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GEOTECHNICAL DATA REPORT
PROPOSED WATER IMPOUNDMENTS FACILITY – CENTRAL PLU
LOVING, EDDY COUNTY, NEW MEXICO

Terracon Project No. A4175030 – Task 3
July 17, 2017

1.0 INTRODUCTION

A Water Impoundments Facility will be constructed at Central PLU Site that is located about 18 miles south of the intersection of Rawhide Road and NM-128 in Eddy County, NM. Our scope of services included drilling and sampling two (2) borings to depths of approximately 75 feet below existing ground surface (bgs), laboratory testing, field testing, and boring log preparation. The purpose of these services is to provide information and geotechnical data relative to:

- subsurface material conditions
- seismic site classification
- groundwater conditions

2.0 PROJECT INFORMATION

2.1 Project Description

Item	Description
Proposed Construction	Two water impoundments with a common berm will be constructed at the Central PLU Site. The combined storage capacity and bottom width of these impoundments will be about 500 KBBL and 250 feet, respectively. The side slope and depth of each impoundment will be 3H:1V and 18 feet without free board (20 feet with freeboard), respectively.

2.2 Site Location and Description

Item	Description
Location	The Central PLU Site is located about 18 miles south of the intersection of Rawhide Road and NM-128 in Loving, Eddy County, NM. The GPS coordinates of approximate center of the project site are 32.148127°N, 103.848702°W.
Existing improvements	None
Current ground cover	Exposed soil with shrubs and native grasses

Item	Description
Existing topography	The project site appears to be relatively level; however, the surrounding area slopes gently downwards from the east towards the west based on a USGS quadrangle map shown on Exhibit A-1 of this report.

Should any of the above information or assumptions be inconsistent with the planned construction, please let us know so that we may make any necessary modifications to this report.

3.0 SUBSURFACE CONDITIONS

3.1 Typical Profile

Conditions encountered at the boring locations are indicated on the boring logs. Stratification boundaries on the boring logs represent the approximate locations of changes in soil types; in-situ, the transition between materials may be gradual. Details for the boring locations can be found on the boring logs in Appendix A of this report. Based on the results of the borings, subsurface conditions at the project site can be generalized as follows:

Description	Approximate Depth to Bottom of Stratum (feet)	Material Encountered	Relative Density/ Consistency
Stratum I	12 to 17	Silty Sand or Silty Sand with Gravel; brown to tan	Loose to Very Dense[2]
Stratum II	31 to 36	Poorly Graded Sand with Silt or Silty Sand; tan to brown	Medium Dense to Very Dense[3]
Stratum III	45 to 75[1]	Poorly Graded Sand/Fat Clay with Sand; brown to dark brown	Dense to Very Dense/Hard[4]
Stratum IV	75[1]	Poorly Graded Sand with Silt; brown to tan	Dense to Very Dense[5]

[1]Borings were terminated within this stratum at the planned termination depth of approximately 75 feet bgs.

[2]Loose to very dense soils with standard penetration resistances (N-values) of 7 blows per foot (bpf) to more than 100 bpf were encountered in this stratum.

[3]Medium dense to very dense soils with N-values of 24 bpf to more than 100 bpf were encountered in this stratum.

[4]Dense to very dense or hard soils with N-values of 33 bpf to 77 bpf were encountered in this stratum.

[5]Dense to very dense soils with N-values of 48 bpf to 83 bpf were encountered in this stratum.

3.2 Groundwater

The borings were advanced in the dry using continuous flight auger drilling techniques that allow short-term groundwater observations to be made while drilling. Groundwater seepage was not observed during or at the completion of drilling.

These groundwater observations provide an indication of the groundwater conditions present at the time the borings were drilled. Groundwater conditions may be different at the time of construction because of seasonal variations in rainfall, runoff, irrigation, and other conditions not apparent at the time of drilling.

4.0 SEISMIC CONSIDERATIONS

Code Used	Site Classification
2012 International Building Code (IBC)[1]	C[2]

[1]In general accordance with the 2012 International Building Code, Section 1613.3.2

[2]The 2012 International Building Code (IBC) requires a site soil profile determination extending a depth of 100 feet for seismic site classification. The current scope requested does not include the required 100 foot soil profile determination. The borings were extended to maximum depths of approximately 75 feet bgs and this seismic site class definition considers that very dense soils are below the maximum depth of the subsurface exploration. Additional exploration to deeper depths would be required to confirm the conditions below the current depth of exploration. Alternatively, a geophysical exploration could be utilized in order to attempt to justify a higher seismic site class.

5.0 GENERAL COMMENTS

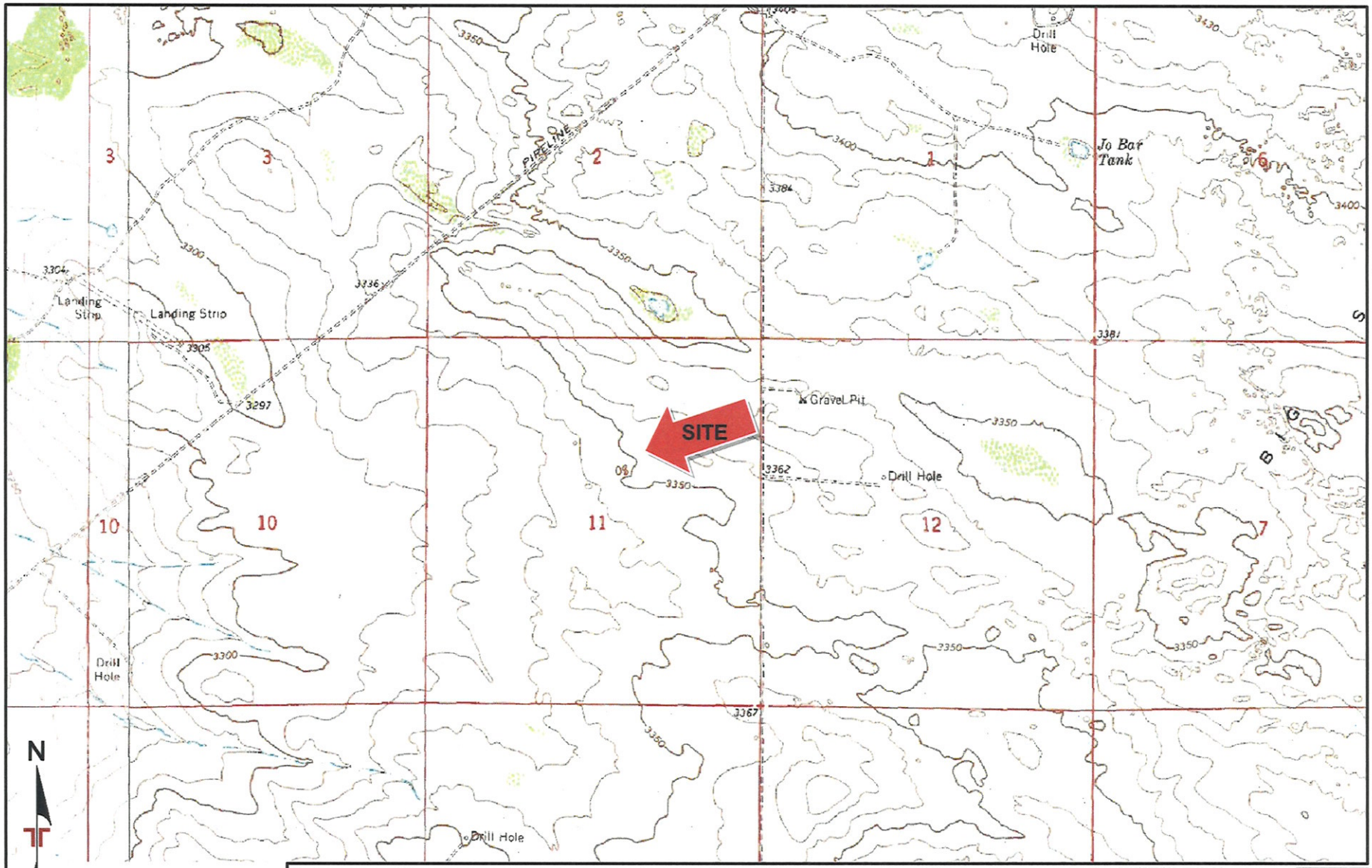
The data presented in this report are based upon the information obtained from the borings performed at the indicated locations and from other information discussed in this report. This report does not reflect variations that may occur across the site or due to the modifying effects of weather. The nature and extent of such variations may not become evident until during or after construction. If significant variations become apparent, it will be necessary to reevaluate the suitability of the site conditions for the proposed project.

The scope of services for this project does not include either specifically or by implication any environmental or biological (e.g., mold, fungi, bacteria) assessment of the site or identification or prevention of pollutants, hazardous materials or conditions. If the owner is concerned about the potential for such contamination or pollution, other studies should be undertaken.

This report has been prepared for the exclusive use of our client for specific application to the project discussed and has been prepared in accordance with generally accepted geotechnical engineering practices. No warranties, express or implied, are intended or made. Site safety, excavation support, and dewatering requirements are the responsibility of others. In the event that

changes in the nature, design, or location of the project as outlined in this report are planned, the data contained in this report shall not be considered valid unless Terracon reviews the changes and either verifies or modifies the data of this report in writing.

APPENDIX A
FIELD EXPLORATION



TOPOGRAPHIC MAP IMAGE COURTESY OF THE U.S. GEOLOGICAL SURVEY QUADRANGLES INCLUDE: PIERCE CANYON, NM (1/1/1968) and BIG SINKS, NM (1/1/1968).

DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

Project Manager:	JT
Drawn by:	JT
Checked by:	JT
Approved by:	JDC

Project No.	A4175030
Scale:	1"=2,000'
File Name:	SLP/EP
Date:	7/14/2017

Terracon

10400 State Highway 191
Midland, TX 79707-1497

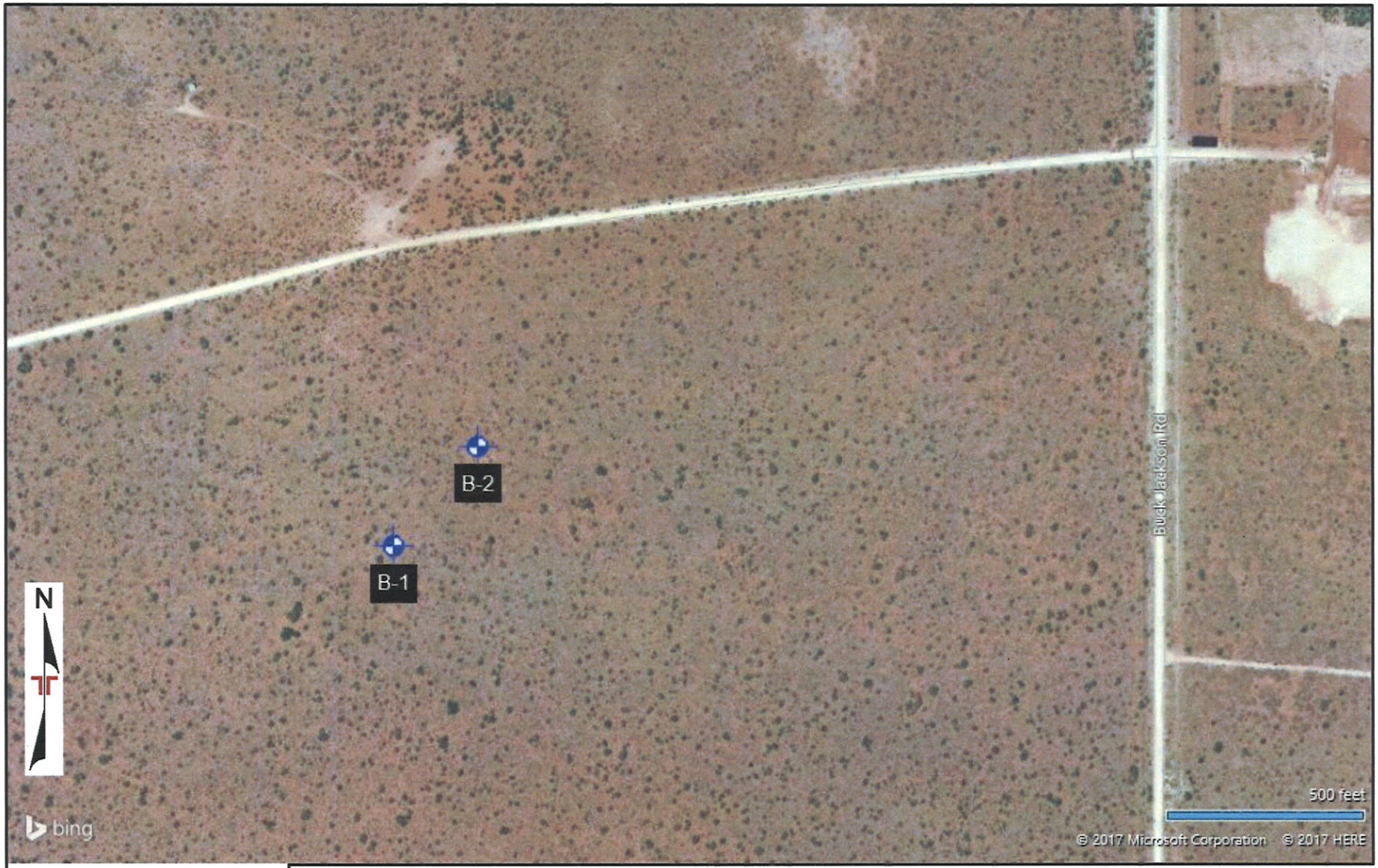
SITE LOCATION PLAN

Proposed Water Impoundments – Central PLU

Rawhide Road and NM-128
Loving, Eddy County, NM

Exhibit

A-1



AERIAL PHOTOGRAPHY PROVIDED BY MICROSOFT BING MAPS

DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

Project Manager:	JT
Drawn by:	JT
Checked by:	JT
Approved by:	JDC

Project No.	A4175030
Scale:	AS SHOWN
File Name:	SLP/EP
Date:	7/14/2017

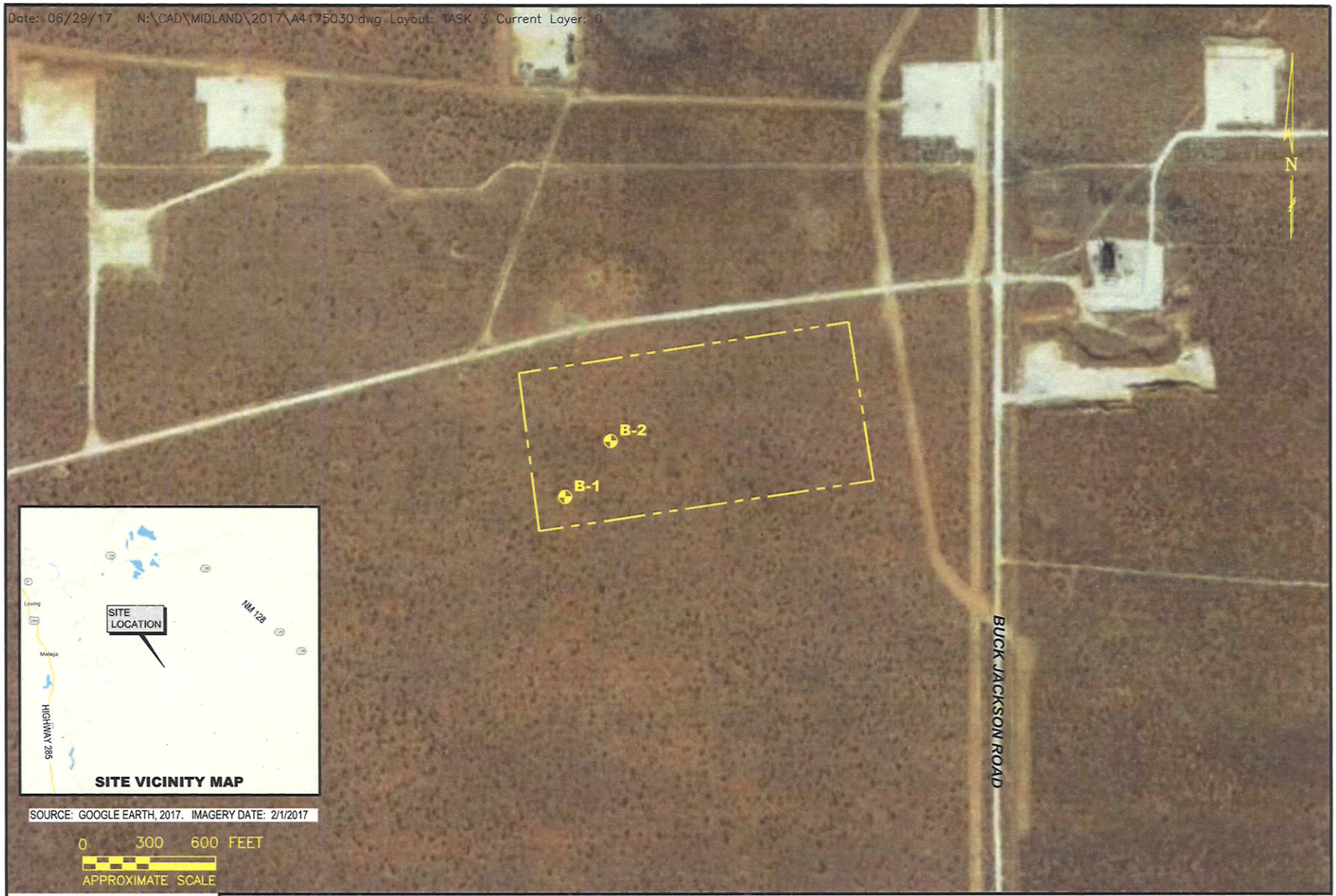
Terracon
10400 State Highway 191
Midland, TX 79707-1497

EXPLORATION PLAN

Proposed Water Impoundments – Central PLU
Rawhide Road and NM-128
Loving, Eddy County, NM

Exhibit
A-2

Date: 06/29/17 N:\CAD\MIDLAND\2017\A4175030.dwg Layout: TASK 3 Current Layer: 0



SOURCE: GOOGLE EARTH, 2017. IMAGERY DATE: 2/1/2017

0 300 600 FEET

APPROXIMATE SCALE

THIS DRAWING SHOULD NOT BE USED SEPARATELY FROM ORIGINAL REPORT.

NOTE: ALL BORING LOCATIONS ARE APPROXIMATE.

Project Mngr:	JT
Drawn By:	CDD
Checked By:	JT
Approved By:	JS

Project No.	A4175030-3
Scale:	AS SHOWN
Date:	06/29/17

Terracon
Consulting Engineers and Scientists
(Registration No.: F-3272)
10400 STATE HIGHWAY 191 MIDLAND, TX 79707
PH. (432-296-4142) FAX. (432-684-9608)

BORING LOCATION PLAN

PROPOSED WATER IMPOUNDMENTS - CENTRAL PLU SITE
RAWHIDE ROAD AND NM-128
LOVING, EDDY COUNTY, NEW MEXICO

EXHIBIT

A-3

Field Exploration Description

Subsurface conditions were explored by drilling two (2) borings at the approximate locations indicated on the Exploration Plan and Boring Location Plan presented on Exhibits A-2 and A-3 in this appendix. The field exploration was performed on June 21, 2017. The test locations were established in the field by a representative of CDM Smith and verified by a representative of Terracon by measuring from available reference features and using a handheld GPS device. The boring locations should be considered accurate only to the degree implied by the methods employed to determine them.

The borings were performed using a truck-mounted drill rig, utilizing continuous flight auger drilling techniques. Samples of the soils encountered in the borings were obtained using split-spoon sampling procedures in accordance with standard penetration tests, utilizing an automatic hammer. The samples were tagged for identification, sealed to reduce moisture loss, and taken to the laboratory for further examination, testing, and classification. Following the completion of drilling, the borings were backfilled with soil cuttings.

A CME automatic SPT hammer was used to advance the split-barrel sampler in the borings performed on this site. A greater efficiency is typically achieved with the automatic hammer compared to the conventional safety hammer operated with a cathead and rope. Published correlations between the SPT values and soil properties are based on the lower efficiency cathead and rope method. This higher efficiency affects the standard penetration resistance blow count (N) value by increasing the penetration per hammer blow over what would be obtained using the cathead and rope method. The effect of the automatic hammer's efficiency has been considered in the interpretation and analysis of the subsurface information for this report.

Field logs of the borings were prepared by a representative of Terracon. The logs included visual classifications of the materials encountered as well as interpretation of the subsurface conditions between samples. The boring logs included with this report represent the engineer's interpretation of the field logs and include modifications based on laboratory evaluation of the samples. The boring logs are presented on Exhibits A-5 and A-6 in this appendix. General notes to log terms and symbols and other supporting documentation are included in Appendix C.

BORING LOG NO. B-1

PROJECT: Proposed Water Impoundments - Central PLU

CLIENT: CDM Smith
Houston, Texas

SITE: South of Rawhide Road and NM-128
Loving, Eddy County, NM

Vickery, Jason A.

LOCATION See Exhibit A-4

Latitude: 32.147791° Longitude: -103.849178°

Approximate Surface Elev: 3359 (Ft.) +/-

DEPTH	ELEVATION (Ft.)	DESCRIPTION	DEPTH (Ft.)	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
		SILTY SAND (SM), reddish-brown to tan, loose		1-3-4 N=7			
		-medium dense at 2'			3	NP	21
		-dense to very dense below 4'	5	7-11-11 N=22			
				12-13-22 N=35	4	NP	21
			10	29-50/3"		NP	31
				22-19-34 N=53			
17.0	3342+/-		15	13-20-18 N=38			
		POORLY GRADED SAND WITH SILT (SP-SM), tan to brown, medium dense	20	8-10-14 N=24			
			25	6-10-14 N=24			
		-dense at 28'	30	7-12-18 N=30	2	NP	8
36.0	3323+/-	-very dense at 33'	35	50/3"			
		POORLY GRADED SAND (SP), brown, dense to very dense	40	8-17-26 N=43			
			45	8-16-24 N=40			
			50	7-15-18 N=33			
			55	16-28-35 N=63			
			60	11-24-29 N=53			
			65	11-26-30 N=56	2	NP	4
			70	13-20-26 N=46			
75.0	3284+/-		75	17-25-31 N=56			
		Boring Terminated at 75 Feet					

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Continuous Flight Auger

Abandonment Method:
Boring backfilled with soil cuttings

See Exhibit A-3 for description of field procedures.
See Appendix B for description of laboratory procedures and additional data (if any).
See Appendix C for explanation of symbols and abbreviations.
Elevations Obtained from Google Earth

Notes:
NP = Non-Plastic

WATER LEVEL OBSERVATIONS

No Groundwater Encountered During Drilling

Dry At Completion

Terracon
10400 State Highway 191
Midland, TX

Boring Started: 6/21/2017 | Boring Completed: 6/21/2017

Drill Rig: CME 55 | Driller: Leo

Project No.: A4175030 Task 3 | Exhibit: A-5

BORING LOG NO. B-2

PROJECT: Proposed Water Impoundments - Central PLU

CLIENT: CDM Smith
Houston, Texas

SITE: South of Rawhide Road and NM-128
Loving, Eddy County, NM

Vickery, Jason A.

LOCATION See Exhibit A-4

Latitude: 32.14848° Longitude: -103.848486°

Approximate Surface Elev: 3366 (Ft.) +/-

DEPTH	ELEVATION (Ft.)	DESCRIPTION
0.0	3366+/-	**SILTY SAND WITH GRAVEL, locally called "CALICHE" (SM)**, brown to tan, very dense
		-medium dense at 4'
12.0	3354+/-	
		SILTY SAND (SM), tan, very dense
		-medium dense at 18'
31.0	3335+/-	
		FAT CLAY WITH SAND (CH), dark brown, hard
45.0	3321+/-	
		POORLY GRADED SAND WITH SILT (SP-SM), brown to tan, very dense
		-dense at 53'
75.0	3291+/-	
		Boring Terminated at 75 Feet

DEPTH (Ft.)	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
0		9-50/1"			
		50/3"	2	NP	16
5		3-4-22 N=26			
		50/2"		NP	20
		50/5"			
10					
15		11-21-31 N=52	4	NP	16
20		8-15-23 N=38			
25		9-21-35 N=56			
30		17-36-50/5"			
35		16-20-45 N=65			
40		19-31-46 N=77	15	57-22-35	83
45		13-24-32 N=56			
50		14-30-34 N=64			
55		11-18-30 N=48	2	NP	8
60		15-30-44 N=74			
65		11-37-46 N=83			
70		16-30-32 N=62			
75		18-26-38 N=64	2	NP	8

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Continuous Flight Auger

Abandonment Method:
Boring backfilled with soil cuttings

See Exhibit A-3 for description of field procedures.
See Appendix B for description of laboratory procedures and additional data (if any).
See Appendix C for explanation of symbols and abbreviations.
Elevations Obtained from Google Earth

Notes:
NP = Non-Plastic

WATER LEVEL OBSERVATIONS

No Groundwater Encountered During Drilling

Dry At Completion

Terracon
10400 State Highway 191
Midland, TX

Boring Started: 6/21/2017 | Boring Completed: 6/21/2017

Drill Rig: CME 55 | Driller: Leo

Project No.: A4175030 Task 3 | Exhibit: A-6

APPENDIX B
LABORATORY TESTING

Laboratory Testing

The boring logs and samples were reviewed by a geotechnical engineer who selected soil samples for testing. Tests were performed by technicians working under the direction of the engineer. A brief description of the tests performed follows.

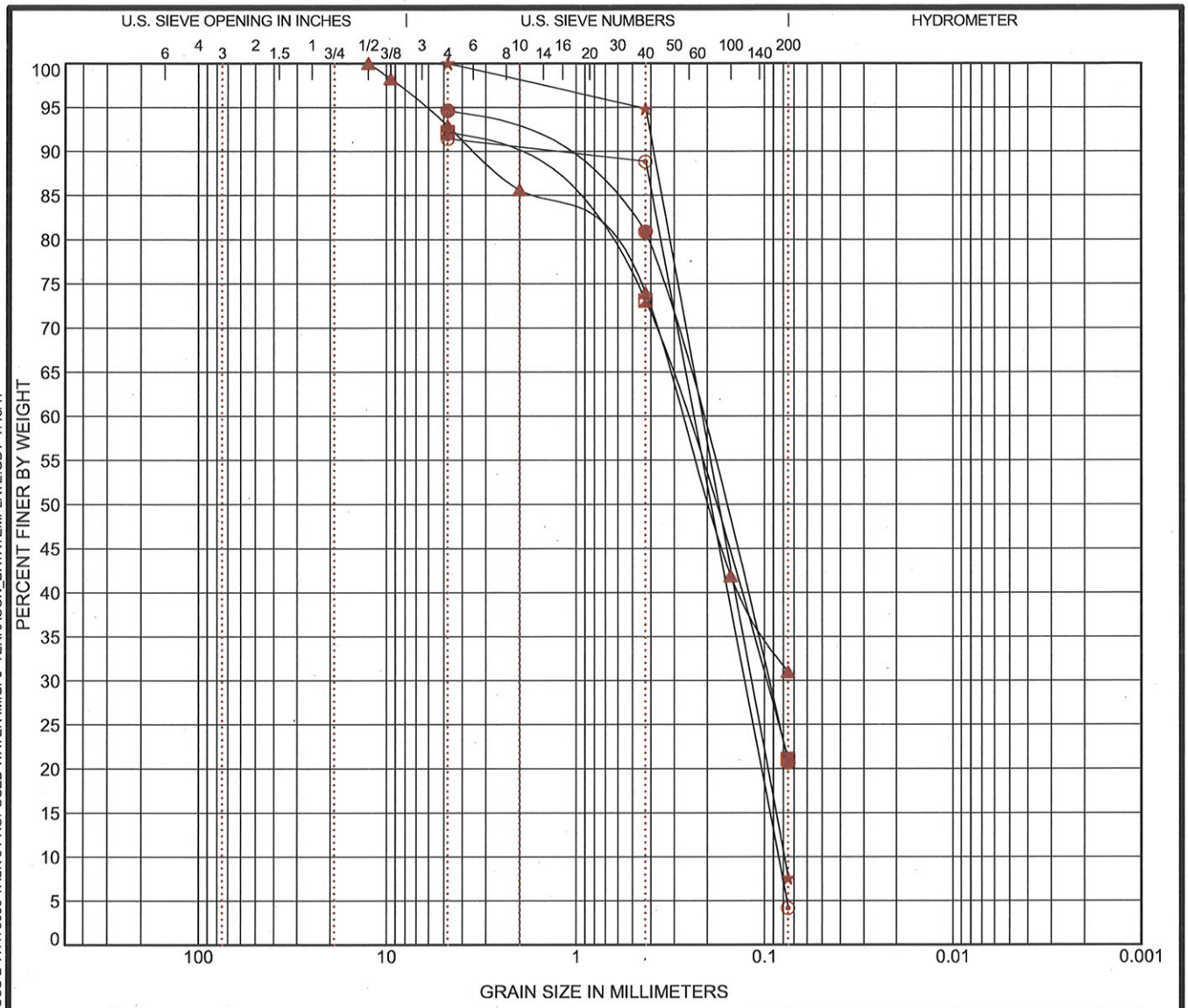
Particle size analysis (ASTM D422), liquid and plastic limit tests (ASTM D4318), and moisture content tests (ASTM D2216) were made to aid in classifying the soils in accordance with the Unified Soil Classification System (USCS). The USCS is summarized on Exhibit C-2 in Appendix C. The results of the laboratory tests are presented on the boring logs in Appendix A. The grain size distribution results are also shown on exhibits B-2 through B-4 of this appendix.

Modified Proctor tests (ASTM D1557) were performed on a bulk soil samples collected from depths of 8 to 10 feet bgs of borings B-1 and B-2. The modified Proctor test results are included on Exhibits B-5 and B-6 in this appendix.

Procedural standards noted above are for reference to methodology in general. In some cases variations to methods are applied as a result of local practice or professional judgment.

GRAIN SIZE DISTRIBUTION

ASTM D422 / ASTM C136



Boring ID	Depth	USCS Classification	WC (%)	LL	PL	PI	Cc	Cu
B-1	2 - 3.5	SILTY SAND (SM)		NP	NP	NP		
B-1	6 - 6.8	SILTY SAND (SM)		NP	NP	NP		
B-1	8	SILTY SAND (SM)		NP	NP	NP		
B-1	28.5 - 30	POORLY GRADED SAND with SILT (SP-SM)		NP	NP	NP	0.82	2.70
B-1	63.5 - 65	POORLY GRADED SAND (SP)		NP	NP	NP	0.81	2.79

Boring ID	Depth	D_{100}	D_{60}	D_{30}	D_{10}	%Gravel	%Sand	%Silt	%Fines	%Clay
B-1	2 - 3.5	4.75	0.233	0.098		0.0	73.9		20.7	
B-1	6 - 6.8	4.75	0.275	0.101		0.0	71.1		21.1	
B-1	8	12.5	0.27			7.1	61.9		31.0	
B-1	28.5 - 30	4.75	0.213	0.117	0.079	0.0	92.4		7.6	
B-1	63.5 - 65	4.75	0.235	0.127	0.085	0.0	87.2		4.2	

PROJECT: Proposed Water Impoundments - Central PLU

SITE: South of Rawhide Road and NM-128 Loving, Eddy County, NM

Terracon
10400 State Highway 191
Midland, TX

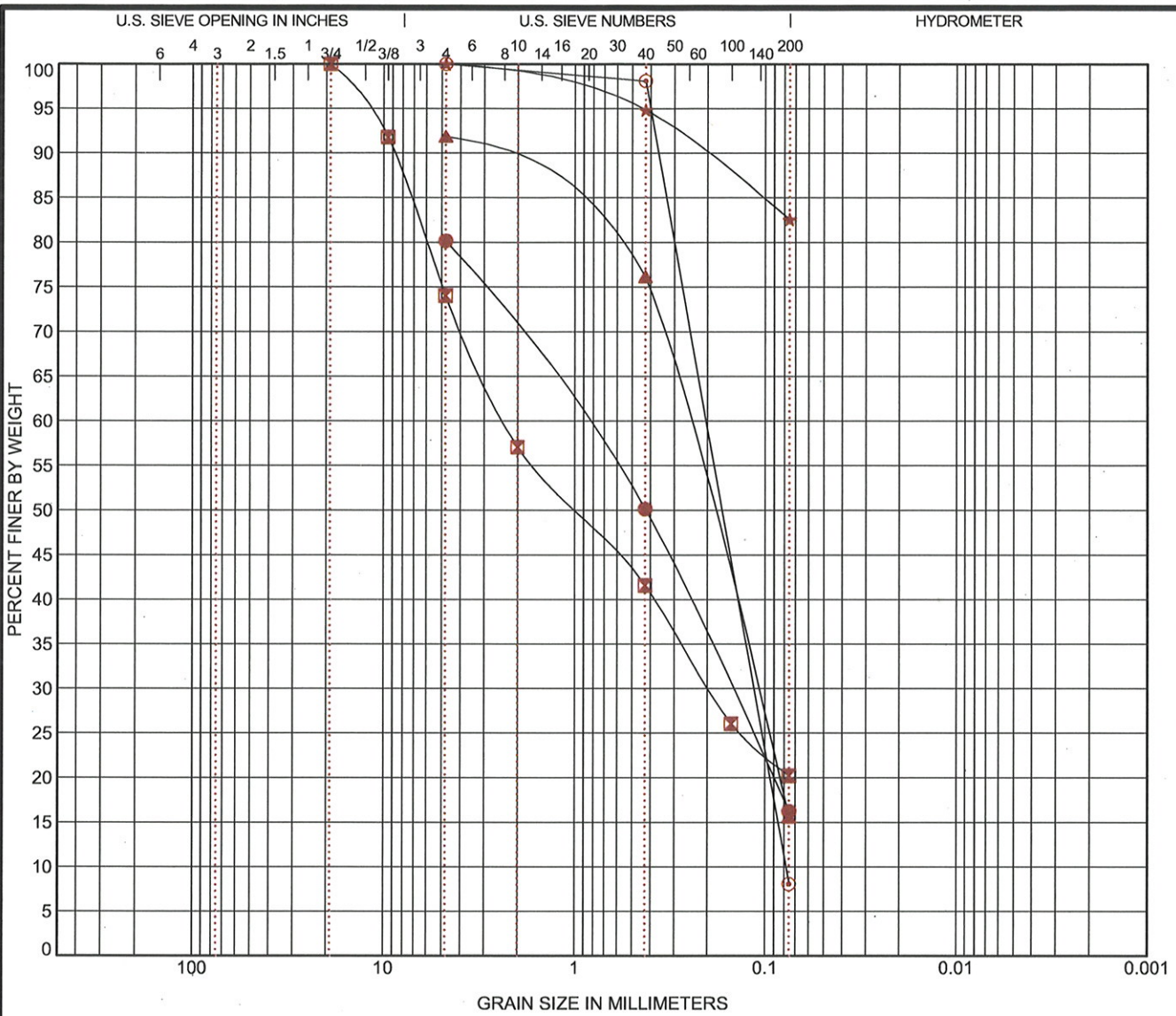
PROJECT NUMBER: A4175030 Task 3

CLIENT: CDM Smith
Houston, Texas

EXHIBIT: B-2

GRAIN SIZE DISTRIBUTION

ASTM D422 / ASTM C136



Boring ID	Depth	USCS Classification	WC (%)	LL	PL	PI	Cc	Cu
B-2	2 - 2.3	SILTY SAND with GRAVEL (SM)		NP	NP	NP		
B-2	8	SILTY SAND with GRAVEL (SM)		NP	NP	NP		
B-2	13.5 - 15	SILTY SAND (SM)		NP	NP	NP		
B-2	38.5 - 40	FAT CLAY with SAND (CH)		57	22	35		
B-2	53.5 - 55	POORLY GRADED SAND with SILT (SP-SM)		NP	NP	NP	0.82	2.62

Boring ID	Depth	D_{100}	D_{60}	D_{30}	D_{10}	%Gravel	%Sand	%Silt	%Fines	%Clay
B-2	2 - 2.3	4.75	0.939	0.152		0.0	63.9		16.3	
B-2	8	19	2.322	0.195		26.0	53.8		20.2	
B-2	13.5 - 15	4.75	0.268	0.113		0.0	76.3		15.6	
B-2	38.5 - 40	4.75				0.0	17.4		82.6	
B-2	53.5 - 55	4.75	0.204	0.114	0.078	0.0	91.9		8.1	

PROJECT: Proposed Water Impoundments - Central PLU

SITE: South of Rawhide Road and NM-128 Loving, Eddy County, NM

Terracon
10400 State Highway 191
Midland, TX

PROJECT NUMBER: A4175030 Task 3

CLIENT: CDM Smith
Houston, Texas

EXHIBIT: B-3

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GRAIN SIZE: USCS-2 A4175030 TASK 3 PROPOSED WATER IM.GPJ TERRACON_DATATEMPLATE.GDT 7/13/17