UPPER EAST FORK CAVE CREEK.

LETTER OF TRANSMITTAL

SPEEDIE
ASSOCIATES
... ENGINEERS
...NIX, ARIZONA 85029
(602) 997-6391
FAX (602) 943-5508

ENGINEERING DIVISION
LIBRARY

DATE	PROJECT NO.
May 13, 1991	910012SA-02

RE: Paradise Valley Community College
32nd Street & Union Hills
Paradise Valley, Arizona
Assignment No. 4
FCD-90-61
CLIENT'S PROJECT NO.

TO Ellery A. Biathrow, P.E.
Maricopa County Flood Control District
3335 West Durango Street
Phoenix, Arizona 85009

GENTLEMEN:

WE ARE SENDING YOU ☐ Attached ☐ Under separate cover via _____ the following:
☐ Reports ☐ Prints ☐ Samples ☐ Specifications
☐ Copy of letter ☐ Plans XX Other

COPIES	NO.	DATE	DESCRIPTION
9	910012SA-02	5-13-91	Back-up documentation on project No. 910012SA-02
			(Boring logs, location plan, etc.)

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Flood Control District of MC Library
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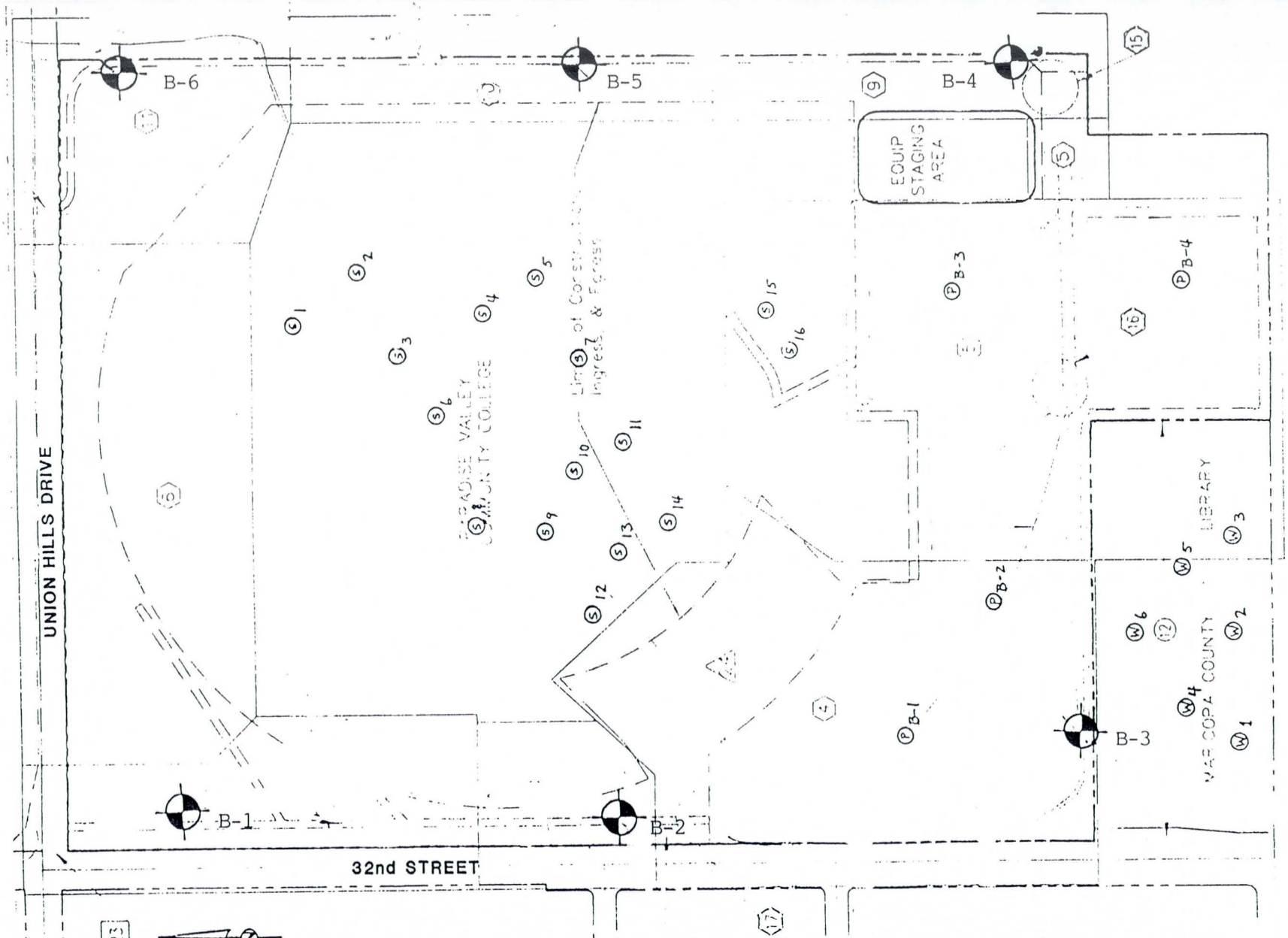
REMARKS

A460.902

BY: Gregg A Creaser/kch
Gregg A. Creaser, P.E.

If enclosures are not as noted, kindly notify us at once.



Soil Boring Locations

Soil Boring Location Plan
Paradise Valley Community Coll.
32nd Street & Union Hills
Paradise Valley, AZ

SPEEDIE AND ASSOCIATES

Project No. 910012SA-02

TABULATION OF TEST DATA

PROJECT: PARADISE VALLEY COMMUNITY COLLEGE - 32nd STREET & UNION HILLS DRIVE
NUMBER: 910012SA-02

Test Boring Number	Sample Depth (feet)	Water Content %	Dry Density (pcf)	<#200 Sieve %	<#40 Sieve %	<#10 Sieve %	<#4 Sieve %	<3" Sieve %	Liquid Limit %	Plastic Limit %	Plast-city Index %	ASTM Classification
B- 1	5.5			37	58	78	91	100	51	25	26	SC
B- 1	10.5	8.5										
B- 2	14.4	17.7										
B- 3	9.5			21	35	56	77	100	54	30	25	SM
B- 3	14.9	8.5										
B- 4	9.2	10.8										
B- 5	9.4	17.5										
B- 6	9.4			24	38	65	84	100	52	29	23	SM

Note: The +200 fraction consists of a calcareous matrix that can be broken down when inundated.

Rig Type:	**CME-55**
Boring Type:	**Hollow Stem Auger**
Surface Elevation:	**N/A**
Datum:	**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	Loose to Medium Dense Brown **CLAYEY SAND** (SC-Dry) With a Little Gravel	S-1	3.0	--	--	
3.5	Hard Light Brown SANDY CLAY (CL-Dry) With Some Caliche and a Little Gravel	S-2	4.8	--	--	50/4"
5						
7.5	Very Dense Brown CLAYEY SAND (SC-Dry) With a Trace of Gravel and Caliche	S-3	9.4	--	--	50/5"
10						
11.5	Hard Light Brown SANDY CLAY (CL-Dry) With Some Caliche and a Little Gravel pH = 8.9 Resistivity = 6894 ohm-cm	S-4	14.2	--	--	50/3"
14.2	End of Boring					
15						
20						
25						
30						

Boring Date:	**5-9-91**
Field Engineer/Technician:	**C. Spencer**
Driller:	**S. Belsky**
Contractor:	**Heber Mining**

Water Level

Depth	Hour	Date

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: **B- 6**

PARADISE VALLEY COMMUNITY COLLEGE

32nd STREET & UNION HILLS DRIVE

PARADISE VALLEY, ARIZONA

Project No.: **910012SA-02**

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

Visual Classification

Hard Light Brown SANDY CLAY (CL-Dry)
With Some Caliche and a Little Gravel

13.0

Very Dense Brown CLAYEY SAND (SC-Dry)
With a Trace of Gravel
pH = 9.2
Resistivity = 3447 ohm-cm

14.3

End of Boring

Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)	Penetration Resistance Blows per Foot
S-1	3.0	--	--	
S-2	5.5	--	--	82/12"
S-3	9.4	17.5	--	50/5"
S-4	14.3	--	--	50/4"

Depth (feet): 0, 5, 10, 15, 20, 25, 30

Penetration Resistance: 0, 25, 50

Boring Date:	**5-9-91**
Field Engineer/Technician:	**C. Spencer**
Driller:	**S. Belsky**
Contractor:	**Heber Mining**

Water Level

Depth	Hour	Date

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: **B- 5**

PARADISE VALLEY COMMUNITY COLLEGE

32nd STREET & UNION HILLS DRIVE

PARADISE VALLEY, ARIZONA

Project No.: **910012SA-02**

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

Depth (feet) | Graphic Log

Visual Classification

Hard Light Brown SANDY CLAY (CL-Dry)
With Some Caliche and a Little Gravel

pH = 8.5
Resistivity = 4022 ohm-cm

End of Boring (14.2)

Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)	Penetration Resistance Blows per Foot (0 – 25 – 50)
S-1	3.0	--	--	61/12"
S-2	4.5	--	--	50/6"
S-3	9.2	10.8	--	50/3"
S-4	14.2	--	--	50/3"

Boring Date: 5-9-91
Field Engineer/Technician: C. Spencer
Driller: S. Belsky
Contractor: Heber Mining

Water Level

Depth	Hour	Date

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: B- 4

PARADISE VALLEY COMMUNITY COLLEGE

32nd STREET & UNION HILLS DRIVE

PARADISE VALLEY, ARIZONA

Project No.: 910012SA-02

Rig Type:	**CME-55**
Boring Type:	**Hollow Stem Auger**
Surface Elevation:	**N/A**
Datum:	**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	Hard Brown **SANDY CLAY** (CL-Dry) With Some Caliche and a Little Gravel	S-1	3.0	--	--	
4.5		S-2	4.8	--	--	50/4"
5	Very Dense Brown CLAYEY SAND (SC-Dry) With a Little Gravel					
7.0	Hard Light Brown SANDY CLAY (CL-Dry) With Some Caliche	S-3	9.5	--	--	50/6"
10						
12.5	Very Dense Brown CLAYEY SAND (SC-Dry) pH = 8.9 Resistivity = 4309 ohm-cm	S-4	14.9	8.5	--	50/5"
15.0	Hard Light Brown SANDY CLAY (CL-Dry) With Some Caliche and a Little Gravel					
19.5	End of Boring	S-5	19.5	--	--	50/6"
20						
25						
30						

Boring Date:	**5-9-91**
Field Engineer/Technician:	**C. Spencer**
Driller:	**S. Belsky**
Contractor:	**Heber Mining**

Water Level

Depth	Hour	Date

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: **B- 3**

PARADISE VALLEY COMMUNITY COLLEGE

32nd STREET & UNION HILLS DRIVE

PARADISE VALLEY, ARIZONA

Project No.: **910012SA-02**

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

Visual Classification

Depth (feet) | Graphic Log

Hard Light Brown SANDY CLAY (CL-Dry)
With Some Caliche and a Little Gravel

11.5

Very Dense Brown CLAYEY SAND (SC-Dry)
With a Little Gravel and Cementation
pH = 8.9
Resistivity = 4309 ohm-cm

14.4

End of Boring

Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)	Penetration Resistance Blows per Foot (0 – 25 – 50)
RS-1	2.3	--	--	50/9"
BS-2	4.0	--	--	
S-3	4.5	--	--	50/6"
S-4	9.9	--	--	50/4"
S-5	14.4	17.7	--	50/5"

Boring Date:	**5-9-91**
Field Engineer/Technician:	**C. Spencer**
Driller:	**S. Belsky**
Contractor:	**Heber Mining**

Water Level

Depth	Hour	Date

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: **B- 2**

PARADISE VALLEY COMMUNITY COLLEGE

32nd STREET & UNION HILLS DRIVE

PARADISE VALLEY, ARIZONA

Project No.: **910012SA-02**

Rig Type:	CME-55
Boring Type:	Hollow Stem Auger
Surface Elevation:	N/A
Datum:	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 CLAYEY SAND (SC-Dry) With a Trace of Gravel and Caliche	S-1	3.0	--	--	
3.0	Hard Light Brown SANDY CLAY (CL-Dry) With Some Caliche and a Little Gravel	S-2	5.5	--	--	82/12"
5						
8.0	Very Dense Light Brown CLAYEY SAND (SC-Dry) With Some Cementation and Gravel	S-3	10.5	8.5	--	73/12"
10						
12.0	Hard Light Brown SANDY CLAY (CL-Dry) With Some Caliche and a Little Gravel pH = 8.3 Resistivity = 3447 ohm-cm	S-4	14.9	--	--	50/5"
14.9	End of Boring					
15						
20						
25						
30						

Boring Date:	5-9-91
Field Engineer/Technician:	C. Spencer
Driller:	S. Belsky
Contractor:	Heber Mining

Water Level

Depth	Hour	Date

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: B- 1

PARADISE VALLEY COMMUNITY COLLEGE

32nd STREET & UNION HILLS DRIVE

PARADISE VALLEY, ARIZONA

Project No.: 910012SA-02

UPPER EAST FORK CAVE CREEK
BASIN #4

SPEEDIE AND ASSOCIATES
GEOTECHNICAL/MATERIALS/SITE ENGINEERS
11029 N. 24th AVE., SUITE 805 • PHOENIX, ARIZONA 85029 • (602) 997-6391 • FAX (602) 943-5508

JAMES A. SPEEDIE, P.E.
HENRIETTA SPEEDIE
GREGG A. CREASER, P.E.
GARY E. STOCKER, P.E.
STEVEN A. GRIESS, P.E.
BRETT P. CREASER, P.E.

April 11, 1991

Ellery A. Biathrow, P.E.
Maricopa County Flood Control District
3335 West Durango Street
Phoenix, Arizona 85009

RE: Addendum No. 2
Project No. 910012SA
FCD Control No. 90-61
Assignment No. 1
Paradise Valley
Community College
Phoenix, Arizona

Dear Mr. Biathrow:

Attached hereto is a recommended earthwork specification for placement of material obtained from the subject site. Fill will be placed in a future structure area and a future landscaped area.

This addendum should be attached to the referenced report and made a part thereof.

Respectfully submitted,

SPEEDIE & ASSOCIATES

Registered Professional Engineer (Civil)
CERTIFICATE NO. 14388
GREGG ALAN CREASER
Date Signed 4/11/91
ARIZONA, U.S.A.

Gregg A. Creaser, P.E.

GAC:klh

Attachment

FLOOD CONTROL DISTRICT
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	ADMIN		LMGT
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	C & O	1	~~EAB~~ SAB 4.16
	ENGR		~~[illegible]~~
REMARKS		2	IVB

PARADISE VALLEY COMMUNITY COLLEGE

CONTRACT 90-61, Assignment No. 1

Site Work Specification

1.0 Site Preparation

1.1 The entire area which is to receive fill (A + B) shall be stripped of all vegetation, debris, rubble and obviously loose surface soils.

1.2 Area A - Prior to placing structural fill, (Area A) the existing grade shall 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.

1.3 Area B - All areas that are to receive landscape fill (Area B) should be scarified 9 inches, moisture conditioned to at least optimum (±2 percent) and uniformly compacted to at least 90 percent of maximum dry density.

2.0 Fill Placement

2.1 Fill shall be placed on subgrade which has been properly prepared per Section 1.0 and approved by a Testing Laboratory. Fill shall be wetted and thoroughly mixed to achieve optimum moisture content, ±2 percent (optimum to +3 percent for fill placed within 2.0 feet of finished grade.) Fill shall be placed in horizontal lifts of 12-inch maximum loose thickness (or thinner if compaction equipment is not capable of uniformly compacting the fill lift thickness) and compacted to the percent of maximum dry density per ASTM D-698 set forth as follows:

A. Structural Area A

1.	More than 2.0 feet below finished grade	95 min
2.	Within 2.0 feet of finished grade	88-92 max

B. Landscape Areas - Area B

1.	More than 2.0' below F/G	90 min
2.	Within 2.0' of F/G	85-90 max

2.2 Fills shall be tested for dry density and moisture content by a Testing Laboratory to ensure compliance with these specifications. A minimum of one test per 10,000 square feet of fill area per lift shall be made, or two tests per lift, whichever is greater.

SPEEDIE
AND ASSOCIATES
GEOTECHNICAL / MATERIALS / SITE ENGINEERS
11029 N. 24th AVE., SUITE 805 • PHOENIX, ARIZONA 85029

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ENGR 3 JVB
REMARKS

February 1, 1991

Ellery A. Biathrow, P.E.
Maricopa County Flood Control District
3335 West Durango Street
Phoenix, Arizona 85009

RE: Addendum No. 1
Project No. 910012SA
FCD Control No. 90-61
Assignment No. 1
Paradise Valley Community College
Phoenix, Arizona

Dear Mr. Biathrow:

This addendum is written to clarify recommendations for use of material excavated from the subject site.

The site soils exhibit an expansion potential in excess of 5% when compacted to 95% of optimum dry density at a moisture content 2% below optimum and restrained with 100 psf surcharge. Test procedures call for totally inundating the sample to elicit a worse case response. The results indicate that these soils are not acceptable for structural fill by most standard specifications.

It is our opinion that these soils may be used for structural fills provided that some precautions are taken. It is recommended that each case be evaluated by a geotechnical engineer to determine what precautions should be taken. The following restrictions should be considered.

1) Utilize the material in structural pad fills at elevations below bottom of footings. Foundation loads should be sufficiently high to prevent movement.

2) The swelling action requires an increase in moisture content ~~contact~~. Accordingly, these materials can be used in areas not subject to moisture changes. This will require proper drainage and restrictions on landscaping.

3) Reducing compaction to a range of 88 to 92% and maintaining moisture contents at above optimum will also reduce swell potential to acceptable levels.

4) Do not use behind retaining walls.

This addendum should be attached to the original report and made a part thereof.

Respectfully submitted

SPEEDIE & ASSOCIATES

Gregg A. Creaser, P.E.

GAC:klh

Attachments

SPEEDIE
AND ASSOCIATES
GEOTECHNICAL / MATERIALS / SITE ENGINEERS
11029 N. 24th AVE., SUITE 805 • PHOENIX, ARIZONA 85029

SWELL TEST DATA

BORING/ PIT NO.	SAMPLE DEPTH (FT.)	REMOLDED DRY DENSITY (PCF)	INITIAL MOISTURE CONTENT PERCENT	PERCENT COMPACTION	INITIAL DEGREE OF SATURATION PERCENT	FINAL DEGREE OF SATURATION PERCENT	TOTAL SWELL PERCENT
B-2/BS-2	5.0	105.3	13.7	94.6	64	91	5.1
B-2/BS-2	5.0	105.8	17.1	95.1	80	94	1.8

*Based on a maximum dry density of 111.3 PCF at 15.5 percent moisture.

Note: Samples loaded with 100 psf surcharge.

Paradise Valley Community Coll
32nd St. & Union Hills Drive
Phoenix, Arizona

SPEEDIE AND ASSOCIATES
GEOTECHNICAL AND SITE ENGINEERS
PROJECT NO. 910012SA

Figure 7

SPEEDIE AND ASSOCIATES
GEOTECHNICAL/MATERIALS/SITE ENGINEERS
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BRETT P. CREASER, P.E.

January 28, 1991

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ADMIN | LMGT
FINANCE 4 FILE 90-61
1 ~~2 EAB~~
ENGR 3 JVB
REMARKS

Mr. Ellery A. Biathrow, P.E.
Maricopa County Flood Control District
3335 W. Durango Street
Phoenix, Arizona 85009

RE: Project No. 910012SA
Paradise Valley
Community College
Phoenix, Arizona

Dear Mr. Biathrow:

At your direction, Speedie & Associates, Inc., performed a subsurface investigation in the area of the proposed retention basins. This report presents the results of that investigation.

On January 17th and 23rd, 1991, four soil test borings were drilled at the approximate locations shown on the attached Soil Boring Location Plan, Plate 1. 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 75 drill rig utilizing 7.0-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 moisture content, dry density, grain-size distribution and plasticity (Atterberg Limits) tests for classification and shrinkage parameters. A remolded swell test was performed on a sample compacted to densities and moisture contents expected during construction. All field and laboratory data is presented in this Appendix as Figures No. 1 through 7.

In general, soils consist of fine grained sandy clay with some deposits of clayey sand. Calcareous cementation varies but was present in each boring at levels ranging from ground surface to 3 feet below the surface. The plasticity ranges from 6 to 32 percent.

The average inplace dry density is on the order of 103 p.c.f. which relates to approximately 92 percent compaction of maximum dry density as determined per ASTM D698A (Standard Proctor).

Increasing the density to 96 percent would result in shrinkage of approximately 4 percent. For design, we would recommend using a value of 5 percent.

Swell tests indicate that the soils have a moderately high potential for swell when compacted to moistures and densities expected during construction. Increasing moisture reduces the potential, although not to a level normally required for underslab fill. The results are as follows:

Percent Compaction	% Moisture	% Swell
94.6	13.7	5.1
95.1	17.1	1.8

Although not generally acceptable for underslab fill, depending upon proposed uses for this material, controlling density and moisture may make it usable.

Excavation should be possible by standard equipment. Depending upon cementation, some heavy ripping may be required. Prior to stockpiling or excavating, the surface should be stripped of the existing desert vegetation.

If there are any further questions, please do not hesitate to call.

Respectfully submitted,

SPEEDIE & ASSOCIATES, INC.

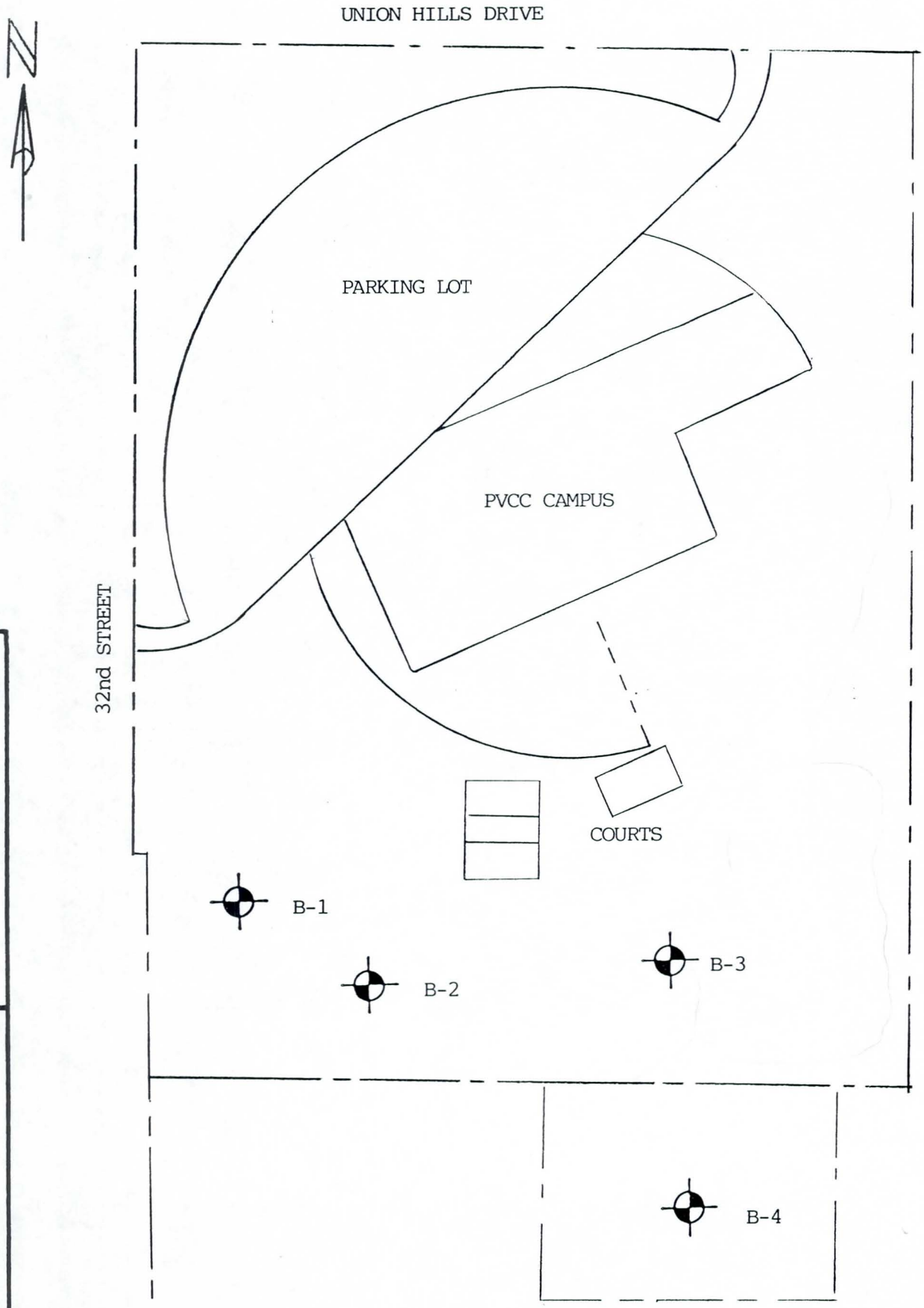
Registered Professional Engineer (Civil) CERTIFICATE No. 14388 GREGG ALAN CREASER Date Signed 1-28-91 ARIZONA, U.S.A.

Gregg A. Creaser, P.E.

GAC:klh

Attachments

SPEEDIE AND ASSOCIATES
GEOTECHNICAL / MATERIALS / SITE ENGINEERS
11029 N. 24th AVE., SUITE 805 • PHOENIX, ARIZONA 85029



Boring Location Plan
Paradise Valley Comm. College
Phoenix, ARizona

SPEEDIE AND ASSOCIATES
GEOTECHNICAL AND SITE ENGINEERS

Project No. 910[illegible]A

Plate 1

10.3-A

SOILS CLASSIFICATION CHART

MAJOR DIVISIONS			GRAPH SYMBOL	LETTER SYMBOL	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS	GRAVEL AND GRAVELLY SOILS	CLEAN GRAVELS (LITTLE OR NO FINES)		GW	WELL-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
				GP	POORLY-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
	MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	GRAVEL WITH FINES (APPRECIABLE AMOUNT OF FINES)		GM	SILTY GRAVELS, GRAVEL-SAND SILT MIXTURES
				GC	CLAYEY GRAVELS, GRAVEL-SAND CLAY MIXTURES
	SAND AND SANDY SOILS	CLEAN SAND (LITTLE OR NO FINES)		SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
				SP	POORLY-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	MORE THAN 50% OF COARSE FRACTION PASSING ON NO. 4 SIEVE	SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)		SM	SILTY SANDS, SAND-SILT MIXTURES
				SC	CLAYEY SANDS, SAND-CLAY MIXTURES
FINE GRAINED SOILS	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
				CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
				OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS
				CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
				OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS				PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

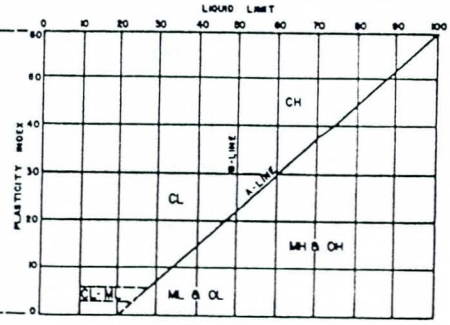
FOR LABORATORY CLASSIFICATION OF FINE GRAINED SOILS

GRADATION CHART

MATERIAL SIZE		PARTICLE SIZE			
		LOWER LIMIT		UPPER LIMIT	
		MILLIMETERS	SIEVE SIZE*	MILLIMETERS	SIEVE SIZE *
SAND	FINE	.074	#200*	0.42	#40*
	MEDIUM	0.42	#40*	2.00	#10*
	COARSE	2.00	#10*	4.76	#4*
GRAVEL	FINE	4.76	#4*	191	3/4"*
	COARSE	191	3/4"*	76.2	3"*
COBBLES		762	3"*	304.8	12"
BOULDERS		304.8	12"*	914.4	36"

*U.S. Standard *Clear Square Openings

PLASTICITY CHART



CONSISTENCY			RELATIVE DENSITY	
CLAYS & SILTS	BLOWS/FOOT*	STRENGTH †	SANDS & GRAVELS	BLOWS/FOOT*
VERY SOFT	0-2	0-½	VERY LOOSE	0-4
SOFT	2-4	½-½	LOOSE	4-10
FIRM	4-8	½-1	MEDIUM DENSE	10-30
STIFF	8-16	1-2	DENSE	30-50
VERY STIFF	16-32	2-4	VERY DENSE	OVER 50
HARD	OVER 32	OVER 4		

* Number of blows of 140 pound hammer falling 30 inches to drive a 2 inch O.D. (1-3/8 inch I.D.) split spoon (ASTM D-1586).

† Unconfined compressive strength in tons/sq ft. Read from a pocket penetrometer.

SAMPLE DESIGNATION	PENETRATION RESISTANCE SYMBOL	DESCRIPTION
Bag	-	Large Bulk Sample
BS	-	Misc. Grab Sample - Bottle or Bag
AS	-	Auger 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, 1 3/8-inch inside diameter, split spoon sampler into undisturbed soil for three sucessive 6-inch increments of penetration by means of a 140-pound weight falling freely through a distance of 30 inches. The cumulative number of blows required for the final 12 inches of penetration is the Standard Penetration Resistance (N)
LS	●	Liner Sample - Standard Penetration Test-Driving a 2.0-inch outside diameter split spoon, equipped with two, 3-inch long by 1 3/8-inch inside diameter brass liners, seperated by a 1-inch long spacer, into undisturbed soil as above.
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 means of a 140-pound weight falling freely through a distance of 30 inches. The blows required for the 12 inches of penetration are recorded.
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 (Bullnose) - Driving a 2.0-inch outside diameter "Bullnose penetrometer" continuously into undisturbed soil by means of a 140-pound weight falling freely through a distance of 30 inches. The blows for each successive 12-inch increment are recorded.

NOTE: The stratification lines shown on the Logs of Test Borings and/or Test Pit represent the approximate boundary between soil types, and the transition may be gradual.

SOIL LOG LEGEND

SPEEDIE & ASSOCIATES
GEOTECHNICAL AND SITE ENGINEERS
11029 NORTH 24TH AVENUE SUITE 805
PHOENIX ARIZONA 85029

Rig Type: **CME-55**
Boring Type: **Hollow Stem Auger**
Surface Elevation:
Datum:

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	Hard Brown SANDY CLAY (CL-Dry)					
3.0		RS-1	3.5	7.8	103.1	56/12"
	Hard Light Brown SANDY CLAY (CL-Dry) With A Little Caliche	BS-2	4.0	--	--	
5.0	End of Boring					
5						
10						
15						
20						
25						
30						

Boring Date: **1-17-91**
Field Engineer/Technician: **R. Berryman**
Driller: **J. Ward**
Contractor: **Heber Mining**

Water Level

Depth	Hour	Date

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: **B-1**

PARADISE VALLEY COMMUNITY COLLEGE

32nd STREET & UNION HILLS DRIVE

PARADISE VALLEY, ARIZONA

Project No.: **910012SA**

Figure 1

Rig Type: **CME-55**
Boring Type: **Hollow Stem Auger**
Surface Elevation:
Datum:

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	Hard Brown SANDY CLAY (CL-Dry)	BS-1	2.0	--	--	
2.0	Hard Light Brown SANDY CLAY (CL-Dry) With A Little Caliche	RS-2	3.4	6.4	98.1	87/11"
5						
6.0	End of Boring					
10						
15						
20						
25						
30						

Boring Date: **1-17-91**
Field Engineer/Technician: **R. Berryman**
Driller: **J. Ward**
Contractor: **Heber Mining**

Water Level

Depth	Hour	Date

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: **B-2**

PARADISE VALLEY COMMUNITY COLLEGE

32nd STREET & UNION HILLS DRIVE

PARADISE VALLEY, ARIZONA

Project No.: **910012SA**

Figure 2

Rig Type: **CME-55**
Boring Type: **Hollow Stem Auger**
Surface Elevation:
Datum:

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	Hard Brown SANDY CLAY/SANDY SILT (CL/ML-Dry)	1.5	BS-1	1.5	--	--	
	Hard Light Brown SANDY CLAY (CL-Dry) With A Little Caliche		RS-2	3.5	6.0	108.8	63/12"
5		6.0					
	Dense Brown CLAYEY SAND (SC-Dry)						
		9.0	BS-3	9.0	--	--	
	End of Boring						
10							
15							
20							
25							
30							

Boring Date: **1-17-91**
Field Engineer/Technician: **R. Berryman**
Driller: **J. Ward**
Contractor: **Heber Mining**

Water Level

Depth	Hour	Date

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: **B-3**

PARADISE VALLEY COMMUNITY COLLEGE

32nd STREET & UNION HILLS DRIVE

PARADISE VALLEY, ARIZONA

Project No.: **910012SA**

Figure 3

Rig Type: **CME-55**
Boring Type: **Hollow Stem Auger**
Surface Elevation:
Datum:

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	Hard Light Brown SANDY CLAY (CL-Dry) With A Little Caliche	BS-1	2.0	--	--	
		RS-2	3.5	5.5	101.0	50/9"
5						
	6.0 End of Boring					
10						
15						
20						
25						
30						

Boring Date: **1-23-91**
Field Engineer/Technician: **R. Berryman**
Driller: **J. Ward**
Contractor: **Heber Mining**

Water Level

Depth	Hour	Date

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: **B-4**

PARADISE VALLEY COMMUNITY COLLEGE

32nd STREET & UNION HILLS DRIVE

PARADISE VALLEY, ARIZONA

Project No.: **910012SA**

Figure 4

TABULATION OF TEST DATA

TEST BORING OR TEST PIT NUMBER	SAMPLE NUMBER	DEPTH OF SAMPLE TIP	ELEVATION 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
						#200	#40	#10	#4	3 IN.	LIQUID LIMIT (PERCENT)	PLASTIC LIMIT (PERCENT)	PLASTICITY INDEX (PERCENT)	
B-1	BS-1	3.5	-	7.8	103.1	-	-	-	-	-	-	-	-	-
B-1	BS-2	5.0	-	-	-	61	78	93	100	100	45	18	27	CL
B-2	BS-1	2.0	-	-	-	54	68	83	94	100	37	19	18	CL
B-2	BS-2	3.4	-	6.4	98.1	-	-	-	-	-	-	-	-	-
B-3	BS-1	1.5	-	-	-	67	86	97	100	100	22	16	6	CL-ML
B-3	BS-2	3.5	-	6.0	108.8	-	-	-	-	-	-	-	-	-
B-3	BS-3	9.0	-	-	-	30	54	83	97	100	56	24	32	SC
B-4	BS-1	2.0	-	-	-	54	65	77	89	100	36	18	18	CL
B-4	BS-2	3.5	-	5.5	101.0	-	-	-	-	-	-	-	-	-

PROJECT NO. 910012SA

SPEEDIE AND ASSOCIATES

SHEET 1 OF 1

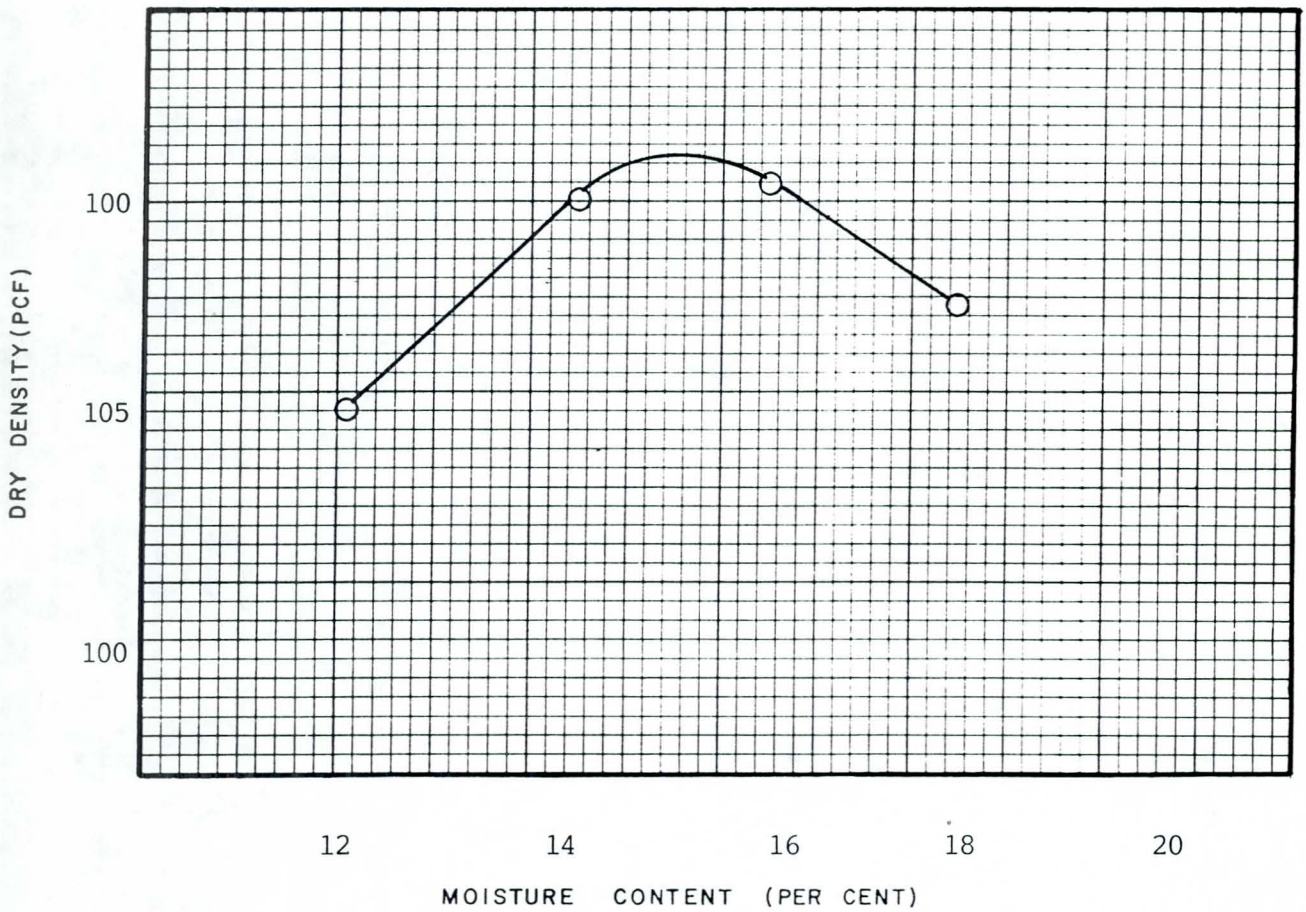
50.22-S

Figure 5

SPEEDIE AND ASSOCIATES
GEOTECHNICAL/MATERIALS/SITE ENGINEERS

MOISTURE-DENSITY RELATIONS

PROJECT: Paradise Valley Comm. College PROJECT NO.: 910012SA DATE: 1/23/91
LOCATION: 32nd St. & Union Hills
CLIENT: MCFCD LAB. SAMPLE NO.: 1399
BORING NO.: B-1 FIELD SAMPLE NO.: BS-2 SAMPLE DEPTH: 5.0 SAMPLE ELEV. (TIP): ---
SOIL DESCRIPTION: Brown-sandy clay
METHOD OF COMPACTION: ASTM D698A
TESTED BY: JS DATE: 1/23/91 CHECKED BY: Jan DATE: 1/25/91



MAXIMUM DRY DENSITY 111.3 PCF OPTIMUM MOISTURE CONTENT 15.5 %

SWELL TEST DATA

BORING/ PIT NO.	SAMPLE DEPTH (FT.)	REMOLDED DRY DENSITY (PCF)	INITIAL MOISTURE CONTENT PERCENT	PERCENT COMPACTION	INITIAL DEGREE OF SATURATION PERCENT	FINAL DEGREE OF SATURATION PERCENT	TOTAL SWELL PERCENT
B-2/BS-2	5.0	105.3	13.7	94.6	64	91	5.1
B-2/BS-2	5.0	105.8	17.1	95.1	80	94	1.8

*Based on a maximum dry density of 11.3 PCF at 15.5 percent moisture.

111.3

Paradise Valley Comm. Coll
32nd St. & Union Hills Dr.
Phoenix, Arizona

SPEEDIE AND ASSOCIATES
GEOTECHNICAL AND SITE ENGINEERS
PROJECT NO. 910012SA

Figure 7

50-21-S

Holtz & Kovacs

tend to swell more than soils with oriented fabrics. Disturbance of or remolding of old natural clays may increase the amount of swelling. Monovalent cations in a clay (for example, sodium montmorillonite) will swell more than divalent clays (for example, calcium montmorillonite). Cementation and organic substances tend to reduce swelling.

Swelling, like shrinkage, is generally confined to the upper portions of a soil deposit. Thus swelling damages lighter structures such as small buildings, highway pavements, and canal linings. Swelling pressures as high as 1000 kPa have been measured, which is equivalent to an embankment thickness of 40 to 50 m. Ordinarily, such high pressures do not occur, but even with more modest swelling pressures of 100 or 200 kPa an embankment of 5 or 6 m would be required to prevent all swelling of subgrade, for example. (For comparison, an ordinary building weighs something on the order of 10 kPa per story.) Practically speaking, the three ingredients generally necessary for potentially damaging swelling to occur are (1) presence of montmorillonite in the soil, (2) the natural water content must be around the PL, and (3) there must be a source of water for the potentially swelling clay (Gromko, 1974).

How is swelling predicted? Many methods and soil tests have been proposed. These include swelling tests and other simple laboratory tests, chemical and mineralogical analyses, and correlation with the classification and index properties of the soil. Table 6-2 is a summary of the experience of the U.S. Water and Power Resources Service (formerly U.S.B.R.) based on considerable research on swelling clays and expansive soils. Gromko (1974) provides some additional correlations with soil tests that have been successfully applied to predict swelling. Figure 6.14 relates swelling and collapse to the liquid limit and the in situ dry density of soils —again, based on the experience of the U.S. Water and Power Resources Service.

TABLE 6-2 Probable Expansion as Estimated from Classification Test Data*

Degree of Expansion	Probable Expansion as a % of the Total Volume Change (Dry to Saturated Condition)†	Colloidal Content (% −1 μm)	Plasticity Index, PI	Shrinkage Limit, SL
Very high	> 30	> 28	> 35	< 11
High	20–30	20–31	25–41	7–12
Medium	10–20	13–23	15–28	10–16
Low	< 10	< 15	< 18	> 15

*After Holtz (1959) and U.S.B.R. (1974).
†Under a surcharge of 6.9 kPa (1 psi).

FLOOD CONTROL DISTRICT of Maricopa County

Interoffice Memorandum

CMT NO.	SUBJECT: EFCC Basin #4 (PVCC)	☐ FILE ☐ DESTROY

TO: Ellery FROM: JVB DATE: 4-4-91

PPM is requesting that Speedie and Associates provide the following additional information to their Soils Report #910012SA:

"A" 1. An existing basin (approx. 6' Deep) on the PVCC site will need to be filled with material taken from the new basin on the PVCC site. This material must be placed as engineered fill to support a future building or parking lot. (Maybe several years down the road).
A short spec. is requested from Speedie that can be included into FCD special provisions.

"B" 2. A similar condition exists on the PVCC site. The difference is that only light future loading is ever expected. Maybe just landscaping and hardscaping (sidewalk / patio). We need a spec for this also.

Requesting that Speedie complete this work by Wednesday 4-10-91. We realize this is quite a short time frame, but project will be advertised 4-19-91, and we must type specs.

Thank-you

C.C. JER.

6910-007 3-90

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

INTEROFFICE MEMORANDUM

Subject: Paradise Valley Comm. College soils report

To: JVB
Via: EAR

From: WFR

Date: 4/4/91

A copy of the Speedie and Associates soils report should be provided to PVCC officials. As explained in the report, the on-site soils have a moderately high potential for swell. Soils of this type are appropriate for use as general site fill. In areas where buildings, pavement or other structures may eventually be constructed, Speedie's recommendations for structural fill should yield satisfactory results. It might also be appropriate for us to recommend that any slab on grade built in these filled areas be placed on a granular base course at least one foot thick.

SPEEDIE AND ASSOCIATES
GEOTECHNICAL AND SITE ENGINEERS
11029 N. 24th Avenue, #805
Phoenix, Arizona 85029
Phone: (602) 997-6391
FAX: (602) 943-5508

FACSIMILE COVER SHEET

DATE: 4/11/91

TIME: 10:30

NUMBER OF PAGES 3
(including this cover sheet)

TO: COMPANY: MCFCD

NAME: Ellery Blathrow

FAX #: 269-4601

FROM: Gregg Creager

MESSAGE:

Hard copy w/ cover letter to be delivered 4/11 AM

9:30A
4-12-91 Tele w/ Gregg -
OK to use Structural Backfill directly under new parking lot.
Flexible pavement can handle the expansive soil.

4-12-0715
Looks OK.

NOTE: PLEASE CALL SENDER AT (602) 997-6391 IF ALL PAGES ARE NOT RECEIVED.

SPEEDIE AND ASSOCIATES
GEOTECHNICAL/MATERIALS/SITE ENGINEERS
11029 N. 24th AVE., SUITE 805 • PHOENIX, ARIZONA 85029 • (602) 997-6391 • FAX (602) 943-5508

JAMES A. SPEEDIE, P.E.
HENRIETTA SPEEDIE
GREGG A. CREASER, P.E.
GARY E. STOCKER, P.E.
STEVEN A. GRIESS, P.E.
BRETT P. CREASER, P.E.

April 11, 1991

Ellery A. Biathrow, P.E.
Maricopa County Flood Control District
3335 West Durango Street
Phoenix, Arizona 85009

RE: Addendum No. 2
Project No. 910012SA
FCD Control No. 90-61
Assignment No. 1
Paradise Valley
Community College
Phoenix, Arizona

Dear Mr. Biathrow:

Attached hereto is a recommended earthwork specification for placement of material obtained from the subject site. Fill will be placed in a future structure area and a future landscaped area.

This addendum should be attached to the referenced report and made a part thereof.

Respectfully submitted,

SPEEDIE & ASSOCIATES

Registered Professional Engineer (Civil)
CERTIFICATE NO.
14388
GREGG ALAN
CREASER
Date Signed 4/11/91
ARIZONA, U.S.A.

Gregg A. Creaser, P.E.

GAC:klh

Attachment

PARADISE VALLEY COMMUNITY COLLEGE

CONTRACT 90-61, Assignment No. 1

Site Work Specification

1.0 Site Preparation

1.1 The entire area which is to receive fill (A + B) shall be stripped of all vegetation, debris, rubble and obviously loose surface soils.

1.2 Area A - Prior to placing structural fill, (Area A) the existing grade shall 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.

1.3 Area B - All areas that are to receive landscape fill (Area B) should be scarified 9 inches, moisture conditioned to at least optimum (±2 percent) and uniformly compacted to at least 90 percent of maximum dry density.

2.0 Fill Placement

2.1 Fill shall be placed on subgrade which has been properly prepared per Section 1.0 and approved by a Testing Laboratory. Fill shall be wetted and thoroughly mixed to achieve optimum moisture content, ±2 percent (optimum to +3 percent for fill placed within 2.0 feet of finished grade.) Fill shall be placed in horizontal lifts of 12-inch maximum loose thickness (or thinner if compaction equipment is not capable of uniformly compacting the fill lift thickness) and compacted to the percent of maximum dry density per ASTM D-698 set forth as follows:

A. Structural Area A

1.	More than 2.0 feet below finished grade	95 min
2.	Within 2.0 feet of finished grade	88-92 max

B. Landscape Areas - Area B

1.	More than 2.0' below F/G	90 min
2.	Within 2.0' of F/G	85-90 max

2.2 Fills shall be tested for dry density and moisture content by a Testing Laboratory to ensure compliance with these specifications. A minimum of one test per 10,000 square feet of fill area per lift shall be made, or two tests per lift, whichever is greater.

SPEEDIE AND ASSOCIATES
GEOTECHNICAL / MATERIALS / SITE ENGINEERS
11029 N. 24th AVE., SUITE 805 • PHOENIX, ARIZONA 85029