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

REPORT ON GEOTECHNICAL INVESTIGATION

DESIGNATION: Dysart Drainage Canal

LOCATION: Dysart Road N/O
Glendale Avenue
Maricopa County, Arizona

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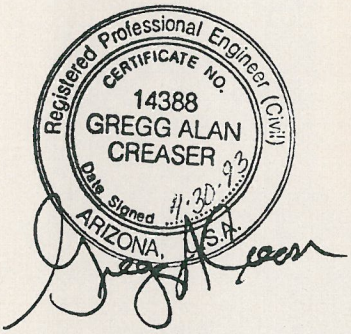
REPORT ON GEOTECHNICAL INVESTIGATION



DESIGNATION: Dysart Drainage Canal

LOCATION: Dysart Road N/O
Glendale Avenue
Maricopa County, Arizona

CLIENT: Flood Control District
of Maricopa County

PROJECT NO: 92113SA1

REVISED DATE: April 30, 1993

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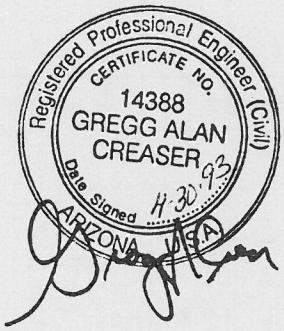

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INTRODUCTION

This report presents the final results of several subsoil investigations carried out at the site of proposed drainage channel improvements for Dysart Drain located between Dysart Road and El Mirage Road north of Glendale Avenue, Maricopa County, Arizona.

The Dysart Drain consists of a concrete lined flood control channel intercepting flows from north of Luke AFB and directing them to the Agua Fria River. Due to area subsidence, areas of the valley have been settling. These differential movements have resulted in the flow gradient of the channel to change, not allowing the channel to drain in the area of the Luke Salt Body which has not subsided. In fact, salt domes are known to rise which could be contributing to the problem. Preliminary information calls for the removal of the bottom of the channel in the offending area, removing soil to lower the flow line and re-installing a concrete lining. The depth of lowering is less than 10 feet below existing channel bottom.

The initial purpose of this investigation was to determine the soils conditions below the bottom, ascertain excavatability and determine if the existing slope paving will remain in place while the bottom is excavated. The scope of work did not include an evaluation of land subsidence or concrete pavement quality.

The initial investigation on February 19, 1993 included drilling two borings through the bottom of the lining in the area to be removed. Field and lab classifications indicated that there is a deposit of sand directly below the lining in the areas drilled. Due to concerns for the stability of this sand during excavation, additional borings were drilled on March 24, 1993 and a test pit was excavated on March 31, 1993 at the request of Warren Rosebraugh, MCFCD. Initial field classifications of the additional borings indicated more granular soil below the slab. However, close examination of the test pit revealed a deposit of desiccated highly plastic sandy clay. Additional lab testing on the test boring samples confirmed the presence of this highly plastic desiccated clay soil.

On April 2, 1993 an additional investigation was conducted in the area of a proposed flood retaining wall to be located on the southern edge of the channel right of way, west of Dysart Road.

GENERAL SITE AND SOIL CONDITIONS

Site Conditions - The canal is located one-half mile north of Glendale Avenue, aligned in an east-west direction. The area under study is bordered by Dysart Road on the west and by El Mirage Road on the east. The Morton Salt Company mine and vacant desert property border the channel on the north and south. The existing channel is lined with reinforced concrete and is approximately 10 feet wide at the bottom with 25° to 30° sloped sidewalls. At the time of the investigation the canal contained 6 to 12 inches of water trapped due to the lack of drainage.

The thickness of the concrete at the four locations cored varied. The recorded thicknesses are as follows:

CORE NO.	STATION	OFFSET	THICKNESS, in.
B-1	165+20	CL	6±
B-2	181+90	CL	6±
C-1	165+20	S. Bank	4.0
C-2	165+20	N. Bank	6.75
C-3	181+90	S. Bank	5.0
C-4	181+90	N. Bank	7.0

The concrete on the bottom of the channel was under water. The borings were augured through the concrete. Accordingly, no core was retrieved and the exact thickness was difficult to measure. The side slope concrete was cored with a diamond tipped barrel which allowed the core to be retrieved.

Cores numbered C-3 and C-4 were drilled through the reinforcing steel. The steel was highly corroded resulting in the delamination of the concrete in this area. The cores taken at Station 165+20 did not penetrate the steel and the concrete was not split. Upon further cursory visual examination and sounding, it appears as if the delamination (based on sounding results) is sporadic between the areas cored. It was also noted that the hollow sound, indicative of delamination, occurs in areas exhibiting both horizontal and vertical cracking in a pattern assumed to reflect the reinforcing locations. Vertical cracking was noted throughout. Rebar was also visible on the surface in some areas.

The proposed wall will be located along the southern boundary of Dysart Drain. At the time of the investigation, a masonry wall and chain-link fence defined the property boundary between Luke Air Force Base housing and the Flood Control District of Maricopa County. The subject site contained a moderate growth of low lying vegetation with an access road located between the existing fence-line and the drainage channel.

General Subsurface Conditions - Subsoil conditions at the site are somewhat variable. The subsoils encountered at the bottom of the canal ranged from relatively dense sands to hard clays and silts with variable calcareous cementation. In-place, the clay soils are desiccated to the point of appearing as sands. However, upon the introduction of water during classification tests, the soil broke down to reveal that this material is actually very high plastic sandy clay with liquid limits as high as 70 percent and plasticity indices as high as 47 percent. Insitu moisture contents are on the order of 5 percent with dry densities on the order of 133 pcf. The subsoils encountered beneath the sidewalls consist of sandy clays with some calcareous cementation. In-place dry densities are on the order of 91 to 100 pcf with moisture contents ranging from 12 to 15 percent.

The results of the direct shear tests on the side slope soils indicate a cohesion value on the order of 200 psf with an internal friction angle of in excess of 45 degrees.

In the area of the proposed wall, the subsoils encountered are quite variable, consisting of firm to hard sandy silt, sandy clays, silty clays and loose to medium dense clayey sands. Calcareous cementation was sporadic, generally increasing with depth. In-place dry densities range from 105 to 118 pcf. Moisture contents are on the order of 6 to 11 percent and plastic limits range from 1 to 26 percent. Laboratory tests indicate that the upper soils have a low to moderate potential for volume increase due to wetting when compacted to moistures and densities expected during construction.

ANALYSIS AND RECOMMENDATIONS

Analysis - Analysis of the field and laboratory data indicates that subsoils in the area of the proposed channel lowering are not highly calcareously cemented below the invert on the channel to a depth of 6± feet. Accordingly, excavation should be rather straight forward to that depth. Excavation into the cemented soils may require heavier duty equipment. Occasional sand deposits may be encountered below the channel may cause problems with sloughing on steep sloped cuts.

The scope of work for this report did not include an evaluation of the concrete pavement. However, it is clear that corrosion of the rebar is occurring and that the concrete is deteriorating at least by delaminating at the most severally corroded areas. It is recommended that this problem be addressed. It is possible that pieces of delaminated concrete could break free when subject to the construction activity disturbance.

In the area of the proposed flood wall, the variable soil conditions result in variable bearing conditions. Saturation of the soils results in weakening which could result in increased settlement. This wall will apparently only undergo loading during an infrequent storm event resulting in flood conditions. The duration of flooding is assumed to be short, thereby reducing the possibility of the foundation soils becoming saturated. To furthermore reduce this potential, it is recommended that the footing be cast neat against the excavation (i.e. no forming). Backfill on top of the footing and against the storm wall should consist of the native clay soils compacted at least 95 percent maximum dry density.

Site Preparation - If excavation below the proposed bottom of the new channel lining results in the need to place 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. Overexcavation of any foundation excavations should be filled with concrete.

Foundation Recommendations - It is recommended that the retaining wall structure be founded on shallow spread footings bearing on undisturbed native soil at a minimum depth of 24 inches below finished exterior grade. If site preparation is carried out as set forth herein, a recommended safe allowable bearing capacity of 3000 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 footing excavations should be level and cleaned of all loose or disturbed materials.

Slope Paving - Analysis of the slope paving indicates that the existing concrete should stay in-place without the support of the bottom. For calculations, a cohesion value of 200 psf and a friction angle of 32 degrees were used. The combination of cohesion and friction provides approximately three times the force resisting the dead weight of the slab sliding down the slope, relying heavily on the adhesion of the concrete to the soils. Theoretically, some movement of the slab would have to occur to initiate the full resistance forces. This analysis assumes some very import details. The assumptions are:

- The concrete is in full contact with the sloped soils.
- The underlying soils do not change from that found at the sample points.
- The concrete is intact, i.e. there is no delamination.
- Does not include the loss of support or additional forces caused by vibration or bumping with equipment.

Due to the fact that it may not be possible to control all of these assumptions, it must be assumed that movement could occur. Accordingly, it is recommended that additional precautions be taken to protect the pavement and especially the personnel who may be working in the trench below the pavement. This could include leaving a portion of the bottom pavement to provide additional lateral support and/or horizontal bracing at the bottom to support the slabs. We recommend that the contractor be made responsible for designing and maintaining suitable bracing to protect their work force. Careful monitoring of the slope pavement should be conducted on a daily basis to detect any movement or unstable conditions.

Fill And Backfill - If over-excavation results in the need to place fill in the area of the channel lining, native sandy soils are suitable for fills. 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 95 percent of maximum dry density per ASTM D-698. The new channel can then be reshaped in the fill.

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.

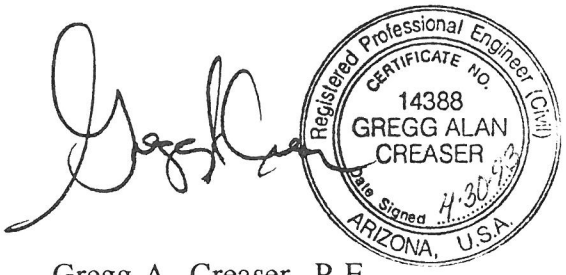
Our analysis of data and the recommendations presented herein are based on the assumption that soil conditions do not vary significantly from those found at specific sample locations. Our work has been performed in accordance with generally accepted engineering principles and practice; this warranty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

We recommend that a Soils/Materials Engineer monitor the foundations, earthwork and paving 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 AND ASSOCIATES

Clay W. Spencer, Staff Geologist



Gregg A. Creaser, P.E.

April 30, 1993

APPENDIX

FIELD AND LABORATORY INVESTIGATION

SOIL BORING LOCATION PLAN

SOIL LOG LEGEND

LOG OF TEST BORINGS

TABULATION OF TEST DATA

CONSOLIDATION TEST DATA

MOISTURE DENSITY RELATIONS

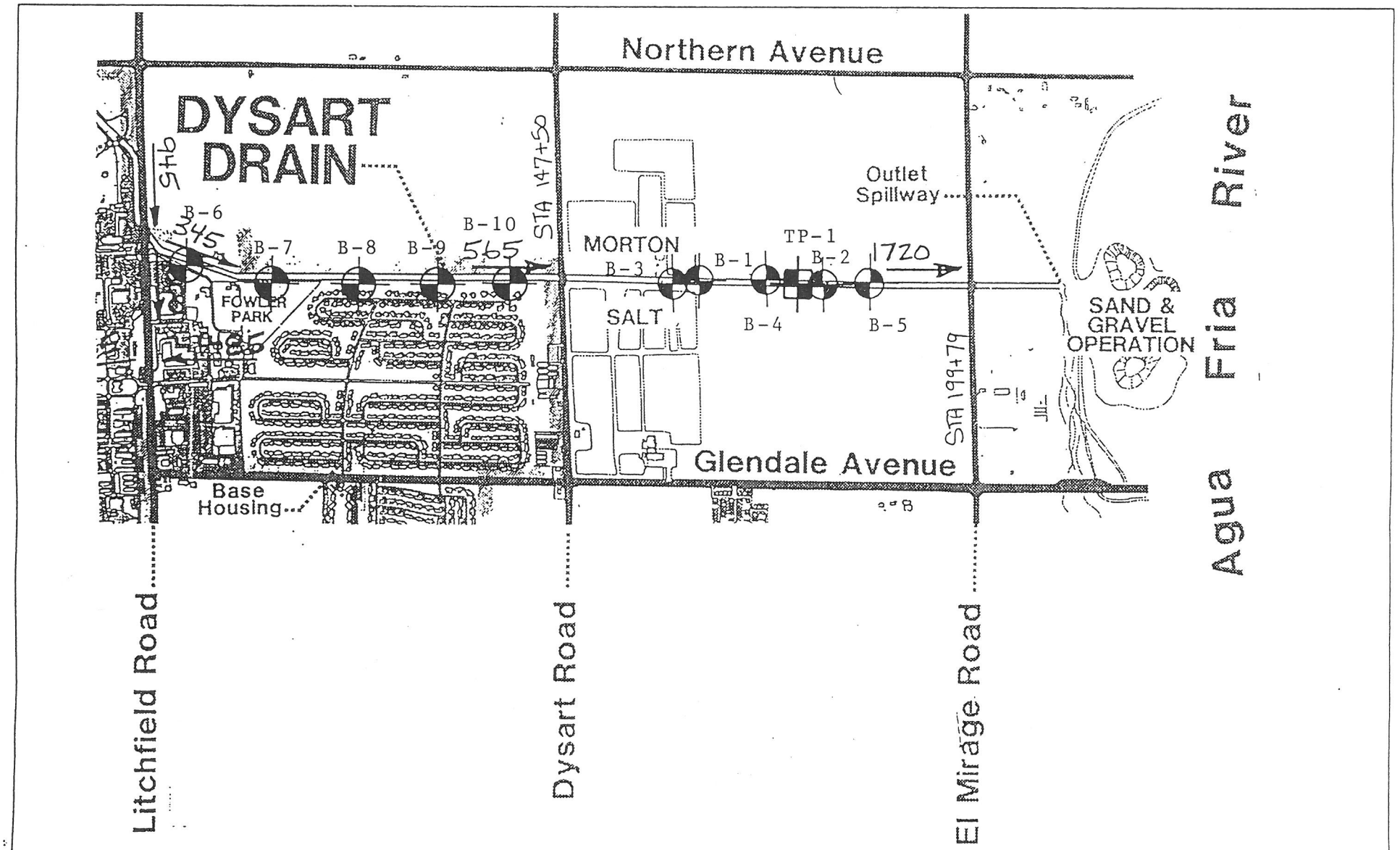
DIRECT SHEAR TEST DATA

SWELL TEST DATA

FIELD AND LABORATORY INVESTIGATION

On February 19, 1993, four concrete cores and two soil test borings were drilled at the approximate locations shown on the attached Soil Boring Location Plan. On March 24, 1993, three additional soil test borings were drilled in the drain bottom at the approximate Stations indicated on the Log of Test Borings. On March 31, 1993, a test pit was excavated by Maricopa County work forces in the Drain bottom at the location indicated on the Log of Test Pit. On April 2, 1993, five soil test borings were drilled at the approximate Stations indicated on the Log of Test Borings. All drilling exploration work was carried out under the full-time supervision of our staff geologist, 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 and plasticity (Atterberg Limits) tests for classification and design parameters. Direct Shear tests were performed on ring samples collected beneath the sidewalls in order to determine friction angle and cohesion values. Saturated direct shear tests were performed to determine soil strength parameters for bearing capacity calculations. Compression tests were performed on a selected ring sample in order to estimate settlements and determine effects of inundation. 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 Boring Location

SOIL BORING LOCATION PLAN

Dysart Drainage Canal
Dysart Rd. N/O Glendale
Maricopa County, Arizona

SPEEDIE AND ASSOCIATES
GEOTECHNICAL / MATERIALS / SITE ENGINEERS

PROJECT NO. 92113SA1

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, 1⅜ 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.

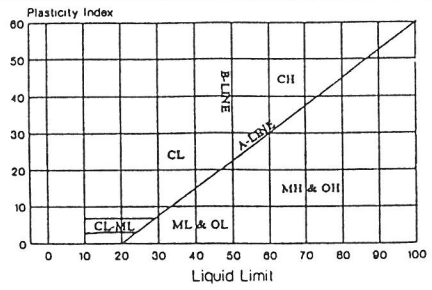
CONSISTENCY			RELATIVE DENSITY	
Clays & Silts	Blows/Foot *	Strength †	Sands and Gravels	Blows/Foot *
Very Soft	0-2	0-¼	Very Loose	0-4
Soft	2-4	¼-½	Loose	5-10
Firm	5-8	½-1	Medium Dense	11-30
Stiff	9-15	1-2	Dense	31-50
Very Stiff	16-30	2-4	Very Dense	> 50
Hard	> 30	> 4		

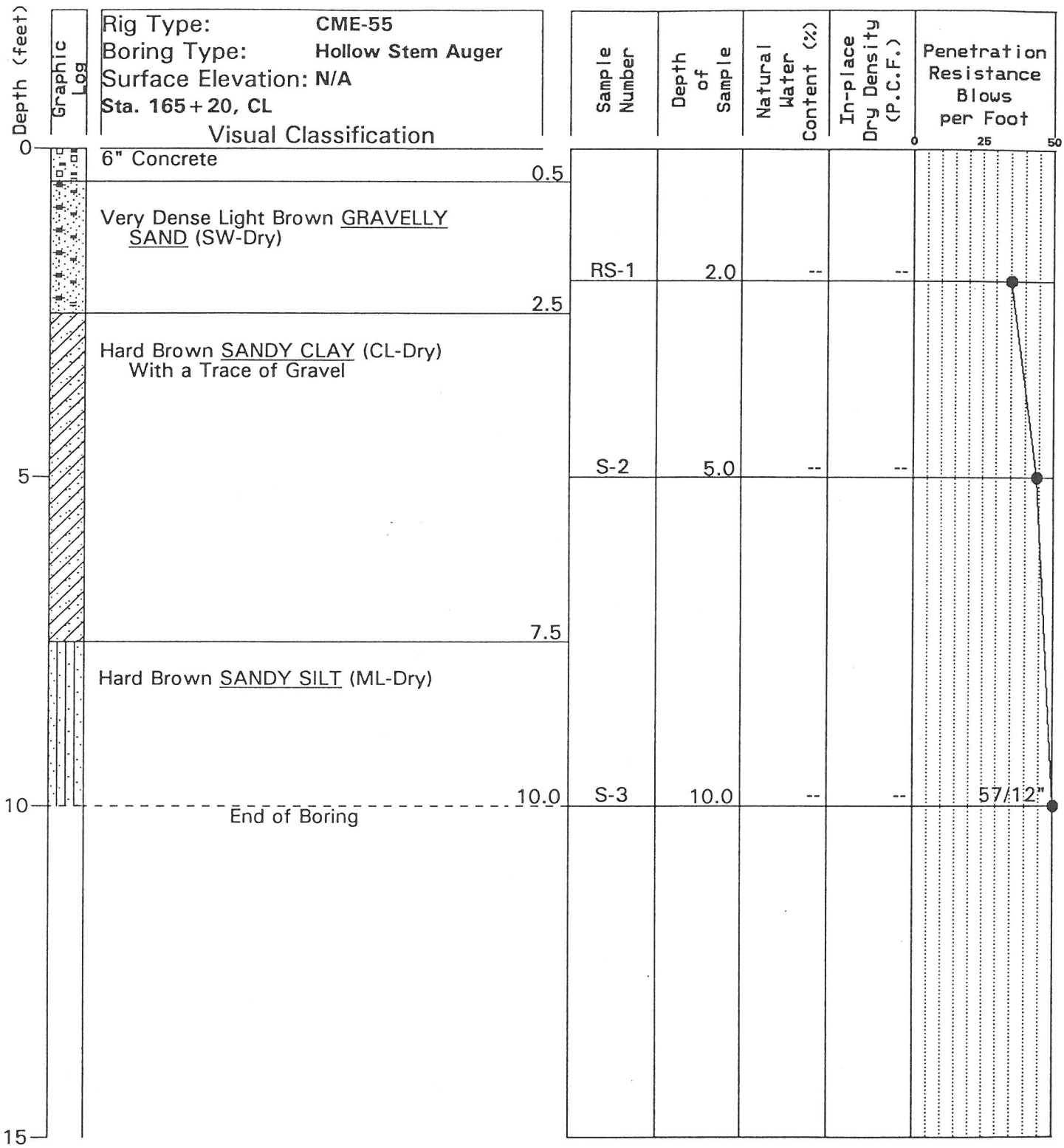
* Number of blows of a 140 lb hammer free falling 30 inches to drive a 2 inch O.D. split spoon sampler (ASTM D-1588)
† Unconfined compressive strength in tons/sq ft. Read from a pocket penetrometer

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





Boring Date: 2-19-93
Field Engineer/Technician: C. Spencer
Driller: S. Belsky
Contractor: Heber Mining

Water Level

Depth	Hour	Date

SPEEDIE AND ASSOCIATES

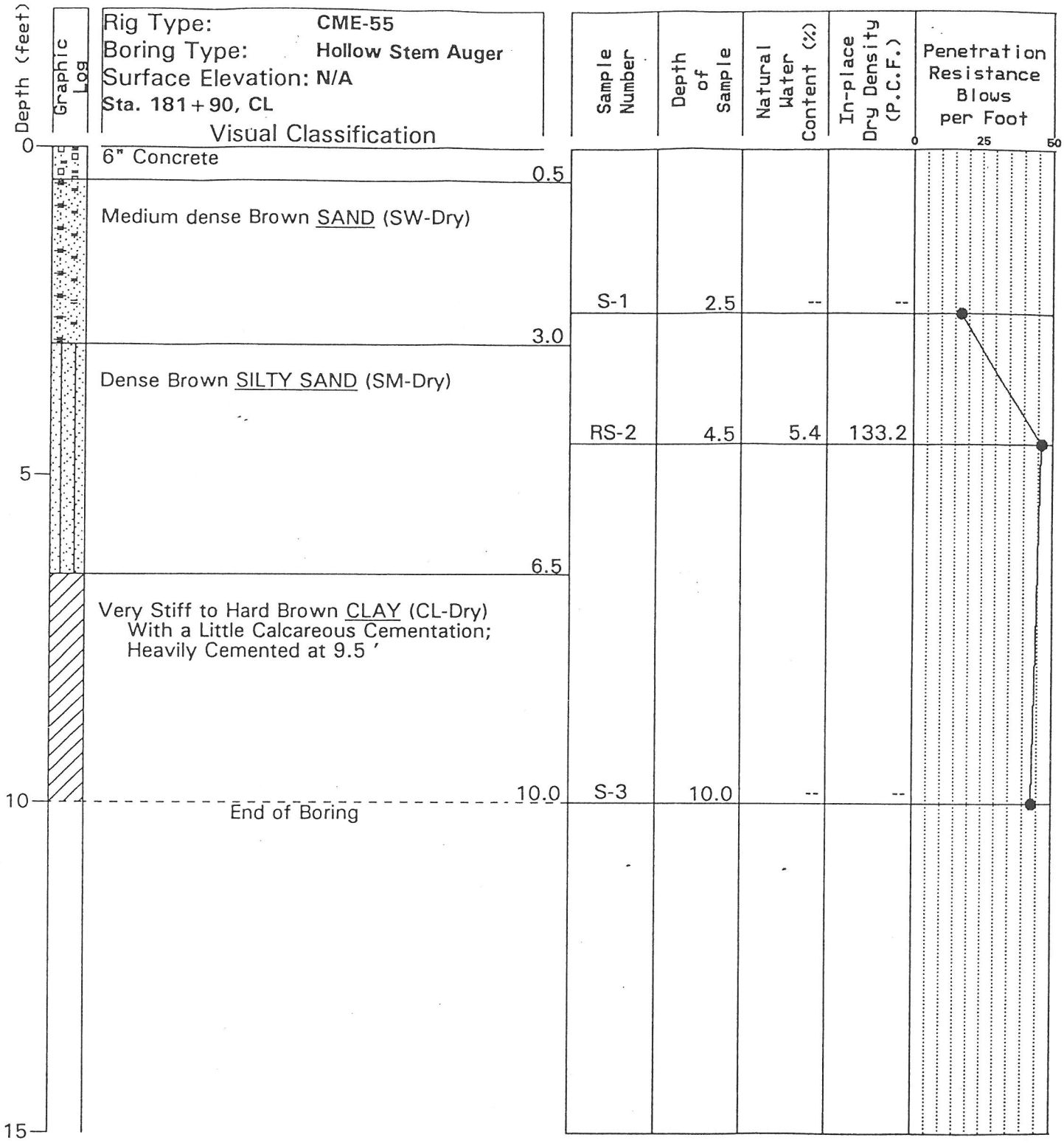
Log of Test Boring Number: B- 1

Dysart Drain

Dysart Road N/O Glendale Avenue

Maricopa County, Arizona

Project No.: 92113SA1



Boring Date: 2-19-93
Field Engineer/Technician: C. Spencer
Driller: S. Belsky
Contractor: Heber Mining

Water Level

Depth	Hour	Date

SPEEDIE AND ASSOCIATES

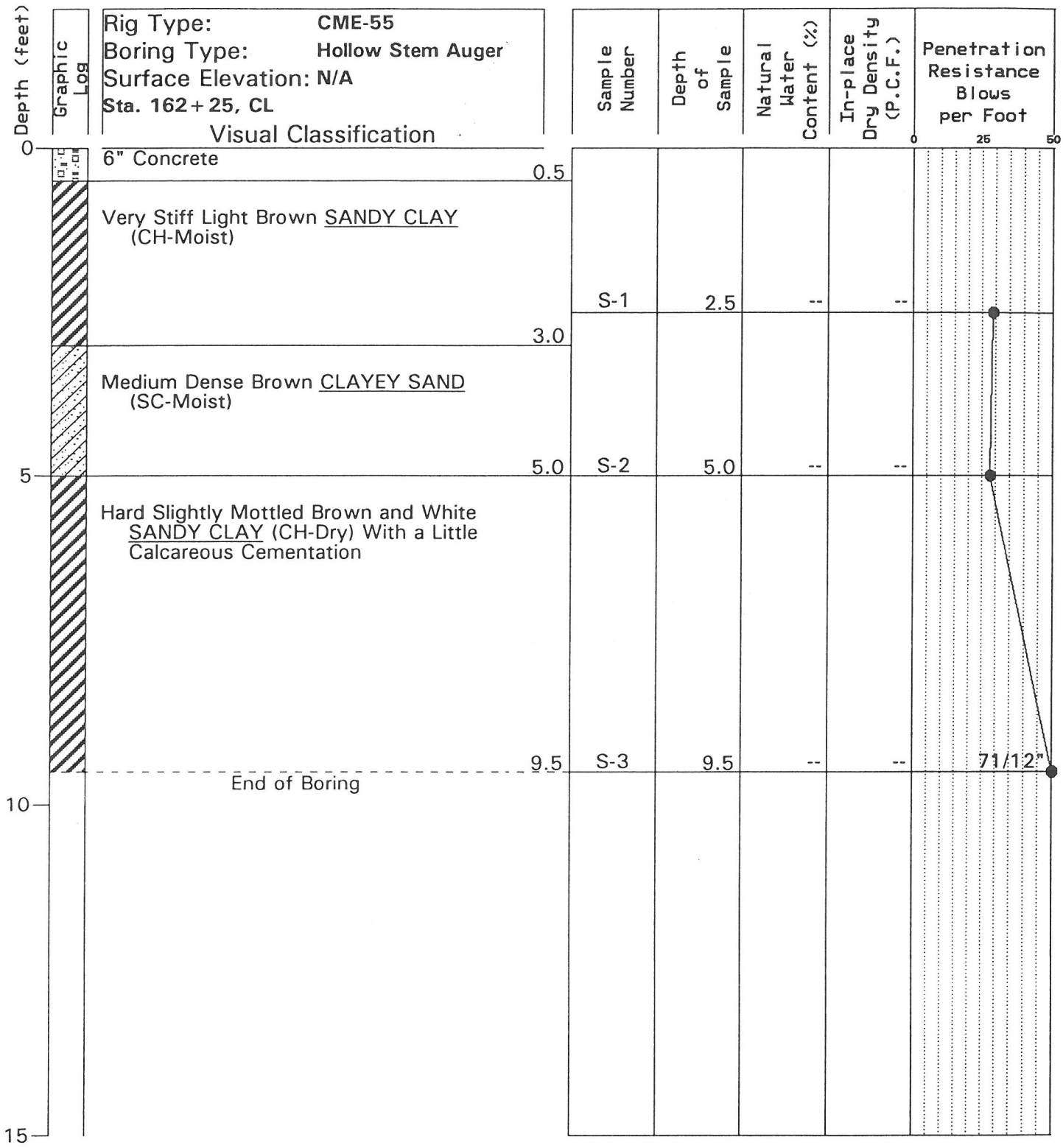
Log of Test Boring Number: B- 2

Dysart Drain

Dysart Road N/O Glendale Avenue

Maricopa County, Arizona

Project No.: 92113SA1



Boring Date: 3-24-93
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

Dysart Drain

Dysart Road N/O Glendale Avenue

Maricopa County, Arizona

Project No.: 92113SA1

Rig Type: CME-55
Boring Type: Hollow Stem Auger
Surface Elevation: N/A
Sta. 173+00, CL

Depth (feet)	Graphic Log	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		6" Concrete					
		0.5					
		Medium Dense Brown SILTY SAND (SM-Moist)	S-1	2.5	--	--	
		3.0					
		Medium Dense Brown CLAYEY SAND (SC-Moist)	S-2	5.0	--	--	
		4.5					
5		Very Stiff Brown SANDY CLAY (CL-Moist)					
		6.5					
		Hard Brown SILTY CLAY (CL-Moist) With a Trace of Sand and Some Mild Calcareous Cementation	S-3	10.0	--	--	
10		10.0 End of Boring					
15							

Boring Date: 3-24-93
Field Engineer/Technician: C. Spencer
Driller: S. Belsky
Contractor: Heber Mining

Water Level

Depth	Hour	Date

SPEEDIE AND ASSOCIATES

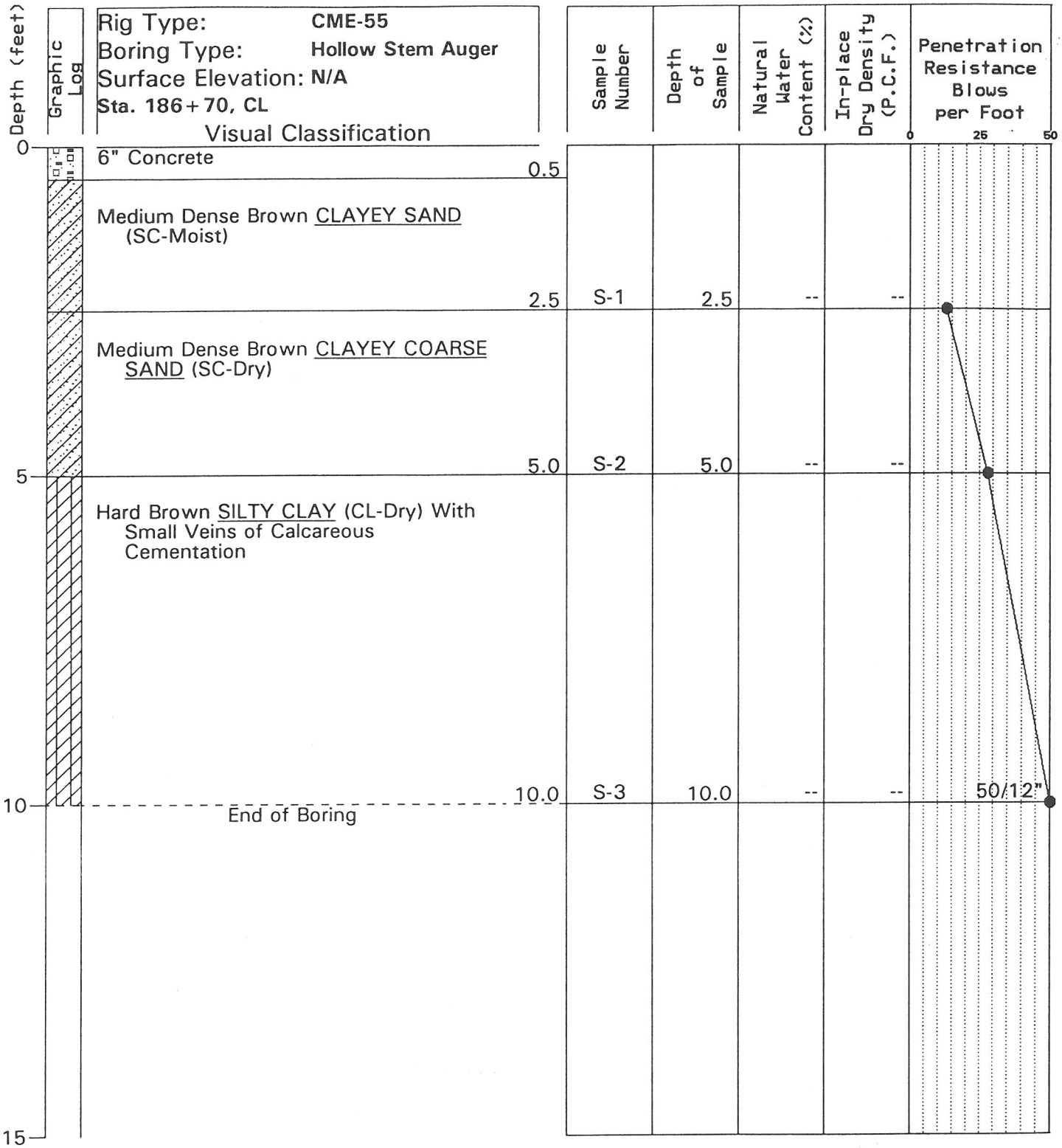
Log of Test Boring Number: B- 4

Dysart Drain

Dysart Road N/O Glendale Avenue

Maricopa County, Arizona

Project No.: 92113SA1



Boring Date: 3-24-93
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

Dysart Drain

Dysart Road N/O Glendale Avenue

Maricopa County, Arizona

Project No.: 92113SA1

Rig Type: CME-55
Boring Type: Hollow Stem Auger
Surface Elevation: N/A
Sta. 118+80

Visual Classification

Depth (feet)	Graphic Log	Visual Classification	Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)	Penetration Resistance Blows per Foot
0		Stiff Brown SANDY SILT (ML-Dry)	RS-1	2.5	6.2	117.8	
3.0		Interbedded Loose and Stiff SILTY SAND & SANDY CLAY (SM/CL-Dry)	S-2	6.0	--	--	
7.5		Hard Mottled Brown/Light Brown SANDY CLAY (CL-Dry to Moist) With Some Weak Calcareous Cementation					
11.0		End of Boring	S-3	11.0	--	--	
15							

Penetration Resistance Blows per Foot: 0, 25, 50

Boring Date: 4-2-93
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

Dysart Drain

Dysart Road N/O Glendale Avenue

Maricopa County, Arizona

Project No.: 92113SA1

Rig Type: CME-55
Boring Type: Hollow Stem Auger
Surface Elevation: N/A
Sta. 110+00

Visual Classification

Depth (feet)	Graphic Log	Visual Classification	Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)	Penetration Resistance Blows per Foot
0		Stiff Brown SANDY SILT (CL-Dry)	RS-1	2.5	11.3	109.9	
3.5		Medium Dense Light Brown CLAYEY SAND (SC-Dry) With a Trace of Cementation	S-2	6.0	--	--	
7.5		Hard Light Brown CLAY (CL-Dry) With a Little Calcareous Cementation					
11.0		End of Boring	S-3	11.0	--	--	91/12"

Penetration Resistance Blows per Foot: 0, 25, 50

Boring Date: 4-2-93
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-7

Dysart Drain

Dysart Road N/O Glendale Avenue

Maricopa County, Arizona

Project No.: 92113SA1

Rig Type: CME-55
Boring Type: Hollow Stem Auger
Surface Elevation: N/A
Sta. 100+00

Visual Classification

Depth (feet) | Graphic Log

0

Hard Brown Fine SANDY CLAY (CL-Dry) With a Trace of Calcareous Cementation

3.0

Very Stiff Light Brown CLAY/SILT (CL/ML) With a Trace of Fine Sand and Calcareous Cementation

5

7.5

Hard Light Brown CLAY (CL-Dry) With Some Calcareous Cementation

10

10.4

End of Boring

15

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	2.4	--	--	50/11"
BS-2	4.0	--	--	
S-3	6.0	--	--	
S-4	11.0	--	--	81/11"

Boring Date: 4-2-93
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-8

Dysart Drain

Dysart Road N/O Glendale Avenue

Maricopa County, Arizona

Project No.: 92113SA1

Rig Type: CME-55
Boring Type: Hollow Stem Auger
Surface Elevation: N/A
Sta. 90+00

Depth (feet)	Graphic Log	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 Fine SANDY CLAY (CL-Dry to Moist) With a trace of Calcareous Cementation	RS-1	2.5	--	--	
5							
6.0			S-2	6.0	--	--	
		Very Stiff White CLAY (CL-Moist) With a Trace of Sand	AS-3	8.0	--	--	
9.5							
10		Hard Brown SILTY CLAY (CL-Dry)					
11.0		End of Boring	S-4	11.0	--	--	
15							

Boring Date: 4-2-93
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- 9

Dysart Drain

Dysart Road N/O Glendale Avenue

Maricopa County, Arizona

Project No.: 92113SA1

Rig Type: CME-55
Boring Type: Hollow Stem Auger
Surface Elevation: N/A
Sta. 80+00

Depth (feet)	Graphic Log	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 Fine SANDY CLAY (CL-Moist)	RS-1	2.5			
3.0		Hard Light Brown SANDY CLAY CL-Dry) With Some Calcareous Cementation	S-2	6.0	--	--	
5							
7.5		Hard Mottled Brown, Green, Gray, Light Brown and Reddish Brown CLAY (CH-Moist)					
10			S-3	11.0	--	--	
11.0		End of Boring					
15							

Boring Date: 4-2-93
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-10

Dysart Drain

Dysart Road N/O Glendale Avenue

Maricopa County, Arizona

Project No.: 92113SA1

Equipment: John Deere 510B
Extend-a-hoe

Surface Elevation: N/A

Sta 180

Depth (feet)	Graphic Log	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		8" Concrete					
		0.7					
		Stiff Brown SANDY CLAY (CH-Dry to Moist)	AS-1	2.0	--	--	
		3.0					
		Medium Dense Brown CLAYEY FINE SAND (SC-Dry)					
5		5.0	AS-2	5.0	--	--	
		Very Stiff Brown SILTY CLAY/CLAYEY SILT (CL/ML-Dry)					
		6.0					
		End of Test Pit					
10							

Excavation Date: 3-31-93
Field Engineer/Technician: C. Spencer
Operator: MCFC
Contractor: MCFC

Water Level

Depth	Hour	Date

SPEEDIE AND ASSOCIATES

Log of Test Pit Number: TP- 1

Dysart Drain

Dysart Road N/O Glendale Avenue

Maricopa County, Arizona

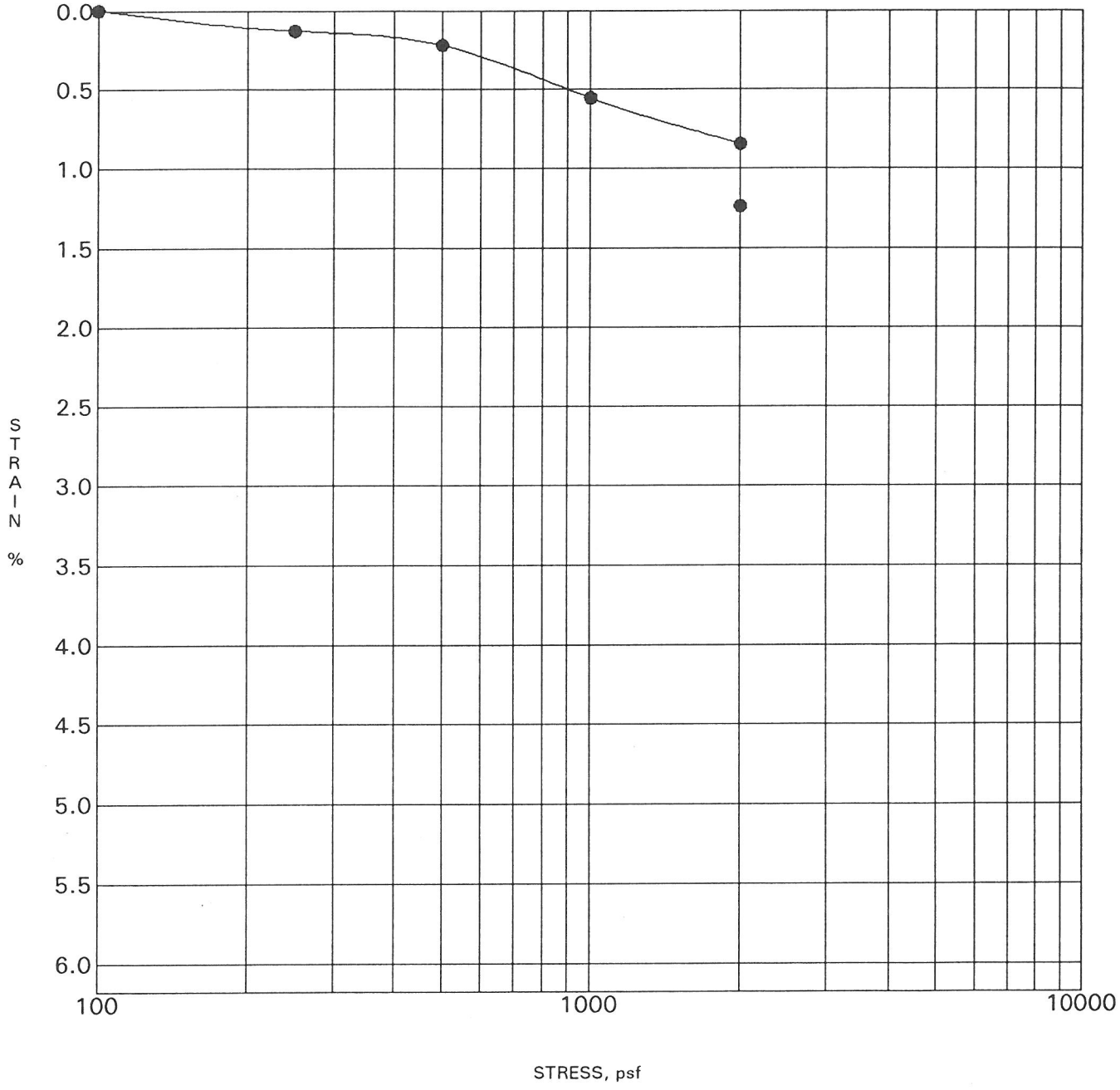
Project No.: 92113SA1

TABULATION OF TEST DATA

PROJECT: Dysart Drain - Dysart Road N/O Glendale Avenue
NUMBER: 92113SA1

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 %	Plasticity Index %	ASTM Classification
B- 2	4.5	5.4	133.2	14	77	100	100	100	NP	NP	NP	SM
B- 3	2.5	--	--	63	97	98	100	100	70	23	47	CH
B- 3	9.5	--	--	69	92	96	98	100	55	21	35	CH
B- 4	5.0	--	--	73	100	100	100	100	41	23	18	CL
B- 5	5.0	--	--	34	48	69	81	100	58	23	35	SC
B- 6	2.5	6.2	117.8	72	94	100	100	100	20	17	3	ML
B- 7	2.5	11.3	109.9	75	93	100	100	100	20	19	1	ML
B- 8	2.4	--	--	77	92	98	99	100	27	16	11	CL
B- 8	4.0	--	--	72	94	99	99	100	22	17	5	CL-ML
B- 9	8.0	--	--	83	90	97	100	100	46	21	26	CL
B-10	2.5	8.6	105.4	82	97	99	99	100	23	18	6	CL-ML
C- 1	1.5	13.4	96.6	52	64	78	89	100	37	17	20	CL
C- 2	1.5	12.6	90.9	85	99	100	100	100	49	21	27	CL
C- 3	1.5	15.4	95.1	92	100	100	100	100	39	22	16	CL
C- 4	1.5	13.1	99.7	67	77	83	90	100	38	18	20	CL
TP- 1	2.0	--	--	84	93	99	99	100	157	41	116	CH
TP- 1	5.0	--	--	33	86	97	99	100	37	19	17	SC

CONSOLIDATION TEST



BORING B- 7

SAMPLE No. RS-1

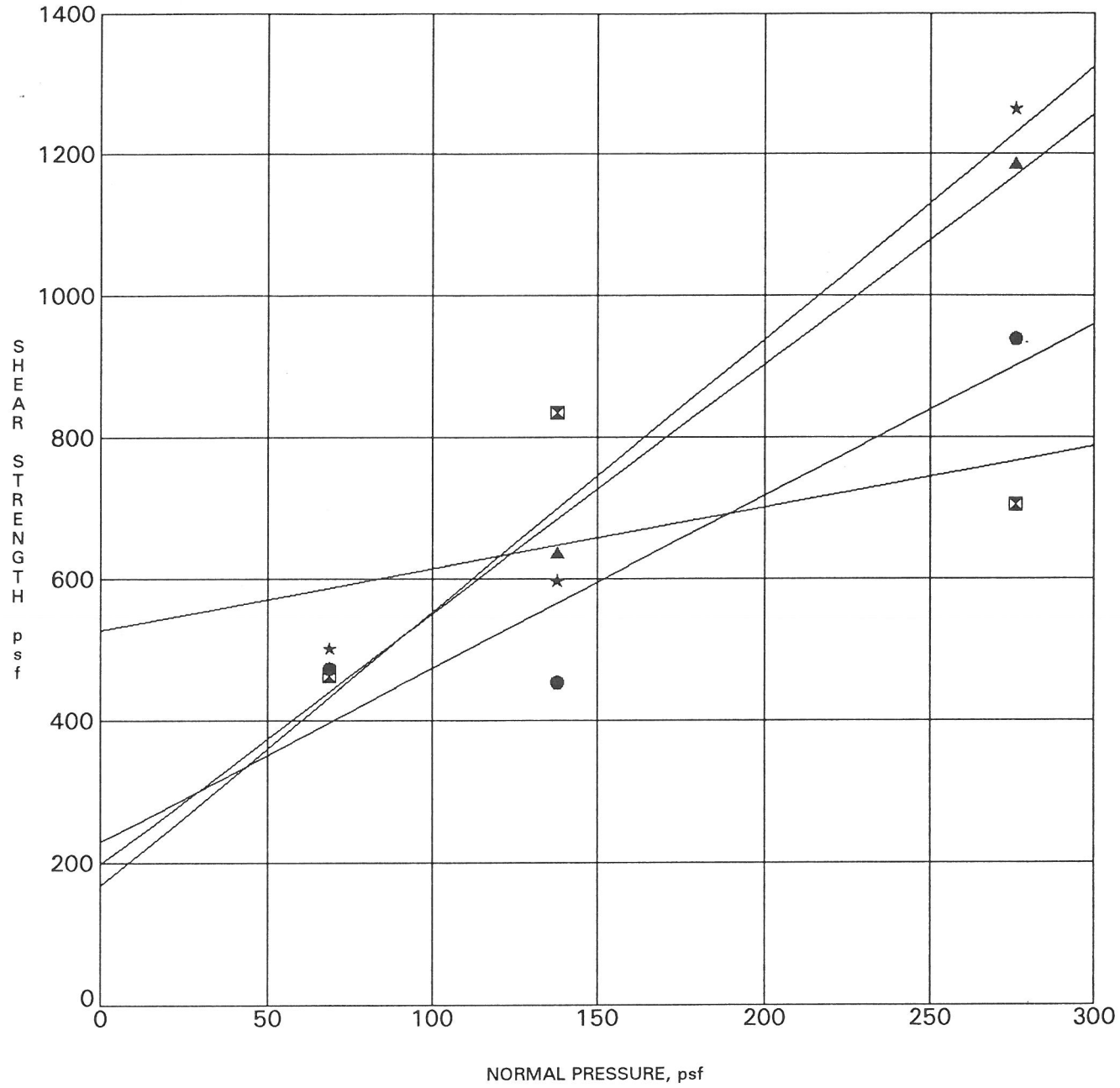
Sample inundated at end of test at 2000 psf

PROJECT **Dysart Drain - Dysart Road N/O Glendale Avenue**

JOB NO. **92113SA1**

DATE **4/2/93**

SPEEDIE AND ASSOCIATES



Specimen Identification			Classification	DD	MC%
●	C- 1	1.5	SANDY LEAN CLAY CL	97	14
⊠	C- 2	1.5	LEAN CLAY with SAND CL	91	13
▲	C- 3	1.5	LEAN CLAY CL	100	15
★	C- 4	1.5	SANDY LEAN CLAY CL	100	13

PROJECT Dysart Drain - Dysart Road N/O Glendale Avenue

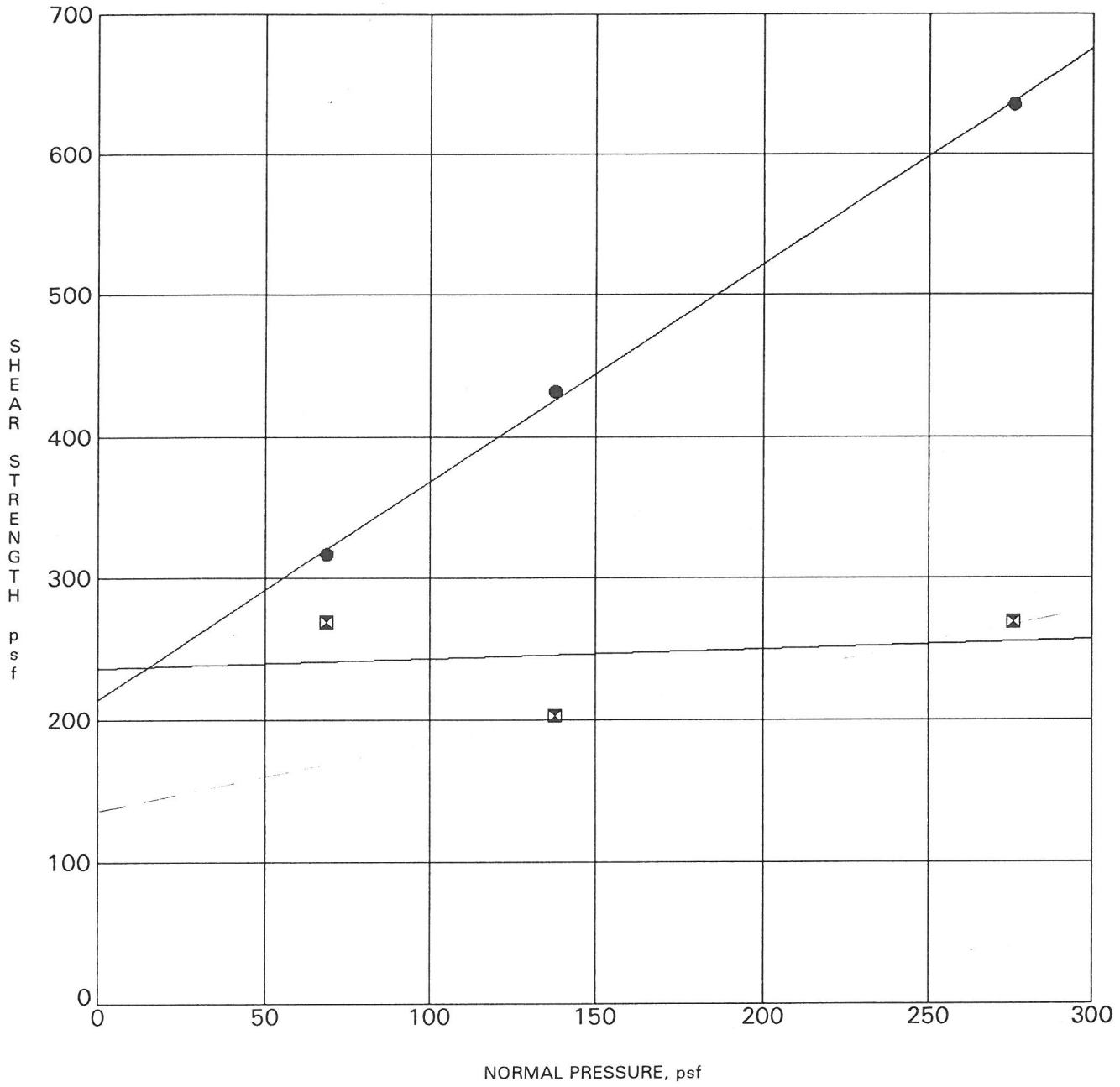
JOB NO. 92113SA1

DATE 2/19/93

SHEAR TEST DIAGRAM

Speedie & Associates

Phoenix, Arizona



Specimen Identification			Classification	DD	MC%
●	B- 6	2.5	SILT with SAND ML	109	13
⊠	B-10	2.5	SILTY CLAY with SAND CL-ML	97	16

PROJECT Dysart Drain - Dysart Road N/O Glendale Avenue

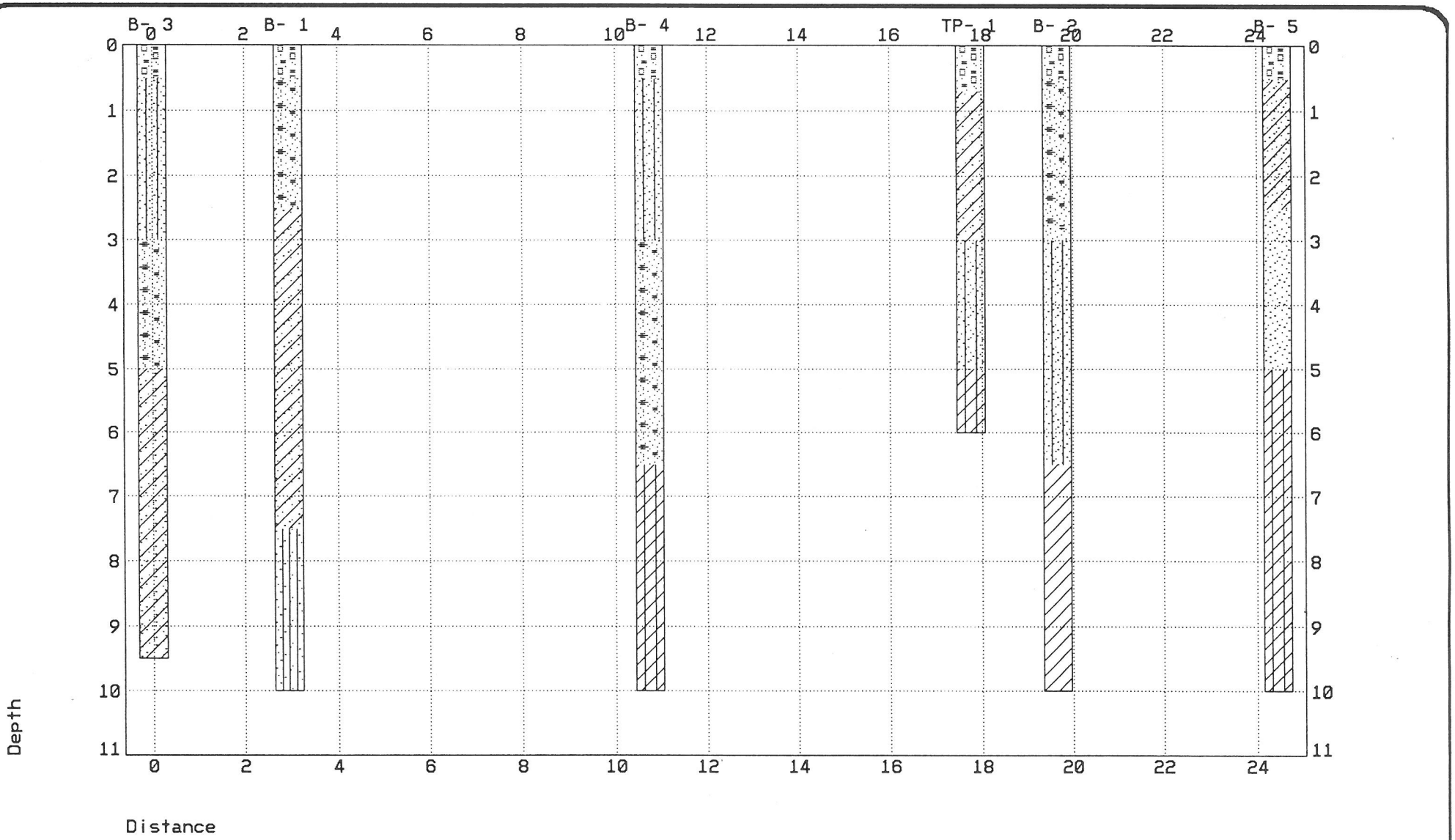
JOB NO. 92113SA1

DATE 4/2/93

SHEAR TEST DIAGRAM

Speedie & Associates

Phoenix, Arizona



Dysart Drain
Dysart Road N/O Glendale Avenue
Maricopa County, Arizona
Project No.: 92113SA1

SPEEDIE AND ASSOCIATES

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-8	4.0	113.6	10.5	95.8*	61	98	1.6

*Based on a maximum dry density of 118.6 pcf at 13.1 percent optimum moisture

Dysart Drainage Channel
Dysart Rd. N/O Glendale Ave.
Maricopa County, Arizona

SPEEDIE AND ASSOCIATES
GEOTECHNICAL AND SITE ENGINEERS
PROJECT NO. 92113SA1