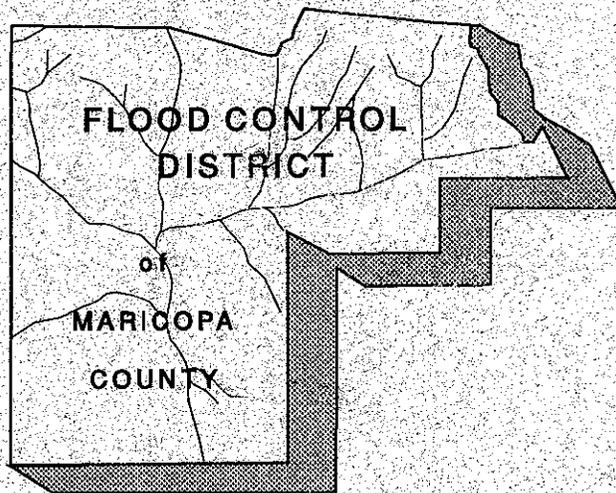


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Geotechnical Report

Volume 1

Field and Laboratory Data



Flood Control District of Maricopa County

Casandro Wash Dam



**Casandro Wash Detention Dam
Geotechnical Report**

**Volume 1
Field and Laboratory Data**

**Prepared for the
Flood Control District of Maricopa County**

**Prepared by
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February 1995

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Introduction

The Flood Control District of Maricopa County (District) retained CH2M HILL on October 18, 1993, to provide professional engineering services necessary for the design and preparation of plans, construction Special Provisions, and cost estimates for construction of an earthen fill dam on Casandro Wash. Volume 1 of the Geotechnical Report presents the results of CH2M HILL's geotechnical exploration and lab testing for the proposed project. Volume 2 presents the interpretation of the data and analysis of the foundation conditions and embankment geometry.

Purpose and Scope

The purpose of the geotechnical exploration was to obtain subsurface information at the proposed damsite and basin area for geotechnical analysis and development of recommendations for dam design and construction. Lab tests were performed to characterize the onsite materials and determine their engineering properties applicable to this project. The Scope of Work for Volume 1 of the Geotechnical Report included the following tasks:

- Drilling and logging 13 soil borings
- Excavating and logging 22 test pits
- Surveying the location of the soil borings and test pits
- Conducting a laboratory analysis program to determine index and strength properties of soil samples
- Preparing this report

Project Description

The Casandro Wash is located in Wickenburg, Arizona, and drains a watershed of about 3 square miles into Sols Wash, a tributary of the Hassayampa River (Figure 1). The wash flows through the Town of Wickenburg in a poorly defined channel and in roadways. The wash is partially restricted by an undersized culvert approximately 1,000 feet downstream of the project site. This wash has a history of flooding resulting in damage to roads and homes. A drainage masterplan for the Wickenburg area recommended construction of a detention basin on Casandro Wash to reduce the 100-year peak discharge of the wash from roughly 3,000 cubic feet per second (cfs) to less than 30 cfs.

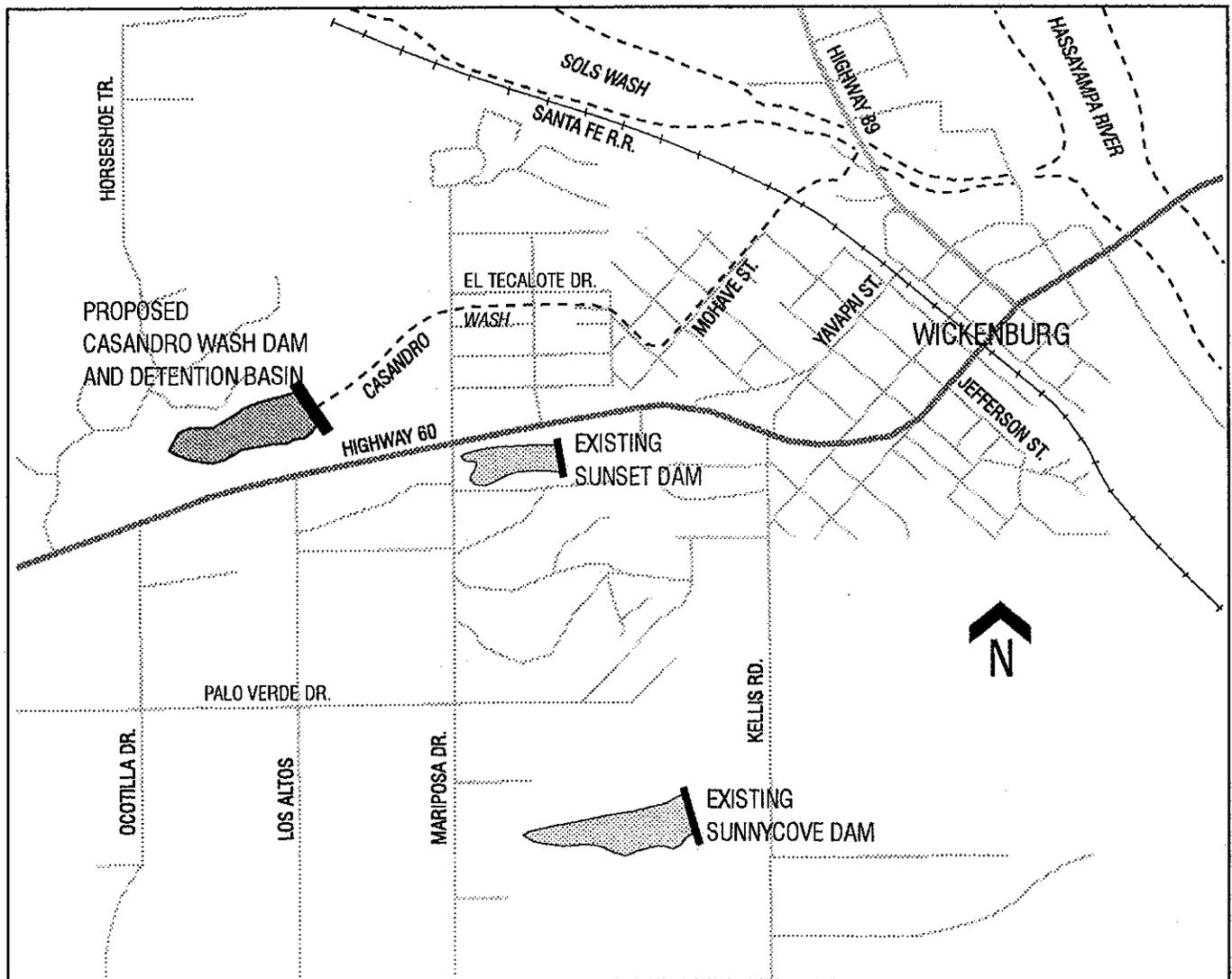


FIGURE 1-1

LOCATION AND VICINITY MAP

CASANDRO WASH DETENTION BASIN
WICKENBURG, AZ.



Previous Site Geotechnical Work

No evidence of previous geotechnical work was found for the Casandro Wash project site. However, geologic investigation reports for two previously constructed floodwater-retarding structures in the Wickenburg watershed are available (Sanders, 1974). The Sunnycove and the Sunset Floodwater retarding structures are located within the town limits of Wickenburg, and are within about one-half mile of the Casandro Wash project site to the south and southeast, respectively.

The Sunnycove and Sunset damsites contain alluvial deposits overlying dense, carbonate-cemented sands and gravels, generally similar to the subsurface conditions found at Casandro Wash. Both existing dams have cutoff trenches excavated into the cemented material and the embankments are constructed with material excavated within the reservoirs.

Technical Data

Field Exploration

Between January 18 and 28, 1994, CH2M HILL conducted a field exploration of the project site. The exploration consisted of excavating 21 test pits, drilling 13 soil borings, as summarized in Tables 1 and 2. Nine infiltration tests were performed in both boreholes and test pits. A CH2M HILL engineer specified test pit and boring locations, determined sampling intervals, logged materials encountered, and provided general oversight during all exploration operations. Locations of the test pits and soil borings are shown in Figure 2.

Test Pits

Riggs Enterprises of Wickenburg, Arizona, was subcontracted to excavate all of the test pits for this exploration. Depths of the test pits ranged from 5 to 18 feet. As indicated in Figure 2, the test pits were located near the proposed dam alignment and throughout the reservoir and banks of Casandro Wash. All of the test pits were excavated with a Caterpillar EL 200B trackhoe.

Disturbed soil samples were obtained from each of the major soil layers encountered in the test pits. Each soil sample was composed of a bulk sample portion, weighing approximately 40 pounds, and a moisture sample portion. Bulk samples were enclosed in doubled, plastic bulk soil sample bags, and moisture samples in double, gallon size plastic bags with zip-lock enclosures. A CH2M HILL engineer visually classified all soil samples following the Unified Soil Classification System, in general accordance with ASTM D 2488. Test pit logs are included in Appendix A.

Table 1
Summary of Test Pit Depth and Location
Casandro Wash Detention Basin

Test Pit Number	Total Depth (feet)	Location Relative to Dam or Reservoir	Infiltration Test
TP-1	15	Left abutment	No
TP-2	15	Left abutment	No
TP-3	18	Downstream, left abutment	No
TP-4	17	Downstream in center of channel	No
TP-5	17	Downstream, right abutment	No
TP-6	--	Not excavated	No
TP-7	20	Left abutment	No
TP-8	16	Upstream, center of channel	Yes
TP-9	6	Upstream, center of channel	Yes
TP-10	--	Not excavated	No
TP-11	17	Upstream, right side of channel	No
TP-12	13	Upstream, center of channel	No
TP-13	5	Reservoir	No
TP-14	16	Reservoir	No
TP-15	18	Reservoir	No
TP-16	12	Right bank of reservoir	No
TP-17	8	Right bank of reservoir	No
TP-18	14	Reservoir	No
TP-19	--	Not excavated	No
TP-20	13	Left bank of reservoir	No
TP-21	11	Reservoir	No
TP-22	19	Right bank of reservoir	No
TP-23	20	Left bank of reservoir	No
TP-24	12	Upstream of reservoir in channel	No

Table 2
Summary of Borehole Depth and Location
Casandro Wash Detention Basin

Borehole/Test Pit Number	Total Depth (feet)	Location Relative to the Dam	Infiltration Test
B-1	100	Left abutment	Yes
B-2	100	Left abutment	Yes
B-3	50	Left abutment	Yes
B-4	50	Near dam centerline	No
B-5	50	Near dam centerline	Yes
B-6	50	Downstream of dam centerline	No
B-7	50	Near dam centerline	No
B-8	50	Right abutment	Yes
B-9	100	Right abutment	Yes
B-10	100	Right abutment	Yes
B-11	50	Right abutment	No
B-12	50	North bank of reservoir	No
B-13	50	South bank of reservoir	No
Total depth of boreholes	850		

Soil encountered in the test pits was classified in the field as gravelly sand with varying amounts of silt or clay. Two major soil layers were commonly identified, consisting of a loose-to-medium-dense sand overlying a dense-to-very-dense slightly cemented sand. Samples taken from the partially cemented zone were typically highly reactive to hydrochloric acid, indicating a carbonate cementing agent in the soil. Depth to the dense cemented layer varied from near ground surface to about 16 feet below ground surface (bgs). In some of the test pits the cemented layer was not encountered, even after reaching a maximum pit depth of 20 feet bgs.

After sampling and logging the soil profile, all test pits were backfilled with the excavated soil. The trackhoe operator used the bucket and tracks of the trackhoe to compact the fill as much as possible while backfilling the test pits.



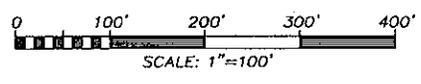
LEGEND

- B-12 ⊕ APPROXIMATE BORING
- TP-5 □ APPROXIMATE TEST PIT

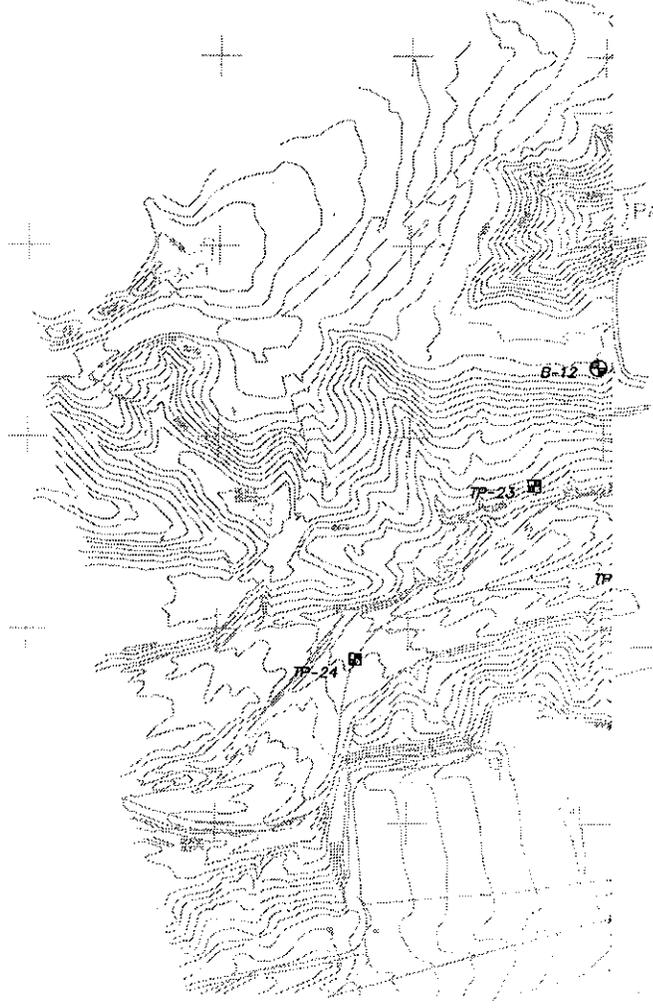
BORING AND TEST PIT LOCATIONS WERE DETERMINED BY SURVEY.

COLONDRINA DR

PAJARITO DR



NOTES: TP-6, TP-10, AND TP-19 WERE NOT EXCAVATED



**FIGURE 2
GEOTECHNICAL EXPLORATION PLAN**

CASANDRO WASH DETENTION BASIN
MCKENBURG, AZ.



Soil Borings

From January 24 through January 28, 1994, Enviro-Drill, Inc., from Phoenix, Arizona, drilled 13 soil borings using a CME 75 drill rig. All soil borings were advanced using 8-inch-outside-diameter (OD), hollow-stem augers. Soil Borings B-1, B-2, B-9, and B-10 were drilled to a final depth of 100 feet bgs. The remaining borings along the proposed dam alignment and on the banks of Casandro Wash were drilled to a final depth of 50 feet. Locations of the soil borings are shown in Figure 2.

Disturbed soil samples were obtained in each of the soil borings using a 2-inch-OD split-spoon sampler. Sampling was performed on 2.5-foot intervals between zero and 20 feet. After 20 feet, sampling continued on 5-foot intervals until maximum depth of the boring was reached. In some soil borings the sampling interval was extended to 10-foot intervals after drilling 20 feet into the cemented zone. In these cases, the 10-foot sample interval was continued to the total depth of the boring.

Standard Penetration Tests (SPTs) were performed in general accordance with ASTM D 1586. The SPT uses a 140-pound hammer, dropped 30 inches, to drive the sampler 18 inches into the soil. The number of hammer blows for each 6-inch interval of sampler penetration is counted and recorded. The sum of the blows during the last two 6-inch penetration intervals determines the "N" value expressed as blows per foot (blowcounts) for the sample. The SPT hammer used for this project was an automatic, fully enclosed hammer fastened to the drill rig. No rope, cable, or cathead was used.

In-place density samples were obtained typically between ground surface and 10 feet bgs. A 3-inch-OD, 12-inch-long split barrel sampler, equipped with two 6-inch brass-sleeve liners, was used to obtain density samples. This sampler was driven in the same manner as the standard split-spoon sampler described above in general accordance with ASTM D 3550.

Where fine-grain soil was encountered, or SPT blow counts were comparatively low, 3-inch-OD Shelby tube samplers were used to obtain relatively undisturbed soil samples. The thin-walled Shelby tubes were advanced in general accordance with procedures described in ASTM D 1587.

A CH2M HILL engineer visually classified soils recovered during the drilling program following the Unified Soil Classification System, and in general accordance with ASTM D 2488. Soil samples obtained from the SPTs were placed in plastic bags with zip-lock-type enclosures. In-place density samples collected in the 6-inch brass sleeves, as well as Shelby tube samples, were sealed with plastic end caps and black plastic tape. Sample descriptions, blowcounts recorded during the SPTs, and related information were recorded on the soil boring logs. Upon completion of the soil borings, all boreholes were grouted to ground surface with a sand/cement grout poured from the ground surface. No borehole caving was observed. Soil boring logs are included in Appendix B.

Soil encountered in the soil borings was consistent with soil found in the test pits. At various depths in all of the borings the dense cemented layer was encountered. As indicated by the blowcounts, visual classification, and reaction to hydrochloric acid, once this layer was identified, it continued through to the final depth of the soil boring. Therefore, total thickness of the dense cemented layer is not evident.

Infiltration testing

In Test Pits TP-8 and TP-9 and in Soil Borings B-1, B-2, B-3, B-5, B-8, B-9, and B-10 infiltration testing was performed. The borehole infiltration tests were performed on selected boreholes. After drilling to the predetermined depth for the test, the augers were pulled up approximately 3 feet off the bottom of the borehole. Approximately 500 gallons of water was pumped down the auger. Water was generally observed to flow up near or at the borehole collar in the annular space outside the augers. An electric water level sounder was used to determine the water level inside the hollow stem auger as it declined. Water level measurements were generally recorded every 30 seconds for a 10 minute period. The measurements are presented in Appendix C.

Infiltration tests were performed in selected test pits by driving a stake calibrated with 0.1-foot increments into the bottom of the test pit. Water was added to the test pit, and the depth of water was recorded periodically over a 10-minute period.

Laboratory Testing

Laboratory testing included Atterberg limits, sieve analysis, specific gravity, bulk density, and moisture content to establish index properties and verify field classifications; Standard Proctor compaction tests, direct shear, unconsolidated-undrained triaxial shear, and consolidated-undrained triaxial shear with pore pressure measurements on remolded samples were performed to assess strength characteristics for embankment design. Laboratory triaxial permeability testing of remolded samples was performed to aid in assessing seepage potential and slope stability. The data for all laboratory results is included in Appendix D. A summary of the soil classification and index property testing is shown in Table 3.

Limitations

This report has been prepared for the exclusive use of FCDMC and the Town of Wickenburg for specific application to the Casandro Wash Dam in accordance with generally accepted geotechnical engineering practice. No other warranty, express or implied, is made.

The boring and test pits logs and related information depict subsurface conditions only at the specific locations and times indicated. Subsurface conditions and water levels at other locations may differ from conditions occurring at these indicated locations. Also, the passage of time may result in a change in the conditions at these locations.

Table 3-2
Summary of Laboratory Analyses
Casandro Wash Detention Basin

Test Pit/ Boring #	Depth (ft)	Sample I.D.	Classification	Field Soil Properties		Particle Size Distribution % Passing by Weight (a)		Atterberg Limits		Moisture Density Relationship		Shear Strength (b)		Triaxial Shear (c)		Permeability (f)
				Dry Density (pcf)	Moisture Content (%)	#4	#200	LL	PI	Max Dry Density (pcf)	Optimum Moisture Content (%)	Specific Gravity	C (ksf)	φ (Deg)	C (ksf)	φ (Deg)
TP-1	5	TP-1, B-1	SW-SM		2.5	65.0	9.3									
TP-1	9	TP-1, B-2	SW							2.62						1.1E-03
TP-2	3	TP-2, B-1	SW		3.8							0.4	39			
TP-3	5	TP-3, B-1	SP		3.9	86.0	3.5									
TP-3	17	TP-3, B-2	SW-SC			67.0	11.7									
TP-4	3	TP-4, B-1	SW-SM		4.0											
TP-4	14	TP-4, B-2	SW-SM			52.0	6.0					0	45			
TP-5	7	TP-5, B-1	SM		5.8											
TP-5	16	TP-5, B-2	SW-SM			67.0	9.3									6.0E-04
TP-7	4	TP-7, B-1	SW-SM		3.9											7.6E-04
TP-7	15	TP-7, B-2	SW-SM			90.0	9.8									
TP-8	4	TP-8, B-1	SM		7.4									2.88	0	
TP-8	15	TP-8, B-2	SW-SM			71.0	7.6					0.5	40			1.2E-04
TP-9	2	TP-9, B-1	SW-SM		6.8	64.0	8.3									
TP-11	2	TP-11, B-1	SP		6.1	88.0	3.4									
TP-11	5	TP-11, B-2	SC		7.6	74.0	12.1			113.0	14.2					
TP-11	14	TP-11, B-3	SM									0	45			
TP-12	4	TP-12, B-1	SM		5.0					118.0	11.5	1.55	27			
TP-12	9	TP-12, B-2	GW-GM			37.0	6.3									1.1E-04
TP-13	4	TP-13, B-1	SP-SM									0	45			
TP-15	5	TP-15, B-1	SM		6.2	75.0	25.6	27.0	6.0					0.72	22.0	
TP-15	10	TP-15, B-2	SP													1.6E-03
TP-15	13	TP-15, B-3	SW-SM			51.0	6.3									4.2E-04
TP-16	2	TP-16, B-1	SM		4.3											
TP-16	8	TP-16, B-2	SW-SM		9.1	81.0	7.3									
TP-18	3	TP-18, B-1	SW-SM		6.9	51.0	5.4			114.0	12.9					8.3E-05
TP-18	9	TP-18, B-2	SW-SM			61.0	5.1									

**Table 3-2
Summary of Laboratory Analyses
Casandro Wash Detention Basin**

Test Pit/ Boring #	Depth (ft)	Sample I.D.	Classification	Field Soil Properties		Particle Size Distribution % Passing by Weight (a)		Atterberg Limits		Moisture Density Relationship		Specific Gravity	Shear Strength (b)		Triaxial Shear (c)		Permeability (f) K (cm/sec)
				Dry Density (pcf)	Moisture Content (%)	#4	#200	LL	PI	Max Dry Density (pcf)	Optimum Moisture Content (%)		C (ksf)	φ (Deg)	C (ksf)	φ (Deg)	
TP-20	3	TP-20, B-1	SW-SM		5.0	63.0	10.3			118.0	11.8	2.57					2.1E-06
TP-20	8	TP-20, B-2	SW-SM	124 (d)		69.0	11.8										
TP-21	3	TP-21, B-1	SW		5.2	74.0	4.3										
TP-21	5	TP-21, B-2	SM		5.7												
TP-22	3	TP-22, B-1	SM		4.8	86.0	18.7			120.0	11.0						1.1E-04
TP-23	5	TP-23, B-1	SW		4.6	66.0	2.7										
TP-24	2	TP-24, B-1	SW		7.9	85.0	5.9			109.0	14.6						
TP-24	2	TP-24, B-2	SW-SM		7.5	63.0	5.9										
B-1	17.5	B-1, SS-8	CL					33.0	12.0								
B-6	10	B-6, ST-5	SW	106.0	5.6												
B-10	4	B-10, ST-3	SM	98.0	9.9												
B-10	20	B-10, SC-9	SW-SM	92.0	9.6												
Sediment (e)	0		SW			90.0	3.0										

Notes:

- (a) 100% of every sample passed 2-inch sieve
- (b) Direct shear test with normal stresses of 1, 2, and 3 ksf
- (c) Triaxial shear test with confining pressures of 10, 20, and 30 psi
- (d) Sample was cemented. Density determined by paraffin coating method. (ASTM D1188)
- (e) Surface sample collected near TP-21
- (f) Permeability determined in laboratory on sample compacted to 95% of ASTM 698 at optimum moisture.

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Appendix A
Test Pit Logs

BORING AND TEST PIT LOG LEGEND:

SAMPLE TYPE:

B - BAG SAMPLE

G - GRAB SAMPLE (FROM CUTTINGS)

SS - SPLIT BARREL SAMPLE (ASTM D 1586 UNLESS OTHERWISE NOTED)

SC - SPLIT BARREL SAMPLE (ASTM D 1586 UNLESS OTHERWISE NOTED)

ST - SHELBY TUBE SAMPLE

STANDARD PENETRATION TEST:

6"-6"-6" - THE NUMBER OF BLOWS FOR THREE 6-INCH INCREMENTS REQUIRED FROM A 140-LB HAMMER FALLING 30 INCHES TO DRIVE A STANDARD 2-INCH O.D. SPLIT-BARREL SAMPLER (ASTM D 1586)

(N) - THE SUM OF BLOWS FOR THE SECOND AND THIRD 6-INCH INCREMENTS

NOTES:

1. THE BORING AND/OR TEST PIT LOGS AND RELATED INFORMATION DEPICT SUBSURFACE CONDITIONS ONLY AT THE SPECIFIC LOCATIONS AND DATES INDICATED. SUBSURFACE CONDITIONS AND WATER LEVELS AT OTHER LOCATIONS MAY DIFFER FROM CONDITIONS OCCURRING AT THESE BORING AND/OR TEST PIT LOCATIONS. ALSO, THE PASSAGE OF TIME MAY RESULT IN A CHANGE IN THE CONDITIONS AT THESE LOCATIONS.
2. BORINGS AND/OR TEST PITS WERE LOGGED IN THE FIELD BY A REPRESENTATIVE OF CH2M HILL. SAMPLES WERE EXAMINED AND VISUALLY CLASSIFIED IN APPROXIMATE ACCORDANCE WITH ASTM D2488.
3. ELEVATION OF BORINGS AND/OR TEST PITS WERE DETERMINED BY INTERPOLATION BETWEEN GRADING PLAN CONTOURS.



PROJECT NUMBER SWW35441.GT.10	TEST PIT NUMBER TP-1	SHEET 1 OF 1
TEST PIT LOG		

PROJECT CASANDRO WASH LOCATION NORTH CENTRAL BANK OF WASH LOGGER B. BLEAZARD
 ELEVATION APPROXIMATELY 2160 CONTRACTOR RIGGS ENTERPRISES
 EXCAVATION EQUIPMENT CATERPILLAR EL200B TRACK HOE DATE EXCAVATED 1/21/94
 WATER LEVEL AND DATE NOT ENCOUNTERED APPROX. DIMENSIONS: Length 15' Width 4' Max Depth 15'

DEPTH BELOW SURFACE (FT)	SAMPLE		SOIL DESCRIPTION	COMMENTS
	INTERVAL	NUMBER AND TYPE		
6.0	5.0		<u>WELL GRADED SAND WITH SILT & GRAVEL</u> (SW-SM), tan, dry, medium dense	Start @ 11:15
	6.0	B-1	Same as above	Cobbles, gravelly layer from 3-4' Highly reactive to HCL
10.0	9.0		<u>WELL GRADED SAND WITH GRAVEL AND SOME SILT.</u> (SW), light tan, dry	Excavator notes harder digging at 7', increase in sand and gravel, highly reactive to HCL
	10.0	B-2	Same material as above, 15-20% gravel	Intermittent sands and gravel
15.0			End Test Pit @ 15'	Couldn't reach deeper because of slope. 11:40
20.0				
25.0				



PROJECT NUMBER SWM36441.GT.10	TEST PIT NUMBER TP-2	SHEET 1 OF 1
TEST PIT LOG		

PROJECT CASANDRO WASH LOCATION NORTH EAST BANK OF WASH LOGGER B. BLEAZARD
 ELEVATION APPROXIMATELY 2155 CONTRACTOR RIGGS ENTERPRISES
 EXCAVATION EQUIPMENT CATERPILLAR EL200B TRACK HOE DATE EXCAVATED 1/20/94
 WATER LEVEL AND DATE NOT ENCOUNTERED APPROX. DIMENSIONS: Length 21' Width 4' Max Depth 15'

DEPTH BELOW SURFACE (FT)	SAMPLE		SOIL DESCRIPTION	COMMENTS
	INTERVAL	NUMBER AND TYPE		
			SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	DIFFICULTY IN EXCAVATION, RUNNING GRAVEL CONDITION, COLLAPSE OF WALLS, SAND HEAVE DEBRIS ENCOUNTERED, WATER SEEPAGE GRADATIONAL CONTACTS, TESTS, INSTRUMENTATION
	3.0		<u>WELL GRADED SAND WITH GRAVEL (SW)</u> , reddish brown, moist, medium dense to dense	Start @ 15:10 Very clean sand, almost fill look
	4.0	B-1	Same sandy material as above	No reaction with HCL
5.0			Same as above	
	9.0		<u>WELL GRADED SAND WITH GRAVEL AND SOME SILT (SW-SM)</u> , brown, moist, dense, higher gravel content than above, 25% gravel	Slight material change at 6'
	10.0	B-2	Same as above	
10.0			Same material as above, large cemented chunks in with cuttings	Material shows slight cohesion, intermitant clay lenses
15.0	15.0		End Test Pit @ 15'	Back to poorly graded sand layer like Sample B-1 15:30
20.0				
25.0				



PROJECT NUMBER Sww35441.GT.10	TEST PIT NUMBER TP-3	SHEET 1 OF 1
TEST PIT LOG		

PROJECT CASANDRO WASH LOCATION NORTH EAST BANK OF WASH LOGGER B. BLEAZARD
 ELEVATION APPROXIMATELY 2153 CONTRACTOR RIGGS ENTERPRISES
 EXCAVATION EQUIPMENT CATERPILLAR EL200B TRACK HOE DATE EXCAVATED 1/20/94
 WATER LEVEL AND DATE NOT ENCOUNTERED APPROX. DIMENSIONS: Length 20' Width 4' Max Depth 18'

DEPTH BELOW SURFACE (FT)	SAMPLE		SOIL DESCRIPTION	COMMENTS
	INTERVAL	NUMBER AND TYPE	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	DIFFICULTY IN EXCAVATION, RUNNING GRAVEL CONDITION, COLLAPSE OF WALLS, SAND HEAVE DEBRIS ENCOUNTERED, WATER SEEPAGE GRADATIONAL CONTACTS, TESTS, INSTRUMENTATION
5.0	5.0		<u>POORLY GRADED SAND WITH SILT AND GRAVEL (SP)</u> , reddish brown, loose to medium dense	Start @ 16:05 Some silt gives slight cohesion, makes loose packed ball in hand
	6.0	B-1	Same as above	Reacts violently with HCL
10.0			Same as above except cobble layer from 7-8'	Excavator notes very easy digging conditions Highly reactive with HCL
			Same as above, cobbles 6", angular <5% just a few boulders	Slight increase in cobbles and few boulders
15.0	17.0			Recovered fracture of what looked like carbonate rock, highly reactive to HCL
	18.0	B-2	<u>WELL GRADED SAND WITH CLAY AND GRAVEL (SW-SC)</u> , reddish brown, moist, dense	16:30
20.0			End Test Pit @ 18'	
25.0				



PROJECT NUMBER

SWW35441.GT.10

TEST PIT NUMBER

TP-4

SHEET 1 OF 1

TEST PIT LOG

PROJECT CASANDRO WASH

LOCATION EAST END OF WASH

LOGGER B. BLEAZARD

ELEVATION APPROXIMATELY 2136

CONTRACTOR RIGGS ENTERPRISES

EXCAVATION EQUIPMENT CATERPILLAR EL200B TRACK HOE

DATE EXCAVATED 1/20/94

WATER LEVEL AND DATE NOT ENCOUNTERED

APPROX. DIMENSIONS: Length 20'

Width 4'

Max Depth 17'

DEPTH BELOW SURFACE (FT)	SAMPLE		SOIL DESCRIPTION	COMMENTS
	INTERVAL	NUMBER AND TYPE		
5.0	3.0		<p><u>WELL GRADED SAND WITH SILT AND GRAVEL</u> (SW-SM), brown, dry to moist, loose to medium dense</p>	<p>Start @ 14:25</p> <p>Soft digging</p> <p>Slight cohesion in material, can make soft compacted ball</p>
	4.0	B-1	<p>Same as above</p>	
10.0			<p>Same as above</p>	<p>Very consistent material to about 9' then gets more granular and less silty material</p> <p>Not very hard digging</p> <p>Pit sides sloughing at about 12'</p>
	14.0		<p><u>WELL GRADED SAND WITH SILT AND GRAVEL</u> (SW-SM), brown, moist, dense to medium dense</p> <p>Same as above</p>	
15.0	15.0	B-2	<p>Same material as above, very rocky</p> <p>Same as above</p>	<p>Reacts actively with HCL</p> <p>Test pit sloughing a lot at bottom</p> <p>Excavator notes hard digging at 16', start of what looks like carbonate cemented sand</p> <p>Chunks of cemented sands and gravels, reacts actively with HCL probably carbonate cemented sand layer</p> <p>14:55</p>
			<p><u>WELL GRADED SAND WITH GRAVEL AND SOME SILT</u> (SW), whites and tans, dry, very dense</p> <p>End Test Pit @ 17'</p>	
20.0				
25.0				



PROJECT NUMBER SWW35441.GT.10	TEST PIT NUMBER TP-5	SHEET 1 OF 1
TEST PIT LOG		

PROJECT CASANDRO WASH	LOCATION SOUTH EAST END OF WASH	LOGGER B. BLEAZARD
ELEVATION APPROXIMATELY 2147	CONTRACTOR RIGGS ENTERPRISES	
EXCAVATION EQUIPMENT CATERPILLAR EL200B TRACK HOE	DATE EXCAVATED 1/20/94	
WATER LEVEL AND DATE NOT ENCOUNTERED	APPROX. DIMENSIONS: Length 18'	Width 4' Max Depth 17'

DEPTH BELOW SURFACE (FT)	SAMPLE		SOIL DESCRIPTION	COMMENTS
	INTERVAL	NUMBER AND TYPE	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	DIFFICULTY IN EXCAVATION, RUNNING GRAVEL CONDITION, COLLAPSE OF WALLS, SAND HEAVE DEBRIS ENCOUNTERED, WATER SEEPAGE GRADATIONAL CONTACTS, TESTS, INSTRUMENTATION
5.0			<u>SILTY SAND WITH SOME GRAVEL</u> (SM), light tan, dry, loose	Start @ 13:55 Measurements taken up slope at top of pit very easy digging
			Same as above	Material very silty, very dusty digging
7.0				
8.0		B-1	<u>SILTY SAND WITH GRAVEL</u> (SM), tan, dry, loose to medium dense	Slightly darker tan than material above, but very similar
10.0			Same material as above, but more gravel	
				Hole sloughing at about 12' Easy consistent digging
15.0				Hit gravelly layer Continued sloughing
16.0				
17.0		B-2	<u>WELL GRADED SAND WITH SILT AND GRAVEL</u> (SW-SM), dry, medium dense, light tan, 25-30% gravel	14:10
			End Test Pit @ 17'	
20.0				
25.0				



PROJECT NUMBER SNN35441GT.10	TEST PIT NUMBER TP-7	SHEET 1 OF 1
TEST PIT LOG		

PROJECT CASANDRO WASH LOCATION NORTH CENTRAL BANK OF WASH LOGGER B. BLEAZARD
 ELEVATION APPROXIMATELY 2150 CONTRACTOR RIGGS ENTERPRISES
 EXCAVATION EQUIPMENT CATERPILLAR EL200B TRACK HOE DATE EXCAVATED 1/21/94
 WATER LEVEL AND DATE NOT ENCOUNTERED APPROX. DIMENSIONS: Length 10' Width 4' Max Depth 20'

DEPTH BELOW SURFACE (FT)	SAMPLE		SOIL DESCRIPTION	COMMENTS
	INTERVAL	NUMBER AND TYPE	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	DIFFICULTY IN EXCAVATION, RUNNING GRAVEL CONDITION, COLLAPSE OF WALLS, SAND HEAVE DEBRIS ENCOUNTERED, WATER SEEPAGE GRADATIONAL CONTACTS, TESTS, INSTRUMENTATION
5.0	4.0		<u>WELL GRADED SAND WITH SILT AND GRAVEL</u> (SW-SM), pale brown, dry, medium	Start @ 1t:45
	5.0	B-1	Same as above	Soil highly reactive to HCL
10.0			Same as above except increase gravel @ 10', 25-30% gravel	Intermittent layers of sand and gravel
	15.0		<u>WELL GRADED SAND WITH SILT</u> (SW-SM), brown, moist, dense, 5% gravel	Coarse sand, rounded grains, no reaction to HCL Stop for lunch @ 12:00 Start @ 13:00
20.0	16.0	B-2	Same as above	
			End Test Pit @ 20'	13:26
25.0				



PROJECT NUMBER SWW35441GT.10	TEST PIT NUMBER TP-8	SHEET 1 OF 1
TEST PIT LOG		

PROJECT CASANDRO WASH LOCATION SOUTH EAST CORNER OF WASH LOGGER B. BLEAZARD
 ELEVATION APPROXIMATELY 2138 CONTRACTOR RIGGS ENTERPRISES
 EXCAVATION EQUIPMENT CATERPILLAR EL200B TRACK HOE DATE EXCAVATED 1/20/94
 WATER LEVEL AND DATE NOT ENCOUNTERED APPROX. DIMENSIONS: Length 14' Width 4' Max Depth 16'

DEPTH BELOW SURFACE (FT)	SAMPLE		SOIL DESCRIPTION	COMMENTS
	INTERVAL	NUMBER AND TYPE	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	DIFFICULTY IN EXCAVATION, RUNNING GRAVEL CONDITION, COLLAPSE OF WALLS, SAND HEAVE DEBRIS ENCOUNTERED, WATER SEEPAGE GRADATIONAL CONTACTS, TESTS, INSTRUMENTATION
			<u>SILTY SAND WITH GRAVEL (SM)</u> , dark brown, moist, medium dense	Start @ 13:15 few cobbles, material has some cohesion
	4.0		Same as above	Very easy digging
5.0	5.0	B-1		
	10.0		<u>SAND WITH GRAVEL AND SOME SILT (SP-SM)</u> , reddish brown, moist, 25% gravel rest sand	Coarse rounded grain sand, angular gravel
10.0	11.0	B-2		
	15.0		<u>WELL GRADED SAND WITH SILT AND GRAVEL (SW-SM)</u> , reddish brown, moist	Silt material acts like binder, balls in hand Very similar to above maybe slightly more moist
15.0	16.0	B-3		
			Soil slightly stickier at bottom	13:30
			End Test Pit @ 16'	
20.0				
25.0				



PROJECT NUMBER SNW35441GT.10	TEST PIT NUMBER TP-9	SHEET 1 OF 1
TEST PIT LOG		

PROJECT CASANDRO WASH LOCATION NORTH CENTER OF WASH LOGGER B. BLEAZARD
 ELEVATION APPROXIMATELY 2141 CONTRACTOR RIGGS ENTERPRISES
 EXCAVATION EQUIPMENT CATERPILLAR EL200B TRACK HOE DATE EXCAVATED 1/21/94
 WATER LEVEL AND DATE NOT ENCOUNTERED APPROX. DIMENSIONS: Length 10' Width 4' Max Depth 6'

DEPTH BELOW SURFACE (FT)	SAMPLE		SOIL DESCRIPTION	COMMENTS
	INTERVAL	NUMBER AND TYPE	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	DIFFICULTY IN EXCAVATION, RUNNING GRAVEL CONDITION, COLLAPSE OF WALLS, SAND HEAVE DEBRIS ENCOUNTERED, WATER SEEPAGE GRADATIONAL CONTACTS, TESTS, INSTRUMENTATION
2.0			<u>WELL GRADED SAND WITH SILT AND GRAVEL (SW-SM), light brown, dry to moist, very dense</u>	Start @ 09:20 Very hard digging from start Cemented sands and gravels, gravel shows strong reaction with HCL, soil shows mild reaction with HCL Too hard to continue Perc test performed
3.0		B-1		
5.0			End Test Pit @ 6'	09:50
10.0				
15.0				
20.0				
25.0				



PROJECT NUMBER Sww35441.GT.10	TEST PIT NUMBER TP-II	SHEET 1 OF 1
TEST PIT LOG		

PROJECT CASANDRO WASH LOCATION SOUTH SIDE OF WASH LOGGER B. BLEAZARD
 ELEVATION APPROXIMATELY 2139 CONTRACTOR RIGGS ENTERPRISES
 EXCAVATION EQUIPMENT CATERPILLAR EL200B TRACK HOE DATE EXCAVATED 1/19/94
 WATER LEVEL AND DATE NOT ENCOUNTERED APPROX. DIMENSIONS: Length _____ Width 4' Max Depth 17'

DEPTH BELOW SURFACE (FT)	SAMPLE		SOIL DESCRIPTION	COMMENTS
	INTERVAL	NUMBER AND TYPE	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	DIFFICULTY IN EXCAVATION, RUNNING GRAVEL CONDITION, COLLAPSE OF WALLS, SAND HEAVE DEBRIS ENCOUNTERED, WATER SEEPAGE GRADATIONAL CONTACTS, TESTS, INSTRUMENTATION
5.0	2.0		<u>WELL GRADED SAND WITH SILT AND GRAVEL</u> (SW-SM), brown, moist, loose	Start @ 11:15
	4.0	B-1	<u>POORLY GRADED SAND</u> (SP), moist, loose to medium dense Bottom 6" <u>PEA GRAVEL</u> (GP), multicolor browns and reds, moist	Easy digging
10.0	6.0	B-2	<u>WELL GRADED SAND WITH GRAVEL</u> (SW-SC), brown, moist, medium dense to dense	Material has some cohesion, balls up, sticky
			Same material as above	Some cohesion in material, can make ball Very few to no cobbles
15.0	13.0		<u>SILTY SAND WITH GRAVEL</u> (SM), light gray, dry to moist	Material change @ 12'
	14.0	B-3	Same as above gravel angular	Very few cobbles, material remaining consistent @ 15', excavator notes harder digging
20.0	17.0		<u>SILTY SAND WITH GRAVEL AND SOME COBBLES</u> (SM), light gray, dry	Similar to soil above but cobble content increasing
			End Test Pit @ 17.0'	12:09
25.0				



PROJECT NUMBER Sww35441.GT.10	TEST PIT NUMBER TP-12	SHEET 1 OF 1
TEST PIT LOG		

PROJECT CASANDRO WASH LOCATION NEAR DAM ALIGNMENT LOGGER B. BLEAZARD
 ELEVATION APPROXIMATELY 2140 CONTRACTOR RIGGS ENTERPRISES
 EXCAVATION EQUIPMENT CATERPILLAR EL200B TRACK HOE DATE EXCAVATED 1/19/94
 WATER LEVEL AND DATE NOT ENCOUNTERED APPROX. DIMENSIONS: Length 31' Width 4' Max Depth 13'

DEPTH BELOW SURFACE (FT)	SAMPLE		SOIL DESCRIPTION	COMMENTS
	INTERVAL	NUMBER AND TYPE		
			SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	DIFFICULTY IN EXCAVATION, RUNNING GRAVEL CONDITION, COLLAPSE OF WALLS, SAND HEAVE DEBRIS ENCOUNTERED, WATER SEEPAGE GRADATIONAL CONTACTS, TESTS, INSTRUMENTATION
	4.0		<u>SILTY SAND WITH GRAVEL</u> (SM), light gray, dry, loose	Start @ 12:25
6.0	5.0	B-1	Same as above except denser	Cobbles starting to show, very few 4"
	8.0		<u>GRAVEL WITH SAND, SILT AND SOME COBBLES</u> (GM), gray, dry, dense	More gravel @ 6', strong reaction to HCL on gravel, excavator noted hard digging
	9.0	B-2	<u>WELL GRADED GRAVEL WITH SILT AND SAND AND SOME COBBLES</u> (GW-GM), light tan, dry, dense	Break for lunch @ 12:45 Back from lunch @ 13:45 Cobbles very sparce
10.0			Same material as above except very dense and hard	At 10' excavator notes very hard digging, can't scrape past 10', rocks react violently with HCL, extended pit 10' could only get 13' down before refusal
	13.0		End Test Pit @ 13'	Appears carbonate cemented sand layer slopes to east 14:30
15.0				
20.0				
25.0				



PROJECT NUMBER SWM35441GT.10	TEST PIT NUMBER TP-13	SHEET 1 OF 1
TEST PIT LOG		

PROJECT CASANDRO WASH LOCATION CENTER OF WASH LOGGER B. BLEAZARD
 ELEVATION APPROXIMATELY 2148 CONTRACTOR RIGGS ENTERPRISES
 EXCAVATION EQUIPMENT CATERPILLAR EL200B TRACK HOE DATE EXCAVATED 1/21/94
 WATER LEVEL AND DATE NOT ENCOUNTERED APPROX. DIMENSIONS: Length 10' Width 4' Max Depth 5'

DEPTH BELOW SURFACE (FT)	SAMPLE		SOIL DESCRIPTION	COMMENTS
	INTERVAL	NUMBER AND TYPE	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	DIFFICULTY IN EXCAVATION, RUNNING GRAVEL CONDITION, COLLAPSE OF WALLS, SAND HEAVE DEBRIS ENCOUNTERED, WATER SEEPAGE GRADATIONAL CONTACTS, TESTS, INSTRUMENTATION
5.0	3.0		<u>WELL GRADED SAND WITH GRAVEL (SW),</u> light brown, dry to moist, very dense	Start @ 14:35 Very hard digging from start, carbonate cemented sand material from start of hole Large cemented clumps in cuttings Too hard to continue
	4.0	B-1	Same as above	
	5.0			
			End Test Pit @ 5'	14:55
10.0				
15.0				
20.0				
25.0				



PROJECT NUMBER SWW35441.GT.10	TEST PIT NUMBER TP-14	SHEET 1 OF 1
TEST PIT LOG		

PROJECT CASANDRO WASH LOCATION CENTER OF WASH LOGGER B. BLEAZARD
 ELEVATION APPROXIMATELY 2144 CONTRACTOR RIGGS ENTERPRISES
 EXCAVATION EQUIPMENT CATERPILLAR EL200B TRACK HOE DATE EXCAVATED 1/19/94
 WATER LEVEL AND DATE NOT ENCOUNTERED APPROX. DIMENSIONS: Length 21' Width 4' Max Depth 16'

DEPTH BELOW SURFACE (FT)	SAMPLE		SOIL DESCRIPTION	COMMENTS
	INTERVAL	NUMBER AND TYPE	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	DIFFICULTY IN EXCAVATION, RUNNING GRAVEL CONDITION, COLLAPSE OF WALLS, SAND HEAVE DEBRIS ENCOUNTERED, WATER SEEPAGE GRADATIONAL CONTACTS, TESTS, INSTRUMENTATION
1.0			<u>WELL GRADED SAND WITH SILT (SW-SM), brown, moist, loose</u>	Start @ 08:10
4.0		B-1	<u>SAND WITH GRAVEL AND SILT (SP-SM), light tan with white, dry, dense</u>	Hard digging, white streaks
5.0			<u>WELL GRADED SAND WITH GRAVEL AND SILT (SW-SM), light tan with white, dry, dense, very similar to above except maybe harder</u>	
8.0			<u>WELL GRADED SAND WITH GRAVEL AND SILT AND COBBLES (SW-SM), 5% cobbles (angular), about 6" Avg, 55% gravel (angular), light tan, dry, dense</u>	Some cobbles start to appear, harder digging than above
10.0		B-2		Walls remaining intact, not much sloughing
			Same material as above	Excavator notes continous digging conditions
15.0				Material remained consistent to final depth Digging too hard and hoe extended too far to make more progress
16.0			End Test Pit @ 16.0'	09:29
20.0				
25.0				



PROJECT NUMBER SWW35441.GT.10	TEST PIT NUMBER TP-15	SHEET 1 OF 1
TEST PIT LOG		

PROJECT CASANDRO WASH LOCATION SOUTH SIDE OF WASH LOGGER B. BLEAZARD
 ELEVATION APPROXIMATELY 2141 CONTRACTOR RIGGS ENTERPRISES
 EXCAVATION EQUIPMENT CATERPILLAR EL200B TRACK HOE DATE EXCAVATED 1/19/94
 WATER LEVEL AND DATE NOT ENCOUNTERED APPROX. DIMENSIONS: Length 25' Width 4' Max Depth 18'

DEPTH BELOW SURFACE (FT)	SAMPLE		SOIL DESCRIPTION	COMMENTS
	INTERVAL	NUMBER AND TYPE	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	DIFFICULTY IN EXCAVATION, RUNNING GRAVEL CONDITION, COLLAPSE OF WALLS, SAND HEAVE DEBRIS ENCOUNTERED, WATER SEEPAGE GRADATIONAL CONTACTS, TESTS, INSTRUMENTATION
5.0	5.0		<u>WELL GRADED SAND WITH GRAVEL (SW)</u> , brown, moist, loose	Start @ 10:00 Sand very coarse and well rounded grains
	6.0	B-1	<u>WELL GRADED GRAVEL WITH SAND (GW)</u> , brown, medium dense Same as above except some cobbles, 5% cobbles 4-6" angular, 75% gravel the rest sand and silt	
			<u>SILTY SAND WITH GRAVEL (SM)</u> , brown, moist, soft to firm	
10.0	9.0		<u>WELL GRADED SAND WITH GRAVEL (SW)</u> , brown, moist, loose to medium dense	Excavator notes easy digging conditions
	12.0	B-2	Similar to above but also has some cobbles, 5% cobbles (angular), 10% gravel (angular), rest sand, some fines	
	13.0		<u>WELL GRADED SAND WITH GRAVEL AND COBBLES (SW)</u> Similar as above except more gravel and cobbles	
15.0	15.0	B-3	<u>WELL GRADED SAND WITH SILT AND GRAVEL (SW-SM)</u> , brownish tan, dry to moist, dense, 60% gravel, 5% cobbles (angular), cobbles 6" diameter	Driller notes harder digging conditions, difficult to tell if sand or gravel 50-50
	18.0		<u>POORLY GRADED GRAVEL WITH SAND AND SOME COBBLES (GP)</u> , brownish tan, dry, dense, high gravel and sand content, some cobbles 4-6" (angular)	
20.0			End Test Pit @ 18.0'	11:00
25.0				



PROJECT NUMBER SWM35441.GT.10	TEST PIT NUMBER TP-16	SHEET 1 OF 1
TEST PIT LOG		

PROJECT CASANDRO WASH LOCATION SOUTH CENTRAL BANK OF WASH LOGGER B. BLEAZARD
 ELEVATION APPROXIMATELY 2150 CONTRACTOR RIGGS ENTERPRISES
 EXCAVATION EQUIPMENT CATERPILLAR EL200B TRACK HOE DATE EXCAVATED 1/21/94
 WATER LEVEL AND DATE NOT ENCOUNTERED APPROX. DIMENSIONS: Length 6' Width 4' Max Depth 12'

DEPTH BELOW SURFACE (FT)	SAMPLE		SOIL DESCRIPTION	COMMENTS
	INTERVAL	NUMBER AND TYPE	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	DIFFICULTY IN EXCAVATION, RUNNING GRAVEL CONDITION, COLLAPSE OF WALLS, SAND HEAVE DEBRIS ENCOUNTERED, WATER SEEPAGE GRADATIONAL CONTACTS, TESTS, INSTRUMENTATION
	2.0		<u>SILTY SAND WITH GRAVEL (SM)</u> , brown, dry, dense	Start @ 13:45 Scatched face of vertical bank for this pit, highly reactive to HCL (soil)
	3.0	B-1	Same as above	Cobbley layer at 3'
6.0			<u>WELL GRADED SAND WITH SILT AND GRAVEL (SW-SM)</u> , light tan, dry, very dense, 25% gravel	Soil much harder to dig at 5', carbonate cemented sand
	8.0		Same as above	Excavator notes, very hard scraping from 5-12'
	9.0	B-2		
10.0				
	12.0		End Test Pit @ 12'	13:55
15.0				
20.0				
25.0				



PROJECT NUMBER

SWW35441GTJ0

TEST PIT NUMBER

TP-17

SHEET 1 OF 1

TEST PIT LOG

PROJECT CASANDRO WASH

LOCATION SOUTH WEST BANK OF WASH

LOGGER B. BLEAZARD

ELEVATION APPROXIMATELY 2170

CONTRACTOR RIGGS ENTERPRISES

EXCAVATION EQUIPMENT CATERPILLAR EL200B TRACK HOE

DATE EXCAVATED 1/21/94

WATER LEVEL AND DATE NOT ENCOUNTERED

APPROX. DIMENSIONS: Length 8'

Width 4'

Max Depth 8'

DEPTH BELOW SURFACE (FT)	SAMPLE		SOIL DESCRIPTION	COMMENTS
	INTERVAL	NUMBER AND TYPE		
0.0			SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	DIFFICULTY IN EXCAVATION, RUNNING GRAVEL CONDITION, COLLAPSE OF WALLS, SAND HEAVE DEBRIS ENCOUNTERED, WATER SEEPAGE GRADATIONAL CONTACTS, TESTS, INSTRUMENTATION
6.0			Fill: <u>SILTY SAND WITH GRAVEL</u> , (SM), light brown, loose to medium dense, asphalt chunks throughout	Start @ 14:15 Abandoned pit because bank was full of big chunks of asphalt, obvious fill, not native
10.0			End Test Pit @ 8'	14:25
15.0				
20.0				
25.0				



PROJECT NUMBER SWW35441GT.10	TEST PIT NUMBER TP-18	SHEET 1 OF 1
TEST PIT LOG		

PROJECT CASANDRO WASH LOCATION WEST END OF WASH LOGGER B. BLEAZARD
 ELEVATION APPROXIMATELY 2151 CONTRACTOR RIGGS ENTERPRISES
 EXCAVATION EQUIPMENT CATERPILLAR EL200B TRACK HOE DATE EXCAVATED 1/19/94
 WATER LEVEL AND DATE NOT ENCOUNTERED APPROX. DIMENSIONS: Length _____ Width 4' Max Depth 14'

DEPTH BELOW SURFACE (FT)	SAMPLE		SOIL DESCRIPTION	COMMENTS
	INTERVAL	NUMBER AND TYPE	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	DIFFICULTY IN EXCAVATION, RUNNING GRAVEL CONDITION, COLLAPSE OF WALLS, SAND HEAVE DEBRIS ENCOUNTERED, WATER SEEPAGE GRADATIONAL CONTACTS, TESTS, INSTRUMENTATION
5.0	3.0	B-1	WELL GRADED SAND (SW), brown, dry, loose SILTY SAND WITH GRAVEL (SM), tan, dry, loose to dry SAND WITH GRAVEL	Start @ 14:45 Material slightly cohesive, makes balls
	6.0		WELL GRADED SAND WITH SILT AND GRAVEL (SW-SM), dark brown, moist, dense Same as above	
	9.0			
10.0	10.0	B-2	WELL GRADED SAND WITH SILT AND GRAVEL (SW-SM), light gray, dry, dense Material remaining consistent, probably carbonate cemented sand, same as above	Mild reaction to HCL Few cobbles Digging getting harder Progress very slow, @ 12' 15:20 about 1'/10-15 min. @ 13' 15:30 Operator put bigger teeth on Bucket, material shows strong reaction with HCL
15.0	14.0		End Test Pit @ 14'	16:00 Digging too hard to proceed
20.0				
25.0				



PROJECT NUMBER

SWW35441.GT.10

TEST PIT NUMBER

TP-20

SHEET 1 OF 1

TEST PIT LOG

PROJECT CASANDRO WASH

LOCATION NORTH CENTRAL BANK OF WASH

LOGGER B. BLEAZARD

ELEVATION APPROXIMATELY 2147

CONTRACTOR RIGGS ENTERPRISES

EXCAVATION EQUIPMENT CATERPILLAR EL200B TRACK HOE

DATE EXCAVATED 1/20/94

WATER LEVEL AND DATE NOT ENCOUNTERED

APPROX. DIMENSIONS: Length 20'

Width 4'

Max Depth 13'

DEPTH BELOW SURFACE (FT)	SAMPLE		SOIL DESCRIPTION	COMMENTS
	INTERVAL	NUMBER AND TYPE		
3.0			WELL GRADED SAND WITH SILT and GRAVEL (SW-SM), tan to light gray, loose	Start @ 11:30 Very soft digging
4.0		B-1	Same as above	Strong reaction to HCL in soil
5.0			Same material as above	
8.0			WELL GRADED SAND WITH SILT and GRAVEL (SW-SM), light tan, dry, dense to very dense, more gravel and cemented chunks than above	Top of hard layer tagged @ 7.5', driller notes harder digging @ 8'
10.0		B-2	Same material as above	Big cemented chunks in sample, carbonate cemented sand? conglomerate?, reacts strong with HCL
13.0			End Test Pit @ 13'	some roots present in hard cemented layer 11:55
15.0				
20.0				
25.0				



PROJECT NUMBER Sww35441.GT.10	TEST PIT NUMBER TP-21	SHEET 1 OF 1
TEST PIT LOG		

PROJECT CASANDRO WASH LOCATION WEST END OF WASH LOGGER B. BLEAZARD
 ELEVATION APPROXIMATELY 2154 CONTRACTOR RIGGS ENTERPRISES
 EXCAVATION EQUIPMENT CATERPILLAR EL200B TRACK HOE DATE EXCAVATED 1/19/94
 WATER LEVEL AND DATE NOT ENCOUNTERED APPROX. DIMENSIONS: Length 20' Width 4' Max Depth 11'

DEPTH BELOW SURFACE (FT)	SAMPLE		SOIL DESCRIPTION	COMMENTS
	INTERVAL	NUMBER AND TYPE	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	DIFFICULTY IN EXCAVATION, RUNNING GRAVEL CONDITION, COLLAPSE OF WALLS, SAND HEAVE DEBRIS ENCOUNTERED, WATER SEEPAGE GRADATIONAL CONTACTS, TESTS, INSTRUMENTATION
			<u>WELL GRADED SAND WITH GRAVEL (SW), reddish brown, moist, medium dense</u>	Start @ 16:15 Intermittent gravel lenses
	3.0		Same as above except dense	
	4.0	B-1		
	5.0			
5.0	6.0	B-2	<u>SILTY SAND WITH GRAVEL (SM), light tan, dry to moist, dense</u>	Gravel angular Moderate to strong reaction with HCL End day 1/19/94 @ 16:37 Mark had to go to yard before dark to set up water trailer for tomorrow Start 1/20/94 @ 09:00
10.0	11.0		<u>SILTY SAND WITH GRAVEL (SM), light tan, dry to moist, dense</u>	Same material, hard layer continues,
			End Test Pit @ 11'	B-3 carbonate cemented sand sample taken @ 11' 09:25
15.0				
20.0				
25.0				



PROJECT NUMBER SWM35441.GT.10	TEST PIT NUMBER TP-22	SHEET 1 OF 1
TEST PIT LOG		

PROJECT CASANDRO WASH LOCATION SOUTH WEST BANK OF WASH LOGGER B. BLEAZARD
 ELEVATION APPROXIMATELY 2160 CONTRACTOR RIGGS ENTERPRISES
 EXCAVATION EQUIPMENT CATERPILLAR EL200B TRACK HOE DATE EXCAVATED 1/21/94
 WATER LEVEL AND DATE NOT ENCOUNTERED APPROX. DIMENSIONS: Length 20' Width 4' Max Depth 19'

DEPTH BELOW SURFACE (FT)	SAMPLE		SOIL DESCRIPTION	COMMENTS
	INTERVAL	NUMBER AND TYPE	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	DIFFICULTY IN EXCAVATION, RUNNING GRAVEL CONDITION, COLLAPSE OF WALLS, SAND HEAVE DEBRIS ENCOUNTERED, WATER SEEPAGE GRADATIONAL CONTACTS, TESTS, INSTRUMENTATION
			<u>SILTY SAND WITH GRAVEL (SM)</u> , brown, moist, medium dense	Start @ 15:15
	3.0		Same as above	Easy digging, uncovered some tin cans, plastic, and garbage, probably fill Material has some cohesion, moderately reactive to HCL
	4.0	B-1		
5.0			<u>WELL GRADED SAND WITH GRAVEL AND SMALL AMOUNT OF CLAY (SW)</u> , brown, moist, dense	Material change at 7', more sand and gravel slightly harder digging, highly reactive to HCL, material more granular than above
	9.0		Same as above	Excavator finds plastic, not known if it was at 10' or if it fell in the hole from spoil pile
10.0	10.0	B-2		
15.0			Same material as above	Some cobbles in soil +6" diameter
	19.0		<u>WELL GRADED SAND WITH GRAVEL AND SOME CLAY (SW)</u> , brown, moist, dense	Same material as above except 2 boulders found 15:46
20.0			End Test Pit @ 19'	
25.0				



PROJECT NUMBER SWW35441.GT.10	TEST PIT NUMBER TP-23	SHEET 1 OF 1
TEST PIT LOG		

PROJECT CASANDRO WASH LOCATION NORTHWEST BANK OF WASH LOGGER B. BLEAZARD
 ELEVATION APPROXIMATELY 2164 CONTRACTOR RIGGS ENTERPRISES
 EXCAVATION EQUIPMENT CATERPILLAR EL200B TRACK HOE DATE EXCAVATED 1/20/94
 WATER LEVEL AND DATE NOT ENCOUNTERED APPROX. DIMENSIONS: Length 25' Width 4' Max Depth 20'

DEPTH BELOW SURFACE (FT)	SAMPLE		SOIL DESCRIPTION	COMMENTS
	INTERVAL	NUMBER AND TYPE		
5.0	5.0	B-1	<u>WELL GRADED SAND WITH SILT AND GRAVEL</u> (SW-SM), light tan, dry, loose	Start @ 10:30 Very easy, loose digging Intermittent sands and gravel Cobbly layer @ 3' Lots of dust during digging
	6.0		<u>WELL GRADED SAND WITH GRAVEL AND SILT</u> (SW-SM), tan, dry, loose to medium dense Same material as above	Fast easy digging Small gravel lenses (intermittent)
10.0			Same as above except increase cobbles between 11-12'	Cobbly layer
15.0			Same as above <u>WELL GRADED SAND WITH SILT AND GRAVEL</u> (SW-SM), light brown, moist	12" boulder removed from hole Easy digging throughout the entire pit
20.0	20.0		<u>WELL GRADED SAND WITH SILT AND GRAVEL</u> (SW-SM), light brown, moist, medium dense End Test Pit @ 20'	No reaction to HCL in soil 11:00 No other samples taken because sample B-1 is very representative of entire pit
25.0				



PROJECT NUMBER Sww35441.GT.10	TEST PIT NUMBER TP-24	SHEET 1 OF 1
TEST PIT LOG		

PROJECT CASANDRO WASH LOCATION MOST WESTERN OF WASH LOGGER B. BLEAZARD
 ELEVATION APPROXIMATELY 2155 CONTRACTOR RIGGS ENTERPRISES
 EXCAVATION EQUIPMENT CATERPILLAR EL200B TRACK HOE DATE EXCAVATED 1/20/94
 WATER LEVEL AND DATE NOT ENCOUNTERED APPROX. DIMENSIONS: Length 18' Width 4' Max Depth 12'

DEPTH BELOW SURFACE (FT)	SAMPLE		SOIL DESCRIPTION	COMMENTS
	INTERVAL	NUMBER AND TYPE	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	DIFFICULTY IN EXCAVATION, RUNNING GRAVEL CONDITION, COLLAPSE OF WALLS, SAND HEAVE DEBRIS ENCOUNTERED, WATER SEEPAGE GRADATIONAL CONTACTS, TESTS, INSTRUMENTATION
2.0			<u>WELL GRADED SAND WITH SOME CLAY AND GRAVEL</u> (SW), reddish brown, moist, medium dense	Start @ 09:45
3.0		B-1	Same as above	Material has cohesion, balls in hand, coarse, rounded sand, gravel angular
5.0			<u>WELL GRADED SAND WITH GRAVEL</u> (SW), light brown, moist, very dense	Digging getting harder as noted by excavator
6.0		B-2	Same as above	Consistently hard digging
12.0			<u>WELL GRADED SAND WITH GRAVEL AND SILT</u> (SW-SM), light brown, moist, very dense	Material consistent
			End Test Pit @ 12'	10:20

Appendix B
Soil Boring Logs

CRITERIA FOR DESCRIBING MOISTURE CONDITION

<u>Description</u>	<u>Criteria</u>
Dry	Absence of moisture, dusty, dry to the touch
Moist	Damp, but no visible water
Wet	Visible free water, usually soil is below water table

RELATIVE DENSITY OF COARSE-GRAINED SOIL

<u>Blows/Ft</u>	<u>Relative Density</u>	<u>Field Test</u>
0-4	Very loose	Easily penetrated with ½-in. steel rod pushed by hand
5-10	Loose	Easily penetrated with ½-in. steel rod pushed by hand
11-30	Medium	Easily penetrated with ½-in. steel rod driven with 5-lb hammer
31-50	Dense	Penetrated a foot with ½-in. steel rod driven with 5-lb hammer
>50	Very dense	Penetrated only a few inches with ½-in. steel rod driven with 5-lb hammer

CONSISTENCY OF FINE-GRAINED SOIL

<u>Blows/Ft</u>	<u>Consistency</u>	<u>Pocket Penetrometer (TSF)</u>	<u>Torvane (TSF)</u>	<u>Field Test</u>
<2	Very soft	<0.25	<0.12	Easily penetrated several inches by fist
2-4	Soft	0.25-0.50	0.12-0.25	Easily penetrated several inches by thumb
5-8	Firm	0.50-1.0	0.25-0.5	Can be penetrated several inches by thumb with moderate effort
9-15	Stiff	1.0-2.0	0.5-1.0	Readily indented by thumb, but penetrated only with great effort
16-30	Very stiff	2.0-4.0	1.0-2.0	Readily indented by thumbnail
>30	Hard	>4.0	>2.0	Indented with difficulty by thumbnail

BORING AND TEST PIT LOG LEGEND:

SAMPLE TYPE:

B - BAG SAMPLE

G - GRAB SAMPLE (FROM CUTTINGS)

SS - SPLIT BARREL SAMPLE (ASTM D 1586 UNLESS OTHERWISE NOTED)

SC - SPLIT BARREL SAMPLE (ASTM D 1586 UNLESS OTHERWISE NOTED)

ST - SHELBY TUBE SAMPLE

STANDARD PENETRATION TEST:

6"-6"-6" - THE NUMBER OF BLOWS FOR THREE 6-INCH INCREMENTS REQUIRED FROM A 140-LB HAMMER FALLING 30 INCHES TO DRIVE A STANDARD 2-INCH O.D. SPLIT-BARREL SAMPLER (ASTM D 1586)

(N) - THE SUM OF BLOWS FOR THE SECOND AND THIRD 6-INCH INCREMENTS

NOTES:

1. THE BORING AND/OR TEST PIT LOGS AND RELATED INFORMATION DEPICT SUBSURFACE CONDITIONS ONLY AT THE SPECIFIC LOCATIONS AND DATES INDICATED. SUBSURFACE CONDITIONS AND WATER LEVELS AT OTHER LOCATIONS MAY DIFFER FROM CONDITIONS OCCURRING AT THESE BORING AND/OR TEST PIT LOCATIONS. ALSO, THE PASSAGE OF TIME MAY RESULT IN A CHANGE IN THE CONDITIONS AT THESE LOCATIONS.
2. BORINGS AND/OR TEST PITS WERE LOGGED IN THE FIELD BY A REPRESENTATIVE OF CH2M HILL. SAMPLES WERE EXAMINED AND VISUALLY CLASSIFIED IN APPROXIMATE ACCORDANCE WITH ASTM D2488.
3. ELEVATION OF BORINGS AND/OR TEST PITS WERE DETERMINED BY INTERPOLATION BETWEEN GRADING PLAN CONTOURS.



PROJECT NUMBER SWW35441.GT.10	BORING NUMBER B-1	SHEET 2 OF 4
SOIL BORING LOG		

PROJECT CASANDRO WASH LOCATION NORTH ABUTMENT
 ELEVATION APPROXIMATELY 2166 DRILLING CONTRACTOR ENVIRO-DRILL
 DRILLING METHOD AND EQUIPMENT CME 75, 8" HOLLOW STEM AUGER
 WATER LEVELS NOT ENCOUNTERED START 1/25/94 FINISH 1/25/94 LOGGER B. BLEAZARD

DEPTH BELOW SURFACE (FT)	SAMPLE			STANDARD PENETRATION TEST RESULTS 6" - 6" - 6" (N)	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS TESTS AND INSTRUMENTATION
	INTERVAL	TYPE AND NUMBER	RECOVERY (FT)			
30.0						
31.5	30.0 - 31.5	SS-11	1.1	18-23-27 (50)	<u>WELL GRADED SAND WITH TRACE GRAVEL (SW)</u> , light tan, dry, very dense	No reaction to HCL
35.0						
35.0	35.0 - 36.5				<u>SILTY SAND (SM)</u> , brown, dry, very dense	Very fractured, no reaction with HCL
36.5		SS-12	0.7	17-37-40 (77)		
40.0						
40.0	40.0 - 41.5				<u>WELL GRADED SAND WITH SILT (SW-SM)</u> , light brown, dry, very dense	Shoe empty, slight reaction to HCL
41.5		SS-13	0.2	20-50/1"		
45.0						
45.0	45.0 - 46.5				<u>WELL GRADED SAND WITH SILT AND GRAVEL (SW-SM)</u> , light tan and white, dry, very dense	Moderately reactive to HCL
46.5		SS-14	0.1	50/4.5"		
50.0						
50.0	50.0 - 51.5				Same as above	Moderately reactive to HCL
51.5		SS-15	0.2	50/5.5"		
55.0						
55.0	55.5 - 56.5				<u>SILTY SAND WITH GRAVEL (SM)</u> , light brown, dry, very dense	Highly reactive to HCL
56.5		SS-16	0.1	50/3"		
60.0						



PROJECT NUMBER SWW35441.GT.10	BORING NUMBER B-1	SHEET 3 OF 4
SOIL BORING LOG		

PROJECT CASANDRO WASH LOCATION NORTH ABUTMENT
 ELEVATION APPROXIMATELY 2166 DRILLING CONTRACTOR ENVIRO-DRILL
 DRILLING METHOD AND EQUIPMENT CME 75, 8" HOLLOW STEM AUGER
 WATER LEVELS NOT ENCOUNTERED START 1/25/94 FINISH 1/25/94 LOGGER B. BLEAZARD

DEPTH BELOW SURFACE (FT)	SAMPLE			STANDARD PENETRATION TEST RESULTS 6" - 6" - 6" (N)	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS TESTS AND INSTRUMENTATION
	INTERVAL	TYPE AND NUMBER	RECOVERY (FT)			
60.0	60.0 - 61.5	SS-17	0.2	5-50/3"	<u>SILTY SAND WITH GRAVEL (SM)</u> , tan, dry, very dense	Some chatter, didn't last long
65.0						
70.0	70.0 - 71.5	SS-18	0.1	50/2"	<u>WELL GRADED SAND WITH GRAVEL (SW)</u> , light brown, dry, very dense	Some fines, rock fragments in sample, highly reactive to HCL
75.0						
80.0	80.0 - 81.5	SS-19	0.4	50/3.5"	<u>WELL GRADED SAND WITH SILT AND GRAVEL (SW-SM)</u> , light brown, dry, very dense	Highly reactive to HCL
85.0						
90.0						



PROJECT NUMBER SWW35441.GT.10	BORING NUMBER B-1	SHEET 4 OF 4
SOIL BORING LOG		

PROJECT CASANDRO WASH LOCATION NORTH ABUTMENT
 ELEVATION APPROXIMATELY 2166 DRILLING CONTRACTOR ENVIRO-DRILL
 DRILLING METHOD AND EQUIPMENT CME 75, 8" HOLLOW STEM AUGER
 WATER LEVELS NOT ENCOUNTERED START 1/25/94 FINISH 1/25/94 LOGGER B. BLEAZARD

DEPTH BELOW SURFACE (FT)	SAMPLE			STANDARD PENETRATION TEST RESULTS 6" - 6" - 6" (N)	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS TESTS AND INSTRUMENTATION
	INTERVAL	TYPE AND NUMBER	RECOVERY (FT)			
90.0						
91.5	SS-20	0.2	50/3"	WELL GRADED SAND WITH GRAVEL (SW), light brown and white, dry, very dense	Highly reactive to HCL	
95.0					Slight chatter of augers	
100.0				No recovery	Soil cuttings same as above, no change in drilling or material	
101.5	SS-21	N.R.	50/2.5"	Total Depth at 101.5'	11:38	
105.0						
110.0						
115.0						



PROJECT NUMBER SWW35441GT.10	BORING NUMBER B-2	SHEET 1 OF 4
SOIL BORING LOG		

PROJECT CASANDRO WASH LOCATION NORTH ABUTMENT
 ELEVATION APPROXIMATELY 2160 DRILLING CONTRACTOR ENVIRO-DRILL
 DRILLING METHOD AND EQUIPMENT CME 75, 8" HOLLOW STEM AUGER
 WATER LEVELS NOT ENCOUNTERED START 1/24/94 FINISH 1/24/94 LOGGER B. BLEAZARD

DEPTH BELOW SURFACE (FT)	SAMPLE			STANDARD PENETRATION TEST RESULTS 6" -6" -6" (N)	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
	INTERVAL	TYPE AND NUMBER	RECOVERY (FT)			
5.0	1.5	SS-1	1.2	3-7-11 (18)	<u>WELL GRADED SAND WITH SOME CLAY</u> (SC), orangish brown, moist, medium dense	Start 13:25 Rounded and angular grains, has some cohesion, makes balls in fist
	2.5					
	4.0	SS-2	1.5	17-18-28 (46)	<u>WELL GRADED SAND</u> (SW), tan and white, dry, dense	No reaction to HCL, very little to no cohesion
	5.0				Same as above except has trace gravel	
10.0	6.5	SS-3	1.5	14-17-20 (37)		
	7.5					
	9.0	SS-4	0.9	11-18-15 (33)	<u>SILTY SAND WITH GRAVEL</u> (SM), brown and gray, dry to moist, dense	Dense silt and sand in tip of sampler
	10.0					
15.0	11.5	SS-5	0.6	16-14-15 (29)	<u>SILTY SAND</u> (SM), brown, moist, medium dense	Enough silt to maintain shape of split spoon, no reaction to HCL
	12.5					
	14.0	SC-6	1.5	18-19-19 (3" SAMPLER)	<u>WELL GRADED SAND WITH GRAVEL</u> (SW), brown, dense, (sand ran out of sleeve)	3" samper with sleeves used, wouldn't stay in sleeves Not able to take density sample
	15.0				Same as above	
20.0	16.5	SS-7	1.0	14-19-20 (39)		
	17.5					
	19.0	SS-8	0.8	8-16-22 (38)	<u>WELL GRADED SAND WITH SILT AND GRAVEL</u> (SW-SM), light tan, dry, dense	No reaction to HCL
	20.0				Same as above	
25.0	21.5	SS-9	0.8	7-14-21 (35)		
	25.0					
	26.5	SS-10	1.1	20-31-34 (65)	<u>SILTY SAND WITH TRACE GRAVEL</u> (SM), tan, dry to moist, very dense	No reaction to HCL
30.0						



PROJECT NUMBER Sww35441.GT.10	BORING NUMBER B-2	SHEET 2 OF 4
SOIL BORING LOG		

PROJECT CASANDRO WASH LOCATION NORTH ABUTMENT
 ELEVATION APPROXIMATELY 2180 DRILLING CONTRACTOR ENVIRO-DRILL
 DRILLING METHOD AND EQUIPMENT CME 75, 8" HOLLOW STEM AUGER
 WATER LEVELS NOT ENCOUNTERED START 1/24/94 FINISH 1/24/94 LOGGER B. BLEAZARD

DEPTH BELOW SURFACE (FT)	SAMPLE			STANDARD PENETRATION TEST RESULTS 6" - 6" - 6" (N)	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS TESTS AND INSTRUMENTATION
	INTERVAL	TYPE AND NUMBER	RECOVERY (FT)			
30.0	30.0	SS-11	1.2	15-25-18 (43)	<u>WELL GRADED SAND WITH SILT AND SOME GRAVEL</u> (SW-SM), brown, moist, dense	No reaction to HCL
	31.5					
35.0	35.0	SS-12	1.1	19-25-27 (52)	Same as above except dense	Higher gravel content than above
	36.5					
40.0	40.0	SS-13	0.6	48-50/1"	<u>WELL GRADED SAND WITH SILT AND GRAVEL</u> (SW-SM), light gray, dry, very dense	Highly reactive to HCL, broken rock fragments in sample, probably cobbles
	41.5					
45.0	45.0	SS-14	0.3	50/3"	<u>SILTY SAND WITH GRAVEL</u> (SM), tan and white, dry, very dense	Carbonate cemented looking material, highly reactive to HCL
	46.5					
50.0	50.0	SS-15	0.1	50/3"	Same as above, very dense and difficult to pound split spoon	Most of sample was slough on top, recovered some sample from shoe
	51.5					
55.0	55.0	SS-16	0.2	50/2"	<u>SILTY SAND WITH SOME GRAVEL</u> (SM), white, dry, very dense	Carbonate cemented material continues, highly reactive with HCL
	56.5					
60.0						



PROJECT NUMBER
SWW35441.GT.10

BORING NUMBER
B-2

SHEET 3 OF 4

SOIL BORING LOG

PROJECT CASANDRO WASH LOCATION NORTH ABUTMENT
 ELEVATION APPROXIMATELY 2160 DRILLING CONTRACTOR ENVIRO-DRILL
 DRILLING METHOD AND EQUIPMENT CME 75, 8" HOLLOW STEM AUGER
 WATER LEVELS NOT ENCOUNTERED START 1/24/94 FINISH 1/24/94 LOGGER B. BLEAZARD

DEPTH BELOW SURFACE (FT)	SAMPLE			STANDARD PENETRATION TEST RESULTS 6" -6" -6" (N)	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS TESTS AND INSTRUMENTATION
	INTERVAL	TYPE AND NUMBER	RECOVERY (FT)			
60.0	60.0	SS-17	0.2	50/3"	<u>SILTY SAND WITH GRAVEL (SM)</u> , light gray, dry, very dense	Very reactive to HCL, still carbonate cemented material Augers drilling fine
	61.5					
65.0	65.0	SS-18	0.2	50/3"	<u>POORLY GRADED GRAVEL WITH SAND AND SOME SILT (GP)</u> , white, dry, very dense	Fractured rock fragments, highly reactive to HCL, still carbonate cemented sand
	66.5					
70.0	70.0	SS-19	0.5	50/4.5"	<u>WELL GRADED SAND WITH SILT AND GRAVEL (SW-SM)</u> , light brown, dry, very dense	Not much of a carbonate cemented sand look, moderately reactive to HCL
	71.5					
75.0	75.0	SS-20	0.2	50/1.5"	<u>WELL GRADED SAND WITH SILT AND GRAVEL (SW-SM)</u> , light brown and white, dry, very dense	Rock in tip of shoe to sampler, highly reactive to HCL
	76.5					
80.0	80.0	SS-21	0.1	50/2.5"	<u>SILTY SAND (SM)</u> , light brown, dry to moist, very dense	Carbonate cemented sand, highly reactive to HCL Decided to take samples every 10'
	81.5					
85.0						
90.0						



PROJECT NUMBER Sww35441.GT.10	BORING NUMBER B-2	SHEET 4 OF 4
SOIL BORING LOG		

PROJECT CASANDRO WASH LOCATION NORTH ABUTMENT
 ELEVATION APPROXIMATELY 2160 DRILLING CONTRACTOR ENVIRO-DRILL
 DRILLING METHOD AND EQUIPMENT CME 75, 8" HOLLOW STEM AUGER
 WATER LEVELS NOT ENCOUNTERED START 1/24/94 FINISH 1/24/94 LOGGER B. BLEAZARD

DEPTH BELOW SURFACE (FT)	SAMPLE			STANDARD PENETRATION TEST RESULTS 6" -6" -6" (N)	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
	INTERVAL	TYPE AND NUMBER	RECOVERY (FT)			
90.0	91.5	SS-22	0.1	50/2.5"	<u>SILTY SAND WITH GRAVEL</u> (SM), tan and white, dry, very dense	Highly reactive to HCL, carbonate cemented sand continues
95.0						Consistent drilling, same as above
100.0	101.5	SS-23	0.2	50/2.5"	<u>WELL GRADED SAND WITH SILT AND GRAVEL</u> (SW-SM), light brown, dry, very dense	Highly reactive to HCL 16:40
105.0					Total Depth at 101.5'	
110.0						
115.0						



PROJECT NUMBER SWW35441.GT.10	BORING NUMBER B-3	SHEET 1 OF 2
SOIL BORING LOG		

PROJECT CASANDRO WASH LOCATION NORTH SIDE OF WASH, EAST OF ALIGNMENT

ELEVATION APPROXIMATELY 2141 DRILLING CONTRACTOR ENVIRO-DRILL

DRILLING METHOD AND EQUIPMENT CME 75, 8" HOLLOW STEM AUGER

WATER LEVELS NOT ENCOUNTERED START 1/25/94 FINISH 1/25/94 LOGGER B. BLEAZARD

DEPTH BELOW SURFACE (FT)	SAMPLE			STANDARD PENETRATION TEST RESULTS 6" -6" -6" (N)	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS TESTS AND INSTRUMENTATION
	INTERVAL	TYPE AND NUMBER	RECOVERY (FT)			
5.0	1.5	SS-1	1.0	10-11-10 (21)	WELL GRADED SAND WITH GRAVEL (SW), light tan, dry, medium dense	Start 14:20
	2.5				Same as above except loose	Fine grain sand
	4.0	SS-2	0.5	3-4-4 (8)		
	5.0				Same as above	Slight reaction to HCL
	6.5	SS-3	0.3	3-2-3 (5)		
	7.5					
10.0	9.0	SS-4	1.0	4-12-12 (24)	WELL GRADED SAND WITH SILT AND GRAVEL (SW-SM), light brown, dry, medium dense	More gravel than above
	10.0					
	11.5	SC-5	0.8	4-5-4 (3" SAMPLER)	WELL GRADED SAND WITH GRAVEL (SW), light brown, dry, loose	3" sampler used for in place density Sample too loose to stay in sleeves
	12.5					
15.0	14.0	SS-6	0.6	15-50/5.5"	WELL GRADED SAND WITH SILT AND GRAVEL (SW-SM), light brown, dry, very dense	Highly reactive to HCL
	15.0				Same as above except more chalky white in sample	
	16.5	SS-7	0.4	50/5.5"		Highly reactive to HCL, some fractured rock in sample
	17.5					
	19.0	SS-8	0.3	7-50/3"	SILTY SAND WITH GRAVEL (SM), brown, dry to moist, very dense	Rock fragments, highly reactive to HCL
20.0	20.0					
	21.5	SS-9	0.2	50/5"	WELL GRADED SAND WITH SILT AND GRAVEL (SW-SM), light brown and white, dry, very dense	
	25.0					
25.0	26.5	SS-10		50/5"	WELL GRADED SAND WITH SILT AND TRACE GRAVEL (SW-SM), light brown, dry to moist, very dense	Carbonate cemented sand continues
	30.0					



PROJECT NUMBER
Sww35441.GT.10

BORING NUMBER
B-3

SHEET 2 OF 2

SOIL BORING LOG

PROJECT CASANDRO WASH LOCATION NORTH SIDE OF WASH, EAST OF ALIGNMENT

ELEVATION APPROXIMATELY 2141 DRILLING CONTRACTOR ENVIRO-DRILL

DRILLING METHOD AND EQUIPMENT CME 75, 8" HOLLOW STEM AUGER

WATER LEVELS NOT ENCOUNTERED START 1/25/94 FINISH 1/25/94 LOGGER B. BLEAZARD

DEPTH BELOW SURFACE (FT)	SAMPLE			STANDARD PENETRATION TEST RESULTS 6" - 6" - 6" (N)	SOIL DESCRIPTION	COMMENTS
	INTERVAL	TYPE AND NUMBER	RECOVERY (FT)			
30.0					SILTY SAND (SM), light brown and white, dry to moist, very dense	Slight rock texture, highly reactive to HCL, no real gravel or rock fractures
31.5	SS-11	0.1	50/3"			
35.0					WELL GRADED SAND WITH GRAVEL (SW), brown, moist, very dense	Darker than above but still highly reactive to HCL
36.5	SS-12	0.1	50/4"			
40.0					WELL GRADED SAND WITH TRACE GRAVEL (SW), light brown and white, dry, very dense	Highly reactive to HCL
41.5	SS-13	0.3	50/4.5"			
50.0					SILTY SAND WITH GRAVEL (SM), brown with white, moist, very dense	Rock fragments in sample 15:55
51.5	SS-14	0.3	50/5.5"			
55.0					Total Depth at 51.5'	



PROJECT NUMBER SWW35441.GT.10	BORING NUMBER B-4	SHEET 1 OF 2
SOIL BORING LOG		

PROJECT CASANDRO WASH LOCATION NORTH SIDE OF WASH, NEAR DAM ALIGNMENT
 ELEVATION APPROXIMATELY 2140 DRILLING CONTRACTOR ENVIRO-DRILL
 DRILLING METHOD AND EQUIPMENT CME 75, 8" HOLLOW STEM AUGER
 WATER LEVELS NOT ENCOUNTERED START 1/25/94 FINISH 1/26/94 LOGGER B. BLEAZARD

DEPTH BELOW SURFACE (FT)	SAMPLE			STANDARD PENETRATION TEST RESULTS 6" - 6" - 6" (N)	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS TESTS AND INSTRUMENTATION
	INTERVAL	TYPE AND NUMBER	RECOVERY (FT)			
5.0	1.5	SS-1	0.8	4-6-6 (12)	<u>SILTY SAND WITH GRAVEL (SM)</u> , light brown, moist, medium dense	Start 16:30 Broken rock in sampler
	2.5					
	4.0	SS-2	0.4	50/5.5"	<u>WELL GRADED SAND WITH GRAVEL (SW)</u> , light tan and white, dry, very dense	Highly reactive to HCL
	5.0					
10.0	6.5	SS-3	0.6	32-50/4"	<u>SILTY SAND WITH TRACE GRAVEL (SM)</u> , light brown, dry to moist, very dense	Makes loose balls in hand, slight cohesion
	7.5					
	9.0	SS-4	0.1	50/5"	<u>WELL GRADED SAND WITH GRAVEL (SW)</u> , light brown, dry, very dense	Highly reactive to HCL
	10.0					
15.0	11.5	SS-5	0.3	50/4"	<u>WELL GRADED SAND WITH GRAVEL SIZE ROCK FRAGMENTS (SW)</u> , multicolor and brown, moist, very dense	Red chunks in shoe, fractured chunk of a green stone in sampler
	12.5					
	14.0	SS-6	0.4	50/5"	<u>POORLY GRADED GRAVEL WITH SAND (GP)</u> , gray and brown, dry, very dense	Definite carbonate cemented look, highly reactive to HCL Rock fragments the diameter of sampler inside
	15.0					
20.0	16.5	SS-7	0.5	32-50/2.5	<u>WELL GRADED SAND WITH SILT AND GRAVEL (SW-SM)</u> , brown, dry, very dense	Large rock lodged in tip of shoe
	17.5					Some of sample could be slough in hole
	19.0	SS-8	0.3	49-50/5"	<u>WELL GRADED SAND WITH GRAVEL (SW)</u> , multicolored gray and brown, dry, very dense	Rock fragments in sample
	20.0					End 1/25/94 @ 17:18 Start 1/26/94 @ 07:45
25.0	21.5	SS-9	0.1	50/5"	Same as above	
	25.0					
	26.5	SS-10	0.3	50/4"	<u>WELL GRADED SAND WITH GRAVEL SIZED ROCK FRAGMENTS (SW)</u> , multicolor browns, red, and whites, dry, very dense	Fractured rock at tip of sampler
30.0						



PROJECT NUMBER Sww35441.GT.10	BORING NUMBER B-4
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SHEET 2 OF 2

SOIL BORING LOG

PROJECT CASANDRO WASH	LOCATION NORTH SIDE OF WASH, NEAR DAM ALIGNMENT
ELEVATION APPROXIMATELY 2140	DRILLING CONTRACTOR ENVIRO-DRILL
DRILLING METHOD AND EQUIPMENT CME 75, 8" HOLLOW STEM AUGER	
WATER LEVELS NOT ENCOUNTERED	START 1/25/94 FINISH 1/26/94 LOGGER B. BLEAZARD

DEPTH BELOW SURFACE (FT)	SAMPLE			STANDARD PENETRATION TEST RESULTS	SOIL DESCRIPTION	COMMENTS
	INTERVAL	TYPE AND NUMBER	RECOVERY (FT)	6" - 6" - 6" (N)	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS TESTS AND INSTRUMENTATION
	30.0	SS-11	0.4	50/4"	WELL GRADED SAND WITH GRAVEL (SW), light brown and white, dry, very dense	Moderately reactive to HCL
	31.5					
35.0	35.0	SS-12	0.6	36-50/3.5"	SILTY SAND WITH GRAVEL (SM), brown, moist, very dense	Moderately reactive to HCL
	36.5					
40.0	40.0	SS-13	N.R.	50/4.5"	No recovery, no sample taken	Cuttings look similar to those all along
	41.5					
45.0	45.0	SS-14	0.4	50/4.5"	WELL GRADED SAND WITH GRAVEL (SW), brown, dry, very hard	Rock fragment lodged in shoe of sampler Red rock fragments in sampler
	46.5					
50.0	50.0	SS-15	0.2	50/4"	WELL GRADED SAND WITH GRAVEL (SW), light brown, dry, very dense	Highly reactive to HCL 08:45
	51.5					
55.0					Total Depth at 51.5'	



PROJECT NUMBER Sww35441.GT.10	BORING NUMBER B-5	SHEET 1 OF 2
SOIL BORING LOG		

PROJECT CASANDRO WASH **LOCATION** WEST OF DAM ALIGNMENT, CENTER OF WASH
ELEVATION APPROXIMATELY 2140 **DRILLING CONTRACTOR** ENVIRO-DRILL
DRILLING METHOD AND EQUIPMENT CME 75, 8" HOLLOW STEM AUGER
WATER LEVELS NOT ENCOUNTERED **START** 1/26/94 **FINISH** 1/26/94 **LOGGER** B. BLEAZARD

DEPTH BELOW SURFACE (FT)	SAMPLE			STANDARD PENETRATION TEST RESULTS 6" -6" -6" (N)	SOIL DESCRIPTION	COMMENTS
	INTERVAL	TYPE AND NUMBER	RECOVERY (FT)			
5.0	1.5	SS-1	1.2	5-13-30 (43)	<u>WELL GRADED SAND WITH SILT AND GRAVEL</u> (SW-SM), brownish gray, dry, dense	Start 11:34 Highly reactive to HCL
	2.5				Same as above except very dense	
	4.0	SS-2	0.8	32-50/5"		
	5.0					
10.0	6.5	SS-3	0.6	32-50/4"	<u>SILTY SAND WITH GRAVEL</u> (SM), light brown and gray, dry, very dense	Highly reactive to HCL, slightly cohesive
	7.5					
	9.0	SS-4	0.6	40-50/2.5"	<u>WELL GRADED SAND WITH GRAVEL</u> (SW), light brown and white, dry, very hard	Highly reactive to material in shoe Very cemented sample
	10.0					
15.0	11.5	SS-5	0.3	50/3.5"	<u>WELL GRADED SAND WITH GRAVEL SIZED ROCK FRAGMENTS</u> (SW), light brown, dry to moist, very dense	
	12.5				Same as above	
	14.0	SS-6	0.3	20-50/3"		
	15.0					
20.0	16.5	SS-7	0.4	50-50/1.5"	<u>WELL GRADED SAND WITH SILT AND GRAVEL</u> (SW-SM), light brown, moist, very dense	Highly reactive to HCL, not typical carbonate cemented sand look
	17.5					
	19.0	SS-8	0.3	50/5"	<u>POORLY GRADED GRAVEL WITH SAND</u> (GP), light reddish brown, dry, very dense	Lots of fractured rock pieces in sample
	20.0					
25.0	21.5	SS-9	0.3	50/5.5"	<u>WELL GRADED SAND WITH SILT AND GRAVEL</u> (SW-SM), brown, moist, very dense	Moderately reactive to HCL
	25.0					
	26.5	SS-10	0.1	50/4.5"	<u>WELL GRADED SAND WITH GRAVEL</u> (SW), light brown, dry, very dense	Some rock fragments
	30.0					



PROJECT NUMBER SWW35441GT.10	BORING NUMBER B-5	SHEET 2 OF 2
SOIL BORING LOG		

PROJECT CASANDRO WASH LOCATION WEST OF DAM ALIGNMENT, CENTER OF WASH
 ELEVATION APPROXIMATELY 2140 DRILLING CONTRACTOR ENVIRO-DRILL
 DRILLING METHOD AND EQUIPMENT CME 75, 8" HOLLOW STEM AUGER
 WATER LEVELS NOT ENCOUNTERED START 1/26/94 FINISH 1/26/94 LOGGER B. BLEAZARD

DEPTH BELOW SURFACE (FT)	SAMPLE			STANDARD PENETRATION TEST RESULTS 6" - 6" - 6" (N)	SOIL DESCRIPTION	COMMENTS
	INTERVAL	TYPE AND NUMBER	RECOVERY (FT)			
30.0	30.0	SS-11	0.3	50/4"	<u>WELL GRADED SAND WITH CLAY AND GRAVEL (SW-SC), brown, moist, very dense</u>	Soil slightly cohesive, highly reactive to HCL
	31.5					
35.0					Cuttings indicate similar material as above (carbonate cemented sand)	Driller notes same drilling rate and cuttings similar to above
40.0	40.0	SS-12	0.3	50/5"	<u>WELL GRADED SAND WITH SILT AND GRAVEL (SW-SM), light, brown, moist, very dense</u>	Material has some cohesive, highly reactive to HCL
	41.5					
45.0					Cuttings indicate similar material as above (carbonate cemented sand)	No change in drilling rate, conditions, or cuttings (driller notes)
50.0	50.0	SS-13	0.3	50/4.5"	<u>WELL GRADED SAND WITH SILT AND GRAVEL (SW-SM), brown, moist, very dense</u>	Moderately reactive to HCL
	51.5					
55.0					Total Depth at 51.5'	13:52



PROJECT NUMBER SNN35441.GT.10	BORING NUMBER B-6	SHEET 1 OF 2
SOIL BORING LOG		

PROJECT CASANDRO WASH LOCATION NORTH SIDE OF WASH, DOWNSTREAM FROM DAM
 ELEVATION APPROXIMATELY 2134 DRILLING CONTRACTOR ENVIRO-DRILL
 DRILLING METHOD AND EQUIPMENT CME 75, 8" HOLLOW STEM AUGER
 WATER LEVELS NOT ENCOUNTERED START 1/26/94 FINISH 1/26/94 LOGGER B. BLEAZARD

DEPTH BELOW SURFACE (FT)	SAMPLE			STANDARD PENETRATION TEST RESULTS 6" - 6" - 6" (N)	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS TESTS AND INSTRUMENTATION
	INTERVAL	TYPE AND NUMBER	RECOVERY (FT)			
5.0	1.5	SS-1	1.1	6-8-12 (20)	WELL GRADED SAND WITH SILT AND GRAVEL (SW), brown, dry, medium dense	Start 09:25
	2.5					
5.0	4.0	SS-2	1.0	25-20-28 (48)	WELL GRADED SAND WITH SILT AND GRAVEL (SW-SM), light, gray, dry, dense	Highly reactive to HCL
	5.0					
	6.5	SS-3	1.0	4-9-8 (17)	WELL GRADED SAND WITH SOME GRAVEL (SW), brown, dry, medium dense	More gravel at bottom of sampler
10.0	7.5					
	9.0	SS-4	0.6	4-6-7 (13)	SILTY SAND WITH TRACE GRAVEL (SM), light brown, dry, dense	Slight cohesion in material
	10.0					
	12.0	ST-5	2		Same as above at top of sample @ bottom: WELL GRADED SAND WITH GRAVEL (SW), moist, dark brown, very dense	Driller suggests pushing a shelly tube, material may be mostly granular but good sample for in place density. Material much denser at bottom
15.0	12.5					
	14.0	SS-6	1.0	20-17-16 (33)	WELL GRADED SAND WITH CLAY AND GRAVEL (SW-SC), brown and white, dry to moist, dense	Highly reactive to HCL
	15.0					
	16.5	SS-7	1.2	36-46-50/4.5"	SILTY SAND WITH GRAVEL (SM), multicolor grays and browns, dry to moist, very dense	Highly reactive to HCL, looks like carbonate cemented sand
	17.5					
20.0	19.0	SS-8	0.3	50/5"	Same as above	Highly reactive to HCL
	20.0					
	21.5	SS-9	0.3	50/5.5"	WELL GRADED SAND WITH GRAVEL (SW), light brown and gray, dry to moist, very dense	Highly reactive to HCL
25.0	25.0					
	26.5	SS-10	0.4	50/5"	SILTY SAND WITH GRAVEL (SM), white and brown, dry to moist, very dense	White quartz like rocks in sample, carbonate cemented sand
	30.0					



PROJECT NUMBER SWW35441.GT.10	BORING NUMBER B-6	SHEET 2 OF 2
SOIL BORING LOG		

PROJECT CASANDRO WASH LOCATION NORTH SIDE OF WASH, DOWNSTREAM FROM DAM
 ELEVATION APPROXIMATELY 2134 DRILLING CONTRACTOR ENVIRO-DRILL
 DRILLING METHOD AND EQUIPMENT CME 75, 8" HOLLOW STEM AUGER
 WATER LEVELS NOT ENCOUNTERED START 1/26/94 FINISH 1/26/94 LOGGER B. BLEAZARD

DEPTH BELOW SURFACE (FT)	SAMPLE			STANDARD PENETRATION TEST RESULTS 6" -6" -6" (N)	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS TESTS AND INSTRUMENTATION
	INTERVAL	TYPE AND NUMBER	RECOVERY (FT)			
35.0	30.0 - 31.5	SS-11	0.1	50/4.5"	<u>WELL GRADED SAND WITH GRAVEL SIZED ROCK FRAGMENTS</u> (SW), gray and light brown, dry, very dense	Fractured rocks in sample
	35.0 - 37.5	SS-12	0.2	50/3.5"	<u>CLAYEY SAND WITH GRAVEL</u> (SC), brown with white, moist, very dense	Fractured red rock at top of sample Cohesion in sample
40.0	40.0 - 41.5	SS-13	0.2	50/4"	<u>SILTY SAND WITH GRAVEL</u> (SM), light brown, moist, very dense	Highly reactive to HCL, some cohesion in sample
	45.0 - 50.0					Cuttings similar to above, driller notes no change in drilling
50.0	50.0 - 51.5	SS-14	0.2	50/4"	<u>WELL GRADED SAND WITH CLAY AND GRAVEL</u> (SW-SC), light brown, white, and gray, moist, very dense	Fractured rocks in sample 11:17
	51.5 - 55.0				Total Depth at 51.5'	



PROJECT NUMBER SWW35441GT.10	BORING NUMBER B-7	SHEET 1 OF 2
SOIL BORING LOG		

PROJECT CASANDRO WASH	LOCATION NEAR SOUTH ABUTMENT
ELEVATION APPROXIMATELY 2136	DRILLING CONTRACTOR ENVIRO-DRILL
DRILLING METHOD AND EQUIPMENT CME 75, 8" HOLLOW STEM AUGER	
WATER LEVELS NOT ENCOUNTERED	START 1/27/94 FINISH 1/27/94
LOGGER B. BLEAZARD	

DEPTH BELOW SURFACE (FT)	SAMPLE			STANDARD PENETRATION TEST RESULTS 6" - 6" - 6" (N)	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS TESTS AND INSTRUMENTATION
	INTERVAL	TYPE AND NUMBER	RECOVERY (FT)			
5.0	1.5	SS-1	1.3	6-16-21 (37)	SILTY SAND WITH GRAVEL (SM), light brown, moist, dense	Start 10:24
	2.5					
	4.0	SS-2	0.5	7-13-17 (30)	WELL GRADED SAND WITH SILT AND GRAVEL (SW-SM), light, gray, dry, dense	Highly reactive to HCL
	5.0					
10.0	6.5	SC-3	1.2	10-18-17 (3" SAMPLER)	SILTY SAND WITH GRAVEL (SM), light brown, dry, dense	3" sampler used for in place density
	7.5				WELL GRADED SAND WITH CLAY AND GRAVEL (SW-SC), dark brown, moist, dense	
	9.0	SS-4	1.3	7-11-12 (23)	WELL GRADED SAND WITH TRACE CLAY AND GRAVEL (SW-SC), dark brown, moist, medium dense	Very coarse sand
	10.0					
15.0	11.5	SS-5	0.5	12-21-25 (46)	WELL GRADED SAND WITH GRAVEL (SW), light gray, dry, dense	Highly reactive to HCL, sample very blocky
	12.5					
	14.0	SS-6	1.3	17-28-50 (78)	WELL GRADED SAND WITH SILT AND GRAVEL (SW-SM), light brown and gray, dry, very dense	Lots of fractured rock
	15.0					
20.0	16.5	SS-7	0.4	22-50/2"	WELL GRADED SAND WITH GRAVEL (SW), light tan, dry, very dense	Highly reactive to HCL
	17.5					Driller forgot to stop for 17.5-19' sample
	20.0					
	21.5	SS-8	0.3	50/4.5"	WELL GRADED SAND WITH GRAVEL (SW), light brown, dry, very dense	Fragments of rocks and gravel in sample
25.0	25.0					
	26.5	SS-9	0.5	45-50/1.5"	WELL GRADED SAND WITH GRAVEL (SW), light brown and gray, dry, very dense	Slight chatter/grinding at 25', rock fragments the diameter of sampler in sample
	30.0					



PROJECT NUMBER SWW35441.GT.10	BORING NUMBER B-8	SHEET 1 OF 2
SOIL BORING LOG		

PROJECT CASANDRO WASH LOCATION WEST OF SOUTH ABUTMENT
 ELEVATION APPROXIMATELY 2139 DRILLING CONTRACTOR ENVIRO-DRILL
 DRILLING METHOD AND EQUIPMENT CME 75, 8" HOLLOW STEM AUGER
 WATER LEVELS NOT ENCOUNTERED START 1/27/94 FINISH 1/27/94 LOGGER B. BLEAZARD

DEPTH BELOW SURFACE (FT)	SAMPLE			STANDARD PENETRATION TEST RESULTS 6" -6" -6" (N)	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS TESTS AND INSTRUMENTATION
	INTERVAL	TYPE AND NUMBER	RECOVERY (FT)			
5.0	1.5	SS-1	1.0	5-8-8 (16)	WELL GRADED SAND WITH SILT AND GRAVEL (SW-SM), light brown, dry, medium dense	Start 08:05 Rock in shoe of sampler
	2.5				Same as above	
	4.0	SS-2	1.0	7-8-10 (18)		No reaction to HCL
	5.0				WELL GRADED SAND WITH GRAVEL (SW), brown, moist, medium dense	Coarse grain sand
10.0	6.5	SS-3	0.9	15-17-11 (28)		
	7.5				WELL GRADED SAND WITH SILT AND GRAVEL (SW-SM), multicolored browns and whites, dry, very dense	Looks like carbonate cemented sand sample, very blocky and cemented, highly reactive to HCL
	9.0	SS-4	0.6	10-40/3.5"		
	10.0				Same as above	
15.0	11.5	SS-5	0.8	48-50/4"		Highly reactive to HCL
	12.5				WELL GRADED SAND WITH GRAVEL (SW), light brown, dry, very dense	Highly reactive to HCL, doesn't seem as cemented as above
	14.0	SS-6	0.6	35-50/2"		
	15.0				WELL GRADED SAND WITH SILT AND GRAVEL (SW-SM), light brown, moist, very dense	Not as blocky or cemented as carbonate cemented sand above
20.0	16.5	SS-7	0.3	50/3.5"		
	17.5				WELL GRADED SAND WITH GRAVEL (SW), light brown, dry to moist, very dense	Continuing in carbonate cemented sand
	19.0	SS-8	0.3	50/5.5"		
	20.0				WELL GRADED SAND WITH SILT AND GRAVEL (SW-SM), brown, moist, very dense	Moderately reactive to HCL
25.0	21.5	SS-9	0.4	50/5.5"		
	25.0				WELL GRADED SAND WITH GRAVEL (SW), light brown, dry, very dense	Fractured rock bits in sample
	26.5	SS-10	0.3	50/4"		
30.0						



PROJECT NUMBER SWW35441.GT.10	BORING NUMBER B-8	SHEET 2 OF 2
SOIL BORING LOG		

PROJECT CASANDRO WASH LOCATION WEST OF SOUTH ABUTMENT
 ELEVATION APPROXIMATELY 2139 DRILLING CONTRACTOR ENVIRO-DRILL
 DRILLING METHOD AND EQUIPMENT CME 75, 8" HOLLOW STEM AUGER
 WATER LEVELS NOT ENCOUNTERED START 1/27/94 FINISH 1/27/94 LOGGER B. BLEAZARD

DEPTH BELOW SURFACE (FT)	SAMPLE			STANDARD PENETRATION TEST RESULTS 6" - 6" - 6" (N)	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS TESTS AND INSTRUMENTATION
	INTERVAL	TYPE AND NUMBER	RECOVERY (FT)			
30.0	30.0	SS-11	0.2	50/5"	WELL GRADED SAND WITH GRAVEL (SW), light brown and gray, dry to moist, very dense	Large fractured gravel bits in sample, moderately reactive to HCL
	31.5					
35.0	35.0	SS-12	0.2	50/4"	WELL GRADED SAND WITH GRAVEL (SW), brown, moist, very dense	Gray and white gravel and rock fragments, moderately reactive to HCL
	36.5					
40.0	40.0	SS-13	0.3	50/5"	WELL GRADED SAND WITH SOME SILT AND GRAVEL (SW-SM), brown and gray, moist, very dense	Some cemented chunks, highly reactive to HCL
	41.5					
45.0					Cuttings indicate same material as above	Consistent drilling conditions and rate, similar cuttings as above
50.0	50.0	SS-14	0.3	50/3.5"	WELL GRADED SAND WITH SILT AND GRAVEL (SW-SM), brown, moist, very dense	09:30
	51.5					
55.0					Total Depth at 51.5'	



PROJECT NUMBER SWW35441.GT.10	BORING NUMBER B-9	SHEET 1 OF 4
SOIL BORING LOG		

PROJECT CASANDRO WASH LOCATION SOUTH ABUTMENT
 ELEVATION APPROXIMATELY 2150 DRILLING CONTRACTOR ENVIRO-DRILL
 DRILLING METHOD AND EQUIPMENT CME 75, 8" HOLLOW STEM AUGER
 WATER LEVELS NOT ENCOUNTERED START 1/27/94 FINISH 1/27/94 LOGGER B. BLEAZARD

DEPTH BELOW SURFACE (FT)	SAMPLE			STANDARD PENETRATION TEST RESULTS	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS TESTS AND INSTRUMENTATION
	INTERVAL	TYPE AND NUMBER	RECOVERY (FT)	6" -6" -6" (N)		
5.0	1.5	SS-1	1.0	12-12-12 (24)	SILTY SAND WITH GRAVEL (SM), light brown, dry, medium dense	Start 12:30
	2.5					Hard drilling at 2'
	4.0	SS-2	1.4	13-19-50/4.5"	WELL GRADED SAND WITH SILT AND GRAVEL (SW-SM), light brown, dry to moist, very dense	No reaction to HCL
	5.0					
	6.5	SS-3	0.8	7-15-23 (38)	Same as above	
	7.5					
10.0	8.5	SC-4	0.8	20-40 (3" SAMPLER)	WELL GRADED SAND WITH CLAY AND GRAVEL (SW-SC), brown, moist, dense	3" sampler used for in place density, 12" sample. Pushed shelby because material was starting to look clayey
	10.0	ST-5	0		Material too hard for shelby tube, no sample recovered	
	11.5	SS-6	0.5	18-50/4"	WELL GRADED SAND WITH SILT AND GRAVEL (SW-SM), light brown and gray, dry, very dense	
	12.5					
15.0	14.0	SS-7	0.4	50/5"	Same as above	
	15.0					
	16.5	SS-8	0.7	38-50/3"	WELL GRADED SAND WITH SILT AND GRAVEL (SW-SM), grayish brown, moist, very dense	Highly reactive to HCL, a carbonate cemented sand look
	17.5					Highly reactive to HCL, looks like carbonate cemented sand
	19.0	SS-9	0.3	50/5.5"	SILTY SAND WITH GRAVEL (SM), brown and white, moist, very dense	Carbonate cemented sand, highly reactive to HCL
20.0	20.0				Same as above	Moderately reactive to HCL
	21.5	SS-10	0.4	45-50/2"		
	25.0					
25.0	25.0					
	26.5	SS-11	0.3	50/5"	SILTY SAND WITH GRAVEL (SM), brown, moist, very dense	Highly reactive to HCL
30.0						



PROJECT NUMBER SWW35441.GT.10	BORING NUMBER B-9	SHEET 3 OF 4
SOIL BORING LOG		

PROJECT CASANDRO WASH LOCATION SOUTH ABUTMENT
 ELEVATION APPROXIMATELY 2150 DRILLING CONTRACTOR ENVIRO-DRILL
 DRILLING METHOD AND EQUIPMENT CME 75, 8" HOLLOW STEM AUGER
 WATER LEVELS NOT ENCOUNTERED START 1/27/94 FINISH 1/27/94 LOGGER B. BLEAZARD

DEPTH BELOW SURFACE (FT)	SAMPLE			STANDARD PENETRATION TEST RESULTS 6" - 6" - 6" (N)	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS TESTS AND INSTRUMENTATION
	INTERVAL	TYPE AND NUMBER	RECOVERY (FT)			
60.0	60.0 - 61.5	SS-18	0.2	50/3.5"	<u>WELL GRADED SAND WITH SILT AND GRAVEL SIZED ROCK FRAGMENTS</u> (SW-SM), light brown and gray, dry, very dense	Highly reactive to HCL Driller notes similar drilling rate and conditions as above Driller notes slight higher clay content than normal, Hole tight and takes time to sweep the hole
61.5						
70.0	70.0 - 71.5	SS-19	0.2	50/3"	<u>SILTY SAND WITH GRAVEL</u> (SM), light brown and gray, dry to moist, very dense	Material looks like carbonate cemented sand at tip of shoe, rock texture blocky sample, very cemented Driller added water to auger to help lift cuttings Drilling progressing much better
71.5						
80.0	80.0 - 81.5	SS-20	0.2	50/3"	<u>SILTY SAND WITH GRAVEL</u> (SM), brown, moist, very dense	Highly reactive to HCL, moisture could be due to water added to hole Same drilling rate as above, driller adds water to help sweep hole Progress slows to sweep hole
81.5						
90.0	90.0					



PROJECT NUMBER Sww35441.GT.10	BORING NUMBER B-9	SHEET 4 OF 4
SOIL BORING LOG		

PROJECT CASANDRO WASH LOCATION SOUTH ABUTMENT
 ELEVATION APPROXIMATELY 2150 DRILLING CONTRACTOR ENVIRO-DRILL
 DRILLING METHOD AND EQUIPMENT CME 75, 8" HOLLOW STEM AUGER
 WATER LEVELS NOT ENCOUNTERED START 1/27/94 FINISH 1/27/94 LOGGER B. BLEAZARD

DEPTH BELOW SURFACE (FT)	SAMPLE			STANDARD PENETRATION TEST RESULTS 6" -6" -6" (N)	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
	INTERVAL	TYPE AND NUMBER	RECOVERY (FT)			
90.0	90.0 91.5	SS-21	0.2	50/2.5"	SILTY SAND WITH GRAVEL (SM), light brown and white, dry to moist, very dense	Fractured rock at tip of shoe, rock texture in sample
95.0						
100.0	100.0 101.5	SS-22	0.4	50/5"	SILTY SAND WITH GRAVEL (SM), brown, moist, very dense	Material shows some cohesion 17:40
105.0						
110.0	Total Depth at 101.5'					
115.0						



PROJECT NUMBER SWW35441.GT.10	BORING NUMBER B-10	SHEET 1 OF 4
SOIL BORING LOG		

PROJECT CASANDRO WASH LOCATION SOUTH ABUTMENT (RYAN'S YARD)
 ELEVATION APPROXIMATELY 2164 DRILLING CONTRACTOR ENVIRO-DRILL
 DRILLING METHOD AND EQUIPMENT CME 75, 8" HOLLOW STEM AUGER
 WATER LEVELS NOT ENCOUNTERED START 1/28/94 FINISH 1/28/94 LOGGER B. BLEAZARD

DEPTH BELOW SURFACE (FT)	SAMPLE			STANDARD PENETRATION TEST RESULTS 6" - 6" - 6" (N)	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
	INTERVAL	TYPE AND NUMBER	RECOVERY (FT)			
5.0	1.5	SS-1	1.0	7-8-10 (18)	<u>SILTY SAND WITH TRACE GRAVEL (SM)</u> , brown, moist, medium dense	Start 09:15
	2.5					
	4.0	SS-2	1.1	3-3-3 (6)	<u>SANDY SILT WITH TRACE GRAVEL (ML)</u> , brown, moist, firm	Because of silt, try to push a shelly tube
	6.0	ST-3	2.0	1-2-2-1	<u>SILTY SAND (SM)</u> , brown, moist, loose	No real sign of gravel in shelly tube
10.0	7.5					
	9.0	SS-4	1.3	6-10-16 (26)	<u>SILTY SAND WITH GRAVEL (SM)</u> , brown, moist, medium dense	Highly reactive to HCL
	10.0					
	11.5	SS-5	1.2	6-12-25 (37)	<u>SANDY SILT WITH GRAVEL (ML)</u> , brown, moist, hard	Carbonate cemented sand looking soil at tip of shoe
15.0	12.5					
	14.0	SS-6	1.2	11-11-9 (20)	<u>SILTY SAND WITH TRACE GRAVEL (SM)</u> , brown, moist, medium dense	
	15.0				Same as above except lighter brown	
	16.5	SS-7	0.8	10-15-3 (28)		
20.0	17.5					
	19.0	SS-8	1.2	16-18-11 (29)	<u>WELL GRADED SAND WITH SILT AND GRAVEL (SW-SM)</u> , light brown, moist, medium dense	
	20.0				Same as above	
	21.0	SC-9	1.0	9-21 (3" SAMPLER)		3" sampler for inplace density
25.0	25.0					
	26.5	SS-10	0.3	50/5.5"	<u>WELL GRADED SAND WITH GRAVEL (SW)</u> , light brown, moist	Highly reactive to HCL, sample looks like carbonate cemented sand
	30.0					



PROJECT NUMBER SWW35441.GT.10	BORING NUMBER B-10	SHEET 3 OF 4
SOIL BORING LOG		

PROJECT CASANDRO WASH LOCATION SOUTH ABUTMENT (RYAN'S YARD)
 ELEVATION APPROXIMATELY 2164 DRILLING CONTRACTOR ENVIRO-DRILL
 DRILLING METHOD AND EQUIPMENT CME 75, 8" HOLLOW STEM AUGER
 WATER LEVELS NOT ENCOUNTERED START 1/28/94 FINISH 1/28/94 LOGGER B. BLEAZARD

DEPTH BELOW SURFACE (FT)	SAMPLE			STANDARD PENETRATION TEST RESULTS 6" - 6" - 6" (N)	SOIL DESCRIPTION	COMMENTS
	INTERVAL	TYPE AND NUMBER	RECOVERY (FT)			
60.0	60.0	SS-17	0.3	50/5"	<u>SILTY SAND WITH GRAVEL (SM)</u> , light brown, dry to moist, very dense	Highly reactive to HCL
	61.5					
65.0	65.0	SS-18	0.3	50/5"	Same as above except moist	Highly reactive to HCL
	66.5					
70.0	70.0	SS-19	0.2	50/3.5"	<u>WELL GRADED SAND WITH SILT AND GRAVEL (SW-SM)</u> , multicolor brown, gray, and white, dry to moist, very dense	Highly reactive to HCL
	71.5					
75.0	75.0				Cuttings indicate similar material as above, sandy and gravelly	Drilling rate and conditions similar to above, no change
80.0	80.0	SS-20	0.1	50/3"	<u>WELL GRADED SAND WITH GRAVEL AND CHUNK OF DECOMPOSED GRANITE (SW)</u> , light brown and white, dry to moist, very dense	Driller having slight problem getting soil to lift out of hole Chunk looked like decomposed granite or like rock
	81.5					
85.0	85.0					Driller adds water to hole to help flush cuttings
90.0						Driller notes similar rate, takes time to sweep hole



PROJECT NUMBER Sww35441.GT.10	BORING NUMBER B-10	SHEET 4 OF 4
SOIL BORING LOG		

PROJECT CASANDRO WASH LOCATION SOUTH ABUTMENT (RYAN'S YARD)
 ELEVATION APPROXIMATELY 2164 DRILLING CONTRACTOR ENVIRO-DRILL
 DRILLING METHOD AND EQUIPMENT CME 75, 8" HOLLOW STEM AUGER
 WATER LEVELS NOT ENCOUNTERED START 1/28/94 FINISH 1/28/94 LOGGER B. BLEAZARD

DEPTH BELOW SURFACE (FT)	SAMPLE			STANDARD PENETRATION TEST RESULTS 6" -6" -6" (N)	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
	INTERVAL	TYPE AND NUMBER	RECOVERY (FT)			
90.0	91.5	SS-21	0.2	50/3"	<u>SILTY SAND WITH GRAVEL (SM)</u> , light brown and gray, dry to moist, very dense	Moisture could be due to water added to hole Similar drilling rate, mud flushing from hole and helping progress
95.0						
100.0	101.5	SS-22	0.3	50/4"	<u>SILTY SAND WITH TRACE ROCK FRAGMENTS (SM)</u> , brown, moist, very dense	Hard to tell if sample was all slough or not 12:15
105.0					Total Depth at 101.5'	
110.0						
115.0						



PROJECT NUMBER SWW35441.GT.10	BORING NUMBER B-11
SHEET 1 OF 2	
SOIL BORING LOG	

PROJECT CASANDRO WASH	LOCATION SOUTH OF SOUTH ABUTMENT
ELEVATION APPROXIMATELY 2161	DRILLING CONTRACTOR ENVIRO-DRILL
DRILLING METHOD AND EQUIPMENT CME 75, 8" HOLLOW STEM AUGER	
WATER LEVELS NOT ENCOUNTERED	START 1/28/94 FINISH 1/28/94 LOGGER B. BLEAZARD

DEPTH BELOW SURFACE (FT)	SAMPLE			STANDARD PENETRATION TEST RESULTS	SOIL DESCRIPTION	COMMENTS
	INTERVAL	TYPE AND NUMBER	RECOVERY (FT)	6" - 6" - 6" (N)	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS TESTS AND INSTRUMENTATION
5.0	1.5	SS-1	0.5	7-7-11 (18)	<u>SILTY SAND WITH GRAVEL</u> (SM), light brown, dry, medium dense	Start 14:00
	2.5				Same as above	
	4.0	SS-2	1.5	10-10-12 (22)		Highly reactive to HCL
	5.0					
	6.5	SS-3	0.5	12-15-20 (35)	<u>SILTY SAND WITH GRAVEL</u> (SM), light brown, dry, dense	Highly reactive to HCL
	7.5					
	9.0	SS-4	0.4	10-17-12 (29)	<u>WELL GRADED SAND WITH SILT AND GRAVEL</u> (SW-SM), light brown and white, dry, medium dense	
	10.0					
10.0	11.5	SC-5	0.4	7-15 (3" SAMPLER)	<u>SANDY SILT WITH GRAVEL</u> (ML), light brown, dry, very stiff	3" sampler used, sample fell out of rings
	12.5					
	14.0	SS-6	0.6	10-16-16 (32)	<u>WELL GRADED SAND WITH SILT AND GRAVEL</u> (SW-SM), light brown, dry, dense	Highly reactive to HCL
	15.0					
15.0	16.5	SS-7	0.8	8-15-17 (32)	Same as above	
	17.5					
	19.0	SS-8		18-33-40 (73)	<u>WELL GRADED SAND WITH SILT AND GRAVEL</u> (SW-SM), brown and white, dry, very dense	No reaction to HCL, sample very blocky
	20.0					
20.0	21.5	SS-9	1.2	11-26-25 (51)	<u>CLAYEY SAND WITH GRAVEL</u> (SC), reddish brown and white, dry to moist, very dense	No reaction to HCL, very blocky
	25.0					
25.0	26.5	SS-10	0.6	13-29-33 (62)	<u>WELL GRADED SAND WITH SILT AND GRAVEL</u> (SW-SM), light gray and white, dry, very dense	No reaction to HCL
	30.0					



PROJECT NUMBER SWW35441.GT.10	BORING NUMBER B-11
SHEET 2 OF 2	
SOIL BORING LOG	

PROJECT CASANDRO WASH	LOCATION SOUTH OF SOUTH ABUTMENT
ELEVATION APPROXIMATELY 2161	DRILLING CONTRACTOR ENVIRO-DRILL
DRILLING METHOD AND EQUIPMENT CME 75, 8" HOLLOW STEM AUGER	
WATER LEVELS NOT ENCOUNTERED	START 1/28/94 FINISH 1/28/94 LOGGER B. BLEAZARD

DEPTH BELOW SURFACE (FT)	SAMPLE			STANDARD PENETRATION TEST RESULTS 6" - 6" - 6" (N)	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS TESTS AND INSTRUMENTATION
	INTERVAL	TYPE AND NUMBER	RECOVERY (FT)			
30.0	30.0	SS-11	0.5	40-50/4"	WELL GRADED SAND WITH SILT AND GRAVEL (SW-SM), light brown and white	No reaction to HCL, rock fractures in sample
	31.5					
35.0	35.0	SS-12	0.1	50/4"	SILTY SAND WITH GRAVEL (SM), tan and gray, dry, very dense	Highly reactive to HCL, looks like carbonate cemented sand
	36.5					
40.0	40.0	SS-13	0.3	50/5.5"	SILTY SAND WITH GRAVEL (SM), light brown and gray, dry, very dense	Rock fragments in sample, highly reactive to HCL, carbonate cemented sand looking
	41.5					
45.0	45.0	SS-14	0.2	50/4.5"	WELL GRADED SAND WITH SILT AND GRAVEL (SW-SM), light brown and white, dry, very dense	Highly reactive to HCL, carbonate cemented sand
	46.5					
50.0	50.0	SS-15	N.R.	50/4"	No recovery, no sample taken	Probably pounded sampler on top of cobble
	51.5					
55.0					Total Depth at 51.5'	15:00



PROJECT NUMBER Sww35441.GT.10	BORING NUMBER B-12	SHEET 2 OF 2
SOIL BORING LOG		

PROJECT CASANDRO WASH	LOCATION NORTH WEST BANK OF WASH
ELEVATION APPROXIMATELY 2189	DRILLING CONTRACTOR ENVIRO-DRILL
DRILLING METHOD AND EQUIPMENT CME 75, 8" HOLLOW STEM AUGER	
WATER LEVELS NOT ENCOUNTERED	START 1/24/94 FINISH 1/24/94 LOGGER B. BLEAZARD

DEPTH BELOW SURFACE (FT)	SAMPLE			STANDARD PENETRATION TEST RESULTS 6" -6" -6" (N)	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
	INTERVAL	TYPE AND NUMBER	RECOVERY (FT)			
30.5						
34.0						
35.0	35.5	SS-12	1.0	17-39-38 (77)	WELL GRADED SAND WITH GRAVEL (SW), light gray, dry, very dense	Some coarser sand at slope, probably slough from above Rock fragments in sample, probably from large gravel/cobbles, very fine grain sands
	39.0					
40.0	40.5	SS-13	N.R.	10-22-25 (47)	No recovery, cuttings look the same as above	Probably pounded sampler on cobble, driller notes no change in drilling from above
	44.0					
45.0	45.5	SS-14	1.0	13-24-35 (59)	SILTY SAND WITH GRAVEL (SM), light brown, dry, very dense	More silt at bottom 3" of sampler
	49.0					
50.0	50.5	SS-15	0.8	24-29-30 (59)	Same as above	Signs of carbonate cemented sand at nose of sample, highly reactive to HCL 12:42
					Total Depth at 50.5'	
55.0						



PROJECT NUMBER SWW35441.GT.10	BORING NUMBER B-13	SHEET 2 OF 2
SOIL BORING LOG		

PROJECT CASANDRO WASH LOCATION SOUTH BANK OF WASH
 ELEVATION APPROXIMATELY 2178 DRILLING CONTRACTOR ENVIRO-DRILL
 DRILLING METHOD AND EQUIPMENT CME 75, 8" HOLLOW STEM AUGER
 WATER LEVELS NOT ENCOUNTERED START 1/26/94 FINISH 1/26/94 LOGGER B. BLEAZARD

DEPTH BELOW SURFACE (FT)	SAMPLE			STANDARD PENETRATION TEST RESULTS 6" -6" -6" (N)	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS TESTS AND INSTRUMENTATION
	INTERVAL	TYPE AND NUMBER	RECOVERY (FT)			
30.0						
31.5	30.0-31.5	SS-11	0.9	12-25-33 (58)	WELL GRADED SAND WITH GRAVEL (SW), light gray, dry, very dense	No reaction to HCL
35.0						
36.5	35.0-36.5	SS-12	0.1	50/5"	WELL GRADED SAND WITH SILT (SW-SM), light brown, dry, very dense	No sign of gravel, no reaction of HCL
40.0						
41.5	40.0-41.5	SS-13	0.3	50/3.5"	WELL GRADED SAND WITH SILT AND GRAVEL (SW-SM), light gray, dry, very dense	Very reactive to HCL, bottom of shoe carbonate cemented sand
45.0						
46.5	45.0-46.5	SS-14	0.2	50/5"	Same as above	Highly reactive to HCL
50.0						
51.5	50.0-51.5	SS-15		50/3.5"	SILTY SAND WITH GRAVEL (SM), light gray and white, dry, very dense	Highly reactive to HCL, carbonate cemented sand
55.0					Total Depth at 51.5'	16:07

Appendix C
Field Permeability Test Measurements

Field Infiltration Test Data							
Borehole	Surface Elevation	Depth of Boring (ft)	Time (min)	Elapsed Time (sec)	Depth to water (ft)	Elevation of water (msl)	Depth of water (ft)
B-1	2165	101.5	5.5	0	16.5	2148.5	85.0
			6.0	30	20.0	2145.0	81.5
			7.0	90	27.0	2138.0	74.5
			7.5	120	29.5	2135.5	72.0
			8.0	150	31.5	2133.5	70.0
			8.5	180	33.5	2131.5	68.0
			9.0	210	35.0	2130.0	66.5
			9.5	240	36.0	2129.0	65.5
			10.0	270	37.2	2127.8	64.3
			10.5	300	38.0	2127.0	63.5
			11.0	330	39.4	2125.6	62.1
			11.5	360	40.6	2124.4	60.9
			12.5	420	41.1	2123.9	60.4
			13.0	450	43.0	2122.0	58.5
B-2	2160	101.5	49.0	0	14.5	2145.5	87.0
			49.8	45	17.0	2143.0	84.5
			50.5	90	19.8	2140.2	81.7
			51.0	120	22.0	2138.0	79.5
			51.5	150	23.3	2136.7	78.2
			52.0	180	24.0	2136.0	77.5
			52.5	210	25.9	2134.1	75.6
			53.0	240	26.9	2133.1	74.6
			53.5	270	28.0	2132.0	73.5
			54.0	300	29.0	2131.0	72.5
			54.5	330	30.5	2129.5	71.0
			55.0	360	31.4	2128.6	70.1
			55.5	390	32.0	2128.0	69.5
			56.0	420	32.5	2127.5	69.0
			56.5	450	33.3	2126.7	68.2
			57.0	480	34.8	2125.2	66.7
57.5	510	35	2125.0	66.5			
58.0	540	36	2124.0	65.5			
58.5	570	36.8	2123.2	64.7			
59.0	600	37.6	2122.4	63.9			
59.5	630	38.3	2121.7	63.2			
60.0	660	39	2121.0	62.5			

Field Infiltration Test Data							
Borehole	Surface Elevation	Depth of Boring (ft)	Time (min)	Elapsed Time (sec)	Depth to water (ft)	Elevation of water (msl)	Depth of water (ft)
B-3	2140	51.5	57.0	0	9.0	2131.0	42.5
			57.5	30	10.7	2129.3	40.8
			58.0	60	11.7	2128.3	39.8
			58.5	90	12.8	2127.2	38.7
			59.0	120	13.6	2126.4	37.9
			59.5	150	14.4	2125.6	37.1
			60.0	180	15.4	2124.6	36.1
			60.5	210	16.3	2123.7	35.2
			61.0	240	17.0	2123.0	34.5
			61.5	270	17.3	2122.7	34.2
			62.0	300	18.5	2121.5	33.0
			62.5	330	19.9	2120.1	31.6
			63.0	360	20.0	2120.0	31.5
			63.5	390	20.5	2119.5	31.0
			64.0	420	21.0	2119.0	30.5
			64.5	450	21.5	2118.5	30.0
			65.0	480	22.2	2117.8	29.3
65.5	510	22.9	2117.1	28.6			
66.0	540	23.4	2116.6	28.1			
66.5	570	24	2116.0	27.5			
67.0	600	24.4	2115.6	27.1			
TP-9	2140	5	0.0	0	2.05	2138.0	2.95
			6.0	360	2.10	2137.9	2.90
			25.0	1500	2.20	2137.8	2.80
			48.0	2880	2.30	2137.7	2.70
			82.0	4920	2.40	2137.6	2.60
			132.0	7920	2.50	2137.5	2.50
255.0	15300	2.70	2137.3	2.30			

Field Infiltration Test Data							
Borehole	Surface Elevation	Depth of Boring (ft)	Time (min)	Elapsed Time (sec)	Depth to water (ft)	Elevation of water (msl)	Depth of water (ft)
B-5	2140	51.5	56.0	0	14.1	2125.9	37.4
			56.5	30	15.2	2124.8	36.3
			57.0	60	16.3	2123.7	35.2
			57.5	90	16.9	2123.1	34.6
			58.0	120	17.7	2122.3	33.8
			58.5	150	18.4	2121.6	33.1
			59.0	180	19.1	2120.9	32.4
			59.5	210	19.7	2120.3	31.8
			60.0	240	20.4	2119.6	31.1
			60.5	270	21.0	2119.0	30.5
			61.0	300	21.5	2118.5	30.0
			61.5	330	21.9	2118.1	29.6
			62.0	360	22.3	2117.7	29.2
			62.5	390	22.7	2117.3	28.8
			63.0	420	23.1	2116.9	28.4
			63.5	450	23.6	2116.4	27.9
			64.0	480	23.8	2116.2	27.7
			64.5	510	24.2	2115.8	27.3
			65.5	570	24.4	2115.6	27.1
			66.0	600	24.7	2115.3	26.8
66.5	630	25.1	2114.9	26.4			
67.0	660	25.5	2114.5	26.0			
B-8	2140	51.5	32.5	0	7.2	2132.8	44.3
			33.0	30	8.2	2131.8	43.3
			33.5	60	8.3	2131.7	43.2
			34.0	90	8.9	2131.1	42.6
			34.5	120	9.6	2130.4	41.9
			35.0	150	10.1	2129.9	41.4
			35.5	180	10.6	2129.4	40.9
			36.0	210	11.0	2129.0	40.5
			36.5	240	11.5	2128.5	40.0
			37.0	270	11.8	2128.2	39.7
			37.5	300	12.2	2127.8	39.3
			38.0	330	12.5	2127.5	39.0
			38.5	360	12.9	2127.1	38.6
			39.0	390	13.2	2126.8	38.3
			39.5	420	13.6	2126.4	37.9
			40.0	450	13.9	2126.1	37.6
			40.5	480	14.3	2125.7	37.2
			41.0	510	14.6	2125.4	36.9
			41.5	540	15	2125.0	36.5
			42.0	570	15.3	2124.7	36.2
42.5	600	15.5	2124.5	36.0			

Field Infiltration Test Data							
Borehole	Surface Elevation	Depth of Boring (ft)	Time (min)	Elapsed Time (sec)	Depth to water (ft)	Elevation of water (msl)	Depth of water (ft)
B-9	2150	101.5	39.5	0	10.0	2140.0	91.5
			40.0	30	11.0	2139.0	90.5
			40.5	60	12.2	2137.8	89.3
			41.0	90	13.4	2136.6	88.1
			41.5	120	14.5	2135.5	87.0
			42.0	150	15.3	2134.7	86.2
			42.5	180	16.1	2133.9	85.4
			43.0	210	16.8	2133.2	84.7
			43.5	240	17.1	2132.9	84.4
			44.0	270	17.5	2132.5	84.0
			44.5	300	18.1	2131.9	83.4
			45.0	330	18.8	2131.2	82.7
			45.5	360	19.2	2130.8	82.3
			46.0	390	19.6	2130.4	81.9
			46.5	420	19.9	2130.1	81.6
			47.0	450	20.2	2129.8	81.3
			47.5	480	20.4	2129.6	81.1
			48.0	510	20.6	2129.4	80.9
			48.5	540	20.9	2129.1	80.6
			49.0	570	21.1	2128.9	80.4
49.5	600	21.3	2128.7	80.2			
			102	3750	28.1	2121.9	73.4
B-10	2165	101.5	29.0	0	10.6	2154.4	90.9
			29.5	30	11.8	2153.2	89.7
			30.0	60	12.7	2152.3	88.8
			30.5	90	13.6	2151.4	87.9
			31.0	120	14.3	2150.7	87.2
			31.5	150	15.2	2149.8	86.3
			32.0	180	16.0	2149.0	85.5
			32.5	210	16.7	2148.3	84.8
			33.0	240	17.4	2147.6	84.1
			33.5	270	18.0	2147.0	83.5
			34.0	300	18.7	2146.3	82.8
			34.5	330	19.2	2145.8	82.3
			35.0	360	19.7	2145.3	81.8
			35.5	390	20.3	2144.7	81.2
			36.0	420	20.9	2144.1	80.6
			36.5	450	21.4	2143.6	80.1
			37.0	480	21.9	2143.1	79.6
			37.5	510	22.4	2142.6	79.1
			38.0	540	22.9	2142.1	78.6
			38.5	570	23.3	2141.7	78.2
39.0	600	23.7	2141.3	77.8			

Field Infiltration Test Data							
Borehole	Surface Elevation	Depth of Boring (ft)	Time (min)	Elapsed Time (sec)	Depth to water (ft)	Elevation of water (msl)	Depth of water (ft)
TP-8	2138	16	44.5	0	13.60	2124.4	2.40
			59.5	900	14.20	2125.8	1.80
			60.0	930	14.25	2123.8	1.75
			68.8	1455	14.45	2123.6	1.55
			13.8	0	12.90	2125.1	3.10
			14.8	60	13.00	2125.0	3.00
			19.0	315	13.30	2124.7	2.70
			53.0	2355	15.90	2122.1	0.10
			16.0	0	11.50	2126.5	4.50
			24.0	480	12.05	2126.0	3.95
			25.0	540	12.10	2125.9	3.90
			26.0	600	12.15	2125.9	3.85
			27.0	660	12.20	2125.8	3.80
			28.0	720	12.25	2125.8	3.75
			29.5	810	12.30	2125.7	3.70
			32.2	970	12.40	2125.6	3.60
			35.0	1140	12.50	2125.5	3.50
			45.8	1785	12.80	2125.2	3.20
			58.0	2520	13.00	2125.0	3.00

Appendix D
Laboratory Test Results

SOIL PROPERTIES

Test Pit No.	Bag No.	Soil Class.	Soil Property		Compression/Consolidation			Expansion			Shear Strength			Water Soluble Matter, ppm		Remarks
			Initial Dry Density (pcf)	Initial Water Content (%)	Surcharge KSF	Total Comp. (%)	Void Ratio	Surcharge KSF	Expansion (%)	Max. Swell Pressure KSF	Test Method	C KSF	φ Deg	Salts	Sulfates	
1	1			2.5												
2	1			3.8												
3	1			3.9												
4	1			4.0												
5	1			5.8												
7	1			3.9												
8	1			9.1												
8	2			7.4												
9	1			6.8												
11	1			6.1												
11	2			7.6												
12	1			5.0												
13	1			8.2												
15	1			6.2												
16	1			4.3												

Note: Initial Dry Density and Initial Water Content are in-situ values unless otherwise noted.

LEGEND

Shear Strength Test Method
 DS Direct Shear
 DS Direct Shear (Saturated)
 UC Unconfined Compression
 UU Unconsolidated Undrained
 CU Consolidated Undrained w/pore pressure
 CU Consolidated Undrained
 CD Consolidated Drained

REMARKS

1. Compacted density (approximately 95% of ASTM D698 maximum density at moisture content slightly below optimum).
2. Compacted density (approximately 95% of ASTM D1557 maximum density at moisture content slightly below optimum).
3. Submerged to approximate saturation.
4. Dry Density determined from one ring of a multiring sample.
5. Visual Classification.

CH2M HILL - CASANDRO WASH

Soil Properties

WESTERN TECHNOLOGIES INC.

Job No: 2123JH240 | Plate No: B1

SOIL PROPERTIES

Test Pit No.	Bag No.	Soil Class.	Soil Property		Compression/Consolidation			Expansion			Shear Strength			Water Soluble Matter, ppm		Remarks
			Initial Dry Density (pcf)	Initial Water Content (%)	Surcharge KSF	Total Comp. (%)	Void Ratio	Surcharge KSF	Expansion (%)	Max. Swell Pressure KSF	Test Method	C KSF	φ Deg	Salts	Sulfates	
16	2			9.1												
18	1			6.9												
20	1			5.0												
21	1			5.2												
21	2			5.7												
22	1			4.8												
23	1			4.6												
24	1			7.9												
24	2			7.5												
B-6	ST-5		106	5.6												
B-10	ST-3		98	9.9												
B-10	SC-9		92	9.6												
TP-20	2		124*													

* Sample was cemented; density determined by paraffin coating method

Note: Initial Dry Density and Initial Water Content are in-situ values unless otherwise noted.

LEGEND

Shear Strength Test Method
 DS Direct Shear
 DS Direct Shear (Saturated)
 UC Unconfined Compression
 UU Unconsolidated Undrained
 CU Consolidated Undrained w/pore pressure
 CU Consolidated Undrained
 CD Consolidated Drained

REMARKS

1. Compacted density (approximately 95% of ASTM D698 maximum density at moisture content slightly below optimum).
2. Compacted density (approximately 95% of ASTM D1557 maximum density at moisture content slightly below optimum).
3. Submerged to approximate saturation.
4. Dry Density determined from one ring of a multiring sample.
5. Visual Classification.

CH2M HILL - CASANDRO WASH

Soil Properties

WESTERN TECHNOLOGIES INC.

Job No: 2123JH240 Plate No: B2

PHYSICAL PROPERTIES

Boring No.	Depth (ft)	Soil Class.	Particle Size Distribution, % Passing by Weight					Atterberg Limits		Moisture-Density Relationship			Specific Gravity	Permeability		Corrected R-Value	Remarks
			3"	#4	#10	#40	#200	LL	PI	Dry Density (pcf)	Optimum Moisture (%)	Method		Dry Density (pcf)	K Cm/Sec		
TP-15, B-1	5							27	6								
B-1, SS-8	18							33	12								
TP-1; B-2	10											2.62					
TP-20, B-1	3											2.57					

REMARKS

Classification/Partical Size

1. Visual
 2. Laboratory Tested
 3. Minus #200 Only
- Moisture-Density Relationship**
4. Tested ASTM D698/AASHTO T99
 5. Tested ASTM D1557/AASHTO T180
- Specific Gravity**
6. Minus #4
 7. Plus #4

Permeability

8. Constant Head
 9. Falling Head
- R-Value**
10. Expansion Pressure _____ psf
 11. Exudation Pressure _____ psi

Note: NP = nonplastic

CH2M HILL - CASANDRO WASH	
Physical Properties	
WESTERN TECHNOLOGIES INC.	
Job No: 2124JH240	Plate No: B3

PHYSICAL PROPERTIES

Boring No.	Depth (ft)	Soil Class.	Particle Size Distribution, % Passing by Weight					Atterberg Limits		Moisture-Density Relationship			Specific Gravity	Permeability		Corrected R-Value	Remarks
			3"	#4	#10	#40	#200	LL	PI	Dry Density (pcf)	Optimum Moisture (%)	Method		Dry Density (pcf)	K Cm/Sec		
TP-15, B-1	5	SC-SM						27	6				2.62				2
B-1, SS-8	18							33	12								
TP-1, B-2	10	SP											110	1.1X10 ⁻³		1	
TP-5, B-2	16	SP-SM											114	6.0X10 ⁻⁴		1	
TP-7, B-1	5	SP-SM											111	7.6X10 ⁻⁴		1	
TP-8, B-3	16	SP-SM											108	1.2X10 ⁻⁴		1	
TP-12, B-2	9	SM											110	1.1X10 ⁻⁴		1	
TP-15, B-2	10	SP											108	1.6X10 ⁻³		1	
TP-15, B-3	13	SP											107	4.2X10 ⁻⁴		1	
TP-18, B-1	3	SC											109	8.3X10 ⁻⁶		1	
TP-20, B-1	3	SM										2.57	112	2.1X10 ⁻⁶		1	
TP-22, B-1	3	SM												114	1.1X10 ⁻⁴		1

REMARKS

Classification/Partical Size

1. Visual
2. Laboratory Tested
3. Minus #200 Only

Moisture-Density Relationship

4. Tested ASTM D698/AASHTO T99
5. Tested ASTM D1557/AASHTO T180

Specific Gravity

6. Minus #4
7. Plus #4

Permeability

8. Constant Head
9. Falling Head

R-Value

10. Expansion Pressure _____ psf
11. Exudation Pressure _____ psi

Note: NP = nonplastic

CH2M HILL - CASANDRO WASH

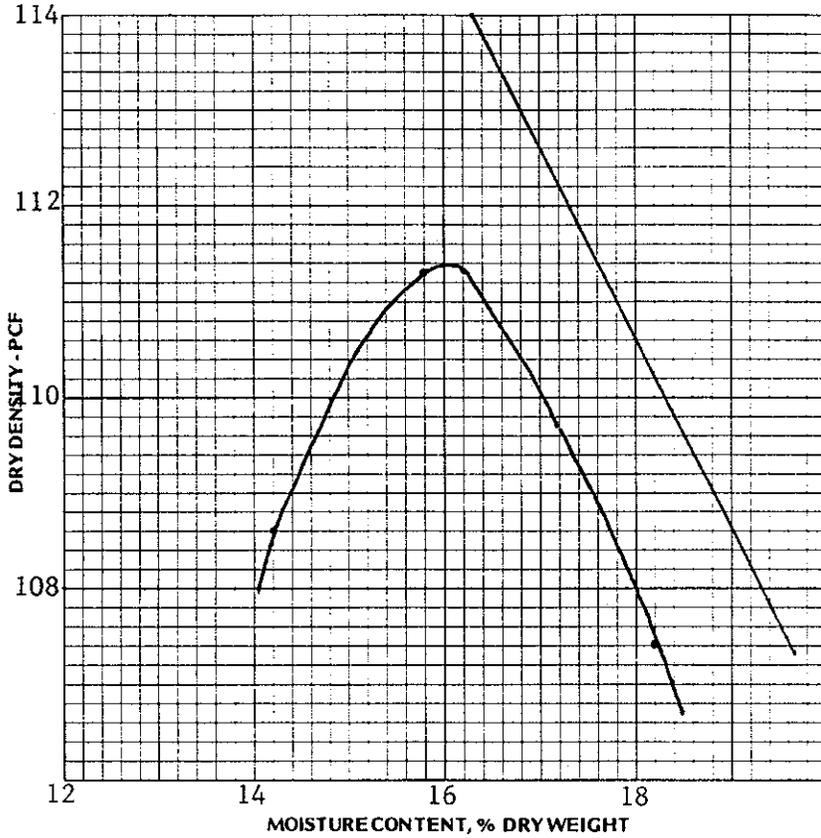
Physical Properties

WESTERN TECHNOLOGIES INC.

Job No: 2124JH240

Plate No: B4

SOIL/AGGREGATE MOISTURE DENSITY RELATIONS



Lab/Invoice No. N/A

Type of Material --

Source of Material TP-2, B-1

Sampled By CH2M Hill Date _____

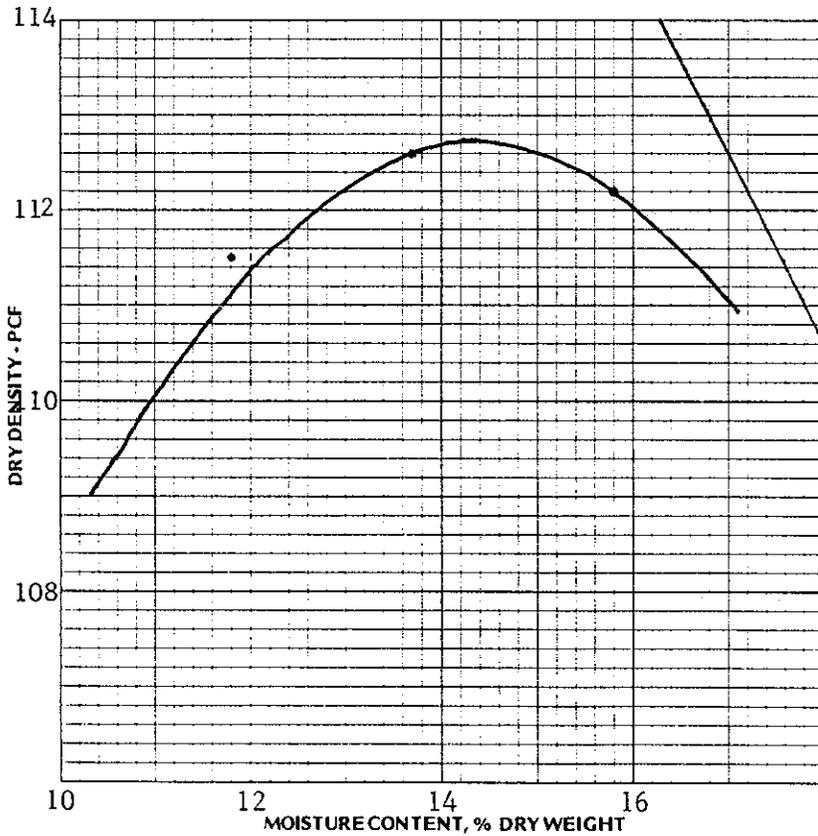
Submitted By D. Smith Date 2/3/94

Reviewed By JCR Date 2/16/94

Test Procedure ASTM D698

Max. Dry Density, pcf 111

Optimum Moisture Content, % 16.1



Lab./Invoice No. N/A

Type of Material --

Source of Material TP-8, B-2

Sampled By CH2M Hill Date _____

Submitted By D. Smith Date 2/3/94

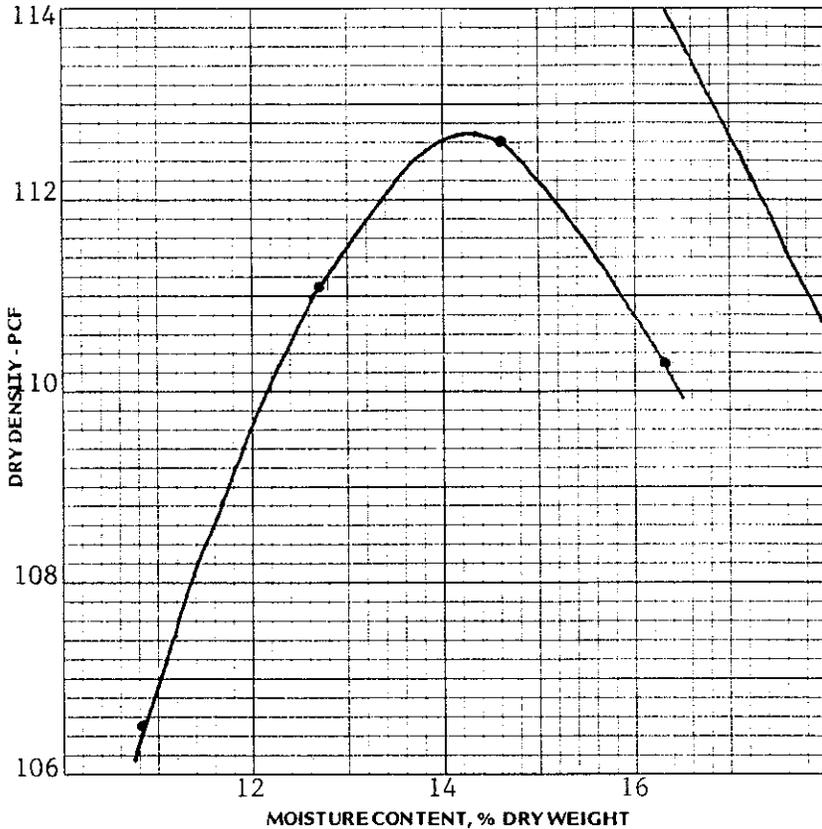
Reviewed By JCR Date 2/16/94

Test Procedure ASTM D698

Max. Dry Density, pcf 113

Optimum Moisture Content, % 14.2

SOIL/AGGREGATE MOISTURE DENSITY RELATIONS



Lab/Invoice No. N/A

Type of Material --

Source of Material TP-11, B-2

Sampled By CH2M Hill Date _____

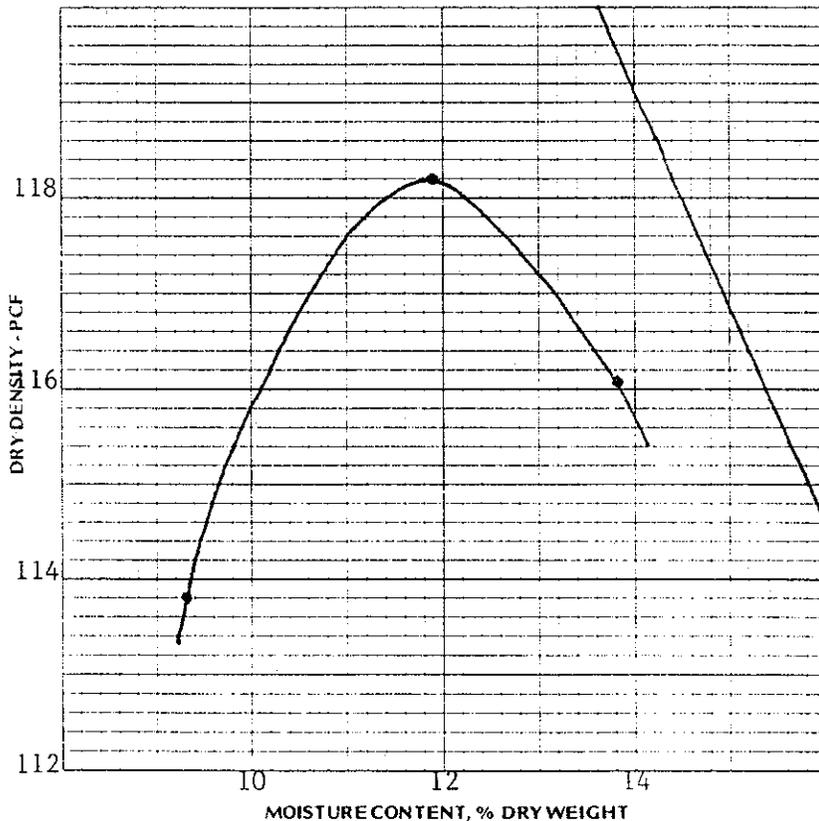
Submitted By D. Smith Date 2/3/94

Reviewed By JCR Date 2/16/94

Test Procedure ASTM D698

Max. Dry Density, pcf 113

Optimum Moisture Content, % 14.2



Lab./Invoice No. N/A

Type of Material --

Source of Material TP-12, B-1

Sampled By CH2M Hill Date _____

Submitted By D. Smith Date 2/3/94

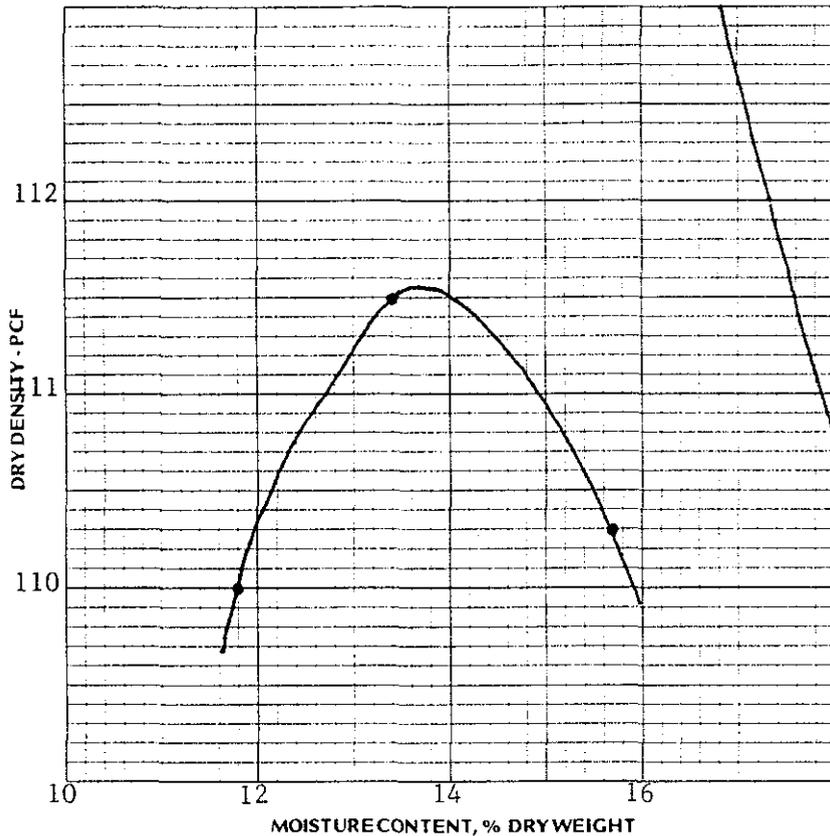
Reviewed By JCR Date 2/16/94

Test Procedure ASTM D698

Max. Dry Density, pcf 118

Optimum Moisture Content, % 11.5

SOIL/AGGREGATE MOISTURE DENSITY RELATIONS



Lab./Invoice No. N/A

Type of Material --

Source of Material TP-13, B-1

Sampled By CH2M Hill Date _____

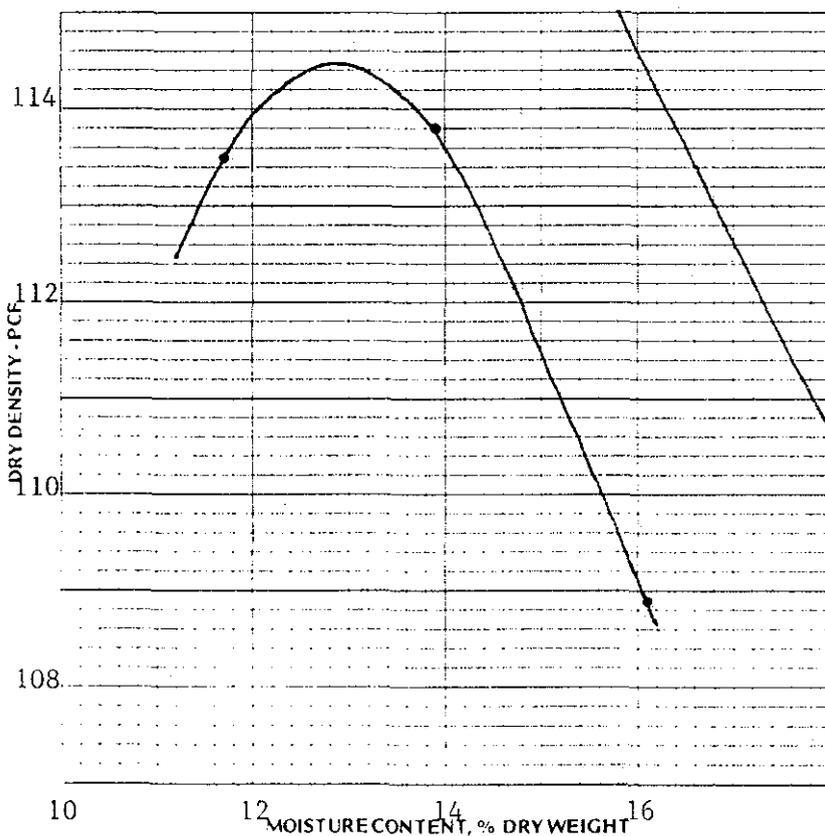
Submitted By D. Smith Date 2/3/94

Reviewed By JCR Date 2/16/94

Test Procedure ASTM D698

Max. Dry Density, pcf 112

Optimum Moisture Content, % 13.7



Lab./Invoice No. N/A

Type of Material --

Source of Material TP-18, B-1

Sampled By CH2M Hill Date _____

Submitted By D. Smith Date 2/3/94

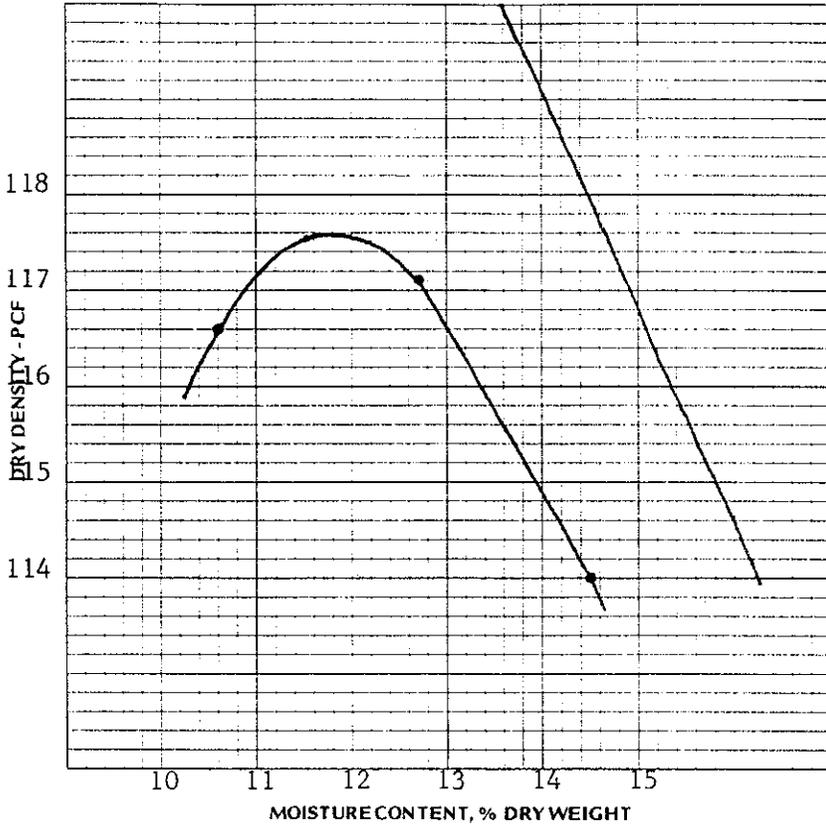
Reviewed By JCR Date 2/16/94

Test Procedure ASTM D698

Max. Dry Density, pcf 114

Optimum Moisture Content, % 12.9

SOIL/AGGREGATE MOISTURE DENSITY RELATIONS



Lab/Invoice No. N/A

Type of Material --

Source of Material TP-20, B-1

Sampled By CH2M Hill Date _____

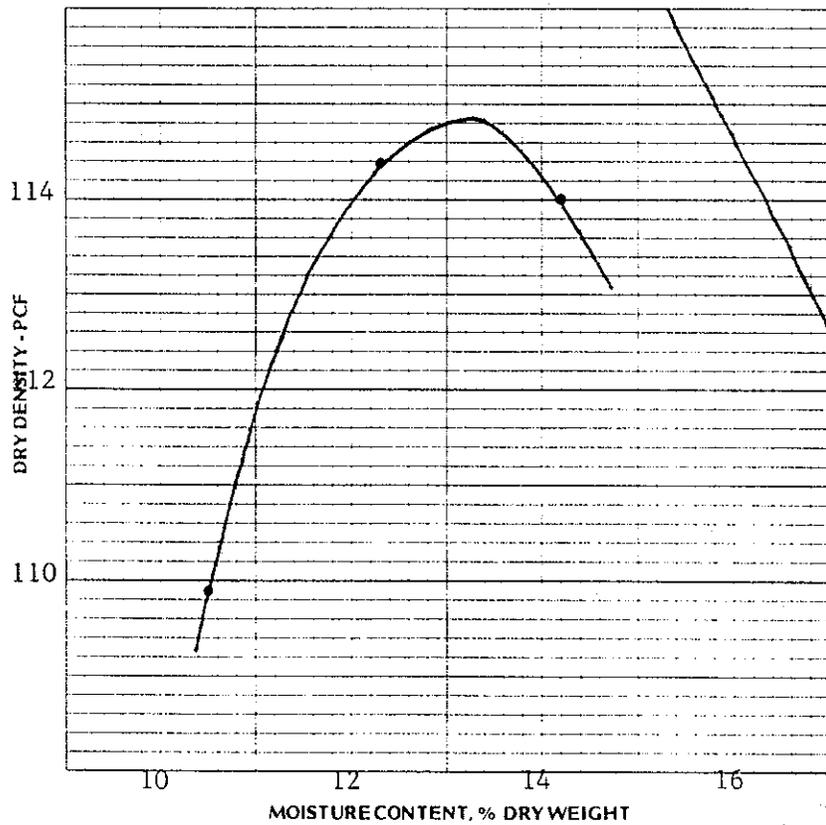
Submitted By D. Smith Date 2/3/94

Reviewed By JCR Date 2/16/94

Test Procedure ASTM D698

Max. Dry Density, pcf 118

Optimum Moisture Content, % 11.8



Lab./Invoice No. N/A

Type of Material --

Source of Material TP-21, B-2

Sampled By CH2M Hill Date _____

Submitted By D. Smith Date 2/3/94

Reviewed By JCR Date 2/16/94

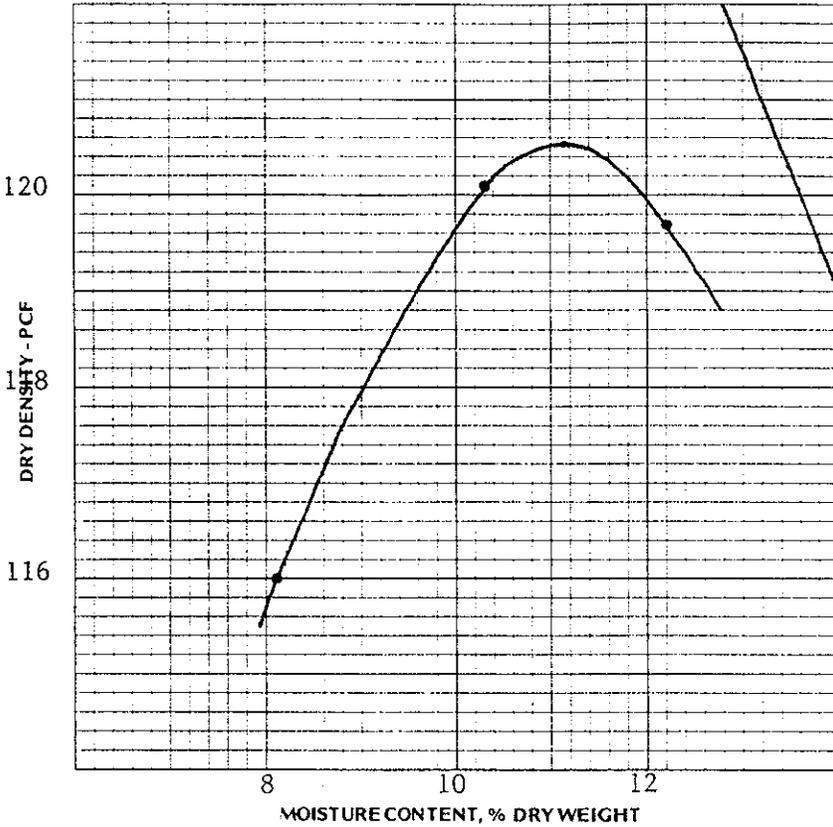
Test Procedure ASTM D698

Max. Dry Density, pcf 115

Optimum Moisture Content, % 13.2

Job No. 2123JH240

SOIL/AGGREGATE MOISTURE DENSITY RELATIONS



Lab/Invoice No. N/A

Type of Material --

Source of Material TP-22, B-1

Sampled By CH2M Hill Date

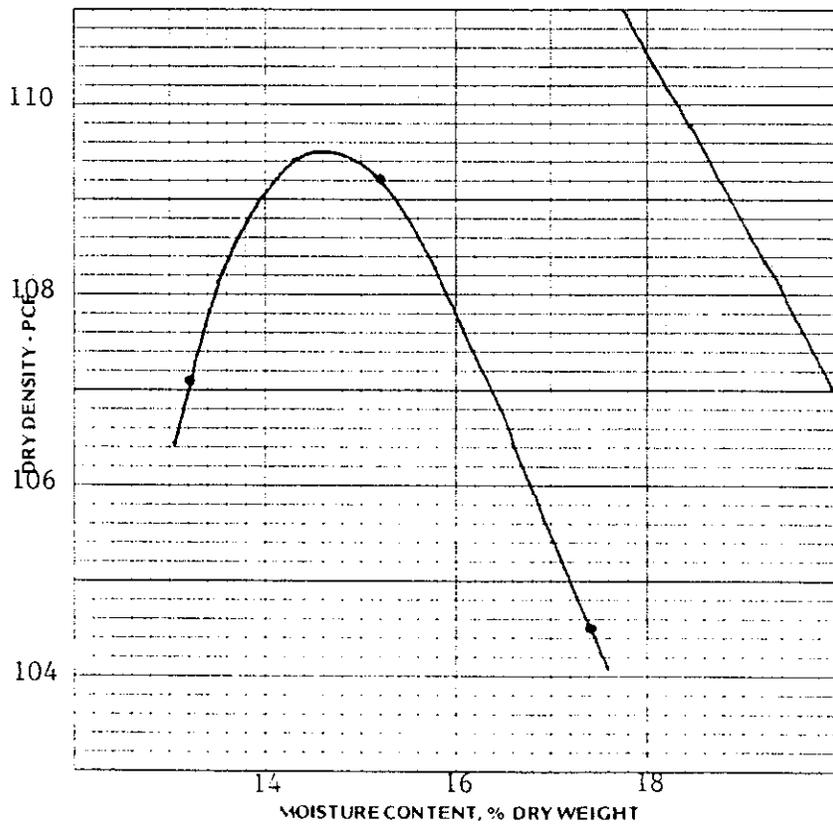
Submitted By D. Smith Date 2/3/94

Reviewed By JCR Date 2/16/94

Test Procedure ASTM D698

Max. Dry Density, pcf 120

Optimum Moisture Content, % 11.0



Lab./Invoice No. N/A

Type of Material --

Source of Material TP-24, B-1

Sampled By CH2M Hill Date

Submitted By D. Smith Date 2/3/94

Reviewed By JCR Date 2/16/94

Test Procedure ASTM D698

Max. Dry Density, pcf 109

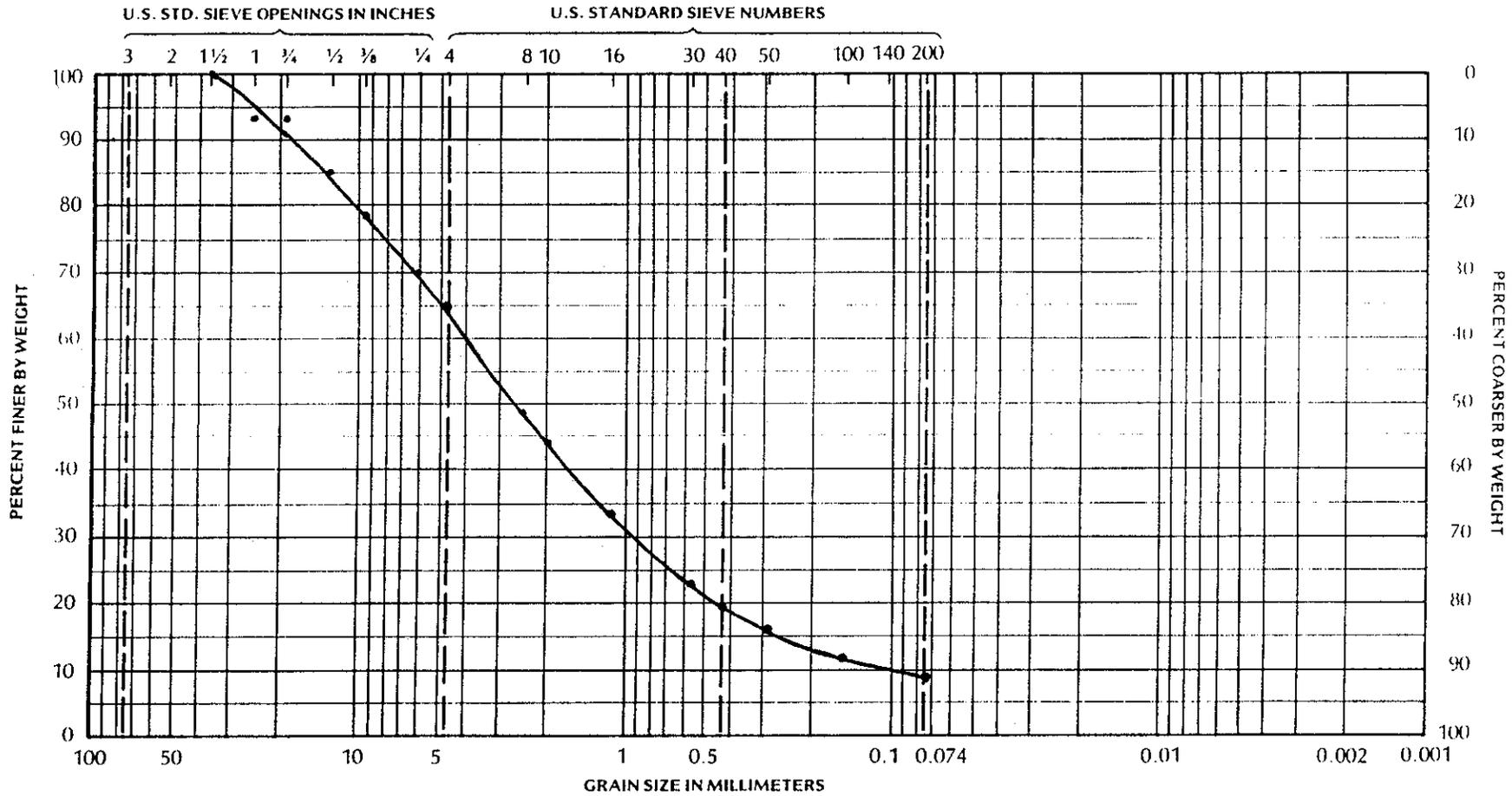
Optimum Moisture Content, % 14.6

Type of Material Casandro Wash Detention Dam Job No. 2123JH240

Source of Material TP-1, B-1; 5' Lab/Inv. No. N/A

Test Procedure ASTM D422 Tested/Calc. By Simpson Date 2/7/94

Reviewed By JCR Date 2/15/94

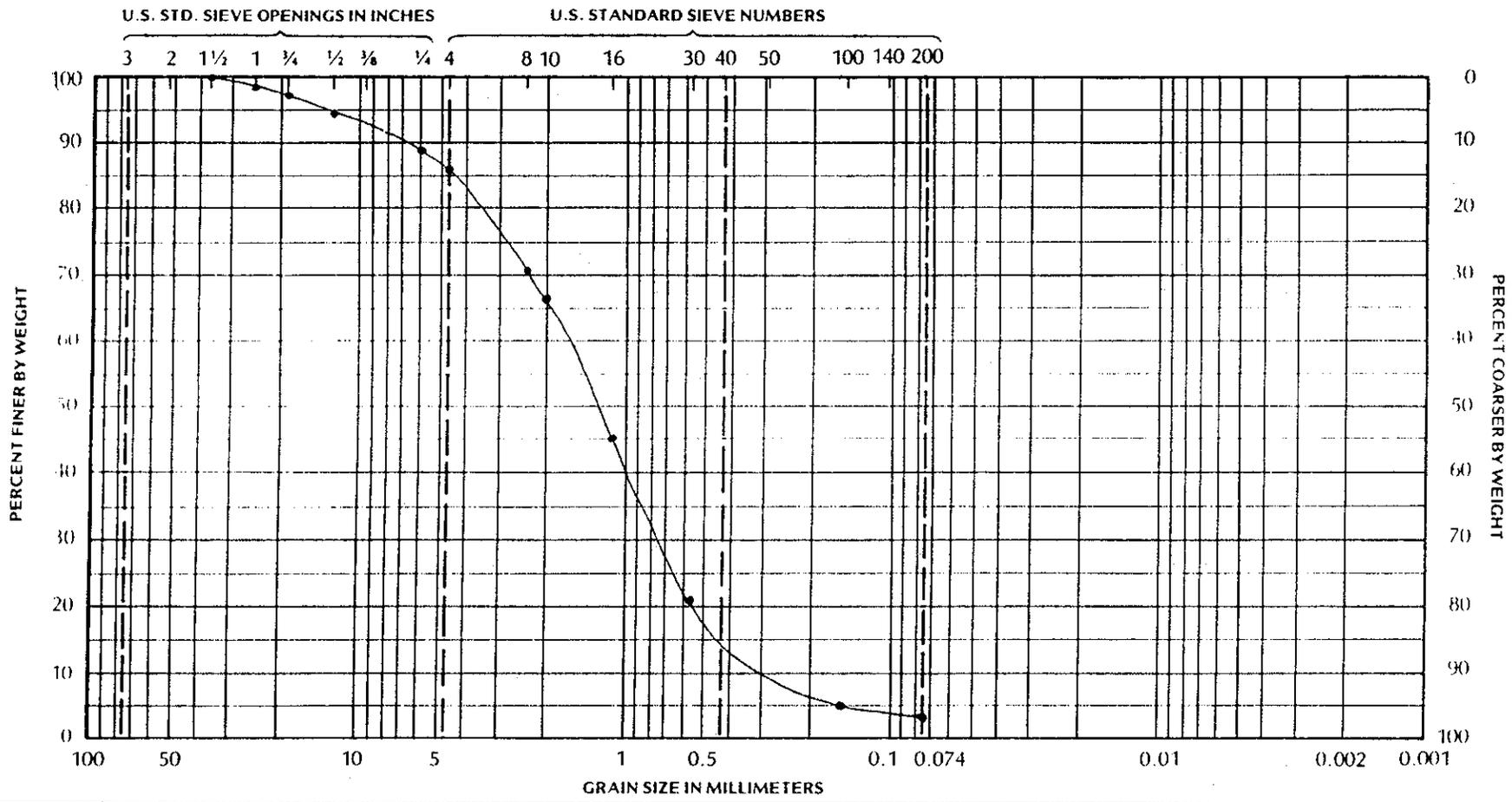


PARTICLE SIZE DISTRIBUTION CHART

Unified	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt or Clay
AASHTO	Gravel	Coarse Sand	Coarse Sand	Fine Sand	Silt Clay

Particle Size, Percent Passing										Atterberg Limits				
2"	1"	93	1/2"	85	#10	45	#30	23	#100	12	0.05 mm	Liquid Limit	P.I.	
1 1/2"	100	1/4"	93	#4	65	#16	34	#50	16	#200	9.3	0.002 mm	Plastic Limit	Sp. Gr.

Type of Material _____ Casandro Wash Detention Dam _____ Job No. 2123JH240 _____
 Source of Material TP-3, B-1; 5' _____ Lab/Inv. No. N/A _____
 Test Procedure ASTM D422 _____ Tested/Calc. By Simpson _____ Date 2/7/94 _____
 Reviewed By JCR _____ Date 2/15/94 _____

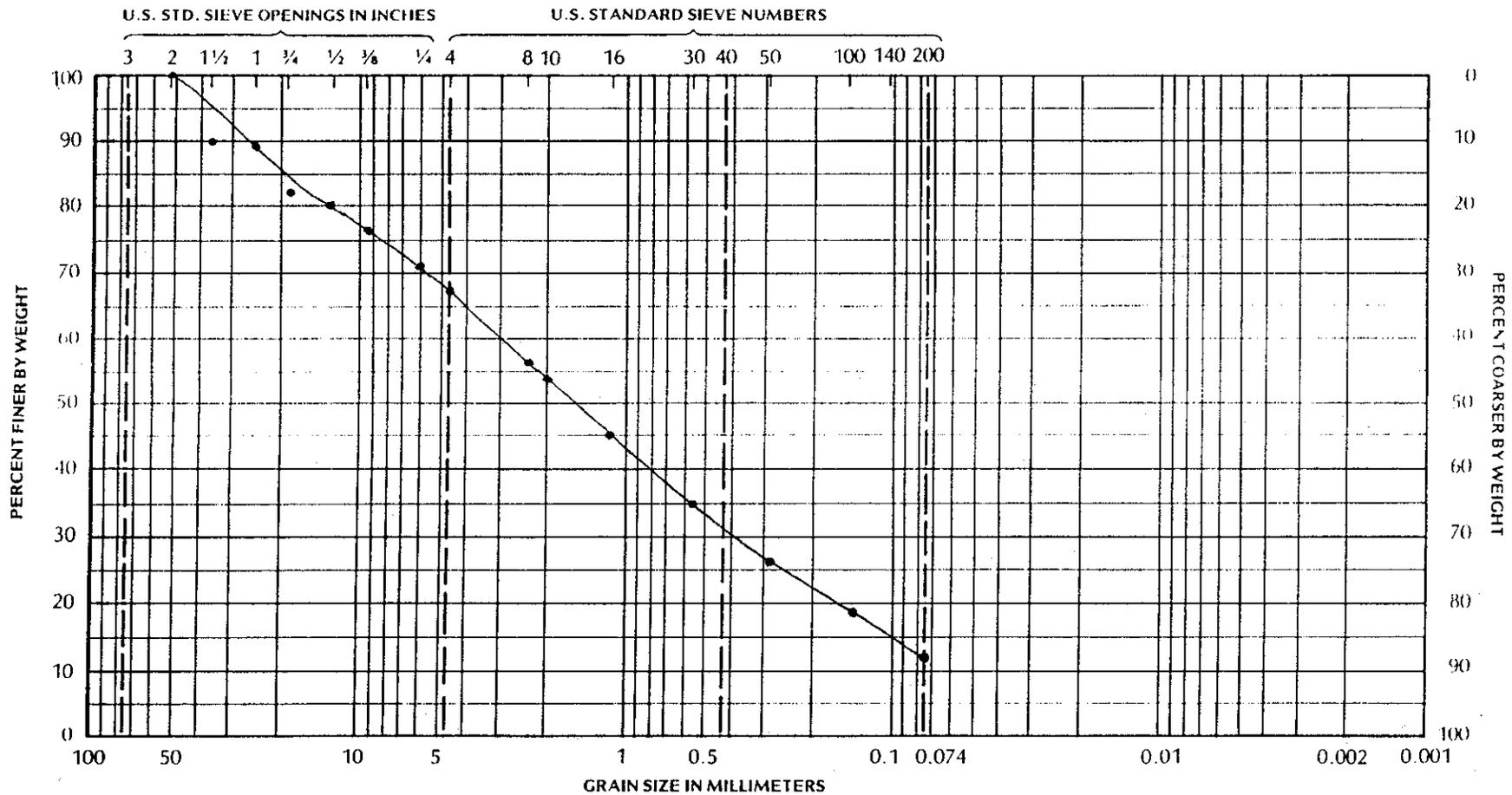


PARTICLE SIZE DISTRIBUTION CHART

Unified	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt or Clay
AASHTO	Gravel	Coarse Sand	Fine Sand	Silt	Clay

Particle Size, Percent Passing										Atterberg Limits			
2"	1"	97	1/2"	94	#10	67	#30	21	#100	5	0.05 mm	Liquid Limit	P.L.
1 1/2"	100	97	#4	86	#16	45	#50	9	#200	3.5	0.002 mm	Plastic Limit	Sp. Gr.

Type of Material _____ Casandro Wash Detention Dam _____ Job No. 2123JH240 _____
 Source of Material TP-3, B-2; 17' _____ Lab. Inv. No. N/A _____
 Test Procedure ASTM D422 _____ Tested/Calc. By Simpson _____ Date 2/8/94 _____
 Reviewed By JCR _____ Date 2/15/94 _____

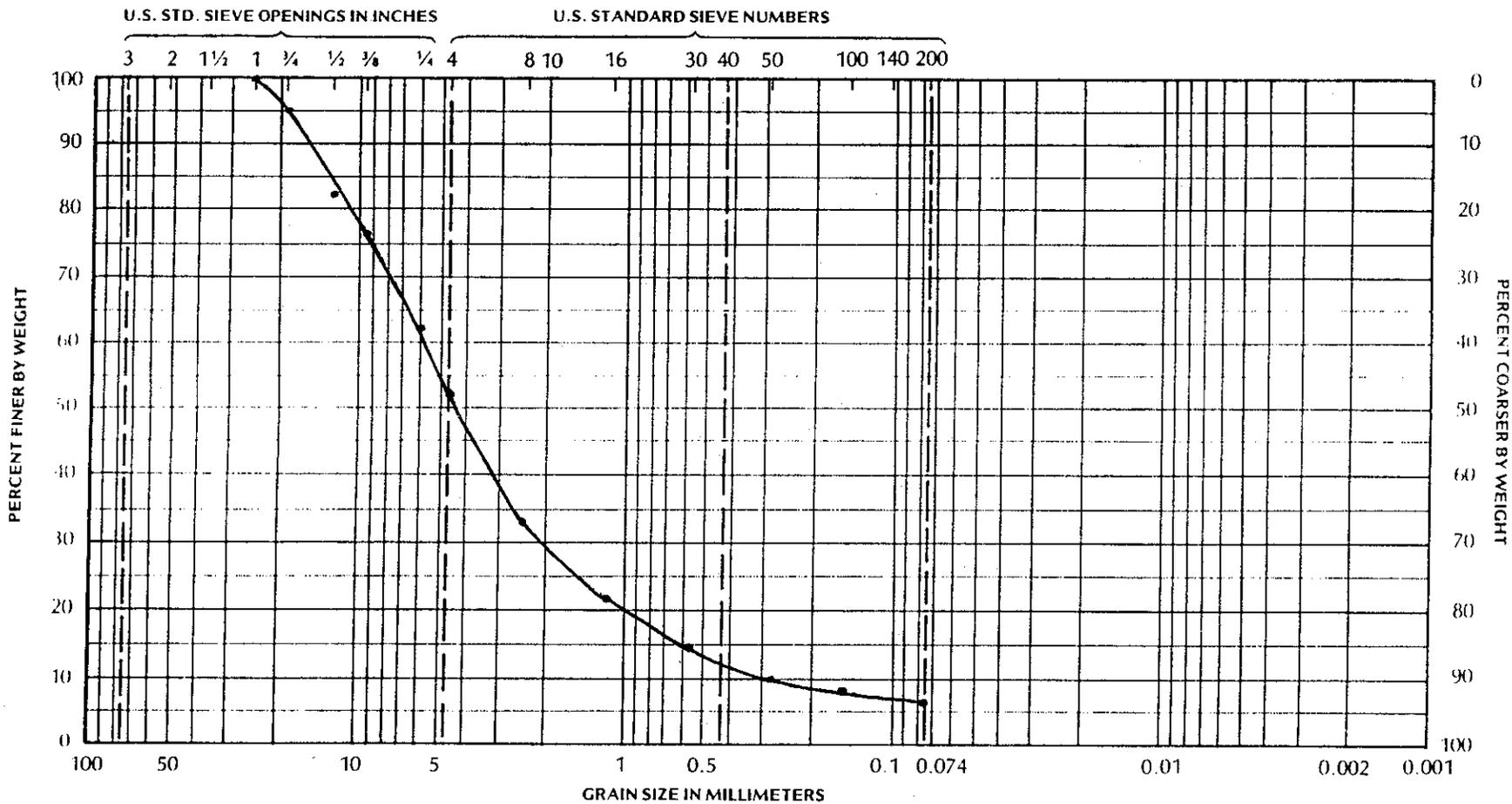


PARTICLE SIZE DISTRIBUTION CHART

Unified	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt or Clay	
AASHTO	Gravel	Coarse Sand		Fine Sand	Silt	Clay

Particle Size, Percent Passing											Atterberg Limits			
2"	100	1"	89	½"	80	#10	54	#30	35	#100	19	0.05 mm	Liquid Limit	P.I.
1½"	89	¾"	82	#4	67	#16	45	#50	26	#200	11.7	0.002 mm	Plastic Limit	Sp. Gr.

Type of Material Casandro Wash Detention Dam Job No. 2123JH240
 Source of Material TP-4, B-2 ; 14' Lab/Inv. No. N/A
 Test Procedure ASTM D422 Tested/Calc. By Simpson Date 2/8/94
 Reviewed By JCR Date 2/15/94



Type of Material

Casandro Wash Detention Dam

Job No. 2123JH240

Source of Material TP-7, B-2; 15'

Lab/Inv. No. N/A

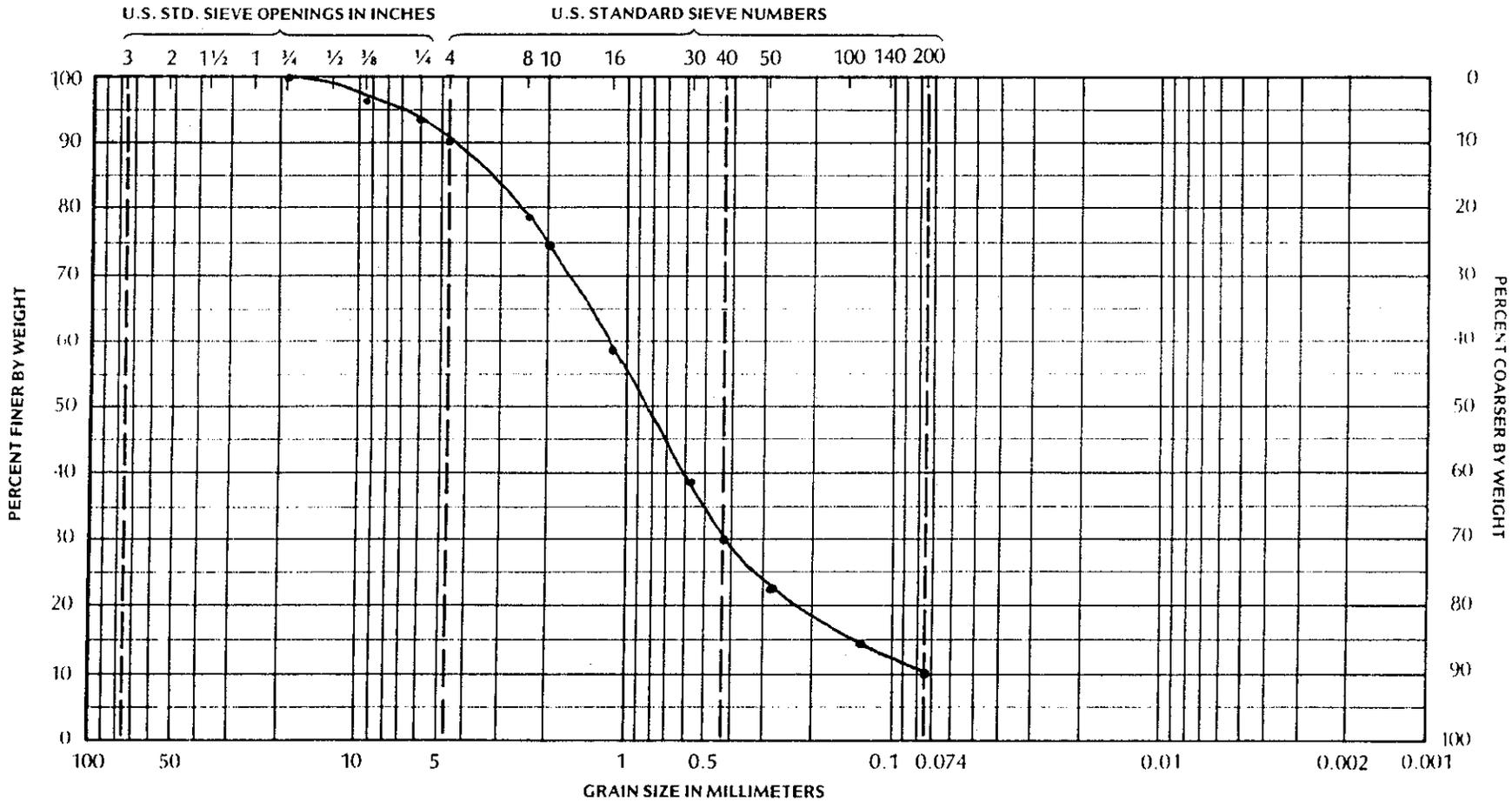
Test Procedure ASTM D422

Tested/Calc. By Simpson

Date 2/8/94

Reviewed By JCR

Date 2/15/94

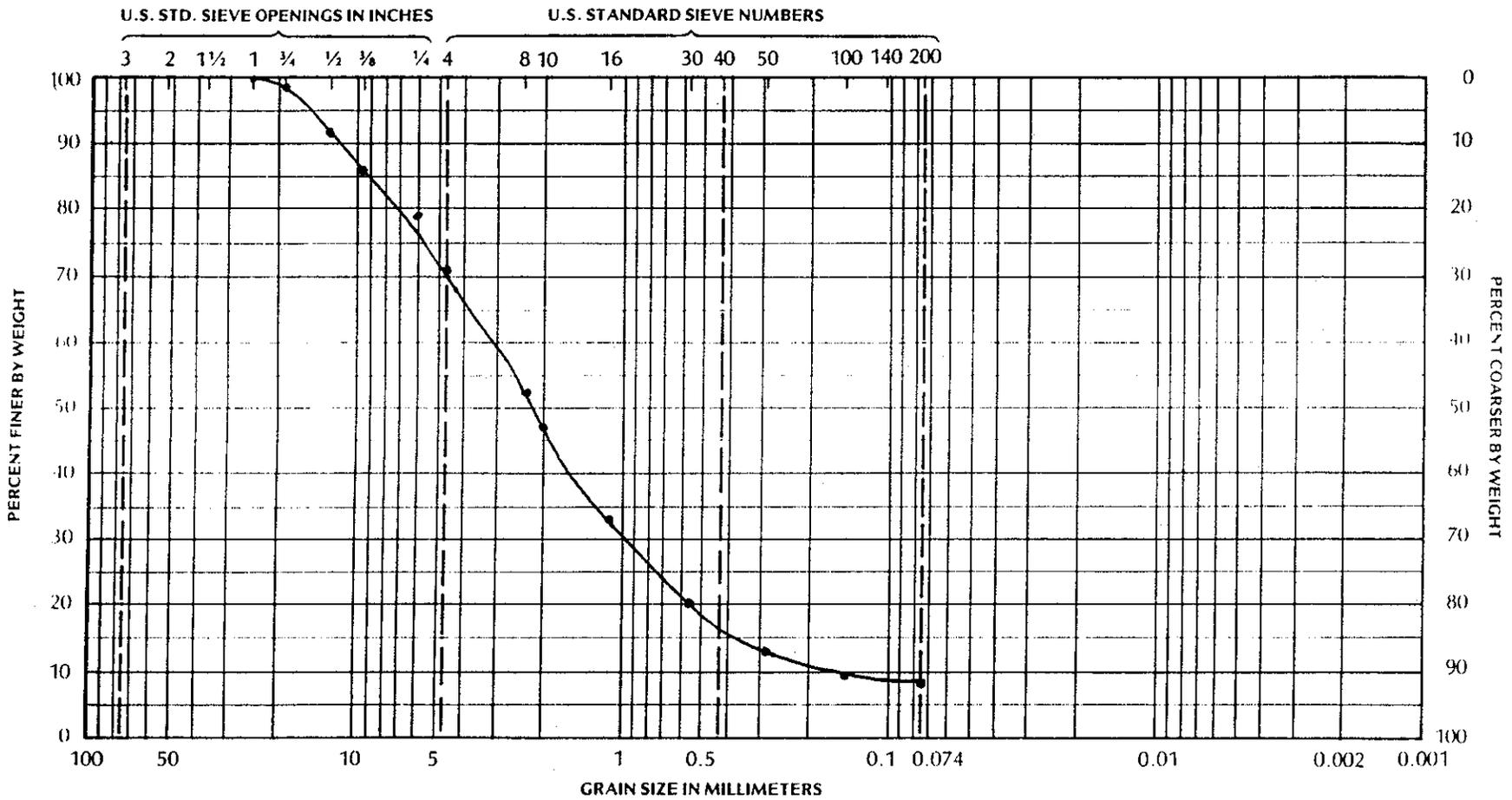


PARTICLE SIZE DISTRIBUTION CHART

Unified	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt or Clay	
AASHTO	Gravel	Coarse Sand	Coarse Sand	Fine Sand	Silt	Clay

Particle Size, Percent Passing										Atterberg Limits		
2"	1"	3/4"	98	#10	74	#30	38	#100	14	0.05 mm	Liquid Limit	P.I.
1 1/2"	3/4"	100	90	#16	58	#50	22	#200	9.8	0.002 mm	Plastic Limit	Sp. Gr.

Type of Material Casandro Wash Detention Dam Job No. 2123JH240
 Source of Material TP-8, B-3; 16' Lab/Inv. No. N/A
 Test Procedure ASTM D422 Tested/Calc. By Simpson Date 2/8/94
 Reviewed By JCR Date 2/15/94

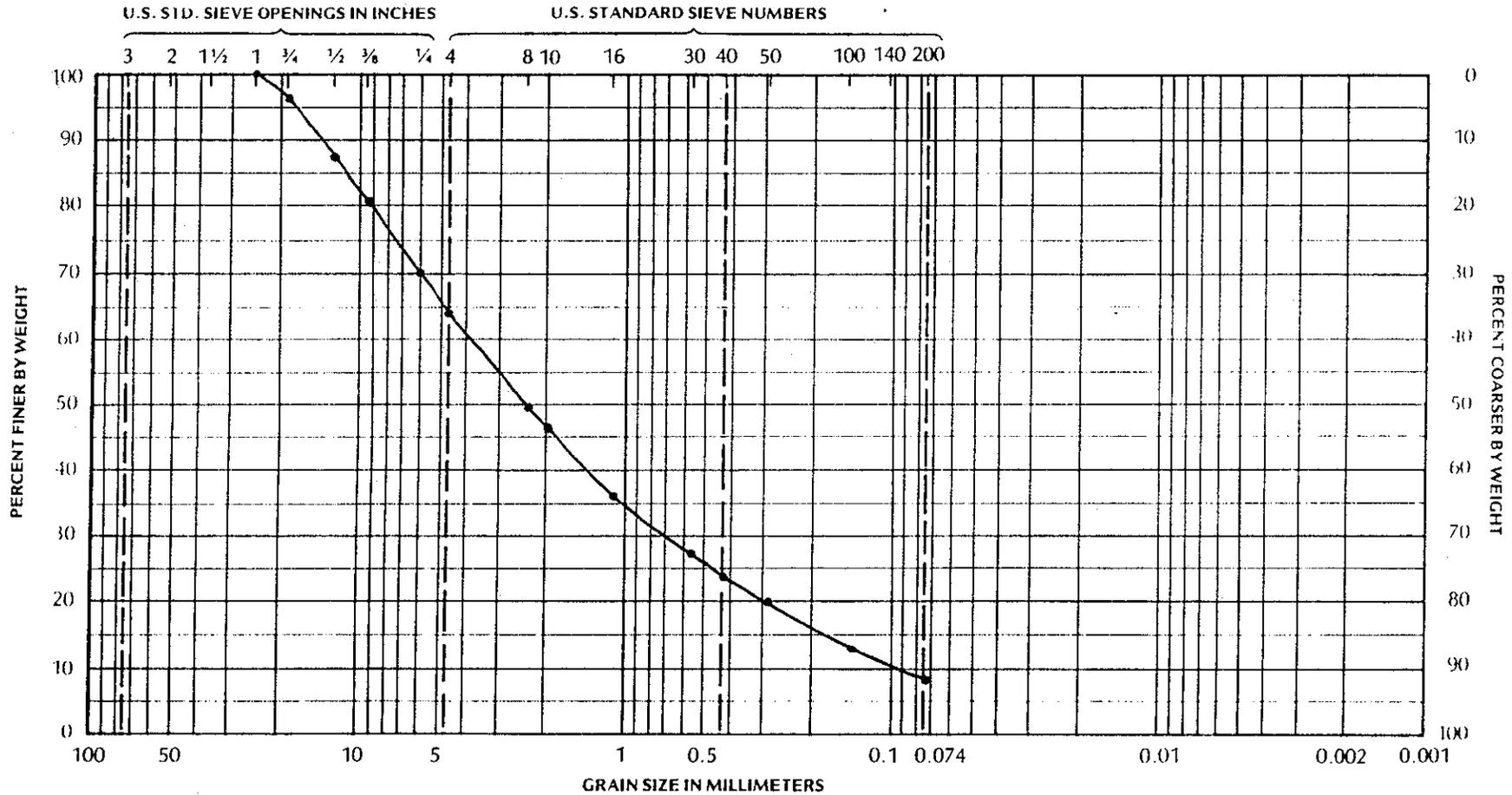


PARTICLE SIZE DISTRIBUTION CHART

Unified	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt or Clay	
AASHTO	Gravel	Coarse Sand	Coarse Sand	Fine Sand	Silt	Clay

Particle Size, Percent Passing										Atterberg Limits			
2"	1"	100	½"	91	#10	47	#30	20	#100	9	0.05 mm	Liquid Limit	P.I.
1½"	¾"	98	#4	71	#16	33	#50	13	#200	7.6	0.002 mm	Plastic Limit	Sp Gr

Type of Material Casandro Wash Detention Dam Job No. 2123JH240
 Source of Material TP-9, B-1; 3' Lab/Inv. No. N/A
 Test Procedure ASTM D422 Tested/Calc. By Simpson Date 2/7/94
 Reviewed By JCR Date 2/15/94



PARTICLE SIZE DISTRIBUTION CHART

Unified	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt or Clay
AASHTO	Gravel	Coarse Sand	Coarse Sand	Fine Sand	Silt Clay

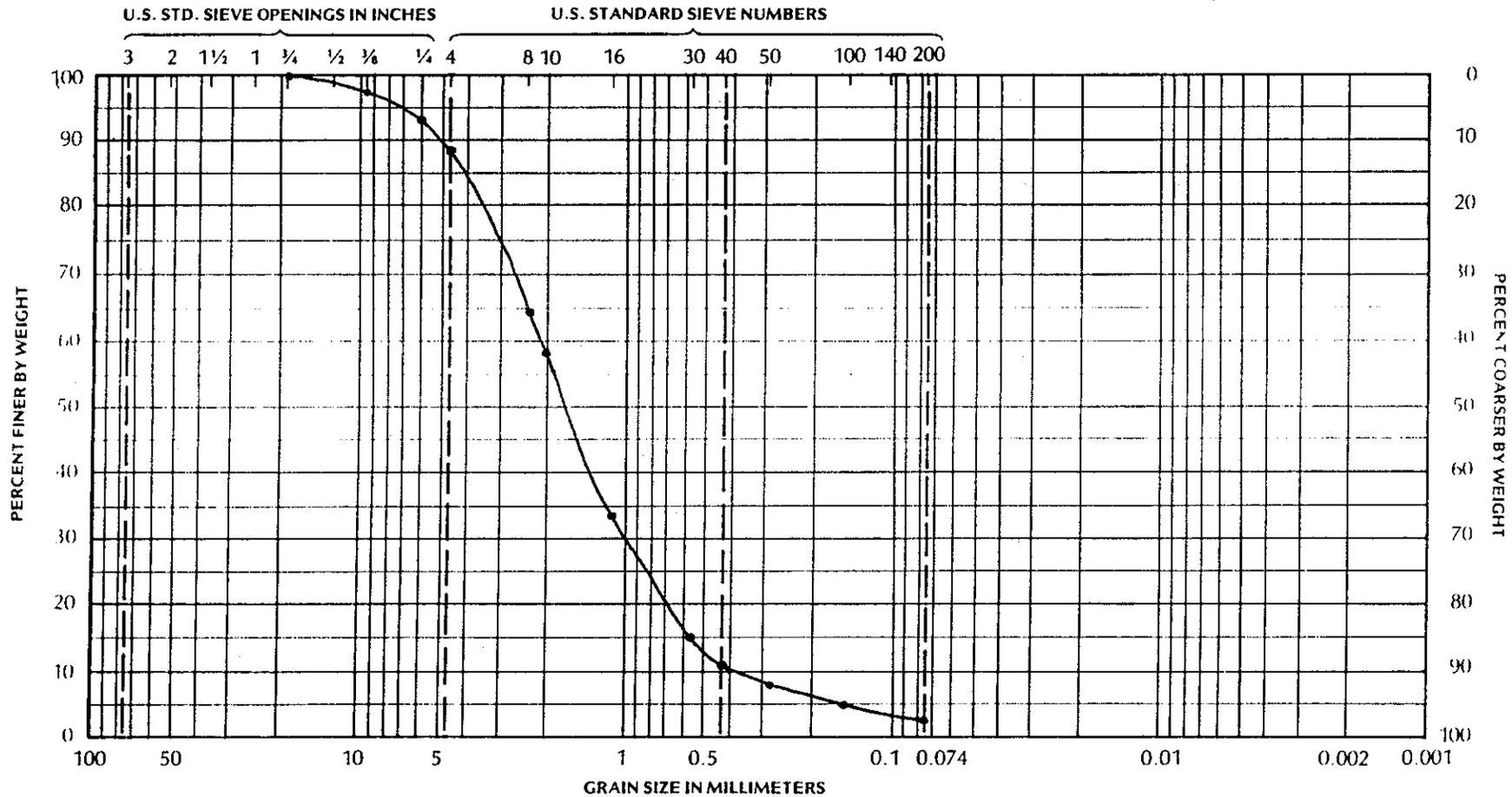
Particle Size, Percent Passing										Atterberg Limits			
2"	1"	100	½"	87	#10	46	#30	27	#100	13	0.05 mm	Liquid Limit	P.I.
1½"	¾"	96	#1	64	#16	36	#50	20	#200	8.3	0.002 mm	Plastic Limit	Sp. Gr.

Type of Material Casandro Wash Detention Dam Job No. 2123JH240

Source of Material TP-11, B-1; 2' Lab/Inv. No. N/A

Test Procedure ASTM D422 Tested/Calc. By Simpson Date 2/7/94

Reviewed By JCR Date 2/15/94

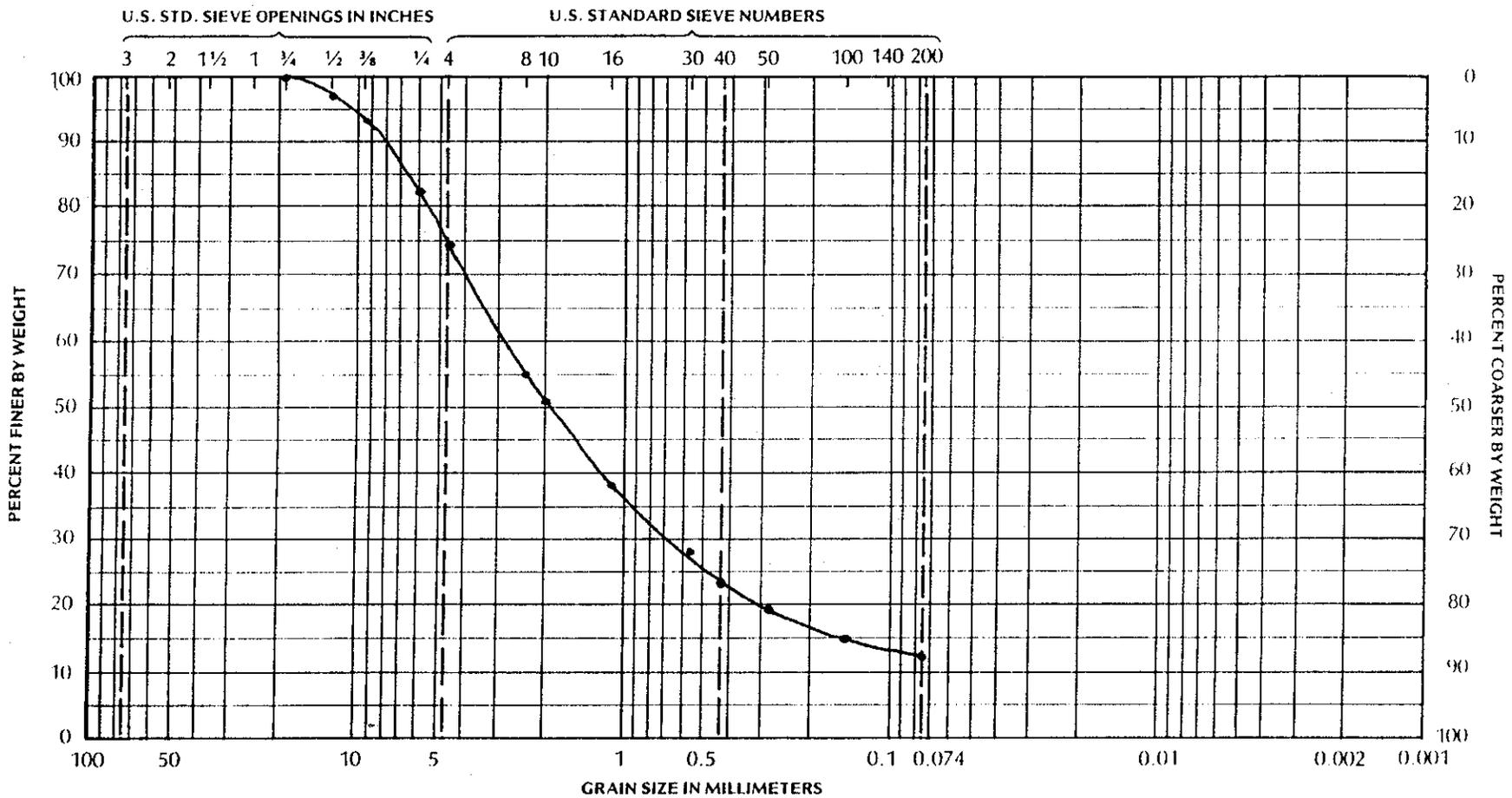


Type of Material Casandro Wash Detention Dam Job No. 2123JH240

Source of Material TP-11, B-2; 5' Lab/Inv. No. N/A

Test Procedure ASTM D422 Tested/Calc. By Simpson Date 2/8/94

Reviewed By JCR Date 2/15/94



PARTICLE SIZE DISTRIBUTION CHART

Unified	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt or Clay	
AASHTO	Gravel		Coarse Sand	Fine Sand	Silt	Clay

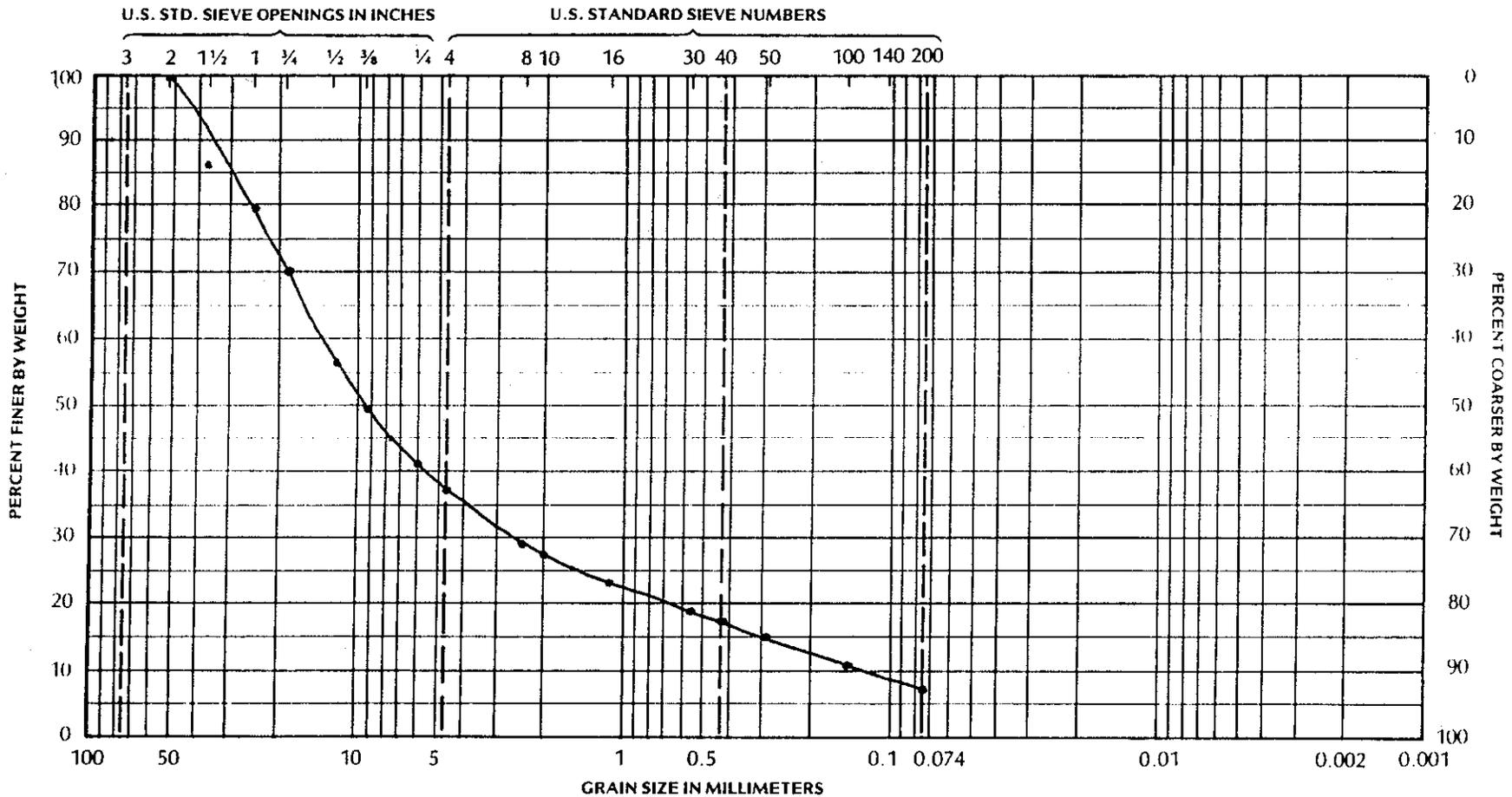
Particle Size, Percent Passing										Atterberg Limits			
2''	1''	1/2''	97	#10	51	#30	28	#100	15	0.05 mm	Liquid Limit	P.I.	
1 1/2''	3/4''	100	#4	74	#16	38	#50	20	#200	12.1	0.002 mm	Plastic Limit	Sp. Gr.

Type of Material Casandro Wash Detention Dam Job No. 2123.IH240

Source of Material TP-12, B-2 ; 9' Lab/Inv. No. N/A

Test Procedure ASTM D422 Tested/Calc. By Simpson Date 2/8/94

Reviewed By ICR Date 2/15/94



PARTICLE SIZE DISTRIBUTION CHART

Unified	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt or Clay	
AASHTO	Gravel	Coarse Sand	Coarse Sand	Fine Sand	Silt	Clay

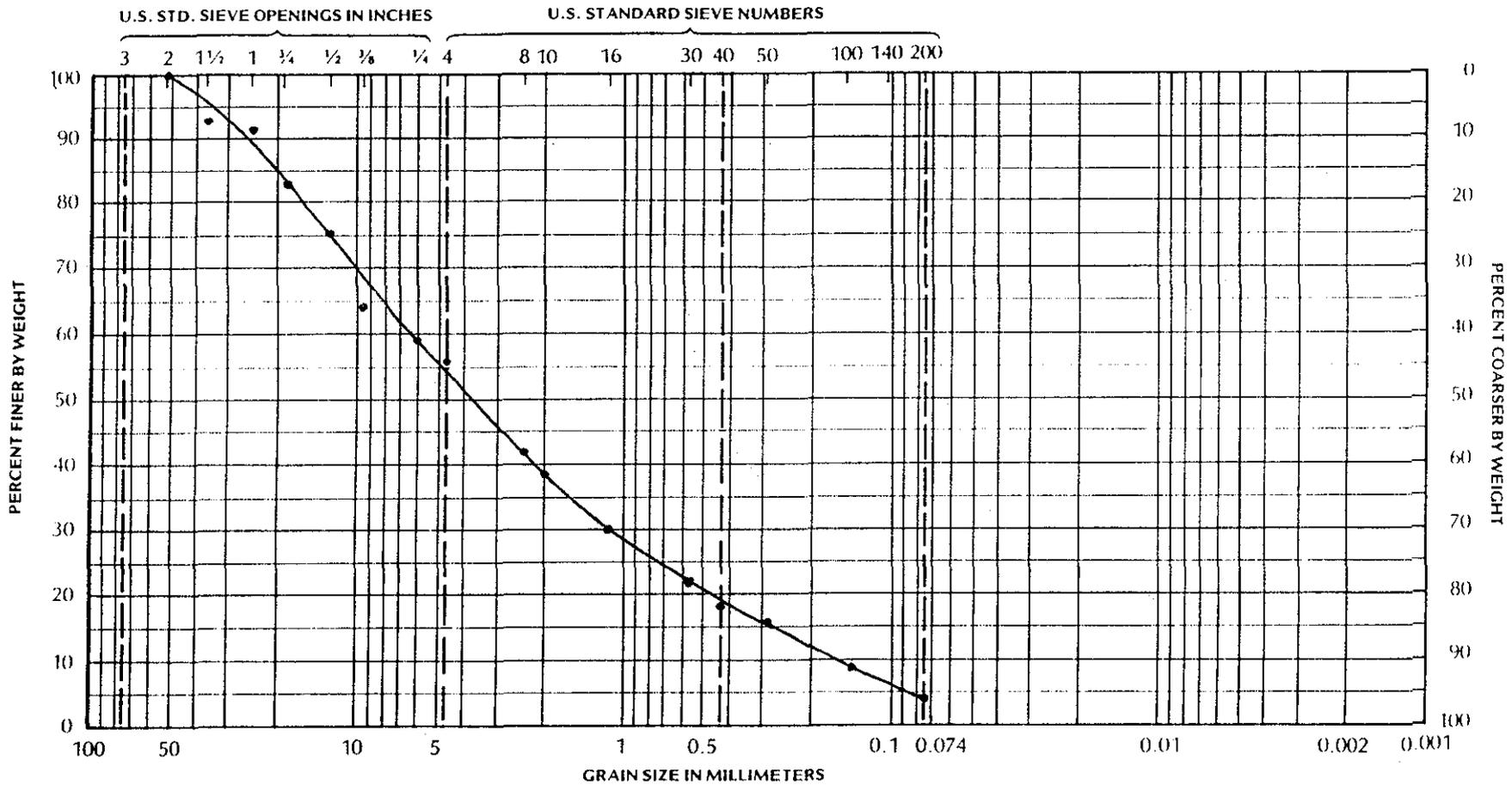
Particle Size, Percent Passing										Atterberg Limits				
2"	100	1"	79	½"	56	#10	27	#30	19	#100	11	0.05 mm	Liquid Limit	P.I.
1½"	86	¾"	70	#4	37	#16	23	#50	15	#200	6.3	0.002 mm	Plastic Limit	Sp. Gr.

Type of Material Casandro Wash Detention Dam Job No. 2123JH240

Source of Material TP-13, B-1; 4' Lab/Inv. No. N/A

Test Procedure ASTM D422 Tested/Calc. By Simpson Date 2/8/94

Reviewed By JCR Date 2/15/94



PARTICLE SIZE DISTRIBUTION CHART

Unified	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt or Clay
AASHTO	Gravel	Coarse Sand	Fine Sand	Fine Sand	Silt Clay

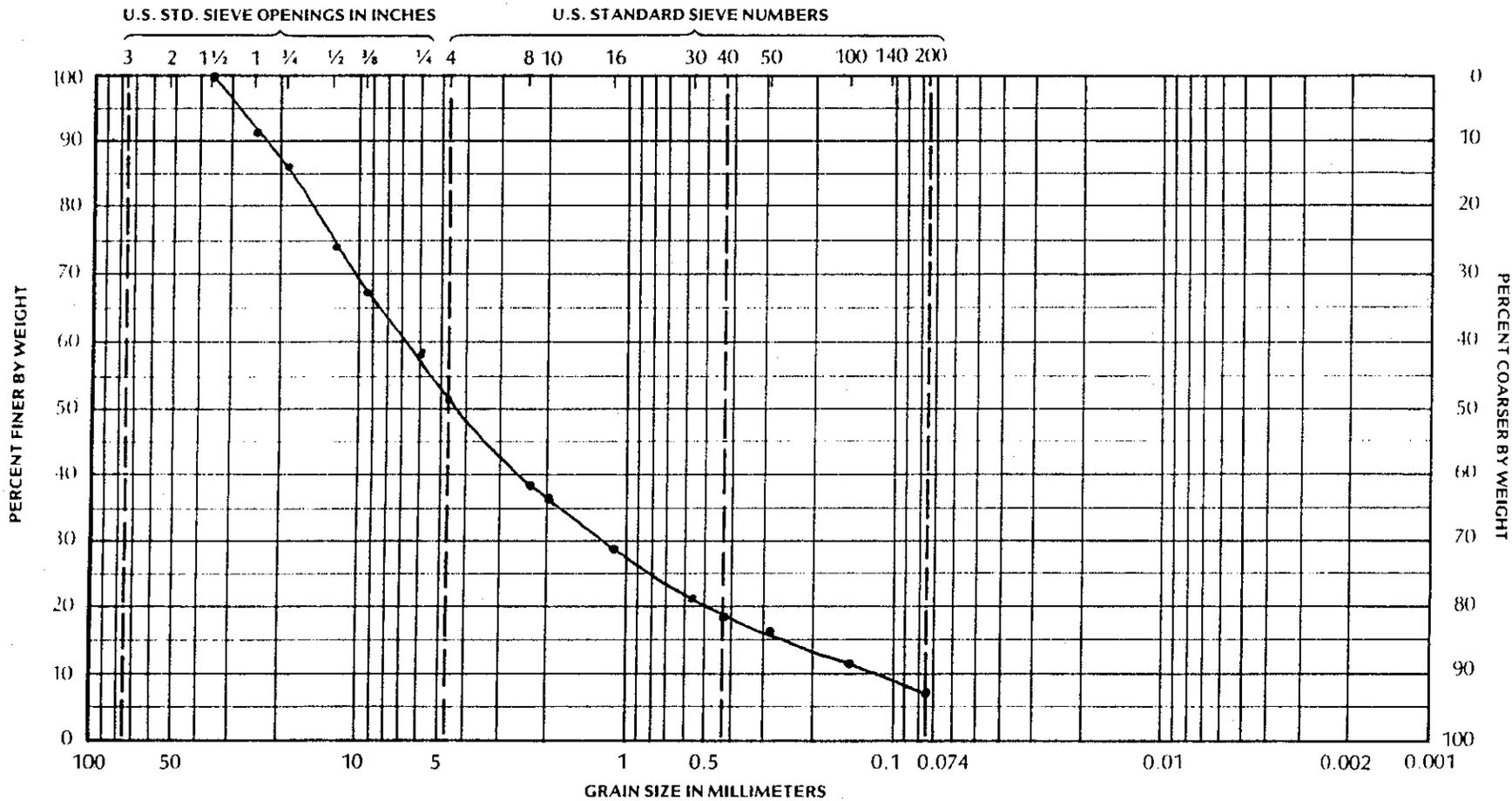
Particle Size, Percent Passing										Atterberg Limits				
2"	100	1"	91	1/2"	75	#10	38	#30	22	#100	9	0.05 mm	Liquid Limit	P.I.
1 1/2"	93	3/4"	83	#4	56	#16	30	#50	16	#200	4.1	0.002 mm	Plastic Limit	Sp. Gr.

Type of Material Casandro Wash Detention Dam Job No. 2123JH240

Source of Material TP-15, B-3; 13' Lab/Inv. No. N/A

Test Procedure ASTM D422 Tested/Calc. By Simpson Date 2/8/94

Reviewed By ICR Date 2/15/94

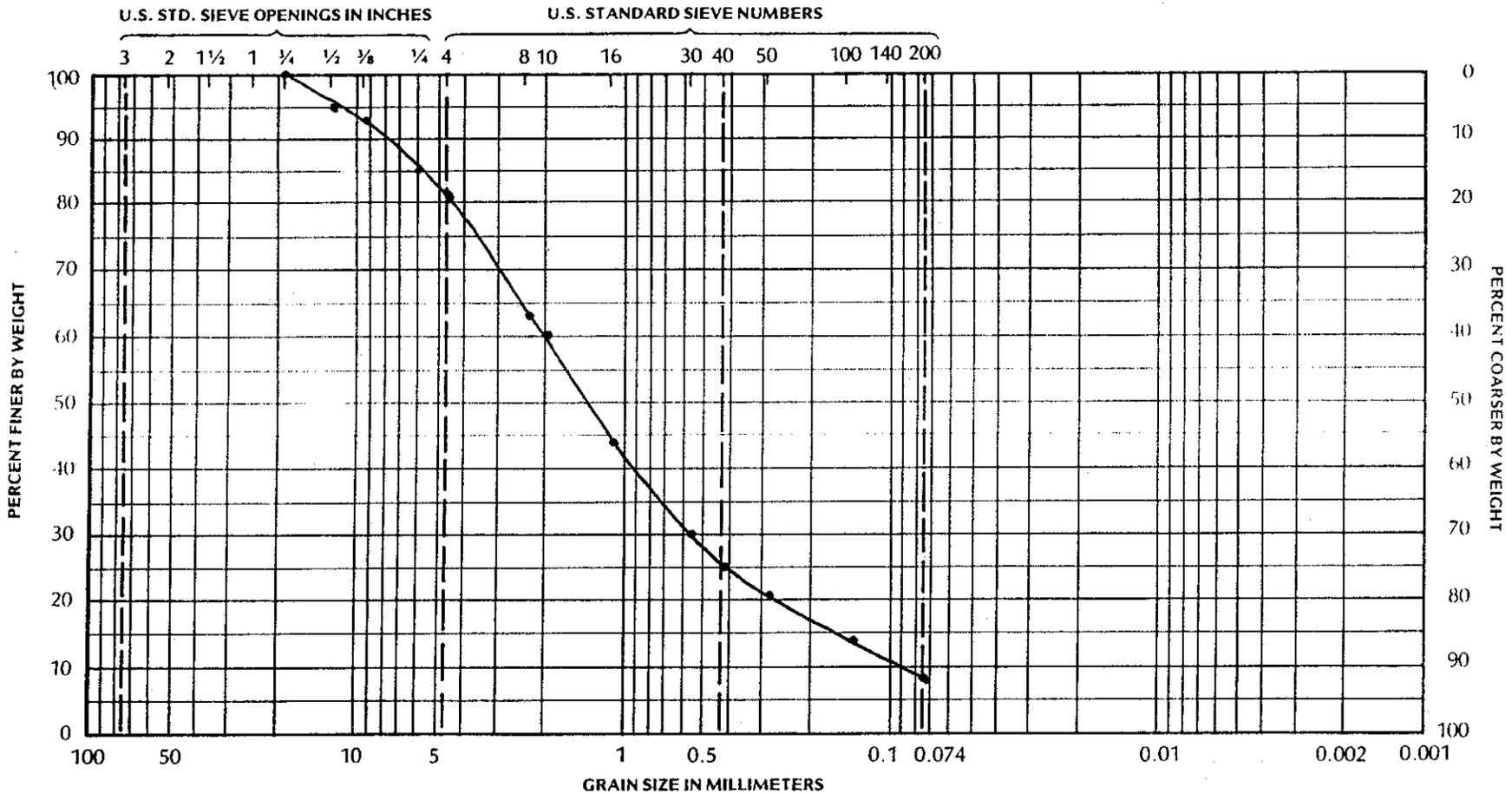


PARTICLE SIZE DISTRIBUTION CHART

Unified	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt or Clay
AASHTO	Gravel	Coarse Sand	Coarse Sand	Fine Sand	Silt Clay

Particle Size, Percent Passing										Atterberg Limits				
2"	1"	91	3/4"	74	#10	36	#30	21	#100	11	0.05 mm	Liquid Limit	P.I.	
1 1/4"	100	3/4"	86	#4	51	#16	28	#50	16	#200	6.3	0.002 mm	Plastic Limit	Sp. Gr.

Type of Material Casandro Wash Detention Dam Job No. 2123JH240
 Source of Material TP-16, B-2; 8' Lab/Inv. No. N/A
 Test Procedure ASTM D422 Tested/Calc. By Simpson Date 2/7/94
 Reviewed By JCR Date 2/15/94



PARTICLE SIZE DISTRIBUTION CHART

Unified	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt or Clay
AASHTO	Gravel	Coarse Sand	Coarse Sand	Fine Sand	Silt Clay

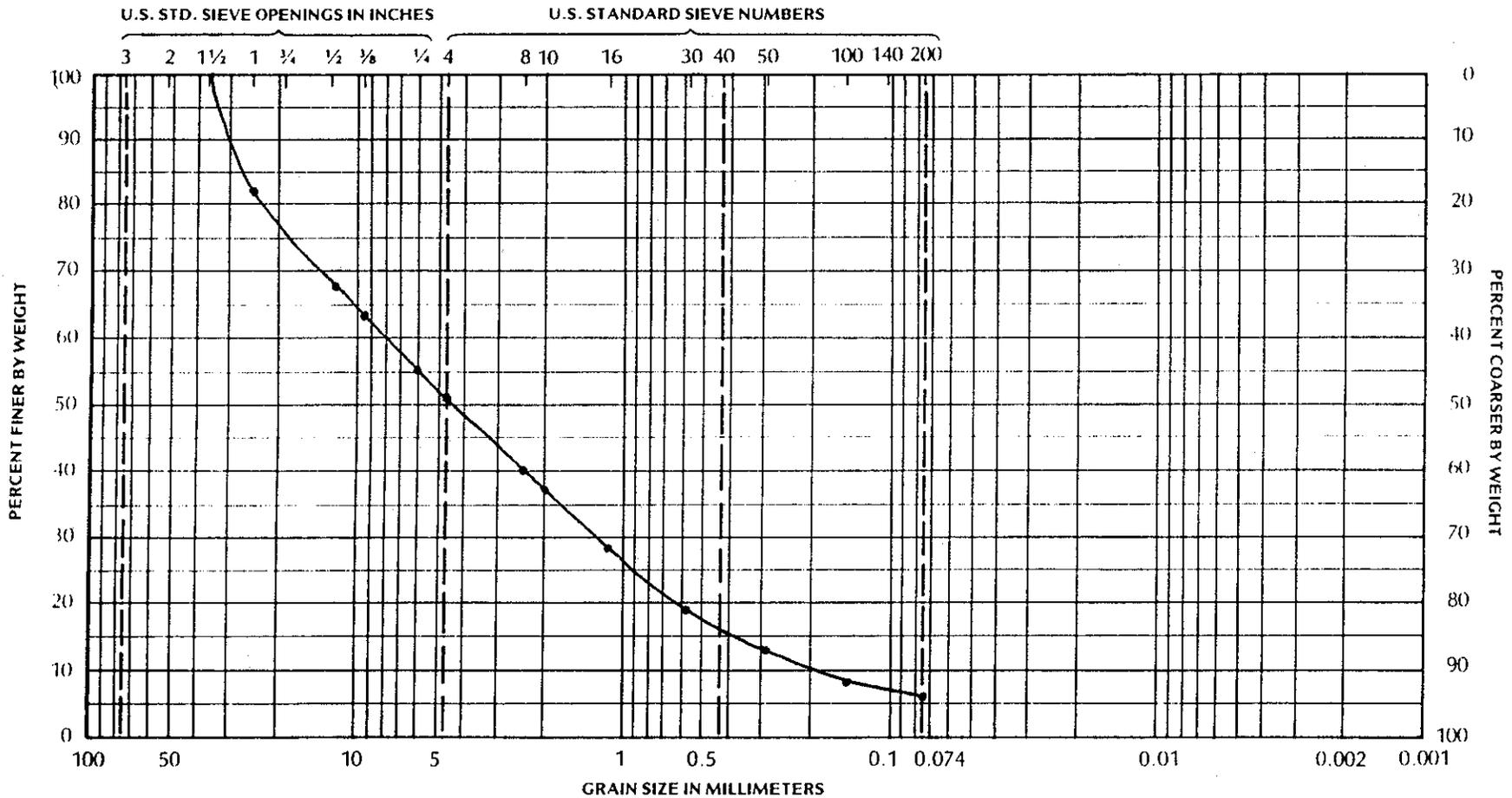
Particle Size, Percent Passing										Atterberg Limits			
2"	1"	1/2"	95	#10	60	#30	30	#100	14	0.05 mm	Liquid Limit	P.I.	
1 1/2"	3/4"	100	#4	81	#16	44	#50	21	#200	7.3	0.002 mm	Plastic Limit	Sp. Gr.

Type of Material _____ Casandro Wash Detention Dam _____ Job No. 2123JH240 _____

Source of Material TP-18, B-1; 3' _____ Lab/Inv. No. N/A _____

Test Procedure ASTM D422 _____ Tested/Calc. By Simpson _____ Date 2/7/94 _____

Reviewed By JCR _____ Date 2/15/94 _____



PARTICLE SIZE DISTRIBUTION CHART

Unified	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt or Clay	
AASHTO	Gravel	Coarse Sand	Coarse Sand	Fine Sand	Silt	Clay

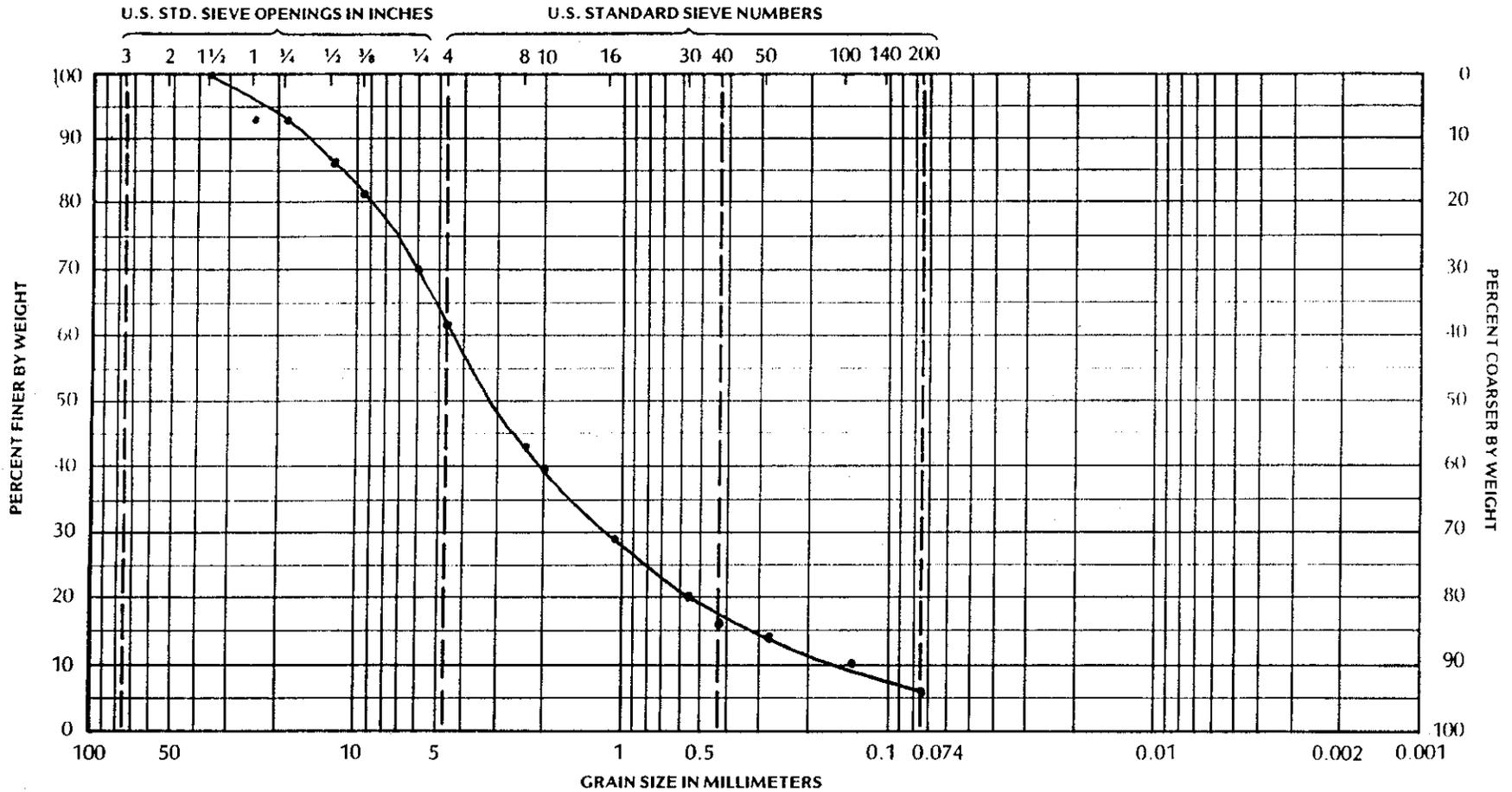
Particle Size, Percent Passing										Atterberg Limits			
2"	1"	82	1/2"	68	#10	37	#30	19	#100	8	0.05 mm	Liquid Limit	P.I.
1 1/2"	100	76	#4	51	#16	28	#50	13	#200	5.4	0.002 mm	Plastic Limit	Sp. Gr.

Type of Material _____ Casandro Wash Detention Dam _____ Job No. 2123JH240 _____

Source of Material TP-18, B-2; 9' _____ Lab/Inv. No. N/A _____

Test Procedure ASTM D422 _____ Tested/Calc. By Simpson _____ Date 2/7/94 _____

Reviewed By JCR _____ Date 2/15/94 _____



PARTICLE SIZE DISTRIBUTION CHART

Unified	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt or Clay
AASHTO	Gravel	Coarse Sand	Coarse Sand	Fine Sand	Silt Clay

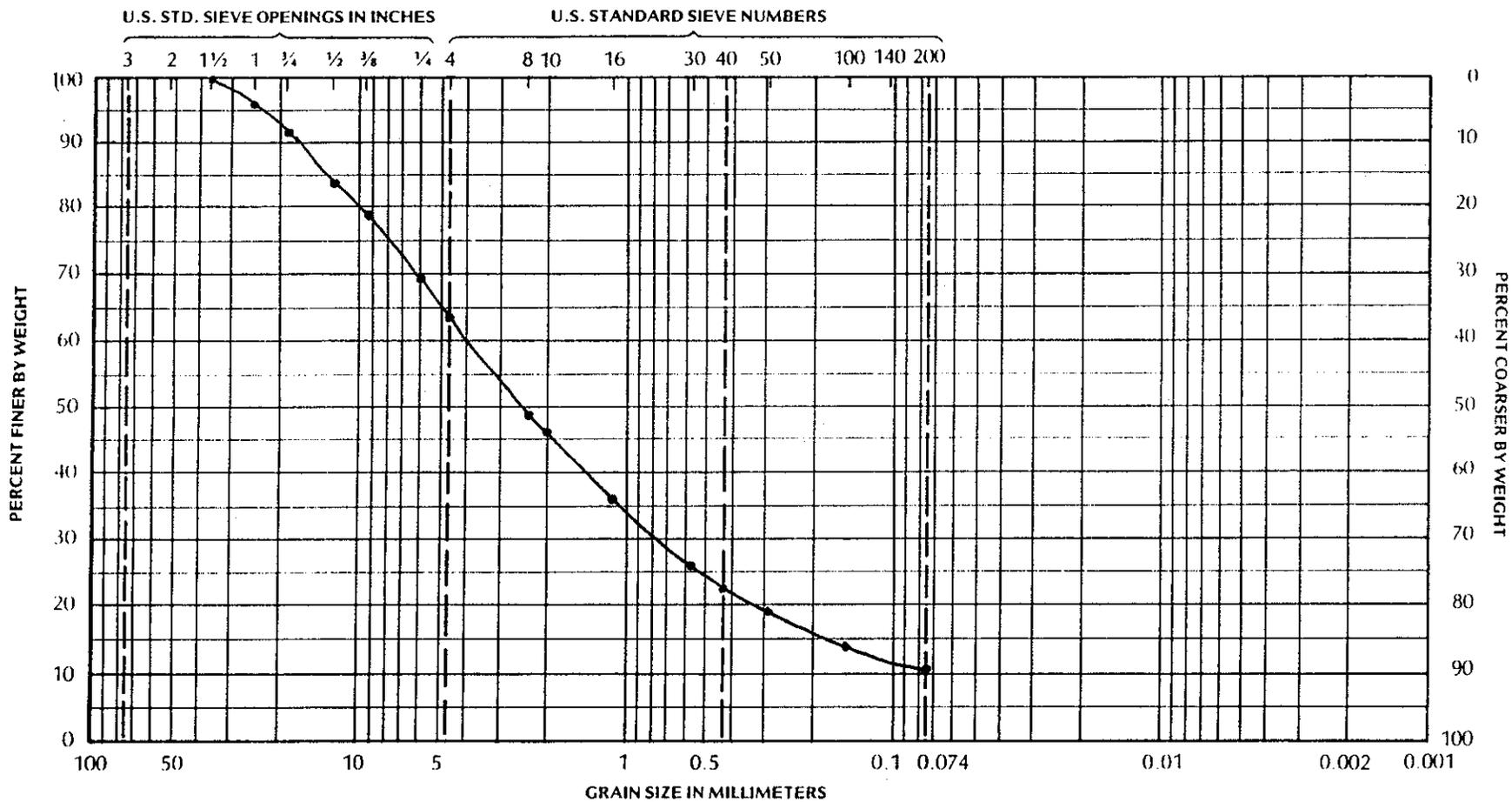
Particle Size, Percent Passing										Atterberg Limits				
2"	1"	93	1/2"	86	#10	39	#30	20	#100	10	0.05 mm	Liquid Limit	P.I.	
1 1/2"	100	1/4"	93	#4	61	#16	29	#50	14	#200	5.1	0.002 mm	Plastic Limit	Sp. Gr.

Type of Material Casandro Wash Detention Dam Job No. 2123JH240

Source of Material TP-20, B-1; 3' Lab/Inv. No. N/A

Test Procedure ASTM D422 Tested/Calc. By Simpson Date 2/7/94

Reviewed By ICR Date 2/15/94



PARTICLE SIZE DISTRIBUTION CHART

Unified	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt or Clay
AASHTO	Gravel	Coarse Sand	Coarse Sand	Fine Sand	Silt Clay

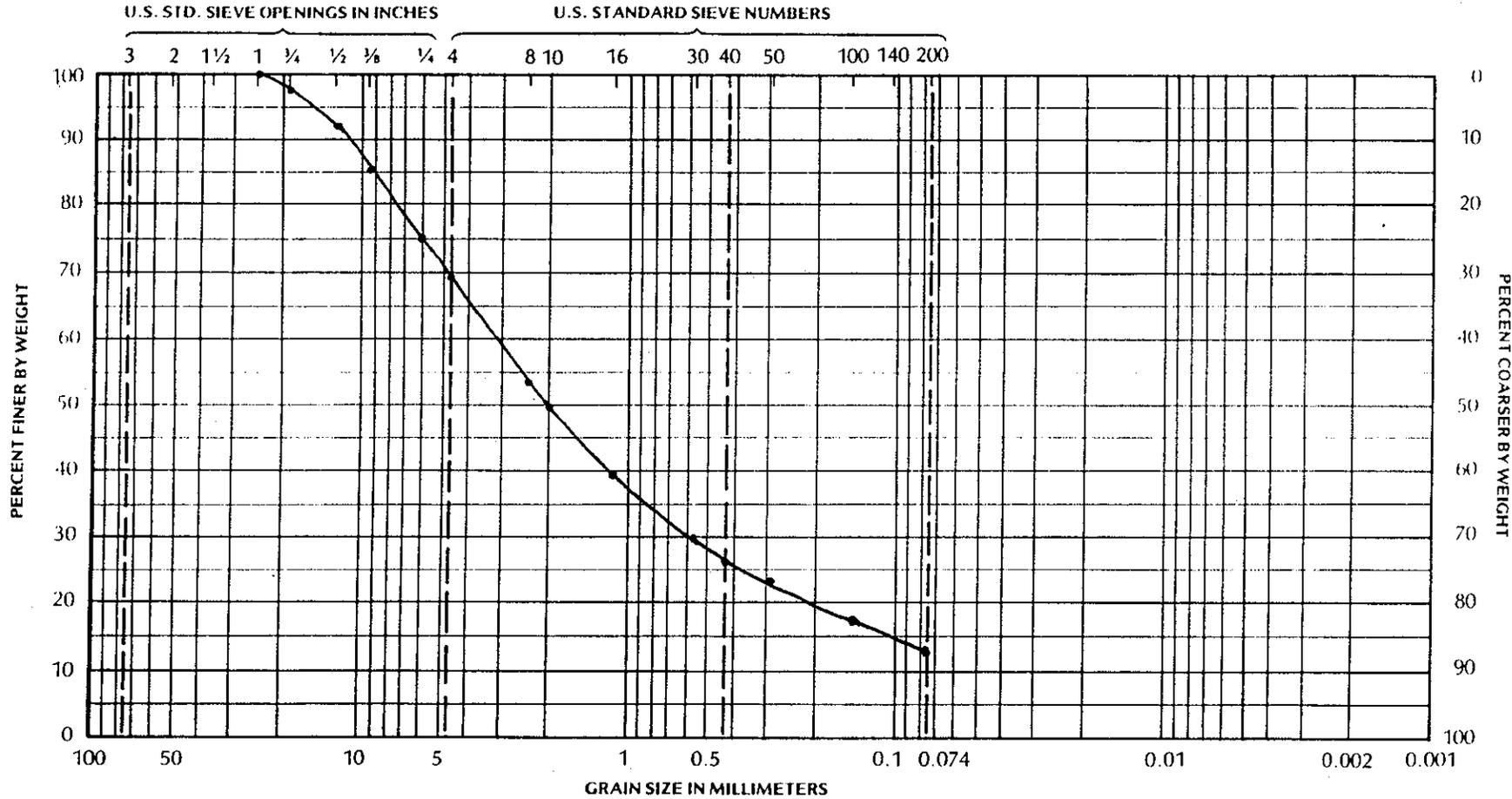
Particle Size, Percent Passing											Atterberg Limits			
2"	1"	96	3/4"	84	#10	46	#30	26	#100	14	0.05 mm	Liquid Limit	P.I.	
1 1/2"	100	3/4"	92	#4	63	#16	36	#50	19	#200	10.3	0.002 mm	Plastic Limit	Sp. Gr.

Type of Material Casandro Wash Detention Dam Job No. 2123JH240

Source of Material TP-20, B-2, 3' Lab/Inv. No. N/A

Test Procedure ASTM D422 Tested/Calc. By Simpson Date 2/8/94

Reviewed By JCR Date 2/15/94



PARTICLE SIZE DISTRIBUTION CHART

Unified	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt or Clay
AASHTO	Gravel	Coarse Sand	Coarse Sand	Fine Sand	Silt Clay

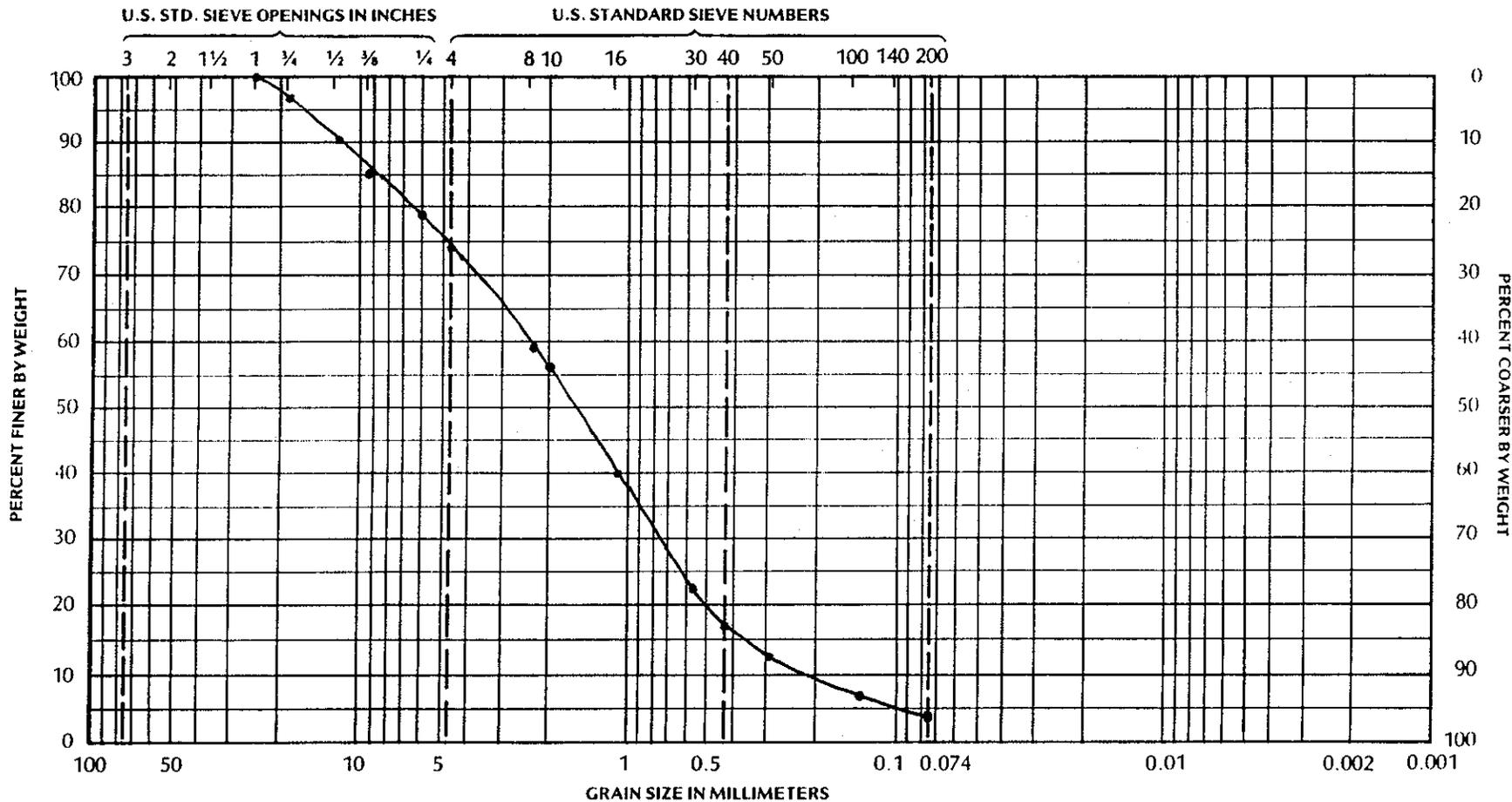
Particle Size, Percent Passing											Atterberg Limits		
2''	1''	100	½''	92	#10	49	#30	30	#100	17	0.05 mm	Liquid Limit	P.I.
1½''	¾''	97	#4	69	#16	39	#50	23	#200	11.8	0.002 mm	Plastic Limit	Sp. Gr.

Type of Material Gasandro Wash Detention Dam Job No. 2123JH240

Source of Material TP-21, B-1; 3' Lab/Inv. No. N/A

Test Procedure ASTM D422 Tested/Calc. By Simpson Date 2/7/94

Reviewed By JCR Date 2/15/94



PARTICLE SIZE DISTRIBUTION CHART

Unified	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt or Clay	
AASHTO	Gravel	Coarse Sand	Coarse Sand	Fine Sand	Silt	Clay

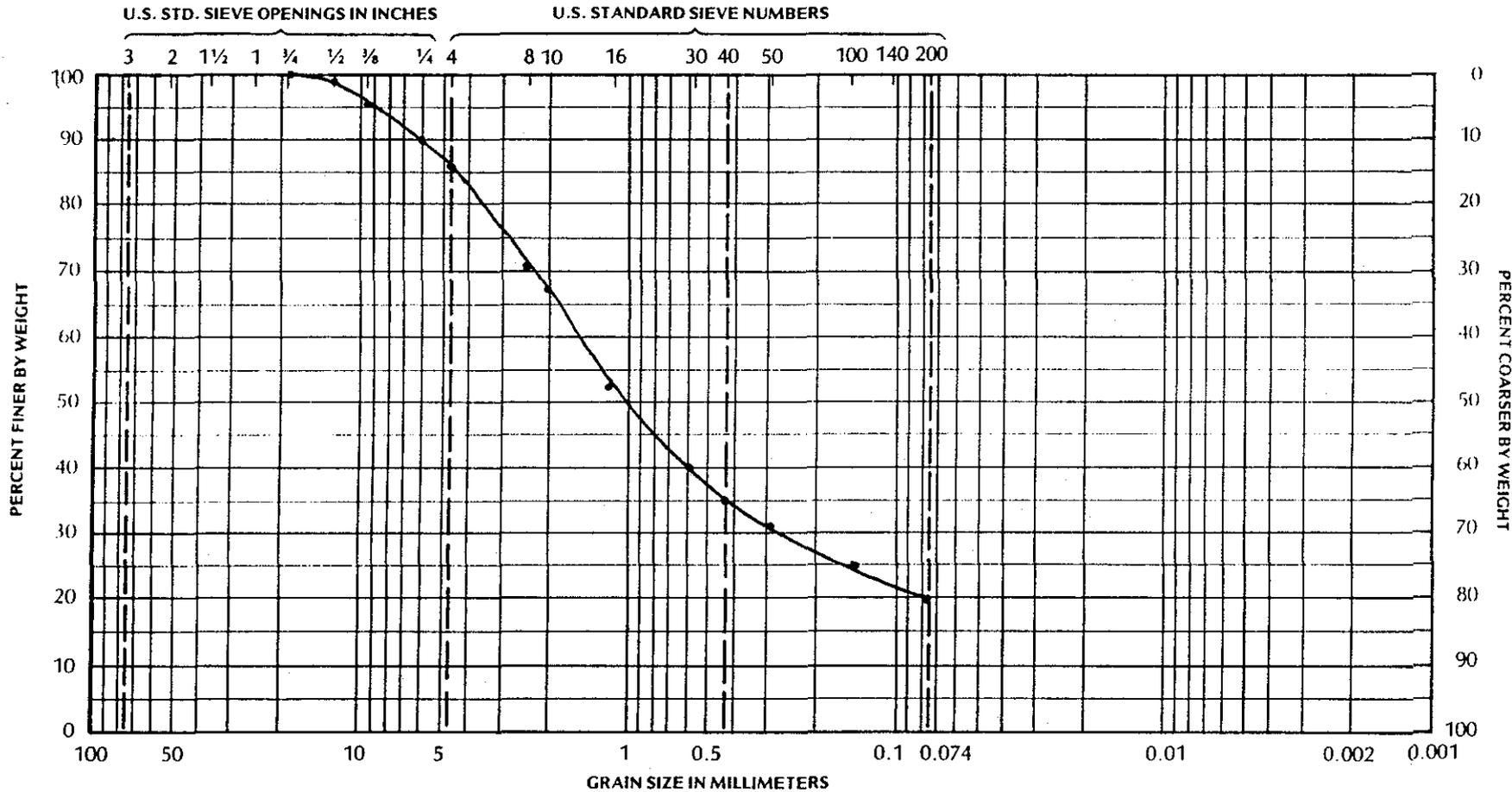
Particle Size, Percent Passing											Atterberg Limits		
2"	1"	100	1/2"	90	#10	56	#30	23	#100	7	0.05 mm	Liquid Limit	P.I.
1 1/2"	3/4"	97	#4	74	#16	40	#50	13	#200	4.3	0.002 mm	Plastic Limit	Sp. Gr.

Type of Material _____ Casandro Wash Detention Dam _____ Job No. 2123JH240 _____

Source of Material TP-22, B-1 ; 3' _____ Lab/Inv. No. N/A _____

Test Procedure ASTM D422 _____ Tested/Calc. By Simpson _____ Date 2/7/94 _____

Reviewed By JCR _____ Date 2/15/94 _____



PARTICLE SIZE DISTRIBUTION CHART

Unified	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt or Clay	
AASHTO	Gravel		Coarse Sand	Fine Sand	Silt	Clay

Particle Size, Percent Passing										Atterberg Limits				
2"	1"	½"	99	#10	67	#30	40	#100	25	0.05 mm	Liquid Limit	P.I.		
1½"	¾"	¼"	100	#4	86	#16	53	#50	31	#200	18.7	0.002 mm	Plastic Limit	Sp. Gr.

Type of Material _____

Casandro Wash Detention Dam

Job No. 2123JH240

Source of Material TP-24, B-1; 2'

Lab/Inv. No. N/A

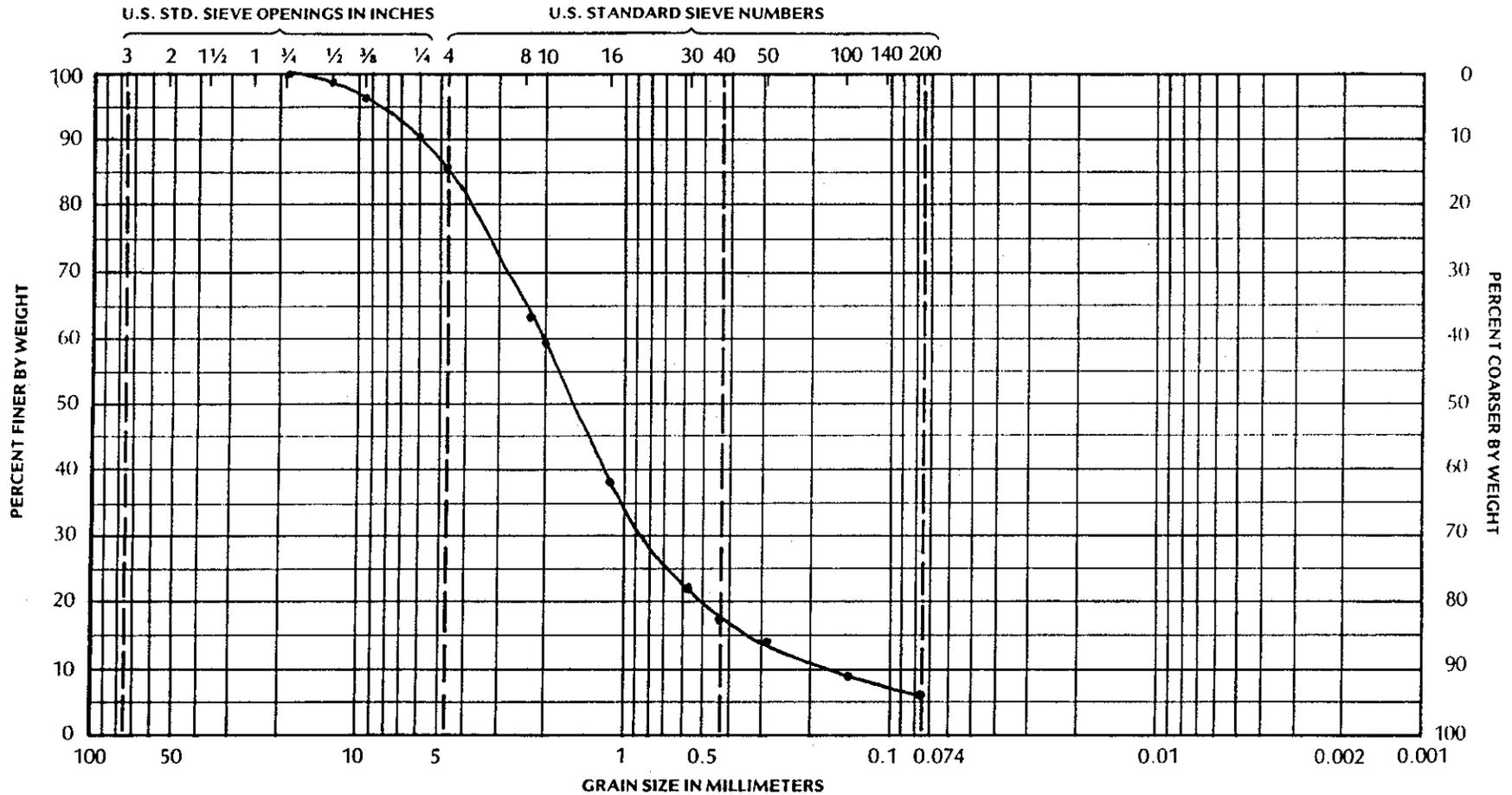
Test Procedure ASTM D422

Tested/Calc. By Simpson

Date 2/7/94

Reviewed By JCR

Date 2/15/94

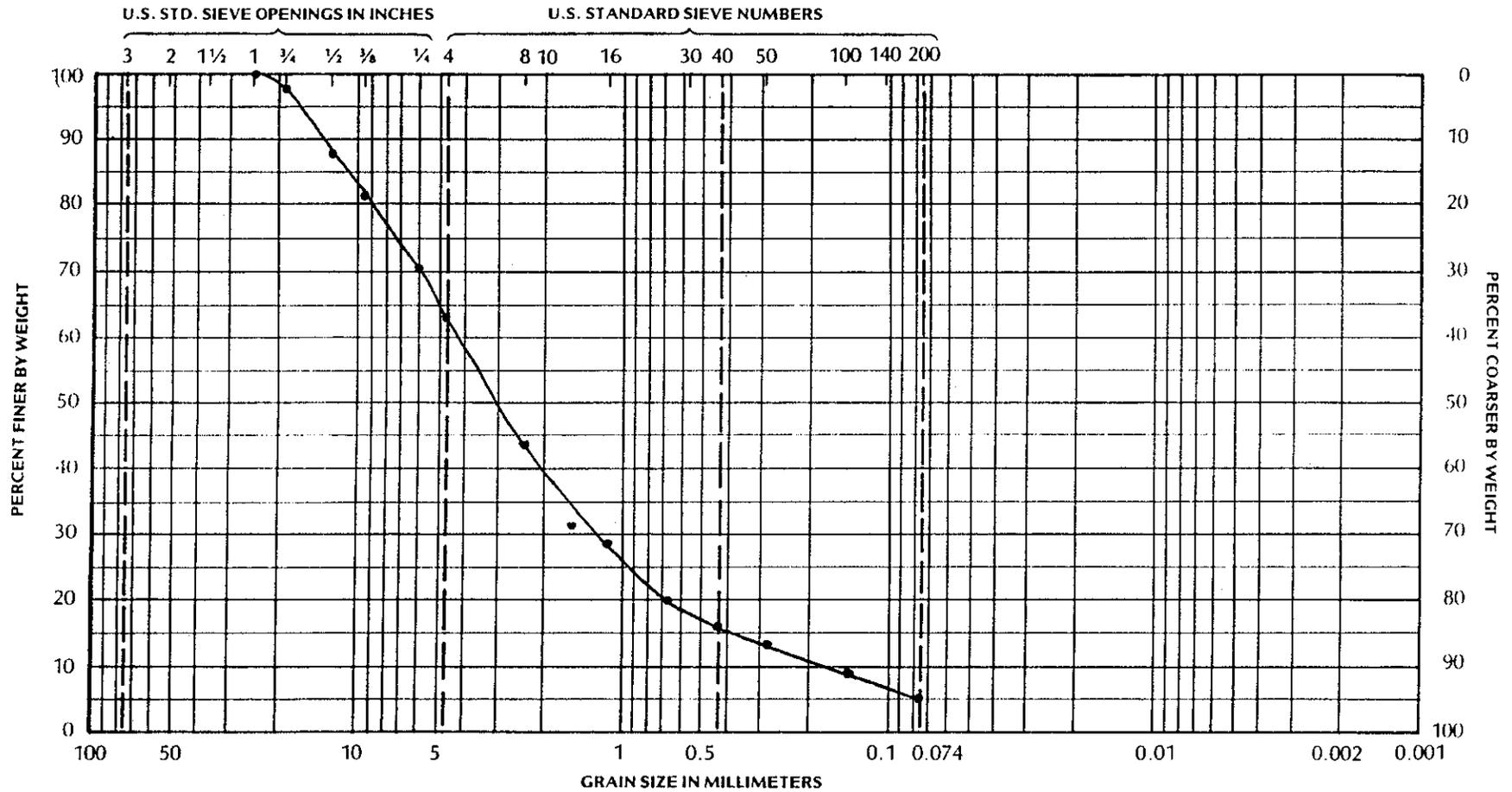


PARTICLE SIZE DISTRIBUTION CHART

Unified	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt or Clay	
AASHTO	Gravel	Coarse Sand	Coarse Sand	Fine Sand	Silt	Clay

Particle Size, Percent Passing											Atterberg Limits		
2"	1"	¾"	98	#10	59	#30	22	#100	9	0.05 mm		Liquid Limit	P.I.
1½"	¾"	100	#4	85	#16	38	#50	14	#200	5.9	0.002 mm	Plastic Limit	Sp. Gr.

Type of Material Casandro Wash Detention Dam Job No. 2123JH240
 Source of Material TP-24, B-2; 5' Lab/Inv. No. N/A
 Test Procedure ASTM D422 Tested/Calc. By Simpson Date 2/7/94
 Reviewed By JCR Date 2/15/94

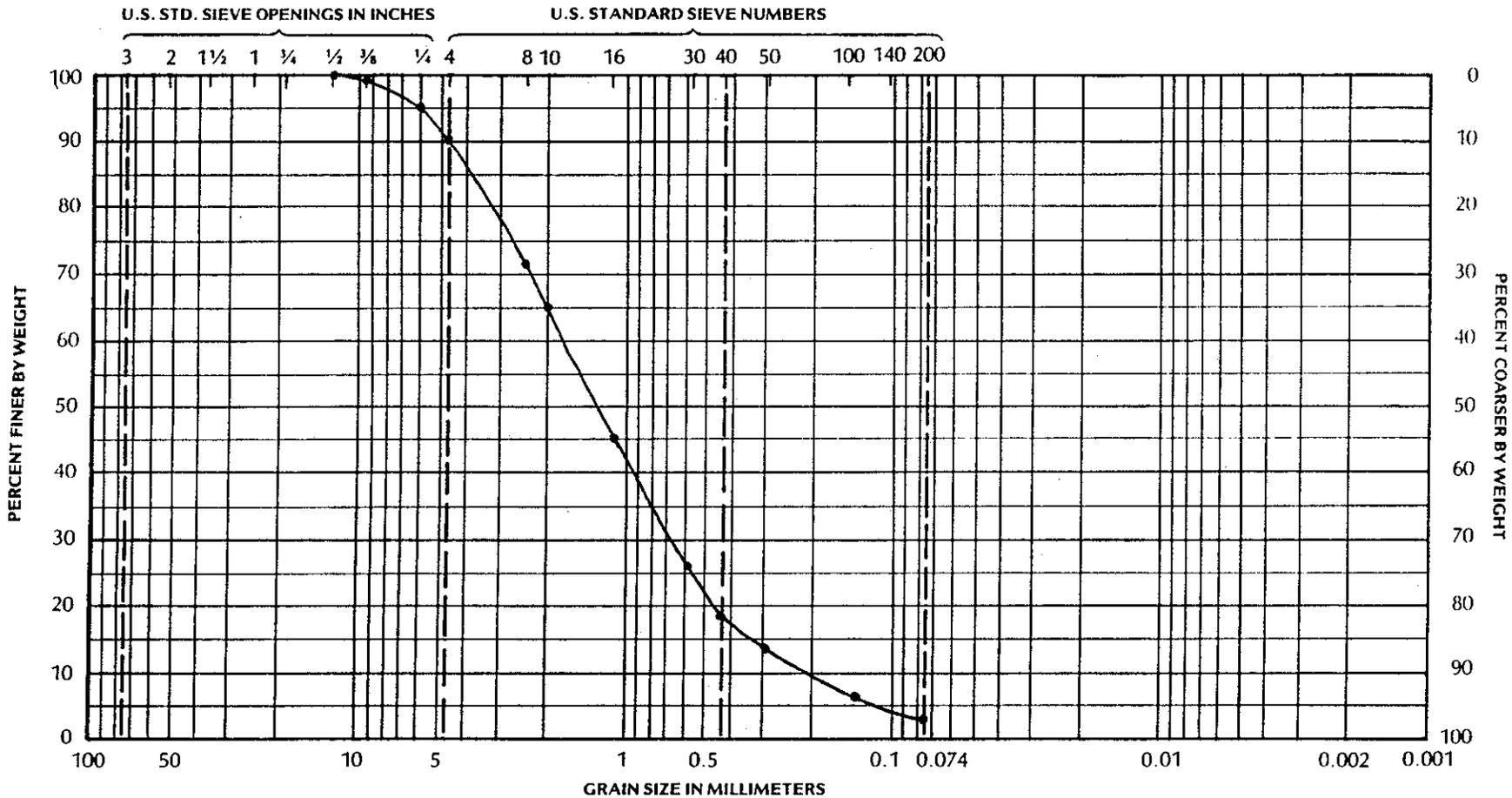


PARTICLE SIZE DISTRIBUTION CHART

Unified	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt or Clay	
AASHTO	Gravel	Coarse Sand	Coarse Sand	Fine Sand	Silt	Clay

Particle Size, Percent Passing										Atterberg Limits			
2"	1"	100	1/2"	88	#10	40	#30	20	#100	10	0.05 mm	Liquid Limit	P.I.
1 1/2"	3/4"	98	#4	63	#16	29	#50	14	#200	5.2	0.002 mm	Plastic Limit	Sp. Gr.

Type of Material Casandro Wash Detention Dam Job No. 2123.IH240
 Source of Material Sediment Lab/Inv. No. N/A
 Test Procedure ASTM D422 Tested/Calc. By Simpson Date 2/8/94
 Reviewed By JCR Date 2/15/94



PARTICLE SIZE DISTRIBUTION CHART

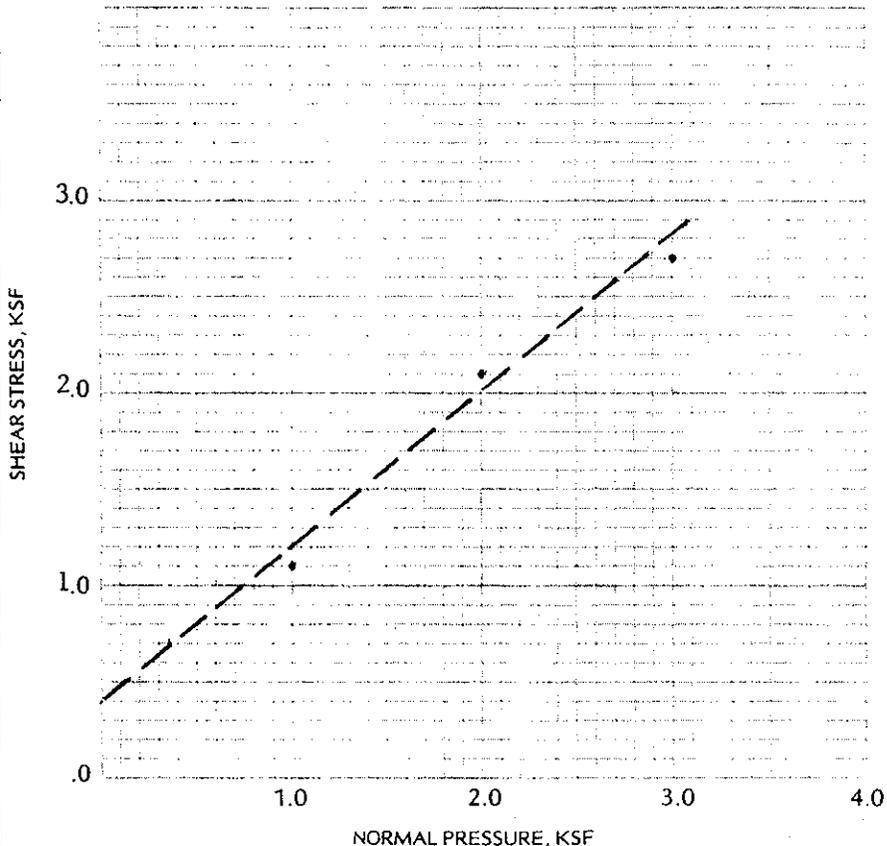
Unified	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt or Clay	
AASHTO	Gravel	Coarse Sand	Coarse Sand	Fine Sand	Silt	Clay

Particle Size, Percent Passing										Atterberg Limits			
2" _____	1" _____	½" _____	100 _____	#10 _____	65 _____	#30 _____	26 _____	#100 _____	6 _____	0.05 mm _____	Liquid Limit _____	P.I. _____	
1½" _____	¾" _____	100 _____	#4 _____	90 _____	#16 _____	45 _____	#50 _____	13 _____	#200 _____	3.0 _____	0.002 mm _____	Plastic Limit _____	Sp. Gr. _____

DIRECT SHEAR TEST

Job No. 2123JH240

Lab/Invoice No. _____



Type of Material SP-SM

Source of Material TP2; B-1; 4'

Sampled By D. Smith Date 2/3/94

Submitted By D. George Date 2/25/94

Reviewed By JCR Date 3/3/94

Test Procedure ASTM D3080- Single Shear

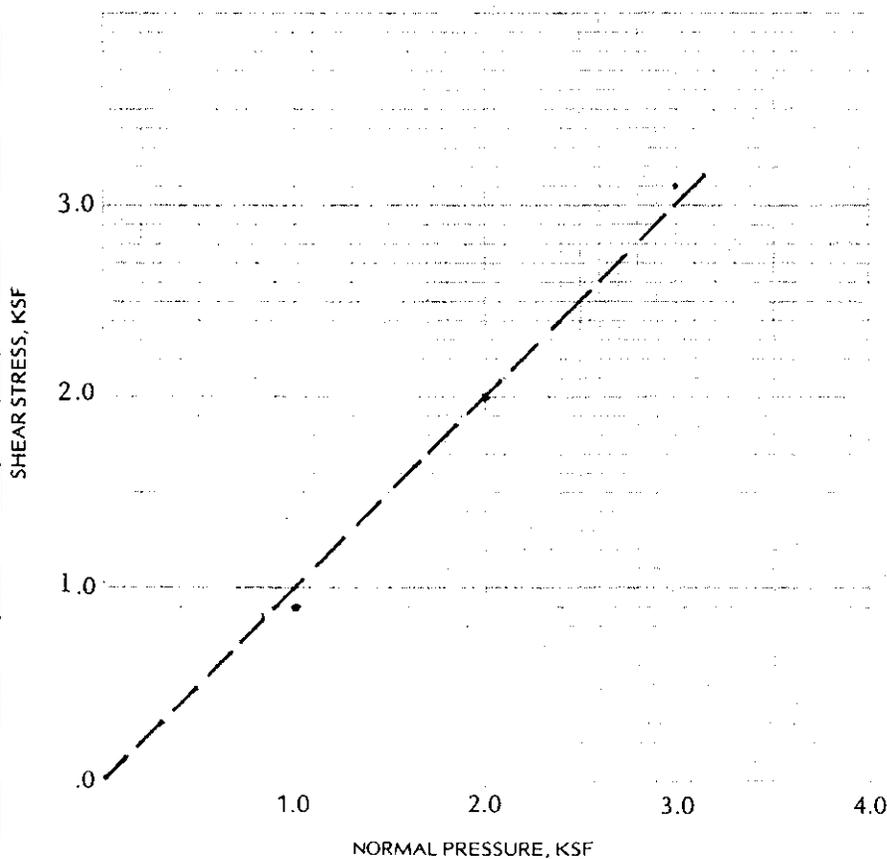
Test Condition: — InSitu ---- Saturated

Sample Condition: Undisturbed Remolded

Initial Dry Density, pcf 107

Initial Moisture Content, % 14.4

$\phi =$ 39 ° $C =$ 0.4 Kips/Sq. Ft.



Type of Material SP

Source of Material TP4; B-2; 14'

Sampled By D. Smith Date 2/3/94

Submitted By D. George Date 3/2/94

Reviewed By JCR Date 3/3/94

Test Procedure ASTM D3080- Single Shear

Test Condition: — InSitu ---- Saturated

Sample Condition: Undisturbed Remolded

Initial Dry Density, pcf 106

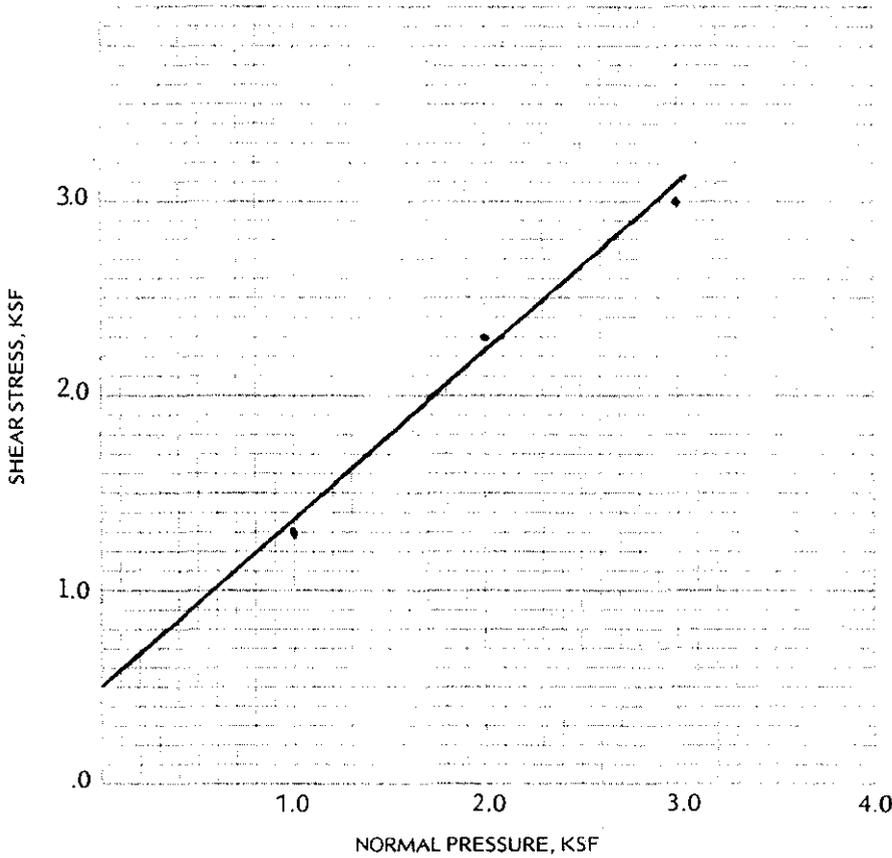
Initial Moisture Content, % 10.6

$\phi =$ 45 ° $C =$ 0 Kips/Sq. Ft.

DIRECT SHEAR TEST

Job No. 2123JH240

Lab/Invoice No. _____



Type of Material SP-SM

Source of Material TP8; B-2; 10'

Sampled By D. Smith Date 2/3/94

Submitted By D. George Date 2/16/94

Reviewed By JCR Date 3/3/94

Test Procedure ASTM D3080- Single Shear

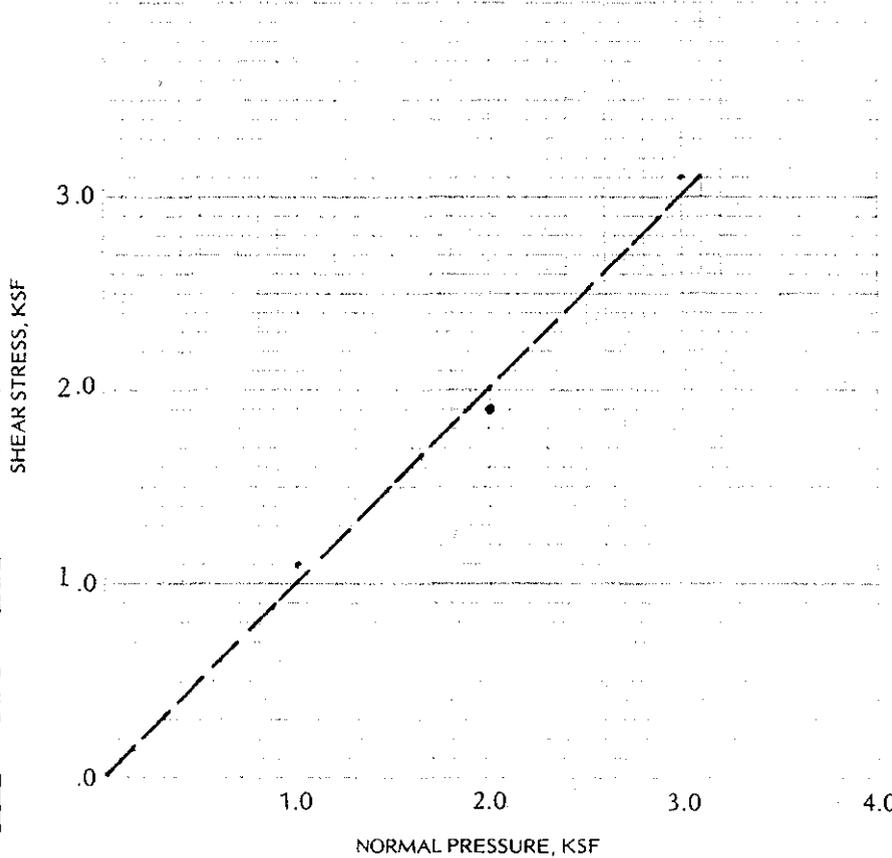
Test Condition: — InSitu ---- Saturated

Sample Condition: Undisturbed Remolded

Initial Dry Density, pcf 107

Initial Moisture Content, % 13.4

$\phi =$ 40 ° $C =$ 0.5 Kips/Sq. Ft.



Type of Material SM

Source of Material TP-11; B-3; 14

Sampled By D. Smith Date 2/3/94

Submitted By D. George Date 3/3/94

Reviewed By JCR Date 3/3/94

Test Procedure ASTM D3080- Single Shear

Test Condition: — InSitu ---- Saturated

Sample Condition: Undisturbed Remolded

Initial Dry Density, pcf 109

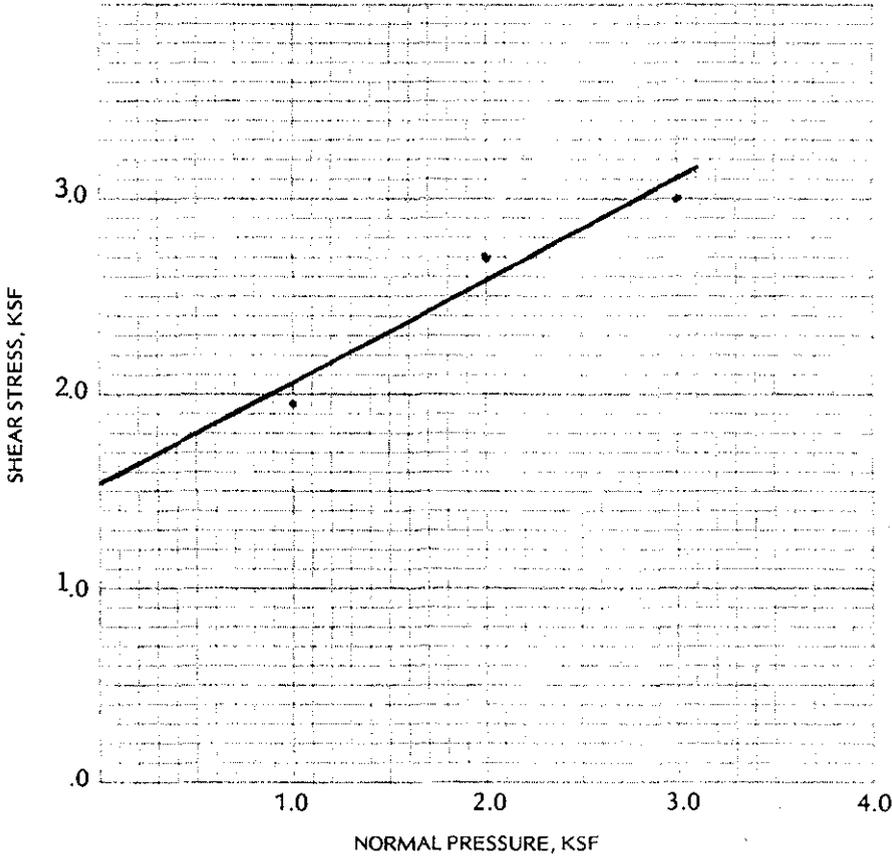
Initial Moisture Content, % 12.1

$\phi =$ 45 ° $C =$ 0.0 Kips/Sq. Ft.

DIRECT SHEAR TEST

Job No. 2123JH240

Lab/Invoice No. _____



Type of Material SM

Source of Material TP-12; B-1; 4'-5'

Sampled By D. Smith Date 2/3/94

Submitted By D. George Date 2/21/94

Reviewed By JCR Date 3/3/94

Test Procedure ASTM D3080- Single Shear

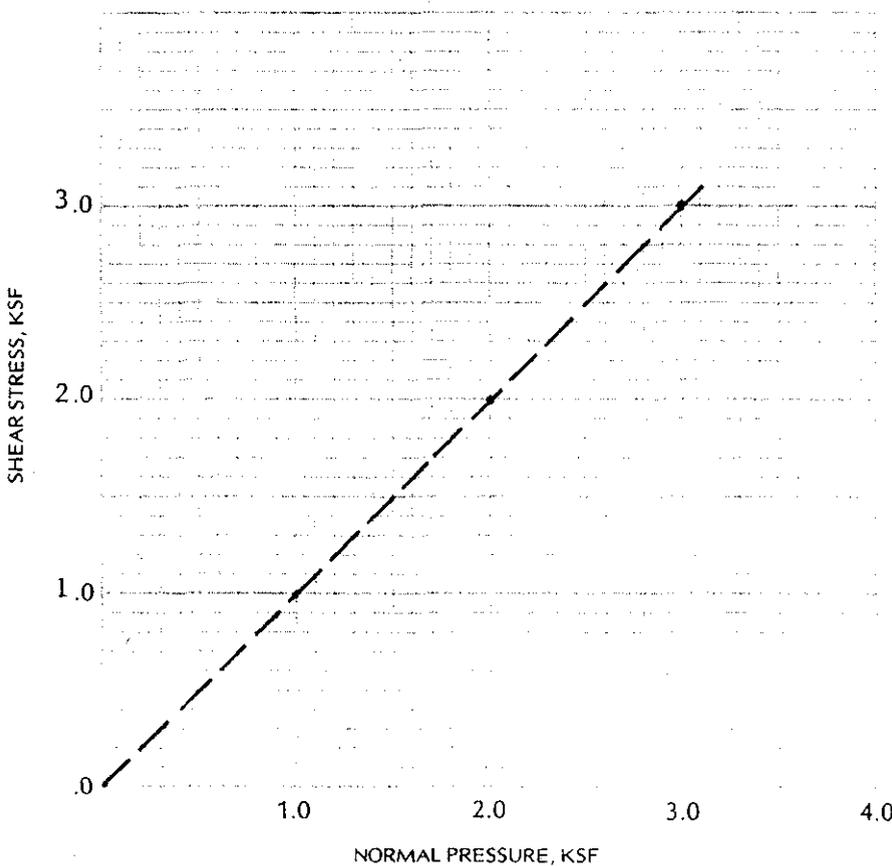
Test Condition: — InSitu ---- Saturated

Sample Condition: Undisturbed Remolded

Initial Dry Density, pcf 113

Initial Moisture Content, % 11.6

$\phi =$ 27 ° $C =$ 1.55 Kips/Sq. Ft.



Type of Material SP-SM

Source of Material TP-13; B-1; 4'

Sampled By D. Smith Date 2/3/94

Submitted By D. George Date 3/2/94

Reviewed By JCR Date 3/3/94

Test Procedure ASTM D3080- Single Shear

Test Condition: — InSitu ---- Saturated

Sample Condition: Undisturbed Remolded

Initial Dry Density, pcf 106

Initial Moisture Content, % 10.9

$\phi =$ 45 ° $C =$ 0.0 Kips/Sq. Ft.



**Western
Technologies
Inc.**

The Quality People
Since 1955

3737 East Broadway Road
Phoenix, Arizona 85040-2966
(602) 437-3737 • fax 470-1341

— RECEIVED —
APR - 6 1994
CH2M HILL/PHOENIX

April 4, 1994

CH₂M HILL
1620 West Fountain Head Parkway
Suite 550
Tempe, Arizona 85282-18/43

Attn: Mr. David Allard, P.E.

Re: Triaxial Shear Testing Results
Casandro Wash Detention Dam
Wickenburg, Arizona

Job No. 2123JH240

As you requested, we are providing additional information regarding the referenced testing.

The consolidated undrained (CU) triaxial test performed on sample TP15, B1 was performed in general accordance with ASTM D4767. The samples were remolded to approximately 95 percent of ASTM D698 maximum density within 2 percent of optimum moisture. The samples were saturated prior to applying the confining pressure. Presented in the following tabulation are the remolded densities and moisture contents for each specimen:

SAMPLE NUMBER	CONFINING PRESSURE, PSI	REMOLDED DRY DENSITY (PCF)	REMOLDED MOISTURE, %
1	10	107.2	11.7
2	20	107.5	11.8
3	30	107.6	11.7

Sample TP15, B1 classified as a SP-SM (according to the Unified Soil Classification System ASTM D2487), based on gradation and atterberg limit testing.

The unconsolidated undrained triaxial tests performed on samples TP8, B1, and TP21, B2 were performed in general accordance with ASTM D2850. The samples were remolded to approximately 95 percent of ASTM D698 maximum dry density within 2 percent of optimum moisture. Presented in the following tabulation are the remolded densities and moisture contents for each specimen:

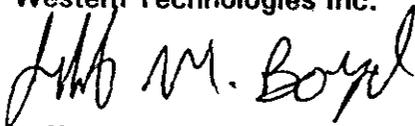
CH₂M HILL
Job No. 2123JH240

SPECIMEN NUMBER	CONFINING PRESSURE, PSI	REMOLDED DRY DENSITY, (PCF)	MOISTURE CONTENT, (%)
TP8, B1, NO. 1	10	108.6	11.8
TP8, B1, NO. 2	20	108.9	11.5
TP8, B1, NO. 3	30	108.5	11.8
TP21, B2, NO. 1	10	110.7	11.9
TP21, B2, NO. 2	20	110.9	11.9
TP21, B2, NO. 3	30	110.9	11.9

The results of the proctor tests (ASTM D698) for samples TP8, B2 and TP21, B2 indicated maximum dry density and optimum moisture contents of 113 pcf. at 14.2%, and 115 pcf. at 13.2%, respectively.

We appreciate working with you on this project. We are sorry for any inconvenience we may have caused you by our unintentionally not reporting this information.

Sincerely,
Western Technologies Inc.

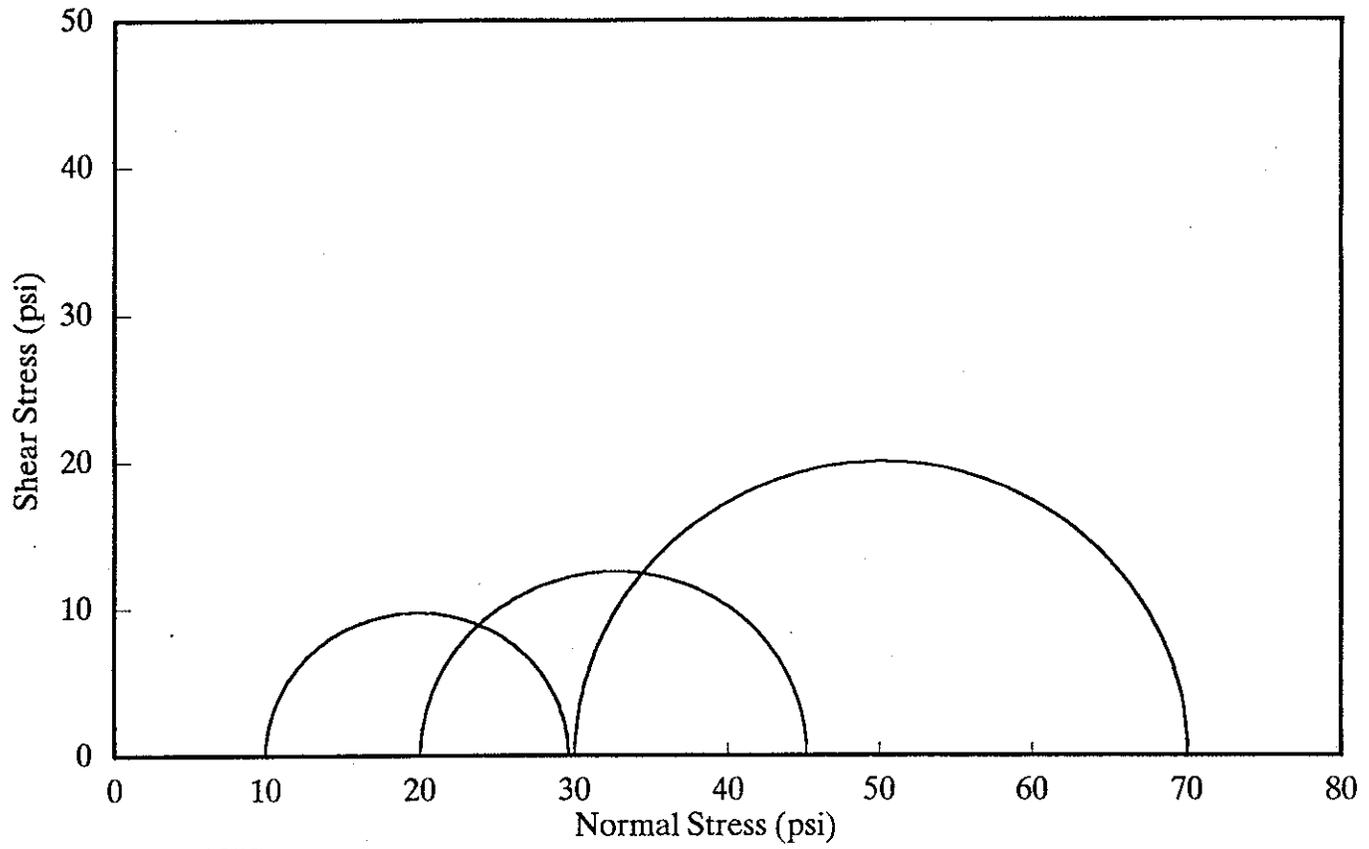


Jeff M. Boyd, E.I.T.
Geological Engineer



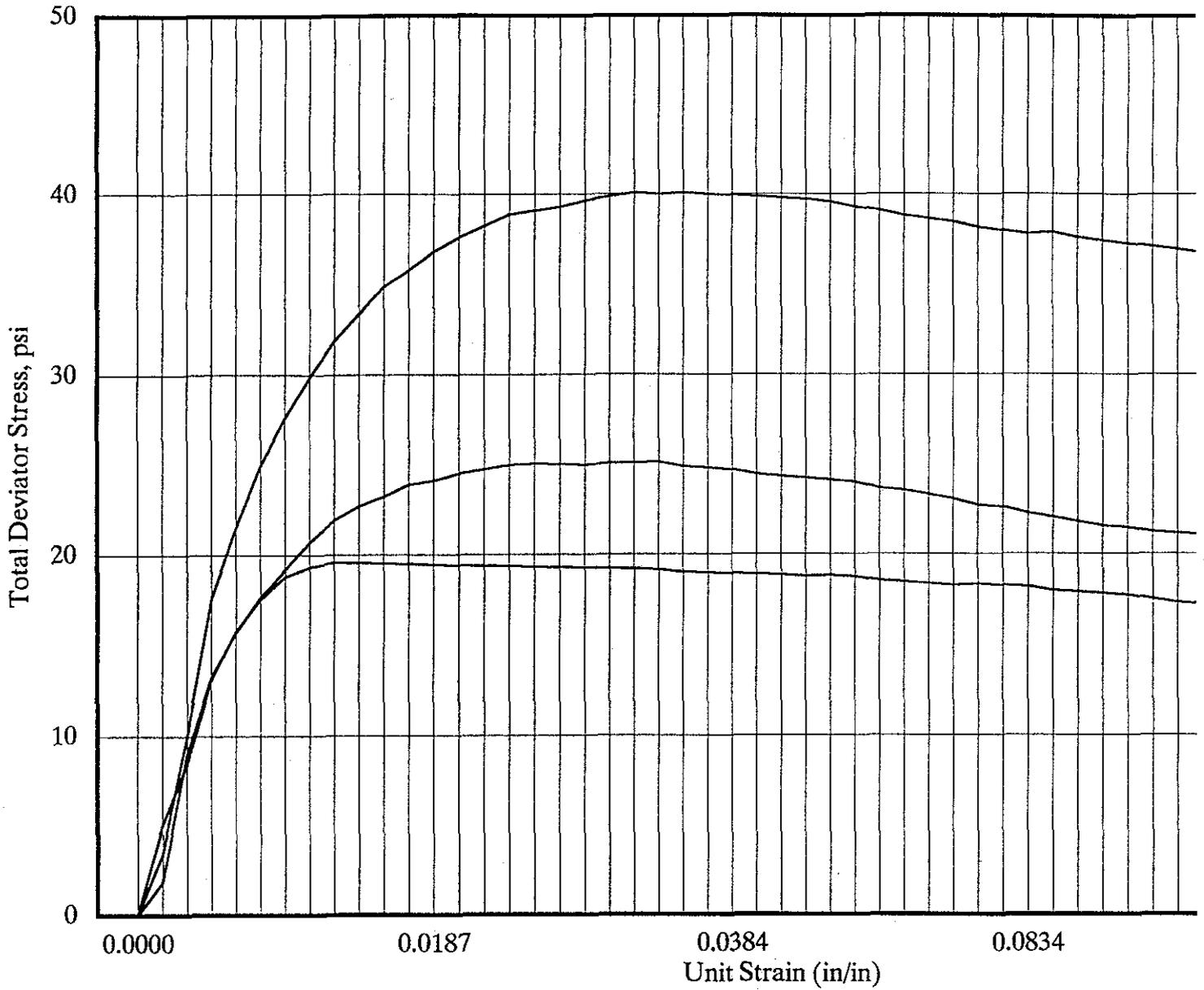
Mohr Failure Envelope

Total Stress



TP15, B1 - (CU)
Casandro Wash 2123JH240

Triaxial Shear Test Results



TP15, B1, (CU)
2123JH240



Triaxial Compression Test Results

Project Name: CH2M HILL
Job No.: 2123JH240

Boring No.: TP 15
Sample No.: B 1 Sample Depth:

Sample Area: 6.42 sq. in.
Sample Length: 6.10 in.
Confining Pressure: 22 psi
Final Back Pressure: 12 psi
Sigma 3: 10 psi
Friction + Pressure Load: 0.0164 dial reading

Deform. Dial Reading	Load Dial Reading	Change in Length	Change In Load	Unit Strain (in/in)	Corr. Area (sq in)	Load (lbs)	Pore Pressure Reading	Pore Pressure (psi)	Total Deviator Stress (psi)	Effective Deviator Stress (psi)
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Triaxial Compression Test Results

Project Name: CH2M HILL
Job No.: 2123JH240

Boring No.: TP 15
Sample No.: B 1 Sample Depth:

Sample Area: 6.42 sq. in.
Sample Length: 6.10 in.
Confining Pressure: 22 psi
Final Back Pressure: 12 psi
Sigma 3: 10 psi
Friction + Pressure Load: 0.0164 dial reading

Deform. Dial Reading	Load Dial Reading	Change in Length	Change In Load	Unit Strain (in/in)	Corr. Area (sq in)	Load (lbs)	Pore Pressure Reading	Pore Pressure (psi)	Total Deviator Stress (psi)	Effective Deviator Stress (psi)
0.016	0.0129	0.000	0.0000	0.0000	6.42	0.00	83	0.00	0.00	0.00
0.020	0.0164	0.004	0.0035	0.0007	6.42	32.03	84	0.15	4.99	4.84
0.030	0.0188	0.014	0.0059	0.0023	6.43	53.99	86	0.44	8.39	7.95
0.040	0.0221	0.024	0.0092	0.0039	6.45	84.18	88	0.73	13.06	12.34
0.050	0.0240	0.034	0.0111	0.0056	6.46	101.56	89	0.87	15.73	14.86
0.060	0.0253	0.044	0.0124	0.0072	6.47	113.46	88	0.73	17.55	16.82
0.070	0.0262	0.054	0.0133	0.0089	6.48	121.70	90	1.02	18.79	17.77
0.080	0.0266	0.064	0.0137	0.0105	6.49	125.36	89	0.87	19.32	18.45
0.090	0.0268	0.074	0.0139	0.0121	6.50	127.19	90	1.02	19.57	18.56
0.100	0.0268	0.084	0.0139	0.0138	6.51	127.19	90	1.02	19.54	18.52
0.110	0.0268	0.094	0.0139	0.0154	6.52	127.19	90	1.02	19.51	18.49
0.120	0.0268	0.104	0.0139	0.0170	6.53	127.19	90	1.02	19.47	18.46
0.130	0.0268	0.114	0.0139	0.0187	6.54	127.19	90	1.02	19.44	18.43
0.140	0.0268	0.124	0.0139	0.0203	6.55	127.19	91	1.16	19.41	18.25
0.150	0.0268	0.134	0.0139	0.0220	6.56	127.19	91	1.16	19.38	18.22
0.160	0.0268	0.144	0.0139	0.0236	6.58	127.19	90	1.02	19.34	18.33
0.170	0.0268	0.154	0.0139	0.0252	6.59	127.19	91	1.16	19.31	18.15
0.180	0.0268	0.164	0.0139	0.0269	6.60	127.19	90	1.02	19.28	18.26
0.190	0.0268	0.174	0.0139	0.0285	6.61	127.19	91	1.16	19.25	18.09
0.200	0.0268	0.184	0.0139	0.0302	6.62	127.19	91	1.16	19.21	18.05
0.210	0.0268	0.194	0.0139	0.0318	6.63	127.19	91	1.16	19.18	18.02
0.220	0.0268	0.204	0.0139	0.0334	6.64	127.19	91	1.16	19.15	17.99
0.230	0.0267	0.214	0.0138	0.0351	6.65	126.27	91	1.16	18.98	17.82
0.240	0.0267	0.224	0.0138	0.0367	6.66	126.27	92	1.31	18.95	17.64
0.250	0.0267	0.234	0.0138	0.0384	6.68	126.27	92	1.31	18.91	17.61
0.260	0.0267	0.244	0.0138	0.0400	6.69	126.27	92	1.31	18.88	17.58
0.275	0.0267	0.259	0.0138	0.0425	6.70	126.27	92	1.31	18.83	17.53
0.300	0.0267	0.284	0.0138	0.0466	6.73	126.27	93	1.45	18.75	17.30
0.325	0.0268	0.309	0.0139	0.0507	6.76	127.19	93	1.45	18.81	17.36
0.350	0.0268	0.334	0.0139	0.0548	6.79	127.19	93	1.45	18.73	17.28
0.375	0.0267	0.359	0.0138	0.0589	6.82	126.27	93	1.45	18.51	17.06
0.400	0.0267	0.384	0.0138	0.0630	6.85	126.27	93	1.45	18.43	16.98
0.425	0.0267	0.409	0.0138	0.0670	6.88	126.27	93	1.45	18.35	16.90
0.450	0.0267	0.434	0.0138	0.0711	6.91	126.27	93	1.45	18.27	16.82
0.475	0.0268	0.459	0.0139	0.0752	6.94	127.19	93	1.45	18.32	16.87
0.500	0.0268	0.484	0.0139	0.0793	6.97	127.19	93	1.45	18.24	16.79
0.525	0.0268	0.509	0.0139	0.0834	7.00	127.19	93	1.45	18.16	16.71
0.550	0.0267	0.534	0.0138	0.0875	7.04	126.27	93	1.45	17.95	16.50



Triaxial Compression Test Results

Project Name: CH2M HILL
 Job No.: 2123JH240

Boring No.: TP 15
 Sample No.: B 1 Sample Depth:

Sample Area: 6.42 sq. in.
 Sample Length: 6.10 in.
 Confining Pressure: 22 psi
 Final Back Pressure: 12 psi
 Sigma 3: 10 psi
 Friction + Pressure Load: 0.0164 dial reading

Defor. Dial Reading	Load Dial Reading	Change in Length	Change In Load	Unit Strain (in/in)	Corr. Area (sq in)	Load (lbs)	Pore Pressure Reading	Pore Pressure (psi)	Total Deviator Stress (psi)	Effective Deviator Stress (psi)
0.575	0.0267	0.559	0.0138	0.0916	7.07	126.27	93	1.45	17.87	16.42
0.600	0.0267	0.584	0.0138	0.0957	7.10	126.27	93	1.45	17.79	16.33
0.625	0.0267	0.609	0.0138	0.0998	7.13	126.27	93	1.45	17.70	16.25
0.650	0.0266	0.634	0.0137	0.1039	7.16	125.36	93	1.45	17.50	16.05
0.675	0.0265	0.659	0.0136	0.1080	7.20	124.44	93	1.45	17.29	15.84
0.700	0.0265	0.684	0.0136	0.1121	7.23	124.44	93	1.45	17.21	15.76
0.725	0.0264	0.709	0.0135	0.1162	7.26	123.53	93	1.45	17.00	15.55
0.750	0.0263	0.734	0.0134	0.1203	7.30	122.61	93	1.45	16.80	15.35
0.775	0.0263	0.759	0.0134	0.1244	7.33	122.61	93	1.45	16.72	15.27
0.800	0.0263	0.784	0.0134	0.1285	7.37	122.61	94	1.60	16.64	15.05
0.825	0.0262	0.809	0.0133	0.1326	7.40	121.70	94	1.60	16.44	14.85
0.850	0.0262	0.834	0.0133	0.1367	7.44	121.70	94	1.60	16.36	14.77
0.875	0.0262	0.859	0.0133	0.1408	7.47	121.70	94	1.60	16.29	14.69
0.900	0.0262	0.884	0.0133	0.1449	7.51	121.70	94	1.60	16.21	14.61
								Max Deviator	19.57	18.56
								Max Pore Press.	1.60	



Triaxial Compression Test Results

Project Name: CH2M HILL
 Job No.: 2123JH240

Boring No.: TP 15
 Sample No.: B 1 Sample Depth:

Sample Area: 6.42 sq. in.
 Sample Length: 6.10 in.
 Confining Pressure: 32 psi
 Final Back Pressure: 12 psi
 Sigma 3: 20 psi
 Friction + Pressure Load: 0.0164 dial reading

Deform. Dial Reading	Load Dial Reading	Change in Length	Change In Load	Unit Strain (in/in)	Corr. Area (sq in)	Load (lbs)	Pore Pressure Reading	Pore Pressure (psi)	Total Deviator Stress (psi)	Effective Deviator Stress (psi)
0.000	0.0117	0.000	0.0000	0.0000	6.42	0.00	84	0.00	0.00	0.00
0.020	0.0130	0.020	0.0013	0.0033	6.44	11.90	85	0.15	1.85	1.70
0.030	0.0180	0.030	0.0063	0.0049	6.45	57.65	88	0.58	8.93	8.35
0.040	0.0210	0.040	0.0093	0.0066	6.46	85.10	92	1.16	13.17	12.01
0.050	0.0228	0.050	0.0111	0.0082	6.47	101.56	95	1.60	15.69	14.10
0.060	0.0242	0.060	0.0125	0.0098	6.48	114.37	100	2.32	17.64	15.32
0.070	0.0253	0.070	0.0136	0.0115	6.49	124.44	102	2.61	19.16	16.55
0.080	0.0264	0.080	0.0147	0.0131	6.51	134.51	105	3.05	20.68	17.63
0.090	0.0273	0.090	0.0156	0.0148	6.52	142.74	100	2.32	21.91	19.59
0.100	0.0279	0.100	0.0162	0.0164	6.53	148.23	112	4.06	22.71	18.65
0.110	0.0283	0.110	0.0166	0.0180	6.54	151.89	114	4.35	23.23	18.88
0.120	0.0288	0.120	0.0171	0.0197	6.55	156.47	117	4.79	23.89	19.11
0.130	0.0290	0.130	0.0173	0.0213	6.56	158.30	118	4.93	24.13	19.20
0.140	0.0293	0.140	0.0176	0.0230	6.57	161.04	121	5.37	24.51	19.14
0.150	0.0295	0.150	0.0178	0.0246	6.58	162.87	122	5.51	24.75	19.23
0.160	0.0297	0.160	0.0180	0.0262	6.59	164.70	123	5.66	24.98	19.33
0.170	0.0298	0.170	0.0181	0.0279	6.60	165.62	124	5.80	25.08	19.28
0.180	0.0298	0.180	0.0181	0.0295	6.62	165.62	125	5.95	25.04	19.09
0.190	0.0298	0.190	0.0181	0.0311	6.63	165.62	127	6.24	24.99	18.76
0.200	0.0299	0.200	0.0182	0.0328	6.64	166.53	128	6.38	25.09	18.71
0.225	0.0300	0.225	0.0183	0.0369	6.67	167.45	130	6.67	25.12	18.45
0.250	0.0301	0.250	0.0184	0.0410	6.69	168.36	133	7.11	25.15	18.04
0.275	0.0300	0.275	0.0183	0.0451	6.72	167.45	133	7.11	24.91	17.80
0.300	0.0300	0.300	0.0183	0.0492	6.75	167.45	134	7.25	24.80	17.55
0.325	0.0300	0.325	0.0183	0.0533	6.78	167.45	135	7.40	24.69	17.30
0.350	0.0299	0.350	0.0182	0.0574	6.81	166.53	136	7.54	24.45	16.91
0.375	0.0299	0.375	0.0182	0.0615	6.84	166.53	137	7.69	24.34	16.66
0.400	0.0299	0.400	0.0182	0.0656	6.87	166.53	138	7.83	24.24	16.41
0.425	0.0299	0.425	0.0182	0.0697	6.90	166.53	138	7.83	24.13	16.30
0.450	0.0299	0.450	0.0182	0.0738	6.93	166.53	139	7.98	24.03	16.05
0.475	0.0297	0.475	0.0180	0.0779	6.96	164.70	139	7.98	23.66	15.68
0.500	0.0297	0.500	0.0180	0.0820	6.99	164.70	140	8.12	23.55	15.43
0.525	0.0296	0.525	0.0179	0.0861	7.02	163.79	139	7.98	23.32	15.34
0.550	0.0295	0.550	0.0178	0.0902	7.06	162.87	140	8.12	23.08	14.96
0.575	0.0293	0.575	0.0176	0.0943	7.09	161.04	140	8.12	22.72	14.60
0.600	0.0293	0.600	0.0176	0.0984	7.12	161.04	141	8.27	22.62	14.35
0.625	0.0291	0.625	0.0174	0.1025	7.15	159.21	141	8.27	22.26	13.99
0.650	0.0290	0.650	0.0173	0.1066	7.19	158.30	140	8.12	22.03	13.91
0.675	0.0289	0.675	0.0172	0.1107	7.22	157.38	141	8.27	21.80	13.53
0.700	0.0288	0.700	0.0171	0.1148	7.25	156.47	140	8.12	21.57	13.45
0.725	0.0288	0.725	0.0171	0.1189	7.29	156.47	141	8.27	21.47	13.21
0.750	0.0287	0.750	0.0170	0.1230	7.32	155.55	141	8.27	21.25	12.98
0.775	0.0287	0.775	0.0170	0.1270	7.35	155.55	141	8.27	21.15	12.88
0.800	0.0287	0.800	0.0170	0.1311	7.39	155.55	141	8.27	21.05	12.78
0.825	0.0287	0.825	0.0170	0.1352	7.42	155.55	141	8.27	20.95	12.69
0.850	0.0286	0.850	0.0169	0.1393	7.46	154.64	141	8.27	20.73	12.46
0.875	0.0285	0.875	0.0168	0.1434	7.50	153.72	142	8.41	20.51	12.10
0.900	0.0283	0.900	0.0166	0.1475	7.53	151.89	141	8.27	20.17	11.90

Max Deviator 25.15 19.59
 Max Pore Press. 8.41



Triaxial Compression Test Results

Project Name: CH2M HILL
Job No.: 2123JH240

Boring No.: TP 15
Sample No.: B 1 Sample Depth:

Sample Area: 6.42 sq. in.
Sample Length: 6.10 in.
Confining Pressure: 42 psi
Final Back Pressure: 12 psi
Sigma 3: 30 psi
Friction + Pressure Load: 0.0164 dial reading

Defor. Dial Reading	Load Dial Reading	Change in Length	Change In Load	Unit Strain (in/in)	Corr. Area (sq in)	Load (lbs)	Pore Pressure Reading	Pore Pressure (psi)	Total Deviator Stress (psi)	Effective Deviator Stress (psi)
								0.00	0.00	

Triaxial Compression Test Results

Project Name: CH2M HILL
Job No.: 2123JH240

Boring No.: TP 15
Sample No.: B 1 Sample Depth:

Sample Area: 6.42 sq. in.
Sample Length: 6.10 in.
Confining Pressure: 42 psi
Final Back Pressure: 12 psi
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Friction + Pressure Load: 0.0164 dial reading

Defor. Dial Reading	Load Dial Reading	Change in Length	Change In Load	Unit Strain (in/in)	Corr. Area (sq in)	Load (lbs)	Pore Pressure Reading	Pore Pressure (psi)	Total Deviator Stress (psi)	Effective Deviator Stress (psi)
0.000	0.0126	0.000	0.0000	0.0000	6.42	0.00	84	0.00	0.00	0.00
0.020	0.0150	0.020	0.0024	0.0033	6.44	21.96	85	0.15	3.41	3.26
0.030	0.0196	0.030	0.0070	0.0049	6.45	64.05	86	0.29	9.93	9.64
0.040	0.0250	0.040	0.0124	0.0066	6.46	113.46	88	0.58	17.56	16.98
0.050	0.0278	0.050	0.0152	0.0082	6.47	139.08	90	0.87	21.49	20.62
0.060	0.0303	0.060	0.0177	0.0098	6.48	161.96	93	1.31	24.98	23.67
0.070	0.0322	0.070	0.0196	0.0115	6.49	179.34	97	1.89	27.61	25.73
0.080	0.0338	0.080	0.0212	0.0131	6.51	193.98	100	2.32	29.82	27.50
0.090	0.0353	0.090	0.0227	0.0148	6.52	207.71	105	3.05	31.88	28.83
0.100	0.0364	0.100	0.0238	0.0164	6.53	217.77	107	3.34	33.36	30.03
0.110	0.0375	0.110	0.0249	0.0180	6.54	227.84	110	3.77	34.85	31.08
0.120	0.0382	0.120	0.0256	0.0197	6.55	234.24	113	4.21	35.77	31.56
0.130	0.0390	0.130	0.0264	0.0213	6.56	241.56	116	4.64	36.82	32.18
0.140	0.0396	0.140	0.0270	0.0230	6.57	247.05	120	5.22	37.60	32.38
0.150	0.0401	0.150	0.0275	0.0246	6.58	251.63	122	5.51	38.23	32.72
0.160	0.0406	0.160	0.0280	0.0262	6.59	256.20	125	5.95	38.86	32.91
0.170	0.0408	0.170	0.0282	0.0279	6.60	258.03	128	6.38	39.07	32.69
0.180	0.0410	0.180	0.0284	0.0295	6.62	259.86	129	6.53	39.28	32.76
0.190	0.0413	0.190	0.0287	0.0311	6.63	262.61	132	6.96	39.63	32.67
0.200	0.0415	0.200	0.0289	0.0328	6.64	264.44	133	7.11	39.84	32.73
0.210	0.0417	0.210	0.0291	0.0344	6.65	266.26	135	7.40	40.05	32.65
0.220	0.0417	0.220	0.0291	0.0361	6.66	266.26	136	7.54	39.98	32.44
0.230	0.0418	0.230	0.0292	0.0377	6.67	267.18	138	7.83	40.05	32.22
0.240	0.0418	0.240	0.0292	0.0393	6.68	267.18	139	7.98	39.98	32.00
0.250	0.0418	0.250	0.0292	0.0410	6.69	267.18	141	8.27	39.91	31.64
0.260	0.0418	0.260	0.0292	0.0426	6.71	267.18	141	8.27	39.84	31.58
0.270	0.0418	0.270	0.0292	0.0443	6.72	267.18	143	8.56	39.77	31.22
0.280	0.0418	0.280	0.0292	0.0459	6.73	267.18	144	8.70	39.71	31.00
0.300	0.0418	0.300	0.0292	0.0492	6.75	267.18	146	8.99	39.57	30.58
0.325	0.0417	0.325	0.0291	0.0533	6.78	266.26	148	9.28	39.26	29.98
0.350	0.0417	0.350	0.0291	0.0574	6.81	266.26	150	9.57	39.09	29.52
0.375	0.0416	0.375	0.0290	0.0615	6.84	265.35	152	9.86	38.79	28.93
0.400	0.0416	0.400	0.0290	0.0656	6.87	265.35	153	10.01	38.62	28.61
0.425	0.0416	0.425	0.0290	0.0697	6.90	265.35	154	10.15	38.45	28.30
0.450	0.0415	0.450	0.0289	0.0738	6.93	264.44	156	10.44	38.15	27.71
0.475	0.0415	0.475	0.0289	0.0779	6.96	264.44	157	10.59	37.98	27.39
0.500	0.0415	0.500	0.0289	0.0820	6.99	264.44	158	10.73	37.81	27.08
0.525	0.0417	0.525	0.0291	0.0861	7.02	266.26	160	11.02	37.90	26.88

Triaxial Compression Test Results

Project Name: CH2M HILL
 Job No.: 2123JH240

Boring No.: TP 15
 Sample No.: B 1 Sample Depth:

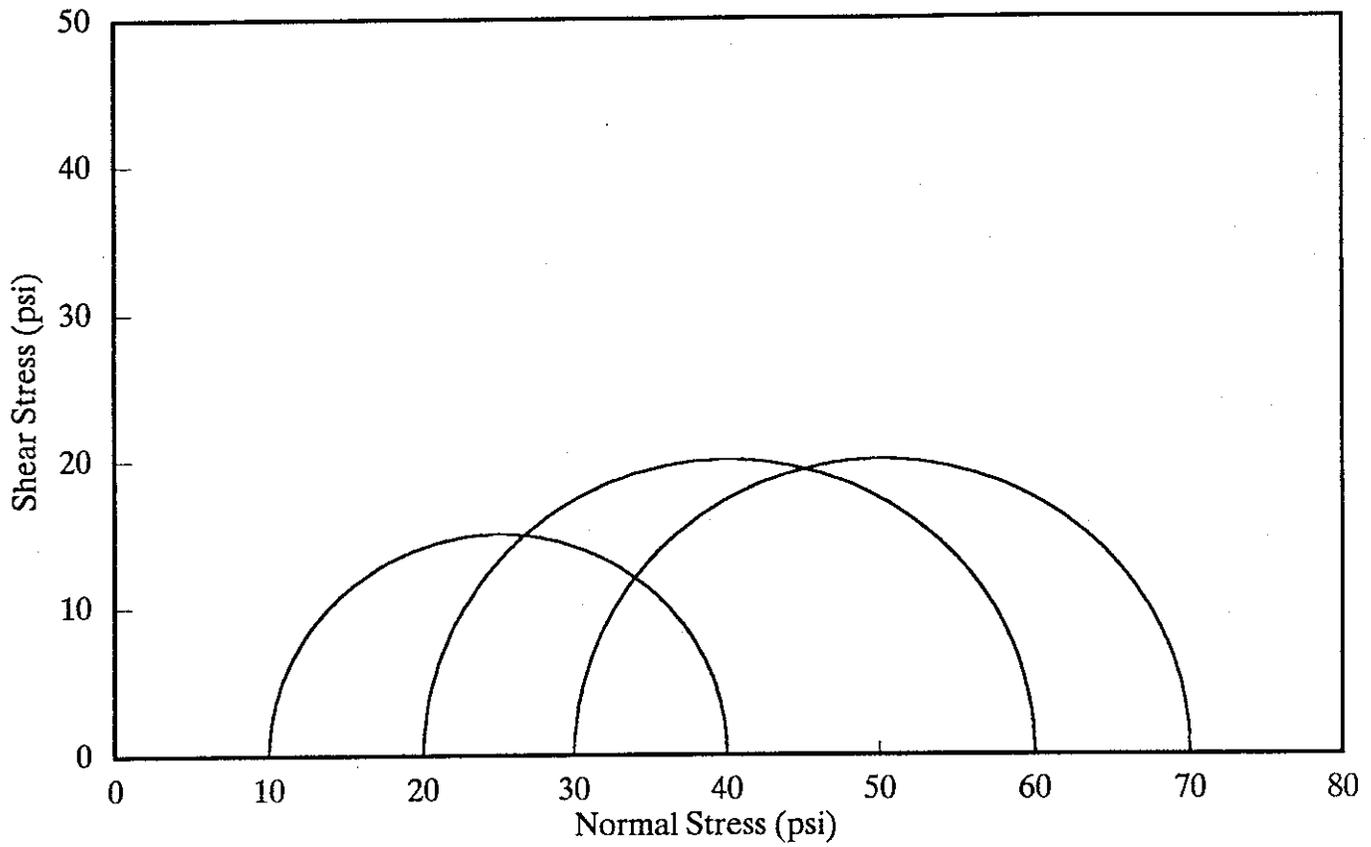
Sample Area: 6.42 sq. in.
 Sample Length: 6.10 in.
 Confining Pressure: 42 psi
 Final Back Pressure: 12 psi
 Sigma 3: 30 psi
 Friction + Pressure Load: 0.0164 dial reading

Defor. Dial Reading	Load Dial Reading	Change in Length	Change In Load	Unit Strain (in/in)	Corr. Area (sq in)	Load (lbs)	Pore Pressure Reading	Pore Pressure (psi)	Total Deviator Stress (psi)	Effective Deviator Stress (psi)
0.550	0.0416	0.550	0.0290	0.0902	7.06	265.35	159	10.88	37.61	26.73
0.575	0.0416	0.575	0.0290	0.0943	7.09	265.35	160	11.02	37.44	26.41
0.600	0.0416	0.600	0.0290	0.0984	7.12	265.35	161	11.17	37.27	26.10
0.625	0.0416	0.625	0.0290	0.1025	7.15	265.35	161	11.17	37.10	25.93
0.650	0.0416	0.650	0.0290	0.1066	7.19	265.35	162	11.31	36.93	25.62
0.675	0.0416	0.675	0.0290	0.1107	7.22	265.35	162	11.31	36.76	25.45
0.700	0.0417	0.700	0.0291	0.1148	7.25	266.26	162	11.31	36.71	25.40
0.725	0.0417	0.725	0.0291	0.1189	7.29	266.26	162	11.31	36.54	25.23
0.750	0.0416	0.750	0.0290	0.1230	7.32	265.35	163	11.46	36.25	24.79
0.775	0.0418	0.775	0.0292	0.1270	7.35	267.18	162	11.31	36.33	25.02
0.800	0.0418	0.800	0.0292	0.1311	7.39	267.18	164	11.60	36.16	24.56
0.825	0.0419	0.825	0.0293	0.1352	7.42	267.82	164	11.60	36.07	24.47
0.850	0.0418	0.850	0.0292	0.1393	7.46	267.18	164	11.60	35.82	24.22
0.875	0.0419	0.875	0.0293	0.1434	7.50	268.10	164	11.60	35.77	24.17
0.900	0.0420	0.900	0.0294	0.1475	7.53	269.01	164	11.60	35.72	24.12

Max Deviator 40.05 32.91
 Max Pore Press. 11.60

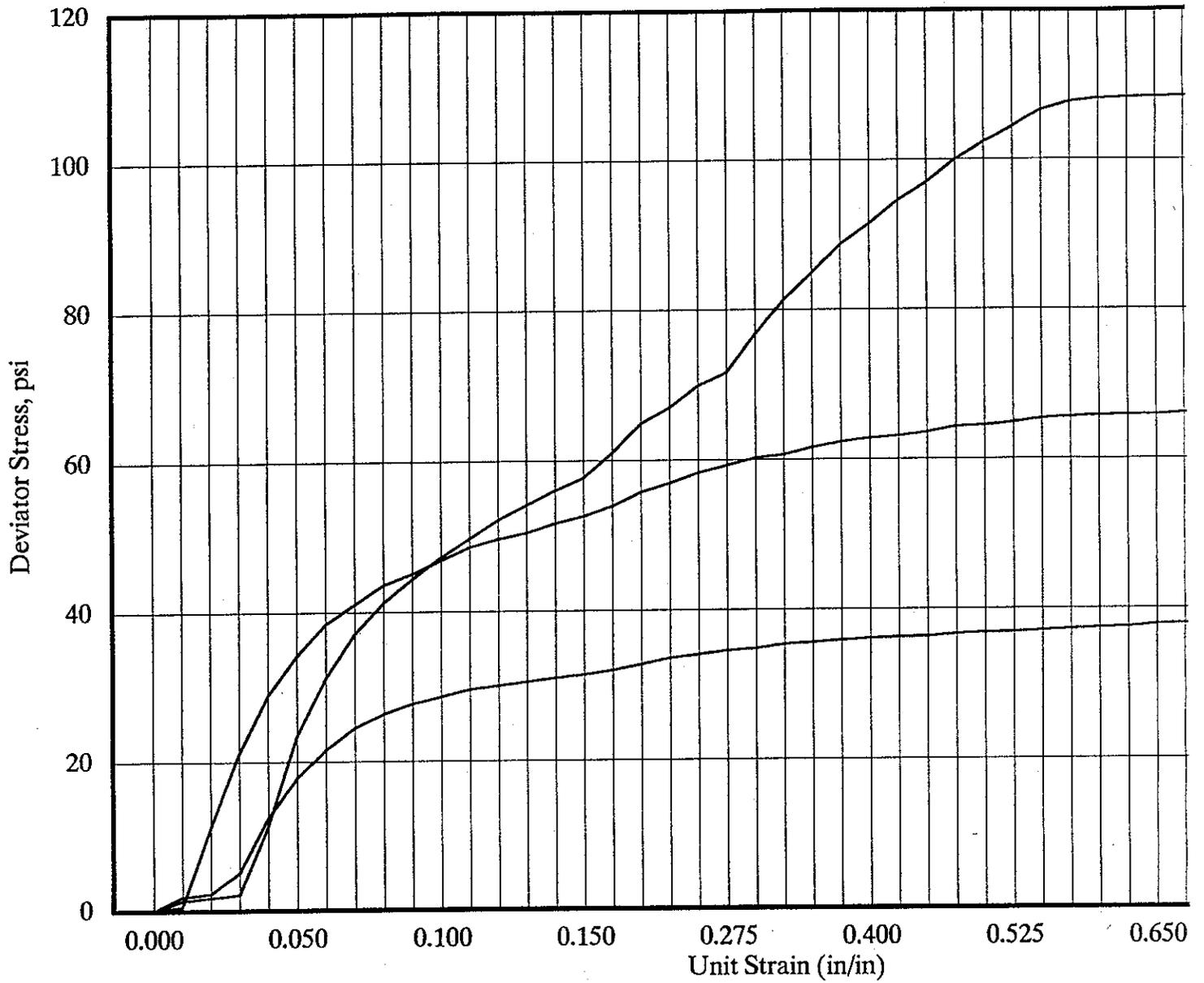
Mohr Failure Envelope

Total Stress



TP8, B1, UU
Casandro Wash 2123JH240

TRIAXIAL SHEAR TEST RESULTS



TP8, B1, UU
212JH240



Project Name: CH2M HILL
 Job No.: 2124JH240

Boring No.: TEST PIT 8
 Sample No.: B1 (UU) Sample Depth:

Sample Area: 6.42 sq. in.
 Sample Length: 6.10 in.
 Confining Pressure: psi
 Inal Back Pressure: psi
 sigma 3: 10 psi
 Friction + Pressure Load: 0.0164 dial reading

Deform. Dial Reading	Load Dial Reading	Change in Length	Change In Load	Unit Strain (in/in)	Corr. Area (sq in)	Load (lbs)	Pore Pressure Reading	Pore Pressure (psi)	Deviator Stress (psi)
0.000	0.0104	0.000	0.0000	0.0000	6.42	0.00	138	0.00	0.00
0.010	0.0117	0.010	0.0013	0.0016	6.43	11.89	138	0.00	1.85
0.020	0.0120	0.020	0.0016	0.0033	6.44	14.64	138	0.00	2.27
0.030	0.0140	0.030	0.0036	0.0049	6.45	32.94	138	0.00	5.11
0.040	0.0192	0.040	0.0088	0.0066	6.46	80.52	138	0.00	12.46
0.050	0.0230	0.050	0.0126	0.0082	6.47	115.29	138	0.00	17.81
0.058	0.0257	0.058	0.0153	0.0095	6.48	140.00	138	0.00	21.60
0.068	0.0278	0.068	0.0174	0.0111	6.49	159.21	138	0.00	24.52
0.080	0.0291	0.080	0.0187	0.0131	6.51	171.11	138	0.00	26.30
0.090	0.0301	0.090	0.0197	0.0148	6.52	180.26	138	0.00	27.66
0.100	0.0308	0.100	0.0204	0.0164	6.53	186.66	138	0.00	28.60
0.110	0.0315	0.110	0.0211	0.0180	6.54	193.06	138	0.00	29.53
0.120	0.0319	0.120	0.0215	0.0197	6.55	196.73	138	0.00	30.04
0.130	0.0323	0.130	0.0219	0.0213	6.56	200.48	138	0.00	30.56
0.140	0.0327	0.140	0.0223	0.0230	6.57	204.05	138	0.00	31.05
0.150	0.0330	0.150	0.0226	0.0246	6.58	206.79	138	0.00	31.42
0.170	0.0335	0.170	0.0231	0.0279	6.60	211.37	138	0.00	32.01
0.200	0.0342	0.200	0.0238	0.0328	6.64	217.77	138	0.00	32.81
0.225	0.0349	0.225	0.0245	0.0369	6.67	224.17	138	0.00	33.63
0.250	0.0353	0.250	0.0249	0.0410	6.69	227.84	138	0.00	34.03
0.275	0.0358	0.275	0.0254	0.0451	6.72	232.41	138	0.00	34.57
0.300	0.0361	0.300	0.0257	0.0492	6.75	235.15	138	0.00	34.83
0.325	0.0366	0.325	0.0262	0.0533	6.78	239.73	138	0.00	35.35
0.350	0.0369	0.350	0.0265	0.0574	6.81	242.48	138	0.00	35.60
0.375	0.0372	0.375	0.0268	0.0615	6.84	245.22	138	0.00	35.85
0.400	0.0375	0.400	0.0271	0.0656	6.87	247.97	138	0.00	36.09
0.425	0.0377	0.425	0.0273	0.0697	6.90	249.80	138	0.00	36.20
0.450	0.0379	0.450	0.0275	0.0738	6.93	251.63	138	0.00	36.30
0.475	0.0383	0.475	0.0279	0.0779	6.96	255.28	138	0.00	36.67
0.500	0.0385	0.500	0.0281	0.0820	6.99	257.12	138	0.00	36.77
0.525	0.0387	0.525	0.0283	0.0861	7.02	258.95	138	0.00	36.86
0.550	0.0390	0.550	0.0286	0.0902	7.06	261.69	138	0.00	37.09
0.575	0.0392	0.575	0.0288	0.0943	7.09	263.52	138	0.00	37.18
0.600	0.0395	0.600	0.0291	0.0984	7.12	266.26	138	0.00	37.39
0.625	0.0397	0.625	0.0293	0.1025	7.15	268.10	138	0.00	37.48
0.650	0.0401	0.650	0.0297	0.1066	7.19	271.76	138	0.00	37.82
0.675	0.0403	0.675	0.0299	0.1107	7.22	273.59	138	0.00	37.90
0.700	0.0404	0.700	0.0300	0.1148	7.25	274.50	138	0.00	37.85
0.725	0.0406	0.725	0.0302	0.1189	7.29	276.33	138	0.00	37.93
0.750	0.0408	0.750	0.0304	0.1230	7.32	278.16	138	0.00	38.00
0.775	0.0411	0.775	0.0307	0.1270	7.35	280.91	138	0.00	38.20
0.800	0.0411	0.800	0.0307	0.1311	7.39	280.91	138	0.00	38.02
0.825	0.0412	0.825	0.0308	0.1352	7.42	281.82	138	0.00	37.96
0.850	0.0414	0.850	0.0310	0.1393	7.46	283.65	138	0.00	38.03
0.875	0.0413	0.875	0.0309	0.1434	7.50	282.74	138	0.00	37.72
0.900	0.0416	0.900	0.0312	0.1475	7.53	285.48	138	0.00	37.91



Project Name: CH2M HILL
 Job No.: 2124JH240

Boring No.: TEST PIT 8
 Sample No.: B1 (UU) Sample Depth:

Sample Area: 6.42 sq. in.
 Sample Length: 6.10 in.
 Confining Pressure: psi
 Initial Back Pressure: psi
 Sigma 3: 20 psi
 Friction + Pressure Load: 0.0164 dial reading

Deform. Dial Reading	Load Dial Reading	Change in Length	Change In Load	Unit Strain (in/in)	Corr. Area (sq in)	Load (lbs)	Pore Pressure Reading	Pore Pressure (psi)	Deviator Stress (psi)
0.000	0.0114	0.000	0.0000	0.0000	6.42	0.00	207	0.00	0.00
0.010	0.0118	0.010	0.0004	0.0016	6.43	3.66	207	0.00	0.57
0.020	0.0193	0.020	0.0079	0.0033	6.44	72.29	207	0.00	11.22
0.030	0.0263	0.030	0.0149	0.0049	6.45	136.34	207	0.00	21.13
0.040	0.0318	0.040	0.0204	0.0066	6.46	186.66	207	0.00	28.88
0.050	0.0356	0.050	0.0242	0.0082	6.47	221.43	207	0.00	34.21
0.058	0.0386	0.058	0.0272	0.0095	6.48	248.88	207	0.00	38.40
0.068	0.0405	0.068	0.0291	0.0111	6.49	266.26	207	0.00	41.01
0.080	0.0424	0.080	0.0310	0.0131	6.51	283.65	207	0.00	43.60
0.090	0.0435	0.090	0.0321	0.0148	6.52	293.72	207	0.00	45.08
0.100	0.0448	0.100	0.0334	0.0164	6.53	305.61	207	0.00	46.82
0.110	0.0461	0.110	0.0347	0.0180	6.54	317.50	207	0.00	48.56
0.120	0.0469	0.120	0.0355	0.0197	6.55	324.83	207	0.00	49.60
0.130	0.0475	0.130	0.0361	0.0213	6.56	330.32	207	0.00	50.35
0.140	0.0485	0.140	0.0371	0.0230	6.57	339.47	207	0.00	51.66
0.150	0.0492	0.150	0.0378	0.0246	6.58	345.87	207	0.00	52.55
0.170	0.0503	0.170	0.0389	0.0279	6.60	355.94	207	0.00	53.90
0.200	0.0518	0.200	0.0404	0.0328	6.64	369.66	207	0.00	55.69
0.220	0.0528	0.220	0.0414	0.0361	6.66	378.81	207	0.00	56.88
0.250	0.0540	0.250	0.0426	0.0410	6.69	389.79	207	0.00	58.23
0.275	0.0549	0.275	0.0435	0.0451	6.72	398.03	207	0.00	59.20
0.300	0.0558	0.300	0.0444	0.0492	6.75	406.26	207	0.00	60.17
0.325	0.0563	0.325	0.0449	0.0533	6.78	410.84	207	0.00	60.58
0.350	0.0572	0.350	0.0458	0.0574	6.81	419.07	207	0.00	61.53
0.375	0.0579	0.375	0.0465	0.0615	6.84	425.48	207	0.00	62.20
0.400	0.0585	0.400	0.0471	0.0656	6.87	430.97	207	0.00	62.73
0.425	0.0589	0.425	0.0475	0.0697	6.90	434.63	207	0.00	62.98
0.450	0.0595	0.450	0.0481	0.0738	6.93	440.12	207	0.00	63.50
0.475	0.0603	0.475	0.0489	0.0779	6.96	447.44	207	0.00	64.27
0.500	0.0606	0.500	0.0492	0.0820	6.99	450.18	207	0.00	64.37
0.525	0.0611	0.525	0.0497	0.0861	7.02	454.76	207	0.00	64.74
0.550	0.0617	0.550	0.0503	0.0902	7.06	460.24	207	0.00	65.23
0.575	0.0621	0.575	0.0507	0.0943	7.09	463.91	207	0.00	65.45
0.600	0.0625	0.600	0.0511	0.0984	7.12	467.57	207	0.00	65.67
0.625	0.0628	0.625	0.0514	0.1025	7.15	470.31	207	0.00	65.75
0.650	0.0630	0.650	0.0516	0.1066	7.19	472.14	207	0.00	65.71
0.675	0.0634	0.675	0.0520	0.1107	7.22	475.80	207	0.00	65.91
0.700	0.0637	0.700	0.0523	0.1148	7.25	478.55	207	0.00	65.99
0.725	0.0639	0.725	0.0525	0.1189	7.29	480.38	207	0.00	65.93
0.750	0.0640	0.750	0.0526	0.1230	7.32	481.29	207	0.00	65.75
0.775	0.0642	0.775	0.0528	0.1270	7.35	483.12	207	0.00	65.69
0.800	0.0645	0.800	0.0531	0.1311	7.39	485.87	207	0.00	65.75
0.825	0.0647	0.825	0.0533	0.1352	7.42	487.69	207	0.00	65.69
0.850	0.0649	0.850	0.0535	0.1393	7.46	489.53	207	0.00	65.63
0.875	0.0650	0.875	0.0536	0.1434	7.50	491.69	207	0.00	65.60
0.900	0.0652	0.900	0.0538				207	0.00	0.00



Project Name: CH2M HILL
 Job No.: 2124JH240

Boring No.: TEST PIT 8
 Sample No.: B1 (UU) Sample Depth:

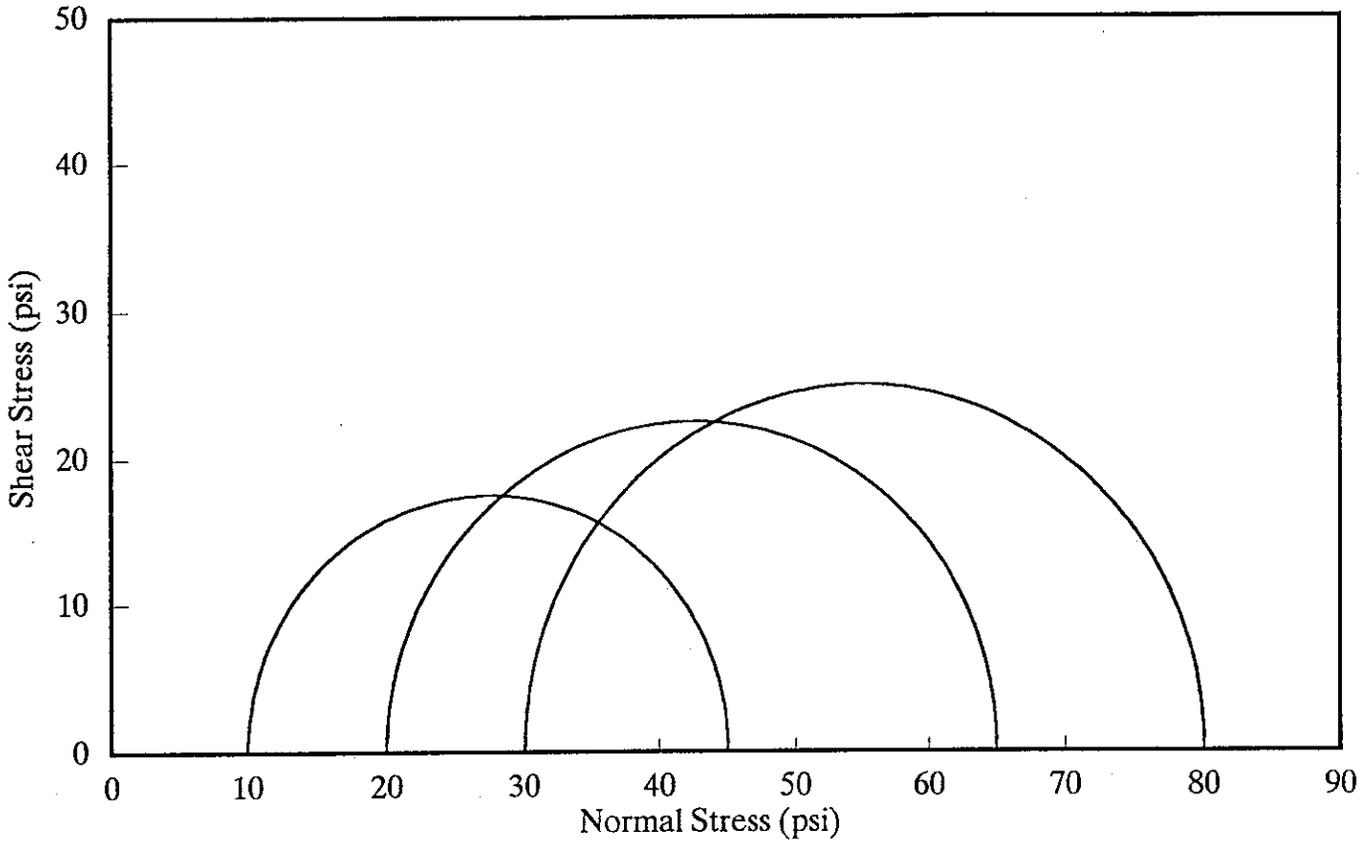
Sample Area: 6.42 sq. in.
 Sample Length: 6.10 in.
 Confining Pressure: psi
 Initial Back Pressure: psi
 Sigma 3: 30 psi
 Friction + Pressure Load: 0.0164 dial reading

Defor. Dial Reading	Load Dial Reading	Change in Length	Change In Load	Unit Strain (in/in)	Corr. Area (sq in)	Load (lbs)	Pore Pressure Reading	Pore Pressure (psi)	Deviator Stress (psi)
0.000	0.0115	0.000	0.0000	0.0000	6.42	0.00	69	0.00	0.00
0.010	0.0124	0.010	0.0009	0.0016	6.43	8.23	69	0.00	1.28
0.020	0.0127	0.020	0.0012	0.0033	6.44	10.98	69	0.00	1.70
0.030	0.0130	0.030	0.0015	0.0049	6.45	13.73	69	0.00	2.13
0.040	0.0195	0.040	0.0080	0.0066	6.46	73.20	69	0.00	11.33
0.050	0.0281	0.050	0.0166	0.0082	6.47	151.89	69	0.00	23.46
0.058	0.0336	0.058	0.0221	0.0095	6.48	202.22	69	0.00	31.20
0.068	0.0378	0.068	0.0263	0.0111	6.49	240.65	69	0.00	37.07
0.080	0.0408	0.080	0.0293	0.0131	6.51	268.10	69	0.00	41.21
0.090	0.0431	0.090	0.0316	0.0148	6.52	289.14	69	0.00	44.37
0.100	0.0452	0.100	0.0337	0.0164	6.53	308.36	69	0.00	47.24
0.110	0.0470	0.110	0.0355	0.0180	6.54	324.83	69	0.00	49.68
0.120	0.0488	0.120	0.0373	0.0197	6.55	341.30	69	0.00	52.12
0.130	0.0503	0.130	0.0388	0.0213	6.56	355.02	69	0.00	54.12
0.140	0.0517	0.140	0.0402	0.0230	6.57	367.83	69	0.00	55.98
0.150	0.0530	0.150	0.0415	0.0246	6.58	379.73	69	0.00	57.69
0.170	0.0555	0.170	0.0440	0.0279	6.60	402.60	69	0.00	60.96
0.200	0.0585	0.200	0.0470	0.0328	6.64	430.05	69	0.00	64.79
0.220	0.0602	0.220	0.0487	0.0361	6.66	445.61	69	0.00	66.91
0.250	0.0626	0.250	0.0511	0.0410	6.69	467.57	69	0.00	69.84
0.270	0.0641	0.270	0.0526	0.0443	6.72	481.29	69	0.00	71.65
0.300	0.0658	0.300	0.0543	0.0492	6.75	518.10	69	0.00	76.73
0.325	0.0673	0.325	0.0558	0.0533	6.78	550.57	69	0.00	81.19
0.350	0.0686	0.350	0.0571	0.0574	6.81	578.71	69	0.00	84.97
0.375	0.0699	0.375	0.0584	0.0615	6.84	606.86	69	0.00	88.72
0.400	0.0709	0.400	0.0594	0.0656	6.87	628.51	69	0.00	91.48
0.425	0.0720	0.425	0.0605	0.0697	6.90	652.32	69	0.00	94.53
0.450	0.0729	0.450	0.0614	0.0738	6.93	671.81	69	0.00	96.92
0.475	0.0740	0.475	0.0625	0.0779	6.96	695.62	69	0.00	99.92
0.500	0.0749	0.500	0.0634	0.0820	6.99	715.11	69	0.00	102.26
0.525	0.0757	0.525	0.0642	0.0861	7.02	732.43	69	0.00	104.27
0.550	0.0766	0.550	0.0651	0.0902	7.06	751.91	69	0.00	106.56
0.575	0.0771	0.575	0.0656	0.0943	7.09	762.74	69	0.00	107.61
0.600	0.0774	0.600	0.0659	0.0984	7.12	769.24	69	0.00	108.03
0.625	0.0776	0.625	0.0661	0.1025	7.15	773.56	69	0.00	108.15
0.650	0.0778	0.650	0.0663	0.1066	7.19	777.89	69	0.00	108.26
0.675	0.0780	0.675	0.0665	0.1107	7.22	782.22	69	0.00	108.36
0.700	0.0782	0.700	0.0667	0.1148	7.25	786.55	69	0.00	108.46
0.725	0.0785	0.725	0.0670	0.1189	7.29	793.05	69	0.00	108.85
0.750	0.0787	0.750	0.0672	0.1230	7.32	797.38	69	0.00	108.93
0.775	0.0789	0.775	0.0674	0.1270	7.35	801.71	69	0.00	109.01
0.800	0.0793	0.800	0.0678	0.1311	7.39	810.37	69	0.00	109.67
0.825	0.0794	0.825	0.0679	0.1352	7.42	812.53	69	0.00	109.45
0.850	0.0796	0.850	0.0681	0.1393	7.46	816.86	69	0.00	109.51
0.875	0.0789	0.875	0.0674	0.1434	7.50	801.71	69	0.00	106.96
0.900	0.0416	0.900	0.0301	0.1475	7.53	275.42	69	0.00	36.57



Mohr Failure Envelope

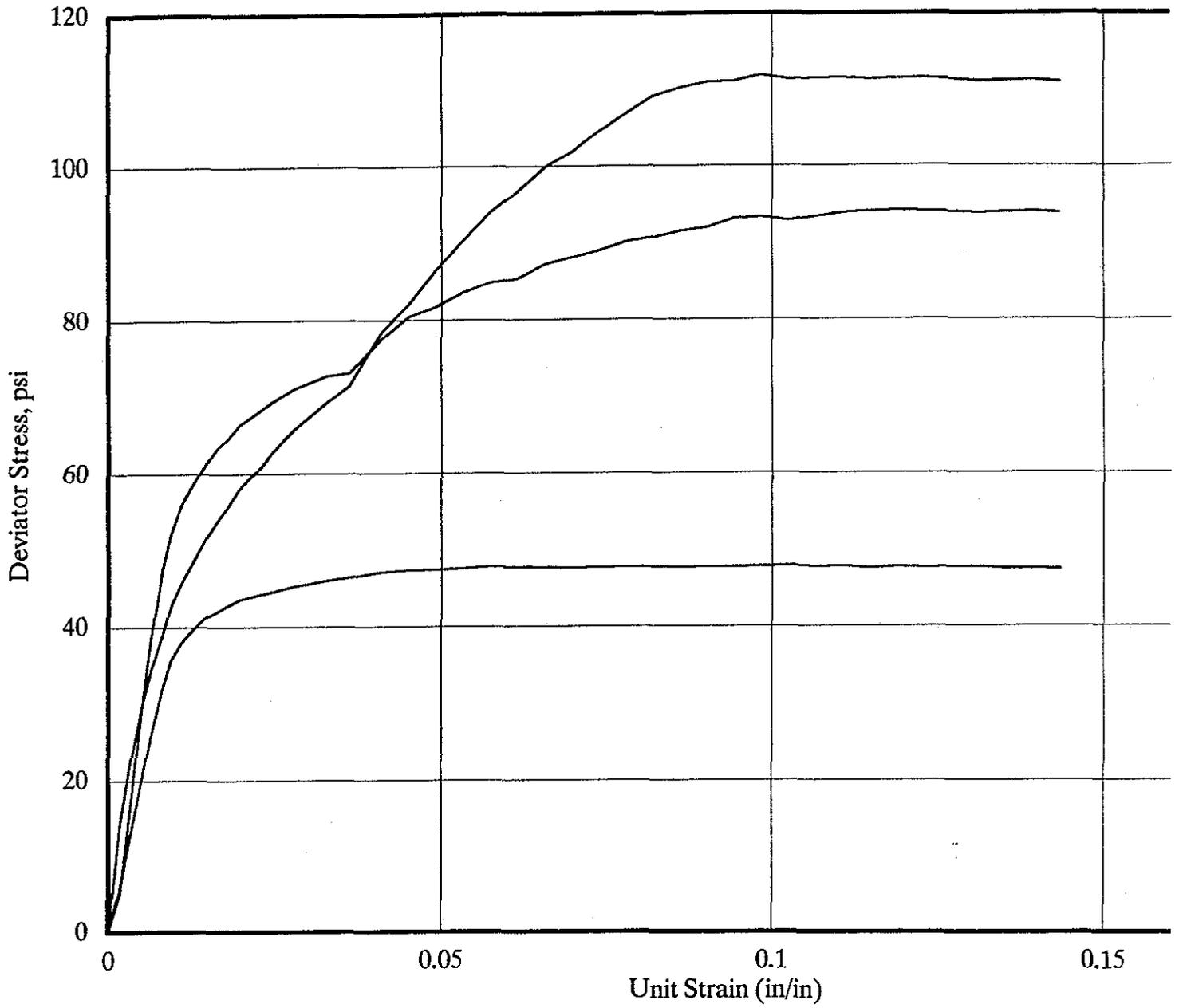
Total Stress



TP21, B2, UU Results
Casandro Wash 2123JH240



Triaxial Shear Test Results



TP21, B2



Triaxial Compression Test Results

Project Name: CH2M HILL
 Job No.: 2124JH240

Spring No.: TEST PIT 21
 Sample No.: B2 (UU) Sample Depth:

Sample Area: 6.42 sq. in.
 Sample Length: 6.10 in.
 Confining Pressure: psi
 Final Back Pressure: psi
 Sigma 3: 10.00 psi
 Friction + Pressure Load: 0.02 dial reading

Defor. Dial Reading	Load Dial Reading	Change in Length	Change In Load	Unit Strain (in/in)	Corr. Area (sq in)	Load (lbs)	Pore Pressure Reading	Pore Pressure (psi)	Total Deviator Stress (psi)
0.000	0.0110	0.000	0.0000	0.0000	6.42	0.00	69.00	0.00	0.00
0.010	0.0150	0.010	0.0040	0.0016	6.43	36.60	69.00	0.00	5.69
0.020	0.0200	0.020	0.0090	0.0033	6.44	82.35	69.00	0.00	12.79
0.030	0.0248	0.030	0.0138	0.0049	6.45	126.27	69.00	0.00	19.57
0.040	0.0296	0.040	0.0186	0.0066	6.46	170.19	69.00	0.00	26.34
0.050	0.0336	0.050	0.0226	0.0082	6.47	206.79	69.00	0.00	31.95
0.060	0.0363	0.060	0.0253	0.0098	6.48	231.50	69.00	0.00	35.70
0.070	0.0380	0.070	0.0270	0.0115	6.49	247.05	69.00	0.00	38.04
0.080	0.0394	0.080	0.0284	0.0131	6.51	259.86	69.00	0.00	39.95
0.090	0.0404	0.090	0.0294	0.0148	6.52	269.01	69.00	0.00	41.28
0.100	0.0410	0.100	0.0300	0.0164	6.53	274.50	69.00	0.00	42.06
0.110	0.0416	0.110	0.0306	0.0180	6.54	279.99	69.00	0.00	42.83
0.120	0.0422	0.120	0.0312	0.0197	6.55	285.48	69.00	0.00	43.59
0.130	0.0425	0.130	0.0315	0.0213	6.56	288.23	69.00	0.00	43.94
0.140	0.0428	0.140	0.0318	0.0230	6.57	290.97	69.00	0.00	44.28
0.150	0.0431	0.150	0.0321	0.0246	6.58	293.72	69.00	0.00	44.63
0.170	0.0437	0.170	0.0327	0.0279	6.60	299.21	69.00	0.00	45.31
0.200	0.0444	0.200	0.0334	0.0328	6.64	305.61	69.00	0.00	46.04
0.220	0.0448	0.220	0.0338	0.0361	6.66	309.27	69.00	0.00	46.44
0.250	0.0455	0.250	0.0345	0.0410	6.69	315.67	69.00	0.00	47.16
0.275	0.0458	0.275	0.0348	0.0451	6.72	318.42	69.00	0.00	47.36
0.300	0.0460	0.300	0.0350	0.0492	6.75	320.25	69.00	0.00	47.43
0.325	0.0463	0.325	0.0353	0.0533	6.78	322.99	69.00	0.00	47.63
0.350	0.0466	0.350	0.0356	0.0574	6.81	325.74	69.00	0.00	47.83
0.375	0.0467	0.375	0.0357	0.0615	6.84	326.65	69.00	0.00	47.75
0.400	0.0468	0.400	0.0358	0.0656	6.87	327.57	69.00	0.00	47.68
0.425	0.0469	0.425	0.0359	0.0697	6.90	328.49	69.00	0.00	47.60
0.450	0.0471	0.450	0.0361	0.0738	6.93	330.32	69.00	0.00	47.66
0.475	0.0473	0.475	0.0363	0.0779	6.96	332.15	69.00	0.00	47.71
0.500	0.0475	0.500	0.0365	0.0820	6.99	333.98	69.00	0.00	47.76
0.525	0.0476	0.525	0.0366	0.0861	7.02	334.89	69.00	0.00	47.67
0.550	0.0478	0.550	0.0368	0.0902	7.06	336.72	69.00	0.00	47.72
0.575	0.0480	0.575	0.0370	0.0943	7.09	338.55	69.00	0.00	47.76
0.600	0.0482	0.600	0.0372	0.0984	7.12	340.38	69.00	0.00	47.80
0.625	0.0484	0.625	0.0374	0.1025	7.15	342.21	69.00	0.00	47.84
0.650	0.0485	0.650	0.0375	0.1066	7.19	343.13	69.00	0.00	47.75
0.675	0.0487	0.675	0.0377	0.1107	7.22	344.96	69.00	0.00	47.79
0.700	0.0487	0.700	0.0377	0.1148	7.25	344.96	69.00	0.00	47.57
0.725	0.0490	0.725	0.0380	0.1189	7.29	347.70	69.00	0.00	47.72
0.750	0.0491	0.750	0.0381	0.1230	7.32	348.62	69.00	0.00	47.63
0.775	0.0493	0.775	0.0383	0.1270	7.35	350.45	69.00	0.00	47.65
0.800	0.0495	0.800	0.0385	0.1311	7.39	352.28	69.00	0.00	47.68
0.825	0.0495	0.825	0.0385	0.1352	7.42	352.28	69.00	0.00	47.45
0.850	0.0497	0.850	0.0387	0.1393	7.46	354.11	69.00	0.00	47.47
0.875	0.0498	0.875	0.0388	0.1434	7.50	355.02	69.00	0.00	47.37
0.900	0.0499	0.900	0.0389	0.1475	7.53	355.94	69.00	0.00	47.26



Compression Test Results

Project Name: CH2M HILL
 Job No.: 2124JH240

Boring No.: TEST PIT 21
 Sample No.: B2 (UU) Sample Depth:

Sample Area: 6.42 sq. in.
 Sample Length: 6.10 in.
 Confining Pressure: psi
 Final Back Pressure: psi
 Sigma 3: 20.00 psi
 Friction + Pressure Load: 0.02 dial reading

Defor. Dial Reading	Load Dial Reading	Change in Length	Change In Load	Unit Strain (in/in)	Corr. Area (sq in)	Load (lbs)	Pore Pressure Reading	Pore Pressure (psi)	Total Deviator Stress (psi)
0.000	0.0110	0.000	0.0000	0.0000	6.42	0.00	138.00	0.00	0.00
0.010	0.0143	0.010	0.0033	0.0016	6.43	30.19	138.00	0.00	4.70
0.020	0.0226	0.020	0.0116	0.0033	6.44	106.14	138.00	0.00	16.48
0.030	0.0310	0.030	0.0200	0.0049	6.45	183.00	138.00	0.00	28.36
0.040	0.0385	0.040	0.0275	0.0066	6.46	251.63	138.00	0.00	38.94
0.050	0.0446	0.050	0.0336	0.0082	6.47	307.44	138.00	0.00	47.50
0.060	0.0480	0.060	0.0370	0.0098	6.48	338.55	138.00	0.00	52.21
0.070	0.0508	0.070	0.0398	0.0115	6.49	364.17	138.00	0.00	56.07
0.080	0.0530	0.080	0.0420	0.0131	6.51	384.30	138.00	0.00	59.07
0.090	0.0547	0.090	0.0437	0.0148	6.52	399.86	138.00	0.00	61.36
0.100	0.0562	0.100	0.0452	0.0164	6.53	413.58	138.00	0.00	63.36
0.110	0.0572	0.110	0.0462	0.0180	6.54	422.73	138.00	0.00	64.66
0.120	0.0585	0.120	0.0475	0.0197	6.55	434.63	138.00	0.00	66.37
0.130	0.0593	0.130	0.0483	0.0213	6.56	441.94	138.00	0.00	67.37
0.140	0.0601	0.140	0.0491	0.0230	6.57	449.27	138.00	0.00	68.37
0.150	0.0609	0.150	0.0499	0.0246	6.58	456.59	138.00	0.00	69.37
0.170	0.0623	0.170	0.0513	0.0279	6.60	469.40	138.00	0.00	71.08
0.200	0.0638	0.200	0.0528	0.0328	6.64	483.12	138.00	0.00	72.79
0.220	0.0647	0.220	0.0537	0.0361	6.66	491.36	138.00	0.00	73.77
0.250	0.0657	0.250	0.0547	0.0410	6.69	513.01	138.00	0.00	76.63
0.275	0.0667	0.275	0.0557	0.0451	6.72	534.66	138.00	0.00	79.53
0.300	0.0672	0.300	0.0562	0.0492	6.75	545.48	138.00	0.00	80.79
0.325	0.0679	0.325	0.0569	0.0533	6.78	560.64	138.00	0.00	82.67
0.350	0.0684	0.350	0.0574	0.0574	6.81	571.46	138.00	0.00	83.91
0.375	0.0687	0.375	0.0577	0.0615	6.84	577.96	138.00	0.00	84.49
0.400	0.0694	0.400	0.0584	0.0656	6.87	593.11	138.00	0.00	86.33
0.425	0.0698	0.425	0.0588	0.0697	6.90	601.77	138.00	0.00	87.20
0.450	0.0702	0.450	0.0592	0.0738	6.93	610.43	138.00	0.00	88.07
0.475	0.0707	0.475	0.0597	0.0779	6.96	621.26	138.00	0.00	89.23
0.500	0.0710	0.500	0.0600	0.0820	6.99	627.75	138.00	0.00	89.77
0.525	0.0714	0.525	0.0604	0.0861	7.02	636.41	138.00	0.00	90.60
0.550	0.0717	0.550	0.0607	0.0902	7.06	642.91	138.00	0.00	91.11
0.575	0.0722	0.575	0.0612	0.0943	7.09	653.73	138.00	0.00	92.23
0.600	0.0724	0.600	0.0614	0.0984	7.12	658.06	138.00	0.00	92.42
0.625	0.0724	0.625	0.0614	0.1025	7.15	658.06	138.00	0.00	92.00
0.650	0.0727	0.650	0.0617	0.1066	7.19	664.56	138.00	0.00	92.48
0.675	0.0730	0.675	0.0620	0.1107	7.22	671.05	138.00	0.00	92.96
0.700	0.0732	0.700	0.0622	0.1148	7.25	675.38	138.00	0.00	93.13
0.725	0.0734	0.725	0.0624	0.1189	7.29	679.71	138.00	0.00	93.29
0.750	0.0735	0.750	0.0625	0.1230	7.32	681.88	138.00	0.00	93.15
0.775	0.0736	0.775	0.0626	0.1270	7.35	684.04	138.00	0.00	93.01
0.800	0.0737	0.800	0.0627	0.1311	7.39	686.21	138.00	0.00	92.87
0.825	0.0739	0.825	0.0629	0.1352	7.42	690.54	138.00	0.00	93.01
0.850	0.0741	0.850	0.0631	0.1393	7.46	694.87	138.00	0.00	93.15
0.875	0.0742	0.875	0.0632	0.1434	7.50	697.03	138.00	0.00	93.00
0.900	0.0746	0.900	0.0636	0.1475	7.53	705.69	138.00	0.00	93.70



axial Compression test results

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 Job No.: 2124JH240

Boring No.: TEST PIT 21
 Sample No.: B2 (UU) Sample Depth:

Sample Area: 6.42 sq. in.
 Sample Length: 6.10 in.
 Confining Pressure: psi
 Final Back Pressure: psi
 Sigma 3: 30.00 psi
 Friction + Pressure Load: 0.02 dial reading

Deform. Dial Reading	Load Dial Reading	Change in Length	Change In Load	Unit Strain (in/in)	Corr. Area (sq in)	Load (lbs)	Pore Pressure Reading	Pore Pressure (psi)	Total Deviator Stress (psi)
0.000	0.0117	0.000	0.0007	0.0000	6.42	6.40	207.00	0.00	1.00
0.010	0.0207	0.010	0.0097	0.0016	6.43	88.76	207.00	0.00	13.80
0.020	0.0266	0.020	0.0156	0.0033	6.44	142.74	207.00	0.00	22.16
0.030	0.0315	0.030	0.0205	0.0049	6.45	187.57	207.00	0.00	29.07
0.040	0.0354	0.040	0.0244	0.0066	6.46	223.26	207.00	0.00	34.55
0.050	0.0385	0.050	0.0275	0.0082	6.47	251.63	207.00	0.00	38.87
0.060	0.0414	0.060	0.0304	0.0098	6.48	278.16	207.00	0.00	42.90
0.070	0.0436	0.070	0.0326	0.0115	6.49	298.29	207.00	0.00	45.93
0.080	0.0458	0.080	0.0348	0.0131	6.51	318.42	207.00	0.00	48.95
0.090	0.0477	0.090	0.0367	0.0148	6.52	335.80	207.00	0.00	51.53
0.100	0.0493	0.100	0.0383	0.0164	6.53	350.45	207.00	0.00	53.69
0.110	0.0508	0.110	0.0398	0.0180	6.54	364.17	207.00	0.00	55.70
0.120	0.0525	0.120	0.0415	0.0197	6.55	379.72	207.00	0.00	57.98
0.130	0.0537	0.130	0.0427	0.0213	6.56	390.71	207.00	0.00	59.56
0.140	0.0548	0.140	0.0438	0.0230	6.57	400.77	207.00	0.00	60.99
0.150	0.0562	0.150	0.0452	0.0246	6.58	413.58	207.00	0.00	62.84
0.170	0.0585	0.170	0.0475	0.0279	6.60	434.63	207.00	0.00	65.81
0.200	0.0613	0.200	0.0503	0.0328	6.64	460.24	207.00	0.00	69.34
0.220	0.0630	0.220	0.0520	0.0361	6.66	475.80	207.00	0.00	71.44
0.250	0.0653	0.250	0.0543	0.0410	6.69	525.60	207.00	0.00	78.51
0.275	0.0668	0.275	0.0558	0.0451	6.72	558.07	207.00	0.00	83.01
0.300	0.0680	0.300	0.0570	0.0492	6.75	584.05	207.00	0.00	86.50
0.325	0.0693	0.325	0.0583	0.0533	6.78	612.20	207.00	0.00	90.28
0.350	0.0706	0.350	0.0596	0.0574	6.81	640.34	207.00	0.00	94.02
0.375	0.0716	0.375	0.0606	0.0615	6.84	661.99	207.00	0.00	96.77
0.400	0.0727	0.400	0.0617	0.0656	6.87	685.81	207.00	0.00	99.82
0.425	0.0735	0.425	0.0625	0.0697	6.90	703.13	207.00	0.00	101.89
0.450	0.0745	0.450	0.0635	0.0738	6.93	724.78	207.00	0.00	104.57
0.475	0.0754	0.475	0.0644	0.0779	6.96	744.26	207.00	0.00	106.90
0.500	0.0763	0.500	0.0653	0.0820	6.99	763.75	207.00	0.00	109.21
0.525	0.0768	0.525	0.0658	0.0861	7.02	774.57	207.00	0.00	110.27
0.550	0.0772	0.550	0.0662	0.0902	7.06	783.23	207.00	0.00	111.00
0.575	0.0774	0.575	0.0664	0.0943	7.09	787.56	207.00	0.00	111.11
0.600	0.0778	0.600	0.0668	0.0984	7.12	796.22	207.00	0.00	111.82
0.625	0.0780	0.625	0.0670	0.1025	7.15	800.55	207.00	0.00	111.92
0.650	0.0782	0.650	0.0672	0.1066	7.19	804.88	207.00	0.00	112.01
0.675	0.0783	0.675	0.0673	0.1107	7.22	807.05	207.00	0.00	111.80
0.700	0.0785	0.700	0.0675	0.1148	7.25	811.38	207.00	0.00	111.88
0.725	0.0787	0.725	0.0677	0.1189	7.29	815.71	207.00	0.00	111.96
0.750	0.0788	0.750	0.0678	0.1230	7.32	817.87	207.00	0.00	111.73
0.775	0.0788	0.775	0.0678	0.1270	7.35	817.87	207.00	0.00	111.21
0.800	0.0789	0.800	0.0679	0.1311	7.39	820.04	207.00	0.00	110.98
0.825	0.0791	0.825	0.0681	0.1352	7.42	824.37	207.00	0.00	111.04
0.850	0.0793	0.850	0.0683	0.1393	7.46	828.70	207.00	0.00	111.09
0.875	0.0794	0.875	0.0684	0.1434	7.50	830.86	207.00	0.00	110.85
0.900	0.0796	0.900	0.0686	0.1475	7.53	835.19	207.00	0.00	110.90

