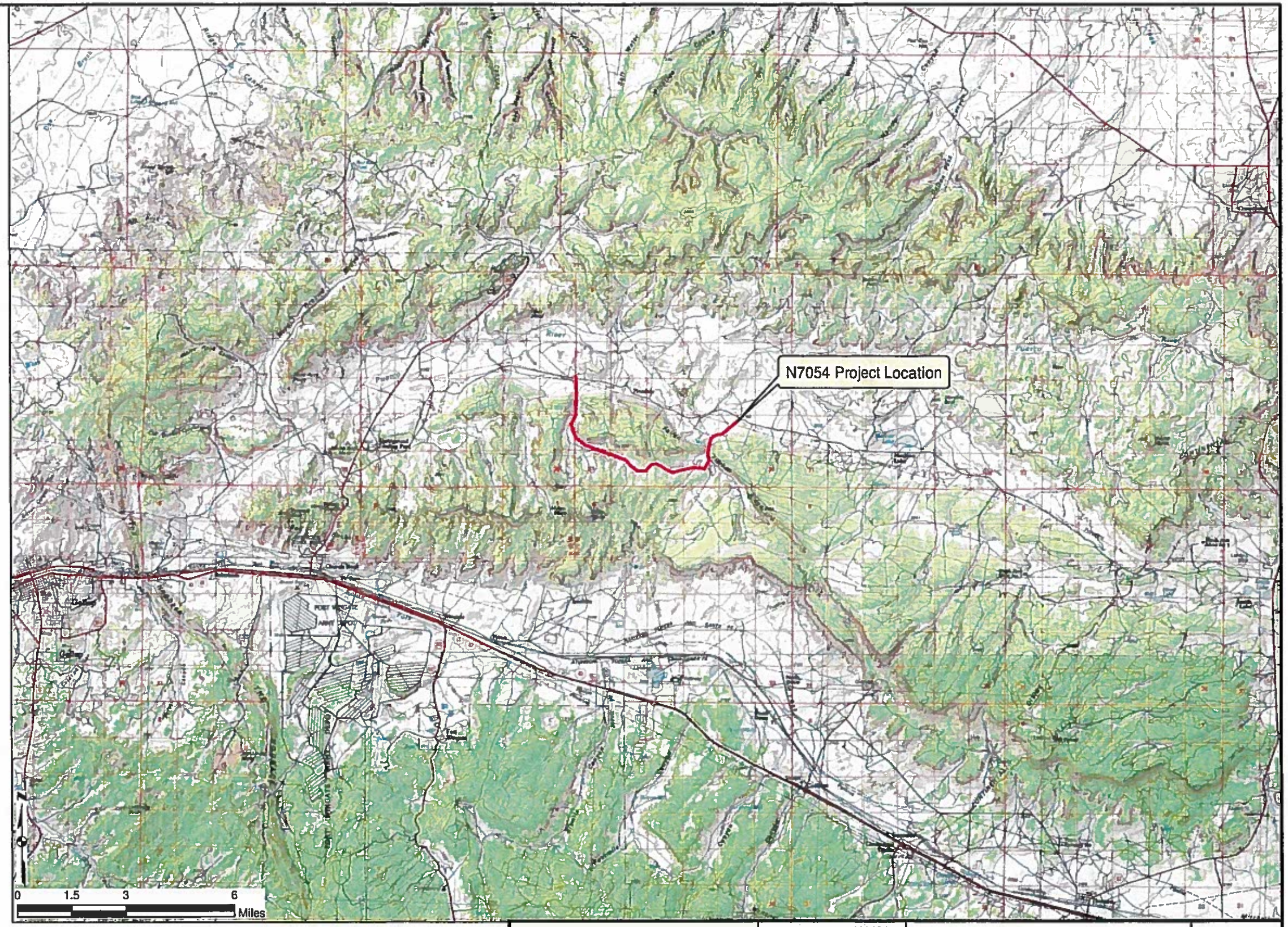
APPENDIX A



LEGEND

★ APPROXIMATE SITE LOCATION

APPROXIMATE N7054 ROADWAY LOCATION

Base Map:
ESRI WORLD MAPS (USA TOPOGRAPHY AND USA STREET)

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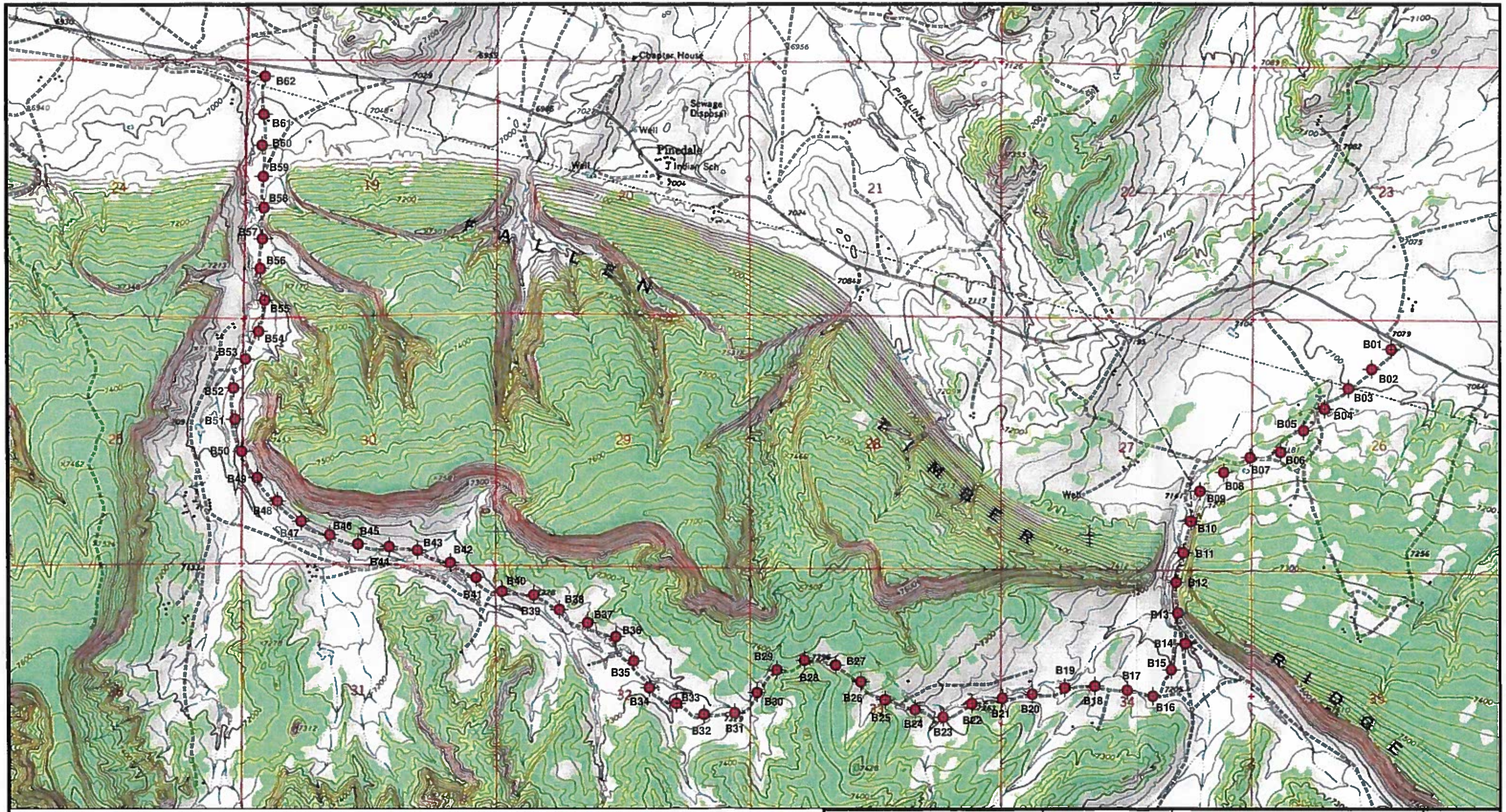
SITE LOCATION MAP

BIA - N7054(1)2,&3
McKINLEY COUNTY
PINEDALE, NEW MEXICO

FIGURE
1



Base Map:
ESRI WORLD MAPS (USA TOPOGRAPHY)

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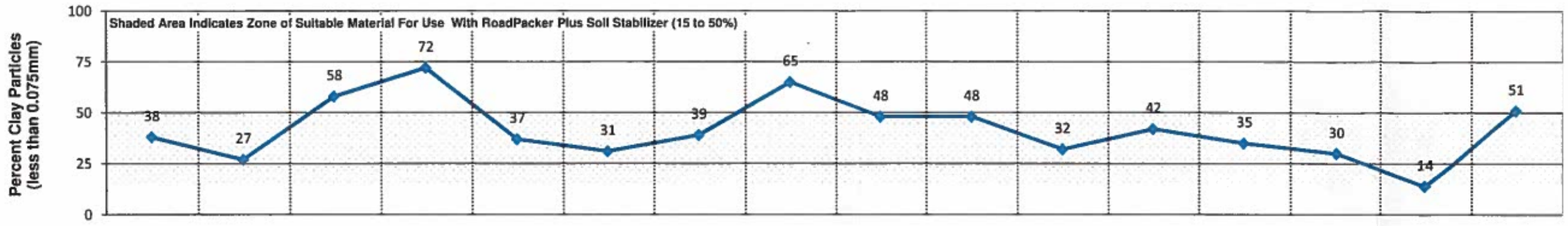
BOREHOLE LOCATION MAP

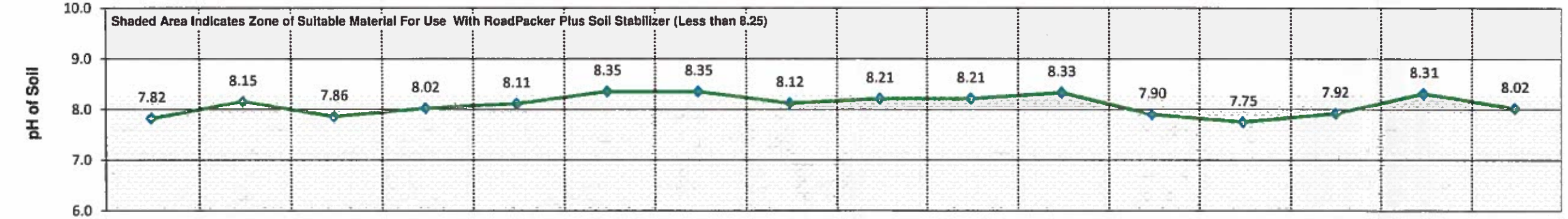
BIA - N7054(1)2,&3
McKINLEY COUNTY
PINEDALE, NEW MEXICO

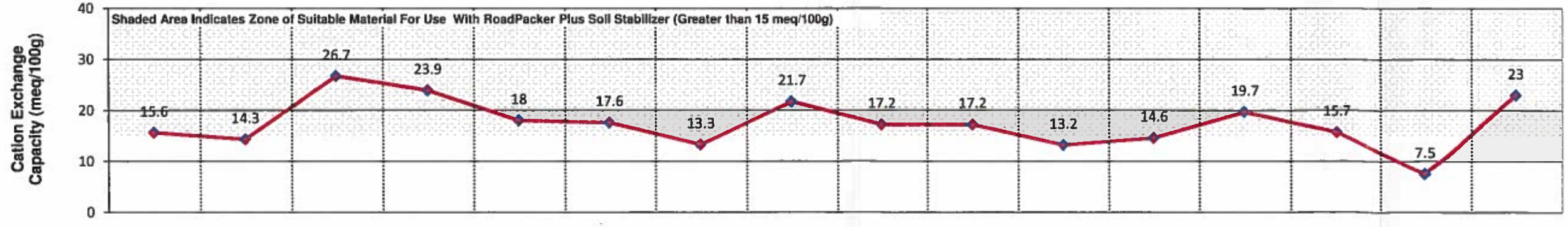
FIGURE
2

Boring ID

	B-1	B-2	B-3	B-4	B-5	B-6	B-7	B-8	B-9	B-10	B-11	B-12	B-13	B-14	B-15	B-16
AASHTO Classification	A-4	A-2-4	A-4	A-7-6	A-4	A-2-4	A-4	A-7-6	A-6	A-6	A-2-4	A-4	A-4	A-2-4	A-2-4	A-4
Liquid Limit																
Plasticity Index																







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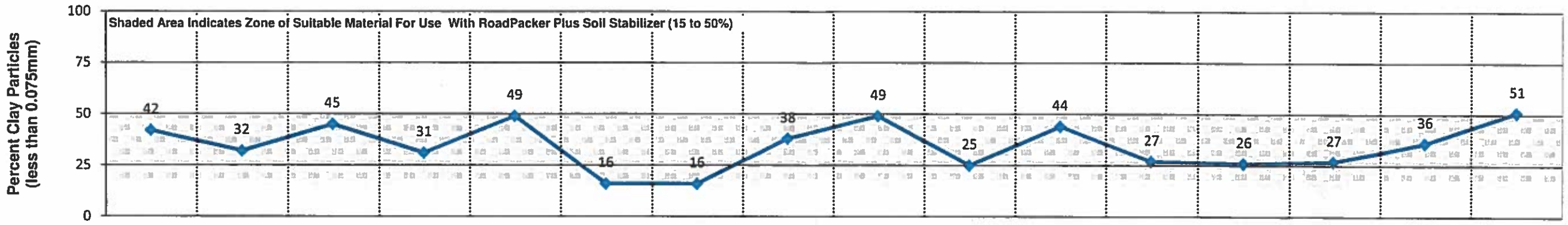
LABORATORY TEST RESULTS

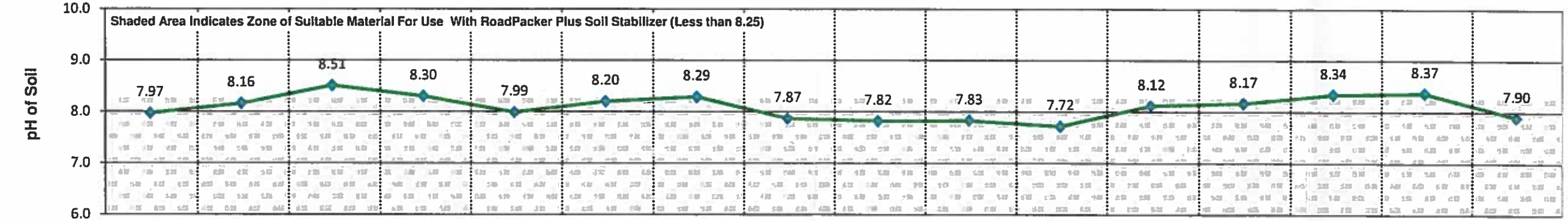
BIA - N7054(1)2, & 3
McKINLEY COUNTY
PINEDALE, NEW MEXICO

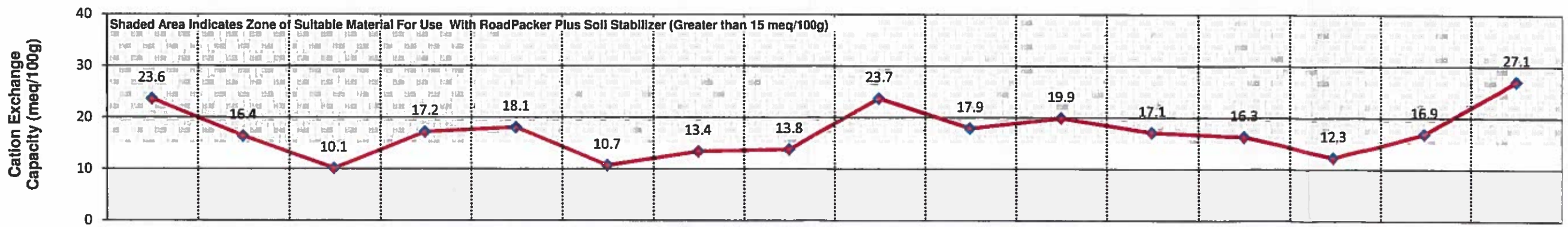
Plate

Boring ID

	B-17	B-18	B-19	B-20	B-21	B-22	B-23	B-24	B-25	B-26	B-27	B-28	B-29	B-30	B-31	B-32
AASHTO Classification	A-6	A-2-4	A-4	A-2-4	A-2-4	A-2-4	A-4	A-4	A-2-4	A-2-4	A-4	A-2-4	A-2-4	A-2-4	A-4	A-6
Liquid Limit																
Plasticity Index																







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LABORATORY TEST RESULTS

BIA - N7054(1)2, & 3
McKINLEY COUNTY
PINEDALE, NEW MEXICO

Plate

Boring ID

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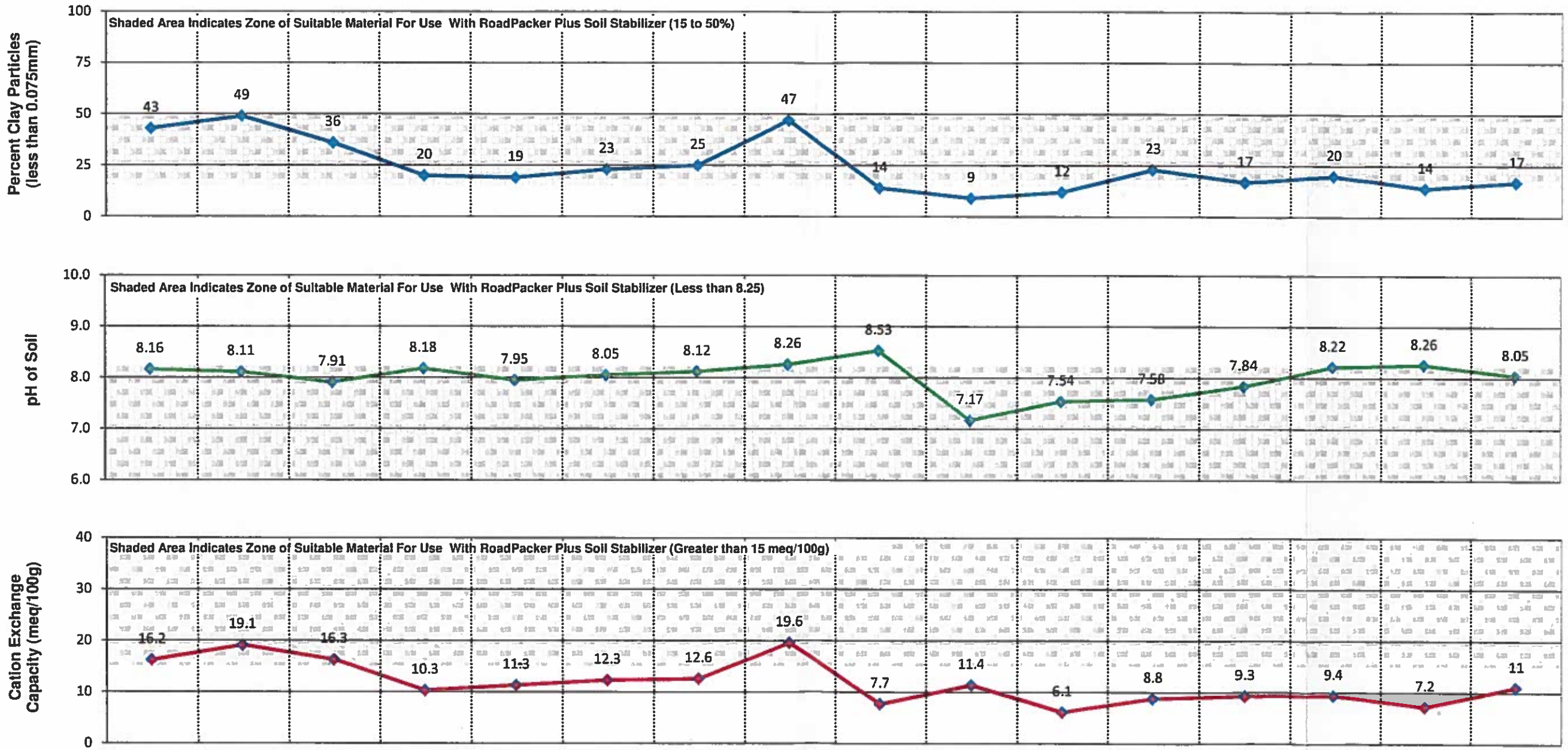
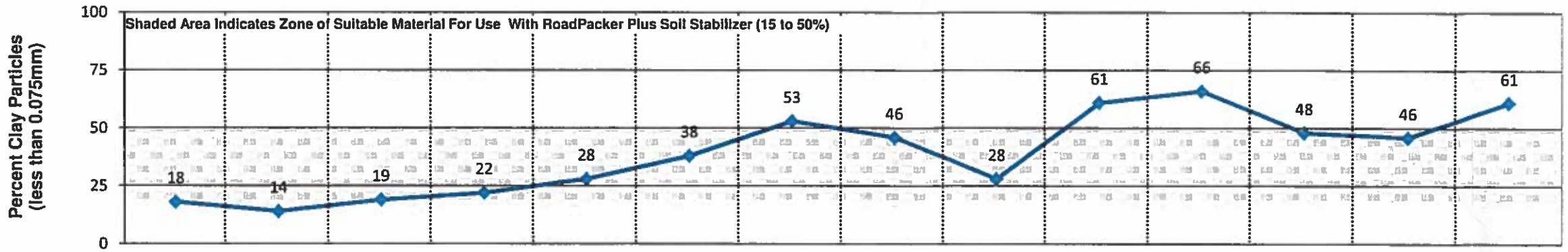
AASHTO Classification	A-6	A-6	A-2-4	A-2-4	A-2-4	A-2-4	A-2-4	A-6	A-2-4	A-2-4	A-2-4	A-2-4	A-2-4	A-2-4	A-2-4	A-2-4
Liquid Limit					NV									NV		
Plasticity Index					NP									NP		

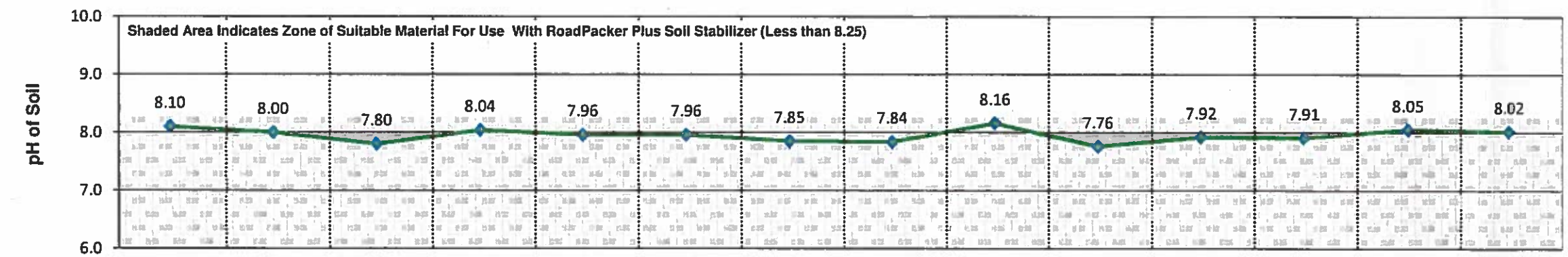


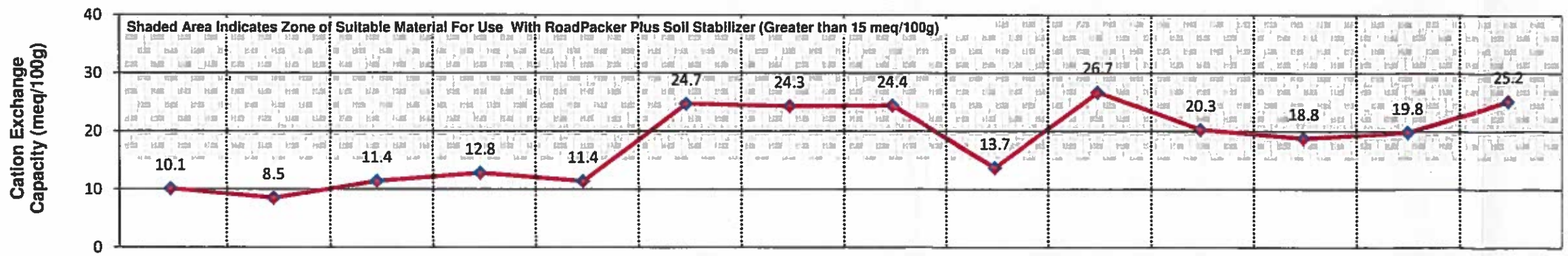
KLEINFELDER *Bright People. Right Solutions.* www.kleinfelder.com	PROJECT NO 126434 DRAWN: 4/24/12 DRAWN BY: JS CHECKED BY: JL FILE NAME: 126434_Lab_Results.xls	**LABORATORY TEST RESULTS** BIA - N7054(1)2, & 3 McKINLEY COUNTY PINEDALE, NEW MEXICO	Plate Page 3 of 4

Boring ID

	B-49	B-50	B-51	B-52	B-53	B-54	B-55	B-56	B-57	B-58	B-59	B-60	B-61	B-62
AASHTO Classification	A-2-4	A-2-4	A-2-4	A-2-4	A-2-4	A-4	A-6	A-6	A-2-4	A-6	A-7-6	A-6	A-6	A-6
Liquid Limit					NV						24			
Plasticity Index					NP						10			







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LABORATORY TEST RESULTS

BIA - N7054(1)2, & 3
McKINLEY COUNTY
PINEDALE, NEW MEXICO

Plate

APPENDIX B

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California Bearing Ratio of Laboratory-Compacted Soils

ASTM D-1883/AASHTO T-193

Project:	FED- BIA Road N7054	Tested By:	J. Menezes
Project No:	126434	Test Date:	5/25/2012
Lab No.:	12173	Reviewed By:	T. Grover
Source:	Blended Shallow Surface Samples except B3, B4, & B8		
Material Description:	Blended Material with Roadpacker		

Compaction Information

Method:	T-180
Maximum Dry Density, pcf:	132.0
Optimum Moisture Content, percent:	7.5

Mold Information

Mold ID:	1
Mold Volume, ft³:	0.0751
Height of Mold, in:	4.5910

Piston Information

Piston Diameter, in:	1.955
Piston Area, in²:	3.002

Select weight units, g for grams, lb for pounds: lb

	Before Test	After Test
Mold Wt., lb	16.0	16.0
Wet Wt. + Mold, lb	25.9	26.4
Wet Soil, lb	9.9	10.4
Wet Density, pcf	132.32	138.58
Dry Density, pcf	124.7	123.9

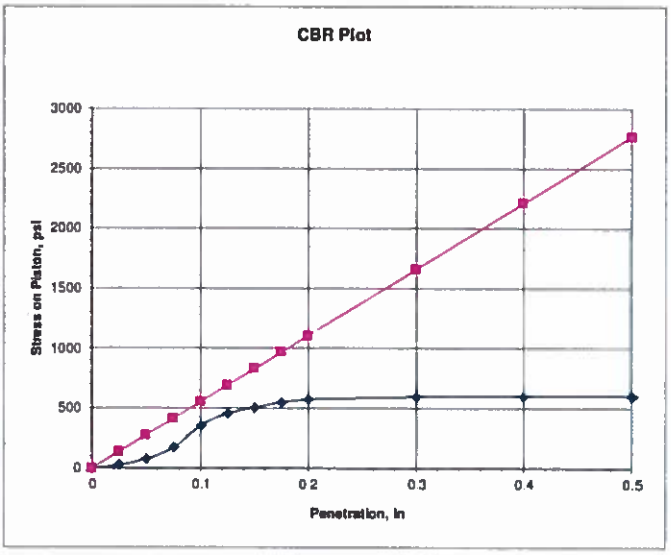
	Before Compaction	After Compaction	After Soaking Top 1"	After Soaking Bottom 1"
Tare Wt., g	0	0	0	0
Wet Wt. + Tare, g	121.8	1104.6	144.7	145.3
Dry Wt. + Tare, g	114.8	1000.3	129.6	129.9
Wt. Of Water, g	7	104.3	15.1	15.4
Wt. Of Dry Soil, g	114.8	1000.3	129.6	129.9
Moisture, %	6.1	10.4	11.7	11.9

Summary of Values

LAB SPECIMEN		CONSOL	
CBR DD Before, pcf	124.7		
CBR DD After, Pcf	123.9		
CBR Percent Compaction, %	94.5%	STRESS	STRAIN
CBR WC Before, %	6.1%	0.0	0.000
CBR WC Top, %	11.7%	29.0	0.025
CBR WC Ave, %	11.8%	80.0	0.050
CBR Surcharge, lbs	10	176.6	0.075
CBR Soaking Period, hr.	96	356.8	0.100
CBR Percent Swell, %	1.29%	456.4	0.125
CBR Value @ 0.1 inches	35.7	506.4	0.150
Corrected CBR Value @ 0.1 inches	55.4	549.7	0.175
Corrected CBR Value @ 0.2 inches	38.3	574.0	0.200
		598.0	0.300
		603.0	0.400
		604.3	0.500

Select Points for Corrected CBR Value*	Penetration, in	Load, lb	Stress, psi	Corrected CBR Value Points
	0	0	0.0	0.00
	0.025	87	29.0	138.42
1	0.050	240	80.0	276.83
	0.075	530	176.6	415.25
2	0.100	1071	356.8	553.67
	0.125	1370	456.4	692.08
	0.150	1520	506.4	830.50
	0.175	1650	549.7	968.91
	0.200	1723	574.0	1107.33
	0.300	1795	598.0	1661.00
	0.400	1810	603.0	2214.66
	0.500	1814	604.3	2768.33
	0.600			3321.99

Swell Data Date	Time	Dial Reading, in	Swell Inches	Percent Swell, %
5-21	1:30	0.384	0	0.00%
5-22	12:33	0.442	0.058	1.26%
5-25	1:32	0.443	0.059	1.29%



Boring Number: B-62	Location:	Drilling Method: Hollow-stem auger
Boring Total Depth: 1.0 m	Coordinates (X/Y, Lat/Long): 35.60934° / 108.47535°	Drilling Equipment:
Depth to Rock: No Rock was Encountered	Datum/Coordinate System:	Drilling Company: Precision Sampling Inc.
Date Begin/End: 04-11-12 / 04-11-12	Top of Boring Elevation:	Bit Size/Type:
Surface Conditions: Unpaved Roadway	Coordinate Data Source: GPS	Hammer Type/Method:
WL Measurement Point:	Depth to Groundwater Initial/Time: Not observed	Hammer Drop/Weight:
Logged By: J. Stoken	Depth to Groundwater Final/Time:	Angle From Vertical/Bearing: -90°

Depth (m)	Sample Type Symbol	Sample Number	Blows per 6 in.	Pocket Pen. (tsf)	Graphic Log	ASTM Symbol	Field Soil Description & Classification: Description	Consistency / Apparent Density	Plasticity	Laboratory: Plasticity Index	Liquid Limit	Water Content (%)	Dry Unit Weight (pcf)	Passing #4 Sieve (%)	Passing #200 Sieve (%)	Other Tests and Field Notes
						CL	**Sandy Lean Clay** (CL): dark brown, dry, fine grained sand									
1							Completed at a depth of 1.0 m below existing site grade.									
2																
3																

The report and log key are an integral part of these logs. All data and interpretations in this log are subject to those stated explanations and limitations.

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Project Number: 126434	**LOG B-62**
Date: 05-11-12	
Entry By: K. Knights	BIA N7054 Pinedale, New Mexico
Checked By: J. Stoken	
File Name: 126434_N7054.gpj	

Plate

SOIL BORING LOG KA CORPORATE STD.GDT KLEINFELDER_GINT_LIBRARY_VER_2.GLB 126434.GPJ 7/18/12

Boring Number: B-61	Location:	Drilling Method: Hollow-stem auger
Boring Total Depth: 1.0 m	Coordinates (X/Y, Lat/Long): 35.60715° / 108.47544°	Drilling Equipment:
Depth to Rock: No Rock was Encountered	Datum/Coordinate System:	Drilling Company: Precision Sampling Inc.
Date Begin/End: 04-11-12 / 04-11-12	Top of Boring Elevation:	Bit Size/Type:
Surface Conditions: Unpaved Roadway	Coordinate Data Source: GPS	Hammer Type/Method:
WL Measurement Point:	Depth to Groundwater Initial/Time: Not observed	Hammer Drop/Weight:
Logged By: J. Stoken	Depth to Groundwater Final/Time:	Angle From Vertical/Bearing: -90°

Depth (m)	Sample Type Symbol	Sample Number	Blows per 6 in.	Pocket Pen. (tsf)	Graphic Log	ASTM Symbol	Field Soil Description & Classification *The report and log key are an integral part of these logs. All data and interpretations in this log are subject to those stated explanations and limitations.* Description	Consistency / Apparent Density	Plasticity	Laboratory: Plasticity Index	Liquid Limit	Water Content (%)	Dry Unit Weight (pcf)	Passing #4 Sieve (%)	Passing #200 Sieve (%)	Other Tests and Field Notes
						SC	**Clayey Sand** (SC): brown, dry, fine grained									
						CL	**Sandy Lean Clay** (CL): dark brown, dry, fine grained sand									
1							Completed at a depth of 1.0 m below existing site grade.									
2																
3																

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Project Number: 126434	**LOG B-61**
Date: 05-11-12	
Entry By: K. Knights	BIA N7054 Pinedale, New Mexico
Checked By: J. Stoken	
File Name: 126434_N7054.gpj	

Plate

SOIL BORING LOG KA CORPORATE STD.GDT KLEINFELDER_GINT_LIBRARY_VER_2.GLB 126434.GPJ 7/18/12

Boring Number: B-60	Location:	Drilling Method: Hollow-stem auger
Boring Total Depth: 1.0 m	Coordinates (X/Y, Lat/Long): 35.60538° / 108.47555°	Drilling Equipment:
Depth to Rock: No Rock was Encountered	Datum/Coordinate System:	Drilling Company: Precision Sampling Inc.
Date Begin/End: 04-11-12 / 04-11-12	Top of Boring Elevation:	Bit Size/Type:
Surface Conditions: Unpaved Roadway	Coordinate Data Source: GPS	Hammer Type/Method:
WL Measurement Point:	Depth to Groundwater Initial/Time: Not observed	Hammer Drop/Weight:
Logged By: J. Stoken	Depth to Groundwater Final/Time:	Angle From Vertical/Bearing: -90°

Depth (m)	Sample Type Symbol	Sample Number	Blows per 6 in.	Pocket Pen. (tsf)	Graphic Log	ASTM Symbol	Field Soil Description & Classification: Description	Consistency / Apparent Density	Plasticity	Laboratory: Plasticity Index	Liquid Limit	Water Content (%)	Dry Unit Weight (pcf)	Passing #4 Sieve (%)	Passing #200 Sieve (%)	Other Tests and Field Notes
						SC	**Clayey Sand** (SC): brown, dry, fine grained									
1							Completed at a depth of 1.0 m below existing site grade.									
2																
3																

The report and log key are an integral part of these logs. All data and interpretations in this log are subject to those stated explanations and limitations.

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Project Number: 126434	**LOG B-60**
Date: 05-11-12	
Entry By: K. Knights	BIA N7054 Pinedale, New Mexico
Checked By: J. Stoken	
File Name: 126434_N7054.gpj	

Plate

SOIL BORING LOG KA CORPORATE STD.GDT KLEINFELDER_GINT_LIBRARY_VER_2.GLB 126434.GPJ 7/18/12

Boring Number: B-59	Location:	Drilling Method: Hollow-stem auger
Boring Total Depth: 1.0 m	Coordinates (X/Y, Lat/Long): 35.60359° / 108.47545°	Drilling Equipment:
Depth to Rock: No Rock was Encountered	Datum/Coordinate System:	Drilling Company: Precision Sampling Inc.
Date Begin/End: 04-11-12 / 04-11-12	Top of Boring Elevation:	Bit Size/Type:
Surface Conditions: Unpaved Roadway	Coordinate Data Source: GPS	Hammer Type/Method:
WL Measurement Point:	Depth to Groundwater Initial/Time: Not observed	Hammer Drop/Weight:
Logged By: J. Stoken	Depth to Groundwater Final/Time:	Angle From Vertical/Bearing: -90°

Depth (m)	Sample Type Symbol	Sample Number	Blows per 6 in.	Pocket Pen. (tsf)	Graphic Log	ASTM Symbol	Field Soil Description & Classification: *The report and log key are an integral part of these logs. All data and interpretations in this log are subject to those stated explanations and limitations.* — Description	Consistency / Apparent Density	Plasticity	Laboratory: Plasticity Index	Liquid Limit	Water Content (%)	Dry Unit Weight (pcf)	Passing #4 Sieve (%)	Passing #200 Sieve (%)	Other Tests and Field Notes
		B-59				CL	**Sandy Lean Clay** (CL): brownish gray, dry, fine grained sand			10	24					
1							Completed at a depth of 1.0 m below existing site grade.									
2																
3																

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Project Number: 126434	**LOG B-59**
Date: 05-11-12	
Entry By: K. Knights	BIA N7054 Pinedale, New Mexico
Checked By: J. Stoken	
File Name: 126434_N7054.gpj	

Plate

SOIL BORING LOG KA CORPORATE STD.GDT KLEINFELDER_GINT_LIBRARY_VER_2.GLB 126434.GPJ 7/18/12

Boring Number: B-58	Location:	Drilling Method: Hollow-stem auger
Boring Total Depth: 1.0 m	Coordinates (X/Y, Lat/Long): 35.60179° / 108.47541°	Drilling Equipment:
Depth to Rock: No Rock was Encountered	Datum/Coordinate System:	Drilling Company: Precision Sampling Inc.
Date Begin/End: 04-11-12 / 04-11-12	Top of Boring Elevation:	Bit Size/Type:
Surface Conditions: Unpaved Roadway	Coordinate Data Source: GPS	Hammer Type/Method:
WL Measurement Point:	Depth to Groundwater Initial/Time: Not observed	Hammer Drop/Weight:
Logged By: J. Stoken	Depth to Groundwater Final/Time:	Angle From Vertical/Bearing: -90°

Depth (m)	Sample Type Symbol	Sample Number	Blows per 6 in.	Pocket Pen. (tsf)	Graphic Log	ASTM Symbol	Field Soil Description & Classification: Description	Consistency / Apparent Density	Plasticity	Laboratory: Plasticity Index	Liquid Limit	Water Content (%)	Dry Unit Weight (pcf)	Passing #4 Sieve (%)	Passing #200 Sieve (%)	Other Tests and Field Notes
							The report and log key are an integral part of these logs. All data and interpretations in this log are subject to those stated explanations and limitations.									
0						CL	**Sandy Lean Clay** (CL): olive brown, dry to moist, fine grained sand									
1							Completed at a depth of 1.0 m below existing site grade.									
2																
3																

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Project Number: 126434	**LOG B-58**
Date: 05-11-12	
Entry By: K. Knights	BIA N7054 Pinedale, New Mexico
Checked By: J. Stoken	
File Name: 126434_N7054.gpj	

Plate

SOIL BORING LOG KA CORPORATE STD.GDT KLEINFELDER GINT LIBRARY VER 2.GLB 126434.GPJ 7/18/12

Boring Number: B-57	Location:	Drilling Method: Hollow-stem auger
Boring Total Depth: 1.0 m	Coordinates (X/Y, Lat/Long): 35.60001° / 108.4755°	Drilling Equipment:
Depth to Rock: No Rock was Encountered	Datum/Coordinate System:	Drilling Company: Precision Sampling Inc.
Date Begin/End: 04-11-12 / 04-11-12	Top of Boring Elevation:	Bit Size/Type:
Surface Conditions: Unpaved Roadway	Coordinate Data Source: GPS	Hammer Type/Method:
WL Measurement Point:	Depth to Groundwater Initial/Time: Not observed	Hammer Drop/Weight:
Logged By: J. Stoken	Depth to Groundwater Final/Time:	Angle From Vertical/Bearing: -90°

Depth (m)	Sample Type Symbol	Sample Number	Blows per 6 in.	Pocket Pen. (tsf)	Graphic Log	ASTM Symbol	Field Soil Description & Classification: *The report and log key are an integral part of these logs. All data and interpretations in this log are subject to those stated explanations and limitations.* — Description	Consistency / Apparent Density	Plasticity	Laboratory: Plasticity Index	Liquid Limit	Water Content (%)	Dry Unit Weight (pcf)	Passing #4 Sieve (%)	Passing #200 Sieve (%)	Other Tests and Field Notes
0						SC	**Clayey Sand** (SC): dark brown, dry, fine grained									
1							Completed at a depth of 1.0 m below existing site grade.									
2																
3																

SOIL BORING LOG KA CORPORATE STD.GDT KLEINFELDER_GINT_LIBRARY_VER_2.GLB 126434.GPJ 7/18/12

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Project Number: 126434	**LOG B-57**
Date: 05-11-12	
Entry By: K. Knights	BIA N7054 Pinedale, New Mexico
Checked By: J. Stoken	
File Name: 126434_N7054.gpj	

Plate

Boring Number: B-56	Location:	Drilling Method: Hollow-stem auger
Boring Total Depth: 1.0 m	Coordinates (X/Y, Lat/Long): 35.59832° / 108.47566°	Drilling Equipment:
Depth to Rock: No Rock was Encountered	Datum/Coordinate System:	Drilling Company: Precision Sampling Inc.
Date Begin/End: 04-11-12 / 04-11-12	Top of Boring Elevation:	Bit Size/Type:
Surface Conditions: Unpaved Roadway	Coordinate Data Source: GPS	Hammer Type/Method:
WL Measurement Point:	Depth to Groundwater Initial/Time: Not observed	Hammer Drop/Weight:
Logged By: J. Stoken	Depth to Groundwater Final/Time:	Angle From Vertical/Bearing: -90°

Depth (m)	Sample Type Symbol	Sample Number	Blows per 6 in.	Pocket Pen. (tsf)	Graphic Log	ASTM Symbol	Field Soil Description & Classification: Description	Consistency / Apparent Density	Plasticity	Laboratory: Plasticity Index	Liquid Limit	Water Content (%)	Dry Unit Weight (pcf)	Passing #4 Sieve (%)	Passing #200 Sieve (%)	Other Tests and Field Notes
						SC	**Clayey Sand** (SC): brownish gray, dry, fine grained									
						CL	**Sandy Lean Clay** (CL): light brownish-gray, moist, fine grained sand									
1							Completed at a depth of 1.0 m below existing site grade.									
2																
3																

The report and log key are an integral part of these logs. All data and interpretations in this log are subject to those stated explanations and limitations.

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Project Number: 126434	**LOG B-56**
Date: 05-11-12	
Entry By: K. Knights	BIA N7054 Pinedale, New Mexico
Checked By: J. Stoken	
File Name: 126434_N7054.gpj	

Plate

SOIL BORING LOG KA CORPORATE STD.GDT KLEINFELDER_GINT_LIBRARY_VER_2.GLB 126434.GPJ 7/18/12

Boring Number: B-55	Location:	Drilling Method: Hollow-stem auger
Boring Total Depth: 1.0 m	Coordinates (X/Y, Lat/Long): 35.5965° / 108.47534°	Drilling Equipment:
Depth to Rock: No Rock was Encountered	Datum/Coordinate System:	Drilling Company: Precision Sampling Inc.
Date Begin/End: 04-11-12 / 04-11-12	Top of Boring Elevation:	Bit Size/Type:
Surface Conditions: Unpaved Roadway	Coordinate Data Source: GPS	Hammer Type/Method:
WL Measurement Point:	Depth to Groundwater Initial/Time: Not observed	Hammer Drop/Weight:
Logged By: J. Stoken	Depth to Groundwater Final/Time:	Angle From Vertical/Bearing: -90°

Depth (m)	Sample Type Symbol	Sample Number	Blows per 6 in.	Pocket Pen. (tsf)	Graphic Log	ASTM Symbol	Field Soil Description & Classification	Consistency / Apparent Density	Plasticity	Laboratory: Plasticity Index	Liquid Limit	Water Content (%)	Dry Unit Weight (pcf)	Passing #4 Sieve (%)	Passing #200 Sieve (%)	Other Tests and Field Notes
							The report and log key are an integral part of these logs. All data and interpretations in this log are subject to those stated explanations and limitations.									
							Description									
						CL	**Sandy Lean Clay** (CL): brownish gray, dry, fine grained sand									
1							Completed at a depth of 1.0 m below existing site grade.									
2																
3																

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Project Number: 126434	**LOG B-55**
Date: 05-11-12	
Entry By: K. Knights	BIA N7054 Pinedale, New Mexico
Checked By: J. Stoken	
File Name: 126434_N7054.gpj	

Plate

SOIL BORING LOG KA CORPORATE STD.GDT KLEINFELDER_GINT_LIBRARY_VER_2.GLB 126434.GPJ 7/18/12

Boring Number: B-54	Location:	Drilling Method: Hollow-stem auger
Boring Total Depth: 1.0 m	Coordinates (X/Y, Lat/Long): 35.59471° / 108.47577°	Drilling Equipment:
Depth to Rock: No Rock was Encountered	Datum/Coordinate System:	Drilling Company: Precision Sampling Inc.
Date Begin/End: 04-11-12 / 04-11-12	Top of Boring Elevation:	Bit Size/Type:
Surface Conditions: Unpaved Roadway	Coordinate Data Source: GPS	Hammer Type/Method:
WL Measurement Point:	Depth to Groundwater Initial/Time: Not observed	Hammer Drop/Weight:
Logged By: J. Stoken	Depth to Groundwater Final/Time:	Angle From Vertical/Bearing: -90°

Depth (m)	Sample Type Symbol	Sample Number	Blows per 6 in.	Pocket Pen. (tsf)	Graphic Log	ASTM Symbol	Field Soil Description & Classification: *The report and log key are an integral part of these logs. All data and interpretations in this log are subject to these stated explanations and limitations.* — Description	Consistency / Apparent Density	Plasticity	Laboratory: Plasticity Index	Liquid Limit	Water Content (%)	Dry Unit Weight (pcf)	Passing #4 Sieve (%)	Passing #200 Sieve (%)	Other Tests and Field Notes
1						SC	**Clayey Sand** (SC): brown, dry to moist, fine grained									
							Completed at a depth of 1.0 m below existing site grade.									
2																
3																

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Project Number: 126434	**LOG B-54**
Date: 05-11-12	
Entry By: K. Knights	BIA N7054 Pinedale, New Mexico
Checked By: J. Stoken	
File Name: 126434_N7054.gpj	

Plate

SOIL BORING LOG KA CORPORATE STD.GDT KLEINFELDER_GINT_LIBRARY_VER_2.GLB 126434.GPJ 7/18/12

Boring Number: B-53	Location:	Drilling Method: Hollow-stem auger
Boring Total Depth: 1.0 m	Coordinates (X/Y, Lat/Long): 35.59313° / 108.47669°	Drilling Equipment:
Depth to Rock: No Rock was Encountered	Datum/Coordinate System:	Drilling Company: Precision Sampling Inc.
Date Begin/End: 04-11-12 / 04-11-12	Top of Boring Elevation:	Bit Size/Type:
Surface Conditions: Unpaved Roadway	Coordinate Data Source: GPS	Hammer Type/Method:
WL Measurement Point:	Depth to Groundwater Initial/Time: Not observed	Hammer Drop/Weight:
Logged By: J. Stoken	Depth to Groundwater Final/Time:	Angle From Vertical/Bearing: -90°

Depth (m)	Sample Type Symbol	Sample Number	Blows per 6 in.	Pocket Pen. (tsf)	Graphic Log	ASTM Symbol	Field Soil Description & Classification: *The report and log key are an integral part of these logs. All data and interpretations in this log are subject to those stated explanations and limitations.* — Description	Consistency / Apparent Density	Plasticity	Laboratory: Plasticity Index	Liquid Limit	Water Content (%)	Dry Unit Weight (pcf)	Passing #4 Sieve (%)	Passing #200 Sieve (%)	Other Tests and Field Notes
		B-53				SM	**Silty Sand** (SM): reddish brown, dry to moist, fine to medium grained			NP	NP					
1							Completed at a depth of 1.0 m below existing site grade.									
2																
3																

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Project Number: 126434	**LOG B-53**
Date: 05-11-12	
Entry By: K. Knights	BIA N7054 Pinedale, New Mexico
Checked By: J. Stoken	
File Name: 126434_N7054.gpj	

Plate

SOIL BORING LOG KA CORPORATE STD.GDT KLEINFELDER_GINT_LIBRARY_VER_2.GLB 126434.GPJ 7/18/12

Boring Number: B-52	Location:	Drilling Method: Hollow-stem auger
Boring Total Depth: 1.0 m	Coordinates (X/Y, Lat/Long): 35.59146° / 108.47752°	Drilling Equipment:
Depth to Rock: No Rock was Encountered	Datum/Coordinate System:	Drilling Company: Precision Sampling Inc.
Date Begin/End: 04-11-12 / 04-11-12	Top of Boring Elevation:	Bit Size/Type:
Surface Conditions: Unpaved Roadway	Coordinate Data Source: GPS	Hammer Type/Method:
WL Measurement Point:	Depth to Groundwater Initial/Time: Not observed	Hammer Drop/Weight:
Logged By: J. Stoken	Depth to Groundwater Final/Time:	Angle From Vertical/Bearing: -90°

Depth (m)	Sample Type Symbol	Sample Number	Blows per 6 in.	Pocket Pen. (tsf)	Graphic Log	ASTM Symbol	Field Soil Description & Classification: *The report and log key are an integral part of these logs. All data and interpretations in this log are subject to those stated explanations and limitations.* — Description	Consistency / Apparent Density	Plasticity	Laboratory: Plasticity Index	Liquid Limit	Water Content (%)	Dry Unit Weight (pcf)	Passing #4 Sieve (%)	Passing #200 Sieve (%)	Other Tests and Field Notes
0						SM	**Silty Sand** (SM): reddish brown, dry to moist, fine to medium grained									
1							Completed at a depth of 1.0 m below existing site grade.									
2																
3																

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Project Number: 126434	**LOG B-52**
Date: 05-11-12	
Entry By: K. Knights	BIA N7054 Pinedale, New Mexico
Checked By: J. Stoken	
File Name: 126434_N7054.gpj	

Plate

SOIL BORING LOG KA CORPORATE STD.GDT KLEINFELDER GINT LIBRARY VER 2.GLB 126434.GPJ 7/18/12

Boring Number: B-51	Location:	Drilling Method: Hollow-stem auger
Boring Total Depth: 1.0 m	Coordinates (X/Y, Lat/Long): 35.58967° / 108.47741°	Drilling Equipment:
Depth to Rock: No Rock was Encountered	Datum/Coordinate System:	Drilling Company: Precision Sampling Inc.
Date Begin/End: 04-11-12 / 04-11-12	Top of Boring Elevation:	Bit Size/Type:
Surface Conditions: Unpaved Roadway	Coordinate Data Source: GPS	Hammer Type/Method:
WL Measurement Point:	Depth to Groundwater Initial/Time: Not observed	Hammer Drop/Weight:
Logged By: J. Stoken	Depth to Groundwater Final/Time:	Angle From Vertical/Bearing: -90°

Depth (m)	Sample Type Symbol	Sample Number	Blows per 6 in.	Pocket Pen. (tsf)	Graphic Log	ASTM Symbol	Field Soil Description & Classification: *The report and log key are an integral part of these logs. All data and interpretations in this log are subject to those stated explanations and limitations.* — Description	Consistency / Apparent Density	Plasticity	Laboratory: Plasticity Index	Liquid Limit	Water Content (%)	Dry Unit Weight (pcf)	Passing #4 Sieve (%)	Passing #200 Sieve (%)	Other Tests and Field Notes
1						SM	**Silty Sand** (SM): brown, dry to moist, fine to medium grained									
							Completed at a depth of 1.0 m below existing site grade.									
2																
3																

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Project Number: 126434	**LOG B-51**	Plate
Date: 05-11-12		
Entry By: K. Knights	BIA N7054 Pinedale, New Mexico	
Checked By: J. Stoken		
File Name: 126434_N7054.gpj		

SOIL BORING LOG KA CORPORATE STD.GDT KLEINFELDER_GINT_LIBRARY_VER_2.GLB 126434.GPJ 7/18/12

Boring Number: B-50	Location:	Drilling Method: Hollow-stem auger
Boring Total Depth: 1.0 m	Coordinates (X/Y, Lat/Long): 35.58785° / 108.47694°	Drilling Equipment:
Depth to Rock: No Rock was Encountered	Datum/Coordinate System:	Drilling Company: Precision Sampling Inc.
Date Begin/End: 04-11-12 / 04-11-12	Top of Boring Elevation:	Bit Size/Type:
Surface Conditions: Unpaved Roadway	Coordinate Data Source: GPS	Hammer Type/Method:
WL Measurement Point:	Depth to Groundwater Initial/Time: Not observed	Hammer Drop/Weight:
Logged By: J. Stoken	Depth to Groundwater Final/Time:	Angle From Vertical/Bearing: -90°

Depth (m)	Sample Type Symbol	Sample Number	Blows per 6 in.	Pocket Pen. (tsf)	Graphic Log	ASTM Symbol	Field Soil Description & Classification: *The report and log key are an integral part of these logs. All data and interpretations in this log are subject to those stated explanations and limitations.* — Description	Consistency / Apparent Density	Plasticity	Laboratory: Plasticity Index	Liquid Limit	Water Content (%)	Dry Unit Weight (pcf)	Passing #4 Sieve (%)	Passing #200 Sieve (%)	Other Tests and Field Notes
1						SM	**Silty Sand** (SM): reddish brown, dry to moist, fine to medium grained									
							Completed at a depth of 1.0 m below existing site grade.									
2																
3																

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Project Number: 126434	**LOG B-50**
Date: 05-11-12	
Entry By: K. Knights	BIA N7054 Pinedale, New Mexico
Checked By: J. Stoken	
File Name: 126434_N7054.gpj	

Plate

SOIL BORING LOG KA CORPORATE STD.GDT KLEINFELDER_GINT_LIBRARY_VER_2.GLB 126434.GPJ 7/18/12

Boring Number: B-49	Location:	Drilling Method: Hollow-stem auger
Boring Total Depth: 1.0 m	Coordinates (X/Y, Lat/Long): 35.58635° / 108.47583°	Drilling Equipment:
Depth to Rock: No Rock was Encountered	Datum/Coordinate System:	Drilling Company: Precision Sampling Inc.
Date Begin/End: 04-11-12 / 04-11-12	Top of Boring Elevation:	Bit Size/Type:
Surface Conditions: Unpaved Roadway	Coordinate Data Source: GPS	Hammer Type/Method:
WL Measurement Point:	Depth to Groundwater Initial/Time: Not observed	Hammer Drop/Weight:
Logged By: J. Stoken	Depth to Groundwater Final/Time:	Angle From Vertical/Bearing: -90°

Depth (m)	Sample Type Symbol	Sample Number	Blows per 6 in.	Pocket Pen. (tsf)	Graphic Log	ASTM Symbol	Field Soil Description & Classification	Laboratory							Other Tests and Field Notes
							The report and log key are an integral part of these logs. All data and interpretations in this log are subject to those stated explanations and limitations. Description	Consistency / Apparent Density	Plasticity	Plasticity Index	Liquid Limit	Water Content (%)	Dry Unit Weight (pcf)	Passing #4 Sieve (%)	Passing #200 Sieve (%)	
1						SM	**Silty Sand** (SM): dark brown, dry to moist, fine to medium grained								
							Completed at a depth of 1.0 m below existing site grade.								
2															
3															

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Project Number: 126434	**LOG B-49**
Date: 05-11-12	
Entry By: K. Knights	BIA N7054 Pinedale, New Mexico
Checked By: J. Stoken	
File Name: 126434_N7054.gpj	

Plate

SOIL BORING LOG KA CORPORATE STD.GDT KLEINFELDER_GINT_LIBRARY_VER_2.GLB 126434.GPJ 7/18/12

Boring Number: B-48	Location:	Drilling Method: Hollow-stem auger
Boring Total Depth: 1.0 m	Coordinates (X/Y, Lat/Long): 35.58501° / 108.47442°	Drilling Equipment:
Depth to Rock: No Rock was Encountered	Datum/Coordinate System:	Drilling Company: Precision Sampling Inc.
Date Begin/End: 04-11-12 / 04-11-12	Top of Boring Elevation:	Bit Size/Type:
Surface Conditions: Unpaved Roadway	Coordinate Data Source: GPS	Hammer Type/Method:
WL Measurement Point:	Depth to Groundwater Initial/Time: Not observed	Hammer Drop/Weight:
Logged By: J. Stoken	Depth to Groundwater Final/Time:	Angle From Vertical/Bearing: -90°

Depth (m)	Sample Type Symbol	Sample Number	Blows per 6 in.	Pocket Pen. (tsf)	Graphic Log	ASTM Symbol	Field Soil Description & Classification: *The report and log key are an integral part of these logs. All data and interpretations in this log are subject to those stated explanations and limitations.* — Description	Consistency / Apparent Density	Plasticity	Laboratory: Plasticity Index	Liquid Limit	Water Content (%)	Dry Unit Weight (pcf)	Passing #4 Sieve (%)	Passing #200 Sieve (%)	Other Tests and Field Notes
1						SM	**Silty Sand** (SM): dark brown, dry to moist, fine to medium grained									
							Completed at a depth of 1.0 m below existing site grade.									
2																
3																

KLEINFELDER
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Project Number: 126434	**LOG B-48**
Date: 05-11-12	
Entry By: K. Knights	BIA N7054 Pinedale, New Mexico
Checked By: J. Stoken	
File Name: 126434_N7054.gpj	

Plate

SOIL BORING LOG KA CORPORATE STD.GDT KLEINFELDER_GINT_LIBRARY_VER_2.GLB 126434.GPJ 7/18/12

Boring Number: B-47	Location:	Drilling Method: Hollow-stem auger
Boring Total Depth: 1.0 m	Coordinates (X/Y, Lat/Long): 35.58386° / 108.47275°	Drilling Equipment:
Depth to Rock: No Rock was Encountered	Datum/Coordinate System:	Drilling Company: Precision Sampling Inc.
Date Begin/End: 04-11-12 / 04-11-12	Top of Boring Elevation:	Bit Size/Type:
Surface Conditions: Unpaved Roadway	Coordinate Data Source: GPS	Hammer Type/Method:
WL Measurement Point:	Depth to Groundwater Initial/Time: Not observed	Hammer Drop/Weight:
Logged By: J. Stoken	Depth to Groundwater Final/Time:	Angle From Vertical/Bearing: -90°

Depth (m)	Sample Type Symbol	Sample Number	Blows per 6 in.	Pocket Pen. (tsf)	Graphic Log	ASTM Symbol	Field Soil Description & Classification: *The report and log key are an integral part of these logs. All data and interpretations in this log are subject to those stated explanations and limitations.* — Description	Consistency / Apparent Density	Plasticity	Laboratory: Plasticity Index	Liquid Limit	Water Content (%)	Dry Unit Weight (pcf)	Passing #4 Sieve (%)	Passing #200 Sieve (%)	Other Tests and Field Notes
1						SP-SM	**Poorly Graded Sand With Silt** (SP-SM): brown, dry, fine grained									
							Completed at a depth of 1.0 m below existing site grade.									
2																
3																

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Project Number: 126434	**LOG B-47**
Date: 05-11-12	
Entry By: K. Knights	BIA N7054 Pinedale, New Mexico
Checked By: J. Stoken	
File Name: 126434_N7054.gpj	

Plate

SOIL BORING LOG KA CORPORATE STD.GDT KLEINFELDER GINT LIBRARY VER_2.GLB 126434.GPJ 7/18/12

Boring Number: B-46	Location:	Drilling Method: Hollow-stem auger
Boring Total Depth: 1.0 m	Coordinates (X/Y, Lat/Long): 35.5831° / 108.47074°	Drilling Equipment:
Depth to Rock: No Rock was Encountered	Datum/Coordinate System:	Drilling Company: Precision Sampling Inc.
Date Begin/End: 04-11-12 / 04-11-12	Top of Boring Elevation:	Bit Size/Type:
Surface Conditions: Unpaved Roadway	Coordinate Data Source: GPS	Hammer Type/Method:
WL Measurement Point:	Depth to Groundwater Initial/Time: Not observed	Hammer Drop/Weight:
Logged By: J. Stoken	Depth to Groundwater Final/Time:	Angle From Vertical/Bearing: -90°

Depth (m)	Sample Type Symbol	Sample Number	Blows per 6 in.	Pocket Pen. (tsf)	Graphic Log	ASTM Symbol	Field Soil Description & Classification: Description	Consistency / Apparent Density	Plasticity	Laboratory: Plasticity Index	Liquid Limit	Water Content (%)	Dry Unit Weight (pcf)	Passing #4 Sieve (%)	Passing #200 Sieve (%)	Other Tests and Field Notes
		B-46				SC	**Clayey Sand** (SC): brown, dry to moist, fine to medium grained			NP	NP					
1							Completed at a depth of 1.0 m below existing site grade.									
2																
3																

The report and log key are an integral part of these logs. All data and interpretations in this log are subject to those stated explanations and limitations.

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Project Number: 126434	**LOG B-46**
Date: 05-11-12	
Entry By: K. Knights	BIA N7054 Pinedale, New Mexico
Checked By: J. Stoken	
File Name: 126434_N7054.gpj	

Plate

SOIL BORING LOG KA CORPORATE STD.GDT KLEINFELDER_GINT_LIBRARY_VER_2.GLB 126434.GPJ 7/18/12

Boring Number: B-45	**Location:**	**Drilling Method:** Hollow-stem auger
Boring Total Depth: 1.0 m	**Coordinates (X/Y, Lat/Long):** 35.58258° / 108.46876°	**Drilling Equipment:**
Depth to Rock: No Rock was Encountered	**Datum/Coordinate System:**	**Drilling Company:** Precision Sampling Inc.
Date Begin/End: 04-11-12 / 04-11-12	**Top of Boring Elevation:**	**Bit Size/Type:**
Surface Conditions: Unpaved Roadway	**Coordinate Data Source:** GPS	**Hammer Type/Method:**
WL Measurement Point:	**Depth to Groundwater Initial/Time:** Not observed	**Hammer Drop/Weight:**
Logged By: J. Stoken	**Depth to Groundwater Final/Time:**	**Angle From Vertical/Bearing:** -90°

Depth (m)	Sample Type Symbol	Sample Number	Blows per 6 in.	Pocket Pen. (tsf)	Graphic Log	ASTM Symbol	Field Soil Description & Classification: *The report and log key are an integral part of these logs. All data and interpretations in this log are subject to those stated explanations and limitations.* — Description	Consistency / Apparent Density	Plasticity	Laboratory: Plasticity Index	Liquid Limit	Water Content (%)	Dry Unit Weight (pcf)	Passing #4 Sieve (%)	Passing #200 Sieve (%)	Other Tests and Field Notes
0						SC	**Clayey Sand** (SC): brown, dry to moist, fine to medium grained									
1							Completed at a depth of 1.0 m below existing site grade.									
2																
3																

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Project Number: 126434	**LOG B-45**
Date: 05-11-12	
Entry By: K. Knights	BIA N7054 Pinedale, New Mexico
Checked By: J. Stoken	
File Name: 126434_N7054.gpj	

Plate

SOIL BORING LOG KA CORPORATE STD.GDT KLEINFELDER GINT LIBRARY VER 2.GLB 126434.GPJ 7/18/12

Boring Number: B-44	Location:	Drilling Method: Hollow-stem auger
Boring Total Depth: 1.0 m	Coordinates (X/Y, Lat/Long): 35.58243° / 108.46657°	Drilling Equipment:
Depth to Rock: No Rock was Encountered	Datum/Coordinate System:	Drilling Company: Precision Sampling Inc.
Date Begin/End: 04-11-12 / 04-11-12	Top of Boring Elevation:	Bit Size/Type:
Surface Conditions: Unpaved Roadway	Coordinate Data Source: GPS	Hammer Type/Method:
WL Measurement Point:	Depth to Groundwater Initial/Time: Not observed	Hammer Drop/Weight:
Logged By: J. Stoken	Depth to Groundwater Final/Time:	Angle From Vertical/Bearing: -90°

Depth (m)	Sample Type Symbol	Sample Number	Blows per 6 in.	Pocket Pen. (tsf)	Graphic Log	ASTM Symbol	Field Soil Description & Classification: Description	Consistency / Apparent Density	Plasticity	Laboratory: Plasticity Index	Liquid Limit	Water Content (%)	Dry Unit Weight (pcf)	Passing #4 Sieve (%)	Passing #200 Sieve (%)	Other Tests and Field Notes
							The report and log key are an integral part of these logs. All data and interpretations in this log are subject to those stated explanations and limitations.									
0						SM	**Silty Sand** (SM): dark brown, dry to moist, fine to medium grained									
1							Completed at a depth of 1.0 m below existing site grade.									
2																
3																

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Project Number: 126434	**LOG B-44**
Date: 05-11-12	
Entry By: K. Knights	BIA N7054 Pinedale, New Mexico
Checked By: J. Stoken	
File Name: 126434_N7054.gpj	

Plate

SOIL BORING LOG KA CORPORATE STD.GDT KLEINFELDER_GINT_LIBRARY_VER_2.GLB 126434.GPJ 7/18/12

Boring Number: B-43	Location:	Drilling Method: Hollow-stem auger
Boring Total Depth: 1.0 m	Coordinates (X/Y, Lat/Long): 35.58224° / 108.46459°	Drilling Equipment:
Depth to Rock: No Rock was Encountered	Datum/Coordinate System:	Drilling Company: Precision Sampling Inc.
Date Begin/End: 04-11-12 / 04-11-12	Top of Boring Elevation:	Bit Size/Type:
Surface Conditions: Unpaved Roadway	Coordinate Data Source: GPS	Hammer Type/Method:
WL Measurement Point:	Depth to Groundwater Initial/Time: Not observed	Hammer Drop/Weight:
Logged By: J. Stoken	Depth to Groundwater Final/Time:	Angle From Vertical/Bearing: -90°

Depth (m)	Sample Type Symbol	Sample Number	Blows per 6 in.	Pocket Pen. (tsf)	Graphic Log	ASTM Symbol	Field Soil Description & Classification *The report and log key are an integral part of these logs. All data and interpretations in this log are subject to those stated explanations and limitations.* Description	Consistency / Apparent Density	Plasticity	Laboratory: Plasticity Index	Liquid Limit	Water Content (%)	Dry Unit Weight (pcf)	Passing #4 Sieve (%)	Passing #200 Sieve (%)	Other Tests and Field Notes
						SP-SM	**Poorly Graded Sand With Silt** (SP-SM): light brown, dry, fine grained									
						SC	**Clayey Sand** (SC): brown, dry to moist, fine grained									
1							Completed at a depth of 1.0 m below existing site grade.									
2																
3																

SOIL BORING LOG KA CORPORATE STD.GDT KLEINFELDER_GINT_LIBRARY_VER_2.GLB 126434.GPJ 7/18/12

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Project Number: 126434	**LOG B-43**
Date: 05-11-12	
Entry By: K. Knights	BIA N7054 Pinedale, New Mexico
Checked By: J. Stoken	
File Name: 126434_N7054.gpj	

Plate

Boring Number: B-42	Location:	Drilling Method: Hollow-stem auger
Boring Total Depth: 1.0 m	Coordinates (X/Y, Lat/Long): 35.58154° / 108.46225°	Drilling Equipment:
Depth to Rock: No Rock was Encountered	Datum/Coordinate System:	Drilling Company: Precision Sampling Inc.
Date Begin/End: 04-11-12 / 04-11-12	Top of Boring Elevation:	Bit Size/Type:
Surface Conditions: Unpaved Roadway	Coordinate Data Source: GPS	Hammer Type/Method:
WL Measurement Point:	Depth to Groundwater Initial/Time: Not observed	Hammer Drop/Weight:
Logged By: J. Stoken	Depth to Groundwater Final/Time:	Angle From Vertical/Bearing: -90°

Depth (m)	Sample Type Symbol	Sample Number	Blows per 6 in.	Pocket Pen. (tsf)	Graphic Log	ASTM Symbol	Field Soil Description & Classification	Consistency / Apparent Density	Plasticity	Laboratory: Plasticity Index	Liquid Limit	Water Content (%)	Dry Unit Weight (pcf)	Passing #4 Sieve (%)	Passing #200 Sieve (%)	Other Tests and Field Notes
							The report and log key are an integral part of these logs. All data and interpretations in this log are subject to those stated explanations and limitations.									
							Description									
1						SP-SM	**Poorly Graded Sand With Silt** (SP-SM): dark brown, dry to moist, fine to medium grained									
							Completed at a depth of 1.0 m below existing site grade.									
2																
3																

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Project Number: 126434	**LOG B-42**
Date: 05-11-12	
Entry By: K. Knights	BIA N7054 Pinedale, New Mexico
Checked By: J. Stoken	
File Name: 126434_N7054.gpj	

Plate

SOIL BORING LOG KA CORPORATE STD.GDT KLEINFELDER_GINT_LIBRARY_VER_2.GLB 126434.GPJ 7/18/12

Boring Number: B-41	Location:	Drilling Method: Hollow-stem auger
Boring Total Depth: 1.0 m	Coordinates (X/Y, Lat/Long): 35.5807° / 108.46043°	Drilling Equipment:
Depth to Rock: No Rock was Encountered	Datum/Coordinate System:	Drilling Company: Precision Sampling Inc.
Date Begin/End: 04-11-12 / 04-11-12	Top of Boring Elevation:	Bit Size/Type:
Surface Conditions: Unpaved Roadway	Coordinate Data Source: GPS	Hammer Type/Method:
WL Measurement Point:	Depth to Groundwater Initial/Time: Not observed	Hammer Drop/Weight:
Logged By: J. Stoken	Depth to Groundwater Final/Time:	Angle From Vertical/Bearing: -90°

Depth (m)	Sample Type Symbol	Sample Number	Blows per 6 in.	Pocket Pen. (tsf)	Graphic Log	ASTM Symbol	Field Soil Description & Classification *The report and log key are an integral part of these logs. All data and interpretations in this log are subject to those stated explanations and limitations.* Description	Consistency / Apparent Density	Plasticity	Laboratory: Plasticity Index	Liquid Limit	Water Content (%)	Dry Unit Weight (pcf)	Passing #4 Sieve (%)	Passing #200 Sieve (%)	Other Tests and Field Notes
1						SM	**Silty Sand** (SM): brown, dry to moist, fine to medium grained									
							Completed at a depth of 1.0 m below existing site grade.									
2																
3																

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Project Number: 126434	**LOG B-41**
Date: 05-11-12	
Entry By: K. Knights	BIA N7054 Pinedale, New Mexico
Checked By: J. Stoken	
File Name: 126434_N7054.gpj	

Plate

SOIL BORING LOG KA CORPORATE STD.GDT KLEINFELDER_GINT_LIBRARY_VER_2.GLB 126434.GPJ 7/18/12

Boring Number: B-40	Location:	Drilling Method: Hollow-stem auger
Boring Total Depth: 1.0 m	Coordinates (X/Y, Lat/Long): 35.57992° / 108.45862°	Drilling Equipment:
Depth to Rock: No Rock was Encountered	Datum/Coordinate System:	Drilling Company: Precision Sampling Inc.
Date Begin/End: 04-11-12 / 04-11-12	Top of Boring Elevation:	Bit Size/Type:
Surface Conditions: Unpaved Roadway	Coordinate Data Source: GPS	Hammer Type/Method:
WL Measurement Point:	Depth to Groundwater Initial/Time: Not observed	Hammer Drop/Weight:
Logged By: J. Stoken	Depth to Groundwater Final/Time:	Angle From Vertical/Bearing: -90°

Depth (m)	Sample Type Symbol	Sample Number	Blows per 6 in.	Pocket Pen. (tsf)	Graphic Log	ASTM Symbol	Field Soil Description & Classification: *The report and log key are an integral part of these logs. All data and interpretations in this log are subject to those stated explanations and limitations.* — Description	Consistency / Apparent Density	Plasticity	Laboratory: Plasticity Index	Liquid Limit	Water Content (%)	Dry Unit Weight (pcf)	Passing #4 Sieve (%)	Passing #200 Sieve (%)	Other Tests and Field Notes
0						SC	**Clayey Sand** (SC): brown, dry, fine grained									
1							Completed at a depth of 1.0 m below existing site grade.									
2																
3																

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Project Number: 126434	**LOG B-40**
Date: 05-11-12	
Entry By: K. Knights	BIA N7054 Pinedale, New Mexico
Checked By: J. Stoken	
File Name: 126434_N7054.gpj	

Plate

SOIL BORING LOG KA CORPORATE STD.GDT KLEINFELDER GINT LIBRARY VER 2.GLB 126434.GPJ 7/18/12

Boring Number: B-39	Location:	Drilling Method: Hollow-stem auger
Boring Total Depth: 1.0 m	Coordinates (X/Y, Lat/Long): 35.57972° / 108.4564°	Drilling Equipment:
Depth to Rock: No Rock was Encountered	Datum/Coordinate System:	Drilling Company: Precision Sampling Inc.
Date Begin/End: 04-11-12 / 04-11-12	Top of Boring Elevation:	Bit Size/Type:
Surface Conditions: Unpaved Roadway	Coordinate Data Source: GPS	Hammer Type/Method:
WL Measurement Point:	Depth to Groundwater Initial/Time: Not observed	Hammer Drop/Weight:
Logged By: J. Stoken	Depth to Groundwater Final/Time:	Angle From Vertical/Bearing: -90°

Depth (m)	Sample Type Symbol	Sample Number	Blows per 6 in.	Pocket Pen. (tsf)	Graphic Log	ASTM Symbol	Field Soil Description & Classification *The report and log key are an integral part of these logs. All data and interpretations in this log are subject to those stated explanations and limitations.* Description	Consistency / Apparent Density	Plasticity	Laboratory: Plasticity Index	Liquid Limit	Water Content (%)	Dry Unit Weight (pcf)	Passing #4 Sieve (%)	Passing #200 Sieve (%)	Other Tests and Field Notes
0						SM	**Silty Sand** (SM): dark brown, dry to moist, fine to medium grained									
1							Completed at a depth of 1.0 m below existing site grade.									
2																
3																

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Project Number: 126434	**LOG B-39**
Date: 05-11-12	
Entry By: K. Knights	BIA N7054 Pinedale, New Mexico
Checked By: J. Stoken	
File Name: 126434_N7054.gpj	

Plate

SOIL BORING LOG KA CORPORATE STD.GDT KLEINFELDER_GINT_LIBRARY_VER_2.GLB 126434.GPJ 7/18/12

Boring Number: B-38	Location:	Drilling Method: Hollow-stem auger
Boring Total Depth: 1.0 m	Coordinates (X/Y, Lat/Long): 35.57888° / 108.45459°	Drilling Equipment:
Depth to Rock: No Rock was Encountered	Datum/Coordinate System:	Drilling Company: Precision Sampling Inc.
Date Begin/End: 04-11-12 / 04-11-12	Top of Boring Elevation:	Bit Size/Type:
Surface Conditions: Unpaved Roadway	Coordinate Data Source: GPS	Hammer Type/Method:
WL Measurement Point:	Depth to Groundwater Initial/Time: Not observed	Hammer Drop/Weight:
Logged By: J. Stoken	Depth to Groundwater Final/Time:	Angle From Vertical/Bearing: -90°

Depth (m)	Sample Type Symbol	Sample Number	Blows per 6 in.	Pocket Pen. (tsf)	Graphic Log	ASTM Symbol	Field Soil Description & Classification: Description	Consistency / Apparent Density	Plasticity	Laboratory: Plasticity Index	Liquid Limit	Water Content (%)	Dry Unit Weight (pcf)	Passing #4 Sieve (%)	Passing #200 Sieve (%)	Other Tests and Field Notes
						SM	**Silty Sand** (SM): dark brown, dry to moist, fine to medium grained									
1							Completed at a depth of 1.0 m below existing site grade.									
2																
3																

The report and log key are an integral part of these logs. All data and interpretations in this log are subject to those stated explanations and limitations.

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Project Number: 126434	**LOG B-38**
Date: 05-11-12	
Entry By: K. Knights	BIA N7054
Checked By: J. Stoken	Pinedale, New Mexico
File Name: 126434_N7054.gpj	

Plate

SOIL BORING LOG KA CORPORATE STD.GDT KLEINFELDER_GINT_LIBRARY_VER_2.GLB 126434.GPJ 7/18/12

Boring Number: B-37	**Location:**	**Drilling Method:** Hollow-stem auger
Boring Total Depth: 1.0 m	**Coordinates (X/Y, Lat/Long):** 35.57815° / 108.4526°	**Drilling Equipment:**
Depth to Rock: No Rock was Encountered	**Datum/Coordinate System:**	**Drilling Company:** Precision Sampling Inc.
Date Begin/End: 04-11-12 / 04-11-12	**Top of Boring Elevation:**	**Bit Size/Type:**
Surface Conditions: Unpaved Roadway	**Coordinate Data Source:** GPS	**Hammer Type/Method:**
WL Measurement Point:	**Depth to Groundwater Initial/Time:** Not observed	**Hammer Drop/Weight:**
Logged By: J. Stoken	**Depth to Groundwater Final/Time:**	**Angle From Vertical/Bearing:** -90°

Depth (m)	Sample Type Symbol	Sample Number	Blows per 6 in.	Pocket Pen. (tsf)	Graphic Log	ASTM Symbol	Field Soil Description & Classification: *The report and log key are an integral part of these logs. All data and interpretations in this log are subject to those stated explanations and limitations.* — Description	Consistency / Apparent Density	Plasticity	Laboratory: Plasticity Index	Liquid Limit	Water Content (%)	Dry Unit Weight (pcf)	Passing #4 Sieve (%)	Passing #200 Sieve (%)	Other Tests and Field Notes
		B-37				SM	**Silty Sand** (SM): dark brown, dry to moist, fine to medium grained			NP	NP					
1							Completed at a depth of 1.0 m below existing site grade.									
2																
3																

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Project Number: 126434	**LOG B-37**	**Plate**
Date: 05-11-12		
Entry By: K. Knights	**BIA N7054** **Pinedale, New Mexico**	
Checked By: J. Stoken		
File Name: 126434_N7054.gpj		

SOIL BORING LOG KA CORPORATE STD.GDT KLEINFELDER_GINT_LIBRARY_VER_2.GLB 126434.GPJ 7/18/12

Boring Number: B-36	Location:	Drilling Method: Hollow-stem auger
Boring Total Depth: 1.0 m	Coordinates (X/Y, Lat/Long): 35.57736° / 108.4506°	Drilling Equipment:
Depth to Rock: No Rock was Encountered	Datum/Coordinate System:	Drilling Company: Precision Sampling Inc.
Date Begin/End: 04-11-12 / 04-11-12	Top of Boring Elevation:	Bit Size/Type:
Surface Conditions: Unpaved Roadway	Coordinate Data Source: GPS	Hammer Type/Method:
WL Measurement Point:	Depth to Groundwater Initial/Time: Not observed	Hammer Drop/Weight:
Logged By: J. Stoken	Depth to Groundwater Final/Time:	Angle From Vertical/Bearing: -90°

Depth (m)	Sample Type Symbol	Sample Number	Blows per 6 in.	Pocket Pen. (tsf)	Graphic Log	ASTM Symbol	Field Soil Description & Classification: *The report and log key are an integral part of these logs. All data and interpretations in this log are subject to those stated explanations and limitations.* — Description	Consistency / Apparent Density	Plasticity	Laboratory: Plasticity Index	Liquid Limit	Water Content (%)	Dry Unit Weight (pcf)	Passing #4 Sieve (%)	Passing #200 Sieve (%)	Other Tests and Field Notes
1						SM	**Silty Sand** (SM): dark brown, dry to moist, fine grained									
							Completed at a depth of 1.0 m below existing site grade.									
2																
3																

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Project Number: 126434	**LOG B-36**
Date: 05-11-12	
Entry By: K. Knights	BIA N7054 Pinedale, New Mexico
Checked By: J. Stoken	
File Name: 126434_N7054.gpj	

Plate

SOIL BORING LOG KA CORPORATE STD.GDT KLEINFELDER_GINT_LIBRARY_VER_2.GLB 126434.GPJ 7/18/12

Boring Number: B-35	Location:	Drilling Method: Hollow-stem auger
Boring Total Depth: 1.0 m	Coordinates (X/Y, Lat/Long): 35.57598° / 108.44933°	Drilling Equipment:
Depth to Rock: No Rock was Encountered	Datum/Coordinate System:	Drilling Company: Precision Sampling Inc.
Date Begin/End: 04-10-12 / 04-10-12	Top of Boring Elevation:	Bit Size/Type:
Surface Conditions: Unpaved Roadway	Coordinate Data Source: GPS	Hammer Type/Method:
WL Measurement Point:	Depth to Groundwater Initial/Time: Not observed	Hammer Drop/Weight:
Logged By: J. Stoken	Depth to Groundwater Final/Time:	Angle From Vertical/Bearing: -90°

Depth (m)	Sample Type Symbol	Sample Number	Blows per 6 in.	Pocket Pen. (tsf)	Graphic Log	ASTM Symbol	Field Soil Description & Classification *The report and log key are an integral part of these logs. All data and interpretations in this log are subject to those stated explanations and limitations.* Description	Consistency / Apparent Density	Plasticity	Laboratory: Plasticity Index	Liquid Limit	Water Content (%)	Dry Unit Weight (pcf)	Passing #4 Sieve (%)	Passing #200 Sieve (%)	Other Tests and Field Notes
						SC	**Clayey Sand** (SC): brown, dry to moist, fine grained									
1							Completed at a depth of 1.0 m below existing site grade.									
2																
3																

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Project Number: 126434	**LOG B-35**
Date: 05-11-12	
Entry By: K. Knights	BIA N7054 Pinedale, New Mexico
Checked By: J. Stoken	
File Name: 126434_N7054.gpj	

Plate

SOIL BORING LOG KA CORPORATE STD.GDT KLEINFELDER_GINT_LIBRARY_VER_2.GLB 126434.GPJ 7/18/12

Boring Number: B-34	Location:	Drilling Method: Hollow-stem auger
Boring Total Depth: 1.0 m	Coordinates (X/Y, Lat/Long): 35.57446° / 108.44823°	Drilling Equipment:
Depth to Rock: No Rock was Encountered	Datum/Coordinate System:	Drilling Company: Precision Sampling Inc.
Date Begin/End: 04-10-12 / 04-10-12	Top of Boring Elevation:	Bit Size/Type:
Surface Conditions: Unpaved Roadway	Coordinate Data Source: GPS	Hammer Type/Method:
WL Measurement Point:	Depth to Groundwater Initial/Time:	Hammer Drop/Weight:
Logged By: J. Stoken	Depth to Groundwater Final/Time:	Angle From Vertical/Bearing: -90°

Depth (m)	Sample Type Symbol	Sample Number	Blows per 6 in.	Pocket Pen. (tsf)	Graphic Log	ASTM Symbol	Field Soil Description & Classification: Description	Consistency / Apparent Density	Plasticity	Laboratory: Plasticity Index	Liquid Limit	Water Content (%)	Dry Unit Weight (pcf)	Passing #4 Sieve (%)	Passing #200 Sieve (%)	Other Tests and Field Notes
						SC	**Clayey Sand** (SC): brown, dry to moist, fine grained									
1							Completed at a depth of 1.0 m below existing site grade.									
2																
3																

The report and log key are an integral part of these logs. All data and interpretations in this log are subject to those stated explanations and limitations.

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Project Number: 126434	**LOG B-34**
Date: 05-11-12	
Entry By: K. Knights	BIA N7054 Pinedale, New Mexico
Checked By: J. Stoken	
File Name: 126434_N7054.gpj	

Plate

SOIL BORING LOG KA CORPORATE STD.GDT KLEINFELDER_GINT_LIBRARY_VER_2.GLB 126434.GPJ 7/18/12

Boring Number: B-33	**Location:**	**Drilling Method:** Hollow-stem auger
Boring Total Depth: 1.0 m	**Coordinates (X/Y, Lat/Long):** 35.57357° / 108.44635°	**Drilling Equipment:**
Depth to Rock: No Rock was Encountered	**Datum/Coordinate System:**	**Drilling Company:** Precision Sampling Inc.
Date Begin/End: 04-10-12 / 04-10-12	**Top of Boring Elevation:**	**Bit Size/Type:**
Surface Conditions: Unpaved Roadway	**Coordinate Data Source:** GPS	**Hammer Type/Method:**
WL Measurement Point:	**Depth to Groundwater Initial/Time:** Not observed	**Hammer Drop/Weight:**
Logged By: J. Stoken	**Depth to Groundwater Final/Time:**	**Angle From Vertical/Bearing:** -90°

Depth (m)	Sample Type Symbol	Sample Number	Blows per 6 in.	Pocket Pen. (tsf)	Graphic Log	ASTM Symbol	Field Soil Description & Classification: *The report and log key are an integral part of these logs. All data and interpretations in this log are subject to those stated explanations and limitations.* — Description	Consistency / Apparent Density	Plasticity	Laboratory: Plasticity Index	Liquid Limit	Water Content (%)	Dry Unit Weight (pcf)	Passing #4 Sieve (%)	Passing #200 Sieve (%)	Other Tests and Field Notes
1						SC	**Clayey Sand** (SC): brown, dry, fine grained									
							Completed at a depth of 1.0 m below existing site grade.									
2																
3																

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Project Number: 126434	**LOG B-33**
Date: 05-11-12	
Entry By: K. Knights	BIA N7054 Pinedale, New Mexico
Checked By: J. Stoken	
File Name: 126434_N7054.gpj	

Plate

SOIL BORING LOG KA CORPORATE STD.GDT KLEINFELDER_GINT_LIBRARY_VER_2.GLB 126434.GPJ 7/18/12

Boring Number: B-32	Location:	Drilling Method: Hollow-stem auger
Boring Total Depth: 1.0 m	Coordinates (X/Y, Lat/Long): 35.57296° / 108.44436°	Drilling Equipment:
Depth to Rock: No Rock was Encountered	Datum/Coordinate System:	Drilling Company: Precision Sampling Inc.
Date Begin/End: 04-10-12 / 04-10-12	Top of Boring Elevation:	Bit Size/Type:
Surface Conditions: Unpaved Roadway	Coordinate Data Source: GPS	Hammer Type/Method:
WL Measurement Point:	Depth to Groundwater Initial/Time: Not observed	Hammer Drop/Weight:
Logged By: J. Stoken	Depth to Groundwater Final/Time:	Angle From Vertical/Bearing: -90°

Depth (m)	Sample Type Symbol	Sample Number	Blows per 6 in.	Pocket Pen. (tsf)	Graphic Log	ASTM Symbol	Field Soil Description & Classification: Description	Consistency / Apparent Density	Plasticity	Laboratory: Plasticity Index	Liquid Limit	Water Content (%)	Dry Unit Weight (pcf)	Passing #4 Sieve (%)	Passing #200 Sieve (%)	Other Tests and Field Notes
						CL	**Sandy Lean Clay** (CL): brown, dry, fine grained sand									
						SC	**Clayey Sand** (SC): brown, moist, fine grained									
1							Completed at a depth of 1.0 m below existing site grade.									
2																
3																

The report and log key are an integral part of these logs. All data and interpretations in this log are subject to those stated explanations and limitations.

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Project Number: 126434	**LOG B-32**
Date: 05-11-12	
Entry By: K. Knights	BIA N7054 Pinedale, New Mexico
Checked By: J. Stoken	
File Name: 126434_N7054.gpj	

Plate

SOIL BORING LOG KA CORPORATE STD.GDT KLEINFELDER_GINT_LIBRARY_VER_2.GLB 126434.GPJ 7/18/12

Boring Number: B-31	Location:	Drilling Method: Hollow-stem auger
Boring Total Depth: 1.0 m	Coordinates (X/Y, Lat/Long): 35.57304° / 108.44219°	Drilling Equipment:
Depth to Rock: No Rock was Encountered	Datum/Coordinate System:	Drilling Company: Precision Sampling Inc.
Date Begin/End: 04-10-12 / 04-10-12	Top of Boring Elevation:	Bit Size/Type:
Surface Conditions: Unpaved Roadway	Coordinate Data Source: GPS	Hammer Type/Method:
WL Measurement Point:	Depth to Groundwater Initial/Time: Not observed	Hammer Drop/Weight:
Logged By: J. Stoken	Depth to Groundwater Final/Time:	Angle From Vertical/Bearing: -90°

Depth (m)	Sample Type Symbol	Sample Number	Blows per 6 in.	Pocket Pen. (tsf)	Graphic Log	ASTM Symbol	Field Soil Description & Classification: *The report and log key are an integral part of these logs. All data and interpretations in this log are subject to those stated explanations and limitations.* — Description	Consistency / Apparent Density	Plasticity	Laboratory: Plasticity Index	Liquid Limit	Water Content (%)	Dry Unit Weight (pcf)	Passing #4 Sieve (%)	Passing #200 Sieve (%)	Other Tests and Field Notes
1						SC	**Clayey Sand** (SC): reddish brown, dry to moist, fine grained									
							Completed at a depth of 1.0 m below existing site grade.									
2																
3																

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Project Number: 126434	**LOG B-31**
Date: 05-11-12	
Entry By: K. Knights	BIA N7054 Pinedale, New Mexico
Checked By: J. Stoken	
File Name: 126434_N7054.gpj	

Plate

SOIL BORING LOG KA CORPORATE STD.GDT KLEINFELDER_GINT_LIBRARY_VER_2.GLB 126434.GPJ 7/18/12

Boring Number: B-30	Location:	Drilling Method: Hollow-stem auger
Boring Total Depth: 1.0 m	Coordinates (X/Y, Lat/Long): 35.57421° / 108.44063°	Drilling Equipment:
Depth to Rock: No Rock was Encountered	Datum/Coordinate System:	Drilling Company: Precision Sampling Inc.
Date Begin/End: 04-10-12 / 04-10-12	Top of Boring Elevation:	Bit Size/Type:
Surface Conditions: Unpaved Roadway	Coordinate Data Source: GPS	Hammer Type/Method:
WL Measurement Point:	Depth to Groundwater Initial/Time: Not observed	Hammer Drop/Weight:
Logged By: J. Stoken	Depth to Groundwater Final/Time:	Angle From Vertical/Bearing: -90°

Depth (m)	Sample Type Symbol	Sample Number	Blows per 6 in.	Pocket Pen. (tsf)	Graphic Log	ASTM Symbol	Field Soil Description & Classification: Description	Consistency / Apparent Density	Plasticity	Laboratory: Plasticity Index	Liquid Limit	Water Content (%)	Dry Unit Weight (pcf)	Passing #4 Sieve (%)	Passing #200 Sieve (%)	Other Tests and Field Notes
						SM	**Silty Sand** (SM): dark brown, dry to moist, fine to medium grained									
1							Completed at a depth of 1.0 m below existing site grade.									
2																
3																

The report and log key are an integral part of these logs. All data and interpretations in this log are subject to those stated explanations and limitations.

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Project Number: 126434	**LOG B-30**
Date: 05-11-12	
Entry By: K. Knights	BIA N7054 Pinedale, New Mexico
Checked By: J. Stoken	
File Name: 126434_N7054.gpj	

Plate

SOIL BORING LOG KA CORPORATE STD.GDT KLEINFELDER_GINT_LIBRARY_VER_2.GLB 126434.GPJ 7/18/12

Boring Number: B-29	Location:	Drilling Method: Hollow-stem auger
Boring Total Depth: 1.0 m	Coordinates (X/Y, Lat/Long): 35.57551° / 108.43921°	Drilling Equipment:
Depth to Rock: No Rock was Encountered	Datum/Coordinate System:	Drilling Company: Precision Sampling Inc.
Date Begin/End: 04-10-12 / 04-10-12	Top of Boring Elevation:	Bit Size/Type:
Surface Conditions: Unpaved Roadway	Coordinate Data Source: GPS	Hammer Type/Method:
WL Measurement Point:	Depth to Groundwater Initial/Time: Not observed	Hammer Drop/Weight:
Logged By: J. Stoken	Depth to Groundwater Final/Time:	Angle From Vertical/Bearing: -90°

Depth (m)	Sample Type Symbol	Sample Number	Blows per 6 in.	Pocket Pen. (tsf)	Graphic Log	ASTM Symbol	Field Soil Description & Classification *The report and log key are an integral part of these logs. All data and interpretations in this log are subject to those stated explanations and limitations.* Description	Consistency / Apparent Density	Plasticity	Laboratory: Plasticity Index	Liquid Limit	Water Content (%)	Dry Unit Weight (pcf)	Passing #4 Sieve (%)	Passing #200 Sieve (%)	Other Tests and Field Notes
0						SM	**Silty Sand** (SM): dark brown, dry to moist, fine to medium grained									
1							Completed at a depth of 1.0 m below existing site grade.									
2																
3																

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Project Number: 126434	**LOG B-29**
Date: 05-11-12	
Entry By: K. Knights	BIA N7054 Pinedale, New Mexico
Checked By: J. Stoken	
File Name: 126434_N7054.gpj	

Plate

SOIL BORING LOG KA CORPORATE STD.GDT KLEINFELDER_GINT_LIBRARY_VER_2.GLB 126434.GPJ 7/18/12

Boring Number: B-28	Location:	Drilling Method: Hollow-stem auger
Boring Total Depth: 1.0 m	Coordinates (X/Y, Lat/Long): 35.57606° / 108.43726°	Drilling Equipment:
Depth to Rock: No Rock was Encountered	Datum/Coordinate System:	Drilling Company: Precision Sampling Inc.
Date Begin/End: 04-10-12 / 04-10-12	Top of Boring Elevation:	Bit Size/Type:
Surface Conditions: Unpaved Roadway	Coordinate Data Source: GPS	Hammer Type/Method:
WL Measurement Point:	Depth to Groundwater Initial/Time: Not observed	Hammer Drop/Weight:
Logged By: J. Stoken	Depth to Groundwater Final/Time:	Angle From Vertical/Bearing: -90°

Depth (m)	Sample Type Symbol	Sample Number	Blows per 6 in.	Pocket Pen. (tsf)	Graphic Log	ASTM Symbol	Field Soil Description & Classification: Description	Consistency / Apparent Density	Plasticity	Laboratory: Plasticity Index	Liquid Limit	Water Content (%)	Dry Unit Weight (pcf)	Passing #4 Sieve (%)	Passing #200 Sieve (%)	Other Tests and Field Notes
						SC	**Clayey Sand** (SC): brown, dry to moist, fine grained									
1							Completed at a depth of 1.0 m below existing site grade.									
2																
3																

The report and log key are an integral part of these logs. All data and interpretations in this log are subject to those stated explanations and limitations.

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Project Number: 126434	**LOG B-28**
Date: 05-11-12	
Entry By: K. Knights	BIA N7054 Pinedale, New Mexico
Checked By: J. Stoken	
File Name: 126434_N7054.gpj	

Plate

SOIL BORING LOG KA CORPORATE STD.GDT KLEINFELDER_GINT_LIBRARY_VER_2.GLB 126434.GPJ 7/18/12

Boring Number: B-27	Location:	Drilling Method: Hollow-stem auger
Boring Total Depth: 1.0 m	Coordinates (X/Y, Lat/Long): 35.5758° / 108.43508°	Drilling Equipment:
Depth to Rock: No Rock was Encountered	Datum/Coordinate System:	Drilling Company: Precision Sampling Inc.
Date Begin/End: 04-10-12 / 04-10-12	Top of Boring Elevation:	Bit Size/Type:
Surface Conditions: Unpaved Roadway	Coordinate Data Source: GPS	Hammer Type/Method:
WL Measurement Point:	Depth to Groundwater Initial/Time: Not observed	Hammer Drop/Weight:
Logged By: J. Stoken	Depth to Groundwater Final/Time:	Angle From Vertical/Bearing: -90°

Depth (m)	Sample Type Symbol	Sample Number	Blows per 6 in.	Pocket Pen. (tsf)	Graphic Log	ASTM Symbol	Field Soil Description & Classification *The report and log key are an integral part of these logs. All data and interpretations in this log are subject to those stated explanations and limitations.* Description	Consistency / Apparent Density	Plasticity	Laboratory: Plasticity Index	Liquid Limit	Water Content (%)	Dry Unit Weight (pcf)	Passing #4 Sieve (%)	Passing #200 Sieve (%)	Other Tests and Field Notes
						SC	**Clayey Sand** (SC): dark brown, dry, fine grained									
						CL	**Sandy Lean Clay** (CL): dark brown, moist, fine grained sand									
1							Completed at a depth of 1.0 m below existing site grade.									
2																
3																

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Project Number: 126434	**LOG B-27**
Date: 05-11-12	
Entry By: K. Knights	BIA N7054 Pinedale, New Mexico
Checked By: J. Stoken	
File Name: 126434_N7054.gpj	

Plate

SOIL BORING LOG KA CORPORATE STD.GDT KLEINFELDER_GINT_LIBRARY_VER_2.GLB 126434.GPJ 7/18/12

Boring Number: B-26	Location:	Drilling Method: Hollow-stem auger
Boring Total Depth: 1.0 m	Coordinates (X/Y, Lat/Long): 35.57486° / 108.4333°	Drilling Equipment:
Depth to Rock: No Rock was Encountered	Datum/Coordinate System:	Drilling Company: Precision Sampling Inc.
Date Begin/End: 04-10-12 / 04-10-12	Top of Boring Elevation:	Bit Size/Type:
Surface Conditions: Unpaved Roadway	Coordinate Data Source: GPS	Hammer Type/Method:
WL Measurement Point:	Depth to Groundwater Initial/Time: Not observed	Hammer Drop/Weight:
Logged By: J. Stoken	Depth to Groundwater Final/Time:	Angle From Vertical/Bearing: -90°

Depth (m)	Sample Type Symbol	Sample Number	Blows per 6 in.	Pocket Pen. (tsf)	Graphic Log	ASTM Symbol	Field Soil Description & Classification: Description	Consistency / Apparent Density	Plasticity	Laboratory: Plasticity Index	Liquid Limit	Water Content (%)	Dry Unit Weight (pcf)	Passing #4 Sieve (%)	Passing #200 Sieve (%)	Other Tests and Field Notes
						SM	**Silty Sand** (SM): brown, dry to moist, fine grained									
1							Completed at a depth of 1.0 m below existing site grade.									
2																
3																

The report and log key are an integral part of these logs. All data and interpretations in this log are subject to those stated explanations and limitations.

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Project Number: 126434	**LOG B-26**
Date: 05-11-12	
Entry By: K. Knights	BIA N7054 Pinedale, New Mexico
Checked By: J. Stoken	
File Name: 126434_N7054.gpj	

Plate

SOIL BORING LOG KA CORPORATE STD.GDT KLEINFELDER GINT LIBRARY VER 2.GLB 126434.GPJ 7/18/12

Boring Number: B-25	Location:	Drilling Method: Hollow-stem auger
Boring Total Depth: 1.0 m	Coordinates (X/Y, Lat/Long): 35.57383° / 108.43161°	Drilling Equipment:
Depth to Rock: No Rock was Encountered	Datum/Coordinate System:	Drilling Company: Precision Sampling Inc.
Date Begin/End: 04-10-12 / 04-10-12	Top of Boring Elevation:	Bit Size/Type:
Surface Conditions: Unpaved Roadway	Coordinate Data Source: GPS	Hammer Type/Method:
WL Measurement Point:	Depth to Groundwater Initial/Time: Not observed	Hammer Drop/Weight:
Logged By: J. Stoken	Depth to Groundwater Final/Time:	Angle From Vertical/Bearing: -90°

Depth (m)	Sample Type Symbol	Sample Number	Blows per 6 in.	Pocket Pen. (tsf)	Graphic Log	ASTM Symbol	Field Soil Description & Classification: *The report and log key are an integral part of these logs. All data and interpretations in this log are subject to those stated explanations and limitations.* — Description	Consistency / Apparent Density	Plasticity	Laboratory: Plasticity Index	Liquid Limit	Water Content (%)	Dry Unit Weight (pcf)	Passing #4 Sieve (%)	Passing #200 Sieve (%)	Other Tests and Field Notes
1						SM	**Silty Sand** (SM): brown, dry to moist, fine grained									
							Completed at a depth of 1.0 m below existing site grade.									
2																
3																

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Project Number: 126434	**LOG B-25**	Plate
Date: 05-11-12		
Entry By: K. Knights	BIA N7054 Pinedale, New Mexico	
Checked By: J. Stoken		
File Name: 126434_N7054.gpj		

SOIL BORING LOG KA CORPORATE STD.GDT KLEINFELDER_GINT_LIBRARY_VER_2.GLB 126434.GPJ 7/18/12

Boring Number: B-24	Location:	Drilling Method: Hollow-stem auger
Boring Total Depth: 1.0 m	Coordinates (X/Y, Lat/Long): 35.57328° / 108.42948°	Drilling Equipment:
Depth to Rock: No Rock was Encountered	Datum/Coordinate System:	Drilling Company: Precision Sampling Inc.
Date Begin/End: 04-10-12 / 04-10-12	Top of Boring Elevation:	Bit Size/Type:
Surface Conditions: Unpaved Roadway	Coordinate Data Source: GPS	Hammer Type/Method:
WL Measurement Point:	Depth to Groundwater Initial/Time: Not observed	Hammer Drop/Weight:
Logged By: J. Stoken	Depth to Groundwater Final/Time:	Angle From Vertical/Bearing: -90°

Depth (m)	Sample Type Symbol	Sample Number	Blows per 6 in.	Pocket Pen. (tsf)	Graphic Log	ASTM Symbol	Field Soil Description & Classification: Description	Consistency / Apparent Density	Plasticity	Laboratory: Plasticity Index	Liquid Limit	Water Content (%)	Dry Unit Weight (pcf)	Passing #4 Sieve (%)	Passing #200 Sieve (%)	Other Tests and Field Notes
						SM	**Silty Sand** (SM): brown, dry to moist, fine grained									
1							Completed at a depth of 1.0 m below existing site grade.									
2																
3																

The report and log key are an integral part of these logs. All data and interpretations in this log are subject to those stated explanations and limitations.

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Project Number: 126434	**LOG B-24**
Date: 05-11-12	
Entry By: K. Knights	BIA N7054 Pinedale, New Mexico
Checked By: J. Stoken	
File Name: 126434_N7054.gpj	

Plate

SOIL BORING LOG KA CORPORATE STD.GDT KLEINFELDER GINT LIBRARY VER 2.GLB 126434.GPJ 7/18/12

Boring Number: B-23	Location:	Drilling Method: Hollow-stem auger
Boring Total Depth: 1.0 m	Coordinates (X/Y, Lat/Long): 35.57286° / 108.4275°	Drilling Equipment:
Depth to Rock: No Rock was Encountered	Datum/Coordinate System:	Drilling Company: Precision Sampling Inc.
Date Begin/End: 04-10-12 / 04-10-12	Top of Boring Elevation:	Bit Size/Type:
Surface Conditions: Unpaved Roadway	Coordinate Data Source: GPS	Hammer Type/Method:
WL Measurement Point:	Depth to Groundwater Initial/Time: Not observed	Hammer Drop/Weight:
Logged By: J. Stoken	Depth to Groundwater Final/Time:	Angle From Vertical/Bearing: -90°

Depth (m)	Sample Type Symbol	Sample Number	Blows per 6 in.	Pocket Pen. (tsf)	Graphic Log	ASTM Symbol	Field Soil Description & Classification	Laboratory						Other Tests and Field Notes
							The report and log key are an integral part of these logs. All data and interpretations in this log are subject to those stated explanations and limitations.							
							Description	Consistency / Apparent Density	Plasticity	Plasticity Index	Liquid Limit	Water Content (%)	Dry Unit Weight (pcf)	Passing #4 Sieve (%)	Passing #200 Sieve (%)	
						SM	**Silty Sand** (SM): dark brown, dry to moist, fine to medium grained									
1							Completed at a depth of 1.0 m below existing site grade.									
2																
3																

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Project Number: 126434	**LOG B-23**
Date: 05-11-12	
Entry By: K. Knights	BIA N7054 Pinedale, New Mexico
Checked By: J. Stoken	
File Name: 126434_N7054.gpj	

Plate

SOIL BORING LOG KA CORPORATE STD.GDT KLEINFELDER_GINT_LIBRARY_VER_2.GLB 126434.GPJ 7/18/12

Boring Number: B-22	Location:	Drilling Method: Hollow-stem auger
Boring Total Depth: 1.0 m	Coordinates (X/Y, Lat/Long): 35.57365° / 108.42544°	Drilling Equipment:
Depth to Rock: No Rock was Encountered	Datum/Coordinate System:	Drilling Company: Precision Sampling Inc.
Date Begin/End: 04-10-12 / 04-10-12	Top of Boring Elevation:	Bit Size/Type:
Surface Conditions: Unpaved Roadway	Coordinate Data Source: GPS	Hammer Type/Method:
WL Measurement Point:	Depth to Groundwater Initial/Time: Not observed	Hammer Drop/Weight:
Logged By: J. Stoken	Depth to Groundwater Final/Time:	Angle From Vertical/Bearing: -90°

Depth (m)	Sample Type Symbol	Sample Number	Blows per 6 in.	Pocket Pen. (tsf)	Graphic Log	ASTM Symbol	Field Soil Description & Classification: Description	Consistency / Apparent Density	Plasticity	Laboratory: Plasticity Index	Liquid Limit	Water Content (%)	Dry Unit Weight (pcf)	Passing #4 Sieve (%)	Passing #200 Sieve (%)	Other Tests and Field Notes
							The report and log key are an integral part of these logs. All data and interpretations in this log are subject to those stated explanations and limitations.									
0						SM	**Silty Sand** (SM): brown, dry to moist, fine grained									
1							Completed at a depth of 1.0 m below existing site grade.									
2																
3																

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Project Number: 126434	**LOG B-22**
Date: 05-11-12	
Entry By: K. Knights	BIA N7054 Pinedale, New Mexico
Checked By: J. Stoken	
File Name: 126434_N7054.gpj	

Plate

SOIL BORING LOG KA CORPORATE STD.GDT KLEINFELDER GINT_LIBRARY_VER_2.GLB 126434.GPJ 7/18/12

Boring Number: B-21	Location:	Drilling Method: Hollow-stem auger
Boring Total Depth: 1.0 m	Coordinates (X/Y, Lat/Long): 35.57398° / 108.4233°	Drilling Equipment:
Depth to Rock: No Rock was Encountered	Datum/Coordinate System:	Drilling Company: Precision Sampling Inc.
Date Begin/End: 04-10-12 / 04-10-12	Top of Boring Elevation:	Bit Size/Type:
Surface Conditions: Unpaved Roadway	Coordinate Data Source: GPS	Hammer Type/Method:
WL Measurement Point:	Depth to Groundwater Initial/Time: Not observed	Hammer Drop/Weight:
Logged By: J. Stoken	Depth to Groundwater Final/Time:	Angle From Vertical/Bearing: -90°

Depth (m)	Sample Type Symbol	Sample Number	Blows per 6 in.	Pocket Pen. (tsf)	Graphic Log	ASTM Symbol	Field Soil Description & Classification: *The report and log key are an integral part of these logs. All data and interpretations in this log are subject to those stated explanations and limitations.* — Description	Consistency / Apparent Density	Plasticity	Laboratory: Plasticity Index	Liquid Limit	Water Content (%)	Dry Unit Weight (pcf)	Passing #4 Sieve (%)	Passing #200 Sieve (%)	Other Tests and Field Notes
1						SM	**Silty Sand** (SM): brown, dry to moist, fine grained									
							Completed at a depth of 1.0 m below existing site grade.									
2																
3																

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Project Number: 126434	**LOG B-21**
Date: 05-11-12	
Entry By: K. Knights	BIA N7054 Pinedale, New Mexico
Checked By: J. Stoken	
File Name: 126434_N7054.gpj	

Plate

SOIL BORING LOG KA CORPORATE STD.GDT KLEINFELDER_GINT_LIBRARY_VER_2.GLB 126434.GPJ 7/18/12

Boring Number: B-20	Location:	Drilling Method: Hollow-stem auger
Boring Total Depth: 1.0 m	Coordinates (X/Y, Lat/Long): 35.57421° / 108.42121°	Drilling Equipment:
Depth to Rock: No Rock was Encountered	Datum/Coordinate System:	Drilling Company: Precision Sampling Inc.
Date Begin/End: 04-10-12 / 04-10-12	Top of Boring Elevation:	Bit Size/Type:
Surface Conditions: Unpaved Roadway	Coordinate Data Source: GPS	Hammer Type/Method:
WL Measurement Point:	Depth to Groundwater Initial/Time: Not observed	Hammer Drop/Weight:
Logged By: J. Stoken	Depth to Groundwater Final/Time:	Angle From Vertical/Bearing: -90°

Depth (m)	Sample Type Symbol	Sample Number	Blows per 6 in.	Pocket Pen. (tsf)	Graphic Log	ASTM Symbol	Field Soil Description & Classification: Description	Consistency / Apparent Density	Plasticity	Laboratory: Plasticity Index	Liquid Limit	Water Content (%)	Dry Unit Weight (pcf)	Passing #4 Sieve (%)	Passing #200 Sieve (%)	Other Tests and Field Notes
						SM	**Silty Sand** (SM): brown, dry to moist, fine grained									
1							Completed at a depth of 1.0 m below existing site grade.									
2																
3																

The report and log key are an integral part of these logs. All data and interpretations in this log are subject to those stated explanations and limitations.

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Project Number: 126434	**LOG B-20**
Date: 05-11-12	
Entry By: K. Knights	BIA N7054 Pinedale, New Mexico
Checked By: J. Stoken	
File Name: 126434_N7054.gpj	

Plate

SOIL BORING LOG KA CORPORATE STD.GDT KLEINFELDER GINT LIBRARY VER 2.GLB 126434.GPJ 7/16/12

Boring Number: B-19	Location:	Drilling Method: Hollow-stem auger
Boring Total Depth: 1.0 m	Coordinates (X/Y, Lat/Long): 35.57458° / 108.41894°	Drilling Equipment:
Depth to Rock: No Rock was Encountered	Datum/Coordinate System:	Drilling Company: Precision Sampling Inc.
Date Begin/End: 04-10-12 / 04-10-12	Top of Boring Elevation:	Bit Size/Type:
Surface Conditions: Unpaved Roadway	Coordinate Data Source: GPS	Hammer Type/Method:
WL Measurement Point:	Depth to Groundwater Initial/Time: Not observed	Hammer Drop/Weight:
Logged By: J. Stoken	Depth to Groundwater Final/Time:	Angle From Vertical/Bearing: -90°

Depth (m)	Sample Type Symbol	Sample Number	Blows per 6 in.	Pocket Pen. (tsf)	Graphic Log	ASTM Symbol	Field Soil Description & Classification: *The report and log key are an integral part of these logs. All data and interpretations in this log are subject to those stated explanations and limitations.* — Description	Consistency / Apparent Density	Plasticity	Laboratory: Plasticity Index	Liquid Limit	Water Content (%)	Dry Unit Weight (pcf)	Passing #4 Sieve (%)	Passing #200 Sieve (%)	Other Tests and Field Notes
1						SM	**Silty Sand** (SM): brown, dry to moist, fine grained									
							Completed at a depth of 1.0 m below existing site grade.									
2																
3																

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Project Number: 126434	**LOG B-19**
Date: 05-11-12	
Entry By: K. Knights	BIA N7054 Pinedale, New Mexico
Checked By: J. Stoken	
File Name: 126434_N7054.gpj	

Plate

SOIL BORING LOG KA CORPORATE STD.GDT KLEINFELDER_GINT_LIBRARY_VER_2.GLB 126434.GPJ 7/18/12

Boring Number: B-18	Location:	Drilling Method: Hollow-stem auger
Boring Total Depth: 1.0 m	Coordinates (X/Y, Lat/Long): 35.57468° / 108.41686°	Drilling Equipment:
Depth to Rock: No Rock was Encountered	Datum/Coordinate System:	Drilling Company: Precision Sampling Inc.
Date Begin/End: 04-10-12 / 04-10-12	Top of Boring Elevation:	Bit Size/Type:
Surface Conditions: Unpaved Roadway	Coordinate Data Source: GPS	Hammer Type/Method:
WL Measurement Point:	Depth to Groundwater Initial/Time: Not observed	Hammer Drop/Weight:
Logged By: J. Stoken	Depth to Groundwater Final/Time:	Angle From Vertical/Bearing: -90°

Depth (m)	Sample Type Symbol	Sample Number	Blows per 6 in.	Pocket Pen. (tsf)	Graphic Log	ASTM Symbol	Field Soil Description & Classification *The report and log key are an integral part of these logs. All data and interpretations in this log are subject to those stated explanations and limitations.* Description	Consistency / Apparent Density	Plasticity	Laboratory: Plasticity Index	Liquid Limit	Water Content (%)	Dry Unit Weight (pcf)	Passing #4 Sieve (%)	Passing #200 Sieve (%)	Other Tests and Field Notes
0						SC	**Clayey Sand** (SC): reddish brown, dry to moist, fine grained									
1							Completed at a depth of 1.0 m below existing site grade.									
2																
3																

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Project Number: 126434	**LOG B-18**
Date: 05-11-12	
Entry By: K. Knights	BIA N7054 Pinedale, New Mexico
Checked By: J. Stoken	
File Name: 126434_N7054.gpj	

Plate

SOIL BORING LOG KA CORPORATE STD.GDT KLEINFELDER_GINT_LIBRARY_VER_2.GLB 126434.GPJ 7/18/12

Boring Number: B-17	Location:	Drilling Method: Hollow-stem auger
Boring Total Depth: 1.0 m	Coordinates (X/Y, Lat/Long): 35.57445° / 108.41458°	Drilling Equipment:
Depth to Rock: No Rock was Encountered	Datum/Coordinate System:	Drilling Company: Precision Sampling Inc.
Date Begin/End: 04-10-12 / 04-10-12	Top of Boring Elevation:	Bit Size/Type:
Surface Conditions: Unpaved Roadway	Coordinate Data Source: GPS	Hammer Type/Method:
WL Measurement Point:	Depth to Groundwater Initial/Time: Not observed	Hammer Drop/Weight:
Logged By: J. Stoken	Depth to Groundwater Final/Time:	Angle From Vertical/Bearing: -90°

Depth (m)	Sample Type Symbol	Sample Number	Blows per 6 in.	Pocket Pen. (tsf)	Graphic Log	ASTM Symbol	Field Soil Description & Classification: *The report and log key are an integral part of these logs. All data and interpretations in this log are subject to those stated explanations and limitations.* — Description	Consistency / Apparent Density	Plasticity	Laboratory: Plasticity Index	Liquid Limit	Water Content (%)	Dry Unit Weight (pcf)	Passing #4 Sieve (%)	Passing #200 Sieve (%)	Other Tests and Field Notes
1						SM	**Silty Sand** (SM): brown, dry to moist, fine grained									
							Completed at a depth of 1.0 m below existing site grade.									
2																
3																

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Project Number: 126434	**LOG B-17**
Date: 05-11-12	
Entry By: K. Knights	BIA N7054 Pinedale, New Mexico
Checked By: J. Stoken	
File Name: 126434_N7054.gpj	

Plate

SOIL BORING LOG KA CORPORATE STD.GDT KLEINFELDER_GINT_LIBRARY_VER_2.GLB 126434.GPJ 7/18/12

Boring Number: B-16	Location:	Drilling Method: Hollow-stem auger
Boring Total Depth: 1.0 m	Coordinates (X/Y, Lat/Long): 35.57414° / 108.41267°	Drilling Equipment:
Depth to Rock: No Rock was Encountered	Datum/Coordinate System:	Drilling Company: Precision Sampling Inc.
Date Begin/End: 04-10-12 / 04-10-12	Top of Boring Elevation:	Bit Size/Type:
Surface Conditions: Unpaved Roadway	Coordinate Data Source: GPS	Hammer Type/Method:
WL Measurement Point:	Depth to Groundwater Initial/Time: Not observed	Hammer Drop/Weight:
Logged By: J. Stoken	Depth to Groundwater Final/Time:	Angle From Vertical/Bearing: -90°

Depth (m)	Sample Type Symbol	Sample Number	Blows per 6 in.	Pocket Pen. (tsf)	Graphic Log	ASTM Symbol	Field Soil Description & Classification *The report and log key are an integral part of these logs. All data and interpretations in this log are subject to those stated explanations and limitations.* Description	Consistency / Apparent Density	Plasticity	Laboratory: Plasticity Index	Liquid Limit	Water Content (%)	Dry Unit Weight (pcf)	Passing #4 Sieve (%)	Passing #200 Sieve (%)	Other Tests and Field Notes
0						ML	**Sandy Silt** (ML): brown, dry, fine grained									
						SM	**Silty Sand** (SM): brown, moist, fine grained									
1							Completed at a depth of 1.0 m below existing site grade.									
2																
3																

SOIL BORING LOG KA CORPORATE STD.GDT KLEINFELDER GINT LIBRARY VER 2.GLB 126434.GPJ 7/18/12

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Project Number: 126434	**LOG B-16**
Date: 05-11-12	
Entry By: K. Knights	BIA N7054 Pinedale, New Mexico
Checked By: J. Stoken	
File Name: 126434_N7054.gpj	

Plate

Boring Number: B-15	Location:	Drilling Method: Hollow-stem auger
Boring Total Depth: 1.0 m	Coordinates (X/Y, Lat/Long): 35.57562° / 108.41133°	Drilling Equipment:
Depth to Rock: No Rock was Encountered	Datum/Coordinate System:	Drilling Company: Precision Sampling Inc.
Date Begin/End: 04-10-12 / 04-10-12	Top of Boring Elevation:	Bit Size/Type:
Surface Conditions: Unpaved Roadway	Coordinate Data Source: GPS	Hammer Type/Method:
WL Measurement Point:	Depth to Groundwater Initial/Time: Not observed	Hammer Drop/Weight:
Logged By: J. Stoken	Depth to Groundwater Final/Time:	Angle From Vertical/Bearing: -90°

Depth (m)	Sample Type Symbol	Sample Number	Blows per 6 in.	Pocket Pen. (tsf)	Graphic Log	ASTM Symbol	Field Soil Description & Classification *The report and log key are an integral part of these logs. All data and interpretations in this log are subject to those stated explanations and limitations.* Description	Consistency / Apparent Density	Plasticity	Laboratory: Plasticity Index	Liquid Limit	Water Content (%)	Dry Unit Weight (pcf)	Passing #4 Sieve (%)	Passing #200 Sieve (%)	Other Tests and Field Notes
						SP-SC	**Poorly Graded Sand With Clay** (SP-SC): reddish brown, dry, fine grained									
						SC	**Clayey Sand** (SC): reddish brown, moist, fine grained									
1							Completed at a depth of 1.0 m below existing site grade.									
2																
3																

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Project Number: 126434	**LOG B-15**
Date: 05-11-12	
Entry By: K. Knights	BIA N7054 Pinedale, New Mexico
Checked By: J. Stoken	
File Name: 126434_N7054.gpj	

Plate

SOIL BORING LOG KA CORPORATE STD.GDT KLEINFELDER_GINT_LIBRARY_VER_2.GLB 126434.GPJ 7/18/12

Boring Number: B-14	Location:	Drilling Method: Hollow-stem auger
Boring Total Depth: 1.0 m	Coordinates (X/Y, Lat/Long): 35.57714° / 108.41035°	Drilling Equipment:
Depth to Rock: No Rock was Encountered	Datum/Coordinate System:	Drilling Company: Precision Sampling Inc.
Date Begin/End: 04-10-12 / 04-10-12	Top of Boring Elevation:	Bit Size/Type:
Surface Conditions: Unpaved Roadway	Coordinate Data Source: GPS	Hammer Type/Method:
WL Measurement Point:	Depth to Groundwater Initial/Time: Not observed	Hammer Drop/Weight:
Logged By: J. Stoken	Depth to Groundwater Final/Time:	Angle From Vertical/Bearing: -90°

Depth (m)	Sample Type Symbol	Sample Number	Blows per 6 in.	Pocket Pen. (tsf)	Graphic Log	ASTM Symbol	Field Soil Description & Classification: Description	Consistency / Apparent Density	Plasticity	Laboratory: Plasticity Index	Liquid Limit	Water Content (%)	Dry Unit Weight (pcf)	Passing #4 Sieve (%)	Passing #200 Sieve (%)	Other Tests and Field Notes
						SM	**Silty Sand** (SM): brown, dry, fine grained									
1							Completed at a depth of 1.0 m below existing site grade.									
2																
3																

The report and log key are an integral part of these logs. All data and interpretations in this log are subject to those stated explanations and limitations.

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Project Number: 126434	**LOG B-14**
Date: 05-11-12	
Entry By: K. Knights	BIA N7054 Pinedale, New Mexico
Checked By: J. Stoken	
File Name: 126434_N7054.gpj	

Plate

SOIL BORING LOG KA CORPORATE STD.GDT KLEINFELDER GINT LIBRARY VER 2.GLB 126434.GPJ 7/18/12

Boring Number: B-13	Location:	Drilling Method: Hollow-stem auger
Boring Total Depth: 1.0 m	Coordinates (X/Y, Lat/Long): 35.57887° / 108.41088°	Drilling Equipment:
Depth to Rock: No Rock was Encountered	Datum/Coordinate System:	Drilling Company: Precision Sampling Inc.
Date Begin/End: 04-10-12 / 04-10-12	Top of Boring Elevation:	Bit Size/Type:
Surface Conditions: Unpaved Roadway	Coordinate Data Source: GPS	Hammer Type/Method:
WL Measurement Point:	Depth to Groundwater Initial/Time: Not observed	Hammer Drop/Weight:
Logged By: J. Stoken	Depth to Groundwater Final/Time:	Angle From Vertical/Bearing: -90°

Depth (m)	Sample Type Symbol	Sample Number	Blows per 6 in.	Pocket Pen. (tsf)	Graphic Log	ASTM Symbol	Field Soil Description & Classification *The report and log key are an integral part of these logs. All data and interpretations in this log are subject to those stated explanations and limitations.* Description	Consistency / Apparent Density	Plasticity	Laboratory: Plasticity Index	Liquid Limit	Water Content (%)	Dry Unit Weight (pcf)	Passing #4 Sieve (%)	Passing #200 Sieve (%)	Other Tests and Field Notes
						SC	**Clayey Sand** (SC): dark brown, dry, fine grained									
						CH	**Fat Clay With Sand** (CH): dark brown, moist, fine grained sand									
1							Completed at a depth of 1.0 m below existing site grade.									
2																
3																

SOIL BORING LOG KA CORPORATE STD.GDT KLEINFELDER_GINT_LIBRARY_VER_2.GLB 126434.GPJ 7/18/12

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Project Number: 126434	**LOG B-13**
Date: 05-11-12	
Entry By: K. Knights	BIA N7054 Pinedale, New Mexico
Checked By: J. Stoken	
File Name: 126434_N7054.gpj	

Plate

Boring Number: B-12	Location:	Drilling Method: Hollow-stem auger
Boring Total Depth: 1.0 m	Coordinates (X/Y, Lat/Long): 35.58064° / 108.411°	Drilling Equipment:
Depth to Rock: No Rock was Encountered	Datum/Coordinate System:	Drilling Company: Precision Sampling Inc.
Date Begin/End: 04-10-12 / 04-10-12	Top of Boring Elevation:	Bit Size/Type:
Surface Conditions: Unpaved Roadway	Coordinate Data Source: GPS	Hammer Type/Method:
WL Measurement Point:	Depth to Groundwater Initial/Time: Not observed	Hammer Drop/Weight:
Logged By: J. Stoken	Depth to Groundwater Final/Time:	Angle From Vertical/Bearing: -90°

Depth (m)	Sample Type Symbol	Sample Number	Blows per 6 in.	Pocket Pen. (tsf)	Graphic Log	ASTM Symbol	Field Soil Description & Classification: Description	Consistency / Apparent Density	Plasticity	Laboratory: Plasticity Index	Liquid Limit	Water Content (%)	Dry Unit Weight (pcf)	Passing #4 Sieve (%)	Passing #200 Sieve (%)	Other Tests and Field Notes
							The report and log key are an integral part of these logs. All data and interpretations in this log are subject to those stated explanations and limitations.									
						SC	**Clayey Sand** (SC): dark brown, dry, fine grained									
						CH	**Sandy Fat Clay** (CH): dark brown, dry, fine grained sand									
1							Completed at a depth of 1.0 m below existing site grade.									
2																
3																

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Project Number: 126434	**LOG B-12**
Date: 05-11-12	
Entry By: K. Knights	BIA N7054 Pinedale, New Mexico
Checked By: J. Stoken	
File Name: 126434_N7054.gpj	

Plate

SOIL BORING LOG KA CORPORATE STD.GDT KLEINFELDER GINT LIBRARY VER 2.GLB 126434.GPJ 7/18/12

Boring Number: B-11	Location:	Drilling Method: Hollow-stem auger
Boring Total Depth: 1.0 m	Coordinates (X/Y, Lat/Long): 35.58232° / 108.41052°	Drilling Equipment:
Depth to Rock: No Rock was Encountered	Datum/Coordinate System:	Drilling Company: Precision Sampling Inc.
Date Begin/End: 04-10-12 / 04-10-12	Top of Boring Elevation:	Bit Size/Type:
Surface Conditions: Unpaved Roadway	Coordinate Data Source: GPS	Hammer Type/Method:
WL Measurement Point:	Depth to Groundwater Initial/Time: Not observed	Hammer Drop/Weight:
Logged By: J. Stoken	Depth to Groundwater Final/Time:	Angle From Vertical/Bearing: -90°

Depth (m)	Sample Type Symbol	Sample Number	Blows per 6 in.	Pocket Pen. (tsf)	Graphic Log	ASTM Symbol	Field Soil Description & Classification: *The report and log key are an integral part of these logs. All data and interpretations in this log are subject to those stated explanations and limitations.* — Description	Consistency / Apparent Density	Plasticity	Laboratory: Plasticity Index	Liquid Limit	Water Content (%)	Dry Unit Weight (pcf)	Passing #4 Sieve (%)	Passing #200 Sieve (%)	Other Tests and Field Notes
1						SM	**Silty Sand** (SM): dark brown, dry to moist, fine grained									
							Completed at a depth of 1.0 m below existing site grade.									
2																
3																

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Project Number: 126434	**LOG B-11**
Date: 05-11-12	
Entry By: K. Knights	BIA N7054 Pinedale, New Mexico
Checked By: J. Stoken	
File Name: 126434_N7054.gpj	

Plate

SOIL BORING LOG KA CORPORATE STD.GDT KLEINFELDER_GINT_LIBRARY_VER_2.GLB 126434.GPJ 7/18/12

Boring Number: B-10	Location:	Drilling Method: Hollow-stem auger
Boring Total Depth: 1.0 m	Coordinates (X/Y, Lat/Long): 35.58413° / 108.41003°	Drilling Equipment:
Depth to Rock: No Rock was Encountered	Datum/Coordinate System:	Drilling Company: Precision Sampling Inc.
Date Begin/End: 04-10-12 / 04-10-12	Top of Boring Elevation:	Bit Size/Type:
Surface Conditions: Unpaved Roadway	Coordinate Data Source: GPS	Hammer Type/Method:
WL Measurement Point:	Depth to Groundwater Initial/Time: Not observed	Hammer Drop/Weight:
Logged By: J. Stoken	Depth to Groundwater Final/Time:	Angle From Vertical/Bearing: -90°

Depth (m)	Sample Type Symbol	Sample Number	Blows per 6 in.	Pocket Pen. (tsf)	Graphic Log	ASTM Symbol	Field Soil Description & Classification: Description	Consistency / Apparent Density	Plasticity	Laboratory: Plasticity Index	Liquid Limit	Water Content (%)	Dry Unit Weight (pcf)	Passing #4 Sieve (%)	Passing #200 Sieve (%)	Other Tests and Field Notes
						SM	**Silty Sand** (SM): dark brown, dry to moist, fine grained									
1							Completed at a depth of 1.0 m below existing site grade.									
2																
3																

The report and log key are an integral part of these logs. All data and interpretations in this log are subject to those stated explanations and limitations.

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Project Number: 126434	**LOG B-10**
Date: 05-11-12	
Entry By: K. Knights	BIA N7054 Pinedale, New Mexico
Checked By: J. Stoken	
File Name: 126434_N7054.gpj	

Plate

SOIL BORING LOG KA CORPORATE STD.GDT KLEINFELDER GINT LIBRARY VER 2.GLB 126434.GPJ 7/18/12

Boring Number: B-09	Location:	Drilling Method: Hollow-stem auger
Boring Total Depth: 1.0 m	Coordinates (X/Y, Lat/Long): 35.58586° / 108.40943°	Drilling Equipment:
Depth to Rock: No Rock was Encountered	Datum/Coordinate System:	Drilling Company: Precision Sampling Inc.
Date Begin/End: 04-10-12 / 04-10-12	Top of Boring Elevation:	Bit Size/Type:
Surface Conditions: Unpaved Roadway	Coordinate Data Source: GPS	Hammer Type/Method:
WL Measurement Point:	Depth to Groundwater Initial/Time: Not observed	Hammer Drop/Weight:
Logged By: J. Stoken	Depth to Groundwater Final/Time:	Angle From Vertical/Bearing: -90°

Depth (m)	Sample Type Symbol	Sample Number	Blows per 6 in.	Pocket Pen. (tsf)	Graphic Log	ASTM Symbol	Field Soil Description & Classification: *The report and log key are an integral part of these logs. All data and interpretations in this log are subject to those stated explanations and limitations.* — Description	Consistency / Apparent Density	Plasticity	Laboratory: Plasticity Index	Liquid Limit	Water Content (%)	Dry Unit Weight (pcf)	Passing #4 Sieve (%)	Passing #200 Sieve (%)	Other Tests and Field Notes
1						SM	**Silty Sand** (SM): dark brown, dry to moist, fine grained									
							Completed at a depth of 1.0 m below existing site grade.									
2																
3																

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Project Number: 126434	**LOG B-09**
Date: 05-11-12	
Entry By: K. Knights	BIA N7054 Pinedale, New Mexico
Checked By: J. Stoken	
File Name: 126434_N7054.gpj	

Plate

SOIL BORING LOG KA CORPORATE STD.GDT KLEINFELDER_GINT_LIBRARY_VER_2.GLB 126434.GPJ 7/18/12

Boring Number: B-08	Location:	Drilling Method: Hollow-stem auger
Boring Total Depth: 1.0 m	Coordinates (X/Y, Lat/Long): 35.58695° / 108.40775°	Drilling Equipment:
Depth to Rock: No Rock was Encountered	Datum/Coordinate System:	Drilling Company: Precision Sampling Inc.
Date Begin/End: 04-10-12 / 04-10-12	Top of Boring Elevation:	Bit Size/Type:
Surface Conditions: Unpaved Roadway	Coordinate Data Source: GPS	Hammer Type/Method:
WL Measurement Point:	Depth to Groundwater Initial/Time: Not observed	Hammer Drop/Weight:
Logged By: J. Stoken	Depth to Groundwater Final/Time:	Angle From Vertical/Bearing: -90°

Depth (m)	Sample Type Symbol	Sample Number	Blows per 6 in.	Pocket Pen. (tsf)	Graphic Log	ASTM Symbol	Field Soil Description & Classification *The report and log key are an integral part of these logs. All data and interpretations in this log are subject to those stated explanations and limitations.* Description	Consistency / Apparent Density	Plasticity	Laboratory: Plasticity Index	Liquid Limit	Water Content (%)	Dry Unit Weight (pcf)	Passing #4 Sieve (%)	Passing #200 Sieve (%)	Other Tests and Field Notes
0						CL	**Sandy Lean Clay** (CL): reddish brown, dry, fine grained sand									
						SC	**Clayey Sand** (SC): reddish brown, moist, fine grained									
1							Completed at a depth of 1.0 m below existing site grade.									
2																
3																

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Project Number: 126434	**LOG B-08**
Date: 05-11-12	
Entry By: K. Knights	BIA N7054 Pinedale, New Mexico
Checked By: J. Stoken	
File Name: 126434_N7054.gpj	

Plate

SOIL BORING LOG KA CORPORATE STD.GDT KLEINFELDER GINT LIBRARY VER 2.GLB 126434.GPJ 7/18/12

Boring Number: B-07	Location:	Drilling Method: Hollow-stem auger
Boring Total Depth: 1.0 m	Coordinates (X/Y, Lat/Long): 35.58781° / 108.40587°	Drilling Equipment:
Depth to Rock: No Rock was Encountered	Datum/Coordinate System:	Drilling Company: Precision Sampling Inc.
Date Begin/End: 04-10-12 / 04-10-12	Top of Boring Elevation:	Bit Size/Type:
Surface Conditions: Unpaved Roadway	Coordinate Data Source: GPS	Hammer Type/Method:
WL Measurement Point:	Depth to Groundwater Initial/Time: Not observed	Hammer Drop/Weight:
Logged By: J. Stoken	Depth to Groundwater Final/Time:	Angle From Vertical/Bearing: -90°

Depth (m)	Sample Type Symbol	Sample Number	Blows per 6 in.	Pocket Pen. (tsf)	Graphic Log	ASTM Symbol	Field Soil Description & Classification *The report and log key are an integral part of these logs. All data and interpretations in this log are subject to those stated explanations and limitations.* Description	Consistency / Apparent Density	Plasticity	Laboratory: Plasticity Index	Liquid Limit	Water Content (%)	Dry Unit Weight (pcf)	Passing #4 Sieve (%)	Passing #200 Sieve (%)	Other Tests and Field Notes
1						SM	**Silty Sand** (SM): dark brown, dry, fine to medium grained									
							Completed at a depth of 1.0 m below existing site grade.									
2																
3																

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Project Number: 126434	**LOG B-07**
Date: 05-11-12	
Entry By: K. Knights	BIA N7054 Pinedale, New Mexico
Checked By: J. Stoken	
File Name: 126434_N7054.gpj	

Plate

SOIL BORING LOG KA CORPORATE STD.GDT KLEINFELDER_GINT_LIBRARY_VER_2.GLB 126434.GPJ 7/18/12

Boring Number: B-06	Location:	Drilling Method: Hollow-stem auger
Boring Total Depth: 1.0 m	Coordinates (X/Y, Lat/Long): 35.58812° / 108.40372°	Drilling Equipment:
Depth to Rock: No Rock was Encountered	Datum/Coordinate System:	Drilling Company: Precision Sampling Inc.
Date Begin/End: 04-10-12 / 04-10-12	Top of Boring Elevation:	Bit Size/Type:
Surface Conditions: Unpaved Roadway	Coordinate Data Source: GPS	Hammer Type/Method:
WL Measurement Point:	Depth to Groundwater Initial/Time: Not observed	Hammer Drop/Weight:
Logged By: J. Stoken	Depth to Groundwater Final/Time:	Angle From Vertical/Bearing: -90°

Depth (m)	Sample Type Symbol	Sample Number	Blows per 6 in.	Pocket Pen. (tsf)	Graphic Log	ASTM Symbol	Field Soil Description & Classification: Description	Consistency / Apparent Density	Plasticity	Laboratory: Plasticity Index	Liquid Limit	Water Content (%)	Dry Unit Weight (pcf)	Passing #4 Sieve (%)	Passing #200 Sieve (%)	Other Tests and Field Notes
						SC	**Clayey Sand** (SC): reddish brown, dry to moist, fine grained									
1							Completed at a depth of 1.0 m below existing site grade.									
2																
3																

The report and log key are an integral part of these logs. All data and interpretations in this log are subject to those stated explanations and limitations.

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Project Number: 126434	**LOG B-06**
Date: 05-11-12	
Entry By: K. Knights	BIA N7054 Pinedale, New Mexico
Checked By: J. Stoken	
File Name: 126434_N7054.gpj	

Plate

SOIL BORING LOG KA CORPORATE STD.GDT KLEINFELDER_GINT_LIBRARY_VER_2.GLB 126434.GPJ 7/18/12

Boring Number: B-05	Location:	Drilling Method: Hollow-stem auger
Boring Total Depth: 1.0 m	Coordinates (X/Y, Lat/Long): 35.58937° / 108.40214°	Drilling Equipment:
Depth to Rock: No Rock was Encountered	Datum/Coordinate System:	Drilling Company: Precision Sampling Inc.
Date Begin/End: 04-10-12 / 04-10-12	Top of Boring Elevation:	Bit Size/Type:
Surface Conditions: Unpaved Roadway	Coordinate Data Source: GPS	Hammer Type/Method:
WL Measurement Point:	Depth to Groundwater Initial/Time: Not observed	Hammer Drop/Weight:
Logged By: J. Stoken	Depth to Groundwater Final/Time:	Angle From Vertical/Bearing: -90°

Depth (m)	Sample Type Symbol	Sample Number	Blows per 6 in.	Pocket Pen. (tsf)	Graphic Log	ASTM Symbol	Field Soil Description & Classification: Description	Consistency / Apparent Density	Plasticity	Laboratory: Plasticity Index	Liquid Limit	Water Content (%)	Dry Unit Weight (pcf)	Passing #4 Sieve (%)	Passing #200 Sieve (%)	Other Tests and Field Notes
						SC	**Clayey Sand** (SC): brown, dry, fine grained									
						CL	**Sandy Lean Clay** (CL): brown, moist, fine grained sand									
1							Completed at a depth of 1.0 m below existing site grade.									
2																
3																

The report and log key are an integral part of these logs. All data and interpretations in this log are subject to those stated explanations and limitations.

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Project Number: 126434	**LOG B-05**
Date: 05-11-12	
Entry By: K. Knights	BIA N7054 Pinedale, New Mexico
Checked By: J. Stoken	
File Name: 126434_N7054.gpj	

Plate

SOIL BORING LOG KA CORPORATE STD.GDT KLEINFELDER_GINT_LIBRARY_VER_2.GLB 126434.GPJ 7/18/12

Boring Number: B-04	Location:	Drilling Method: Hollow-stem auger
Boring Total Depth: 1.0 m	Coordinates (X/Y, Lat/Long): 35.59061° / 108.40068°	Drilling Equipment:
Depth to Rock: No Rock was Encountered	Datum/Coordinate System:	Drilling Company: Precision Sampling Inc.
Date Begin/End: 04-10-12 / 04-10-12	Top of Boring Elevation:	Bit Size/Type:
Surface Conditions: Unpaved Roadway	Coordinate Data Source: GPS	Hammer Type/Method:
WL Measurement Point:	Depth to Groundwater Initial/Time: Not observed	Hammer Drop/Weight:
Logged By: J. Stoken	Depth to Groundwater Final/Time:	Angle From Vertical/Bearing: -90°

Depth (m)	Sample Type Symbol	Sample Number	Blows per 6 in.	Pocket Pen. (tsf)	Graphic Log	ASTM Symbol	Field Soil Description & Classification: Description	Consistency / Apparent Density	Plasticity	Laboratory: Plasticity Index	Liquid Limit	Water Content (%)	Dry Unit Weight (pcf)	Passing #4 Sieve (%)	Passing #200 Sieve (%)	Other Tests and Field Notes
							The report and log key are an integral part of these logs. All data and interpretations in this log are subject to those stated explanations and limitations.									
0						CL	**Lean Clay With Sand** (CL): brown, dry to moist, fine grained sand									
1							Completed at a depth of 1.0 m below existing site grade.									
2																
3																

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Project Number: 126434	**LOG B-04**	Plate
Date: 05-11-12		
Entry By: K. Knights	BIA N7054 Pinedale, New Mexico	
Checked By: J. Stoken		
File Name: 126434_N7054.gpj		

SOIL BORING LOG KA CORPORATE STD.GDT KLEINFELDER GINT LIBRARY VER 2.GLB 126434.GPJ 7/18/12

Boring Number: B-03	Location:	Drilling Method: Hollow-stem auger
Boring Total Depth: 1.0 m	Coordinates (X/Y, Lat/Long): 35.5918° / 108.39901°	Drilling Equipment:
Depth to Rock: No Rock was Encountered	Datum/Coordinate System:	Drilling Company: Precision Sampling Inc.
Date Begin/End: 04-10-12 / 04-10-12	Top of Boring Elevation:	Bit Size/Type:
Surface Conditions: Unpaved Roadway	Coordinate Data Source: GPS	Hammer Type/Method:
WL Measurement Point:	Depth to Groundwater Initial/Time: Not observed	Hammer Drop/Weight:
Logged By: J. Stoken	Depth to Groundwater Final/Time:	Angle From Vertical/Bearing: -90°

Depth (m)	Sample Type Symbol	Sample Number	Blows per 6 in.	Pocket Pen. (tsf)	Graphic Log	ASTM Symbol	Field Soil Description & Classification: *The report and log key are an integral part of these logs. All data and interpretations in this log are subject to those stated explanations and limitations.* — Description	Consistency / Apparent Density	Plasticity	Laboratory: Plasticity Index	Liquid Limit	Water Content (%)	Dry Unit Weight (pcf)	Passing #4 Sieve (%)	Passing #200 Sieve (%)	Other Tests and Field Notes
0						ML	**Sandy Silt** (ML): dark brown, dry to moist, fine grained sand									
1							Completed at a depth of 1.0 m below existing site grade.									
2																
3																

KLEINFELDER
Bright People. Right Solutions.

Project Number: 126434	**LOG B-03**
Date: 05-11-12	
Entry By: K. Knights	BIA N7054 Pinedale, New Mexico
Checked By: J. Stoken	
File Name: 126434_N7054.gpj	

Plate

SOIL BORING LOG KA CORPORATE STD.GDT KLEINFELDER_GINT_LIBRARY_VER_2.GLB 126434.GPJ 7/18/12

Boring Number: B-02	Location:	Drilling Method: Hollow-stem auger
Boring Total Depth: 1.0 m	Coordinates (X/Y, Lat/Long): 35.59291° / 108.39736°	Drilling Equipment:
Depth to Rock: No Rock was Encountered	Datum/Coordinate System:	Drilling Company: Precision Sampling Inc.
Date Begin/End: 04-10-12 / 04-10-12	Top of Boring Elevation:	Bit Size/Type:
Surface Conditions: Unpaved Roadway	Coordinate Data Source: GPS	Hammer Type/Method:
WL Measurement Point:	Depth to Groundwater Initial/Time: Not observed	Hammer Drop/Weight:
Logged By: J. Stoken	Depth to Groundwater Final/Time:	Angle From Vertical/Bearing: -90°

Depth (m)	Sample Type Symbol	Sample Number	Blows per 6 in.	Pocket Pen. (tsf)	Graphic Log	ASTM Symbol	Field Soil Description & Classification: *The report and log key are an integral part of these logs. All data and interpretations in this log are subject to those stated explanations and limitations.* — Description	Consistency / Apparent Density	Plasticity	Laboratory: Plasticity Index	Liquid Limit	Water Content (%)	Dry Unit Weight (pcf)	Passing #4 Sieve (%)	Passing #200 Sieve (%)	Other Tests and Field Notes
0						SM	**Silty Sand** (SM): brown, dry to moist, fine grained									
1							Completed at a depth of 1.0 m below existing site grade.									
2																
3																

KLEINFELDER
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Project Number: 126434	**LOG B-02**	Plate
Date: 05-11-12		
Entry By: K. Knights	BIA N7054 Pinedale, New Mexico	
Checked By: J. Stoken		
File Name: 126434_N7054.gpj		

SOIL BORING LOG KA CORPORATE STD.GDT KLEINFELDER GINT LIBRARY VER 2.GLB 126434.GPJ 7/18/12

Boring Number: B-01	Location:	Drilling Method: Hollow-stem auger
Boring Total Depth: 1.0 m	Coordinates (X/Y, Lat/Long): 35.59406° / 108.39597°	Drilling Equipment:
Depth to Rock: No Rock was Encountered	Datum/Coordinate System:	Drilling Company: Precision Sampling Inc.
Date Begin/End: 04-10-12 / 04-10-12	Top of Boring Elevation:	Bit Size/Type:
Surface Conditions: Unpaved Roadway	Coordinate Data Source: GPS	Hammer Type/Method:
WL Measurement Point: Ground Surface	Depth to Groundwater Initial/Time: Not observed	Hammer Drop/Weight:
Logged By: J. Stoken	Depth to Groundwater Final/Time:	Angle From Vertical/Bearing: -90°

Depth (m)	Sample Type Symbol	Sample Number	Blows per 6 in.	Pocket Pen. (tsf)	Graphic Log	ASTM Symbol	Field Soil Description & Classification *The report and log key are an integral part of these logs. All data and interpretations in this log are subject to those stated explanations and limitations.* Description	Consistency / Apparent Density	Plasticity	Laboratory: Plasticity Index	Liquid Limit	Water Content (%)	Dry Unit Weight (pcf)	Passing #4 Sieve (%)	Passing #200 Sieve (%)	Other Tests and Field Notes
0						SM	**Silty Sand** (SM): brown, dry to moist, fine grained									
1							Completed at a depth of 1.0 m below existing site grade.									
2																
3																

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Project Number: 126434	**LOG B-01**
Date: 05-11-12	
Entry By: K. Knights	BIA N7054 Pinedale, New Mexico
Checked By: J. Stoken	
File Name: 126434_N7054.gpj	

Plate

SOIL BORING LOG KA CORPORATE STD.GDT KLEINFELDER_GINT_LIBRARY_VER_2.GLB 126434.GPJ 7/18/12

United States Department of the Interior

Bureau of Indian Affairs
Navajo Region
P. O. Box 1060
Gallup, New Mexico 87305

In Reply Refer To:
Division of Transportation
M/C: N370

JUN 2 7 2017

MEMORANDUM

TO: Mr. Harold J. Riley, Planning & Design Branch Chief
Attention: Mr. Albert Lee, Design Engineer

FROM: Mr. Christopher Becenti, Materials Design Section Engineer

SUBJECT: Project No. N7054(1)1,2&3 – FP-14-Mainline Station 0+000.000 to 12+201.808

Project Scope

Performed a field review on Route N7054, attached are the recommendations concerning the first materials report design. This memo presents the results of the boring test analysis performed on Route N7054 by BIA NRDOT's Architect and Engineering Consultant, Klienfelder.

Route N7054 (1)1,2&3 Project section is approximately 12.201-Kilometers long and located in the Eastern Navajo Agency. The Project location is a primary loop in Pinedale, NM, with concern for the residents along the route. This route is situated within land jurisdiction commonly known as checkerboard land, comprising of state, trust, and allotted. The roadway alignment largely follows the existing alignment. Currently, the existing alignment is a dirt roadway crossing a couple of incised drainage locations. The Project scope plans are to construct a two lane rural roadway with drainage and signage.

Note: Geotechnical Report conclusion poorly summarizes treatment locations.

DESIGN ANALYSIS AND DISCUSSIONS

N7054 (1)1,2&4 Pinedale, NM

In Klienfelder's designing of the roadway pavement section, the design traffic was based on the existing traffic analysis provided by Mr. Albert Lee, NRDOT Planning Engineer, and projected for a design period of 20 years. A geotechnical report was then initiated by a geotechnical investigation for the N7054(1)1,2&3 Project, providing boring logs and R values. The information provided included the location of borings, and soil classification.

Table I below shows the parameters used for the design of the construction structural section for N7054 (1)1, 2 & 3.

Structural Number for Future Traffic

Parameter	**N7054 (1)1,2&4 ABC Section**
Design Life (years) (2037)	25
18-Kip ESALs (One Way)	13,000
Initial Serviceability (Po)	4.0
Terminal Serviceability (Pt)	2.0
Reliability Level	50%
Overall Standard Deviation (So)	0.45
RoadBed Soil Resilient Modulus	83,426.596 kPa
Required SN (per AASHTO 1993 Guide)	27 mm

Description	Drainage Coef	Thickness (mm)
Future HACP	1	63.5
Future Double Chip Seal *	N/A	19
ABC	1	152.4
	total	216
* Surface does not provide any strength		

Typical Section N7054 (1)1, 2 & 3,
Station 0+000.000 TO 12+201.808

Cross Slope 2%
1 – (Future)63.5 mm Hot Asphaltic Concrete Pavement,
1 – (Future)19 mm Double Chip Seal,
1 - 152 mm ABC topped with Prime Coat.

Klienfelder GEOTECHNICAL REPORT available

SECTION I – FLAT BOTTOM BORROW DITCH & SUBGRADE ACCEPTANCE

Subgrade construction control R-value is 20. It is recommended that soil within 1 meter of the final subgrade elevation meet this construction control value. Thereby, all soils not meeting this value are considered unsuitable soils for strength. Inspection can use the NMDOT method of R-value estimate 60% confidence.

The Earthwork Factor is not provided in the geotechnical report.

Off-site borrow shall meet the requirements set in the FP-14 704.06 unclassified borrow.

SECTION II - SUBGRADE,AND BASES

Item 1 - AGGREGATE BASE COURSE (ALTERED GRADATION)

The Aggregate Base Course shall be an altered gradation, and shall be as specified in SUPPLEMENTAL Section 703.05 of the Specifications. The thickness of the Surface Course Aggregate layer shall be 152 mm.

SECTION 703 - AGGREGATE

703.05 Subbase, Base, and Surface Course Aggregate

The Section (b) of this section is superseded with the following:

b) Subbase or base aggregate
   1) Gradation Table 703-2

Table 703-2
Aggregate Base Gradation Special

Sieve Size	Percent by Mass Passing Designated Sieve (AASHTO T27 & T11)
37.5 mm	100
25 mm	80-100
19 mm	65-80
9.5 mm	40-65
4.75 mm	30-50
425 um	8-30
75 um	2-12

SECTION III - SURFACE TREATMENTS AND PAVEMENTS

N7054 (1) is considered a low volume road with existing ADT around 267. Normally, low volume roads, ADT less than 400, are designed with a gravel surface. However, an all-weather surface is encouraged by the locale and two future upgrades are recommended. An alternative to Hot Asphaltic Concrete Pavement would be Asphalt Treated Surfaces (AST). AST structural design is based primarily on strength attained in the gravel layer. The AST itself has no strength value assigned. The typical section reflects a designed strength section for a 7 year projected ADT. The choice of a 7 year projection is based on the presumed design life of 7 years of the chip seal. The use of AST is a common practice in a few states for low volume roads. After the life of the AST is consumed it is recommended to place Hot Asphaltic Concrete.

ITEM 1 - PRIME COAT: The prime coat shall be as specified in Section 411 of the FP-14 Standard Specifications and Supplemental Specification for Penetrating Emulsified Prime (PEP).

ITEM 2 – DOUBLE COURSE SURFACE TREATMENT DESIGNATION Type 2B CRS-2P. (previous report called for Microsurfacing)

1st APPPLICATION ASPHALT SURFACE TREATMENT – CRS-2P, GRADE B – Initial application rate of 2.1 L/m^2 is suggested, adjustment shall be at Construction Engineers assessment at test strip. The asphalt surface treatment shall be as specified in Section 407 of the FP-14 Standard and Supplemental Specifications. 18-24 kg/m^2 aggregate application rate

2ND APPLICATION ASPHALT SURFACE TREATMENT – CRS-2P, GRADE C – Initial application rate of 2.4 L/m^2 is suggested, adjustment shall be at Construction Engineers assessment at test strip. The asphalt surface treatment

shall be as specified in section 407 of the FP-14 Standard and Supplemental Specifications. 12-14 kg/m^2 aggregate application rate

BASIS OF ESTIMATED QUANTITIES				
Item No.	Description	Grade	Unit Weight	Application
30103-0500	Untreated Aggregate Base Course (Special)	Special (703-2)	2164 kg/m^3	178 mm – mainline, 152mm turnout
40701-1300	Chip seal, type 2B, grading B(future)	B	-	21 kg/ m^2 application rate
40701-1400	Chip seal, type 2B, grading C(future)	C	-	24 kg/ m^2 application rate
40702-0800	Emulsified Asphalt(future)	CRS-2P	1.001 L/Kg	2.1 L/m^2 1st application rate 2.4 L/ m^2 application
40601-0000	Fog Seal(future)	CQS-1H	1.001 L/Kg	0.35 L/m^2 Application rate Applied as seal coat to Chipseal.
41101-5000	Prime Coat (future)	PEP	993 L/t	1.36 L/m^2 Application rate

SECTION IV – GEOTECHNICAL REPORT AVAILABILITY

The General Notes in the Planset referring to Geotechnical Investigation Report, shall be accompanied with "for informational purpose only"

Alfred Myron
BIA NRDOT Materials Engineer

6-15-17
Christopher Becenti P. E.
BIA NRODT Assistant Materials Engineer

6/15/17
Approval
Harold Riley P. E.
BIA NRODT Planning and Design Branch Chief