Financial Management Department
Purchasing Division
1112 Manatee Ave W Suite 803
Bradenton, FL 34205
Phone: (941) 749-3014
www.mymanatee.org

April 1, 2016

TO: All Interested Bidders

SUBJECT: Invitation for Bids #16-1006CD
Southwest Water Reclamation Facility Recharge Well System Infrastructure

ADDENDUM #2

Bidders are hereby notified that this Addendum shall be acknowledged on page Bid Form-1 of the Bid Form and made a part of the above named bidding and contract documents. Bids submitted without acknowledgment of the Addendum will be considered incomplete.

The following items are issued to add to, modify, and clarify the bid and contract documents. These items shall have the same force and effect as the original bidding and contract documents, and cost involved shall be included in the bid prices. Bids to be submitted on the specified bid date, shall conform to the additions and revisions listed herein.

The following questions have been presented by potential bidders after the issuance of Addendum #1:

Question 1: Can you make a separate bid item for electrical and instrumentation?

Response 1: The Bid Items will remain the same within the Measurement and Payment Section 1150. The statement "all other materials and equipment necessary for a complete and fully operable system", includes the Electrical and Instrumentation and Control components and requirements in accordance with the contract documents, technical specifications, and drawings. Any concerns with tracking of scope and completion of electrical and instrumentation work for payment during construction can be addressed during the approval of the schedule of values.

Question 2: I see 3 soil borings on the plans. Is there a soil boring report for this bid?

Response 2: Please see the Geotechnical Report dated August 31, 2015 that is attached to this Addendum #2.

END OF ADDENDUM #2

Bids will be received at Manatee County Purchasing, 1112 Manatee Avenue West, Bradenton, Florida 34205 until **Wednesday, April 6, 2016 at 3:00 PM.**

Sincerely,

Melissa M. Wendel, CPPO
Purchasing Official

REPORT OF THE
GEOTECHNICAL INVESTIGATION

24-INCH DUCTILE IRON PIPELINE
SOUTHWEST WATER RECLAMATION FACILITY
MANATEE COUNTY, FLORIDA

Driggers Engineering Services Incorporated

DRIGGERS ENGINEERING SERVICES INCORPORATED
Geotechnical Engineering & Construction Materials Testing

August 31, 2015

CH2M Hill
4350 West Cypress Street
Suite 600
Tampa, Florida 33626

Attention: Mr. Ryan Messer

RE: Report of the Geotechnical Investigation
24-inch Ductile Iron Pipeline
Southwest Water Reclamation Facility
Manatee County, Florida
Our File: DES 157692

Dear Mr. Messer:

Pursuant to your request and authorization, **DRIGGERS ENGINEERING SERVICES, INC.** has completed a geotechnical investigation at the subject site. The purpose of our investigation was to obtain information about subsurface conditions in order to develop geotechnical recommendations for excavation and backfilling for the proposed pipeline.

GEOTECHNICAL INVESTIGATION PROGRAM

EXPLORATORY BORINGS – Plate I of the report attachments depicts the approximate positioning of the three (3) Standard Penetration Test (SPT) borings which were requested. The borings were staked in the field by our personnel utilizing the aerial photograph provided for our use. The borings were advanced to the requested nominal depths of 20 feet below existing grades to examine soil conditions and obtain Standard Penetration resistance values which are indicative of the strength and bearing capability of the soils penetrated. The upper 6 feet of each boring was advanced with hand auger equipment to as a precaution against encountering unidentified buried utility lines. The hand auger also allows a closer examination of the soils being penetrated. A hand cone penetrometer was utilized in advance of the hand auger to provide a measure of the relative density or consistency of the soils penetrated.

Logs of the borings are presented in the report attachments indicating visual and estimated Unified Soil Classification versus depth. A brief description of the SPT method of sampling and testing is also included for your review.

LABORATORY TESTING PROGRAM

A laboratory testing program was also undertaken to aid in characterizing the engineering properties of typical subsurface soils. Our laboratory tests included grainsize analyses and organic content tests. Selected samples were also tested in the laboratory for corrosivity potential (pH, sulfates, chlorides and resistivity). Atterberg liquid limit and plastic limit determinations (ASTM D-4318). The results of our laboratory tests are included in the report attachments. Grainsize curves are also included.

GENERALIZED SUBSURFACE CONDITIONS

The borings have identified fine sands containing variable silt, clay and organic fines and shell content to the completion depth of the borings. These sandy soils typically comprised the SP and SP-SM Unified soil classifications. Where the sands exhibited an increase in organic fines, visual examination of the recovered samples and results of laboratory testing suggest that the organic content is generally low and less than 5 percent, by weight. However, the sands between about 5.2 and 6 feet at boring location B-1 had a slightly elevated organic content of 7.9 percent. Standard Penetration resistance data reflected a generally medium dense to dense relative density, with occasional loose zones.

Results of laboratory corrosivity testing suggest that the soils tested would be considered to be slightly aggressive.

Groundwater was measured at depth of 3.3 to 3.8 feet below grade when the borings were conducted in Mid-August of 2015. It is expected that normal seasonal high levels may occur relatively close to the measured levels.

GEOTECHNICAL EVALUATION AND RECOMMENDATIONS

Open Cut Construction – We anticipate that open-cutting and backfilling will be utilized for the proposed pipeline. For shallow pipe embedment at depths of some 4 to 6 feet, minimal excavation shoring and dewatering would be expected. For deeper excavations, dewatering along with either properly sloped excavations or sheet piling/trench boxes likely needed to support the excavation side walls.

The pipeline alignment may occur in close proximity to existing structures or utilities. The contractor must, therefore, exercise due care in the protection of these facilities so as to avoid any deformation or damage. We would certainly recommend that elevations be established on the existing structures and utilities and that elevations be carefully monitored during all excavation and construction activities to detect any movements that might signal a need for a modification in the ways and means of construction. Clearly, techniques that would involve significant vibration such as vibratory sheeting installation and extraction or heavy vibratory compaction equipment should be avoided. Compaction of backfill in such areas should be performed utilizing relatively light hand-guided vibratory compaction equipment in thin lifts not in excess of 6 inches so as to achieve uniform compaction consistent with the equipment selected for compaction.

Where sheet piling may be utilized, special care must be exercised to limit the development of any significant vibrations associated with installation and withdrawal activities which could result in settlements of adjacent roadways, utilities and structures. For this reason, it would be imperative, in our opinion, that sheet piles be installed utilizing techniques that do not impart unacceptable vibrations. There are specialty contractors with the capability for installing and removing sheeting utilizing non-vibration techniques. We would recommend contacting Giken American Corporation (phone: 407/380-3232) for details relative to this methodology.

Excavation Shoring - With respect to the design of an excavation bracing system, we recommend consideration of the following soil parameters which would be applicable for the principally sandy soils generally evidenced within the anticipated excavation depths:

Moist Soil Unit Weight:	110 pcf
Saturated Soil Unit Weight:	120 pcf
Buoyant Soil Unit Weight:	60 pcf
Coefficient of Active Earth Pressure:	$K_a = 0.33$

At Rest Earth Pressure Coefficient:	$K_0 = 0.5$
Passive Earth Pressure Coefficient:	$K_p = 3.0$

The at rest lateral earth pressure coefficient is recommended if the shoring will essentially be restrained against lateral deformation of the top which would be needed to approach the active earth pressure state. The effect of any surcharge loads during construction, such as stockpiled soil, must be superimposed. Naturally, the design must include an appropriate factor of safety with respect to the design loads. The contractor must comply with applicable OSHA requirements with respect to excavation safety.

In order to provide a firm stable working surface, we suggest undercutting the soils a minimum of 12 inches below the bottom of the planned pipeline elevation. We also recommend careful geotechnical inspection at the undercut elevation to identify any unexpected pockets or zones of increased compressibility that may warrant further undercutting. However, excessive undercutting should be avoided if possible.

Following removal of any undercut soils, the excavation should be backfilled to the planned pipeline elevation utilizing compacted granular backfill, washed shell, crushed concrete, crushed granite or hard durable crushed limerock having a grading corresponding to an FDOT No. 57. The shell or gravel should be uniformly compacted so as to produce a firm and unyielding subgrade for construction. The gravel layer will also aid in collecting seepage into the excavation. Care must be exercised in the preparation of the subgrade prior to placement of the gravel to avoid any remolding or disturbance of soils at the undercut elevation.

Dewatering - Depending upon the depth of excavation and groundwater levels at the time of construction, dewatering may be needed to maintain groundwater levels below excavation depths. As with all dewatering programs, it is important to maintain careful observations of the effectiveness of the system prior to initiating excavation and construction activities. It would, therefore, be important to install piezometers at points along the alignment to confirm the effectiveness of the dewatering. The dewatering system must consider potential settlement effects in the vicinity of the roads, utilities or structures. Therefore, it is recommended that the contractor retain a competent dewatering consultant to assist in properly designing the dewatering system.

Suitability of Excavated Soils for Use as Backfill – The borings suggest that in general the excavated soils would be suitable for re-use as compacted backfill with proper moisture control and compaction. Commonly, the soils consisted of fine sands with some silt and small amounts of organic fines and variable shell content. We envision that appropriate moisture control and blending would represent a practical and economical approach to avoid the need for off-site disposal and corresponding importation of fill.

Soils excavated below the pre-construction groundwater table may occur in an elevated moisture content even with the utilization of construction dewatering. These soils will typically require aeration or adjustment to the moisture contents to facilitate placement and compaction to project specification requirements. We would suggest that the moisture contents be controlled within ±2% of the optimum moisture content as established by the Modified Proctor moisture density relationship of AASHTO T-180. Backfill soils should be compacted to no less than 98% of the maximum modified Proctor dry density.

Soils containing appreciable silt and even trace amounts of organic fines tend to be weather sensitive and thus, will require appropriate earthwork management to control moisture contents to levels suitable for placement and compaction. Generally, these types of soil will require some spreading and mechanical aeration as they commonly do not effectively drain and dry efficiently within a stockpile.

LIMITATIONS

Our geotechnical investigation herein consisted of a general program of test borings intended to be utilized in the design of the proposed facilities. Our studies may not have included development of all subsurface information that may be needed by a prospective contractor. The contractor is certainly encouraged to conduct such additional studies as he may deem necessary in order to qualify his bid proposal.

In view of the generally widely spaced pattern of test borings, careful geotechnical inspection will be critical during the construction stage. Accordingly, it is our recommendation that a representative of the project geotechnical engineer be retained to monitor the pipeline construction activity to detect areas that may warrant special treatment or remediation. Appropriate compaction tests should also be performed as required by project specification requirements that should comply with applicable County specifications.

DRIGGERS ENGINEERING SERVICES, INC. appreciates the opportunity to serve you and we trust that if you have any questions concerning our geotechnical recommendations, you will not hesitate to contact the undersigned at your convenience.

Respectfully submitted,
DRIGGERS ENGINEERING SERVICES, INC.

Nicholas T. Korecki

Nicholas T. Korecki, P.E.
Senior Geotechnical Engineer
FL Registration No. 45529

NTK-REP\157692
Copies submitted: (3)
Ryan.Messer@ch2m.com

APPENDIX

PLATE I - BORING LOCATION PLAN

STANDARD PENETRATION TEST BORING LOGS

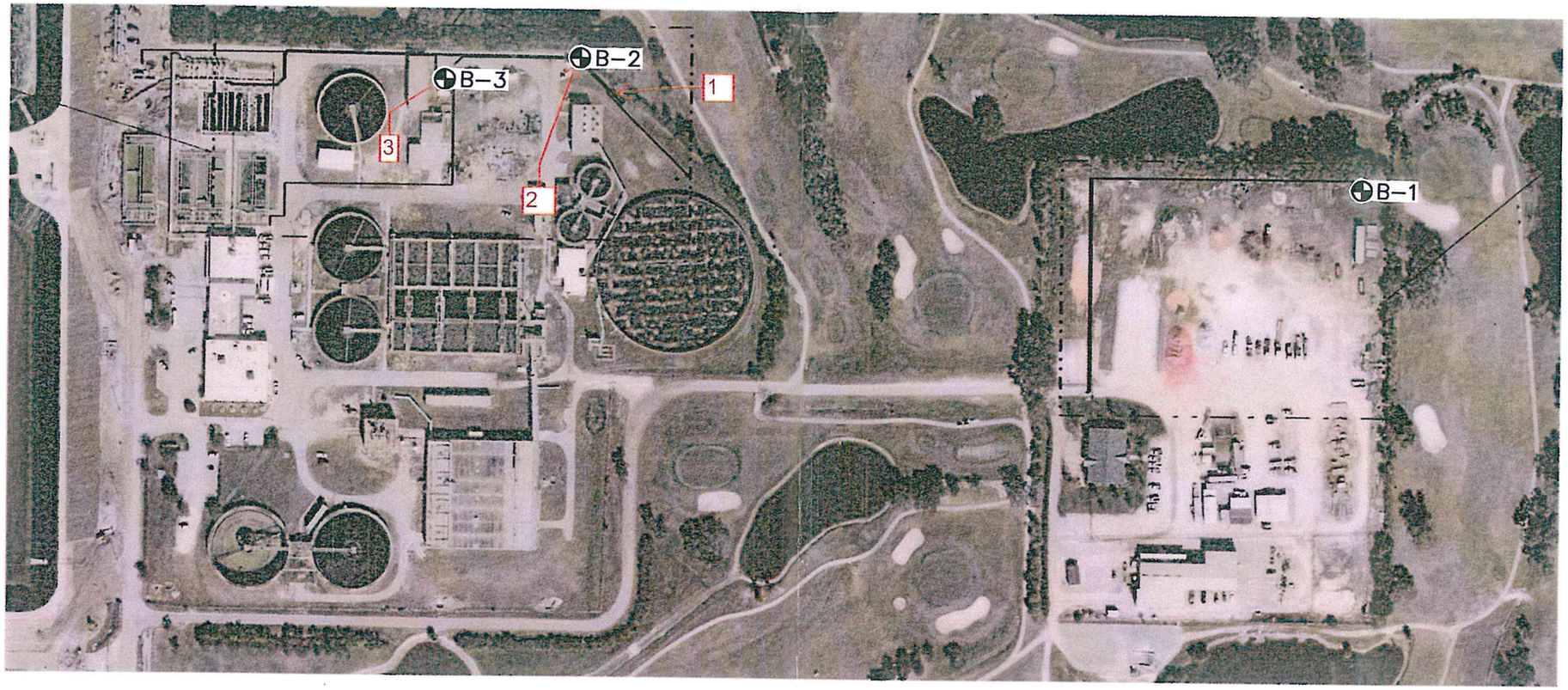
HAND AUGER/HAND CONE BORING LOGS

SUMMARY OF LABORATORY TEST RESULTS

GRAINSIZE ANALYSES

METHOD OF TESTING

PLATE I - BORING LOCATION PLAN



LEGEND:

⊕ STANDARD PENETRATION TEST BORING/
HAND CONE SOUNDING LOCATION

N

0 100 200 400
SCALE IN FEET

CAD / ENGINEER	SHEET TITLE	PROJECT NO.	DATE
R.D.B. / N.T.K.	BORING LOCATION PLAN	DES 157692	8/17/15
PREPARED BY	PROJECT NAME	SCALE	SHEET NO.
DRIGGERS ENGINEERING SERVICES, INCORPORATED	24" DUCTILE IRON PIPING SOUTHWEST WATER RECLAMATION FACILITY MANATEE COUNTY, FLORIDA	AS SHOWN	PLATE 1

STANDARD PENETRATION TEST BORING LOGS

DRIGGERS ENGINEERING SERVICES INCORPORATED

Project No. DES 157692 **BORING NO.** B-1

Project 24" Ductile Iron Piping, Southwest Water Reclamation Facility, Manatee County, Florida

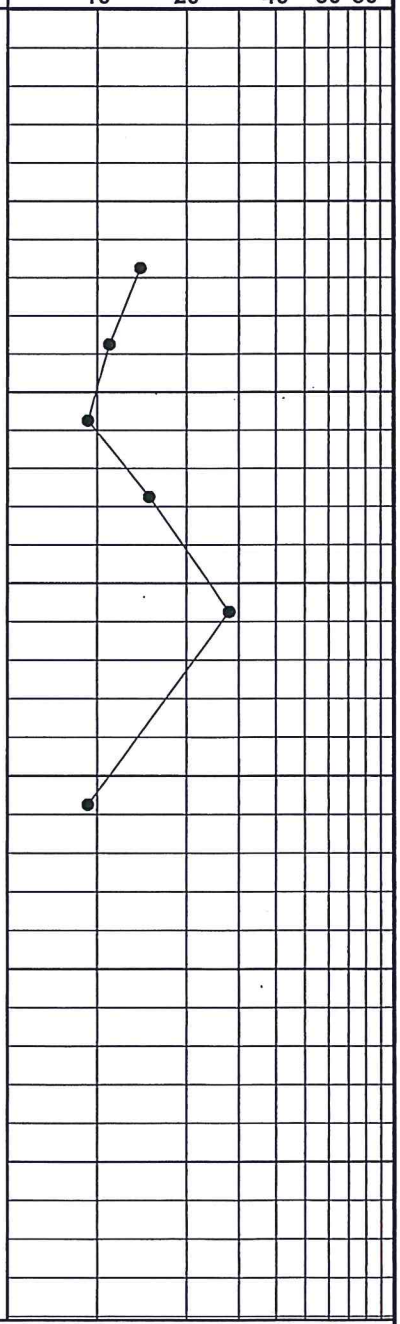
Location See Plate I **Foreman** B.D.

Completion Depth 21.5' **Date** 8/10/15 **Depth To Water** 3.3' **Time** _____ **Date** 8/10/15

DEPTH, FT	SYMBOL	SAMPLES	SOIL DESCRIPTION	BLOWS ON SAMPLER PER 6" OR PEN. STR.
			SURF. EL:	
0			Dark grayish-brown Fine SAND with roots, shell and rock fragments (SP)	
			Light brown Fine SAND with trace of shell fragments (SP)	
			Brown Fine SAND with trace of shell (SP)	
5			Dark brown Fine SAND with finely divided organic material (SP)	
			Grayish-brown Fine SAND (SP)	
			Dark brown organic, slightly silty Fine SAND with some roots (SP-SM/Pt)	2/6/8
			Medium dense dark brown slightly organic Fine SAND (SP)	3/4/7
10			Medium dense to loose tannish-brown to light brown Fine SAND (SP)	2/4/5
			Medium dense light brownish-gray Fine SAND with abundant shell fragments and trace of phosphate (SP)	3/5/10
15				3/6/22
			Loose greenish-brown slightly silty Fine SAND with shell fragments (SP-SM)	
20				2/3/6
25				
30				

STANDARD PENETRATION TEST BLOWS/FT. ON 2" O.D. SAMPLER-140 LB. HAMMER, 30" DROP (AUTOMATIC HAMMER)

10 20 40 60 80



Remarks Borehole Grouted

Casing Length _____

DRIGGERS ENGINEERING SERVICES INCORPORATED

Project No. DES 157692 **BORING NO.** B-2

Project 24" Ductile Iron Piping, Southwest Water Reclamation Facility, Manatee County, Florida

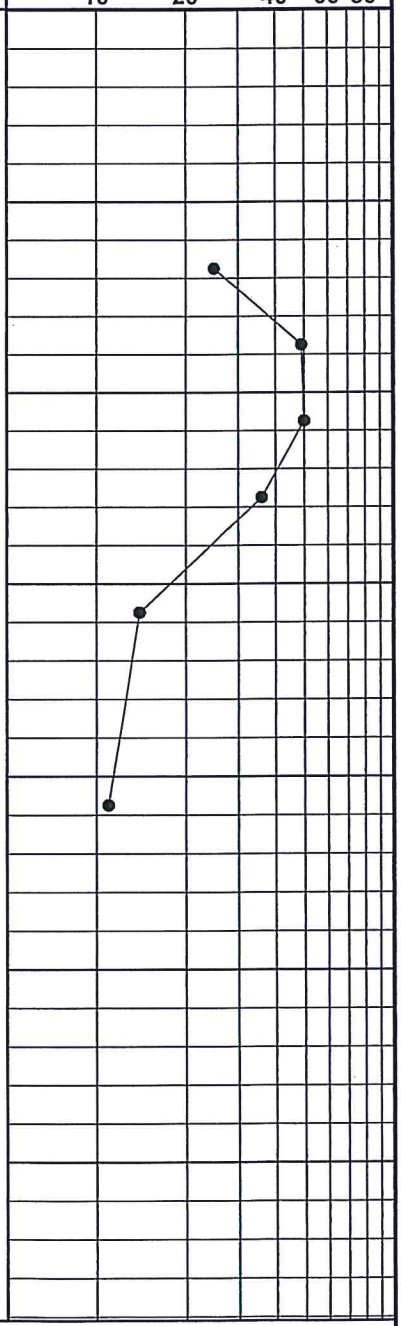
Location See Plate I **Foreman** B.D.

Completion Depth 21.5' **Date** 8/10/15 **Depth To Water** 3.8' **Time** _____ **Date** 8/10/15

DEPTH, FT	SYMBOL	SAMPLES	SOIL DESCRIPTION	BLOWS ON SAMPLER PER 6" OR PEN. STR.
			SURF. EL:	
0			Grayish-brown Fine SAND with roots (SP)	
			Grayish-brown and tan slightly silty Fine SAND (SP-SM)	
			Dark grayish-brown Fine SAND with trace of finely divided organic material (SP)	
5			Brown Fine SAND (SP)	
			Grayish-brown slightly silty Fine SAND (SP-SM)	
			Medium dense tan Fine SAND with abundant shell fragments and phosphate (SP)	2/10/15
			Dense light gray Fine SAND with shell fragments (SP)	12/22/27
10				10/20/30
			Dense light brownish-gray Fine SAND with abundant shell fragments and phosphate (SP)	5/13/23
15				2/5/9
			Medium dense greenish-brown Fine SAND with some shell fragments (SP)	
20				3/4/7
25				
30				

STANDARD PENETRATION TEST BLOWS/FT. ON 2" O.D. SAMPLER-140 LB. HAMMER, 30" DROP (AUTOMATIC HAMMER)

10 20 40 60 80



Remarks _____

Casing Length _____

DRIGGERS ENGINEERING SERVICES INCORPORATED

Project No. DES 157692 **BORING NO.** B-3

Project 24" Ductile Iron Piping, Southwest Water Reclamation Facility, Manatee County, Florida

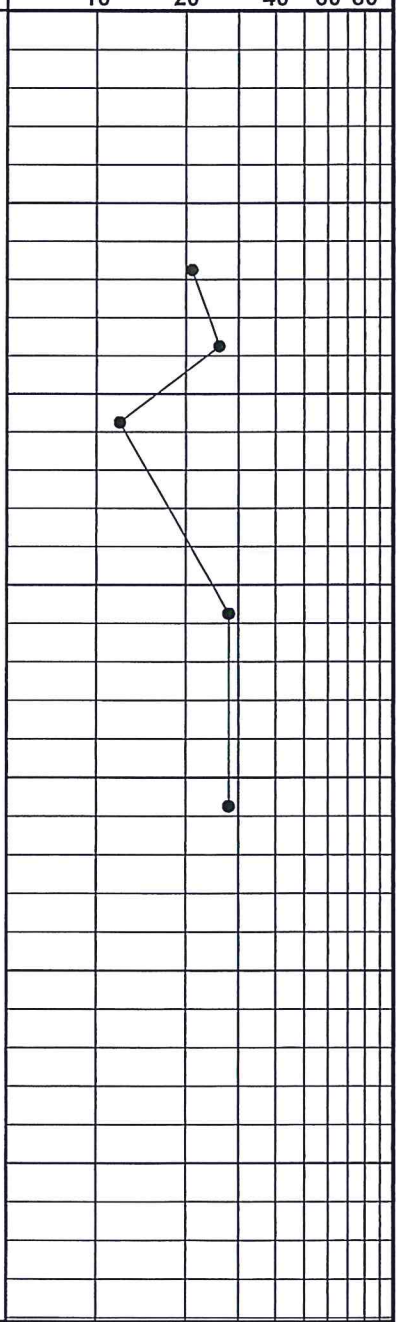
Location See Plate I **Foreman** B.D.

Completion Depth 21.5' **Date** 8/10/15 **Depth To Water** _____ **Time** _____ **Date** _____

DEPTH, FT	SYMBOL	SAMPLES	SOIL DESCRIPTION	BLOWS ON SAMPLER PER 6" OR PEN. STR.
			SURF. EL:	
0			Grayish-brown Fine SAND with roots, shell and rock fragments (SP)	
			Brown Fine SAND with some shell fragments (SP)	
			Dark gray Fine SAND with finely divided organic material (SP)	
5			Light grayish-brown Fine SAND (SP)	
			Brown Fine SAND (SP)	
			Light brownish-gray Fine SAND with abundant shell fragments (SP)	3/9/12
			Medium dense tan Fine SAND with abundant shell fragments and trace of phosphate (SP)	2/10/16
10			Medium dense light gray to light brown Fine SAND with abundant shell fragments and phosphate (SP)	1/3/9
15			Medium dense light brownish-gray Fine SAND with abundant shell fragments and trace of phosphate (SP)	6/13/15
			Medium dense very light gray calcareous Fine SAND with shell fragments (SP)	
20				10/12/16
25				
30				

STANDARD PENETRATION TEST BLOWS/FT. ON 2" O.D. SAMPLER-140 LB. HAMMER, 30" DROP (AUTOMATIC HAMMER)

10 20 40 60 80



Remarks Borehole Grouted

Casing Length _____

HAND AUGER/HAND CONE BORING LOGS

DRIGGERS ENGINEERING SERVICES INCORPORATED

HAND AUGER BORING/HAND CONE SOUNDING LOG

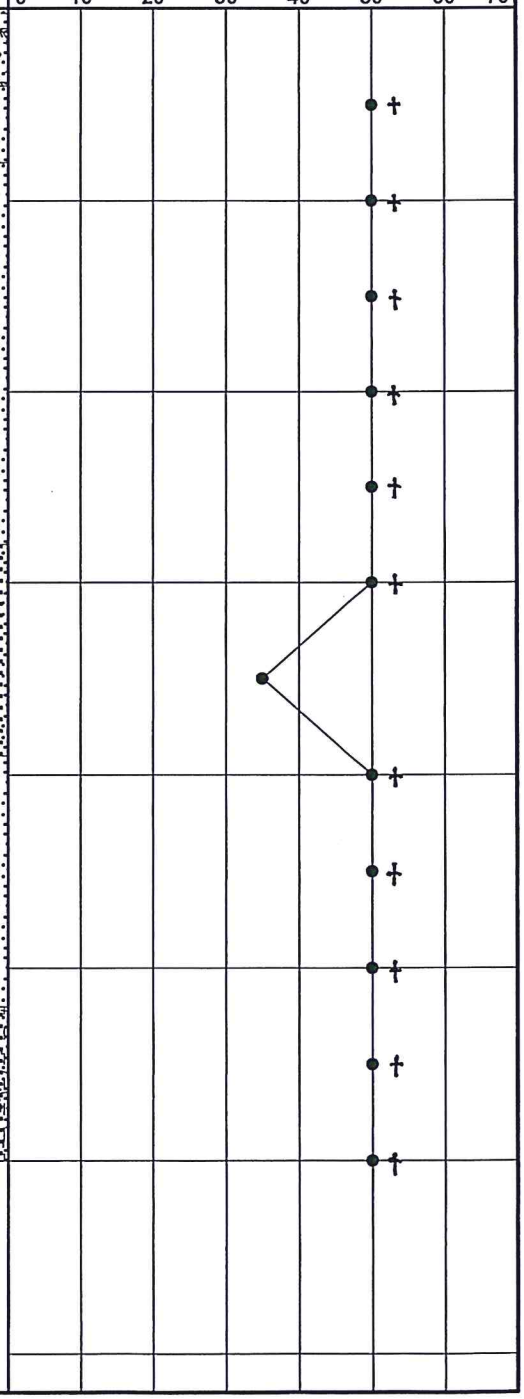
PROJECT: 24" Ductile Iron Pipeline Southwest Water Reclamation Facility Manatee County, Florida Project No.: DES 157692	**CLIENT:** CH2M Hill **WATER TABLE:** 3.3' **DATE:** 8/10/15
TECHNICIAN: B.D./J.R.	**DATE:** 8/10/15 **COMPLETION DEPTH:** 6.0'
LOCATION: See Plate I	**TEST NUMBER:** B-1

ELEV. (FT)	DESCRIPTION	DEPTH (FT)
	Dark grayish-brown Fine SAND with roots, shell and rock fragments (SP)	0
	Light brown Fine SAND with trace of shell fragments (SP)	
	Brown Fine SAND with trace of shell (SP)	1
		2
	Dark brown Fine SAND with finely divided organic material (SP)	3
	Grayish-brown Fine SAND (SP)	4
		5
	Dark brown organic, slightly silty Fine SAND with some roots (SP-SM/Pt)	6
	LEGEND: ● + Denotes Penetration Resistance in excess of 50 TSF	7

SYMBOL

HAND CONE TIP RESISTANCE (TSF)

0 10 20 30 40 50 60 70



DRIGGERS ENGINEERING SERVICES INCORPORATED

HAND AUGER BORING/HAND CONE SOUNDING LOG

PROJECT: 24" Ductile Iron Pipeline Southwest Water Reclamation Facility Manatee County, Florida Project No.: DES 157692	**CLIENT:** CH2M Hill **WATER TABLE:** 3.8' **DATE:** 8/10/15
TECHNICIAN: B.D./J.R.	**DATE:** 8/10/15 **COMPLETION DEPTH:** 6.0'
LOCATION: See Plate I	**TEST NUMBER:** B-2

ELEV. (FT)	DESCRIPTION	DEPTH (FT)	SYMBOL	HAND CONE TIP RESISTANCE (TSF) 0 10 20 30 40 50 60 70
	Grayish-brown Fine SAND with roots (SP)	0		
	Grayish-brown and tan slightly silty Fine SAND (SP-SM)	1		
	Dark grayish-brown Fine SAND with trace of finely divided organic material (SP)	2		
	Brown Fine SAND (SP)	3		
	Grayish-brown slightly silty Fine SAND (SP-SM)	4		
		5		
		6		
	LEGEND: • + Denotes Penetration Resistance in excess of 50 TSF	7		

DRIGGERS ENGINEERING SERVICES INCORPORATED

HAND AUGER BORING/HAND CONE SOUNDING LOG

PROJECT: 24" Ductile Iron Pipeline Southwest Water Reclamation Facility Manatee County, Florida Project No.: DES 157692	**CLIENT:** CH2M Hill **WATER TABLE:** **DATE:**
TECHNICIAN: B.D./J.R.	**DATE:** 8/10/15 **COMPLETION DEPTH:** 6.0'
LOCATION: See Plate I	**TEST NUMBER:** B-3

ELEV. (FT)	DESCRIPTION	DEPTH (FT)	SYMBOL	HAND CONE TIP RESISTANCE (TSF) 0 10 20 30 40 50 60 70
	Grayish-brown Fine SAND with roots, shell and rock fragments (SP)	0		
		1		
	Brown Fine SAND with some shell fragments (SP)	2		
	Dark gray Fine SAND with finely divided organic material (SP)	3		
	Light grayish-brown Fine SAND (SP)	4		
	Brown Fine SAND (SP)	5		
	Light brownish-gray Fine SAND with abundant shell fragments (SP)	6		
	LEGEND: • + . Denotes Penetration Resistance in excess of 50 TSF	7		

SUMMARY OF LABORATORY TEST RESULTS

SUMMARY OF LABORATORY TEST RESULTS

BORING NO.	DEPTH (ft)	DESCRIPTION	W %	Y_d (pcf)	G_s	ATTERBERG LIMITS			P.P. (tsf)	U.C.	CON.	G.S.	ORG. (%)	pH	Cl. (ppm)	SO_4 (ppm)	RES. (ohm-cm)
						LL	PL	PI									
B-1	2.8-3.9	Dark brown Fine SAND with finely divided organic material											3.4				
B-1	3.9-5.2	Grayish-brown Fine SAND										*					
B-1	5.2-6.0	Dark brown organic, slightly silty Fine SAND with some roots											7.9				
B-1	6.0-7.5	Dark brown slightly organic Fine SAND											4.7				
B-1	10.0-11.5	Light brown Fine SAND										*					
B-1	15.0-16.5	Light brownish-gray Fine SAND with abundant shell fragments and trace of phosphate												7.65	5	>50	4,800
B-1	20.0-21.5	Greenish-brown slightly silty Fine SAND with shell fragments										*					
B-2	0.9-1.8	Grayish-brown and tan slightly silty Fine SAND										*					
B-2	1.8-2.3	Dark grayish-brown Fine SAND with trace of finely divided organic material											1.1				
B-2	3.7-6.0	Grayish-brown slightly silty Fine SAND										*					
B-3	2.3-3.1	Dark gray Fine SAND with finely divided organic material											1.8				
B-3	3.1-4.1	Light grayish-brown Fine SAND										*					
B-3	4.1-5.3	Brown Fine SAND										*					
B-3	10.0-11.5	Light gray and light brown Fine SAND with abundant shell fragments and phosphate												7.78	5	>50	5,150

W % = Water Content
Y_d (pcf) = Dry Density
G_S = Specific Gravity
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
P.P. (tsf) = Pocket Penetrometer
U.C. = Unconfined Compression

Con. = Consolidation Test
G.S. (+1) = Grainsize Analysis (Hydrometer)
ORG. (%) = Organic Content
Cl. (ppm) = Total Chloride
SO_4 (ppm) = Total Sulfate
RES. (ohm-cm) = Lab Resistivity
* = See Test Curves
** = Percent Passing No. 200 Sieve

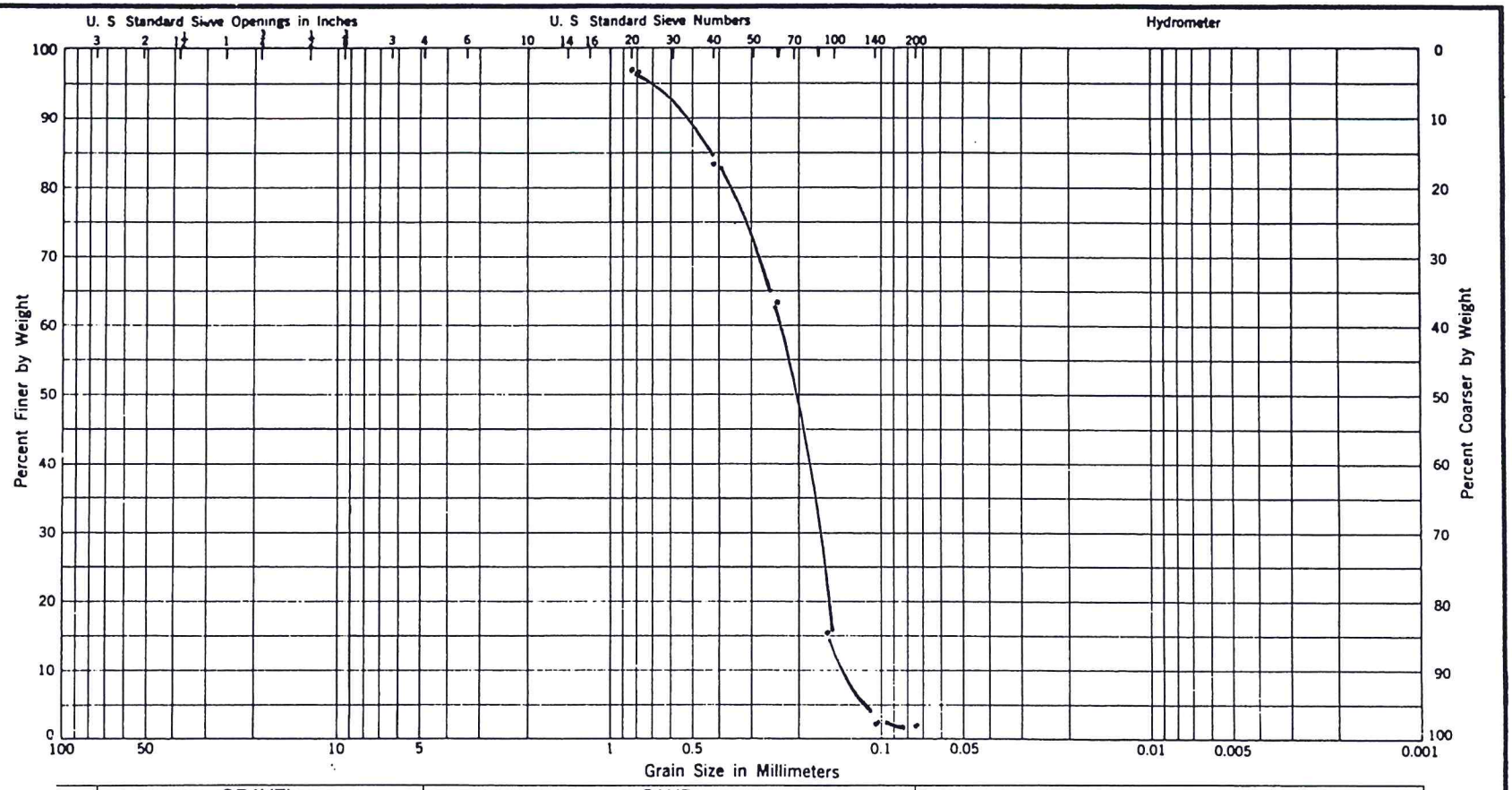
CLIENT: CH2M Hill

PROJECT: 24" Ductile Iron Piping, Southwest Water Reclamation Facility, Manatee County, FL

FILE: DES 157692

GRAINSIZE ANALYSES

DRIGGERS ENGINEERING SERVICES, INC.



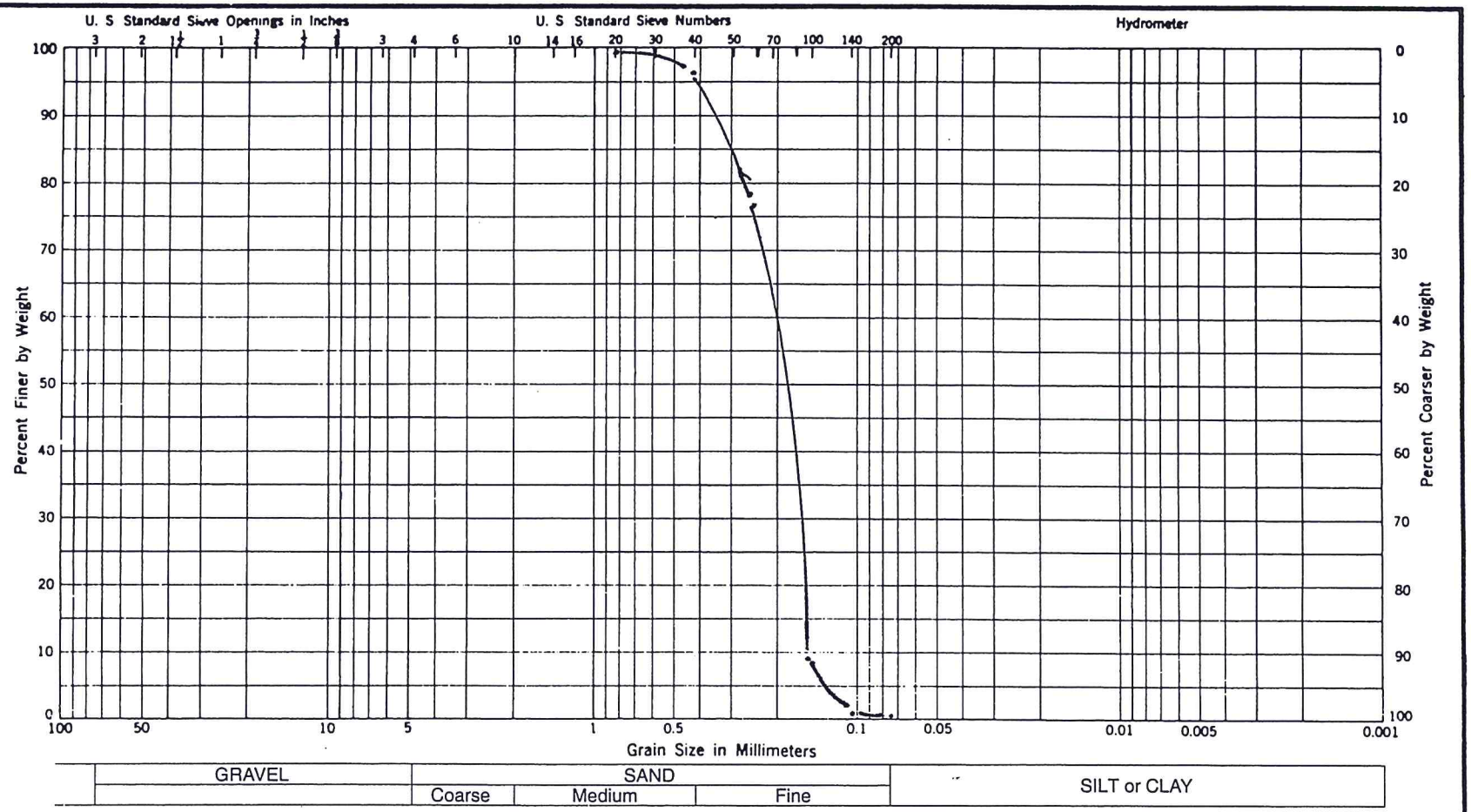
Number	Depth	Natural Moisture	L. L.	P. L.	P. I.	Classification
B-1	3.9' - 5.2'					Grayish-brown Fine SAND

CLIENT: CH2M Hill

PROJECT: 24" Ductile Iron Piping,
Southwest Water Reclamation Facility,
Manatee County, Florida

FILE: DES 157692

DRIGGERS ENGINEERING SERVICES, INC.



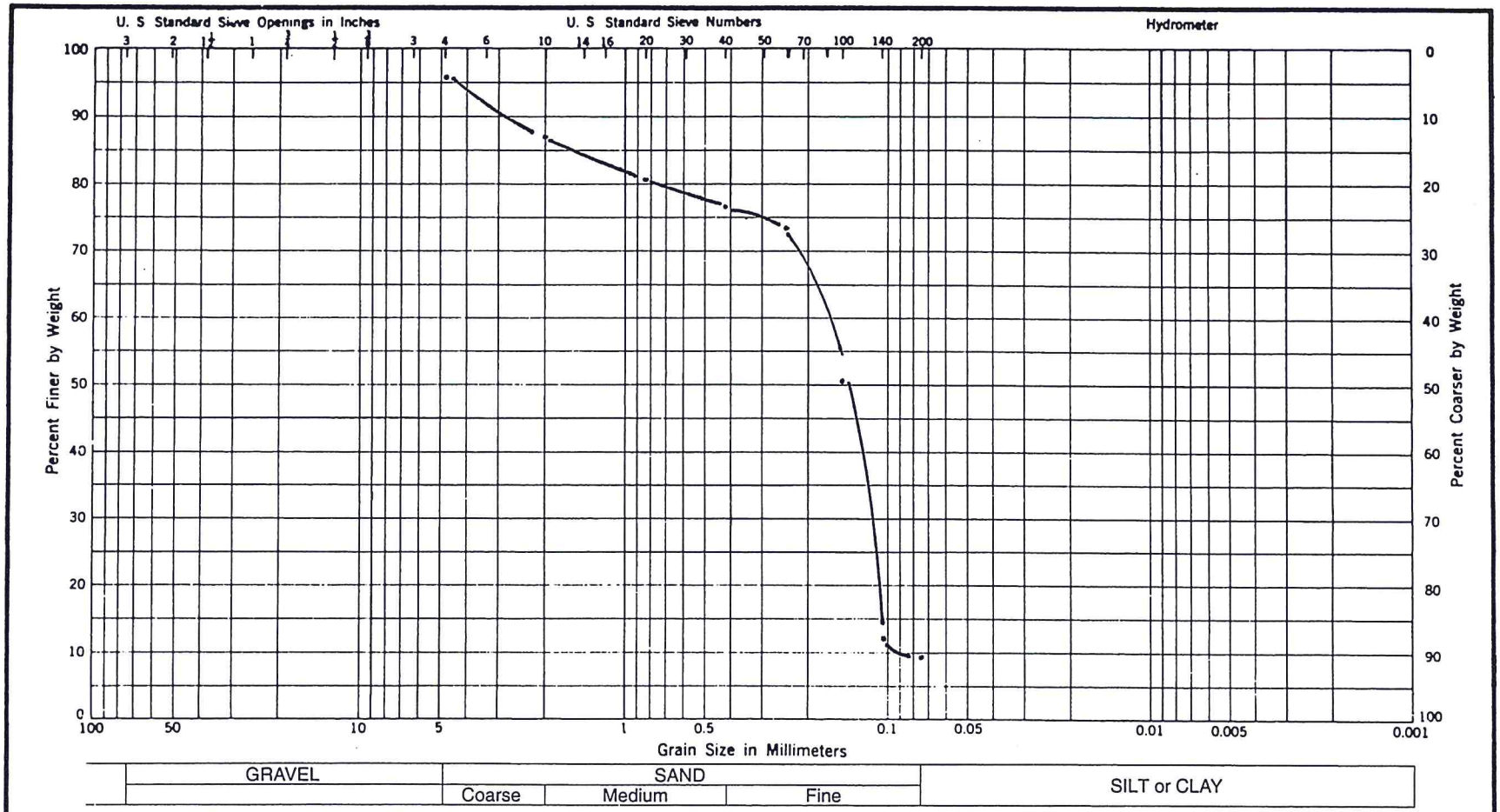
Number	Depth	Natural Moisture	L. L.	P. L.	P. I.	Classification
B-1	10.0' - 11.5'					Light brown Fine SAND

CLIENT: CH2M Hill

PROJECT: 24" Ductile Iron Piping,
Southwest Water Reclamation Facility,
Manatee County, Florida

FILE: DES 157692

DRIGGERS ENGINEERING SERVICES, INC.



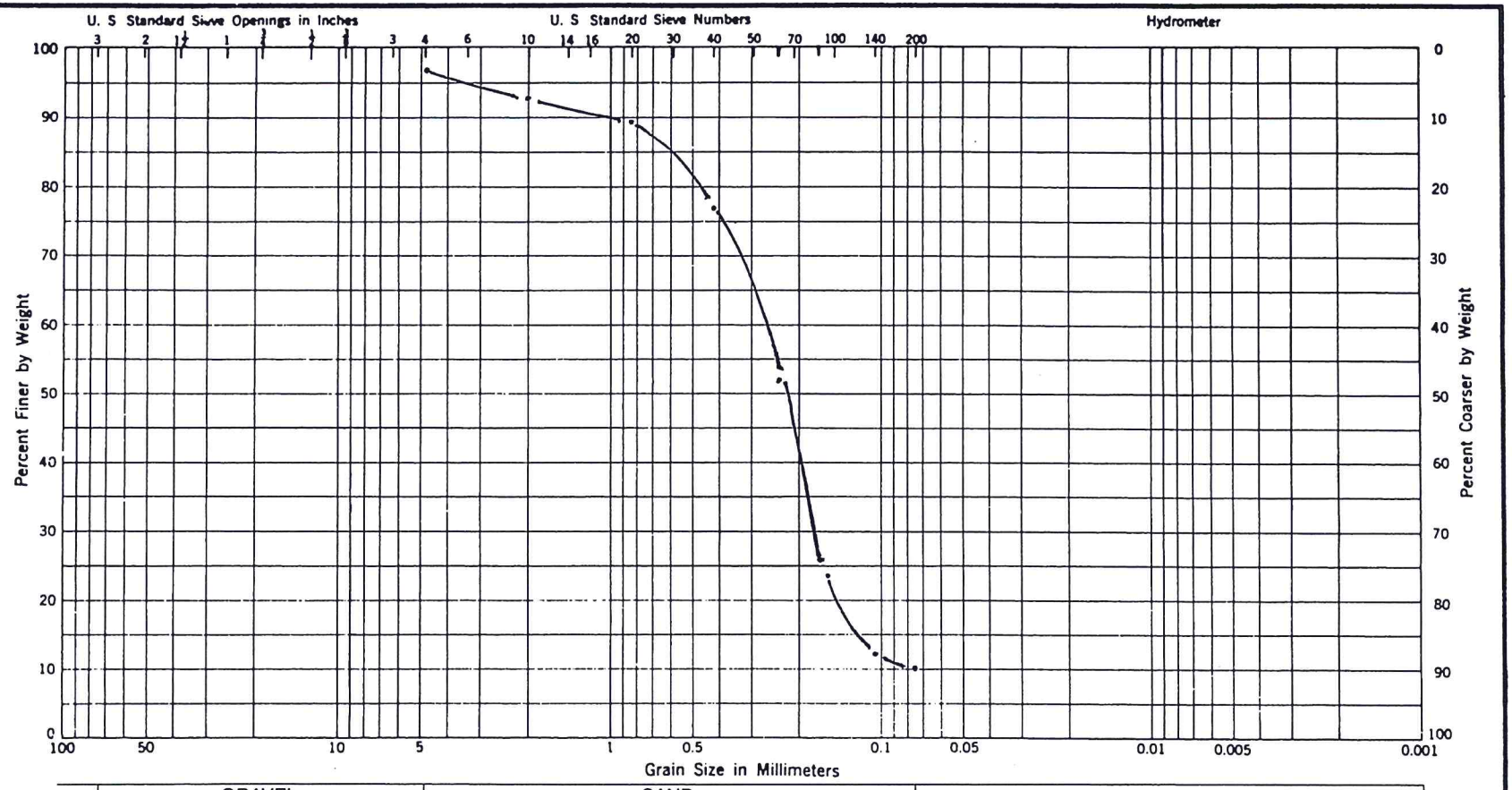
Number	Depth	Natural Moisture	L L.	P. L.	P. I.	Classification
B-1	20.0' - 21.5'					Greenish-brown slightly silty Fine SAND with shell fragments

CLIENT: CH2M Hill

PROJECT: 24" Ductile Iron Piping, Southwest Water Reclamation Facility, Manatee County, Florida

FILE: DES 157692

DRIGGERS ENGINEERING SERVICES, INC.



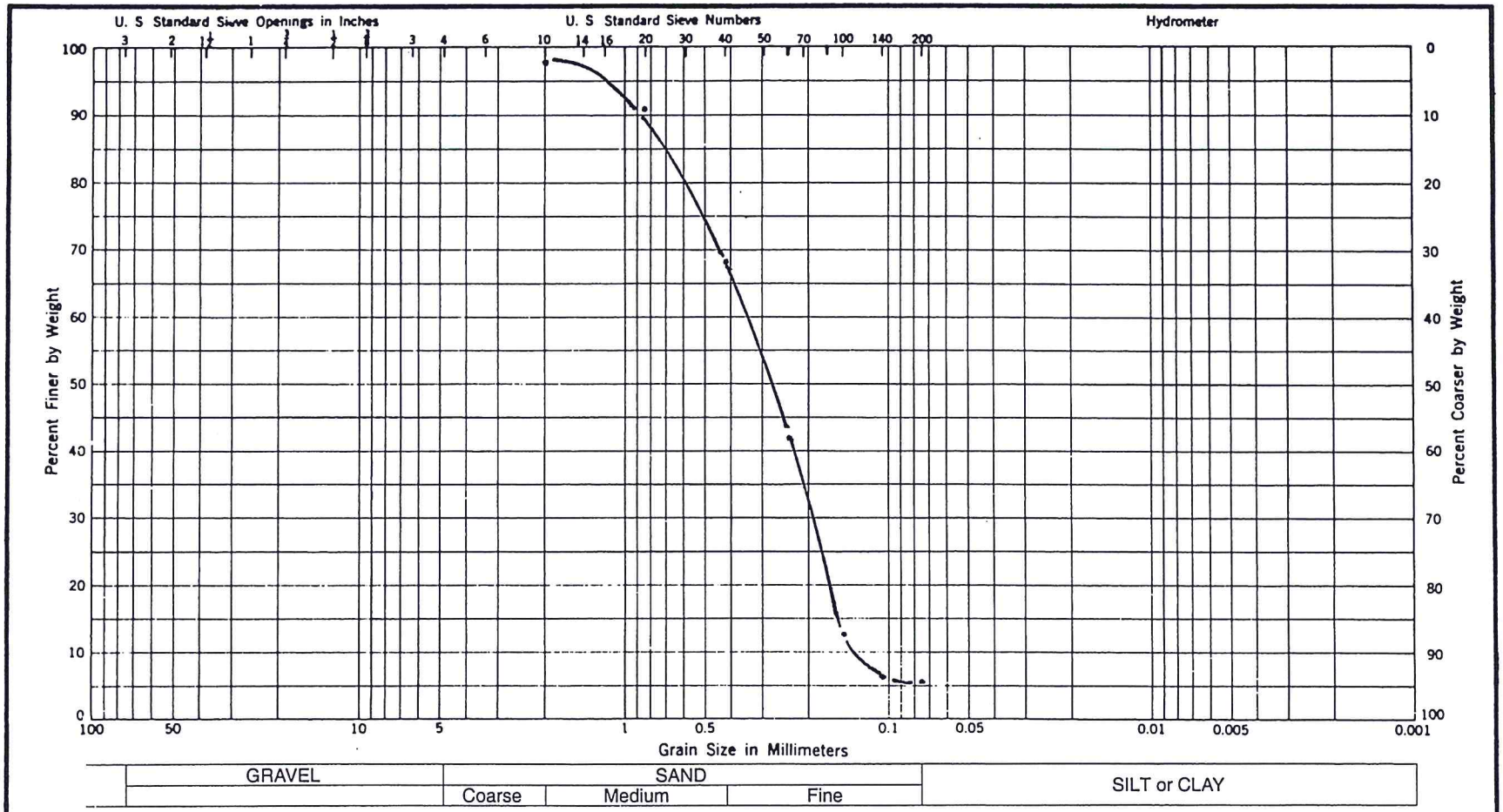
Number	Depth	Natural Moisture	L. L.	P. L.	P. I.	Classification
B-2	0.9' - 1.8'					Grayish-brown and tan slightly silty Fine SAND

CLIENT: CH2M Hill

PROJECT: 24" Ductile Iron Piping, Southwest Water Reclamation Facility, Manatee County, Florida

FILE: DES 157692

DRIGGERS ENGINEERING SERVICES, INC.



Number	Depth	Natural Moisture	L. L.	P. L.	P. I.	Classification
B-2	3.7' - 6.0'					Grayish-brown slightly silty Fine SAND

CLIENT: CH2M Hill

PROJECT: 24" Ductile Iron Piping, Southwest Water Reclamation Facility, Manatee County, Florida

FILE: DES 157692

DRIGGERS ENGINEERING SERVICES, INC.

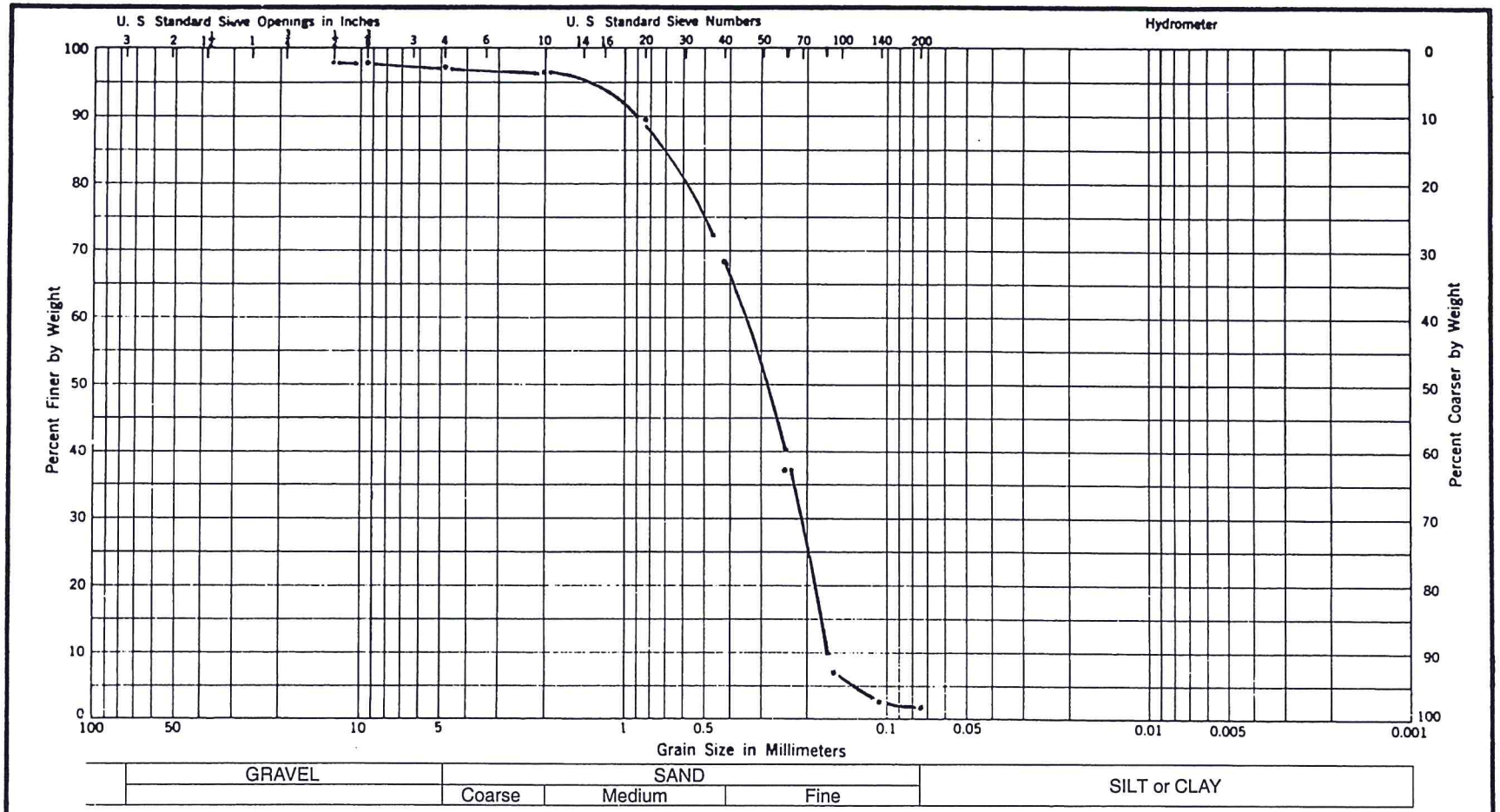
Number	Depth	Natural Moisture	L. L.	P. L.	P. I.	Classification
B-3	3.1' - 4.1'					Light grayish-brown Fine SAND

CLIENT: CH2M Hill

PROJECT: 24" Ductile Iron Piping,
Southwest Water Reclamation Facility,
Manatee County, Florida

FILE: DES 157692

DRIGGERS ENGINEERING SERVICES, INC.



Number	Depth	Natural Moisture	L. L.	P. L.	P. I.	Classification
B-3	4.1' - 5.3'					Brown Fine SAND

CLIENT: CH2M Hill

PROJECT: 24" Ductile Iron Piping,
Southwest Water Reclamation Facility,
Manatee County, Florida

FILE: DES 157692

METHOD OF TESTING

STANDARD PENETRATION TEST WITH AUTOMATIC HAMMER AND SOIL CLASSIFICATION

STANDARD PENETRATION TEST (ASTM D-1586)

In the Standard Penetration Test borings, a rotary drilling rig is used to advance the borehole to the desired test depth. A viscous drilling fluid is circulated through the drill rods and bit to stabilize the borehole and to assist in removal of soil and rock cuttings up and out of the borehole.

Upon reaching the desired test depth, the 2 inch O.D. split-barrel sampler or "split-spoon", as it is sometimes called, is attached to an N-size drill rod and lowered to the bottom of the borehole. A 140 pound automatic hammer, attached to the drill string at the ground surface, is then used to drive the sampler into the formation. The hammer is successively raised and dropped for a distance of 30 inches using an automated lifting mechanism. The number of blows is recorded for each 6 inch interval of penetration or until virtual refusal is achieved. In the above manner, the samples are ideally advanced a total of 18 inches. The sum of the blows required to effect the final 12 inches of penetration is called the blowcount, penetration resistance or "N" value of the particular material at the sample depth.

After penetration, the rods and sampler are retracted to the ground surface where the core sample is removed, sealed in a glass jar and transported to the laboratory for verification of field classification and storage.

SOIL SYMBOLS AND CLASSIFICATION

Soil and rock samples secured in the field sampling operation were visually classified as to texture, color and consistency. The Unified Soil Classification was assigned to each soil stratum per ASTM D-2487. Soil classifications are presented descriptively and symbolically for ease of interpretation. The stratum identification lines represent the approximate boundary between soil types. In many cases, this transition may be gradual.

Consistency of the soil as to relative density or undrained shear strength, unless otherwise noted, is based upon Standard Penetration resistance values of "N" values and industry-accepted standards. "N" values, or blowcounts, are presented in both tabular and graphical form on each respective boring log at each sample interval. The graphical plot of blowcount versus depth is for illustration purposes only and does not warrant continuity in soil consistency or linear variation between sample intervals.

The borings represent subsurface conditions at respective boring locations and sample intervals only. Variations in subsurface conditions may occur between boring locations. Groundwater depths shown represent water depths at the dates and time shown only. The absence of water table information does not necessarily imply that groundwater was not encountered.