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REPORT ON GEOTECHNICAL INVESTIGATION

DESIGNATION: FCD Contract No. 94-22
Assignment No. 9
10th Street Wash
Alice Ave. to ACDC Canal

LOCATION: 10th Street & Alice Ave.
Phoenix, Arizona

FL

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REPORT ON GEOTECHNICAL INVESTIGATION

DESIGNATION: FCD Contract No. 94-22
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10th Street Wash
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LOCATION: 10th Street & Alice Ave.
Phoenix, Arizona

CLIENT: Flood Control District of Maricopa County

PROJECT NO: 95434SA

DATE: October 16, 1995

REGISTERED PROFESSIONAL ENGINEER (Civil)
CERTIFICATE NO. 14388
GREGG ALAN CREASER
DATE SIGNED 10-16-95
ARIZONA U.S.A.

FLOOD CONTROL DISTRICT
RECEIVED
OCT 18 1995

	CHENG		P & PM
	DEF		REG
	ADMIN		LMGT
	FINANCE		FILE
	C & M		
	ENGR		

REMARKS

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INTRODUCTION

This report presents the results of a subsoil investigation carried out at the site of the proposed concrete channel/box culvert or steel pipeline to be constructed along 10th Street from Alice Avenue to the ACDC Canal in Phoenix, Arizona.

Preliminary information calls for the conveyance of an existing wash along 10th Street from Alice Avenue to the ACDC Canal, in possibly a concrete channel with vertical walls. It may transition into a box culvert at the junction with the canal. It is anticipated that the flow line of the channel will be approximately 7 to 10 feet below grade. Associated structures may include drop structures and/or head walls.

GENERAL SITE AND SOIL CONDITIONS

Site Conditions - The site is bounded on the north by Alice Avenue, on the south by residential property, and on the east and west by 10th Street and residential property. At the time of the investigation the wash was open and unlined and contained a sparse amount of deleterious material. A rock "outcrop" was noted in the bottom of the existing channel near Boring B-6. The elevation of the wash was approximately 5 to 7 feet below the existing grade of the surrounding area.

General Subsurface Conditions - Subsoil conditions at the site are comprised of 4 inches of asphaltic concrete and 4 to 5 inches of aggregate base over 3 to 15 feet of sandy, clayey discontinuous fill which was underlain by interbedded clayey/silty sands and sandy clays with subordinate amounts of gravel and calcareous cementation. Fill was encountered in three of the seven borings and was generally nondescript. In Boring B-6, decomposed gray schist/phylitte rock was encountered below 8 feet. Boring B-3 was shifted several feet to the east because of the presence of an underground utility not anticipated. None of the borings met auger refusal.

All borings were dry and the depth of groundwater is reported to be on the order of 250 feet in the general area.

Standard Penetration Test values range from 8 to 50+ blows per foot. Laboratory testing indicates liquid limits of 22 to 45 percent with plasticity indices ranging from 4 to 17 percent. Swell tests indicate that the upper soils have a relatively low potential for volume increase (<1 percent) due to wetting when compacted to moistures and densities expected during construction. The soils exhibit a pH of 8.1 to 8.6 and resistivities of 934 to 3535 ohm-cm.

ANALYSIS AND RECOMMENDATIONS

Analysis - Excavation to accommodate the proposed channel/culvert and related drop structures and/or headwalls is anticipated to terminate between about 8 and 15 feet depth, that is within the very stiff sandy clay or dense clayey sand, and should be relatively straightforward using conventional equipment. However, rock or rock-like materials may be encountered in the area of Boring B-6 where rock removal techniques may be necessary.

Analysis of the field and laboratory data indicates that subsoils are generally favorable for the support of the proposed structure(s) on shallow foundations. It is recommended that the channel and associated elements not be founded on differing bearing media, i.e. soil and rock, because of the increased potential for differential settlement. If rock is encountered along the alignment, it should be overexcavated 2 feet and the area reinstated with compacted soil fill. If over-excavation is not provided, footing and wall design should take into account the effects of differential settlement.

Site Preparation - The entire area to be occupied by the proposed construction should be stripped of all vegetation, debris, rubble and obviously loose soils.

Prior to placing structural fill, the existing grade should be scarified to a depth of 8 inches, moisture conditioned to optimum (± 2 percent) and compacted to at least 95 percent of maximum dry density as determined by ASTM D-698. Pavement areas should be scarified, moisture conditioned and compacted in a similar manner. Scarification may be deleted in areas of exposed bedrock.

All cut areas and areas above footing bottom elevation that are to receive fill should be scarified 8 inches, moisture conditioned to at least optimum and uniformly compacted to 95 percent of maximum dry density as determined by ASTM D-698.

Foundation Design - It is recommended that related structures bear on native undisturbed soil or properly compacted fill at a minimum depth of 18 inches below finished grade. If site preparation is carried out as set forth herein, a recommended safe allowable bearing capacity of **3,000 psf** can be utilized for design. This bearing capacity refers to the total of all loads, dead and live, and is a net pressure. It may be increased one-third for wind, seismic or other loads of short duration. All foundation excavations should be level and cleaned of all loose or disturbed materials. Positive drainage away from the foundation system must be maintained at all times.

Estimated settlements under design loads are on the order of ½-inch, virtually all of which will occur during construction. Post-construction differential settlements will be negligible, under existing and

compacted moisture contents. Additional localized settlements of the same magnitude could occur if native supporting soils were to experience a significant increase in moisture content. Positive drainage away from structures, and controlled routing of runoff should be provided to prevent ponding adjacent to perimeter walls. Care should be taken in design and construction to insure that storm drain water is contained in the culvert system to prevent seepage into the foundation strata.

Lateral Pressures - The following lateral pressure values may be utilized for the proposed construction:

Active Pressure	
Unrestrained Walls	35 pcf
Restrained Walls	60 pcf
Passive Pressure	
Continuous Footings	350 pcf
Spread Footings	400 pcf
Coefficient of Friction (With Passive Pressure)	0.35
Coefficient of Friction (Without Passive Pressure)	0.45

All backfill must be compacted to not less than 95 percent (ASTM D-698) to mobilize these passive values at low strain.

Fill And Backfill - Native soils are considered suitable for use in grading fills provided deleterious materials and particles in excess of 3 inches in size are discarded. If imported common fill for use in site grading is required, it should be examined by a Soils Engineer to ensure that it is of low swell potential and free of organic or otherwise deleterious material. In general, the fill should have 100 percent passing the 3-inch sieve and no more than 60 percent passing the 200 sieve. For the fine fraction (passing the 40 sieve), the liquid limit and plasticity index should not exceed 30 percent and 10 percent, respectively. It should exhibit less than 1.5 percent swell potential when compacted to 95 percent of maximum dry density (ASTM D-698) at a moisture content of 2 percent below optimum, confined under a 100 psf surcharge, and inundated.

Fill should be placed on subgrade which has been properly prepared and approved by a Soils Engineer. Fill must be wetted and thoroughly mixed to achieve optimum moisture content, ± 2 percent. Fill should be placed in horizontal lifts of 8-inch thickness (or as dictated by compaction equipment) and compacted to the percent of maximum dry density per ASTM D-698 set forth below.

Utilities Installation - Trench excavations for utilities can be accomplished by conventional trenching equipment. Trench walls may stand near-vertical for the short periods of time required to install shallow utilities although some sloughing may occur in looser sandy soils and the fill materials. If trenches are greater than shoulder-height, precautions must be taken to protect workmen in accordance with all current governmental regulations. Additionally, care must be taken not to disturb the adjacent roadways and existing utilities.

Trench excavations, backfilling and compaction should be carried out under M.A.G. Specification, Section 601. Backfill of trenches may be carried out using the site-excavated materials provided that oversized material is removed in the bedding zone. This material should be moisture-conditioned, placed in 8 inch lifts and mechanically compacted. Compaction requirements as set forth in M.A.G. Specification, Section 601 should be referred to.

Slabs-On-Grade - To facilitate fine grading operations and aid in concrete curing, a 4-inch thick layer of granular material conforming to the gradation for Aggregate Base Course (A.B.C.) as per M.A.G. Specification Section 702 should be utilized beneath slabs on grade. Dried subgrade soils should be moistened prior to placing the A.B.C.

Asphalt Pavement - The area should be reinstated with, as a minimum, an equally matched section of asphaltic concrete and aggregate base course (ABC). For the most part this will require 5.0 inches of ABC followed by 4.0 inches of asphaltic concrete. Materials and placement should be in accordance with the appropriate City of Phoenix and M.A.G. Specifications.

Soil Corrosion - Minimum resistivity test values were found to be 934 to 3535 ohm-cm with a pH of 8.1 to 8.6 indicating a moderate to severe degree of corrosiveness in saturated soil. Special protection to buried metal pipe should be considered for long term performance.

GENERAL

The scope of this investigation and report does not include regional considerations such as seismic activity and ground fissures resulting from subsidence due to groundwater withdrawal, nor any considerations of hazardous releases or toxic contamination of any type.

Our analysis of data and the recommendations presented herein are based on the assumption that soil conditions do not vary significantly from those found at specific sample locations. Our work has been performed in accordance with generally accepted engineering principles and practice; this warranty is in lieu of all other warranties expressed or implied.

We recommend that a Soils Engineer monitor the earthwork and foundation portions of this project to ensure compliance to project specifications and the field applicability of subsurface conditions which are the basis of the recommendations presented in this report. If any significant changes are made in the scope of work or type of construction that was assumed in this report, we must review such revised conditions to confirm our findings if the conclusions and recommendations presented herein are to apply.

Respectfully submitted,

SPEEDIE & ASSOCIATES, INC.

Michael A. Speedie, E.I.T.

Gregg A. Creaser, P.E. October 16, 1995

APPENDIX

FIELD AND LABORATORY INVESTIGATION

SOIL BORING LOCATION PLAN

SOIL LEGEND

LOG OF TEST BORINGS

TABULATION OF TEST DATA

CONSOLIDATION TEST

MOISTURE-DENSITY RELATIONS

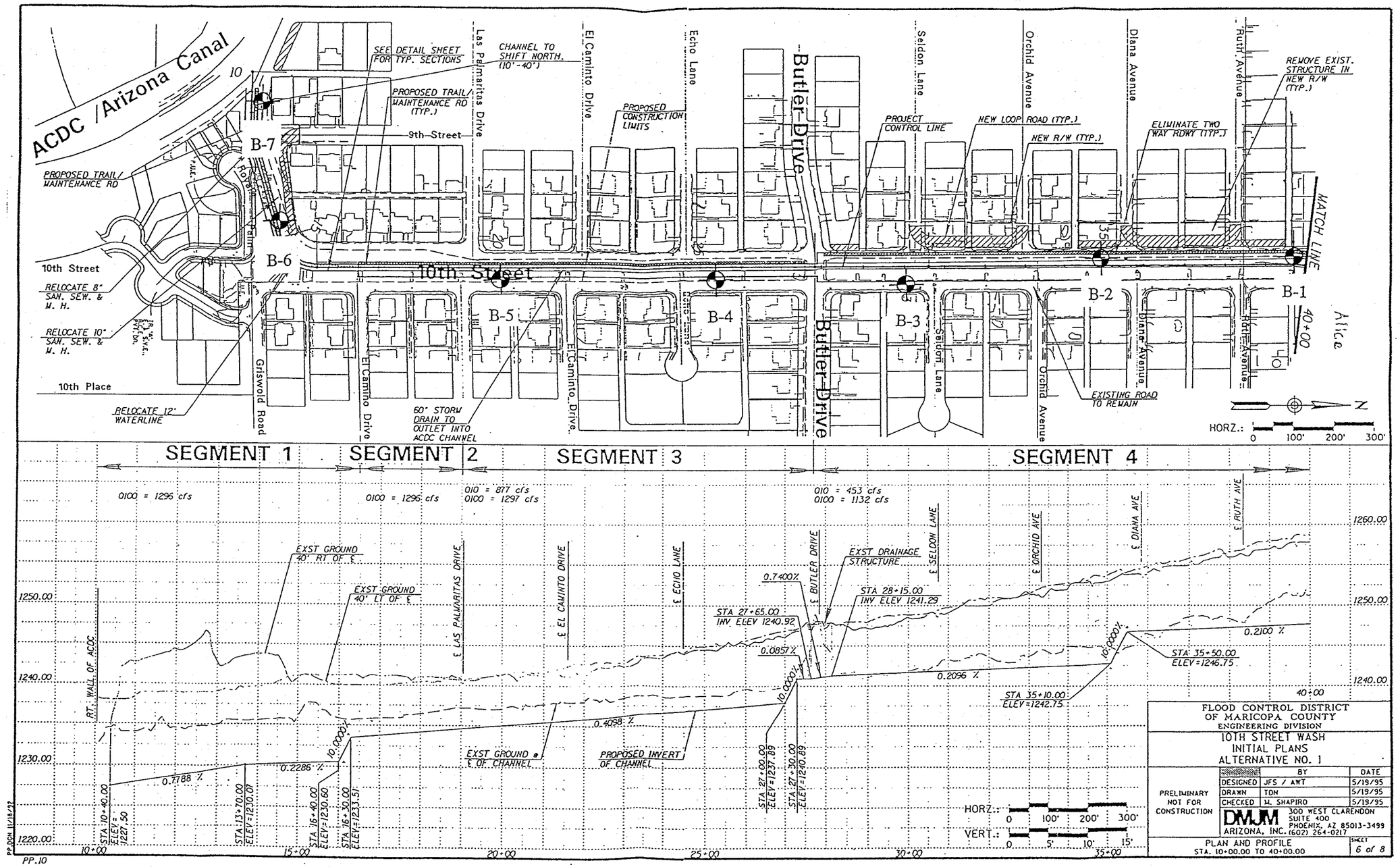
SWELL TEST DATA

pH & RESISTIVITY DATA

FIELD AND LABORATORY INVESTIGATION

On September 11, 1995, seven soil test borings were drilled at the approximate locations shown on the attached Soil Boring Location Plan. All exploration work was carried out under the full-time supervision of our technician, who recorded subsurface conditions and obtained samples for laboratory testing. The soil borings were advanced with a truck-mounted CME-55 drill rig utilizing 7-inch diameter hollow stem flight augers. Detailed information regarding the borings and samples obtained can be found on an individual Log of Test Boring prepared for each drilling location.

Laboratory testing consisted of grain-size distribution, plasticity (Atterberg Limits), pH and resistivity tests for classification and design parameters. Remolded swell tests were performed on samples compacted to densities and moisture contents expected during construction. A compression test could not be performed due to the highly disturbed nature of the ring samples. All field and laboratory data is presented in this appendix.



FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

10TH STREET WASH
INITIAL PLANS
ALTERNATIVE NO. 1

	BY	DATE
DESIGNED	JFS / AWT	5/19/95
DRAWN	TDN	5/19/95
CHECKED	M. SHAPIRO	5/19/95

PRELIMINARY NOT FOR CONSTRUCTION

DMJM ARIZONA, INC. 300 WEST CLARENDON SUITE 400 PHOENIX, AZ 85013-3499 (602) 264-0217

PLAN AND PROFILE
STA. 10+00.00 TO 40+00.00

SHEET 6 of 8

Approximate Soil Boring Location

SOIL BORING LOCATION PLAN

10st St. Wash
Alice Ave. to ACDC Canal
Phoenix, Arizona

SPEEDIE AND ASSOCIATES
GEOTECHNICAL/MATERIALS/SITE ENGINEERS

Prepared by: BP | Date: 9-15-95 | Project No. 95434SA

SOIL LEGEND

SAMPLE DESIGNATION	DESCRIPTION	
AS	Auger Sample-	A grab sample taken directly from auger flights
BS	Large Bulk Sample-	A grab sample taken directly from auger flights
S	Spoon Sample-	Standard Penetration Test (ASTM D-1586) Driving a 2.0 inch outside diameter split spoon sampler into undisturbed soil for three successive 6-inch increments by means of a 140 lb. weight free falling through a distance of 30 inches. The cumulative number of blows for the final 12 inches of penetration is the Standard Penetration Resistance (N).
RS	Ring Sample-	Driving a 3.0 inch outside diameter spoon equipped with a series of 2.42 inch inside diameter, 1 inch long brass rings, into undisturbed soil for one 12 inch increment by the same means of the Spoon Sample. The blows required for the 12 inches of penetration are recorded.
LS	Liner Sample-	Standard Penetration Test driving a 2.0 inch outside diameter split spoon equipped with two 3 inch long, 1¾ inch inside diameter brass liners, separated by a 1 inch long spacer, into undisturbed soil by the same means of the spoon sample.
ST	Shelby Tube-	A 3.0 inch outside diameter thin-walled tube continuously pushed into undisturbed soil by a rapid motion, without impact or twisting (ASTM D-1587).
—	Continuous Penetration Resistance-	Driving a 2.0 inch outside diameter "Bullnose Penetrometer" continuously into undisturbed soil by the same means of the spoon sample. The blows for each successive 12 inch increment are recorded.

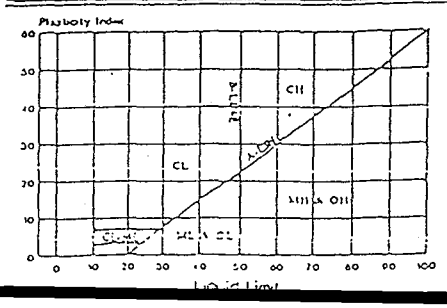
CONSISTENCY			RELATIVE DENSITY	
Clays & Silts	Blows/Foot *	Strength †	Sands and Gravels	Blows/Foot *
Very Soft	0-2	0-¼	Very Loose	0-4
Soft	2-4	¼-½	Loose	5-10
Firm	5-8	½-1	Medium Dense	11-30
Stiff	9-15	1-2	Dense	31-50
Very Stiff	16-30	2-4	Very Dense	> 50
Hard	> 30	> 4		

* Number of blows of a 140 lb hammer free falling 30 inches to drive a 2 inch O.D. split spoon sampler (ASTM D-1588)
† Unconfined compressive strength in tons/sq ft. Read from a pocket penetrometer

MAJOR DIVISIONS			GRAPH SYMBOL	LETTER SYMBOL	TYPICAL DESCRIPTIONS
Coarse Grained Soils	Gravel and Gravelly Soils	Clean Gravels		GW	Well Graded Gravels
				GP	Poorly Graded Gravels
More than 50% of material is larger than #200 sieve size	50% Coarse Fraction is > #4 Sieve Size	Gravels w/Fines		GM	Silty Gravels
				GC	Clayey Gravels
	Sand and Sandy Soils	Clean Sands		SW	Well Graded Sands
				SP	Poorly Graded Sands
	50% Coarse Fraction is < #4 Sieve Size	Sands w/Fines		SM	Silty Sand
				SC	Clayey Sand
Fine Grained Soils	Silts and Clays			ML	Inorganic Silts, Low Plasticity
	Liquid limit is less than 50%			CL	Inorganic Clays, Low Plasticity
				OL	Organic Silts, High Plasticity
More than 50% of material is smaller than #200 sieve size	Silts and Clays			MH	Inorganic Silts, High Plasticity
	Liquid limit is greater than 50%			CH	Inorganic Clays, High Plasticity
				OH	Organic Clays, High Plasticity
Highly Organic Soils				PT	Peat and Humus, Highly Organic

MATERIAL SIZE	PARTICLE SIZE			
	Lower Limit		Upper Limit	
	mm	Sieve Size †	mm	Sieve Size †
Sands				
Fine	.075	#200	0.42	#40
Medium	0.42	#40	2.00	#10
Coarse	2.00	#10	4.76	#4
Gravels				
Fine	4.76	#4	191	¾" *
Coarse	191	¾" *	762	3" *
Cobbles	762	3" *	304.8	12" *
Boulders	304.8	12" *	914.4	36" *

†U.S. Standard *Clear Square Openings



Rig Type: CME-55
Boring Type: Hollow Stem Auger
Surface Elevation: N/A

Depth (feet)	Visual Classification	Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)	Penetration Resistance Blows per Foot (0 – 25 – 50)
0	~4" AC, ~5" ABC POSSIBLE FILL: Loose Brown SILTY SAND (SM-Dry) with Trace Gravel	RS-1	2.0	--	--	
3.5	Stiff Brown SANDY SILT (ML-Dry) with Trace Gravel and Weak Mottled Calcareous Cementation	S-2	6.0	--	--	
8.0	Very Stiff to Hard Brown SANDY SILT/SANDY CLAY (ML/CL-Dry) with Trace Strong Calcareous Cementation	S-3	11.0	--	--	
16.0	End of Boring	S-4	16.0	--	--	61/12"

Boring Date: 9-11-95
Field Engineer/Technician: B. Payton
Driller: R. Wood
Contractor: Heber Mining

Water Level

Depth	Hour	Date
Dry		

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: B- 1

10th St. Wash

Alice Ave. to ACDC Canal

Phoenix, Arizona

Project No.: 95434SA

Rig Type: CME-55
Boring Type: Hollow Stem Auger
Surface Elevation: N/A

Depth (feet)	Visual Classification	Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)	Penetration Resistance Blows per Foot (0 – 25 – 50)
0	~4" AC, ~4" ABC POSSIBLE FILL: Medium Dense Brown SILTY/CLAYEY SAND (SM/SC-Dry) with Little Gravel	S-1	2.5	--	--	
3.2	Medium Dense to Dense Brown SILTY/CLAYEY SAND (SM/SC-Dry) with Some Gravel	S-3	6.0	--	--	
5						
10		BS-2	10.0	--	--	
11.0	End of Boring	S-4	11.0	--	--	
15						
20						

Boring Date: 9-11-95
Field Engineer/Technician: B. Payton
Driller: R. Wood
Contractor: Heber Mining

Water Level

Depth	Hour	Date
Dry		

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: B- 2

10th St. Wash

Alice Ave. to ACDC Canal

Phoenix, Arizona

Project No.: 95434SA

Rig Type: CME-55
Boring Type: Hollow Stem Auger
Surface Elevation: N/A

Depth (feet)	Visual Classification	Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)	Penetration Resistance Blows per Foot (0 – 25 – 50)
0	~4" AC, ~4" ABC POSSIBLE FILL: Very Stiff Brown SANDY CLAY (CL-Dry) with Little Gravel	RS-1	2.0	--	--	
3.5	Medium Dense to Very Dense Brown CLAYEY SAND (SC-Dry) with Some Gravel and Weak Mottled Calcareous Cementation	S-2	6.0	--	--	
5						
10.0	End of Boring	S-3	9.9	--	--	50/4"
10		BS-4	10.0	--	--	
15						
20						

Boring Date: 9-11-95
Field Engineer/Technician: B. Payton
Driller: R. Wood
Contractor: Heber Mining

Water Level

Depth	Hour	Date
Dry		

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: B- 3

10th St. Wash

Alice Ave. to ACDC Canal

Phoenix, Arizona

Project No.: 95434SA

Rig Type: CME-55
Boring Type: Hollow Stem Auger
Surface Elevation: N/A

Depth (feet)	Visual Classification	Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)	Penetration Resistance Blows per Foot (0 – 25 – 50)
0	Very Stiff Brown SANDY SILT/SANDY CLAY (ML/CL-Dry) with Trace Gravel and Weak Mottled Calcareous Cementation	S-1	2.5	--	--	
4.0	Medium Dense to Very Dense Brown CLAYEY SAND (SC-Dry) with Some Gravel and Weak Mottled Calcareous Cementation after 8.5	S-2	6.0	--	--	
5		BS-4	9.5	--	--	
10.0	End of Boring	S-3	10.0	--	--	50/6"
15						
20						

Boring Date: 9-11-95
Field Engineer/Technician: B. Payton
Driller: R. Wood
Contractor: Heber Mining

Water Level

Depth	Hour	Date
Dry		

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: B- 4

10th St. Wash

Alice Ave. to ACDC Canal

Phoenix, Arizona

Project No.: 95434SA

Rig Type: CME-55
Boring Type: Hollow Stem Auger
Surface Elevation: N/A

Depth (feet)	Visual Classification	Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)	Penetration Resistance Blows per Foot (0 – 25 – 50)
0	Medium Dense Brown SILTY SAND (SM-Dry) with Little Gravel					
		S-1	2.5	--	--	
5		S-2	6.0	--	--	
	7.9					
	Very Dense Brown CLAYEY GRAVEL (GC-Dry) and Sand					
		BS-4	10.0	--	--	
10	10.5	RS-3	10.5	--	--	50/12"
	End of Boring					
15						
20						

Boring Date: 9-11-95
Field Engineer/Technician: B. Payton
Driller: R. Wood
Contractor: Heber Mining

Water Level

Depth	Hour	Date
Dry		

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: B- 5

10th St. Wash

Alice Ave. to ACDC Canal

Phoenix, Arizona

Project No.: 95434SA

Rig Type: CME-55
Boring Type: Hollow Stem Auger
Surface Elevation: N/A

Depth (feet)	Visual Classification	Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)	Penetration Resistance Blows per Foot (0 – 25 – 50)
0	Firm Brown SANDY SILT/SANDY CLAY (ML/CL-Dry) with Trace Gravel and Weak Mottled Calcareous Cementation	S-1	2.5	--	--	
3.7	Medium Dense Brown SILTY/CLAYEY SAND (SM/SC-Dry) with Little Gravel	S-2	6.0	--	--	
5						
8.6	Possible Bedrock: Dense Gray Decomposed SCHIST	S-3	9.7	--	--	50/2"
10						
		S-4	14.6	--	--	50/1"
15.0		BS-5	15.0	--	--	
15	End of Boring					
20						

Boring Date: 9-11-95
Field Engineer/Technician: B. Payton
Driller: R. Wood
Contractor: Heber Mining

Water Level

Depth	Hour	Date
Dry		

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: B- 6

10th St. Wash

Alice Ave. to ACDC Canal

Phoenix, Arizona

Project No.: 95434SA

Rig Type: CME-55
Boring Type: Hollow Stem Auger
Surface Elevation: N/A

Depth (feet)	Visual Classification	Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)	Penetration Resistance Blows per Foot (0 – 25 – 50)
0	~4" AC, ~4" ABC Medium Dense Brown CLAYEY SAND (SC-Dry) with Some Gravel	S-1	2.5	--	--	
5		RS-2	5.5	--	--	
10		S-3	11.0	--	--	
13.0	Hard Light Brown SANDY CLAY (CL-Dry) with Little Weak Mottled Calcareous Cementation and Trace Gravel	BS-5	15.0	--	--	
15		S-4	15.3	--	--	50/4"
15.3	End of Boring					
20						

Boring Date: 9-11-95
Field Engineer/Technician: B. Payton
Driller: R. Wood
Contractor: Heber Mining

Water Level

Depth	Hour	Date
Dry		

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: B- 7

10th St. Wash

Alice Ave. to ACDC Canal

Phoenix, Arizona

Project No.: 95434SA

TABULATION OF TEST DATA

SOIL BORING or TEST PIT NUMBER	SAMPLE NUMBER	SAMPLE TYPE	DEPTH OF SAMPLE TIP	NATURAL WATER CONTENT (Percent of Dry Weight)	IN-PLACE DRY DENSITY (Pounds Per Cubic Foot)	PARTICLE SIZE DISTRIBUTION (Percent Finer)					ATTERBERG LIMITS			UNIFIED SOIL CLASSIFICATION	SPECIMEN DESCRIPTION
						#200 SIEVE	#40 SIEVE	#10 SIEVE	#4 SIEVE	3" SIEVE	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX		
B- 1	S-2	SPT	6.0	--	--	52.1	72	85	92	100	45	29	17	ML	SANDY SILT
B- 2	BS-2	BULK	10.0	--	--	21.1	35	54	68	100	24	18	6	SC-SM	SILTY, CLAYEY SAND with GRAVEL
B- 3	BS-4	BULK	10.0	--	--	32.6	45	61	74	100	33	19	14	SC	CLAYEY SAND with GRAVEL
B- 4	S-3	SPT	10.0	--	--	36.9	53	67	77	100	31	20	11	SC	CLAYEY SAND with GRAVEL
B- 5	BS-4	BULK	10.0	--	--	20.9	37	55	67	100	22	19	4	SM	SILTY SAND with GRAVEL
B- 5	RS-3	RS	10.5	--	--	16.8	28	44	54	100	29	20	9	GC	CLAYEY GRAVEL with SAND
B- 6	BS-5	BULK	15.0	--	--	26.5	40	59	71	100	26	21	5	SC-SM	SILTY, CLAYEY SAND with GRAVEL
B- 7	BS-5	BULK	15.0	--	--	32.1	49	65	76	100	23	10	12	SC	CLAYEY SAND with GRAVEL

Sieve analysis results do not include material greater than 3". Refer to the actual boring logs for the possibility of cobble and boulder sized materials.

10th St. Wash
Alice Ave. to ACDC Canal
Phoenix, Arizona
Project No. 95434SA

SPEEDIE AND ASSOCIATES

MOISTURE-DENSITY RELATIONS

PROJECT: 10th St. Wash PROJECT NO.: 95434SA DATE: 9/11/95

LOCATION: Alice Ave. to ACDC Canal

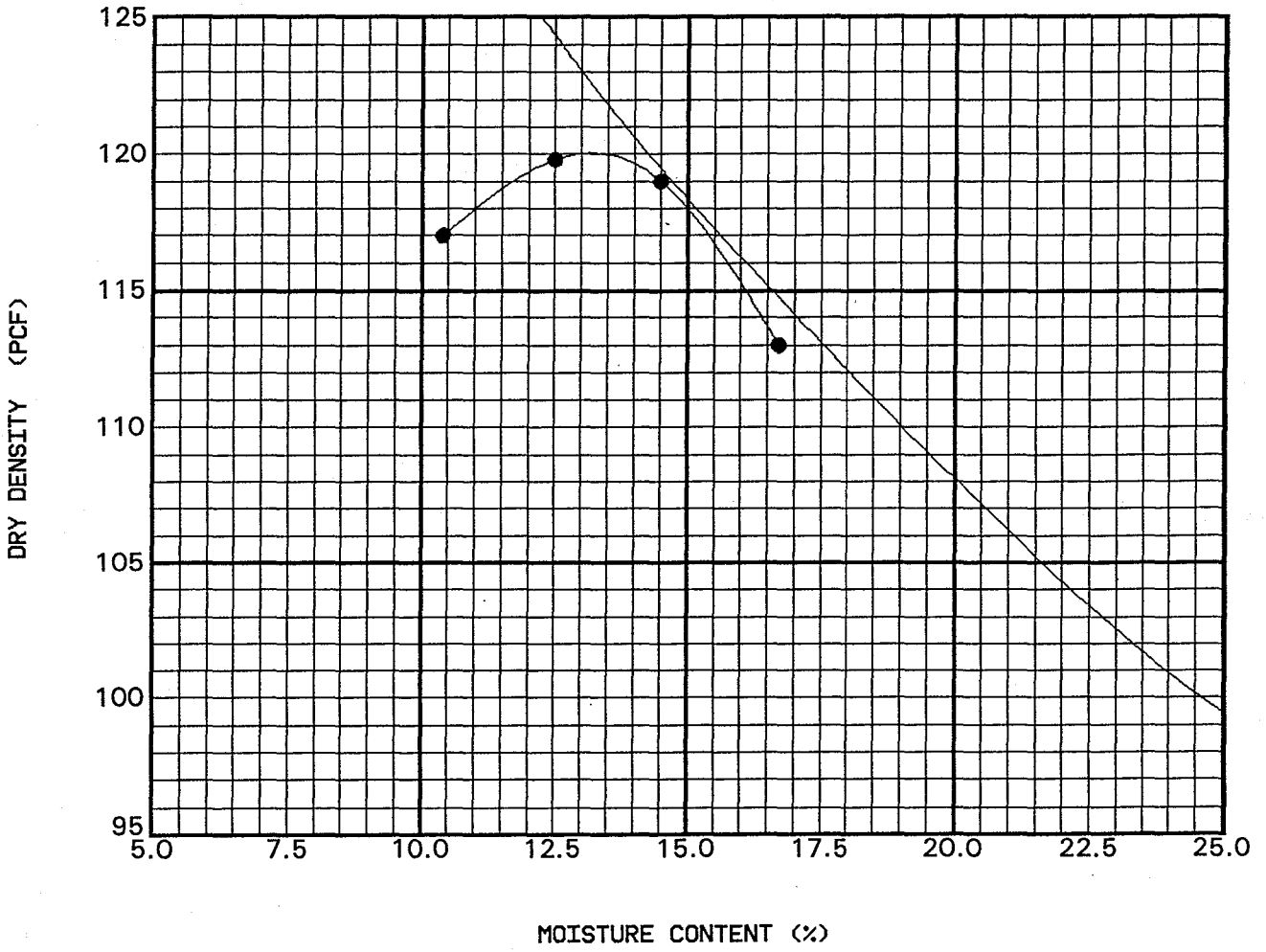
BORING NO.: B- 4 SAMPLE NO.: S-3 SAMPLE DEPTH: 10.00

METHOD OF COMPACTION: ASTM D698A

LIQUID LIMIT: 31 PLASTIC LIMIT: 20 PLASTICITY INDEX: 11

CLASSIFICATION: SC ASTM SOIL DESCRIPTION: CLAYEY SAND with GRAVEL

MAXIMUM DRY DENSITY: 120.7 PCF OPTIMUM MOISTURE CONTENT: 13.7 %



SPEEDIE AND ASSOCIATES

SWELL TEST DATA

BORING or TEST PIT No.	SAMPLE DEPTH, ft	REMOLDED DRY DENSITY (pcf)	INITIAL MOISTURE (%)	PERCENT COMPACTION	INITIAL DEGREE of SATURATION (%)	FINAL DEGREE of SATURATION (%)	TOTAL SWELL (%)
B- 4 S-3	10.0	111.0	15.8	92	85.4	98.9	0.3

PERCENT COMPACTION BASED ON A MAXIMUM DRY DENSITY OF 120.7 pcf @ 13.7 % MOISTURE

10th St. Wash
Alice Ave. to ACDC Canal
Phoenix, Arizona
Project No. 95434SA

SPEEDIE AND ASSOCIATES

Project: FCD Contract No. 94-22
10th Street Wash
Alice Ave. to ACDC Canal

Project No.: 95434SA

pH & RESISTIVITY DATA

BORING NO.	DEPTH, ft.	pH	RESISTIVITY (ohm-cm)
B-2	10	8.4	2935
B-4	10	8.5	3535
B-5	10	8.1	934
B-6	10	8.6	2401
B-7	10	8.5	2668