MARYVALE STADIUM WEST INLET ASSIGNMENT #5

SPEEDIE AND ASSOCIATES

GEOTECHNICAL/ENVIRONMENTAL/MATERIAL ENGINEERS

11029 N. 24th AVE., SUITE 805 • PHOENIX, ARIZONA 85029 • (602) 997-6391

DESIGNATION:	Maryvale Stadium West Inlet Assignment #5
LOCATION:	Grand Canal/57th Ave.-51st Ave. Maryvale, Arizona
CLIENT:	Flood Control District of Maricopa County

A620.902

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REPORT ON GEOTECHNICAL INVESTIGATION

DESIGNATION: Maryvale Stadium West Inlet Assignment #5

LOCATION: Grand Canal/57th Ave.-51st Ave. Maryvale, Arizona

CLIENT: Flood Control District of Maricopa County

PROJECT NO: 990658SA

DATE: August 30, 1999

Registered Professional Engineer (Civil)
CERTIFICATE NO. 14388
GREGG ALAN CREASER
Date Signed 8-30-99
ARIZONA, U.S.A.

TABLE OF CONTENTS

1.0 INTRODUCTION 1

2.0 GENERAL SITE AND SOIL CONDITIONS 1

2.1 Site Conditions 1
2.2 General Subsurface Conditions 1

3.0 ANALYSIS AND RECOMMENDATIONS 2

3.1 Analysis 2
3.2 Soil Corrosion 3
3.3 Excavation And Temporary Cut Slopes 3
3.4 Fill And Backfill 4

4.0 GENERAL 5

APPENDIX

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1.0 INTRODUCTION

This report presents the results of a subsoil investigation carried out at the site of the proposed Maryvale Stadium West Inlet in Maryvale, Arizona.

Preliminary information calls for the construction of a new 48 to 60 inch diameter storm drain to be located along the north bank of the Grand Canal from 57th Avenue to 51st Avenue. The pipe material is not known at this time. The invert of the pipe is not expected to be more than 12 feet below existing grade.

2.0 GENERAL SITE AND SOIL CONDITIONS

2.1 Site Conditions

The storm drain is to be situated on the north side of the Grand Canal, running from Maryvale Stadium, under 55th Avenue, to 57th Avenue. The canal is an earthen canal with built up, unpaved access roads on both the north and south sides. This area is surrounded by residential properties, schools, and parks. Utilities, both underground and overhead, are present.

2.2 General Subsurface Conditions

Subsoil conditions consist mainly of sandy clay, although discontinuous silty sand/sand was encountered in boring B-1 between 4 and 9 feet. Boring B-4 drilled in 55th Avenue revealed a pavement structure made up of 4.5 inches of asphaltic concrete and 18 inches of aggregate base material. The borings were all terminated within the sandy clay unit at depths of 16 feet below existing grade. Borings B-2, B-3, B-5 and B-6, were drilled within the Grand Canal access roadway. The upper 5 to 10 feet is classified as 'possible fill' material. There are no obvious tell-tales to establish its exact vertical extent. The fill may have been produced as part of the excavation of the canal. Standard Penetration Test values generally range from 1 to 25 blows per foot indicating very soft to very stiff conditions within the clay stratum. In some of the borings, the very soft consistency was noted to extend the full boring depth.

No groundwater was encountered during this investigation. Based on visual and tactile observation of the field samples, the soils are described as ranging from dry to wet with the majority being moist to wet. This is mostly likely due to the proximity of and seepage from the unlined Grand Canal.

Laboratory testing indicates in-situ dry densities of the upper soils on the order of 98 to 104 pcf at about 8 to 22 percent moisture at the time of investigation. Liquid limits are in the 26 to 28 percent range with plasticity indices ranging from 6 to 8 percent. The upper clayey soils exhibit volume increase due

to wetting of 2.8 percent when under-compacted at near optimum moisture. Soluble sulfates in the soils are on the order of 0.0057 percent. Field and laboratory resistivities and pH values are as follows:.

Location	Depth (feet)	Field Resistivity (ohm-cm(	Lab Resistivity (ohm-cm)	pH
B-1	4.5	n/m	734	8.0
B-2	9.0	3,062	1,668	8.6
B-3	10.0	2,297	n/m	N/m
B-4	15.0	2,297	934	8.0
B-5	15.0	n/m	1,067	8.3
B-6	10.0	2,680	1,668	8.4

3.0 ANALYSIS AND RECOMMENDATIONS

3.1 Analysis

Excavation for the proposed storm drain are expected to be on the order of 10 to 12 feet deep, terminating within the soft, wet clays. Excavation operations should be relatively straightforward using conventional equipment. Open-cut excavation appears feasible for the alignment depending on proximity to the canal, roadways, sidewalks, utilities, etc. Depending on proximity, shoring, bracing or underpinning may be required to provide structural stability and protect personnel working in the excavation. Allowance should also be made for the presence of unaccounted buried elements and hazards.

The soil conditions encountered in the test borings along the alignment indicate no specific restrictions to any type of piping materials. Cast-in-place pipe is not recommended because of the presence of the soft, wet clays which are expected to be of low strength and may not provide a suitable medium against which to cast.

Bedding should be selected per the requirements of the pipe materials used and the trench loading conditions. Given the soft soil conditions, a minimum thickness of 12 inches of ASTM C 33 Size Number 57 aggregate is recommended for the bottom of the trench to support the pipe.

Soft, wet clays at the invert level may be or become unstable under excavating equipment. Additional time may be required to allow the soils to dry when exposed, or alternative methods such as lime

stabilization or rock fill may be required to stabilize the exposed grade. If any type of structure is anticipate such as junction boxes, manholes etc are expected, this office must be notified to determine the need for special foundations to limit settlement.

Ground water is not expected to be a factor in the design or construction of the storm drain. Depending on time of year and seepage from the adjacent canal, perched water may be encountered within the sand lens (see B-1). Nuisance water should be controllable by means of sumps and pumping. Higher inflows may require more aggressive removal techniques.

3.2 Soil Corrosion

Laboratory and field measured, minimum soil resistivity measurements indicate a severe degree of corrosiveness. Suitable and adequate protection to buried metal pipe and/or increased wall thickness per the American Iron and Steel Institute Handbook of Steel Drainage & Highway Construction Products will be essential for long term performance. Suitable pipe wall thickness and corrosion protection should also be selected per the trench/traffic load and lifetime requirements of the project.

Sulfate attack on buried concrete is considered negligible. Subsurface concrete may use either Type I or II cement, readily available and used in the area.

3.3 Excavation And Temporary Cut Slopes

All excavations must comply with current governmental regulations including the current OSHA Excavation and Trench Safety Standards. Side slopes for open-cut excavation should be cut back at 1.5:1 (horizontal to vertical). The slopes should be protected from erosion due to run-off or long term surcharge at the slope crest. Construction equipment, building materials, excavated soil and vehicular traffic should not be allowed within 10 feet or 1/3 the slope height, whichever is greater, from the top of slope. All cut slopes should be observed by the Soils Engineer during excavation. Adjustments to the recommended slopes may be necessary due to wet zones, loose strata and conditions not observed in the borings. Localized shoring may also be required. Shotcrete or soil stabilizer on the slope face may be useful in preventing erosion due to run-off and/or drying of the slope.

Depending on proximity to the canal, structures, roadways, sidewalks, utilities, etc., shoring, bracing or underpinning may be required to provide structural stability and protect personnel working in the excavation.

3.4 Fill And Backfill

Native soils are considered suitable for use as trench backfill and general fill. This material should be moisture-conditioned, placed in 8-inch lifts and mechanically compacted. Water settling is not recommended.

The soils are in a moist to wet state. These soils may require time to dry before they are replaced and compacted as trench backfill. These soils may also become unstable under excavating equipment. Additional time may be required to allow the soils to dry when exposed, or alternative methods such as lime stabilization or rock fill may be required to stabilize the exposed grade.

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 as follows, as a minimum:

A.	Pavement Subgrade or Fill		95
B.	Utility Trench Backfill		
	1.	More than 2.0' below finish S/G	90
	2.	Within 2.0' of finish S/G	95
C.	Aggregate Base Course		
	1.	Below asphalt paving	100
D.	Landscape Areas		
	1.	Miscellaneous fill	90
	2.	Utility trench - more than 1.0' below F/G	85
	3.	Utility trench - within 1.0' of F/G	90

4.0 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 representative of the Soils Engineer observe and test 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.

Keith R. Gravel, E.I.T.

Prabhakar (Peter) Rupal, P.E.

Registered Professional Engineer (Civil)
CERTIFICATE NO.
14388
GREGG ALAN
CREASER
Date Signed 8-30-99
ARIZONA, U.S.A.

Gregg A. Creaser, P.E.

APPENDIX

FIELD AND LABORATORY INVESTIGATION

SOIL BORING LOCATION PLANS

SOIL LEGEND

LOG OF TEST BORINGS

TABULATION OF TEST DATA

MOISTURE-DENSITY RELATIONS

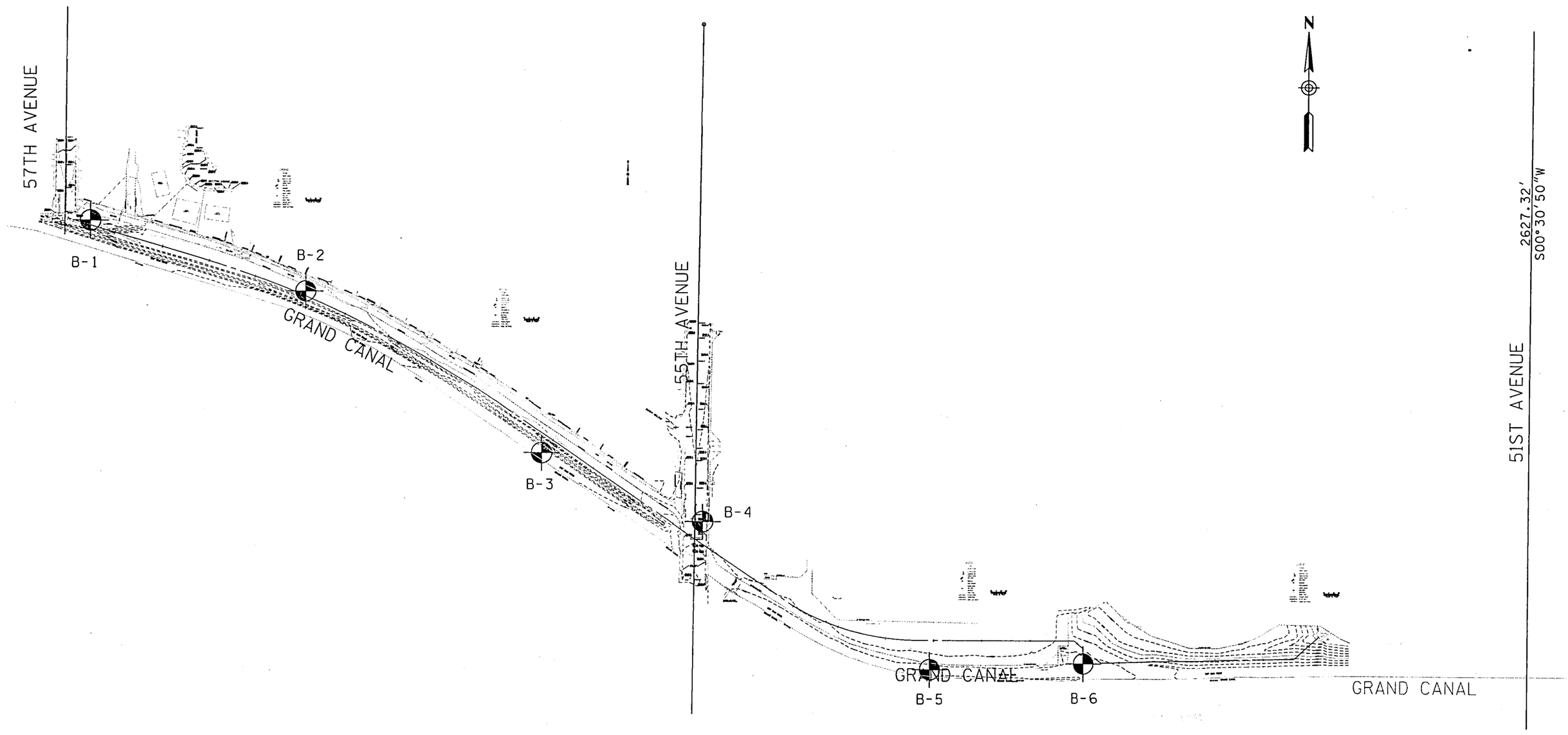
SWELL TEST DATA

SOLUBLE SULFATE RESULTS

FIELD AND LABORATORY INVESTIGATION

On August 6, 1999, 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 staff engineer, 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 moisture content, dry density, grain-size distribution, plasticity (Atterberg Limits) tests, soluble sulfate, pH and resistivity measurements for classification and design parameters. Remolded swell tests were performed on samples compacted to densities and moisture contents expected during construction. All field and laboratory data is presented in this appendix.



- APPROXIMATE SOIL BORING LOCATION

SOIL BORING LOCATION PLAN

MARYVALE STADIUM WEST INLET
GRAND CANAL/57th AVE.-51st AVE.
MARYVALE, ARIZONA

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

DES:	DR: JMM	CHK: PR	DATE: 8-31-99	PROJ. NO.: 990658SA

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 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, ⅜ 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 2.0 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 & Gravels	Blows/Foot *
Very Soft	0–2	0–0.25	Very Loose	0–4
Soft	2–4	0.25–0.5	Loose	5–10
Firm	5–8	0.5–1.0	Medium Dense	11–30
Stiff	9–15	1–2	Dense	31–50
Very Stiff	16–30	2–4	Very Dense	> 50
Hard	> 30	> 4		

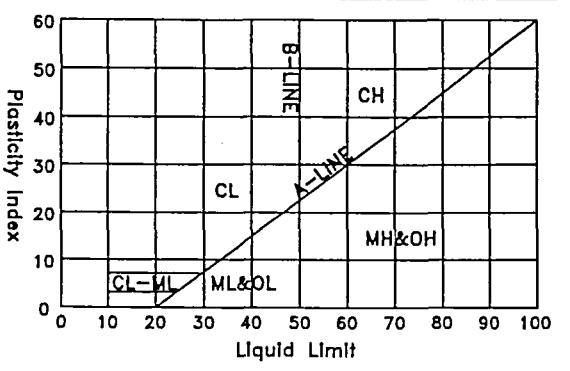
* Number of blows of a 140 lb hammer free falling 30 inches to drive a 2 inch O.D. split spoon sampler (ASTM D–1586)

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

MAJOR DIVISIONS			GRAPH SYMBOL	LETTER SYMBOL	TYPICAL DESCRIPTIONS
Coarse Grained Soils More than 50% of material is larger than #200 sieve size	Gravel and Gravelly Soils	Clean Gravels		GW	Well Graded Gravels
				GP	Poorly Graded Gravels
	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 More than 50% of material is smaller than #200 sieve size	Silts and Clays Liquid Limit is less than 50%			ML	Inorganic Silts, Low P.I.
				CL	Inorganic Clays, Low P.I.
				OL	Organic Silts, High P.I.
	Silts and Clays Liquid Limit is greater than 50%			MH	Inorganic Silts, High P.I.
				CH	Inorganic Clays, High P.I.
				OH	Organic Clays, High P.I.
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
Sta. 5+40

Depth (feet)	Visual Classification	Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)
0	Firm Brown SANDY CLAY (CL-Dry)	S-1	2.5	--	--
4.0		BS-2	4.5	--	--
5	Loose Brown SILTY FINE SAND (SM/SP-Dry)	RS-3	5.5	8.0	103.2
6.5	Brown WELL GRADED SAND (SW-Moist)				
9.0	Stiff to Very Stiff Brown SANDY SILTY CLAY (CL/ML-Moist)	S-4	11.0	--	--
10					
15					
16.0	End of Boring	S-5	16.0	--	--
20					

Penetration Resistance Blows per Foot (0, 25, 50)

Boring Date: 8-6-99
Field Engineer/Technician: K. Gravel
Driller: B. Freeman
Contractor: Heber Mining Co.

Water Level

Depth	Hour	Date
Dry		

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: B- 1

Maryvale Stadium West Inlet

Grand Canal/57th-51st Ave.

Maryvale, Arizona

Project No.: 990658SA

Rig Type: CME-55
Boring Type: Hollow Stem Auger
Surface Elevation: N/A
Sta. 10+10

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 CLAY (CL-Moist)	RS-1	2.0	11.0	101.8	
4.0						
5	Very Soft to Soft Brown SANDY CLAY (CL-Moist to Wet)	S-2	6.0	--	--	2/18"
		BS-3	9.0	--	--	
10		S-4	11.0	--	--	2/18"
15						
16.0	End of Boring	S-5	16.0	--	--	
20						

Boring Date: 8-6-99
Field Engineer/Technician: K. Gravel
Driller: B. Freeman
Contractor: Heber Mining Co.

Water Level

Depth	Hour	Date
Dry		

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Log of Test Boring Number: B- 2

Maryvale Stadium West Inlet

Grand Canal/57th-51st Ave.

Maryvale, Arizona

Project No.: 990658SA

Rig Type: CME-55
Boring Type: Hollow Stem Auger
Surface Elevation: N/A
Sta. 16+00

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	Stiff Brown SANDY CLAY (CL-Dry to Moist)	RS-1	2.0	8.3	105.5	
4.0						
5	Very Soft Brown SANDY CLAY (CL-Moist to Wet)	S-2	6.0	--	--	
10		S-3	11.0	--	--	2/18"
15		S-4	16.0	--	--	2/18"
16.0	End of Boring					
20						

Boring Date: 8-6-99
Field Engineer/Technician: K. Gravel
Driller: B. Freeman
Contractor: Heber Mining Co.

Water Level

Depth	Hour	Date
Dry		

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: B- 3

Maryvale Stadium West Inlet

Grand Canal/57th-51st Ave.

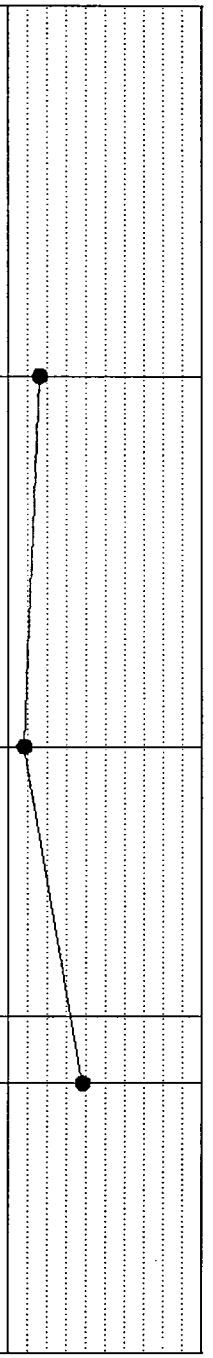
Maryvale, Arizona

Project No.: 990658SA

Rig Type: CME-55
Boring Type: Hollow Stem Auger
Surface Elevation: N/A
Sta. 19+60

Depth (feet)	Visual Classification	Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)
0	4" to 4.5" Asphalt 18" ABC				
1.8					
	Firm Brown SANDY CLAY (CL-Moist)				
4.0					
5		RS-1	5.5	11.4	98.0
7.0					
	Soft Brown SANDY CLAY (CL-Moist)				
10		S-2	11.0	--	--
13.0					
	Very Stiff Brown SANDY CLAY (CL-Moist)	BS-4	15.0	--	--
15					
16.0	End of Boring	S-3	16.0	--	--
20					

Penetration Resistance Blows per Foot (0, 25, 50)



Boring Date: 8-6-99
Field Engineer/Technician: K. Gravel
Driller: B. Freeman
Contractor: Heber Mining Co.

Water Level

Depth	Hour	Date
Dry		

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: B- 4

Maryvale Stadium West Inlet

Grand Canal/57th-51st Ave.

Maryvale, Arizona

Project No.: 990658SA

Rig Type: CME-55
Boring Type: Hollow Stem Auger
Surface Elevation: N/A
Sta. 25+00

Depth (feet)	Visual Classification	Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)
0	Firm Brown SANDY CLAY (CL-Dry to Moist) with Small Clam Shells 2" Layer of Fine Sand	S-1	2.5	--	--
3.0	Firm Brown SANDY CLAY (CL-Moist)	RS-2	5.5	22.2	99.7
8.0	Soft Brown SANDY CLAY (CL-Moist to Wet)	S-3	11.0	--	--
13.0	Firm Brown SANDY CLAY (CL-Moist)	BS-4	15.0	--	--
16.0	End of Boring	S-5	16.0	--	--

Penetration Resistance Blows per Foot (0, 25, 50)

Boring Date: 8-6-99
Field Engineer/Technician: K. Gravel
Driller: B. Freeman
Contractor: Heber Mining Co.

Water Level

Depth	Hour	Date
Dry		

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: B- 5

Maryvale Stadium West Inlet

Grand Canal/57th-51st Ave.

Maryvale, Arizona

Project No.: 990658SA

Rig Type: CME-55
Boring Type: Hollow Stem Auger
Surface Elevation: N/A
Sta. 28+15

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 CLAY (CL-Dry)	RS-1	2.0	8.6	103.7	
3.0						
5	Firm Brown SANDY SILTY CLAY (CL/ML-Moist)	S-2	6.0	--	--	
10		BS-5	10.0	--	--	
		S-3	11.0	--	--	
12.0						
	Stiff Brown SANDY CLAY (CL-Moist)					
15						
16.0		S-4	16.0	--	--	
	End of Boring					
20						

Boring Date: 8-6-99
Field Engineer/Technician: K. Gravel
Driller: B. Freeman
Contractor: Heber Mining Co.

Water Level

Depth	Hour	Date
Dry		

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: B- 6

Maryvale Stadium West Inlet

Grand Canal/57th-51st Ave.

Maryvale, Arizona

Project No.: 990658SA

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			pH	RESISTIVITY (Ohm-Centimeters)	UNIFIED SOIL CLASSIFICATION	SPECIMEN DESCRIPTION
						#200 SIEVE	#40 SIEVE	#10 SIEVE	#4 SIEVE	3" SIEVE	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX				
B- 1	BS-2	BS	4.5	--	--	71.6	89	95	97	100	26	20	6	8.0	734	CL-ML	SILTY CLAY with SAND
B- 1	RS-3	RS	5.5	8.0	103.2									--	--		
B- 2	RS-1	RS	2.0	11.0	101.8									--	--		
B- 2	BS-3	BS	9.0	--	--									8.6	1668		
B- 3	RS-1	RS	2.0	8.3	105.5									--	--		
B- 4	RS-1	RS	5.5	11.4	98.0									--	--		
B- 4	BS-4	BS	15.0	--	--									8.0	934		
B- 5	RS-2	RS	5.5	22.2	99.7									--	--		
B- 5	BS-4	BS	15.0	--	--	96.3	98	99	99	100	28	20	8	8.3	1067	CL	LEAN CLAY
B- 6	RS-1	RS	2.0	8.6	103.7									--	--		
B- 6	BS-5	BS	10.0	--	--									8.4	1668		

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.

Sheet 1 of 1

Maryvale Stadium West Inlet
Grand Canal/57th-51st Ave.
Maryvale, Arizona
Project No. 990658SA

SPEEDIE AND ASSOCIATES

The following bearing capacities are available at each location. Settlement estimates are also provided. Within the clays, settlement will likely continue after construction is complete. Without additional sampling and testing, the time required for consolidation to take place is not known. A favorable factor is that the weight of soil to be removed is greater than the weight of the drop structure implying that some consolidation of the clays may have taken place.

Structure STA	Reference Boring	Depth (feet)	Bearing Medium	Bearing Capacity (psf)	Estimated Immediate Settlement (inches)
7+15	B-1	7	Medium Dense Sand	1,000	0.5-1.0
10+55	B-2	9.5	Very Soft Sandy Clay	150	2.0-3.0
			4' Engineered Fill	1,000	0.5-1.0
20+02	B-4	13	Stiff Sandy Clay	1,000	0.5-1.0

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

Respectfully Submitted,
SPEEDIE & ASSOCIATES, INC.

Registered Professional Engineer (Civil) CERTIFICATE NO. 30524 PRABHAKAR RUPAL Date Signed 9-30 ARIZONA, U.S.A.

Prabhakar (Peter) Rupal, P.E.

SPEEDIE AND ASSOCIATES
GEOTECHNICAL / ENVIRONMENTAL / MATERIAL ENGINEERS
11029 N. 24th AVE., SUITE 605 • PHOENIX, ARIZONA 85029

FAX ROUTING SLIP

Time Called _____

Date Called 10/1

ACTION TAKEN

mail

Initials lnm

MOISTURE-DENSITY RELATIONS

PROJECT: Maryvale Stadium West Inlet — PROJECT NO.: 990658SA

LOCATION: Grand Canal/57th-51st Ave. — DATE: 8/6/99

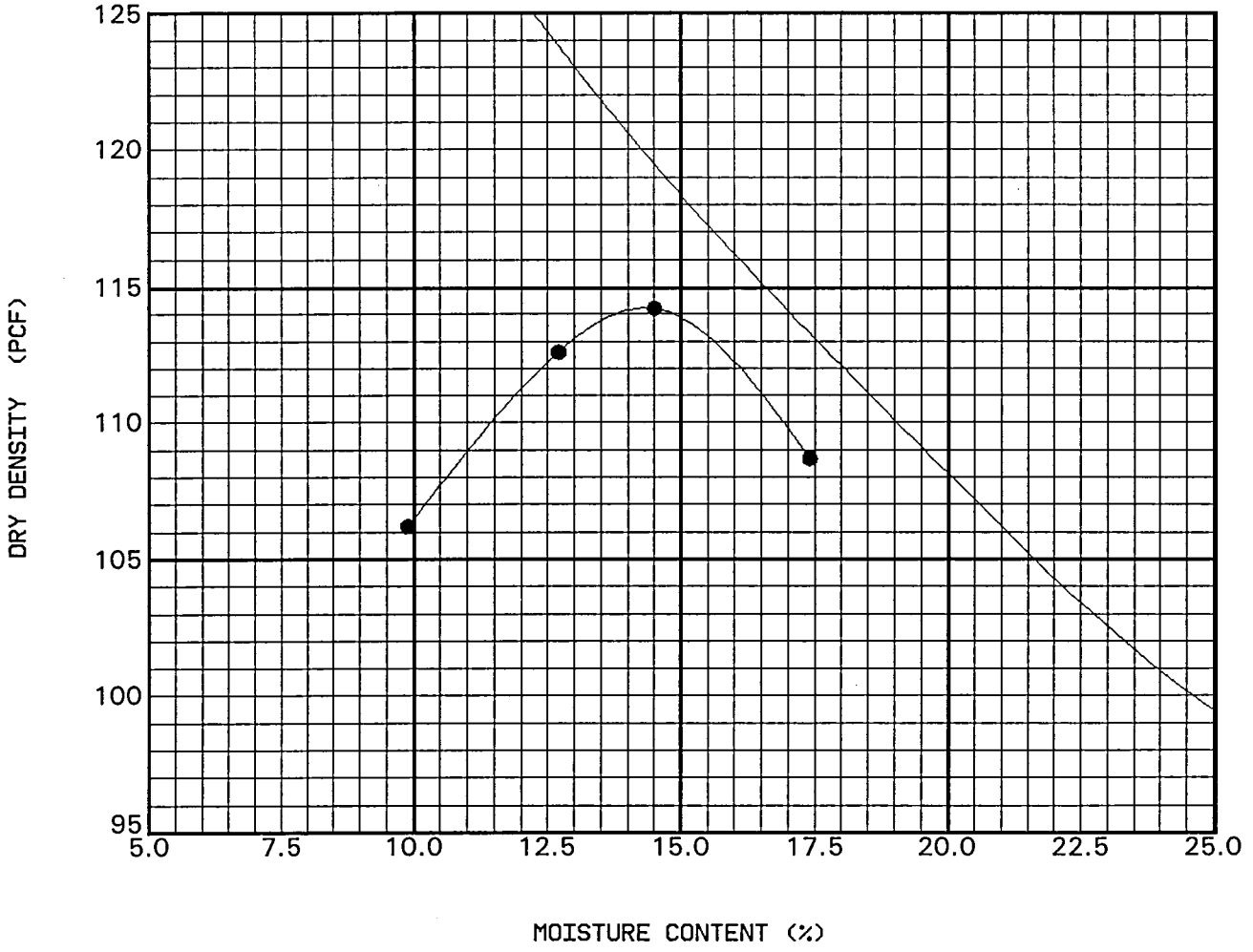
BORING NO.: B- 1 — SAMPLE NO.: BS-2' — SAMPLE DEPTH: 4.50

METHOD OF COMPACTION: ASTM D698A

LIQUID LIMIT: 26 — PLASTIC LIMIT: 20 — PLASTICITY INDEX: 6

CLASSIFICATION: CL-ML — ASTM SOIL DESCRIPTION: SILTY CLAY with SAND

MAXIMUM DRY DENSITY: 114.7 PCF — OPTIMUM MOISTURE CONTENT: 14.0 %



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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- 1 BS-2	4.5	108.8	13.1	92.1	66.7	96.8	2.8

PERCENT COMPACTION BASED ON A MAXIMUM DRY DENSITY OF 114.7 pcf @ 14.0 % MOISTURE

Maryvale Stadium West Inlet
Grand Canal/57th-51st Ave.
Maryvale, Arizona
Project No. 990658SA

SPEEDIE AND ASSOCIATES

Laboratory Consultants, Ltd.

Speedie & Associates
Accounts Payable
11029 N. 24th Avenue
Phoenix, Az 85029

Sample Number: 991381-01
Date Reported: 8/16/99
Date Received: 8/16/99
Project Number: 990658SA

Analyses Results

Client Sample ID	Analysis	Method	Result	Units
59753	SOLUBLE SALTS	ENG. SOIL	0.055	%
59753	SULFATE	CA417	0.0056	%

Approved By: Dadang

There were no problems with the analyses and all data met laboratory quality assurance specifications.

Laboratory Consultants, Ltd.

Speedie & Associates
Accounts Payable
11029 N. 24th Avenue
Phoenix, Az 85029

Sample Number: 991381-02
Date Reported: 8/16/99
Date Received: 8/16/99
Project Number: 990658SA

Analyses Results

Client Sample ID	Analysis	Method	Result	Units
59767	SOLUBLE SALTS	ENG. SOIL	0.042	%
59767	SULFATE	CA417	0.0057	%

Approved By: Dadang

There were no problems with the analyses and all data met laboratory quality assurance specifications.